



2056

SKID-STEER LOADER

SERVICE MANUAL

PART #917438

Revision B - 06/10



INTRODUCTION

With correct maintenance and proper use, Mustang skid-steer loaders will give years of dependable service. This service manual is intended to be a guide in the assembly and disassembly, installation and removal, adjustment and testing, troubleshooting and replacement of components that together make up the Mustang 2056 skid-steer loader.

In many of the procedures found within, the installation steps are the exact opposite of the removal steps and vice versa, and therefore, the opposite procedure is not written. Instead, a note to reverse the procedure will be stated. This reduces redundancy and excessive pages in the manual. In cases though, where the assembly and disassembly or removal and installation procedures differ and additional steps or safety concerns are paramount, the entire reverse procedure will be written out to include the new information.

The Table of Contents and Index can be used to make the procedure you need to find an easier process. Also, there are black tabs extending off the pages highlighting the chapters for those who prefer to thumb through the manual. Many schematics, photographs, and line-art drawings are used to help perform the necessary repairs, tests or adjustments that the Mustang 2056 skid-steer loader needs to keep it in good running condition.

If you have any additional questions, please contact your authorized Mustang dealer or call the Mustang Service Department for assistance.

IMPORTANT

For maximum engine life, when shutting the engine down, allow the engine to idle, without load, for five minutes. This will allow engine components that operate at high temperatures to cool slightly before the engine itself is shut down.

TABLE OF CONTENTS

Specifications	Page
SPECIFICATIONS	1

Safety	Page
General Information	3
Signal Words	3
Additional Safety Reminders	3
Mandatory Safety Shutdown Procedure	4
Lift Arm Support Device	5
Lift Arm Support Device Engagement	5
Lift Arm Support Device Disengagement	6
ROPS – Raising	6
ROPS – Lowering	7
Relieving Hydraulic Pressure	8
Loader Raising Procedure	9
Loader Lowering Procedure	9

Lubrication System	Page
General Information	11
Hydraulic Oil Reservoir	11
Crankcase Oil	12
Chaincases	13
Grease Fitting Locations	14
Cooling System Drain Procedure	14

Mainframe	Page
Introduction	15
Mainframe (Chassis) Components	15
Rear Grille and Engine Cover Components	16
Engine Access Cover - Removal and Installation	17
Roll Over and Falling Object Protective Structure Components - ROPS/FOPS	18
ROPS Removal and Installation	19
Seat Removal and Installation	20
Seat Slide Replacement	20
Air Duct Removal and Installation	21
Air Duct Louver Replacement	21
ROPS Rear Window Removal and Installation	21
Restraint Bar Components	23
Multi-Tach™ Components	23
Power-A-Tach® Components	24
Restraint Bar Removal and Installation	25
Mustang Multi-Tach® or Power-A-Tach® Hitch Removal and Installation	25
Lift Arm Components	26
Lift Arm Removal and Installation	27

Lift Arm Bushing Replacement	31
Lift Arm Stop Installation and Adjustment	31
Control Cover Components	32
Floor Cover/Control Cover Removal and Installation	33
Crossmember Removal and Installation	35
Fuel Sensor Removal and Installation	38
Rear Grille Removal and Installation	39
Rear Grille Latch Removal and Installation	39

Wheel Drives

Page

Introduction	41
Wheel Drive Components	41
Drive Chain Adjustment	42
Axle Housing Assembly Removal and Installation	43
Drive Chain Removal and Installation	44
Axle Assembly Components	45
Axle and Wheel Bearing Disassembly and Assembly	46

Controls

Page

Introduction	49
Control Locations - Dual Joysticks	50
Control Locations - Dual Hand	50
Control Locations - Hand/Foot	51
Wheel Drive Components - Dual Joystick Controls	52
Wheel Drive Components - Dual Hand and Hand/Foot Controls	53
Lift and Tilt Components - Dual Hand Controls	54
Lift and Tilt Components - Dual Joystick Controls	55
Lift and Tilt Components - Hand/Foot Controls	56
Control Handle Removal and Installation - Dual Hand and Hand/Foot Controls	57
Control Handle Assembly Removal and Installation - Dual Joystick Controls	58
Electrical Auxiliary Grip Removal and Installation - Dual Joystick Controls	60
Control Handle Position Adjustment - Dual Hand and Hand/Foot Controls	62
Control Handle Tracking Adjustment, Wheel Drive Controls - Dual Hand and Hand/Foot Controls	63
Control Handle Tracking Adjustment, Wheel Drive Controls - Dual Joystick Controls	64
Hand/Foot and Dual Hand Control Handle Assembly	65
Dual Joystick Assembly	67
Pivot Tube Removal and Installation - Dual Hand and Hand/Foot Controls	69
Neutral Centering Device Adjustment - Dual Hand and Hand/Foot Controls	70
Neutral Centering Adjustment - Dual Joystick Controls	71
Pump Control Arm Assembly Removal and Installation	72
Lift/Tilt Controls Removal and Installation	73
Lift/Tilt Control Adjustment	76
Auxiliary Hydraulics Controls - Dual Hand Controls	78
High-Flow Auxiliary Hydraulics Controls - Dual Hand Controls	79
Auxiliary Hydraulics Controls - Hand/Foot Controls	80
High-Flow Auxiliary Hydraulics Controls - Hand/Foot Controls	81
Standard and High-Flow Auxiliary Hydraulics Controls - Dual Joystick Controls	82
Auxiliary Hydraulics Cable Removal and Installation - Dual Hand and Hand/Foot Controls	83
Auxiliary Hydraulics Cable Adjustment - Dual Hand and Hand/Foot Controls	86

Hand Throttle Controls - Dual Hand Controls	88
Hand Throttle Controls - Hand/Foot Controls	89
Hand Throttle Controls - Dual Joystick Controls	90
Hand Throttle, Foot Throttle Pedal and Throttle Cable Removal and Installation - Dual Hand and Dual Joystick Controls	91
Hand Throttle Tension Adjustment	92
Hand Throttle and Throttle Cable Removal and Installation - Hand/Foot Controls	93
Hand Throttle Adjustment - Hand/Foot Controls	94
Foot Throttle Adjustment - Dual Hand and Dual Joystick Controls	95

Hydrostatic System

Page

Introduction	97
Single-Speed Hydrostatic Components - Dual Joystick Controls	97
Two-Speed Hydrostatic Components - Dual Joystick Controls	98
Single-Speed Hydrostatic Components - Hand/Foot and Dual Hand Controls	99
Two-Speed Hydrostatic Components - Hand/Foot and Dual Hand Controls	100
Charge Pressure Test and Adjustment	101
Hydrostatic Pump Relief Valves	101
Hydrostatic Pump Removal / Installation	102
Hydrostatic Pump Drive Coupling Removal and Installation	103
Drive Motor Removal and Installation	104
Troubleshooting Guide	106
Hydrostatic/Hydraulic Schematic - Dual Joystick Controls	111
Hydrostatic/Hydraulic Schematic - Non-Dual Joystick Controls	112

Hydraulic System

Page

Introduction	115
Standard Auxiliary - Dual Joystick Controls	115
Standard Auxiliary - Dual Hand and Hand/Foot Controls	116
High-Flow Auxiliary - Dual Joystick Controls	117
High-Flow Auxiliary - Dual Hand and Hand/Foot Controls	118
Standard Lift Arm Hydraulics	119
High-Flow Lift Arm Hydraulics	120
Chassis Hydraulics	121
Pressure Tests, Control Valve and High-Flow	122
Tilt Cylinder Test	123
Self-Leveling Valve Test	124
Lift Cylinder Test	125
Solenoid Valve Test - Tilt, Lift, Brake and Two-Speed	126
Hydraulic Oil Filter Element Replacement	127
Tilt Cylinder Removal and Installation	128
Lift Cylinder Removal and Installation	129
Lift Cylinder Components	131
Tilt Cylinder Components	131
Lift/Tilt Cylinder Disassembly / Assembly	132
Gear Pump Removal and Installation	134
Self-Leveling Valve Removal and Installation	135
Self-Leveling Valve Adjustment	136

Safety Lock Valves - Removal/Installation	137
Lift and Tilt Solenoid Valve - Disassembly and Assembly	138
Control Valve Removal and Installation	139
Manifold Valve Removal and Installation	141
Control Valve Disassembly and Assembly	142
Main Relief Valve Removal and Installation	143
Auxiliary Hydraulics Spool Lock Solenoid Removal and Installation	144
Hydraglide™ Ride Control Hydraulics	145
Hydraglide™ Ride Control Accumulator Removal and Installation	146

Electrical System

Page

Introduction	153
Description of Operation - Right and Left Instrument Panels	153
Electrical Chassis Components	157
Electrical Battery Disconnect Switch Components	158
Electrical ROPS/FOPS Components	159
Master Fuse, Module and Relay Test and Operation	160
Master Fuse Test	160
Power Relay Test	160
ISO SPDT Interlock, Joystick, EGR, Fuel and Horn Relays Test	161
Starter and Glow Solenoid Test	162
Glow Control Module Test	162
Glow Control Module	163
Glow Control Module Time/Temp Cycle	163
Interlock Control Module Test	164
Interlock Control Module Truth Table	165
Two-Speed, Ride Control and Float Module Test	166
Two-Speed, Ride Control and Float Module Truth Table	167
Control Handle Actuation Buttons - Two-Speed and Ride Control and Float Module	168
Seat Switch Removal and Installation	169
Restraint Bar Components	170
Restraint Bar Switch Removal and Installation	171
Engine Disconnect Switch - Remote Battery Terminal Removal and Installation	172
Electrical Lights Components	173
Front and Rear Work Light Bulb Replacement	174
Dome Light Bulb Replacement	174
Electrically-controlled Standard Auxiliary Hydraulic Flow System Test and Operation	175
Electrically-controlled High-Flow Auxiliary Hydraulic Flow System Test and Operation	176
Lift and Tilt Solenoid Test and Operation	176
Traction Solenoid Test and Operation	177
Auxiliary Neutral Start Switch	177
2-Bank and 4-Bank Coil Function Colored Wire Connector Chart	178
Chassis - Electrical Schematic	179
ROPS/FOPS - Electrical Schematic	180
Engine - Electrical Schematic	181
Electrical Auxiliary Schematic	182
EGR Solenoid - Electrical Schematic	183
Heater Schematic	184

Engine	Page
Introduction	185
Troubleshooting Guide	185
Engine Components	187
Air Cleaner and Exhaust Components	188
Radiator/Cooler Components	189
Remote Oil Filter Element Removal and Installation	190
Air Cleaner Assembly Removal and Installation	191
Air Filter Element Removal and Installation	192
Battery and Battery Tray Removal and Installation	193
Starter Removal and Installation	194
Exhaust Assembly Removal and Installation	195
Fan Belt Adjustment	195
Radiator/ Oil Cooler Removal and Installation	196
Fan Shroud and Radiator/Oil Cooler Mounting Brackets Removal and Installation	198
Fan Shroud Adjustment	199
Fan Removal and Installation	200
Engine Removal and Installation	201

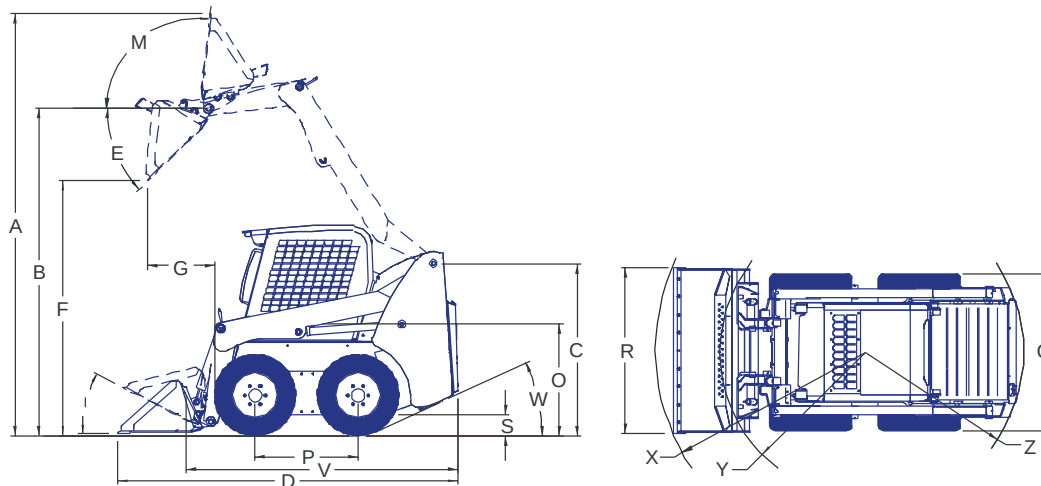
INDEX	205
--------------	------------

THIS PAGE INTENTIONALLY LEFT BLANK

SPECIFICATIONS

Model	2056
Make of Engine	Deutz
Engine Model	TD2009L04 Turbocharged
Fuel	Diesel
Displacement	140 CID (2,29 L)
Horsepower - Net	62 hp (47 kW)
Peak Torque	148 lbf-ft (200 N•m)
Operating Load - SAE*	1900 lbs (862 kg)
Operating Weight	6800 lbs (3084 kg)
Shipping Weight	6100 lbs (2767 kg)
Capacities	Capacities
Engine Oil	8.0 US qts (7,5 L), 8.5 US qts (8,0 L) w/ filter change
Fuel Tank	16.0 US gal (60,5 L)
Chaincase (each)	8.0 US qts (7,57 L)
Hydraulic Reservoir	15.0 US gal (56,8 L)
Engine Coolant	8.0 US qts (7,57 L)
Electrical	Electrical
Battery	12-V DC, Group 31, 950 CCA, 170 Reserve
Starter	12-V DC (2,0 kW)
Alternator	80 A
Hydraulic System	Hydraulic System
Hydraulic System Pressure	2750 PSI (190 bar): High-Flow 2650 PSI (183 bar)
Standard Auxiliary Flow Rate	19 gal/min (72 L/min)
High-Flow Auxiliary Flow Rate	29 gal/min (110 L/min)
Travel Speed - Single-Speed	0 to 8.4 mph (0 to 13,5 km/h)
Travel Speed - Two-Speed	0 to 12.5 mph (0 to 20 km/h)
Tire Options	Tire Options Description
10 X 16.5 Heavy Duty 8-Ply	Flotation Wide Sidewall
10 X 16.5 Heavy Duty 8-Ply	Flotation Wide Sidewall Foam-Filled
12 x 16.5 Heavy Duty 10-Ply	Flotation Wide Sidewall
12 x 16.5 Heavy Duty 10-Ply	Flotation Wide Sidewall Foam-Filled
33 x 15.50 x 16.5 12-Ply	Extra Wide / Wide Sidewall
31 x 15.50-15	Heavy Duty
10 x 16.5 10-Ply	H/E Severe Duty
10 x 16.5 10-Ply	H/E Severe Duty Foam-Filled
12 x 16.5 12-Ply	H/E Severe Duty
12 x 16.5 12-Ply	H/E Severe Duty Foam-Filled
10 x 16.5	Solid Flex
12 x 16.5	Solid Flex
8.00 x 16	Solid Rubber
Buckets and Capacities	
Width - inches (millimeters) - Description	Capacity (Heaped)
67 inches (1702 mm) - Dirt/Construction	10.8 cubic feet : 0,31 cubic meters
67 inches (1702 mm) - Dirt/Construction	14.7 cubic feet : 0,42 cubic meters
70 inches (1778 mm) - Dirt/Construction	15.3 cubic feet : 0,43 cubic meters
70 inches (1778 mm) - Dirt/Construction	19.0 cubic feet : 0,54 cubic meters
74 inches (1880 mm) - Dirt/Construction	20.4 cubic feet : 0,58 cubic meters
67 inches (1702 mm) - Utility/Snow	18.6 cubic feet : 0,53 cubic meters
74 inches (1880 mm) - Utility/Snow	32.5 cubic feet : 0,92 cubic meters
15.75-19.68-24 inches (400-500-610 mm) Pallet	NA

*Operating capacity rated with a 66" inch (1676 mm) 17.9 cubic foot dirt/construction bucket in accordance with SAE J818, SAEJ732 and ISO 14397-1.



Dimensional Specifications		2056 ¹	
		in.	mm
A	Overall operation height - fully raised	160.0	4064
B	Height to hinge pin - fully raised	121.6	3089
C	Overall height - top of ROPS	79.3	2014
D	Overall length - bucket down	126.3	3208
E	Dump angle @ full height	43.2°	
F	Dump height	90.0	2286
G	Dump reach - bucket (full height)	23.0	584
I	Rollback at ground	22°	
M	Rollback angle @ full height	91.5°	
O	Seat-to-ground height	39.5	1003
P	Wheelbase - nominal	42.0	1067
Q	Overall width - less bucket ²	63.2	1605
R	Overall bucket width	66.0	1676
S	Ground clearance to chassis (between wheels)	7.5	191
U	Maximum back grading angle	88.1°	
V	Overall length (less bucket)	94.2	2393
W	Departure angle	25.5°	
X	Clearance circle - front (with bucket)	79.2	2012
Y	Clearance circle - front (less bucket)	44.5	1130
Z	Clearance circle - rear	57.5	1461

1 - w/ 17.9 cu. ft. bkt., w/ 12 x 16.5 tires

2. Overall width (Q) is dependent upon the amount of wheel offset.



General Information

The above safety alert symbol means: **ATTENTION! BECOME ALERT! YOUR SAFETY IS INVOLVED!** It stresses an attitude of “safety awareness” and can be found throughout this service manual and on decals on the machine.

Before operating or working on this machine, read and study the following safety information. In addition, be sure that everyone who operates or works on this equipment is familiar with these safety precautions. It is essential to have competent and careful operators, who are not physically or mentally impaired, and who are thoroughly trained in the safe operation of the machine and the handling of loads. It is recommended that the operator be capable of obtaining a valid motor vehicle operator’s license.

The use of skid-steer loaders is subject to certain hazards that cannot be eliminated by mechanical means, but only by exercising intelligence, care and common sense. Such hazards include, but are not limited to, hillside operation, overloading, instability of the load, poor maintenance and using the equipment for a purpose for which it is not intended or designed.

The Mustang Manufacturing Company **ALWAYS** considers the operator’s safety when designing its machinery and guards exposed moving parts for the operator’s protection. However, some areas cannot be guarded or shielded in order to assure proper operation. Furthermore, the Operator’s Manual and the decals on the machine warn of additional hazards and should be read and observed closely.

These topics in the Safety chapter of the service manual include procedures, which, when followed, will allow safe performance of service procedures: Mandatory Safety Shutdown Procedure, Lift Arm Support Device, Roll-Over Protective Structure (ROPS)/Falling Object Protective Structure (FOPS) Lock Mechanism, Loader Raising and Lowering Procedures, and Relieving Hydraulic Pressure.



Signal Words



DANGER

“**DANGER**” indicates an imminently hazardous situation, which, if not avoided, will result in death or serious injury.



WARNING

“**WARNING**” indicates a potentially hazardous situation, which, if not avoided, could result in death or serious injury.



CAUTION

“**CAUTION**” indicates a potentially hazardous situation, which, if not avoided, may result in minor or moderate injury. May also alert against unsafe practices.

Additional Safety Reminders



Read and understand the Service Manual and all decals before maintaining, adjusting or servicing this equipment.

Doors, Guards and Shields - Some photographs in this manual may show doors, guards and shields open or removed for illustrative purposes only. **BE SURE** all doors, guards and shields are in their proper operating positions before starting engine to operate unit.

Damaged or Worn-out Parts - For safe operation, replace damaged or worn-out parts with genuine Mustang service parts, before operating this equipment.

Attachments - Mustang skid-steer loaders are designed and intended to be used only with Mustang Manufacturing Company attachments or approved referral attachments. Mustang Manufacturing Company cannot be responsible for operator safety if the loader is used with a non-approved attachment.

Battery Safety - To avoid injury from a spark or short circuit, disconnect the negative (-) battery cable before servicing any part of the electrical system. Do not tip the battery more than 45° to avoid spilling electrolyte.

Loader Stability - A skid-steer loader's stability is determined by its wheelbase and tread width. The following elements can affect stability: terrain, speed, load being carried or dumped, and sudden control movements. **DISREGARDING ANY OF THESE FACTORS CAN CAUSE THE LOADER TO TIP, POSSIBLY RESULTING IN DEATH OR SERIOUS INJURY.** Therefore, **ALWAYS** have the operator restraint bar lowered and wear the seat belt. Operate the controls only from the operator's seat. Operate the controls smoothly and gradually at an appropriate engine speed that matches the operating conditions.

DO NOT exceed the rated operating capacity of the machine. For additional stability when operating on inclines or ramps, **ALWAYS** travel with the heavier end of the loader toward the top of the incline.

ALWAYS look to the rear before backing up.

When parking machine, before leaving seat, check restraint bar for proper operation. The restraint bar, when raised, applies the parking brake and deactivates lift/tilt controls and auxiliary hydraulics.

Keyswitch - **NEVER** attempt to bypass the keyswitch to start the engine. Use the jump-starting procedure detailed in the Service chapter of the Operator's Manual.



Hydraulic Fluid Leaks - **NEVER** use hands to search for hydraulic fluid leaks. Instead, use paper or cardboard. Fluid under pressure can be invisible, penetrate the skin and cause a serious injury. If any fluid is injected into skin, see a doctor at once. Injected fluid **MUST** be surgically removed by a doctor or gangrene may result.



Wear Safety Glasses - **ALWAYS** wear safety glasses with side shields when operating the machine or striking metal against metal. In addition, it is recommended that a softer (chip-resistant) material be used to cushion the blow. Failure to heed could lead to serious injury to eyes or other parts of the body.

ALWAYS wear safety glasses when searching for hydraulic leaks or when working near batteries.

Loaded Bucket/Fork - **DO NOT** raise or drop a loaded bucket or fork suddenly. Abrupt movements under load can cause serious loader instability.

NEVER push the lift control into the "float" position with the bucket or attachment loaded or raised, because this will cause the lift arm to lower rapidly.

DO NOT drive too close to an excavation or ditch. **BE SURE** that the surrounding ground has adequate

strength to support the weight of the loader and the load.



DO NOT smoke or have any spark-producing equipment in the area while filling the fuel tank or while working on the fuel or hydraulic systems.

Exhaust Gases - Exhaust fumes can kill. **DO NOT** operate this machine in an enclosed area unless there is adequate ventilation.

Engine - **NEVER** use ether or starting fluid.

People - **NEVER** carry riders. **DO NOT** allow others to ride on the machine or attachment, because they could fall or cause an accident.

BE SURE all persons are away from the machine and warn others in the area before starting the engine.

ALWAYS face the machine and use handholds and steps when getting on and off. **DO NOT** jump off machine.



Wear appropriate ear protection for prolonged exposure to excessive noise.

ALWAYS perform a daily inspection of the machine before using it. Look for damage, loose or missing parts, leaks, etc.

Remove trash and debris from the machine and engine compartment each day to minimize risk of fire.

New operators **MUST** operate loader in an open area away from bystanders. Practice with controls until the loader can be operated safely and efficiently.

Mandatory Safety Shutdown Procedure

BEFORE cleaning, adjusting, lubricating or servicing the unit or leaving it unattended:

1. Move drive control handle(s) to the neutral position.
2. Lower the lift arm and attachment completely. If the lift arm *must* be left in the "raised" position, **BE SURE** to properly engage the lift arm support device.
3. Move the throttle to the low idle position, shut off the engine and remove the key.
4. Before exiting, move the lift/tilt control(s) to verify that controls do not cause movement of the lift arm or hitch.

Only after these precautions can you be sure it is safe to proceed. Failure to follow the above procedure could lead to death or serious injury.

Lift Arm Support Device



WARNING

BEFORE leaving operator's compartment to work on loader with lift arm raised, **ALWAYS** engage lift arm support device. Turn key-switch to **OFF**, remove key and take it with you.

Many service procedures require a raised lift arm to allow easier access to loader components. For operator and service personnel safety, a lift arm support device is standard on Mustang skid-steer loaders. Used as a cylinder block, it helps prevent a raised lift arm from unexpectedly lowering.

BE SURE to engage the lift arm support device whenever the lift arm is raised. When the device is not being used, secure it to the anchor on the underside of the lift arm using the lock pin and retainer provided.

The lift arm support device is a safety device which must be kept in proper operating condition at all times.

The following procedures outline the correct way to engage and disengage the lift arm support device.

Lift Arm Support Device Engagement

1. Lower lift arm until contact with loader frame.
2. Turn keyswitch to OFF position to stop engine.
3. Leave operator's compartment. Remove lock pin holding support device up against lift arm. Allow support device to come down into contact with lift cylinder.



4. Return to the operator's compartment and restart the engine.
5. Use lift control to raise lift arm until lift arm support device drops over the end of the lift cylinder and around cylinder rod. Slowly lower lift arm until free end of support device contacts top end of lift cylinder.



Be sure the support device is secure against the cylinder end. Then, stop the loader engine, remove the key and leave the operator's compartment.

Lift Arm Support Device Disengagement



WARNING

NEVER leave the operator's compartment to disengage the lift arm support device with the engine running.

To return the lift arm support device to its storage position, proceed as follows:

1. Raise the lift arm completely.
2. Turn the keyswitch to the OFF position to stop the engine, remove the key and take it with you.



WARNING

BEFORE testing the machine, ALWAYS clear people from the area.

3. Before leaving the operator's compartment, check to be sure the lift arm is being held in the raised position by the solenoid valve (See NOTE).

NOTE: With the keyswitch OFF, and the solenoid valve functioning properly, the lift arm will not move when the lift control is moved forward. If the valve does NOT hold the lift arm, do NOT leave the operator's compartment. Instead, have someone store the support device for you. Then, contact your Mustang dealer to determine the reason why the lift arm lowers while the keyswitch is in the OFF position.

4. To store the lift arm support device, lift it up and inside the lift arm. Insert lock pin through the hole in the welded tab and lock the ring up to the pin.



ROPS – Raising

For service, the ROPS can be unbolted and tilted back. Gas-charged springs help tilt it back. A self-actuating lock mechanism engages to lock the ROPS in a rolled-back position.

1. The lift arm should be lowered or locked in the raised position as per the “lift arm Support Device Engagement” procedure in this chapter.
2. Turn the keyswitch to the OFF position to stop the engine. Remove the key and take it with you.
3. Leave the operator's compartment.



WARNING

DO NOT leave the operator's compartment with the engine running. Before leaving the loader, shut off the engine according to the “Mandatory Safety Shutdown Procedure” described in this chapter.

4. Remove one capscrew and washer on each side of the ROPS forward stantions.



5. Lift ROPS up and tilt it back until the self-actuating lock mechanism engages. The lock mechanism locks the ROPS in a rolled-back position.



IMPORTANT

BEFORE raising the ROPS, position the seat as far back as it will go. **Avoid** damaging control handles by slowly raising the ROPS. **BE SURE** the control handles clear the ROPS.

ROPS – Lowering

1. Apply upward force on the ROPS and push the lock mechanism handle toward the front of the loader.



2. Lower the ROPS until it contacts the chassis.



IMPORTANT

Avoid damaging control handles by slowly lowering the ROPS. **BE SURE** the control handles clear the ROPS.

3. Be sure control handles clear the ROPS.

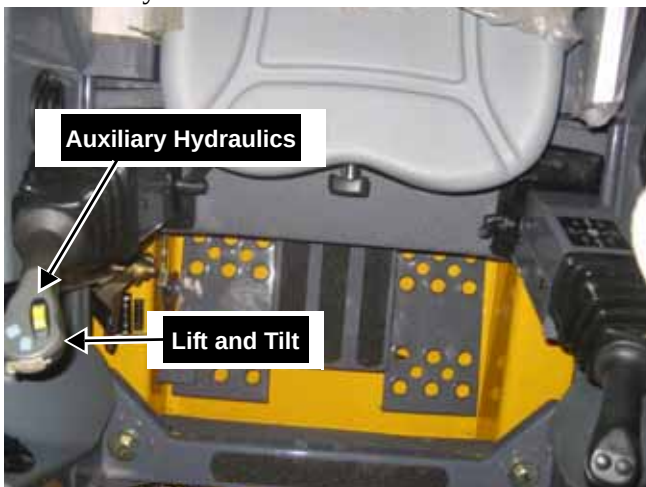


4. Reinstall the two capscrews and flat washers that secure the ROPS front uprights to the chassis.

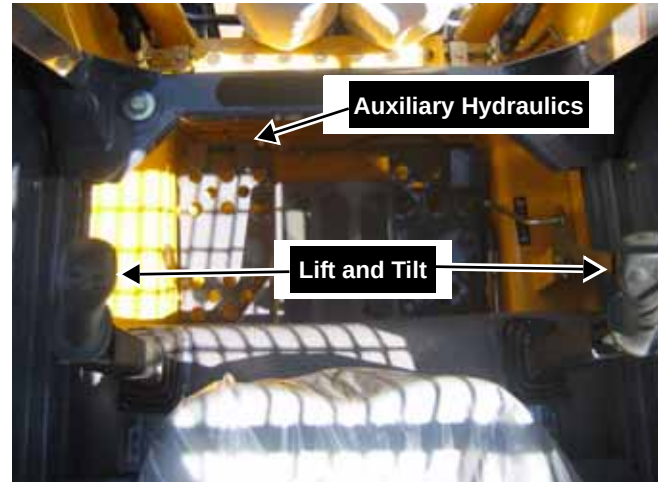
Relieving Hydraulic Pressure

The following procedure should be used to relieve pressure in the hydraulic system before performing service procedures on hydraulic system components.

1. Completely lower the bucket or attachment.
2. Turn the keyswitch to the “OFF” position to shut off engine.
3. With the operator in the seat and the restraint bar lowered, turn the keyswitch to the “ON” position, but DO NOT start the engine.
4. Move the lift, tilt and auxiliary hydraulics controls through several cycles.
5. Dual Joysticks:

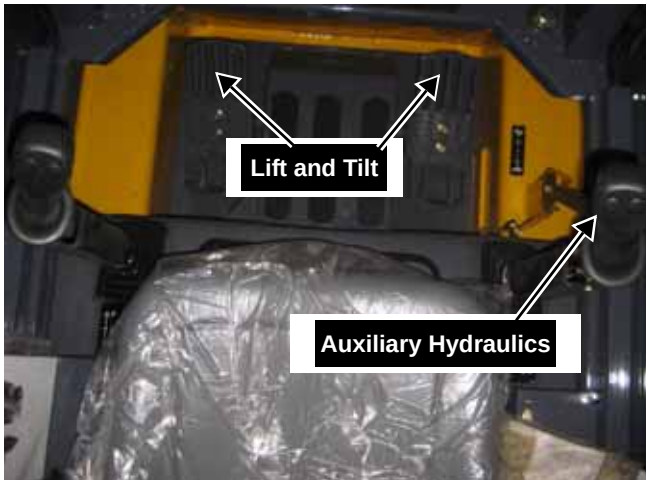


7. Dual Hand units:



8. Turn the keyswitch to the “OFF” position.

6. Hand/Foot units:



Loader Raising Procedure

The following procedure is used to raise the skid-steer loader so that all four tires are off the ground.



WARNING

BEFORE servicing the machine, exercise the “Mandatory Safety Shutdown Procedure” described in this chapter.



WARNING

DO NOT rely on a jack or hoist to maintain the “raised” position without additional blocking and supports. Serious personal injury could result from improperly raising or blocking the skid-steer loader.

1. To raise and block the skid-steer loader, obtain four jack stands (or blocks) of sufficient strength to support the loader.
2. Using a jack or hoist capable of raising the fully-equipped loader, lift the rear of the loader until the tires are off the ground.



3. Place two jack stands (or blocks) under the flat part of the loader chassis. Place them parallel with, but not touching, the rear tires.



4. Slowly lower the loader so that its weight rests on the jack stands (or blocks).
5. Repeat steps 2-4 for the front end. When the procedure is finished, all four tires will be off the ground, and the wheels can be removed as necessary.

Loader Lowering Procedure

When the service procedures are complete, the skid-steer loader can be taken down from the “raised” position. To lower the loader onto its tires:

1. Using a jack or hoist, raise the front of the loader until its weight no longer rests on the jack stands (or blocks).
2. Carefully remove the jack stands (or blocks) under the front of the loader.
3. Slowly lower the loader until the front tires are on the ground.
4. Repeat steps 1-3 for the rear of the loader.

CHAPTER NOTES

General Information



WARNING

NEVER service this unit when any part of the machine is in motion. **ALWAYS BE SURE** to exercise the “Mandatory Safety Shutdown Procedure” (see Safety chapter) **BEFORE** servicing this equipment.

Routine lubrication is an important factor in preventing excessive part wear and early failure. Loader and engine operation depends on using correct grade, high-quality lubricating oils. This chapter and the chart below list locations, temperature ranges and types of recommended lubricants to be used when servicing this machine. In addition, refer to the engine manual for specific grades and ratings as specified by the engine manufacturer.

IMPORTANT

Whenever service is performed on hydraulic components (valves, cylinders, hoses, etc.), fuel tanks and lines, care must be taken to prevent discharging fluid onto the ground. Catch and dispose of fluid per local waste disposal regulations.

Hydraulic Oil Reservoir

The oil reservoir for hydraulic and hydrostatic systems has a capacity of 15 U.S. gallons (56,8 liters). A visual oil level indicator is located on the right riser for convenient maintenance of the hydraulic oil level.

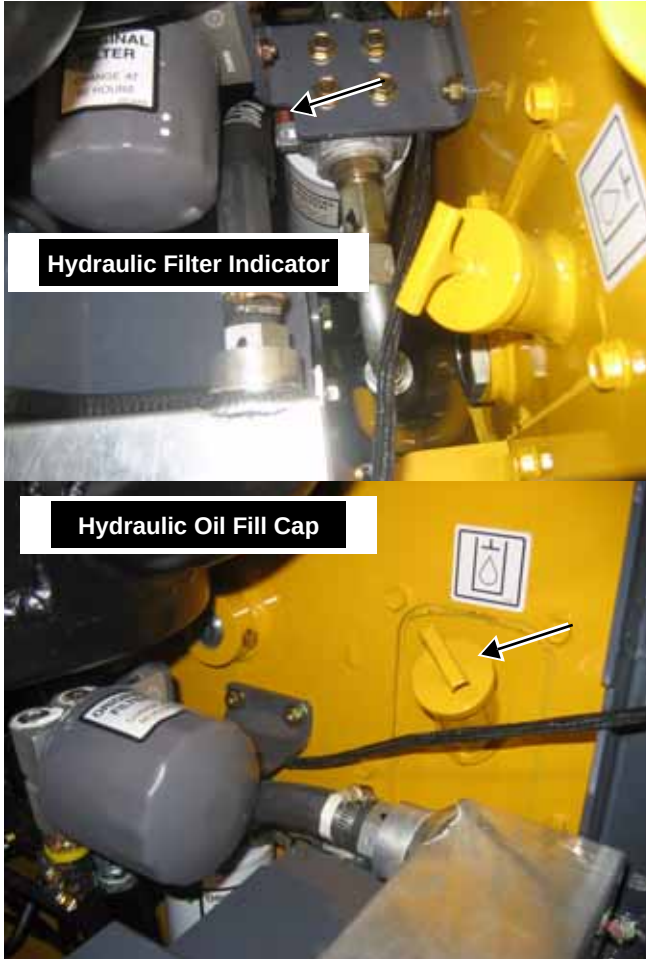


The hydraulic oil reservoir should be drained and filled after every 500 hours of operation or annually (whichever occurs first).



Hydraulic System Reservoir	Chaincases	Grease Fittings	Crankcase Oil
Use Petro-Canada Premium HVI60, or equivalent that contains anti-rust, anti-foam, and anti-oxidation additives & conforms to ISO VG46. Capacity: 15 Gallons (56,8 L)	Use hydraulic system oil or SAE grade 15W-40 motor oil. Capacity (each side): 8.0 Quarts (7,5 L)	Use lithium-based grease	Below 32°F (0°C) use SAE Grade* 10 or 10W-30 Above 32°F (0°C) use SAE Grade* 15W-40 *Service Classification: API - CF-4/CG-4 Capacity (w/ filter change): 8.5 Quarts (8,0 L)

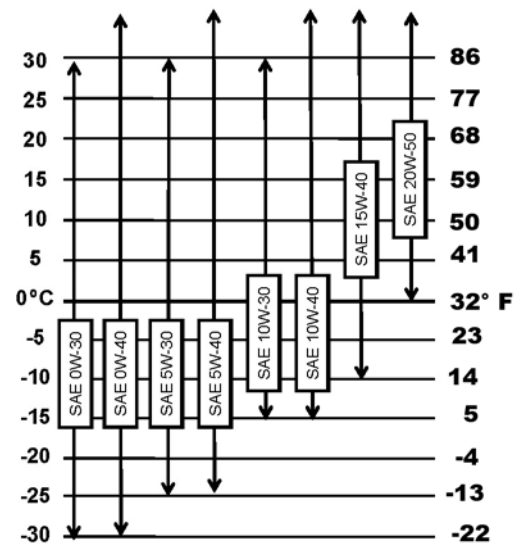
Use Petro-Canada Premium HVI60 hydraulic oil (or ISO VG46 equivalent) that contains anti-rust, anti-foam and anti-oxidation additives. Hydraulic oil filter element should be replaced when filter indicator on filter head shows red (see NOTE). For details, refer to “Hydraulic Oil Filter Element Replacement” procedure in the *Hydraulics System* chapter.



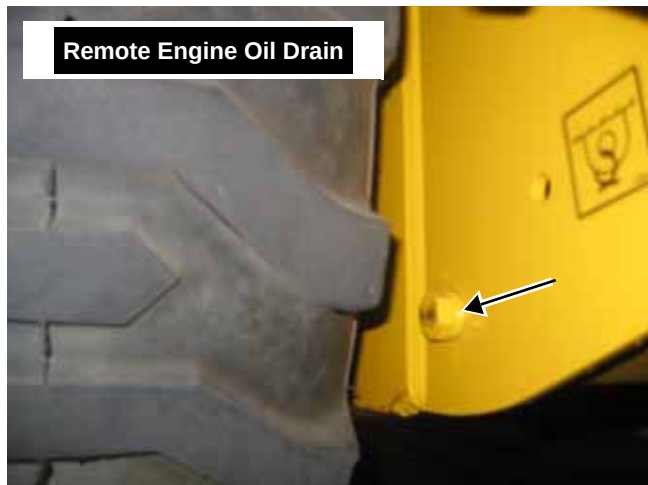
NOTE: Hydraulic filter indicator should be read with engine running at full throttle and normal operating temperature.

Crankcase Oil

The Deutz four-cylinder diesel engine crankcase has a capacity of 8.0 U.S. quarts (7,5 liters). The chart below lists recommended oil viscosity for the Deutz engine.



Engine oil should be changed and filter element replaced every 500 hours of service. A remote engine oil drain is located behind the left rear tire.



The remote engine oil filter is above the radiator cooler.



Refer to engine operator's manual (see NOTE) for details on changing oil, and to "Oil Filter Removal" and "Oil Filter Installation" procedures in *Engine* chapter of this manual.

NOTE: Refer to engine operator's manual for additional information on oil change intervals, including the 50-hour initial oil change.

Chaincases

Each chaincase requires eight quarts (7,5 L) of motor oil. This quantity of oil should be maintained at all times. The oil in both chaincases should be drained and refilled every 500 hours of operation or annually, whichever occurs first.

Change Chaincase Oil

1. Remove drain plug on chaincase and drain the oil.



IMPORTANT

Always dispose of waste lubricating oil according to local regulations or take to a recycling center for disposal; do not pour onto the ground or down the drain.

2. Reinstall the drain plug.
3. Remove the oil fill plug.



4. Add eight quarts (7,5 L) of motor oil through the fill plug.
5. Reinstall the fill plug.

Grease Fitting Locations

Use lithium-based grease on all grease fittings.

Grease every 10 hours of operation (or daily)

1. Grease All-Tach[®] attachment pivots.



2. Grease All-Tach[®] attachment pivots.



Cooling System Drain Procedure

2056 model skid-steer loaders use a hydraulic oil cooler/radiator design to help keep the hydraulic oil and engine coolant from overheating. Many procedures in this Service Manual require partially or fully draining the radiator/cooler to perform the procedures.



WARNING

BEFORE beginning this service procedure, perform the following SAFETY procedure:

Shut off the engine and allow it to cool.

(For detailed instructions, refer to the Safety chapter of this manual.)

Radiator Drain Procedure

1. Be sure the remote anti-freeze drain hose is protruding out the bottom of the chassis.
2. Place a catch pan with a capacity of at least 17-gallons (77,3 L) underneath the chassis, below the hose.
3. Open the drain cock at the lower left bottom of the radiator cooler to drain the anti-freeze.



4. Close the drain cock to when finished draining.

Hydraulic Oil Cooler Plug/Cap Procedure

1. On the cooler side, remove the clamp on the top right hose and plug/cap the hose and cooler port.



2. Disconnect the hose attached at the hydraulic oil filter and plug/cap the hose and filter port.
3. Plugging or capping the two hoses in steps 1 and 2 will help prevent hydraulic oil from spilling onto the floor of the chassis, if removal of the radiator/cooler is required.

Introduction

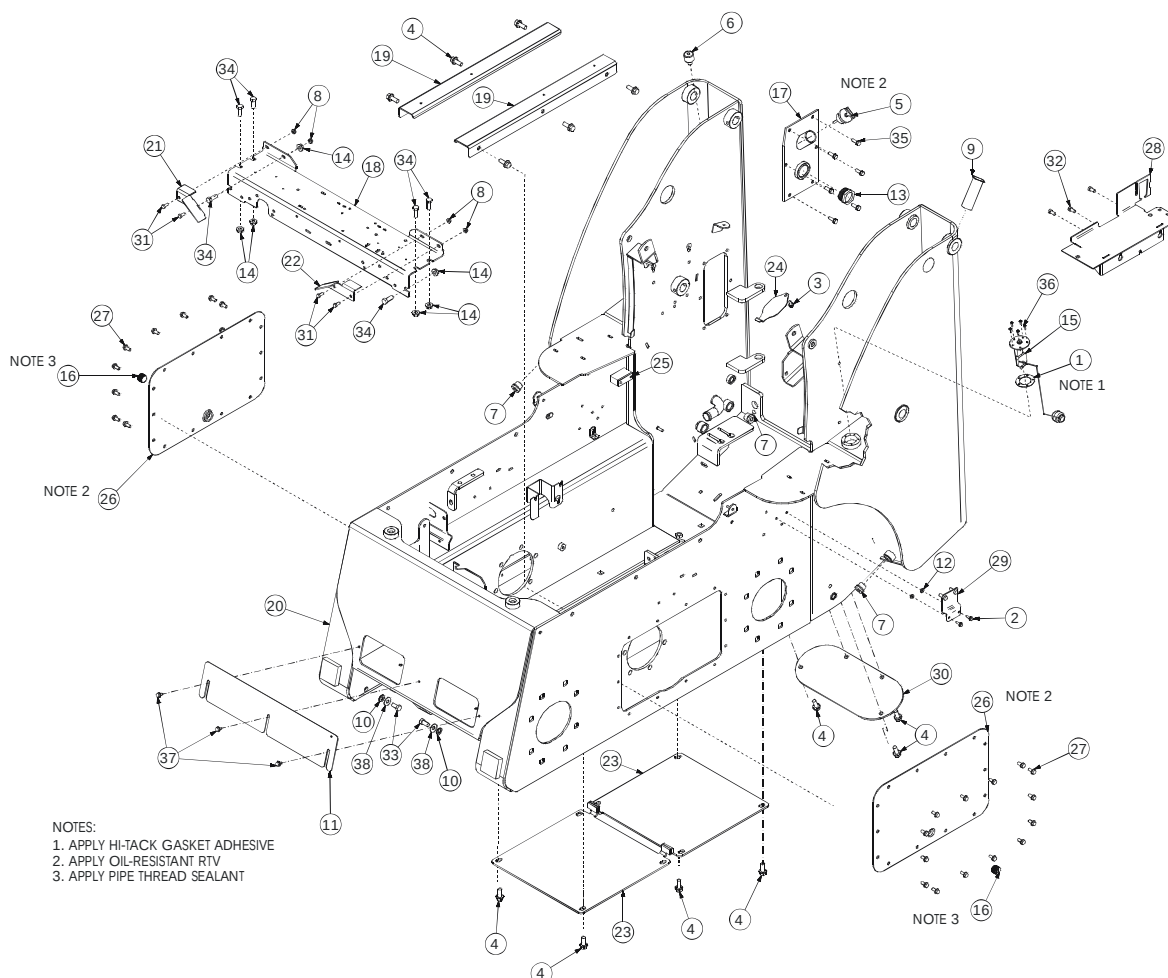
2056 model skid-steer loaders have a welded steel chassis. Maintenance, service and repair may be performed through standard access panels.

Two side chaincases provide mounting for the drive motors and for the front and rear axles. The side cases also serve as sealed housings for the drive chains and

sprockets. Oil is used inside these cases to ensure the chains always receive proper lubrication.

The lift arm and the lift and tilt cylinders are mounted with pivot pins. Capscrews are used to secure the pivot pins. A Rollover Protective Structure/Falling Object Protective Structure (ROPS/FOPS) is standard for operator safety, and both the seat and restraint bar include interlock switches.

Mainframe (Chassis) Components

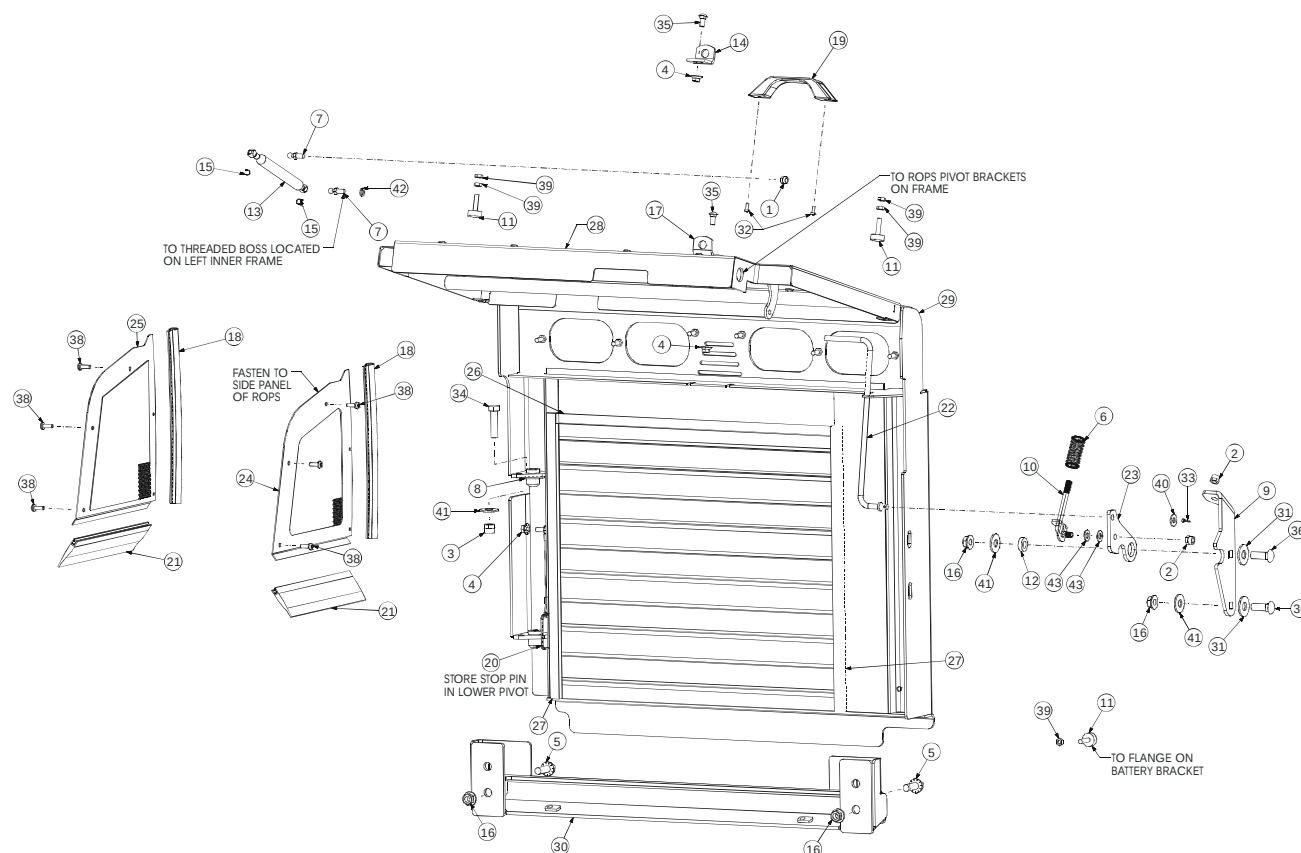


NOTES:

1. APPLY HI-TACK GASKET ADHESIVE
2. APPLY OIL-RESISTANT RTV
3. APPLY PIPE THREAD SEALANT

- | | | |
|---------------------------|------------------------------|----------------------|
| 1 GASKET/FUEL SENDER | 14 NUT/SPIRALOCK | 27 SCREW/TAPPING |
| 2 SCREW/CAP LOCK | 15 FUEL SENSOR/VDO | 28 ASSY/BATTERY TRAY |
| 3 SCREW/CAP LOCK | 16 PLUG/PIPE SQUARE SOCKET | 29 BRACKET/FILTER |
| 4 SCREW/CAP LOCK | 17 COVER/HYDRAULIC RESERVOIR | 30 COVER/ACCESS |
| 5 CAP/HYDRAULIC RESERVOIR | 18 PLATE/CROSSMEMBER | 31 SCREW/CAP |
| 6 BREATHER/HYD. RESERVOIR | 19 ASSY/ROPS FILLER | 32 SCREW/CAP |
| 7 PLUG | 20 WELDMENT/CHASSIS | 33 SCREW/CAP |
| 8 NUT/SPIRALOCK | 21 COVER/UNDER SEAT RIGHT | 34 SCREW/CAP |
| 9 STRAINER/FUEL FILL | 22 COVER/UNDER SEAT LEFT | 35 SCREW/MACHINE |
| 10 WASHER/SEAL | 23 BELLYPAN | 36 SCREW/MACHINE |
| 11 COVER/TOEPLATE | 24 PLATE/COVER | 37 SCREW/CAP |
| 12 NUT/SPIRALOCK | 25 SPACER/SOLENOID LIFT | 38 WASHER/FLAT |
| 13 SIGHT PORT | 26 COVER/CHAINCASE | |

Rear Grille and Engine Cover Components



1 NUT/HEX LOCK	15 CLIP/GAS SPRING	29 WELDMENT/REAR GRILLE
2 NUT/HEX LOCK	16 NUT/SPIRALOCK	30 WELDMENT/BUMPER
3 NUT/HEX LOCK	17 BRACKET	31 WASHER/SPECIAL
4 NUT/SERRATED LOCK	18 SEAL/BULB	32 SCREW/MACHINE
5 SCREW/CAP LOCKING	19 HANDLE/GRAB	33 PIN/COTTER
6 SPRING/COMPRESSION	20 PIN/LOCK	34 SCREW/CAP
7 STUD/BALL	21 SEAL/EDGE	35 BOLT/CARRIAGE
8 WASHER/FLAT	22 ROD/HANDLE	36 BOLT/CARRIAGE
9 MOUNT/LATCH	23 LATCH/REAR GRILLE	38 SCREW/PHILLIPS PAN HEAD
10 ASSY/LATCH ROD	24 ASSY/COVER LEFT	39 NUT/HEX JAM
11 BUMPER	25 ASSY/COVER RIGHT	40 WASHER/FLAT
12 BUSHING	26 SEAL/FOAM	41 WASHER/FLAT
13 SPRING/GAS	27 SEAL/FOAM	42 WASHER/LOCK
14 BRACKET	28 WELDMENT/ENGINE COVER	43 WASHER/FLAT

Engine Access Cover - Removal and Installation



WARNING

It is recommended that this service procedure be performed by a certified Mustang dealer mechanic. **BEFORE** beginning this service procedure, perform the following **SAFETY** procedure:

Shut off the engine.

(For detailed instructions, refer to the **Safety** chapter of this manual.)

Removal Procedure

1. Open the engine access cover until the gas spring is completely extended.
2. Loosen the hose clamp on the flanged tube coming out of the engine cover and separate the hose from the tube.

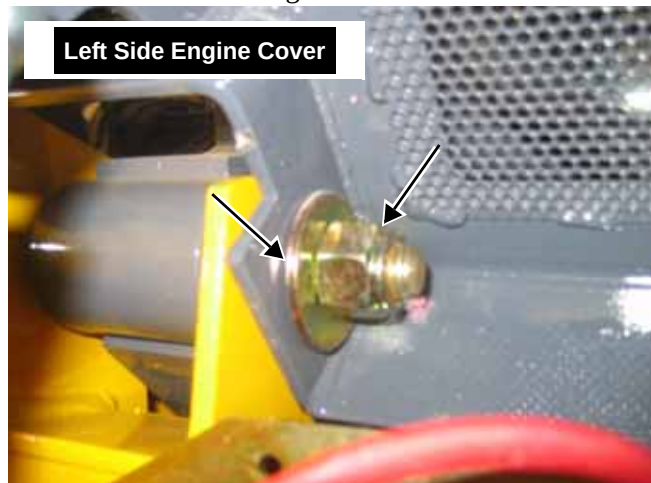


3. Disconnect the gas spring from the engine access cover by removing the gas spring clip at the access

cover end of the gas spring, and then pulling the gas spring off the ball stud on the access cover.



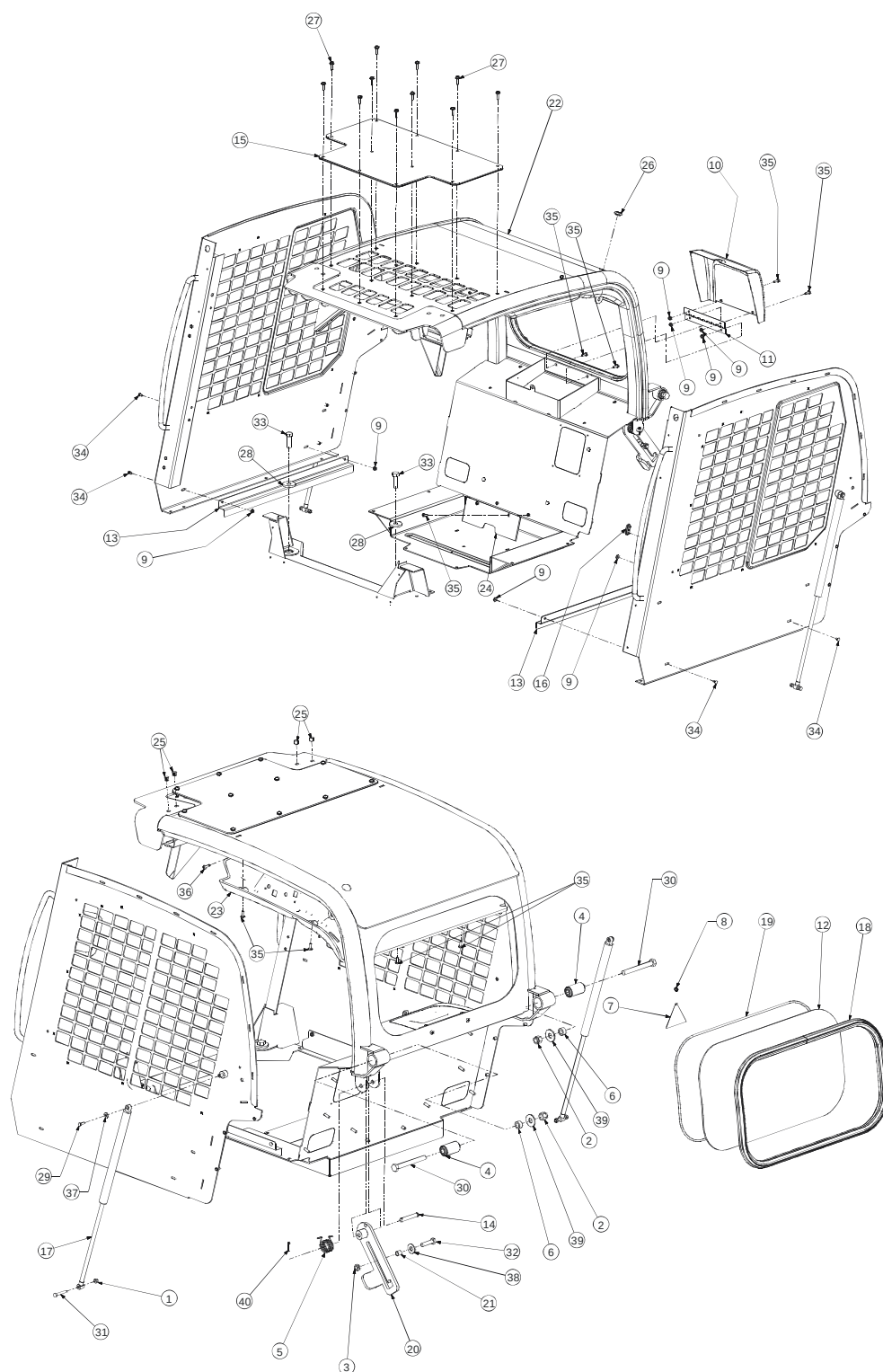
4. Remove two capscrews and all washers on the ROPS bolts securing the access cover to the frame.



5. Turn both ROPS bolts out until flush with the welded tab; remove the engine cover.

Installation Procedure - Follow all warnings first, then reverse the removal steps.

Roll Over and Falling Object Protective Structure Components - ROPS/FOPS



- 1 NUT/HEX LOCK
- 2 NUT/LOCK
- 3 NUT/LOCK
- 4 ISOLATOR/ROPS
- 5 SPRING/TORSION
- 6 BUSHING
- 7 TAG/RIP CORD
- 8 RING
- 9 NUT/SPIRALOCK
- 10 COVER/BOOK BOX
- 11 HINGE/PIANO
- 12 WINDOW/REAR
- 13 CHANNEL/HARNESS
- 14 PIN
- 15 WINDOW/SKYLIGHT
- 16 GROMMET
- 17 SPRING/GAS ASSIST
- 18 WEATHERSTRIP
- 19 RIPCORD
- 20 ROPS SUPPORT
- 21 SPACER/TUBE
- 22 ROPS/FOPS
- 23 HEADLINER
- 24 COVER/WIRE
- 25 PLUG/HOLE
- 26 PLUG/RUBBER
- 27 SCREW/SEM
- 28 WASHER/FLAT
- 29 SCREW/CAP
- 30 SCREW/CAP
- 31 SCREW/CAP
- 32 SCREW/CAP
- 33 SCREW/CAP
- 34 BOLT/CARRIAGE
- 35 SCREW/PHILLIPS
- 36 SCREW/MACHINE
- 37 WASHER/FLAT
- 38 WASHER/FLAT
- 39 WASHER/FLAT
- 40 PIN/COTTER

ROPS Removal and Installation



WARNING

BEFORE beginning this service procedure, perform the following **SAFETY** procedure:

Shut off the engine.

(For detailed instructions, refer to the *Safety* chapter of this manual.)

Removal Procedure

1. Remove the engine access cover per the procedure in this chapter.
2. Disconnect the negative (-) battery cable from the battery.
3. Disconnect the instrument panel wiring harness connector at the harness bulkhead attached to the chassis bracket.



4. Raise the ROPS per the procedure in the *Safety* chapter of this manual.
5. With the ROPS rolled and locked back, attach a hoist so that it is supporting the weight of the ROPS.



WARNING

The hoist **MUST BE** situated precisely above the ROPS or else performing the following steps may cause the ROPS to swing as the bolts are removed. This could cause serious bodily injury and/or damage the loader.

1. Remove one capscrew and flat washer securing each gas spring to the ROPS.



2. Disconnect the ROPS lock mechanism from the chassis by removing the capscrew, washer, spacer and locknut.



3. On each side, carefully remove the capscrew securing the ROPS pivot to the frame.



4. Lift the ROPS off the loader.

Installation Procedure - Follow all warnings first, then reverse the removal steps.

Seat Removal and Installation



WARNING

BEFORE beginning this service procedure, perform the following **SAFETY** procedures:

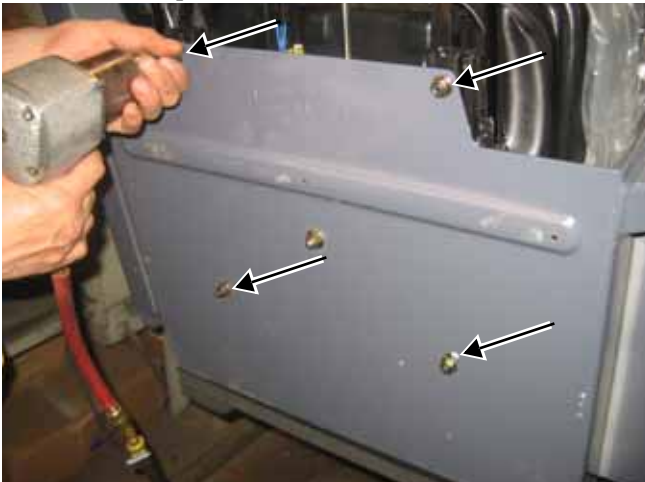
Shut off the engine.

Tilt back ROPS/FOPS until lock engages.

(For detailed instructions, refer to the *Safety* chapter of this manual.)

Removal Procedure

1. Remove four nuts from the studs attaching the seat to the seat pan underneath the ROPS.



2. Release the lock mechanism and lower the ROPS.
3. Disconnect the seat switch from the wiring harness.



4. Lift the seat from the seat pan.

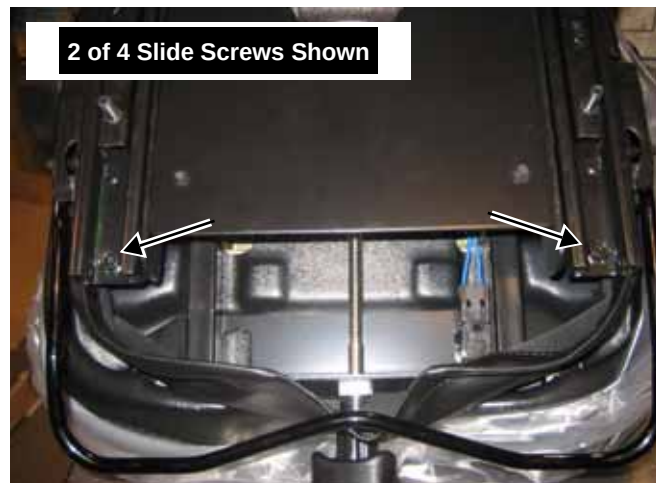


Installation Procedure - Follow all warnings first, then reverse the removal steps.

Seat Slide Replacement

Replacement Procedure

1. Remove the seat per the procedure in this chapter.
2. Remove the four screws attaching the seat slides to the seat.



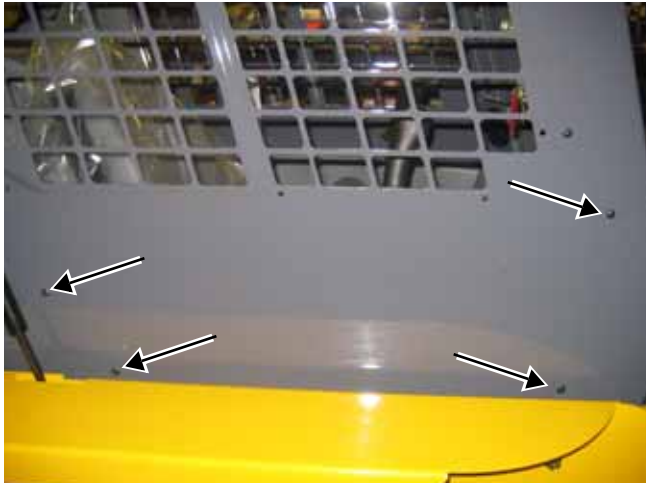
3. Replace with new slides using the existing screws.

Air Duct Removal and Installation

Air ducts in the ROPS are optional and used when heating and air-conditioning options are installed.

Removal Procedure

1. Remove the seat in the ROPS per the procedure in this chapter.
2. On the outside of the ROPS, remove the four screws securing the air ducts to the ROPS.



3. Slide the back of the air duct out first, then slide the front out. Remove air duct from ROPS.

Installation Procedure - Reverse the removal steps.

Air Duct Louver Replacement

Replacement Procedure

For 3" round louvers, open the louver, insert fingers and pop out louver. Pop new louver into existing bezel until a "click" sound indicates it is seated.

For rectangular roll nozzle louvers, unscrew the two screws securing the nozzle louver to the air duct and pull out. Press a new louver into the rectangular space and secure with two screws.

ROPS Rear Window Removal and Installation



WARNING

BEFORE beginning this service procedure, perform the following **SAFETY** procedure:

Shut off the engine.

(For detailed instructions, refer to the Safety chapter of this manual.)

Removal Procedure

1. Grab and pull emergency exit tag until the ripcord pulls free of rubber seal.
2. With an assistant outside the ROPS to catch the window, push window outward.



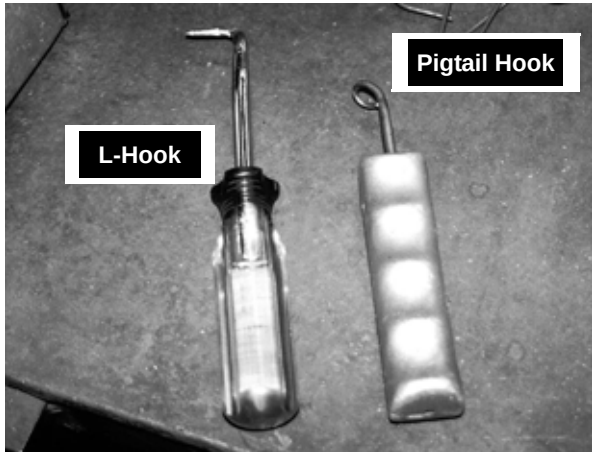
3. Slowly pull weatherstrip away from window frame.



Installation Procedure

1. Recommended but not required: Mix a solution of 10% liquid dish soap and 90% water in a spray bottle.

NOTE: To install the rear window, obtain two insert tools from your glass dealer.



2. Apply soap solution to window, weatherstrip and metal frame surfaces.
3. Start at top of window frame and install weatherstrip with the ripcord lip facing inside the ROPS and the glass lip facing out.
4. From inside the ROPS, spray soap solution between glass window and inside edge of rear window.
5. Use L-hook tool between glass and weatherstrip and work it underneath the glass. Lift the glass lip up over the weatherstrip.

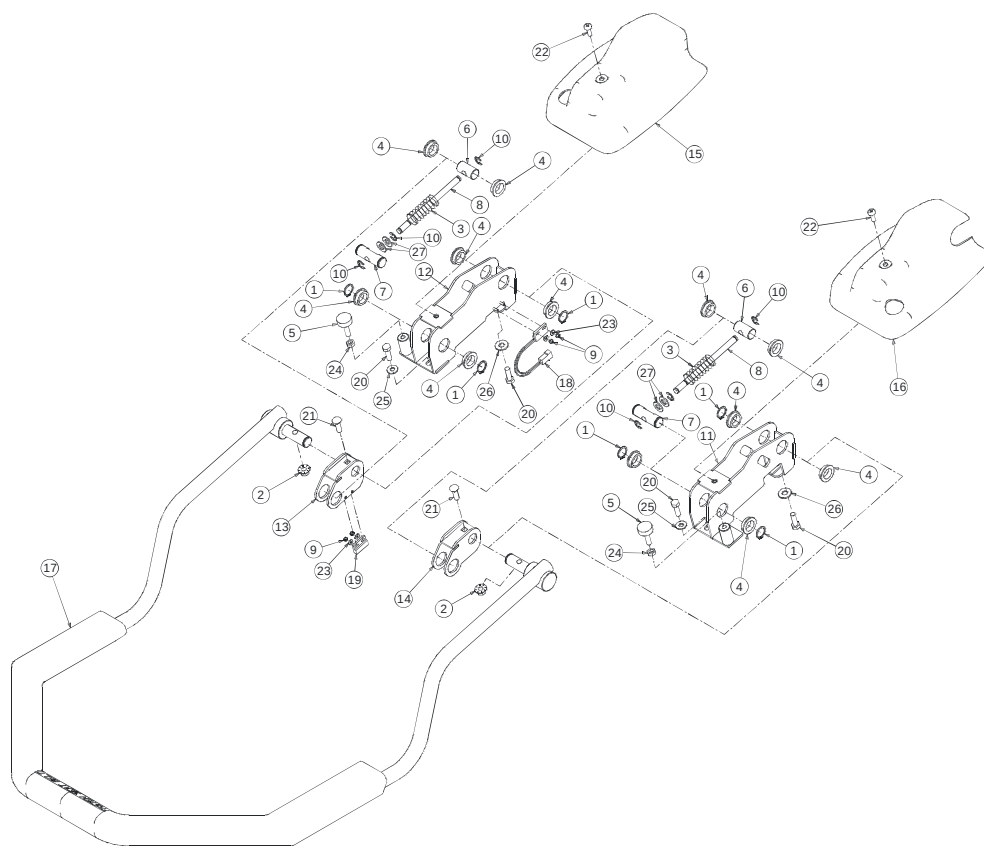


6. Use the pigtail hook tool to “pull down” weatherstrip seal on the outside of the ROPS to secure the window.



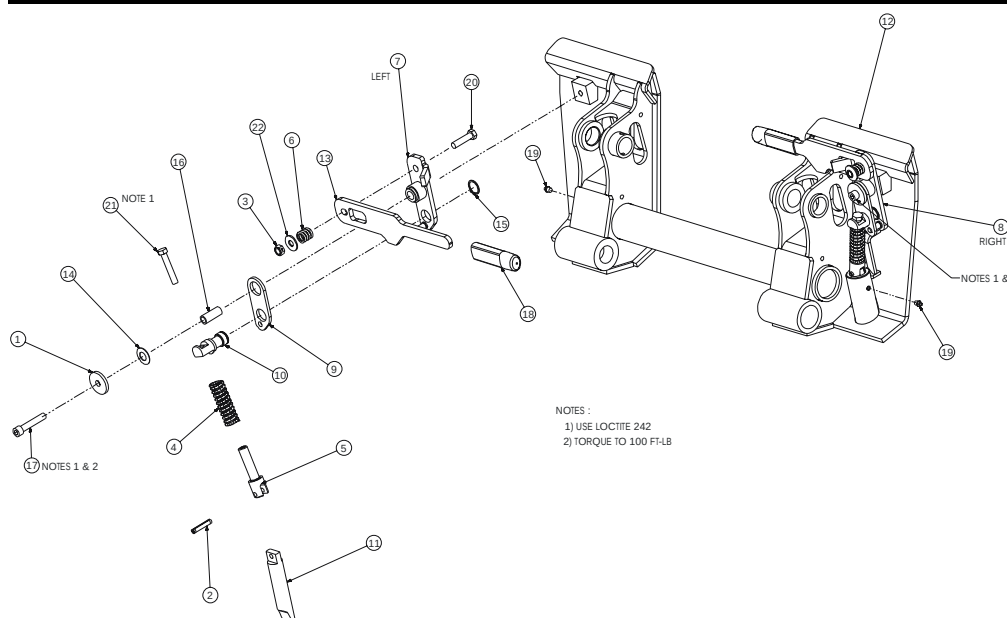
7. On the inside of the ROPS, install the ripcord in the ripcord lip, starting at top of weatherstrip. Be sure to have emergency exit tag slipped over the ripcord before performing this step.
8. Using L-hook tool, secure the ripcord in the ripcord lip by “pulling down” the lip over the cord.
9. Test the window for security and mating of all seals.

Restraint Bar Components

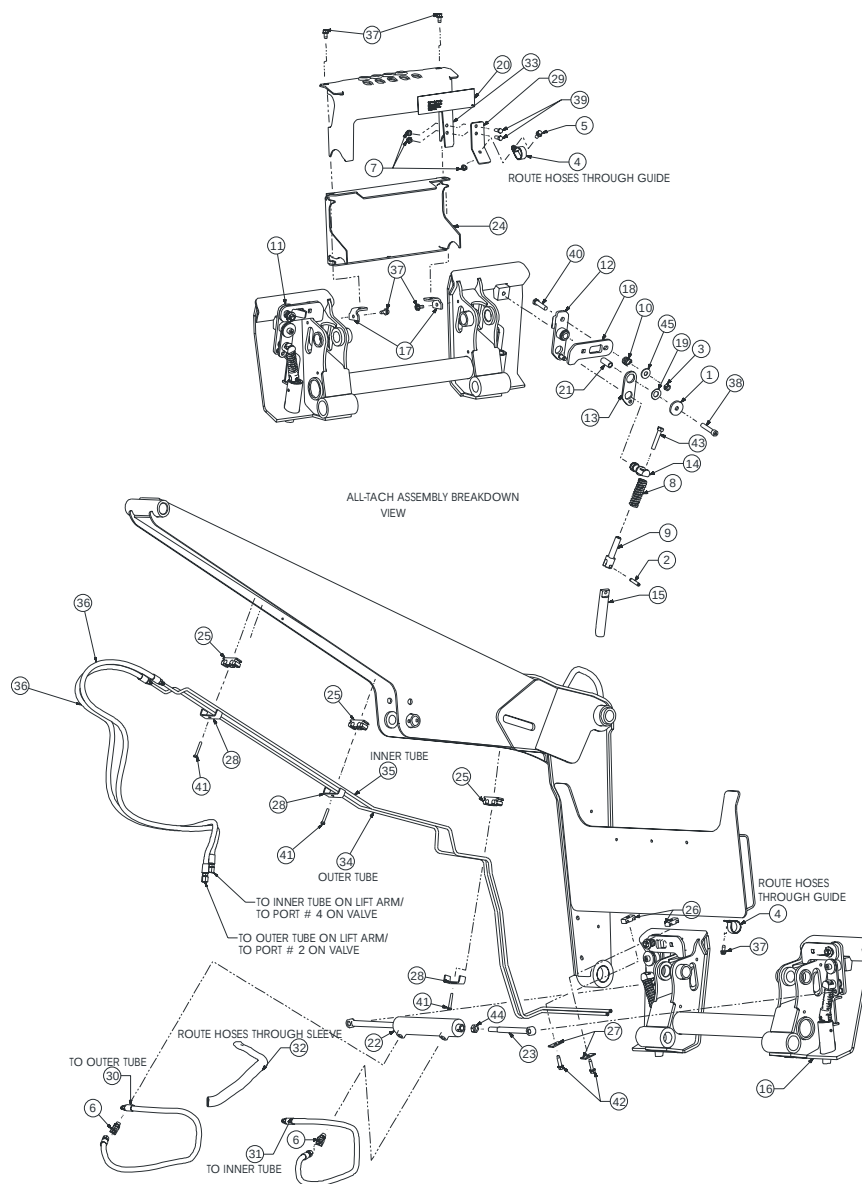


- 1 RING/RETAINING
- 2 NUT/SERRATED LOCK
- 3 SPRING/COMPRESSION
- 4 BUSHING/PIVOT
- 5 BUMPER
- 6 PIN/PIVOT
- 7 PIN/PIVOT GROOVED
- 8 ROD/SPRING GUIDE
- 9 NUT/HEX NYLON INSERT
- 10 CLIP/RETAINING
- 11 ASSY/PIVOT BRACKET
- 12 BRACKET/PIVOT
- 13 ASSY/PIVOT BRACKET
- 14 ASSY/PIVOT BRACKET
- 15 COVER/RIGHT/
- 16 COVER/LEFT/
- 17 BAR/RESTRAINT W/PAD
- 18 SWITCH/PROXIMITY
- 19 MAGNET/SWITCH
- 20 SCREW/CAP
- 21 BOLT/CARRIAGE
- 22 SCREW/PHILLIPS
- 23 WASHER/FLAT
- 24 NUT/HEX JAM
- 25 WASHER/FLAT
- 26 WASHER/FLAT
- 27 WASHER/FLAT

Multi-Tach™ Components



- 1 WASHER/FLAT
- 2 PIN/SPRING
- 3 NUT/LOCK
- 4 SPRING/COMPRESSION
- 5 ROD/PUSH
- 6 SPRING/COMPRESSION
- 7 LINK/LATCH LEFT
- 8 LINK/LATCH RIGHT
- 9 PLATE/LATCH LINK
- 10 ADAPTOR/PUSH ROD
- 11 PIN/LATCH
- 12 ALL-TACH®
- 13 HANDLE
- 14 WASHER/BEVEL
- 15 RING/RETAINING
- 16 SPACER
- 17 SCREW/CAP
- 18 GRIPS
- 19 FITTING/GREASE
- 20 SCREW/CAP
- 21 SCREW/CAP
- 22 WASHER/FLAT

Power-A-Tach[®] Components

- | | | | | | |
|----|--------------------|----|---------------------------|----|----------------------|
| 1 | WASHER/FLAT | 16 | Power-A-Tach [®] | 31 | HOSE/MEDIUM PRESSURE |
| 2 | PIN/SPRING | 17 | BRACKET/COVER SUPPORT | 32 | SLEEVE/PROTECTIVE |
| 3 | NUT/LOCK | 18 | FLAG | 33 | COVER/BACK |
| 4 | CLAMP/HOSE | 19 | WASHER/BEVEL | 34 | POWER TUBE/OUTSIDE |
| 5 | SCREW/CAP | 20 | DECAL | 35 | POWER TUBE/INSIDE |
| 6 | FITTING/45° | 21 | SPACER | 36 | HOSE/MEDIUM PRESSURE |
| 7 | NUT/LOCK FLANGE | 22 | CYLINDER/POWER | 37 | SCREW/SELF-TAPPING |
| 8 | SPRING/COMPRESSION | 23 | ROD/EXTENSION | 38 | SCREW/CAP |
| 9 | ROD/PUSH | 24 | COVER/FRONT | 39 | SCREW/CAP |
| 10 | SPRING/COMPRESSION | 25 | CLAMP/DUAL TUBE | 40 | SCREW/CAP |
| 11 | LINK/LATCH LEFT | 26 | CLAMP/DUAL TUBE | 41 | SCREW/CAP |
| 12 | LINK/LATCH RIGHT | 27 | TUBE CLAMP/PLATE | 42 | SCREW/TAPPING |
| 13 | PLATE/LATCH LINK | 28 | TUBE CLAMP/PLATE | 43 | SCREW/CAP |
| 14 | ADAPTOR/PUSH ROD | 29 | PLATE/MULTI-TACH™ | 44 | NUT/HEX JAM |
| 15 | PIN/LATCH | 30 | HOSE/MEDIUM PRESSURE | 45 | WASHER/FLAT |

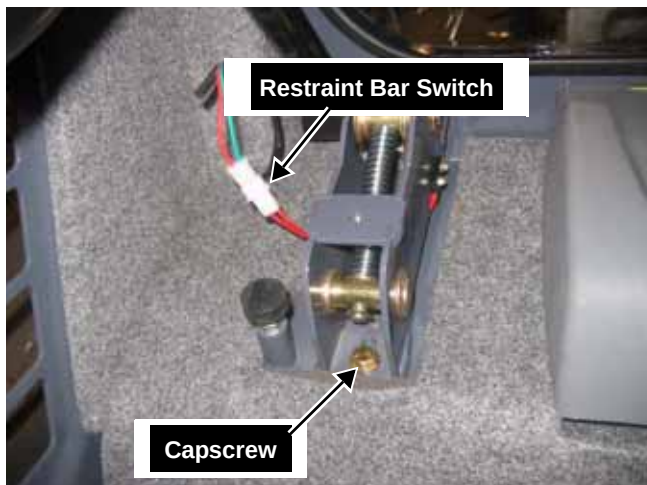
Restraint Bar Removal and Installation

Removal Procedure

1. Raise the engine cover.
2. Underneath the ROPS, remove the two capscrews securing the rear pivots of the restraint bar.



3. Inside the ROPS, remove one screw securing the pivot cover and remove the cover.
4. Disconnect the restraint bar switch from the wire harness located above the restraint bar on the right side.



5. Remove one capscrew on each side securing front of restraint bar pivot to ROPS. Lift restraint bar up and out of loader.

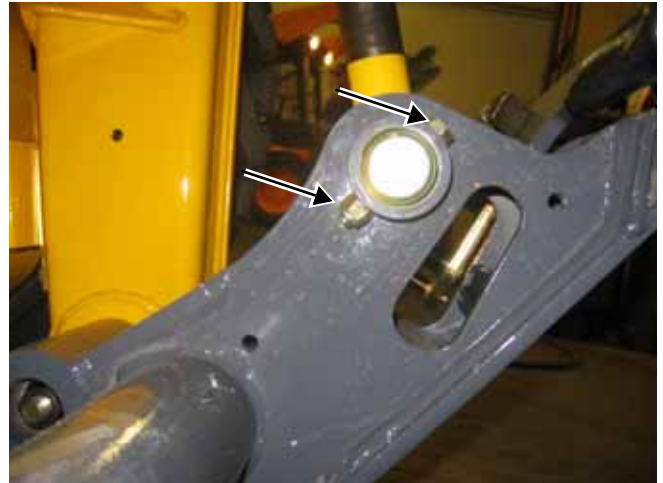
NOTE: For restraint bar switch removal, refer to the *Electrical System* chapter.

Installation Procedure - Reverse the removal steps.

Mustang Multi-Tach[®] or Power-A-Tach[®] Hitch Removal and Installation

Removal Procedure

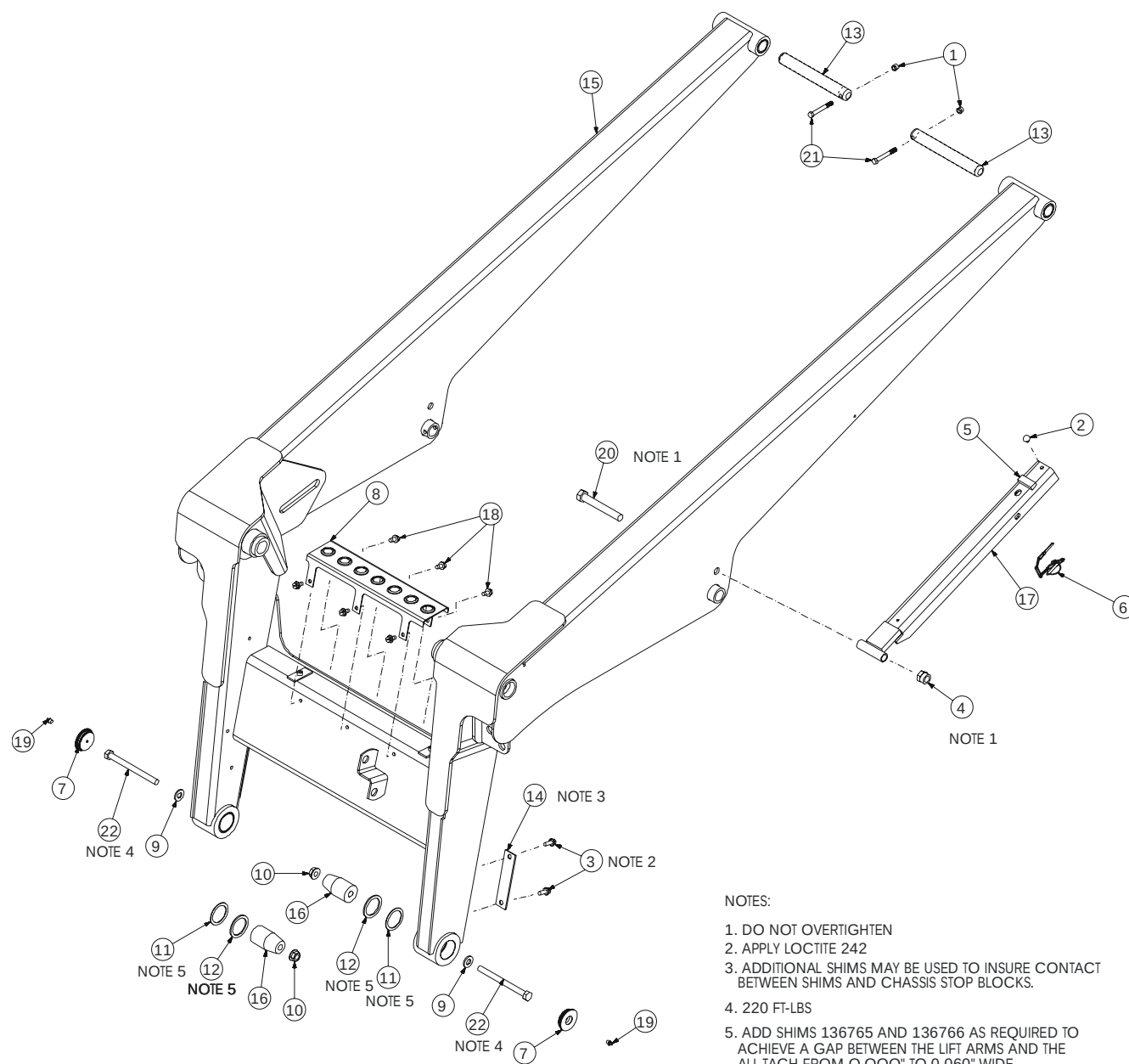
1. Lower the lift arm and slightly extend the two tilt cylinders.
2. While supporting the tilt cylinder, remove two cap-screws and locknuts securing the lower tilt cylinder pivot pins, and drive the lower pivot pins out of their mounts.



3. Using a flat-tip screwdriver, pry the grease caps off the lift arm. Remove the grease caps.



Lift Arm Components



NOTES:

1. DO NOT OVERTIGHTEN
2. APPLY LOCTITE 242
3. ADDITIONAL SHIMS MAY BE USED TO INSURE CONTACT BETWEEN SHIMS AND CHASSIS STOP BLOCKS.
4. 220 FT-LBS
5. ADD SHIMS 136765 AND 136766 AS REQUIRED TO ACHIEVE A GAP BETWEEN THE LIFT ARMS AND THE ALL-TACH FROM 0.000" TO 0.060" WIDE.

- 1 NUT/HEX LOCK
- 2 STEM/RUBBER
- 3 SCREW/CAP
- 4 NUT/HEX
- 5 PAD/ARM BRACE
- 6 PIN/KLIK
- 7 CAP/GREASE
- 8 STEP

- 9 WASHER/FLAT
- 10 NUT/SPIRALOCK
- 11 SHIM
- 12 SHIM
- 13 PIN
- 14 SHIM
- 15 LIFT ARM

- 16 PIN/MULTI-TACH™ PIVOT
- 17 ARM/SAFETY
- 18 SCREW/SELF-TAPPING
- 19 FITTING/GREASE
- 20 SCREW/CAP
- 21 SCREW/CAP
- 22 SCREW/CAP

4. Inside the lift arm, opposite the grease caps, remove the capscrew, washer and locknut securing the pivot pins to the hitch assembly.



NOTE: Support the hitch with suitable hoisting equipment before performing the next step.

5. Insert a 5/8" x 6" capscrew into each pivot pin and force the pin out by hammering on the capscrew.



WARNING

ALWAYS wear safety glasses with side shields when operating the machine or striking metal against metal. In addition, it is recommended that a softer (chip-resistant) material be used to cushion the blow. Failure to heed could lead to serious injury to eyes or other parts of the body.

Installation Procedure - Reverse the removal steps.

Lift Arm Removal and Installation

Removal Procedure

1. Lower the lift arm.
2. Remove the bucket or attachment from the loader.



WARNING

BEFORE continuing this service procedure, perform the following **SAFETY** procedures:

Shut off the engine.

Relieve hydraulic system pressure.

(For detailed instructions, refer to the *Safety* chapter of this manual.)

3. Attach a suitable hoist to the lift arm.
4. Remove the locknut and capscrew that secures the lift cylinder pivot pin to the lift arm.



5. While supporting the lift cylinder, remove the lift cylinder pin from the lift arm.
6. Repeat steps 4 and 5 for other side of the lift arm.

NOTE: Always clean around hydraulic fittings before disconnecting any hydraulic line. When removing hydraulic lines, cap or plug the ends to prevent contaminating the hydraulic system.

NOTE: To help in the correct reassembly of the hydraulic hoses and tubes, mark them prior to disassembly with an oil-resistant chalk or marker or other suitable marking material.

7. Disconnect upper and lower tilt cylinder hoses from steel tubes on top of lift arm crossmember.



8. Repeat step 7 for other side of the lift arm crossmember.
9. Remove the hitch per the procedure in this chapter.
10. Remove both tilt cylinders from the lift arm per the procedure in the *Hydraulics System* chapter.
11. Remove six capscrews securing the step to the top of the lift arm crossmember.



12. Remove capscrews, cover plates and tube clamps from tilt tubes. Remove the tilt tubes.
13. Using a suitable hoist, raise lift arm to gain access to the hydraulic hoses and the lift tube fittings.
14. Disconnect hydraulic hoses from hydraulic tubes on both sides of the lift arm.

15. On High-Flow models there are three additional high-flow hydraulics tubes on the right side of the lift arm to remove.



16. Disconnect the hydraulic tubes from the couplers and remove the couplers from the lift arm.

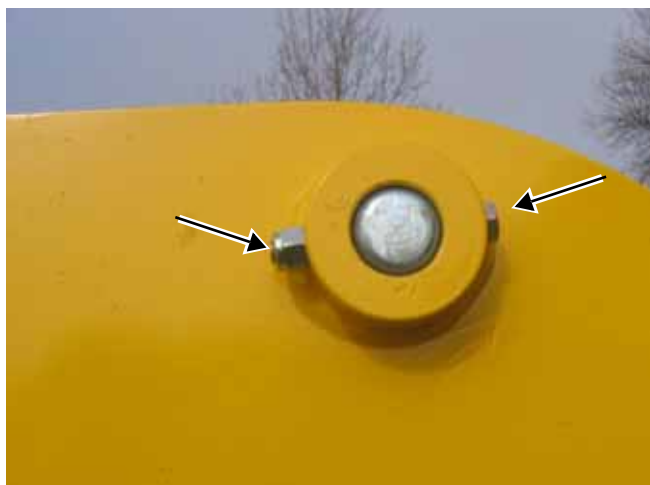


17. Remove the capscrews, cover plates, and tube clamps securing the hydraulic tubes to the lift arm. Remove the hydraulic tubes from the lift arm.





18. Remove the capscrew and locknut securing the lift arm pivot pin to the chassis. Repeat for the opposite side.



19. Drive the lift arm pivot pins out of the chassis.
20. Remove the lift arm assembly from the loader with a suitable hoist.

Installation Procedure

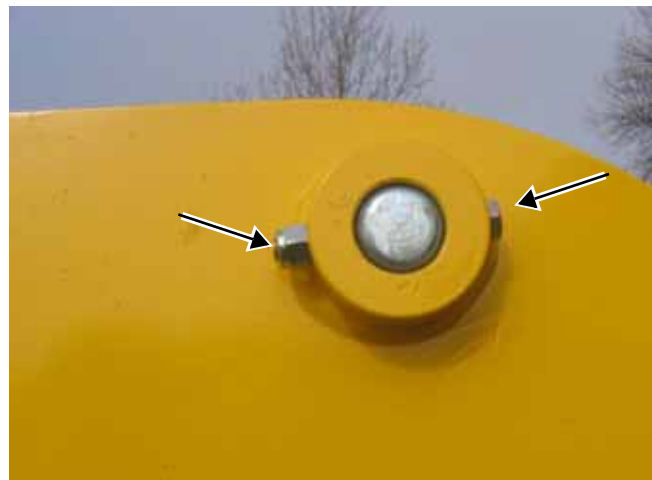
1. Use a suitable hoist to position the lift arm assembly on the chassis.

NOTE: Align the lift arm in a manner that allows access to the hydraulic hose and tilt tube fittings that will be attached to the underside of the lift arm.

2. Secure the lift arm to the chassis riser with two pivot pins.

NOTE: Refer to the lift arm bushing installation procedure in this chapter if bushings require replacement.

3. Secure the lift arm pivot pin in place with two cap screws and locknuts.



4. Before assembly, clean all the hydraulic fittings to prevent contamination of the hydraulic system.

NOTE: For location of the hydraulic hose and tube mounting hardware refer to the Hydraulics System chapter.

5. Attach the couplers and hydraulic tubes to the lift arm with cap screws, tube clamps and cover plates.





6. Connect the hydraulic tubes to the hydraulic hose assemblies according to markings made at removal. On High-Flow models, there are three additional high-flow hydraulic tubes on the right side of the lift arm to attach. If no markings were made prior to removal, refer to the Hydraulics System chapter for the correct fit-up.



7. Attach the tilt cylinder tubes to crossmember with a clamp and capscrew.
8. Attach the tilt tubes to the lift arm crossmember with the capscrews, cover plates and tube clamps used to secure them.

9. Attach the step to the top of the lift arm crossmember with six capscrews.



10. Using the hoist, lower the lift arm.
11. Install the tilt cylinders on the lift arm as per the procedure in the *Hydraulics System* chapter.
12. Install the hitch per the procedure in this chapter.
13. Connect the lower and upper tilt cylinder hoses to the steel tubes on the top of the lift arm crossmember.



14. Connect the lift cylinder to the lower lift arm with a pivot pin, capscrew and locknut. Repeat this step for the other side.

NOTE: After removing/replacing any components of the lift and tilt system, ALWAYS prime hydraulic system by operating the lift arm attachment (NO LOAD) slowly up and down for several cycles. Check system for hydraulic oil leaks following guidelines in the *Safety* chapter. Fill the hydraulic reservoir until fluid becomes visible in the hydraulic oil level sight gauge on the inside of the right lift arm riser.

Lift Arm Bushing Replacement



WARNING

ALWAYS wear safety glasses with side shields when operating the machine or striking metal against metal. In addition, it is recommended that a softer (chip-resistant) material be used to cushion the blow. Failure to heed could lead to serious injury to eyes or other parts of the body.

Replacement Procedure

1. Remove the lift arm from the loader per the procedure in this chapter.
2. Use a punch to drive out the four upper lift arm bushings, two on each side of the lift arm.

NOTE: Applying heat to the upper lift arm bushings will release the adhesive and simplify removal.

3. Clean inside the opening to provide a smooth surface for installation of the new bushings.
4. Apply Loctite® 680 or equivalent to the new lift arm bushings and press or drive them into the lift arm.
5. If replacing the spring bushing in each lower lift arm, use a punch to drive them out of the lift arm.
6. Install new spring bushings by pressing them into place or using a rubber mallet to drive them into the lift arm.
7. Reinstall the lift arm on the loader per the procedure in this chapter.

Lift Arm Stop Installation and Adjustment

Installation/Adjustment Procedure

NOTE: lift arm stops should be shimmed as needed to ensure a gap of no more than 1/8" (3 mm) between the stops and the lift arm when the lift arm is fully lowered.

1. Lower lift arm and measure gaps between stops and lift arm.

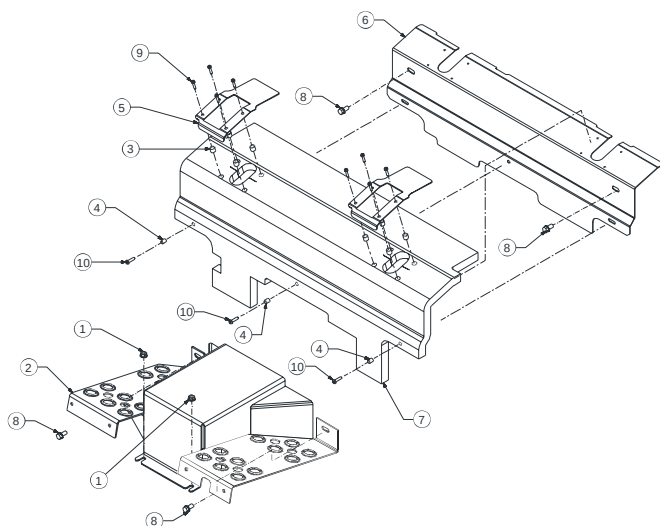


NOTE: It will be necessary to add one shim for every 1/8" (3 mm) gap.

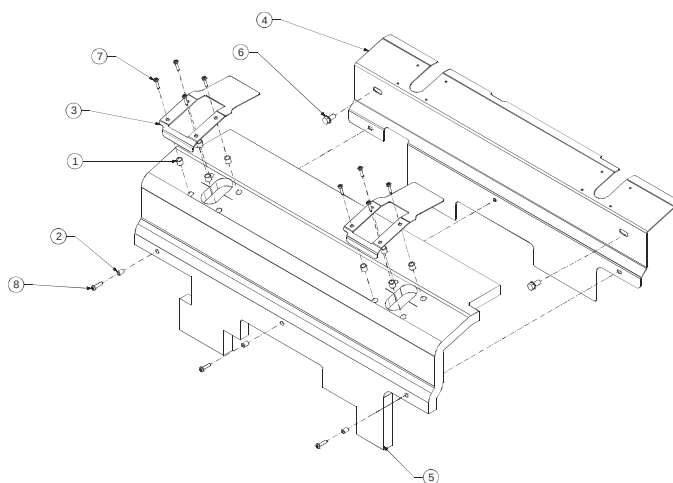
2. Raise lift arm and engage the lift arm support device.
3. Remove two capscrews on each stack of shims.
4. Install shim(s) and secure with capscrews. Use Loctite® 242 or equivalent retaining compound.
5. Start engine and lower lift arm. Verify gaps and repeat procedure as needed.

Control Cover Components

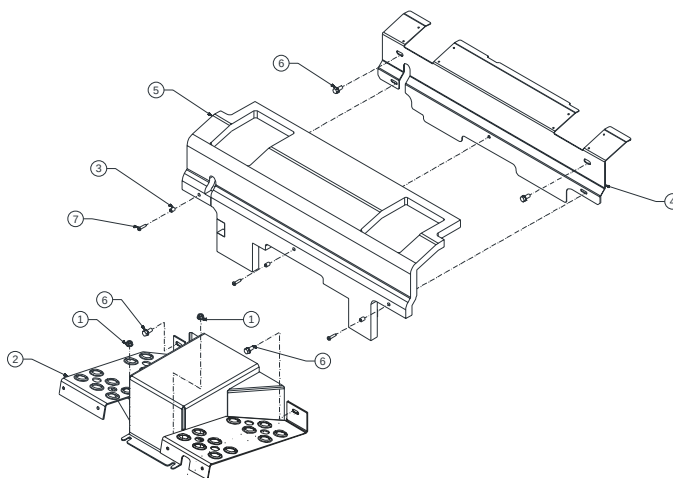
Dual Hand Controls



Hand/Foot Controls



Dual Joystick Controls



Dual Hand Controls

- 1 NUT/SPIRALOCK™
- 2 ASSY/FRONT FLOOR
- 3 SUPPORT/BOOT BEZEL
- 4 SPACER
- 5 COVER/BOOT
- 6 COVER/CONTROLS
- 7 PAD/SOUND
- 8 SCREW/MACHINE
- 9 SCREW/TAPPING
- 10 SCREW/TRUSS

Hand/Foot Controls

- 1 SUPPORT/BOOT BEZEL
- 2 SPACER
- 3 COVER/BOOT
- 4 COVER/CONTROLS
- 5 PAD/SOUND
- 6 SCREW/MACHINE
- 7 SCREW/TAPPING
- 8 SCREW/TRUSS

Dual Joystick Controls

- 1 NUT/SPIRALOCK™
- 2 ASSY/FRONT FLOOR
- 3 SPACER
- 4 COVER/CONTROLS
- 5 SOUND PAD/HEEL
- 6 SCREW/MACHINE
- 7 SCREW/TRUSS

Floor Cover/Control Cover Removal and Installation

The floor cover and control cover may be removed for access to handle assemblies, control linkages and connections to control rods, cables and hoses.



WARNING

BEFORE beginning this service procedure, perform the following **SAFETY** procedures:

Raise lift arm, engage lift arm support device.

Shut off the engine.

Tilt back ROPS/FOPS until lock engages.

(For detailed instructions, refer to the *Safety* chapter of this manual.)

Removal Procedure

1. At the front of the sound pad, remove the three screws securing the sound pad to the control cover.



2. Remove the five self-tapping screws securing the rubber boot flanges to the control cover on two drive stands.



3. Lift the rubber boots up, turning them inside out and carefully lift the sound pad up and off the control cover to retain the spacers.
4. At the floor covers:

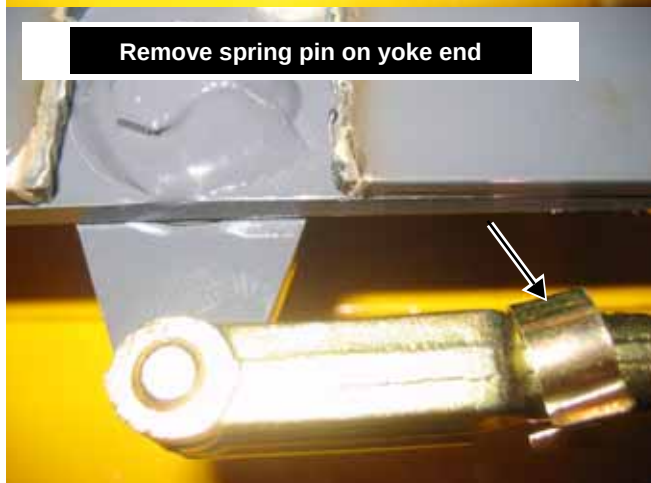
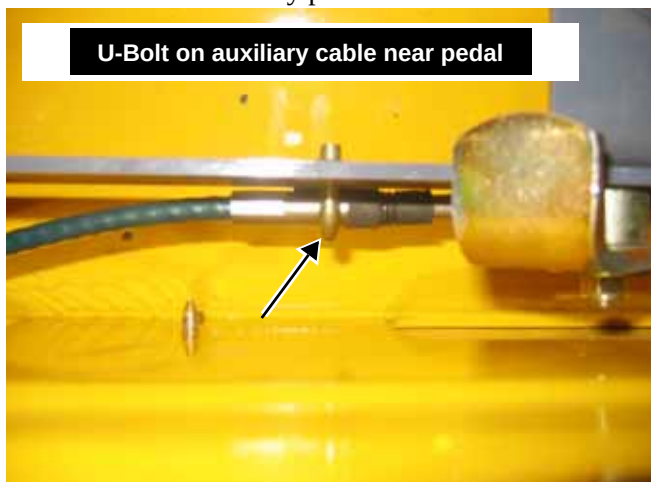
Hand/Foot Controls - Remove the four locking capscrews securing linkage cover to the floor of the chassis and lift the cover out of the chassis.



Dual Hand and Dual Joystick Controls - Remove the two locknuts securing the floor cover to the control cover, and the two machine screws at the front of the floor cover securing the floor cover to the chassis.



Dual Hand Controls - Remove the toeplate and disconnect the auxiliary cable from the cable bracket and auxiliary pedal.



5. Remove the floor cover.



6. Unbolt the two machine screws securing the control cover plate to the crossmember.



7. Lift the control cover forward and up and out of the chassis.



Installation Procedure - Reverse the removal steps.

Crossmember Removal and Installation

The crossmember can be removed as a complete unit with the control handles to facilitate work on the hydraulic/hydrostatic tandem pump found beneath it or to perform work on the control handles.

Removal Procedure



WARNING

BEFORE beginning this service procedure, perform the following **SAFETY** procedures:

Raise lift arm; engage lift arm support device.

Shut off the engine.

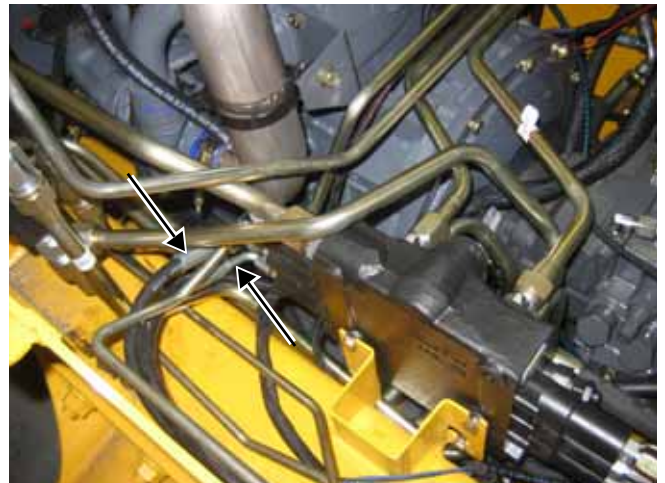
Tilt back ROPS/FOPS until lock engages.

(For detailed instructions, refer to the *Safety* chapter of this manual.)

1. Remove the floor cover and control cover per the procedure in this chapter.

2. At the main control valve:

Dual Joystick Controls: Disconnect the two hoses at front of the control valve and the two hoses at the rear of the control valve.



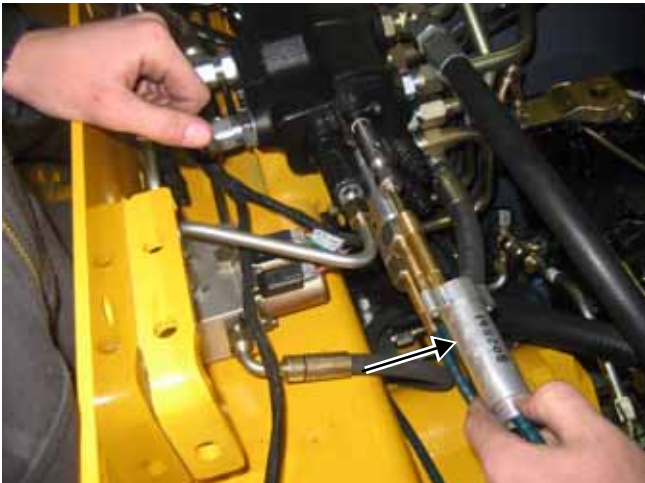
Dual Hand Controls: Disconnect the lift and tilt control cables at the control valve.



Unscrew the cable end from the bonnet.



Remove the two capscrews securing each bonnet.



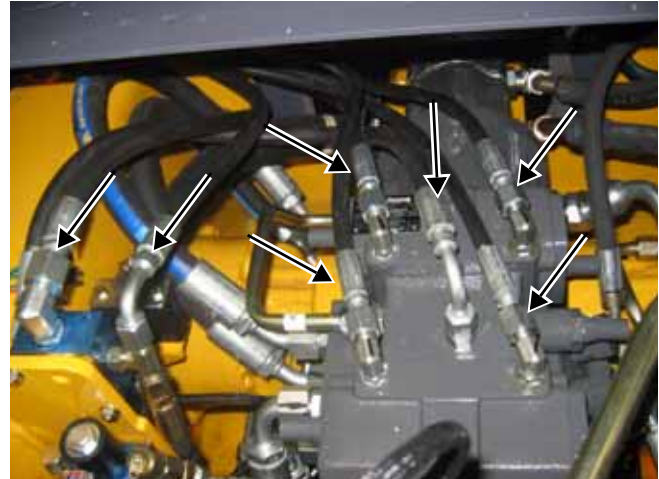
Remove the pins securing the lift and tilt cables to the control valve, and remove the cables.



3. **Dual Hand and Hand/Foot Controls:** Underneath the crossmember, locate the two wheel drive control rods that connect the pivot tube to the top of the hydrostatic pump at the pump control arms. Disconnect both control rods at the pivot tube.



4. **Dual Joystick Controls:** Disconnect five pressure hoses at the hydrostatic pump and two pressure hoses on a solenoid valve to the left of the pump.



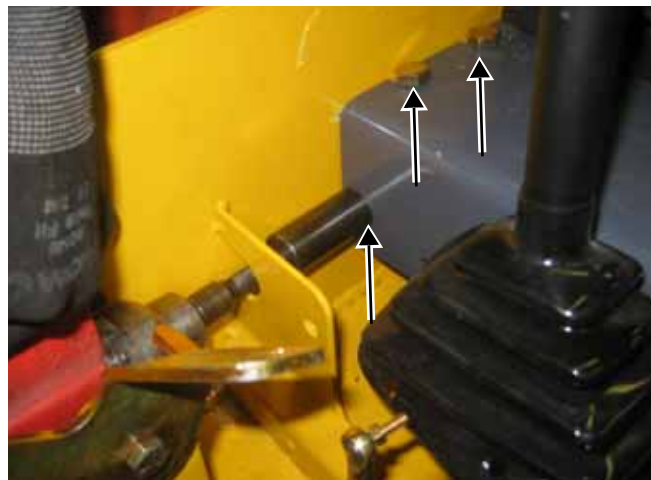
NOTE: Always clean around hydraulic fittings before disconnecting any hydraulic line. When removing hydraulic lines, cap or plug the ends to prevent contaminating the hydraulic system.

NOTE: To help in the correct reassembly of the hydraulic hoses and tubes, mark them prior to disassembly with an oil-resistant chalk or marker or other suitable marking material.

5. Disconnect any electrical connectors attached to the control handles.



8. Remove the three locking capscrews securing the crossmember to the chassis on each side.



6. On the outside of the chassis, remove the three capscrews securing the ROPS filler panels on each side of the chassis and remove the panels.



9. With an assistant's help, carefully lift the crossmember out of the chassis.



7. On the inside of the chassis, remove the two capscrews and locknuts securing the ROPS filler panels to the crossmember.



Installation Procedure - Follow all warnings first, then reverse the removal steps.

Fuel Sensor Removal and Installation

Removal Procedure



WARNING

BEFORE beginning this service procedure, perform the following **SAFETY** procedures:

Shut off the engine.

(For detailed instructions, refer to the *Safety* chapter of this manual.)

1. Drain fuel tank into a clean approved container. Drain fuel below the sensor mounting ($\frac{1}{2}$ full).
2. Disconnect the two wires from the sensor.



3. Remove the five screws securing the sensor, then remove the sensor and gasket from the tank.



Installation Procedure

1. Clean old gasket adhesive off fuel tank.
2. Install new gasket using Form-A-Gasket #765-1211 (or equivalent) to seal sensor opening on fuel tank.



3. With the float to the rear of the fuel tank, install the sensor in the fuel tank.
4. Install four of the five screws through the sensor into the fuel tank. **DO NOT OVERTIGHTEN.**
5. Attach #25 (brown) wire to center stud with a nut, and #0 (black) wire to ground stud with the fifth screw.

Rear Grille Removal and Installation

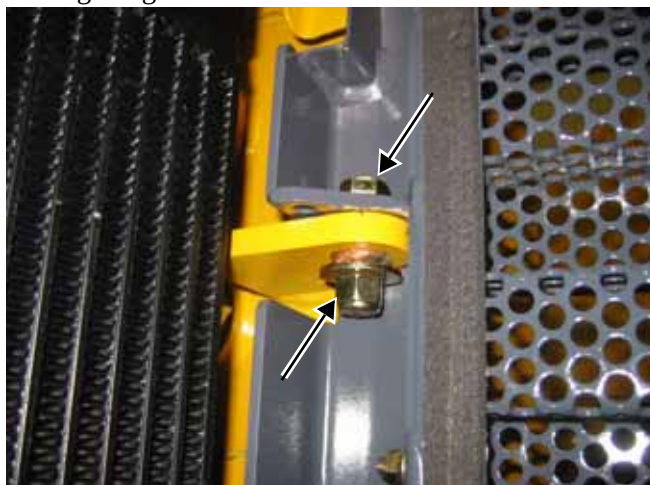
The rear grille is bolted onto the chassis and can be removed to perform work on the cooling system, engine, engine fan and shrouds.

Removal Procedure

1. Open the engine access cover and swing the rear grille fully open.
2. Disconnect the tail lights wire harness.



3. Remove one capscrew, washer and locknut fastening the grille to the chassis.



4. Support the rear grille with a suitable hoist and lift the rear grille off its mounts.

Installation Procedure - Reverse the removal steps.

Rear Grille Latch Removal and Installation

Removal Procedure

1. Open the rear grille and lock open with the lock pin.



2. Remove the two locknuts securing the latch to the rear grille.



3. Pull out the two carriage bolts, washers and bushing and remove the latch.

Installation Procedure - Reverse the removal steps.

CHAPTER NOTES

Introduction

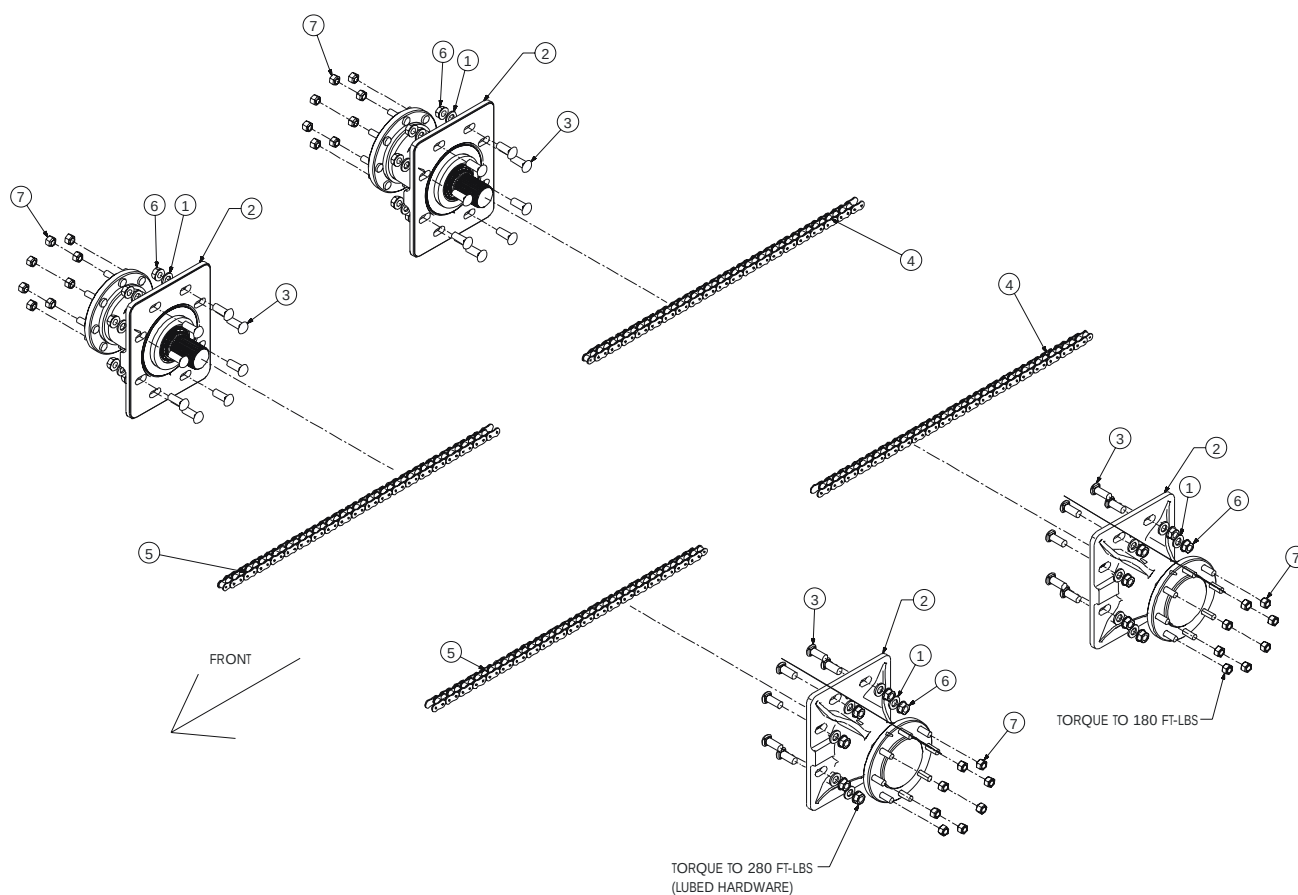
This chapter covers removal, installation, assembly and adjustment procedures for wheel drive system components on 2056 model skid-steer loaders. Wheel drive components covered in this chapter are shown below.

2056 model skid-steer loaders are equipped with a hydrostatic pump assembly coupled to the diesel engine, providing hydrostatic power to the two fixed-displacement hydrostatic drive motors. The drive

motors are directly connected to chaincases. Single-speed or two-speed, each motor drives one set of wheels on each side of the loader through a chain and sprocket system.

Service procedures related to the hydrostatic pump and drive motors can be found in the *Hydrostatic System* chapter.

Wheel Drive Components



- 1 WASHER/FLAT HARDENED
- 2 ASSY/AXLE
- 3 BOLT/CARRIAGE
- 4 CHAIN
- 5 CHAIN
- 6 NUT/SPIRALLOCK
- 7 NUT/WHEEL
- 8 SPROCKET

Drive Chain Adjustment

Skid-steer loader drive chain tension should be checked every 250 hours of operation.

Adjustment Procedure



WARNING

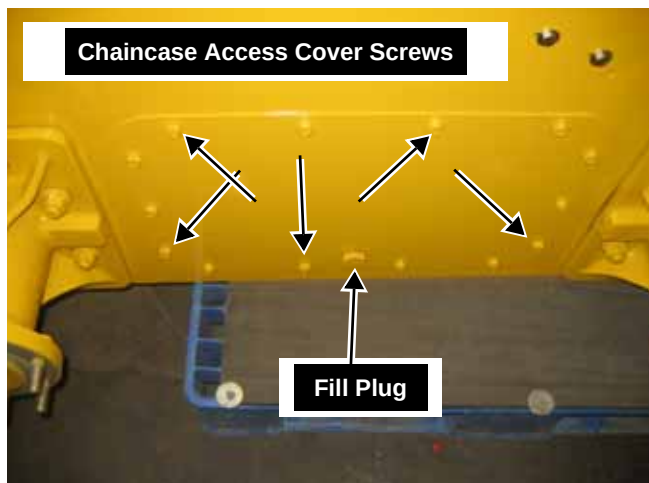
BEFORE beginning this service procedure, perform the following **SAFETY** procedures:

Shut off the engine.

Raise and securely block the loader so all four tires are off the ground.

(For detailed instructions, refer to the *Safety* chapter of this manual.)

1. Remove the wheels and tires on the side of the loader to be serviced.
2. Remove 14 tapping screws on the chaincase access cover (between tires) to gain access to the drive chain.



3. Drain the oil from the chaincase. See the procedure in the *Lubrication* chapter.
4. Correct chain deflection is 1/2" @ 20 lbs. force (13 mm @ 89 N) - halfway between the sprockets.
5. To adjust chain tension, loosen the eight locknuts on two axles on one side of the loader. Using a

spreader bar, push the axles outward in their slots to tighten the chain.



6. After the proper chain tension is obtained, retighten the locknuts on the axle. Axle housing locknuts should be torqued to 280 ft.-lbs. (380 N•m).

NOTE: The drive chain must have a minimum of 1/2" (13 mm) deflection; overtightening causes premature drive chain and sprocket wear.

7. Scrape off the old oil-resistant RTV and reapply new RTV. Reinstall the access cover.



8. Remove the fill plug on the chaincase access cover.
9. Refill the chaincase oil until the oil is up to the fill plug.
10. Reinstall the wheels and tires. Wheel nut torque is: 180 ft.-lbs. (244 N•m).
11. Repeat the adjustment procedure for the other side.

Axle Housing Assembly Removal and Installation

Removal Procedure



WARNING

BEFORE beginning this service procedure, perform the following SAFETY procedures:

Shut off the engine.

Raise and securely block the loader so all four tires are off the ground.

(For detailed instructions, refer to the *Safety* chapter of this manual.)

1. Remove the wheels and tires on the side of loader being serviced.
2. Drain the oil from the chaincase. See the procedure in the *Lubrication* chapter.
3. Remove the chaincase access cover.
4. Attach a suitable hoist to the axle assembly to support the weight of the assembly. Remove the eight locknuts and washers attaching the axle housing to the chassis.



5. Pull the axle housing away from the chassis.

NOTE: It may be necessary to insert a pry bar or chisel between the chassis and axle housing to loosen the axles.

Installation Procedure

1. Support the axle housing assembly with a suitable hoist.
2. Install a new o-ring on the axle housing assembly and secure it with grease.
3. Align the holes in the axle housing with the studs in the chassis and push the axle housing into place.
4. Install the eight washers and locknuts securing the axle housing to the chassis (hand tighten at this point).
5. Install and adjust the drive chains per the procedure in this chapter. Axle nut torque is 280 ft.-lbs. (380 N•m).
6. Reinstall the chaincase access cover using oil-resistant RTV sealant (or equivalent) between the cover and the chaincase.
7. Refill the chaincase oil until the oil is up to the fill plug.



8. Reinstall the wheels and tires. Wheel nut torque is: 180 ft.-lbs. (244 N•m).
9. Repeat the adjustment procedure for the other side.

Drive Chain Removal and Installation

Removal Procedure



WARNING

BEFORE beginning this service procedure, perform the following **SAFETY** procedures:

Shut off the engine.

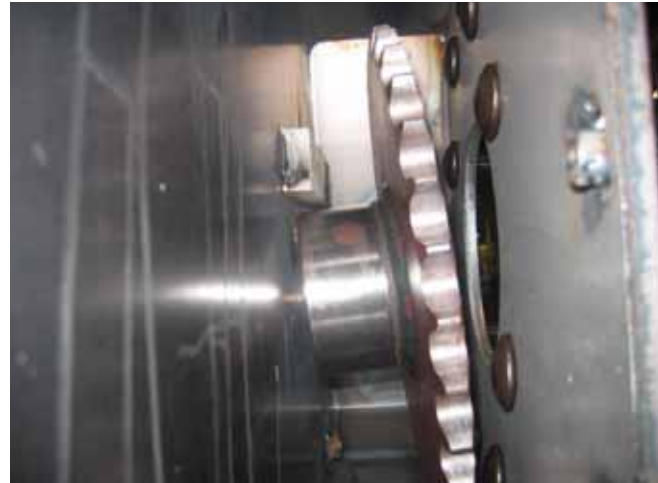
Raise and securely block the loader so all four tires are off the ground.

(For detailed instructions, refer to the *Safety* chapter of this manual.)

1. Remove the wheels and tires on the side of the loader being serviced.
2. Drain the oil from the chaincase. See the procedure in the *Lubrication* chapter.
3. Remove the 14 tapping screws on the chaincase access cover to gain access to the drive chain.
4. For each drive chain: Loosen the eight locknuts on axle assembly attached to the chain. Slide the axle assembly in its slots to loosen the chain tension.



5. Supporting the axle with a suitable hoist, pull the axle housing out of the chaincase to allow the axle housing sprocket to drop inside the chaincase.



6. Slip the drive chain off the axle housing sprocket. Then, slip the drive chain off the drive motor-sprocket.



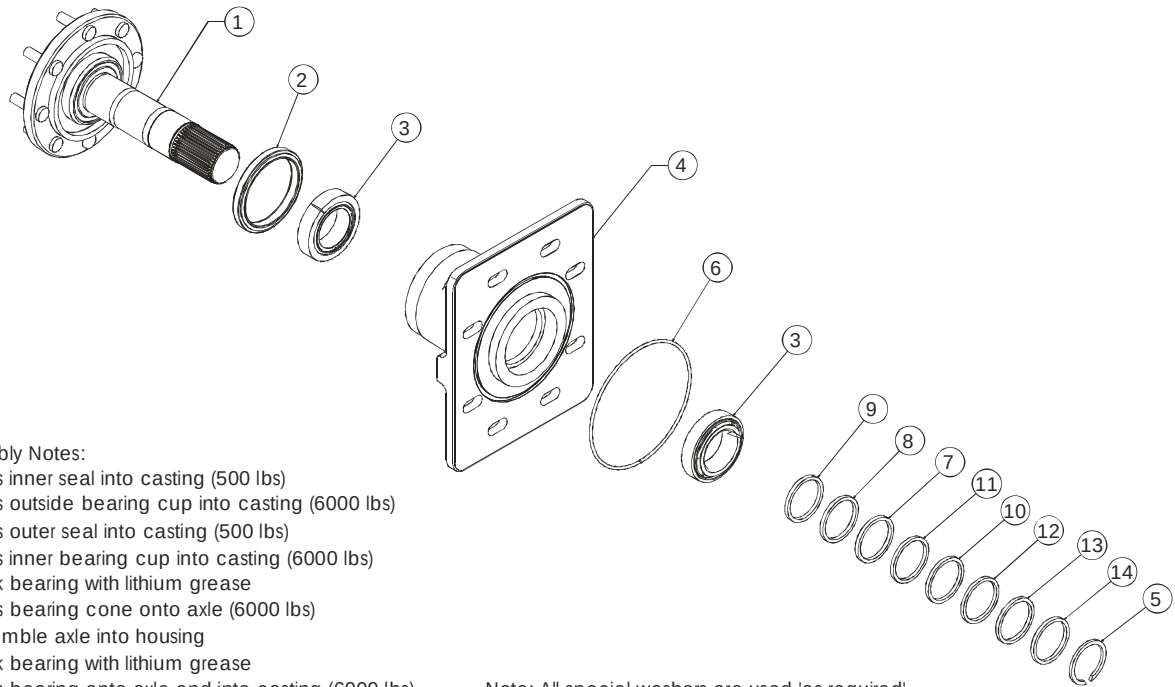
7. Remove the drive chain from the chaincase.

Installation Procedure - Follow the Removal Procedure warnings first, then:

NOTE: When installing the left and right side drive chains, install the inside chain first.

1. Wrap the chain around sprocket of the axle.
2. Wrap the chain around the drive motor sprocket.
3. Adjust the drive chain to the proper tension per the procedure in this chapter.
4. Install the chaincase access covers using oil-resistant RTV sealant (or equivalent) between the covers and chaincase. Refill the chaincase oil until the oil is up to the fill plug.
5. Reinstall the wheels and tires. Wheel nut torque is: 180 ft.-lbs. (244 N•m).

Axle Assembly Components



Assembly Notes:

- 1) Press inner seal into casting (500 lbs)
- 2) Press outside bearing cup into casting (6000 lbs)
- 3) Press outer seal into casting (500 lbs)
- 4) Press inner bearing cup into casting (6000 lbs)
- 5) Pack bearing with lithium grease
- 6) Press bearing cone onto axle (6000 lbs)
- 7) Assemble axle into housing
- 8) Pack bearing with lithium grease
- 9) Press bearing onto axle and into casting (6000 lbs)
- 10) Install retaining ring
- 11) Measure gap between bearing and snap ring
- 12) Remove retaining ring
- 13) Install special washer of appropriate thickness
- 14) Install retaining ring and remove pressure

Note: All special washers are used 'as required'

- | | |
|---|-------------------------|
| 1 | ASSEMBLY/AXLE W/ STUDS |
| 2 | SEAL/AXLE |
| 3 | SET/BEARING |
| 4 | HOUSING/AXLE/MACHINED |
| 5 | RETAINING RING/EXTERNAL |
| 6 | O-RING |
| 7 | WASHER/SPECIAL |

- | | |
|----|----------------|
| 8 | WASHER/SPECIAL |
| 9 | WASHER/SPECIAL |
| 10 | WASHER/SPECIAL |
| 11 | WASHER/SPECIAL |
| 12 | WASHER/SPECIAL |
| 13 | WASHER/SPECIAL |
| 14 | WASHER/SPECIAL |

Axle and Wheel Bearing Disassembly and Assembly

Disassembly Procedure

1. Remove the axle housing assembly per the procedure in this chapter.
2. Move the axle housing assembly to a workbench and clamp it in a vise. Use caution not to clamp the web members in a way that they might be damaged.
3. Remove the external retaining ring and washers from the axle shaft.
4. Remove the bearing cone from the axle shaft.
5. Remove the axle from the axle housing.
6. Remove the outer oil seal, double-lip seal, outer bearing cup and inner bearing cup from the axle housing.
7. Remove the bearing cone from the axle shaft.

Assembly Procedure

NOTE: Pack the tapered bearing cones with synthetic grease before assembling.



1. Place the axle housing in a vise so the axle can be rotated. Use caution not to clamp the web members of the axle housing in such a way that they might be damaged.

2. With the webs of the axle housing facing up, install the inner oil seal with a force of 500 lbf. (2,22 kN). Use suitable drivers or a press to countersink all components until they bottom out.



3. Install the bearing cup in the axle housing with a force of 6000 lbf. (26,7 kN).



4. Install the double-lip axle seal in the axle housing. Use suitable drivers or a press to countersink all components until they bottom out.



5. Turn the axle housing over and press an additional bearing cup into the other side of the axle housing with a force of 6000 lbf. (26,7 kN).
6. Place the axle shaft on a flat surface with the shaft in a vertical position. Press the bearing cone onto

the axle shaft with a suitable driver or a press at a force of 6000 lbf. (26,7 kN). Note the orientation of the first bearing cone.



7. Insert the axle shaft into the axle housing.



NOTE: Allowable end play tolerance on the axle shaft is 0.000" to 0.005" (0.0 mm to 0.127 mm) with the axle turning freely. Add shims to increase end play or remove shims to decrease end play.

8. Install the inner bearing cone with a force of 6000 lbf. (26,7 kN).



9. Install the special washer(s) of appropriate thickness to fill the space below the teeth of the axle and above the axle housing.



10. Seat the external retaining ring in the axle shaft groove and remove the pressure with a metal hammer and steel punch.



11. Apply synthetic grease on the spline of the axle shaft and the face of the axle housing to protect the o-rings and seals from damage.



12. Mount the axle housing assembly on the chassis per the procedure in this chapter.

Introduction

This chapter covers the removal, installation, assembly, and adjustment procedures for standard and optional control equipment on 2056 model skid-steer loaders.

Equipment Identification

Because there are a variety of options available for 2056 models, it is IMPORTANT to properly identify the equipment BEFORE beginning the service procedures. Illustrations and photographs are provided with procedures to aid in servicing this equipment.

Hand/Foot Controls

On skid-steer loaders with "Hand/Foot Controls," the left and right drive control handles operate independently of each other. Pushed forward together causes the skid-steer loader to move forward, but push either one farther forward than the other and the skid-steer loader turns. Separate foot pedals control the lift and tilt functions of the lift arm and bucket. Engine speed is controlled with the hand throttle lever located right of the operator's seat. A lock pin is located on the right control handle, which controls the standard auxiliary hydraulics. On high-flow models, a rocker switch in the right instrument panel activates the high-flow hydraulics.

Dual Hand Controls

On skid-steer loaders with "Dual Hand Controls," the left and right drive control handles with pivoting grips operate independently of each other. Pushed forward together causes the skid-steer loader to move forward, but push either one farther forward than the other and the skid-steer loader turns. The left control handle also operates the lift functions of the lift arm. The right control handle also operates the tilt functions of the bucket. Engine speed is controlled by the hand and/or foot throttles. Standard-flow auxiliary hydraulics is controlled by a foot pedal. On high-flow models, a rocker switch in the right instrument panel activates the high-flow hydraulics.

Dual Joystick Controls

On skid-steer loaders with "Dual Joystick Controls," the left joystick operates the drive wheels. The right joystick operates the lift and tilt functions of the lift arm and bucket. Engine speed is controlled by the hand and/

or foot throttles. A rocker switch in the right joystick controls the auxiliary hydraulics in tandem with a red lock-on button switch at the front of the joystick. On high-flow models, a rocker switch in the right instrument panel activates the high-flow hydraulics.

Float Control

The float control on the skid-steer loaders is controlled by a momentary button switch in the right control handle, which lights a lamp on the instrument panel.

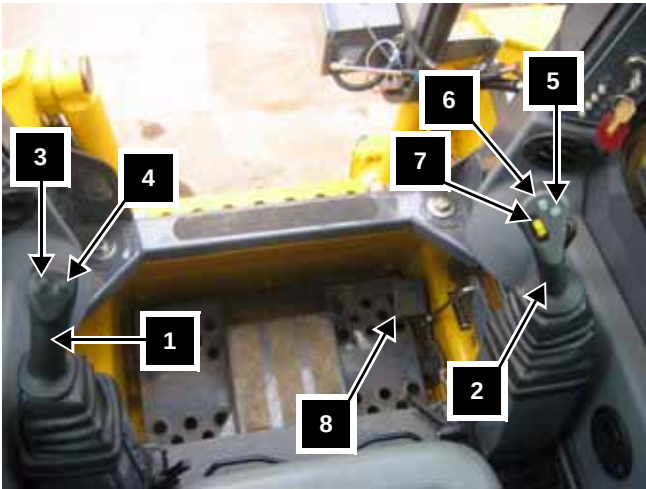
Two-Speed Control

Skid-steer loaders with this option have high- and low-speed settings. It is controlled by a button switch in the left control handle, which lights a lamp on the instrument panel.

Hydraglide™ Ride Control

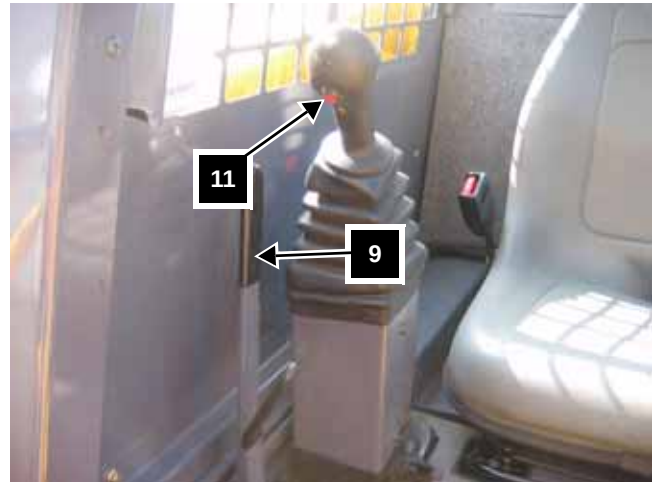
The Hydraglide™ Ride Control option is controlled by a button switch in the right control handle, which lights a lamp on the instrument panel.

Control Locations - Dual Joysticks

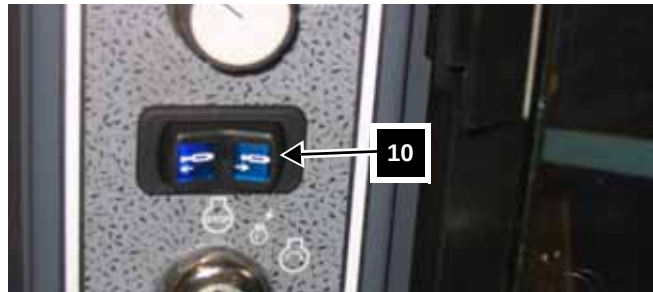


- 1 - Drive Control
- 2 - Lift/Tilt Control
- 3 - Two-Speed Button Switch
- 4 - Horn Button Switch

- 5 - Hydraglide™ Control Switch
- 6 - Float Control Switch
- 7 - Auxiliary Hydraulics Switch
- 8 - Foot Throttle



- 9 - Hand Throttle Handle
- 10 - High-Flow Aux. Flow Control
- 11 - Aux. Hyd. Lock Button



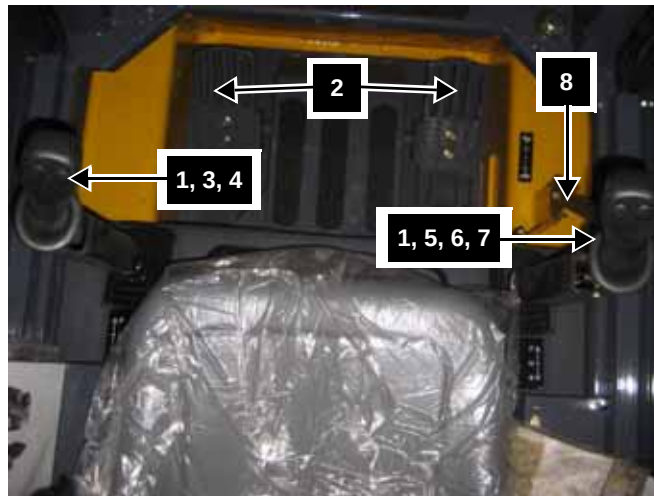
Control Locations - Dual Hand



- 1 - Drive Control
- 2 - Lift/Tilt Control
- 3 - Two-Speed Button Switch
- 4 - Horn Button Switch

- 5 - Hydraglide™ Control Switch
- 6 - Float Control Switch
- 7 - Auxiliary Hydraulics
- 8 - Foot Throttle

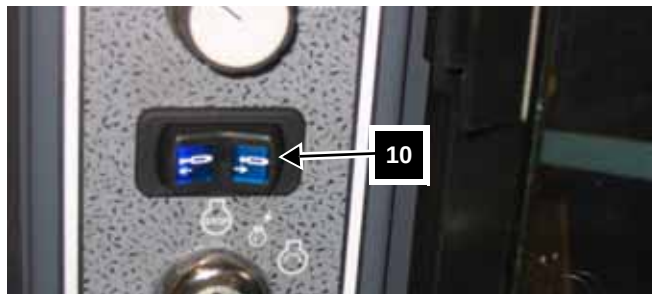
- 9 - Hand Throttle Handle
- 10 - High-Flow Aux. Flow Control

Control Locations - Hand/Foot

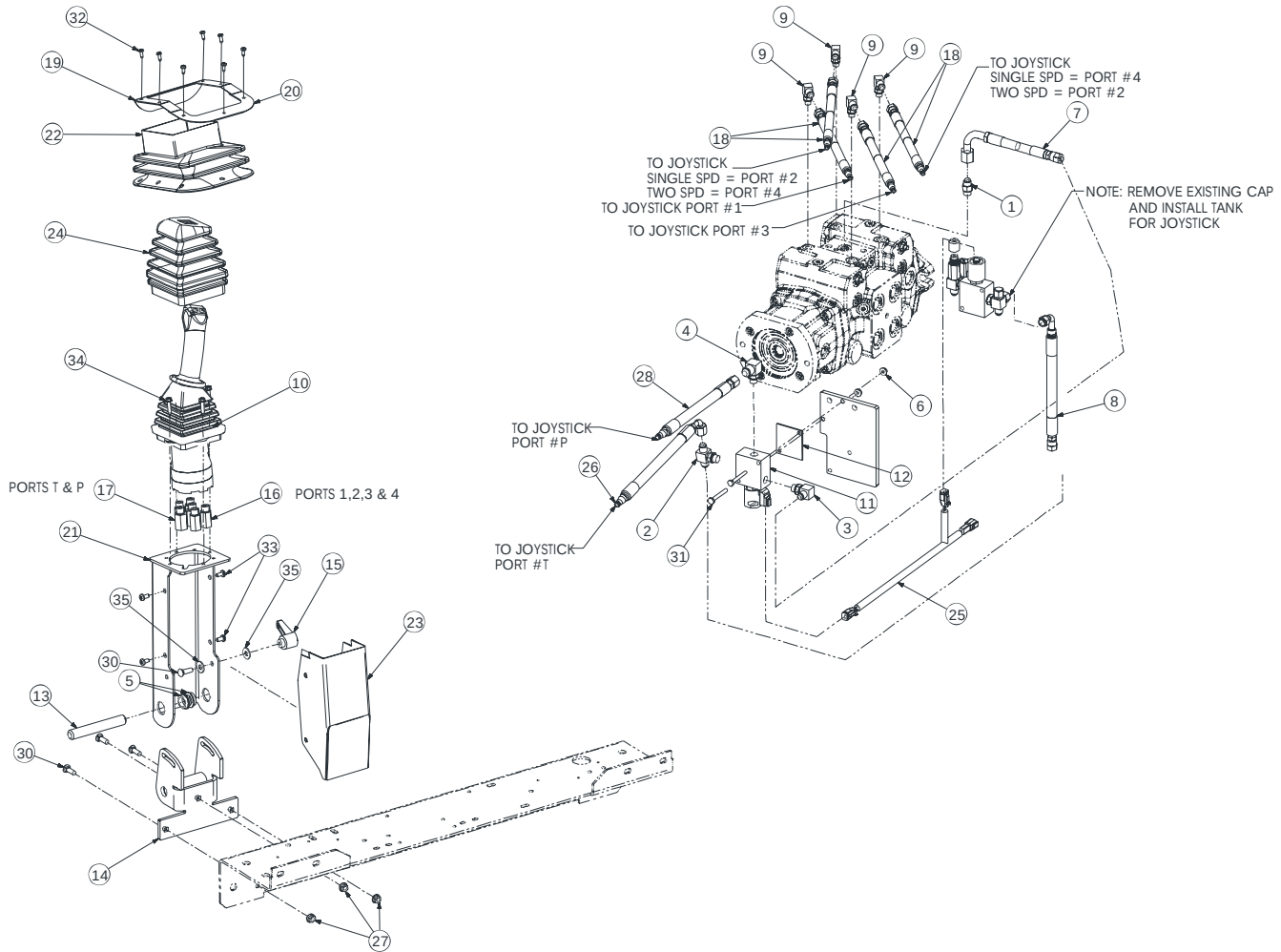
- 1 - Drive Control
- 2 - Lift/Tilt Control
- 3 - Two-Speed Button Switch

- 4 - Horn Button Switch
- 5 - Hydraglide™ Control Switch
- 6 - Float Control Switch

- 7 - Auxiliary Hydraulics
- 8 - Hand Throttle Handle
- 10 - High-Flow Aux. Flow Control

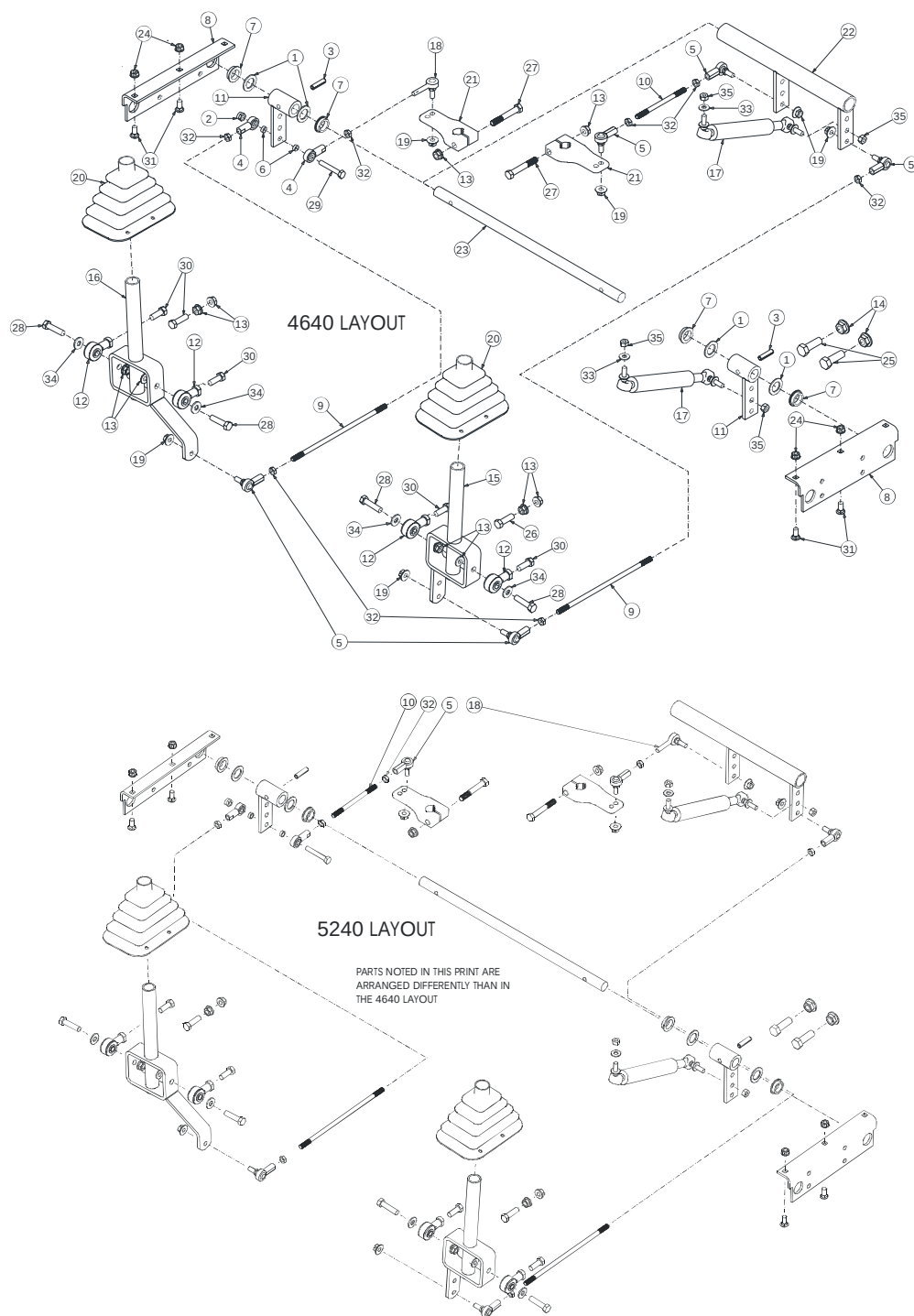


Wheel Drive Components - Dual Joystick Controls



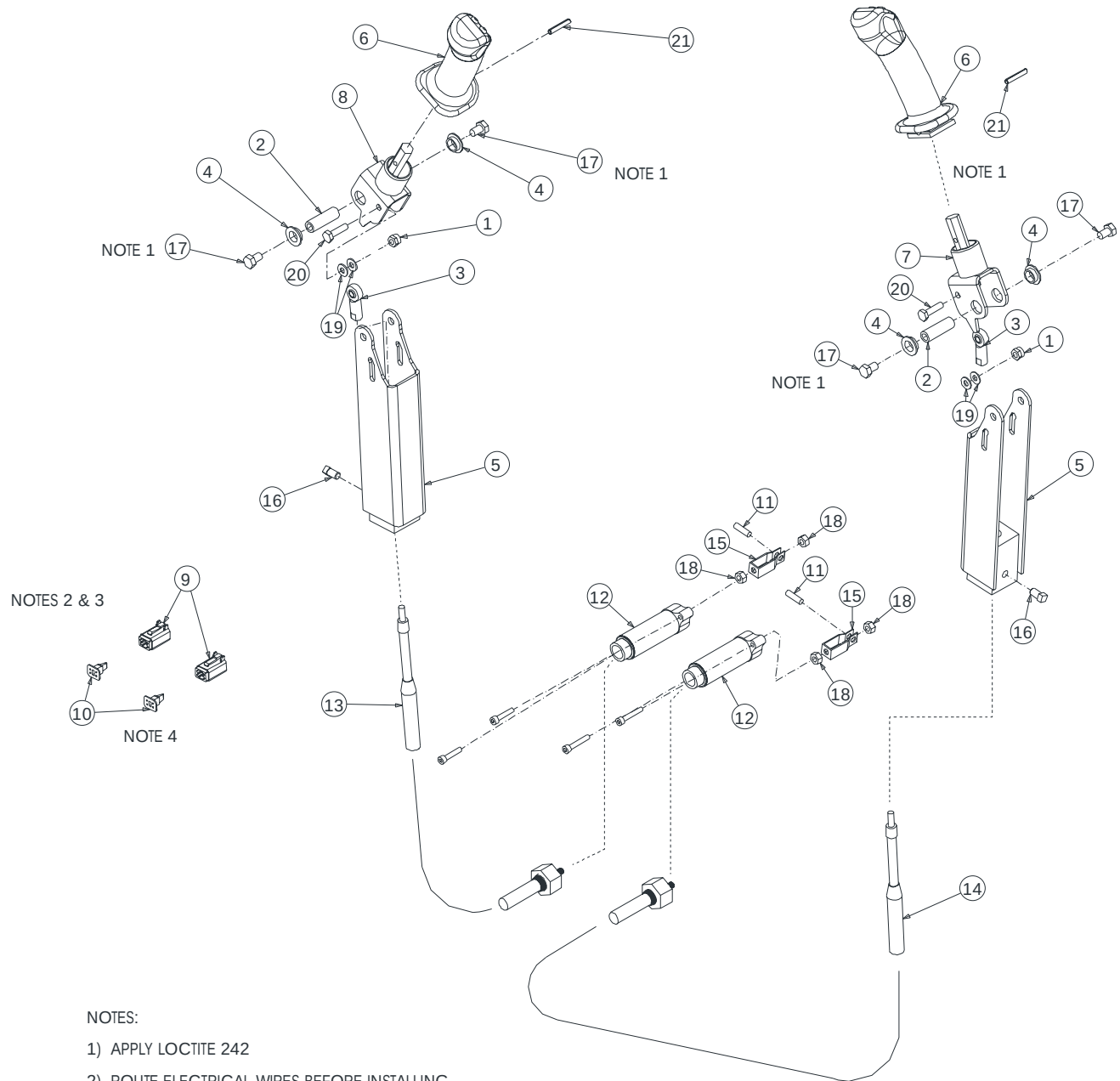
- | | | | | | |
|----|----------------------|----|---------------------------|----|----------------------|
| 1 | FITTING/STRAIGHT | 13 | PIN/TILT CONSOLE | 25 | HARNESS/JUMPER/VALVE |
| 2 | FITTING/TEE | 14 | MOUNT/TOWER | 26 | HOSE/LOW PRESSURE |
| 3 | FITTING/90° | 15 | HANDLE/RATCHET | 27 | NUT/LOCK |
| 4 | FITTING/90° | 16 | ADAPTER/QD/HD | 28 | HOSE/LOW PRESSURE |
| 5 | BUSHING/PIVOT | 17 | ADAPTER/QD/HD | 29 | SCREW/CAP |
| 6 | NUT/SPIRALOCK | 18 | HOSE/LOW PRESSURE | 30 | BOLT/CARRIAGE |
| 7 | HOSE/MEDIUM PRESSURE | 19 | FLANGE/BOOT/JOYSTICK | 31 | SCREW/CAP |
| 8 | HOSE/MEDIUM PRESSURE | 20 | FLANGE/BOOT/JOYSTICK/REAR | 32 | SCREW/THREAD CUTTING |
| 9 | FITTING/90° | 21 | JOYSTICK STAND | 33 | SCREW/MACHINE |
| 10 | JOYSTICK/DRIVE | 22 | BOOT/JOYSTICK LEFT | 34 | SCREW/TAP/R |
| 11 | VALVE/SOLENOID | 23 | COVER/CONSOLE | 35 | WASHER/FLAT |
| 12 | PLATE/SPACER | 24 | BOOT/JOYSTICK | | |

Wheel Drive Components - Dual Hand and Hand/Foot Controls



1	WASHER/FLAT	10	ROD	19	NUT/HEX	28	SCREW/CAP
2	NUT/HEX	11	ARM/ASSY	20	BOOT/T-BAR	29	SCREW/CAP
3	PIN/ROLL	12	ROD END	21	CONTROL ARM/PUMP	30	SCREW/CAP
4	ROD END	13	NUT/SPIRALOCK™	22	ASSY/PIVOT TUBE	31	BOLT/CARRIAGE
5	ROD END	14	NUT/SPIRALOCK™	23	SHAFT/PIVOT	32	NUT/JAM
6	SPACER	15	LEVER ASSY/LEFT	24	NUT/HEX	33	WASHER/FLAT
7	BUSHING/PIVOT	16	LEVER ASSY/RIGHT	25	SCREW/CAP	34	WASHER/FLAT
8	BRACKET/PIVOT	17	DEVICE/CENTERING	26	SCREW/CAP	35	NUT/HEX
9	ROD	18	ROD END	27	SCREW/CAP		

Lift and Tilt Components - Dual Hand Controls

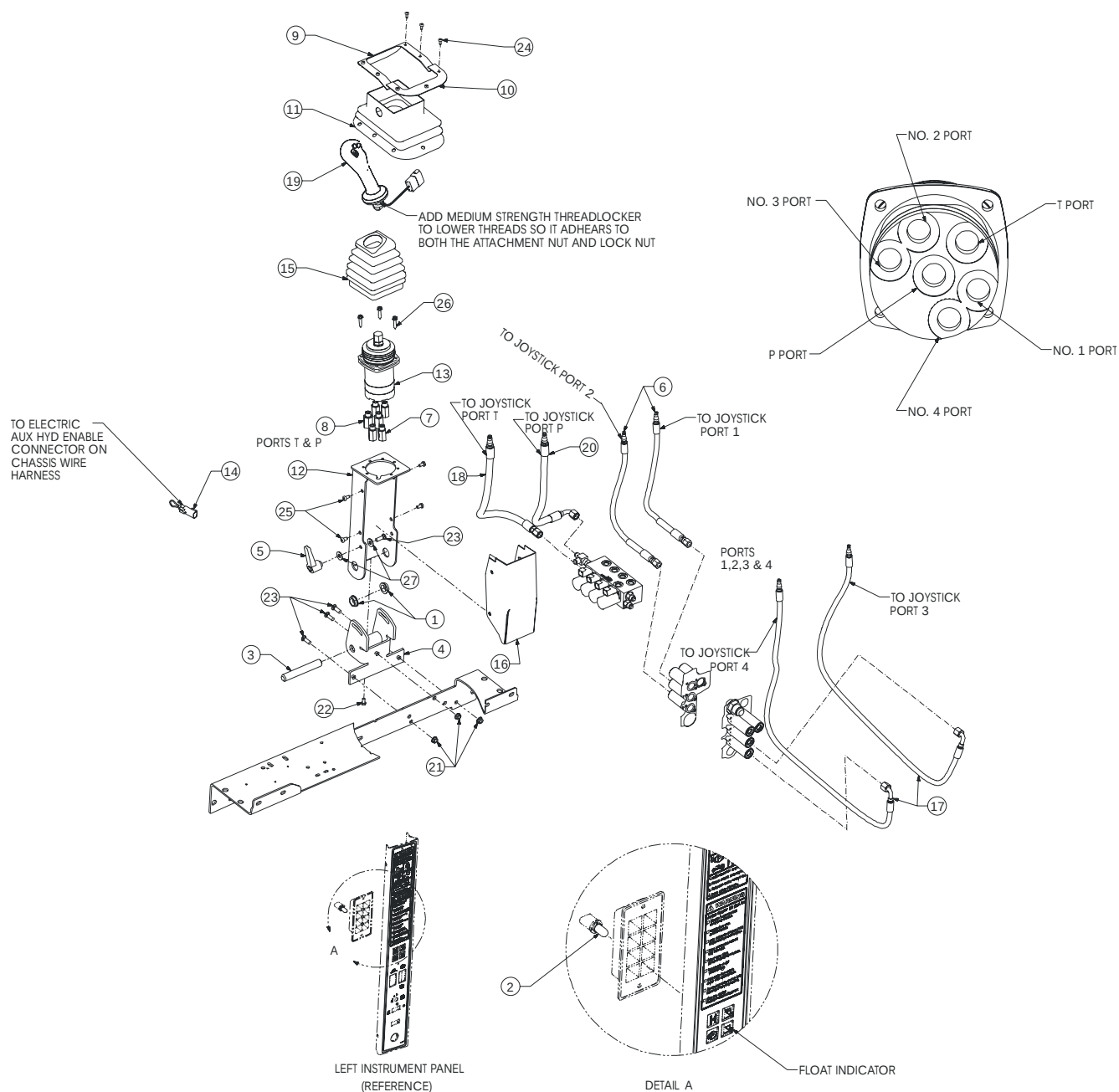


NOTES:

- 1) APPLY LOCTITE 242
- 2) ROUTE ELECTRICAL WIRES BEFORE INSTALLING TERMINALS INTO CONNECTORS
- 3) INSERT RED WIRE INTO PIN LOCATION 1, GRAY INTO 2, BLUE INTO 3, AND BLACK INTO 4
- 4) INSERT WEDGE AFTER ALL TERMINALS ARE INSTALLED

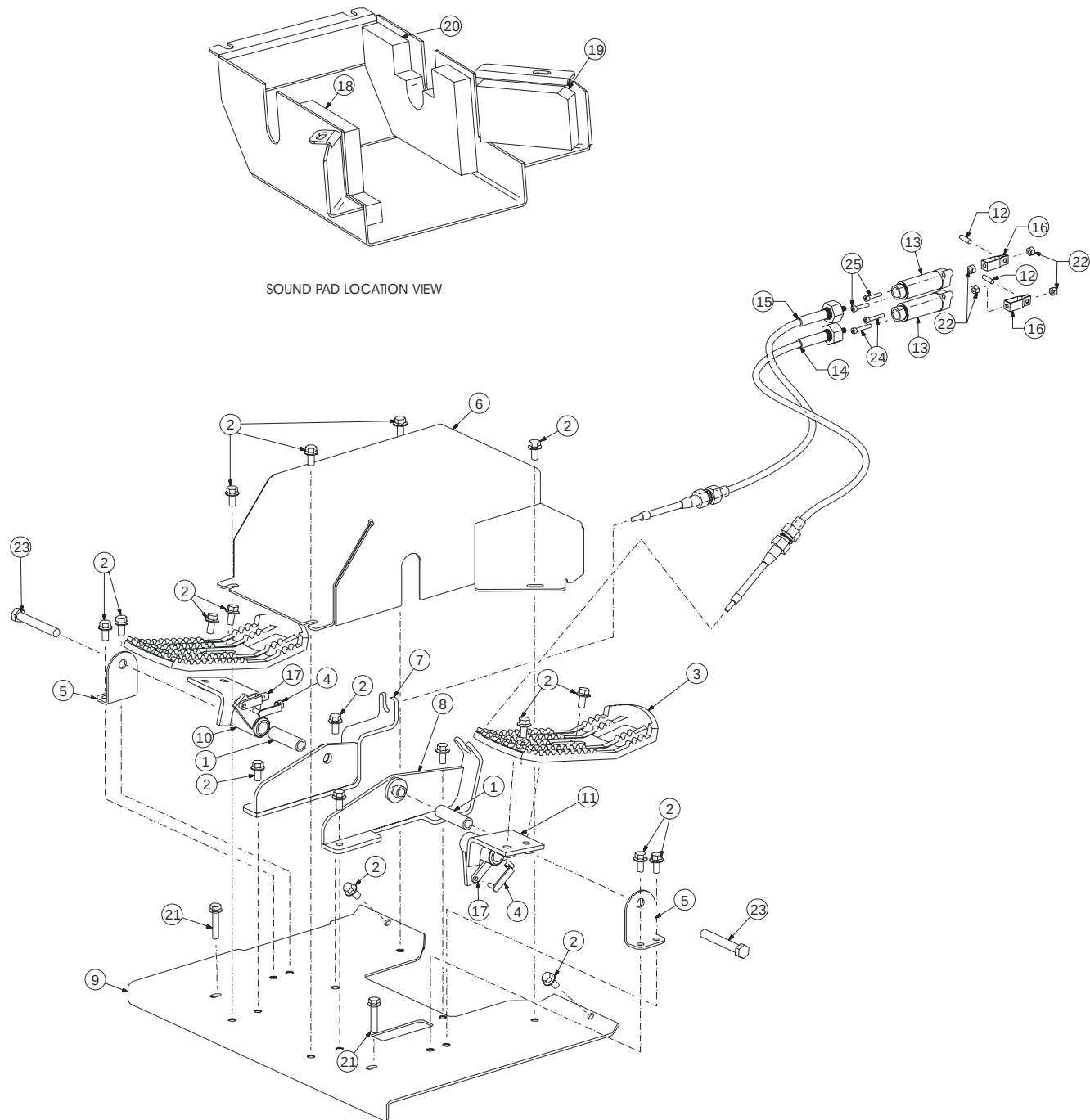
1 NUT/HEX	8 MOUNT/GRIP RIGHT	15 CLEVIS/CABLE
2 PIVOT/SPACER	9 PLUG 4-PIN	16 SCREW/SET
3 ROD END	10 WEDGE 4-PIN	17 SCREW/CAP
4 BEARING/FLANGED	11 PIN	18 NUT/HEX
5 HANDLE/LOWER	12 BONNET	19 WASHER/FLAT
6 GRIP	13 CABLE DUAL HAND TILT	20 SCREW/CAP
7 MOUNT/GRIP LEFT	14 CABLE DUAL HAND LIFT	21 PIN/ROLL

Lift and Tilt Components - Dual Joystick Controls



- | | | | | | |
|---|----------------------|----|---------------------------|----|-------------------------|
| 1 | BUSHING/PIVOT | 10 | FLANGE/BOOT/JOYSTICK/REAR | 19 | GRIP/ELECTRIC AUXILIARY |
| 2 | BULB/LAMP | 11 | BOOT/JOYSTICK | 20 | HOSE/MEDIUM PRESSURE |
| 3 | PIN/TILT CONSOLE | 12 | JOYSTICK STAND | 21 | NUT/LOCK FLANGE |
| 4 | MOUNT/TOWER | 13 | JOYSTICK | 22 | SCREW/CAP |
| 5 | HANDLE/RATCHET | 14 | ADAPTOR/FLOAT ENABLE | 23 | BOLT/CARRIAGE |
| 6 | HOSE/LOW PRESSURE | 15 | BOOT/JOYSTICK | 24 | SCREW/THREAD CUTTING |
| 7 | ADAPTER/QD/HD | 16 | COVER/CONSOLE | 25 | SCREW/MACHINE |
| 8 | ADAPTER/QD/HD | 17 | HOSE/LOW PRESSURE | 26 | SCREW/TAP/R |
| 9 | FLANGE/BOOT/JOYSTICK | 18 | HOSE/LOW PRESSURE | 27 | WASHER/FLAT |

Lift and Tilt Components - Hand/Foot Controls



- | | | |
|----------------------|-----------------------|----------------------|
| 1 BUSHING/OILITE | 10 PIVOT/PEDAL RIGHT | 19 PAD/ACOUSTIC LEFT |
| 2 SCREW/CAP | 11 PIVOT/PEDAL LEFT | 20 PAD/ACOUSTIC LEFT |
| 3 PEDAL/FOOT | 12 PIN | 21 SCREW/CAP |
| 4 PIN/SPRING CLEVIS | 13 BONNET | 22 NUT/HEX |
| 5 PLATE/FOOT SUPPORT | 14 CABLE/LIFT | 23 SCREW/CAP |
| 6 COVER/LINKAGE | 15 CABLE/TILT | 24 SCREW/CAP |
| 7 SUPPORT RIGHT | 16 CLEVIS/CABLE | 25 SCREW/CAP |
| 8 SUPPORT LEFT | 17 CLEVIS | |
| 9 SUBFLOOR | 18 PAD/ACOUSTIC RIGHT | |

Control Handle Removal and Installation - Dual Hand and Hand/Foot Controls

WARNING

BEFORE beginning this service procedure, perform the following **SAFETY** procedures:

Raise lift arm; engage lift arm support device.

Shut off the engine.

Tilt back ROPS/FOPS until lock engages.

(For detailed instructions, refer to the *Safety* chapter of this manual.)

Removal Procedure

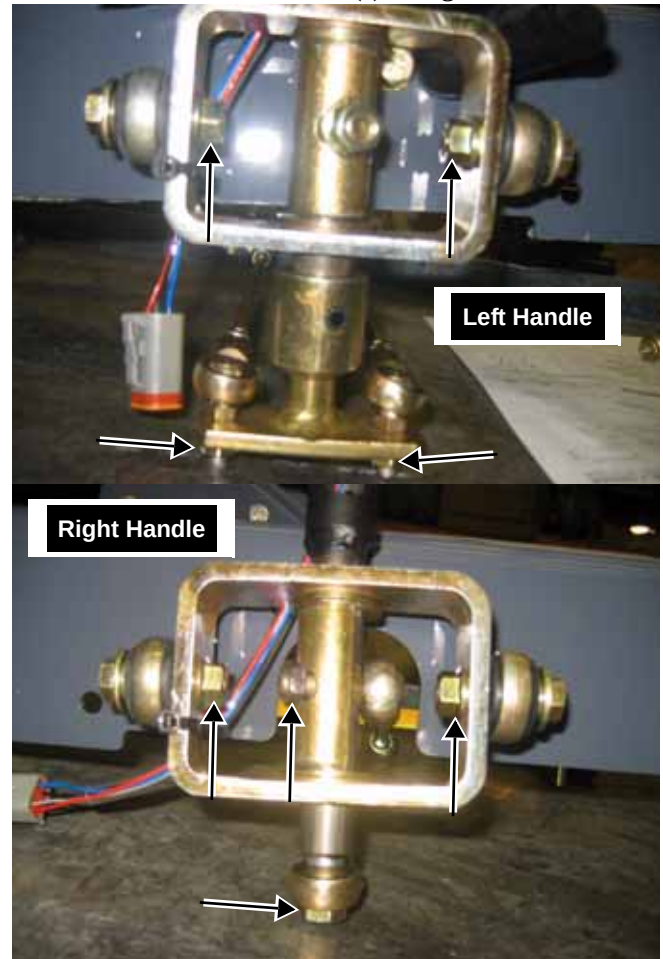
1. Remove the control cover per the procedure in the *Mainframe* chapter.
2. Disconnect the electrical connector in the control handle from the wiring harness.



IMPORTANT

Note the wire terminal connections in the electrical connector for reassembling the control handle if replacing the handle's electrical cable.

3. Remove the locknuts to disconnect the studded rod end(s) on the control rod(s) from the control handle assemblies on the handle(s) being removed.



4. Remove two capscrews, washers and locknuts on the elastomeric rod ends attaching the control handle assembly to the chassis crossmember. Remove the handle assembly.

Installation Procedure: Follow all warnings first, then reverse the removal steps (see NOTE below).

NOTE: When the control handle is installed, and if the control rod(s) are adjusted correctly, the control handle shafts are vertically straight, up and down. If changes are needed, refer to the "Control Handle Position Adjustment" procedure in this chapter.

Control Handle Assembly Removal and Installation - Dual Joystick Controls



WARNING

BEFORE beginning this Service procedure, perform the following SAFETY procedures:

Raise lift arm; engage lift arm support device.

Shut off the engine.

Roll back ROPS/FOPS until lock engages.

(For detailed instructions, refer to the *Safety* chapter of this service manual.)

Removal Procedure

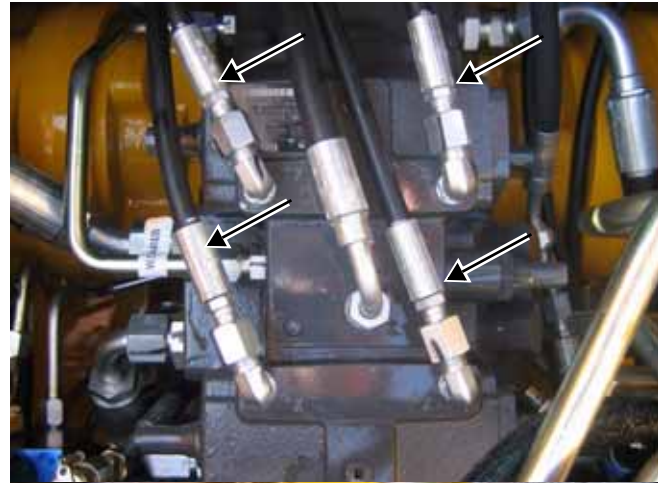
1. Remove the control cover per the procedure in the *Mainframe* chapter.
2. Underneath the crossmember, disconnect the connector on the electrical harness in the left and right joystick stands.



IMPORTANT

Note the wire terminal connections in the electrical connector for reassembling the joystick handles if replacing the handle's electrical cable.

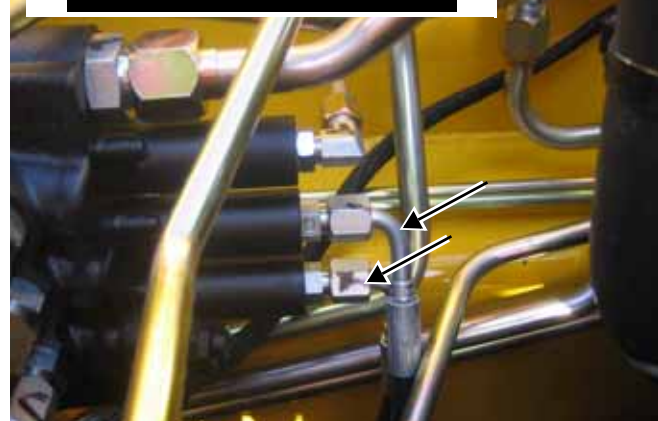
3. Remove four joystick pressure hoses connected at the tandem pump and four more hoses at the control valve.



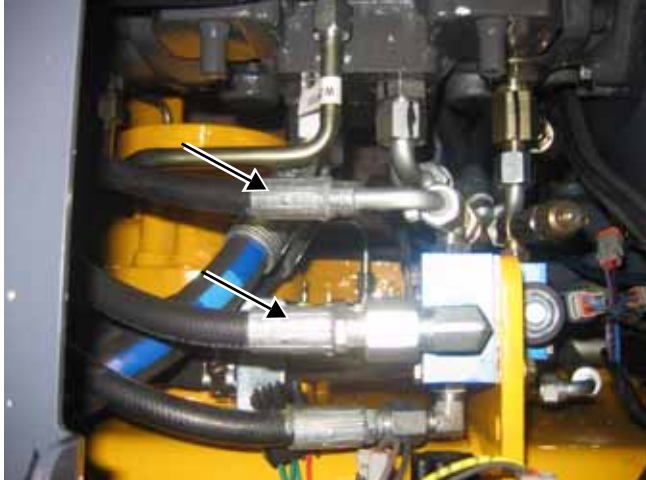
Front of Control Valve



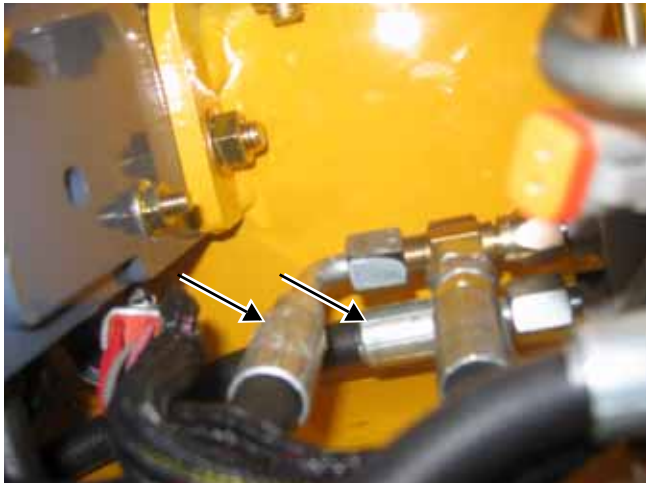
Back of Control Valve



4. Remove the two hoses on fittings at the brake solenoid valve.

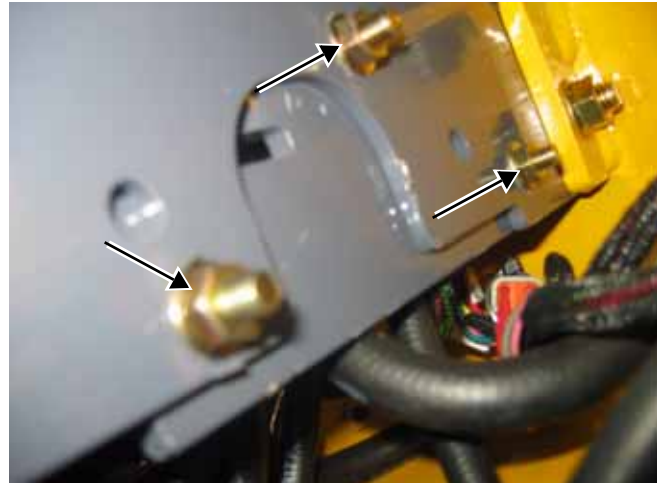


5. Remove two hoses on the 2-Bank (standard auxiliary hydraulics) or the 4-Bank (high-flow auxiliary hydraulics) proportional valve behind the right control grip.



NOTE: Mark the joystick hydraulic hoses prior to removing them from the control valve and the tandem pump for reinstallation later. Cap or plug after they are disconnected to prevent contaminants from entering the hydraulic system.

6. Remove three locknuts and carriage bolts securing each joystick assembly to the chassis crossmember.



7. Carefully pull up on the assembly with the pressure hoses attached and remove the assembly.

Installation Procedure: Follow all warning first, then reverse the removal steps.

Electrical Auxiliary Grip Removal and Installation - Dual Joystick Controls



WARNING

BEFORE beginning this Service procedure, perform the following **SAFETY** procedures:

Raise lift arm; engage lift arm support device.

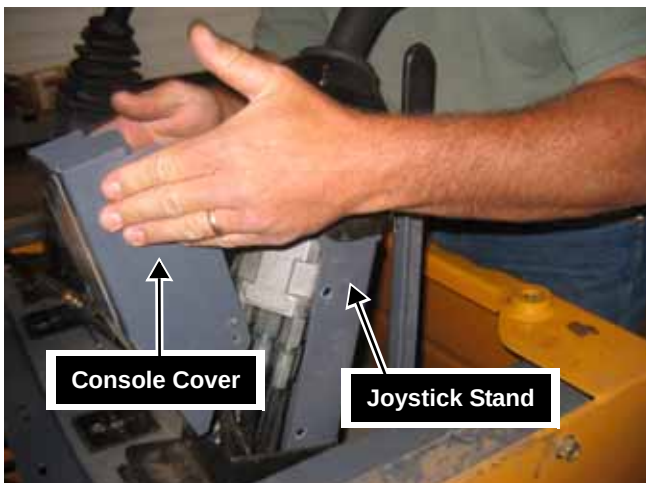
Shut off the engine.

Roll back ROPS/FOPS until lock engages.

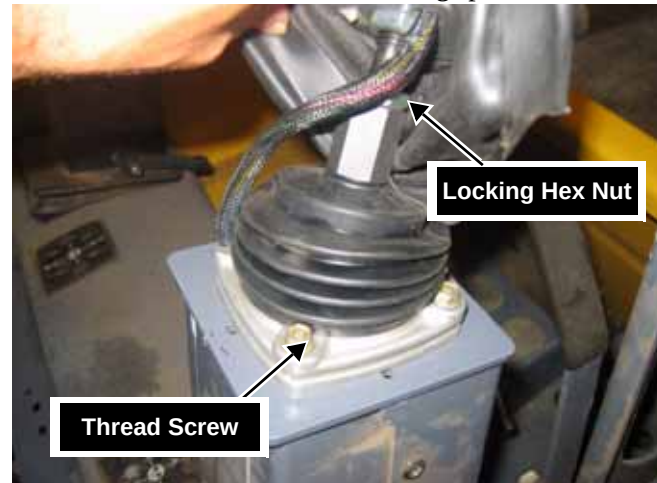
(For detailed instructions, refer to the **Safety** chapter of this service manual.)

Removal Procedure

1. Underneath the crossmember, disconnect the connector on the electrical harness in the right joystick stand.
2. Loosen the ratchet handle on the joystick stand and tilt the right control handle forward.
3. Remove four self-tapping screws securing the console cover to the joystick stand and remove the cover.



4. Pull the joystick boot up and inside-out to expose the locking hex nut of the electric auxiliary grip and the electrical harness to the grip.



5. Remove two hose lines at ports 1 and 4 attached at the bottom of the joystick drive. Mark the hoses with their corresponding port numbers for reinstallation later.



6. Remove four threaded screws securing the joystick drive to the joystick stand and rotate the drive to access the hose line at port 3. Remove the hose line at port 3 after marking it.



Port 3 Line After Rotating Joystick Drive



7. Pull the disconnected hose lines down and out of the joystick stand.
8. Pull the electrical harness and connector through the remaining hydraulic hose lines and out of the joystick stand.



9. Pull the joystick drive up and out of the joystick stand and set the drive on top of the joystick stand. Loosen the locking hex nut and unscrew the grip from the joystick drive.



10. Pull the connector out of the joystick stand.



11. Remove the grip from the skid-steer loader.

Installation Procedure: Follow all warnings first, then reverse the removal steps.

Control Handle Position Adjustment - Dual Hand and Hand/Foot Controls

Control handles are adjusted two ways for proper operation: a vertically straight appearance and the handle orientation.

Adjustment Procedure



WARNING

BEFORE beginning this service procedure, perform the following **SAFETY** procedures:

Raise lift arm; engage lift arm support device.

Shut off the engine.

Tilt back ROPS/FOPS until lock engages.

(For detailed instructions, refer to the **Safety** chapter of this manual.)

1. Adjust the left control handle by changing the length of one control rod.

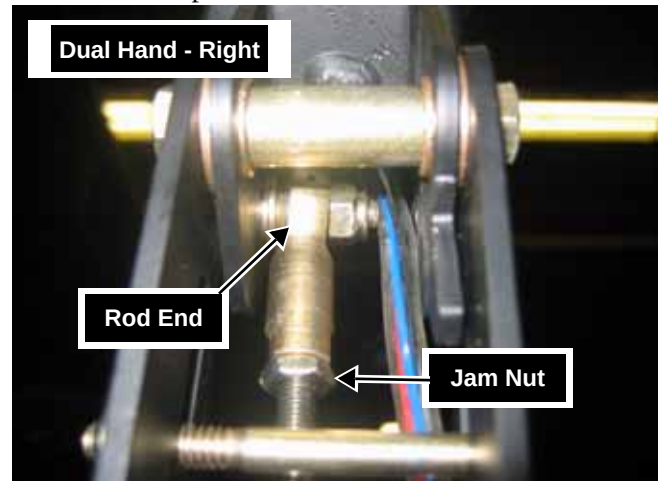


2. Adjust the right control handle vertical orientation by changing the control rod length attached to the bottom of the handle assembly.



3. Right control handle orientation:

Dual Hand: Change the cable length in the lower handle, connected at the grip assembly. Remove the capscrew and locknut on the rod end. Loosen the jam nut and adjust until the handle is properly oriented. Retighten the jam nut and reinstall the capscrew. **BE SURE** the adjustment allows for the full actuation of the control valve in both directions of handle operation.



Hand/Foot: When properly adjusted, the control handle is straight up when fully actuated outward.

Control Handle Tracking Adjustment, Wheel Drive Controls - Dual Hand and Hand/Foot Controls

Tracking adjustment is performed above the neutral centering mechanisms with two capscrews and locknuts secured to the travel stop assembly on the crossmember.

When to adjust: With the control handle(s) engaged FORWARD, if the skid-steer loader turns slightly to the right or left (the skid-steer loader won't drive in a straight line), then adjustment is needed.

Adjustment Procedure

WARNING

BEFORE beginning this service procedure, perform the following **SAFETY** procedures:

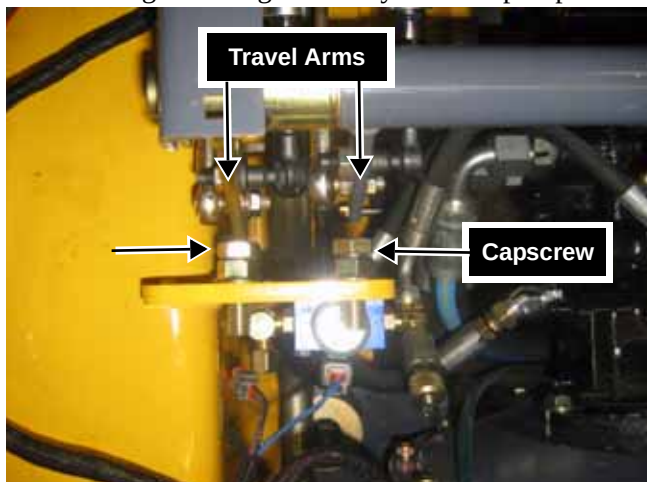
Raise lift arm; engage lift arm support device.

Shut off the engine.

Tilt back ROPS/FOPS until lock engages.

(For detailed instructions, refer to the *Safety* chapter of this manual.)

1. Remove the control cover per the procedure in the *Mainframe* chapter.
2. Decide which capscrew to adjust. If the skid-steer loader turns right, the left side speed must be reduced and vice versa. DO NOT attempt to increase the speed of either side, because it may cause the control arm assemblies to overtravel, resulting in damage to the hydrostatic pumps.



3. If the skid-steer loader is turning right, loosen the locknut on the left capscrew. In a counter-clock-

wise motion, unscrew the capscrew ½ turn and retighten the nut.

4. If the skid-steer loader is turning left, loosen the locknut on the right capscrew. In a counter-clockwise motion, unscrew the capscrew ½ turn and retighten the nut.

Lower and secure the ROPS. Start the skid-steer loader. Test the skid-steer loader tracking and repeat the adjustment procedure as needed. After obtaining the correct adjustment, reinstall the control cover.

Control Handle Tracking Adjustment, Wheel Drive Controls - Dual Joystick Controls

When to adjust: With the joystick engaged in FORWARD or REVERSE, if the skid-steer loader turns slightly to the left or the right (the skid-steer loader won't drive in a straight line), then adjustment is needed.

Forward or Reverse Speed Adjustment Procedure



WARNING

BEFORE beginning this Service procedure, perform the following **SAFETY** procedures:

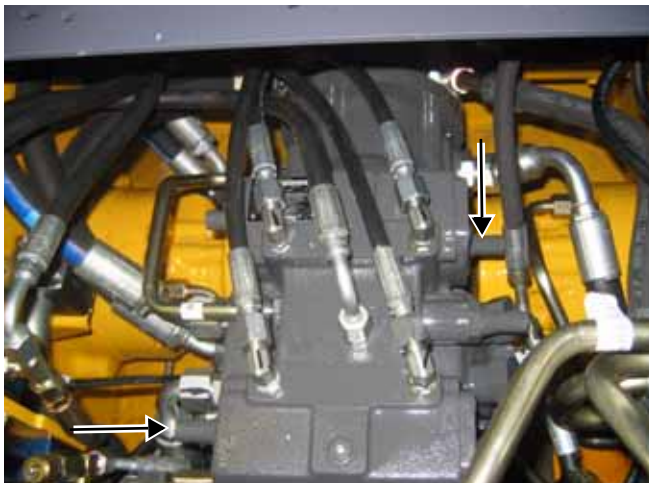
Raise lift arm; engage lift arm support device.

Shut off the engine.

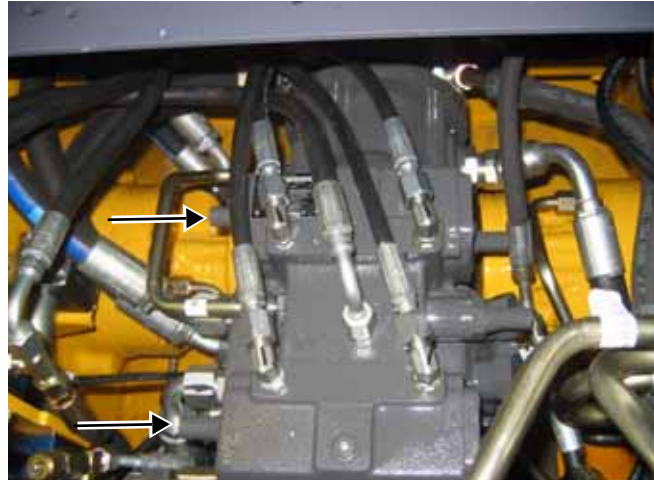
Roll back ROPS/FOPS until lock engages.

(For detailed instructions, refer to the **Safety** chapter of this service manual.)

1. Decide which side needs adjusting. If the skid-steer loader turns right going FORWARD, the left side speed must be reduced and vice versa. **DO NOT** attempt to increase the speed of either side, because it may cause damage to the tandem pumps.
2. **Single-speed models** have the FORWARD adjustment points on the right front and the left rear locations of the tandem pump. The REVERSE adjustment points are the left front and the right rear.



3. **Two-speed models** have the FORWARD adjustment points on the right side of the pump. The REVERSE adjustment points are on the left side of the pump.



4. If the skid-steer loader is turning right in the FORWARD position, remove the front plastic cap on the tandem pump with pliers. Use an allen wrench to hold the stud in place while loosening the locknut. With an allen wrench in a clockwise motion, tighten 1/4 turn. Retighten the locknut.
5. If the skid-steer loader is turning right in the REVERSE position, use the adjustment points opposite the FORWARD position adjustment points in Step 4.
6. If the skid-steer loader is turning left in the FORWARD position, remove the rear plastic cap on the tandem pump with pliers. Use an allen wrench to hold the stud in place while loosening the locknut. With an allen wrench in a clockwise motion, tighten 1/4 turn. Retighten the locknut.
7. If the skid-steer loader is turning left in the REVERSE position, use the adjustment points opposite the FORWARD position adjustment points in Step 6.
8. Lower and secure the ROPS. Start the skid-steer loader. Test the skid-steer loader tracking and repeat the adjustment procedure as needed.

Hand/Foot and Dual Hand Control Handle Assembly

Assembly Procedure

The left Hand/Foot control handle operates the drive function for the left side of the skid-steer loader. There is a button switch for the horn in the grip assembly. On two-speed models, a button switch in the grip assembly controls the skid-steer loader speed range.

The right Hand/Foot control handle operates the drive function for the right side of the skid-steer loader and the auxiliary hydraulics. There is a button switch for Hydraglide™ Ride Control (option) in the grip assembly.

The left Dual Hand control handle operates the drive function for the left side of the skid-steer loader and lift functions. There is a button switch for the horn in the grip assembly. On two-speed models, a button switch in the grip assembly controls the speed range of the loader.

The right Dual Hand control handle operates the drive function for the right side of the skid-steer loader and the tilt functions. There is a button switch for the Hydraglide™ Ride Control (option) in the grip assembly.

1. Install set screw in lower handle.



2. On the grip mount, thread four electrical wires from the control grip into the opening in and through the mount.



3. Align the pin hole in the grip mount with a hole in the base of the control grip and press the control grip onto the mount.



4. Insert roll pin through the aligned holes to secure the control grip to the grip mount.



5. Install two bearings and one pivot spacer in the grip mount.



8. Insert four wire terminals into electrical connector housing.



6. Slip grip mount into lower handle.



9. Press an orange wedge into the other end of the connector housing.

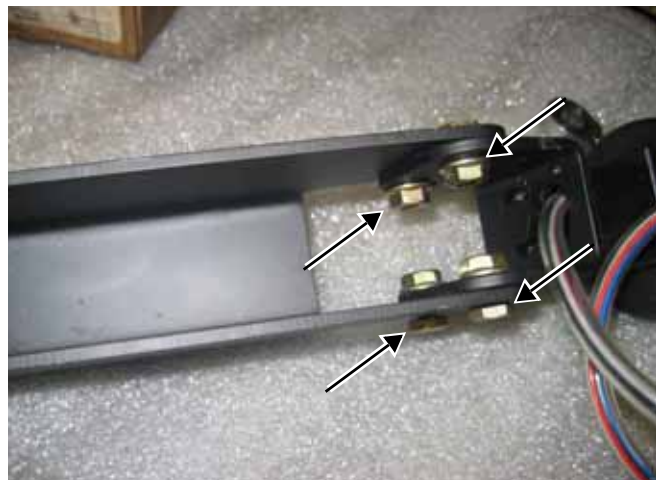


7. Right Handle: Apply Loctite™ 242 onto two cap screws and secure the grip mount to the lower handle with locknuts.

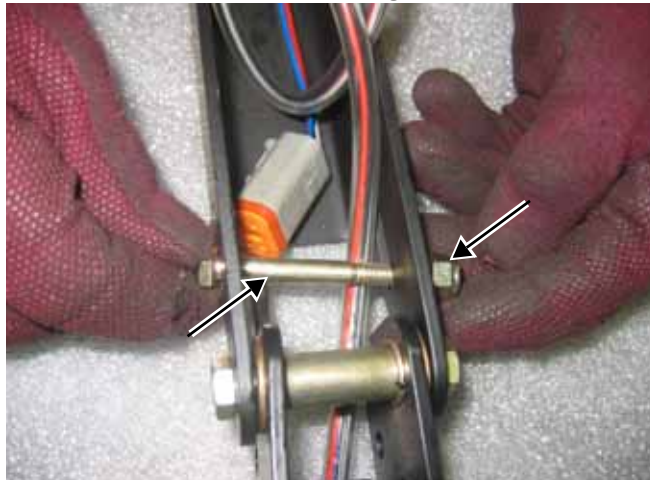


10. Route control grip electrical cables through large inside opening in both lower handles.

11. Left Handle: Apply Loctite™ 242 onto four cap screws and secure the grip mount to the lower handle with locknuts.



12. Right Handle: In the narrow-slotted opening, install a long capscrew used as a lock pin in the right control handle to open the auxiliary hydraulics and secure with a locking nut.



13. Install control handle(s) on the crossmember per the procedure in this chapter.
14. With control handle attached to crossmember, test the handle's operation.

Dual Joystick Assembly

Assembly Procedure

The left joystick operates the drive wheels.

The right joystick operates the lift and tilt functions of the lift arm and bucket. A rocker switch in the right joystick controls the auxiliary hydraulics in tandem with a red lock-on button switch at the front of the joystick.

1. Screw six adapters into the bottom of the joystick. There are four smaller of one size and two larger of another size. Consult the illustrations in this manual or the parts manual for correct installation of these adapters.



2. Screw down and attach the control grip to the top of the joystick.



3. Route the electrical wire in the control grip through a slot in the joystick.



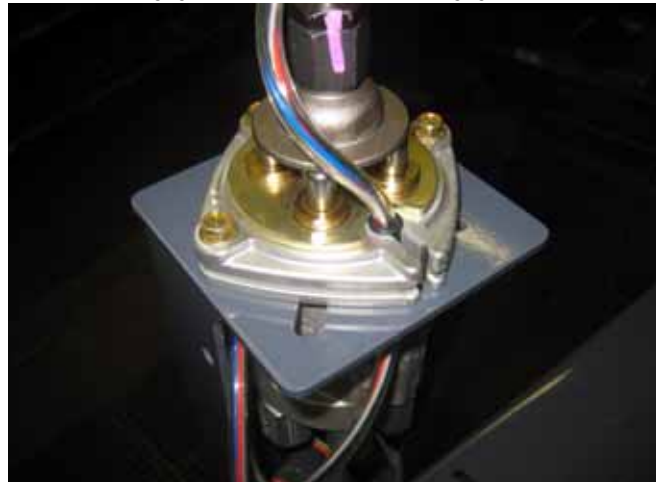
4. Slip the entire assembly into the joystick stand threading the wire through a cut-out in the stand.



5. Bolt the joystick onto the joystick stand.



6. View of joystick secured onto the joystick stand.



7. Pull the boot down over the control grip and top of the joystick stand.



Pivot Tube Removal and Installation - Dual Hand and Hand/Foot Controls

Pivot tube exploded views are a good reference for the pivot tube's removal and installation procedures. Refer to there views for locations in the assemblies.

Removal Procedure



WARNING

BEFORE beginning this service procedure, perform the following **SAFETY** procedures:

Raise lift arm; engage lift arm support device.

Shut off the engine.

Tilt back ROPS/FOPS until lock engages.

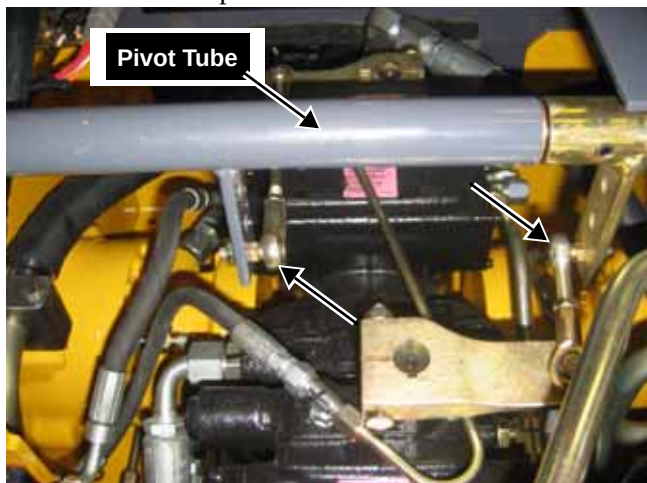
(For detailed instructions, refer to the *Safety* chapter of this manual.)

1. Remove the floor cover/control cover per the procedure in the *Mainframe* chapter.

NOTE: If the skid-steer loader is equipped with a backup alarm, remove the two machine screws and locknuts securing the alarm switch bracket to the crossmember. Set them aside.

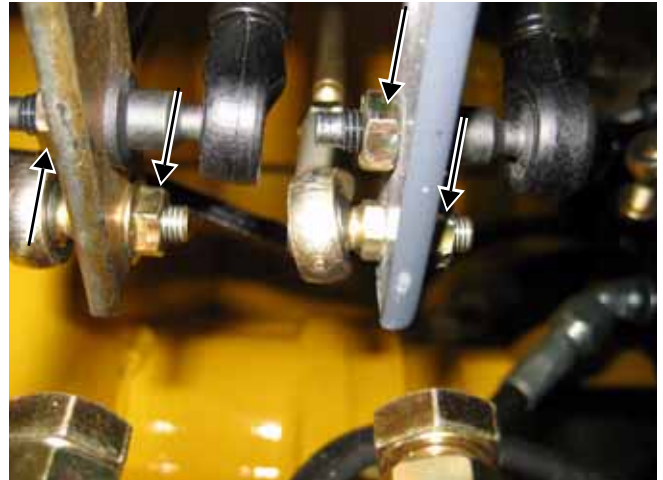
NOTE: It's recommended that good notes be taken to aid in reassembly. If necessary, mark the holes on the levers.

2. Disconnect the two hydrostatic pump arm control rods from the pivot tube.



3. On the left, remove the hex nuts securing two centering devices and two control rods to the pivot

tube levers. Allow the centering devices to hang from their brackets.



4. Remove the two hex nuts and carriage bolts on the right pivot bracket.



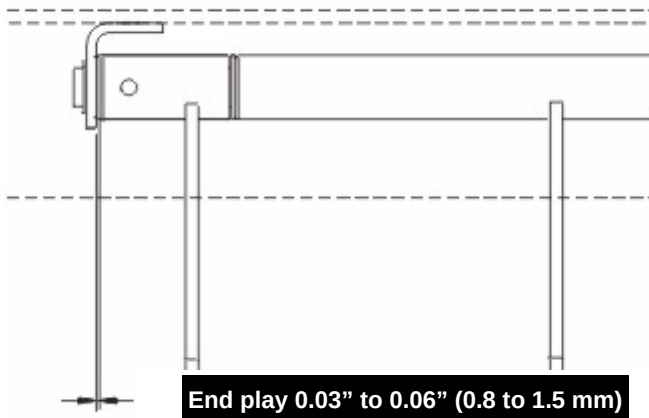
5. Slide the pivot bracket, two washers and arm assembly off the pivot shaft. A bronze bearing is pressed into the pivot bracket. If not, remove it from the pivot shaft.
6. Pull the pivot tube assembly out of the left pivot bracket. Slide the washer off. A bronze bearing is pressed into the pivot bracket. If not, remove it from the pivot shaft.
7. Remove the pivot tube assembly from the crossmember.
8. Disassemble the pivot tube assembly on a workbench to replace parts as needed. Refer to the exploded views for the correct positioning of the pivot tube parts.

Installation Procedure

NOTE: BEFORE installing the pivot tube assembly, refer to the exploded views to determine the correct orientation of the pivot tube levers prior to installation.

1. Maneuver the pivot tube assembly up and under the crossmember.
2. BE SURE the bronze bearing is pressed into the left pivot bracket. Slide the washer on the end of the pivot shaft.
3. Lift the pivot tube assembly up and push the shaft into the left pivot bracket.
4. Slide one washer onto the right end of the pivot tube shaft. BE SURE the bronze bearings are pressed into the right pivot bracket. Slide the control brackets onto the pivot shaft.
5. Slide the second washer and arm assembly onto the pivot shaft.
6. Secure the right pivot bracket to the crossmember with two carriage bolts and hex nuts. **HAND TIGHTEN ONLY.**
7. Push on the right end of the pivot tube assembly and the bearing bracket, then tighten the carriage bolts.

NOTE: There should be 0.03" - 0.06" of end-play (0.8-1.5 mm) on the pivot tube shaft to allow correct operation of the control handles.



8. Attach all the control rods and centering devices to the appropriate levers on the pivot tube assembly.
9. Install the floor cover/control cover per the procedure in the *Mainframe* chapter.

Neutral Centering Device Adjustment - Dual Hand and Hand/Foot Controls

Mustang 2056 skid-steer loaders have two neutral centering devices underneath the crossmember. Neutral centering devices allow the control handles and control arm assemblies to automatically return to the NEUTRAL position when the operator releases the control handles.

Adjustment Procedure



WARNING

BEFORE beginning this service procedure, perform the following **SAFETY** procedures:

Raise and block the skid-steer loader so tires are off the ground.

Raise lift arm; engage lift arm support device.

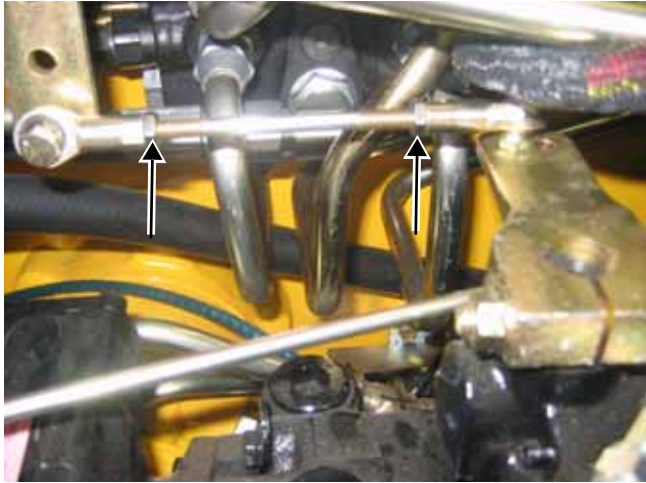
Tilt back ROPS/FOPS until lock engages.

(For detailed instructions, refer to the *Safety* chapter of this manual.)

1. Remove one hex nut on each rod end attached to hydrostatic pump control arms.

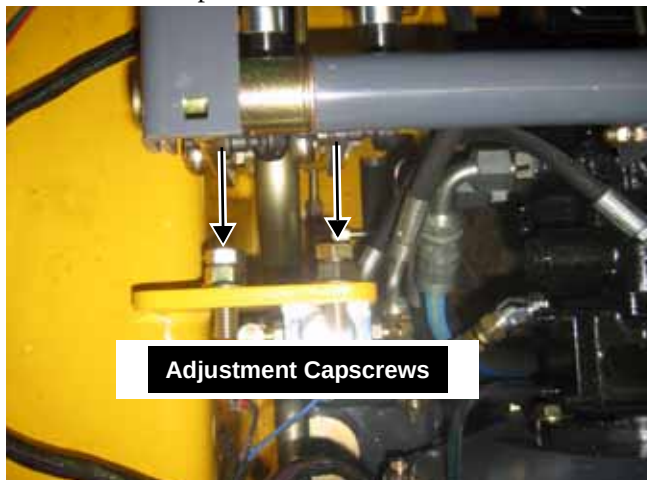


2. Loosen jam nuts on rod ends.



NOTE: Pump control arms and neutral centering devices automatically return to NEUTRAL, needing no adjustment.

3. Twist rod ends on control rods until they slip into the pump control arm holes without pump arm or centering devices moving. Tighten rod ends to pump arms and jam nuts to rod ends.
4. Test operation of control handle(s). Push control handle(s) forward and rearward and allow centering devices to return the control handle to the NEUTRAL position.



IMPORTANT

BE SURE control levers still contact tracking adjustment capscrews. If they do not contact capscrews, extend capscrews counter-clockwise to prevent overtravel of control arms, which may cause pump damage. See "Control Handle Tracking Adjustment" procedure in this chapter.

Neutral Centering Adjustment - Dual Joystick Controls

The control piston has strong centering springs to ensure that after the pump is adjusted for the NEUTRAL position it will always return to NEUTRAL.

Adjustment Procedure



WARNING

BEFORE beginning this Service procedure, perform the following SAFETY procedures:

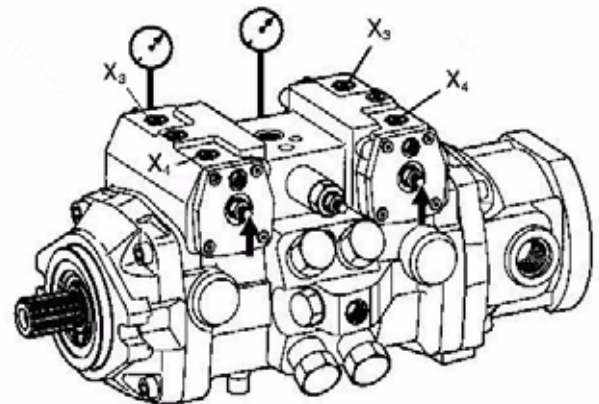
Raise and block the skid-steer loader so that the tires are off the ground.

Raise lift arm; engage lift arm support device.

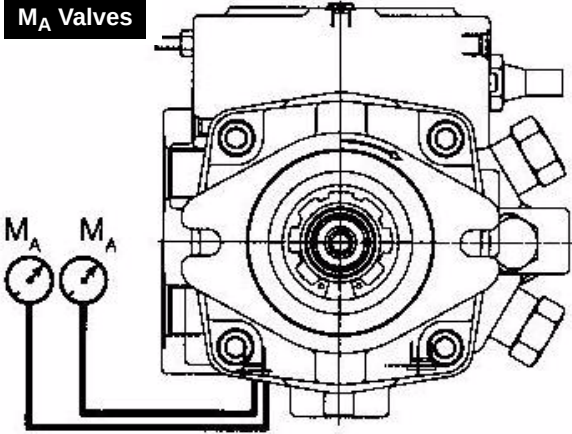
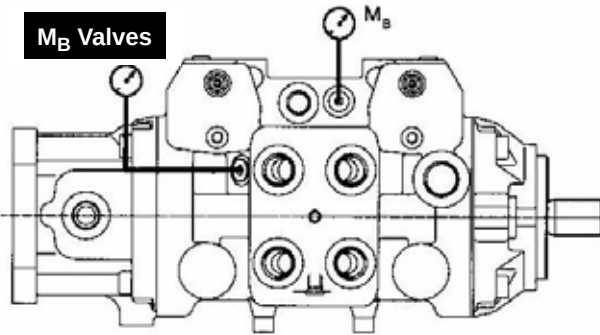
Tilt back ROPS/FOPS until lock engages.

(For detailed instructions, refer to the Safety chapter of this service manual.)

1. Remove plugs covering the adjustment screws for pressure ports X₃ and X₄. Ports X₃ and X₄ are open.



2. Install pressure gauges at M_A and M_B in this configuration: M_A/M_B forward valves together and M_A/M_B rearward valves together.

 M_A Valves **M_B Valves**

3. With the A and B ports blocked and with the hydrostatic pump running, loosen the jam nuts on X_3 and X_4 adjustment screws for the valves tested. Turn the mechanical centering adjusting screw in or out until equal pressure is measured on both gauges.
4. Tighten the jam nut on the adjustment screws when equal pressure is measured on both gauges.

Pump Control Arm Assembly Removal and Installation

Removal Procedure



WARNING

BEFORE beginning this service procedure, perform the following **SAFETY** procedures:

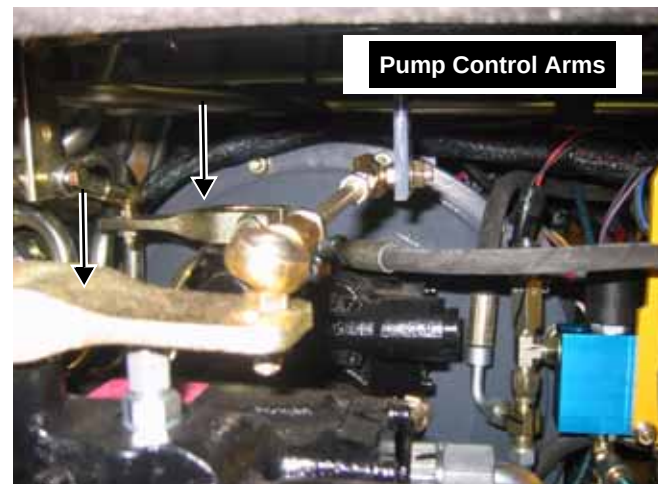
Raise lift arm; engage lift arm support device.

Shut off the engine.

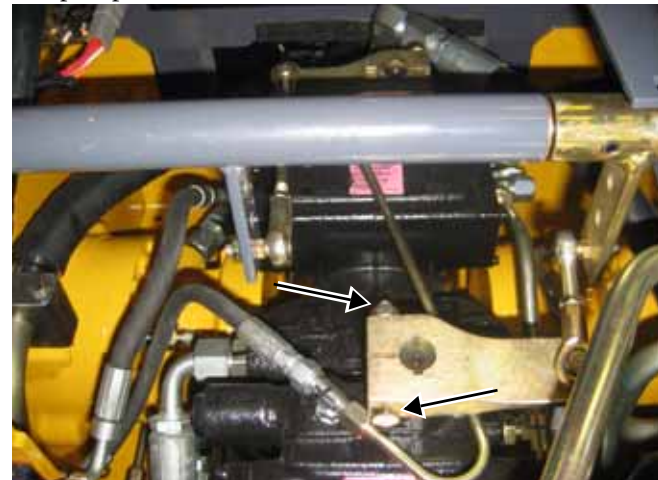
Tilt back ROPS/FOPS until lock engages.

(For detailed instructions, refer to the **Safety** chapter of this manual.)

1. Remove the locknut on each rod end attached to the two pump control arm assemblies and slide the rod ends out of the control arms.



2. Remove the capscrew and locknut that clamps the pump control arm assembly to the hydrostatic pump shaft.



3. Slide the control arm assembly off the hydrostatic pump shaft. Take the small key off the shaft (use caution not to lose it).

Installation Procedure: Follow all warnings first, then reverse the removal steps.*

* It may be necessary to perform the neutral centering device adjustment to locate “true neutral” after installation of the control arms, BUT if the control rods’ lengths were not altered and the rod ends slip right in, or if only a very slight adjustment is made to fit the rod end in the control arm assembly, no adjustment should be necessary.

Lift/Tilt Controls Removal and Installation



WARNING

BEFORE beginning this service procedure, perform the following **SAFETY** procedures:

Raise lift arm; engage lift arm support device.

Shut off the engine.

Tilt back ROPS/FOPS until lock engages.

(For detailed instructions, refer to the *Safety* chapter of this manual.)

Removal Procedure - Hand/Foot Controls



WARNING

BEFORE beginning this service procedure, perform the following **SAFETY** procedures:

Raise lift arm; engage lift arm support device.

Shut off the engine.

Tilt back ROPS/FOPS until lock engages.

(For detailed instructions, refer to the *Safety* chapter of this manual.)

1. Remove the floor linkage cover per the procedure in the *Mainframe* chapter.

2. Loosen a large jam nut on both the lift and tilt control cables where they attach at the foot pedal support weldment.



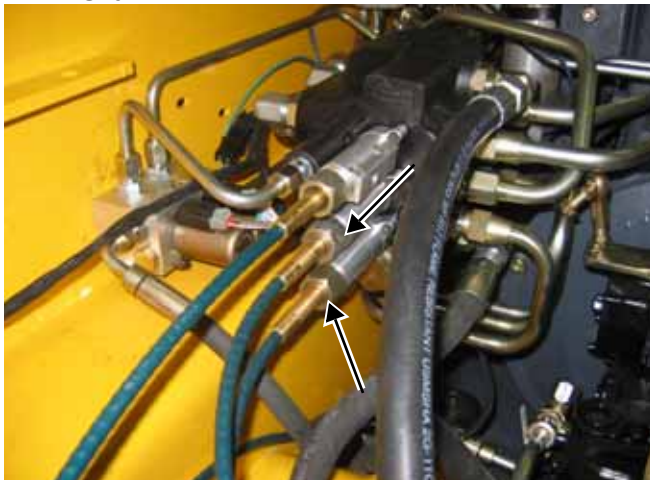
3. Unclip the clevis spring pins on clevis yokes securing the lift and tilt control cables to the foot pedals.



4. If needed, unbolt the two capscrews on the foot pedal assemblies and lift the foot pedal out of the chassis.



5. At the main control valve, completely loosen the large jam nuts on the lift and tilt control cables.



8. Remove the pins securing the lift and tilt cables to the control valve, and remove the cables.



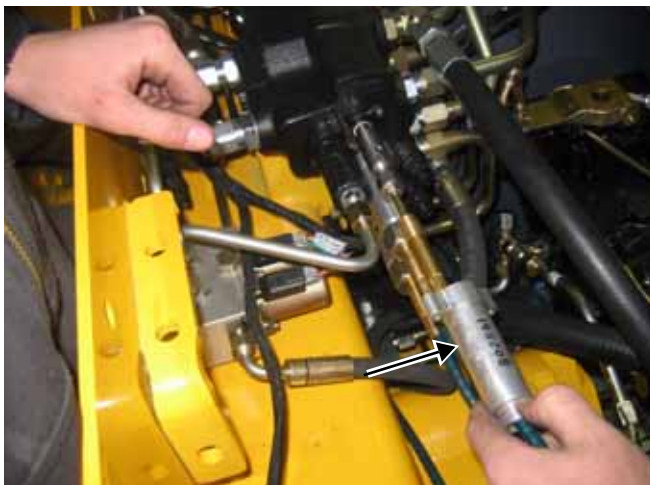
6. Unscrew the cable ends from the bonnets.



9. To reassemble, refer to the exploded view as a guide.

Installation Procedure - Hand/Foot Controls: Follow all warnings first, then reverse the removal steps.

7. Remove the two socket-head capscrews securing each bonnet to the main control valve.



Removal Procedure - Dual Hand Controls

WARNING

BEFORE beginning this service procedure, perform the following **SAFETY** procedures:

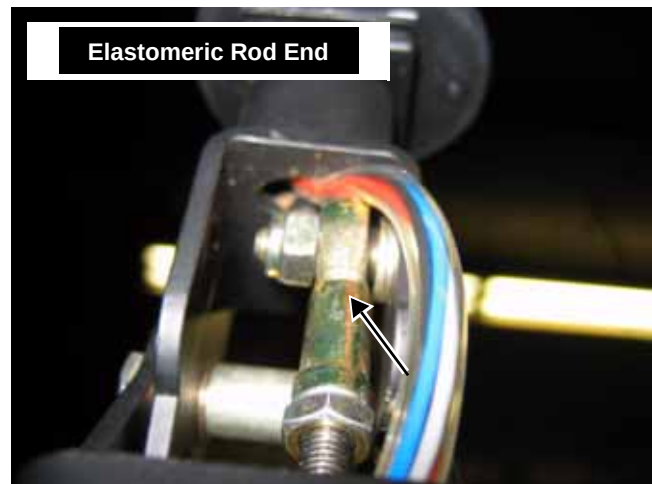
Raise lift arm; engage lift arm support device.

Shut off the engine.

Tilt back ROPS/FOPS until lock engages.

(For detailed instructions, refer to the *Safety* chapter of this manual.)

1. Remove floor cover/control cover per the procedure in the *Mainframe* chapter.
2. On each control handle, disconnect the elastomeric rod end on the control cable in the base of the grip mount by removing one capscrew and locknut and two washers.



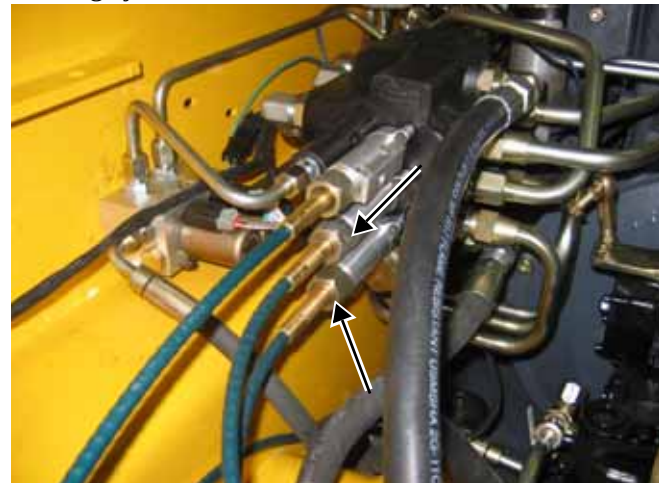
3. Disconnect the electrical connector at the bottom of each control handle.



4. Loosen a set screw in the lower handle base and lift off the lower handle with the grip on each side.



5. At the main control valve, completely loosen the large jam nuts on the lift and tilt control cables.



6. Unscrew the cable ends from the bonnets.



7. Remove the two socket-head capscrews securing each bonnet to the main control valve.



8. Remove the pins securing the lift and tilt cables to the control valve, and remove the cables.



9. To reassemble, refer to the exploded view as a guide.

Installation Procedure - Dual Hand Controls: - Follow all warnings first, then reverse the removal steps.

Lift/Tilt Control Adjustment



WARNING

BEFORE beginning this service procedure, perform the following **SAFETY** procedures:

Raise lift arm; engage lift arm support device.

Shut off the engine.

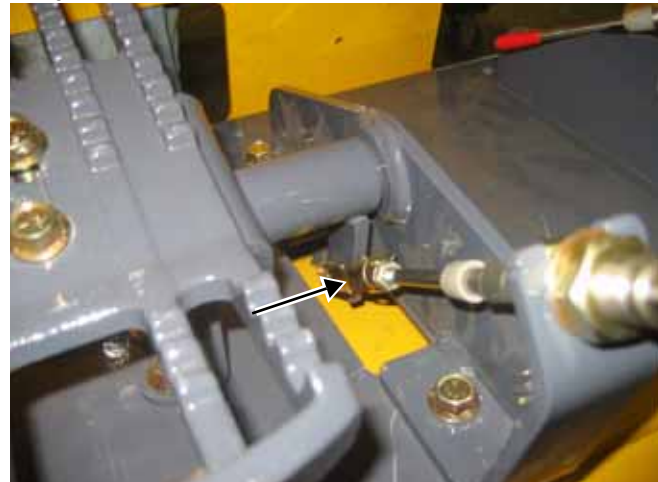
Tilt back ROPS/FOPS until lock engages.

(For detailed instructions, refer to the *Safety* chapter of this manual.)

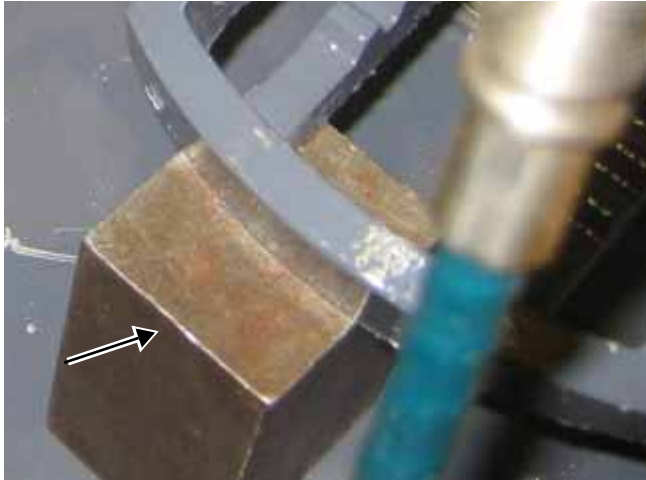
Adjustment Procedure - Hand/Foot Controls

Lift and tilt adjustment involves changing the cable lengths at the foot pedals. The procedure applies to both foot pedal levers.

1. Remove the floor linkage cover per the procedure in the *Mainframe* chapter.
2. Unclip the clevis spring pin on the clevis securing the control cable to the foot pedal and loosen the jam nut on the clevis.



3. The distance (space) between the foot pedal heel and the floor plate should be approximately 2.75" (70 mm). Use a wood block (or other suitable spacer) of that thickness under the foot pedal heel.

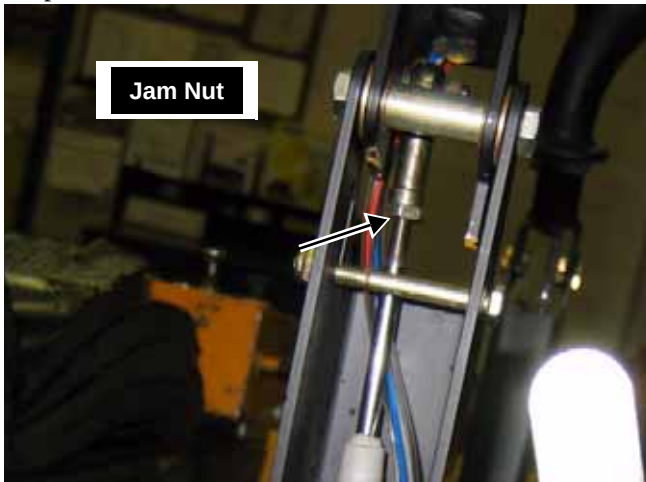


NOTES

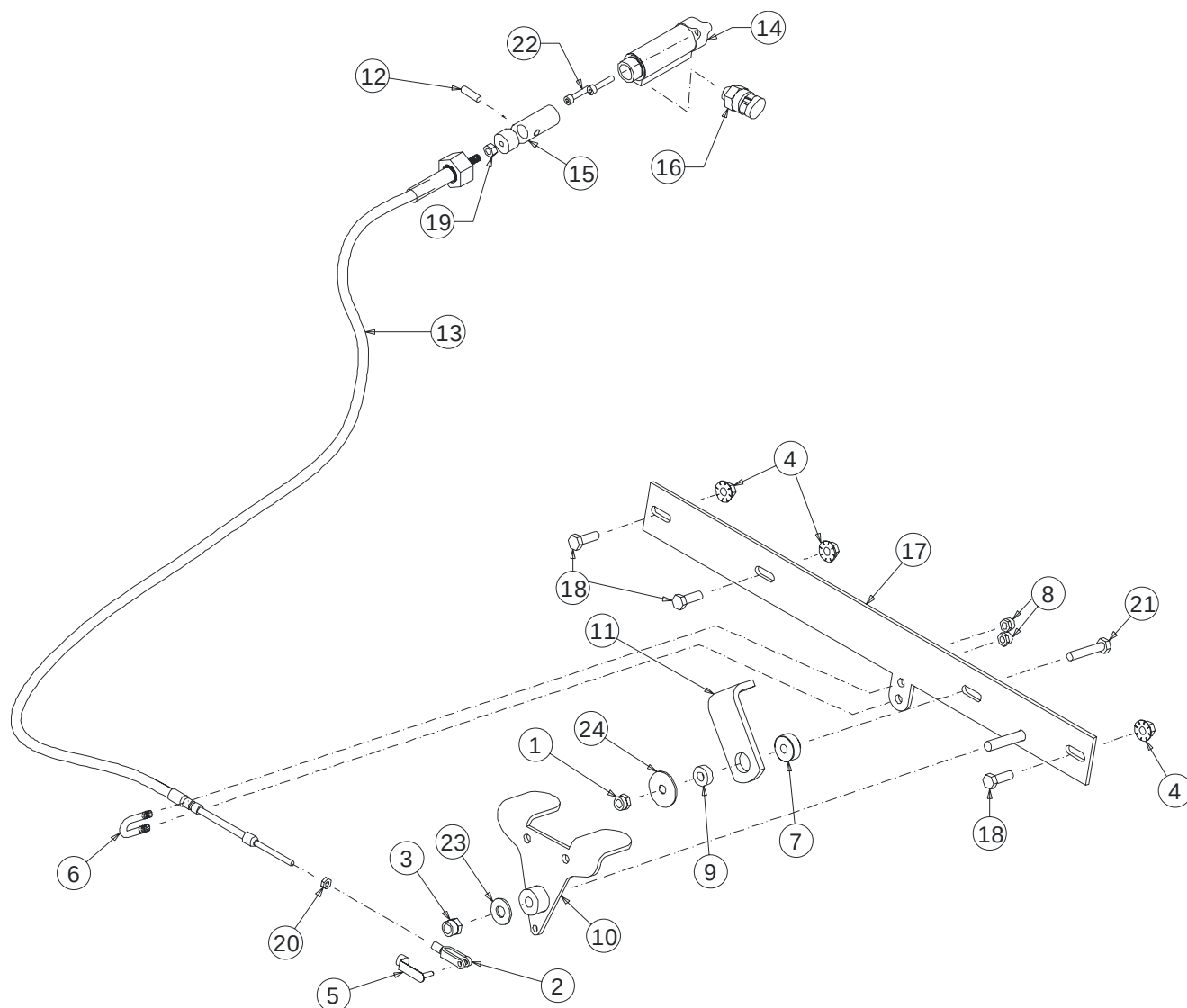
4. Rotate the clevis yoke to obtain the recommended height between the foot pedal heel and the floor plate.
5. Tighten the jam nut to the clevis yoke and reinstall the clevis spring pin.
6. Reinstall the floor linkage cover.

Adjustment Procedure - Dual Hand Controls

Cable length through the control handles can be adjusted to obtain the proper position of Dual Hand control handles at the jam nut on the elastomeric rod end. If additional cable adjustment is necessary, it may be adjusted at the control valve end. Refer to the "Control Handle Position Adjustment" procedure in this chapter as needed.

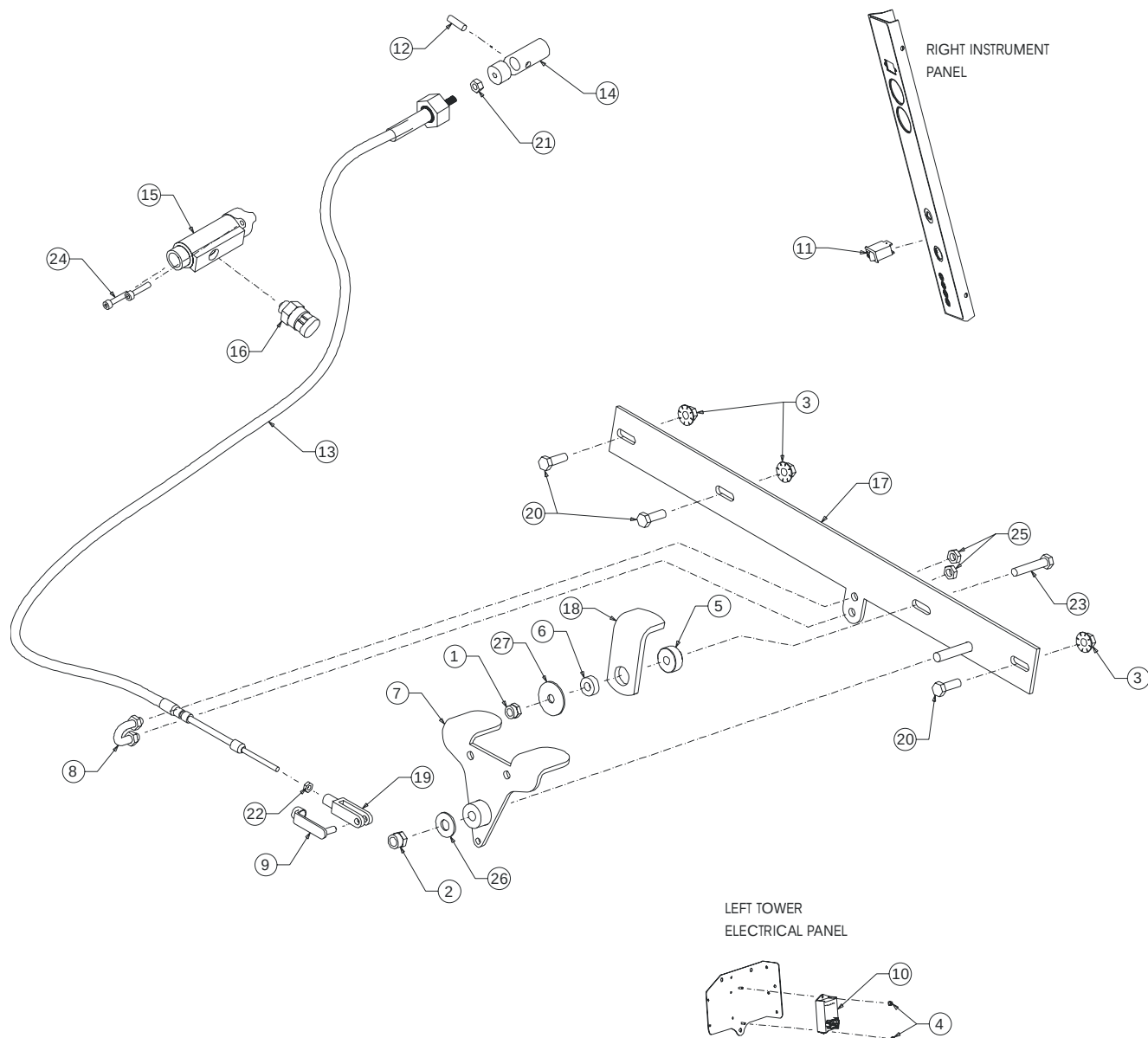


Auxiliary Hydraulics Controls - Dual Hand Controls



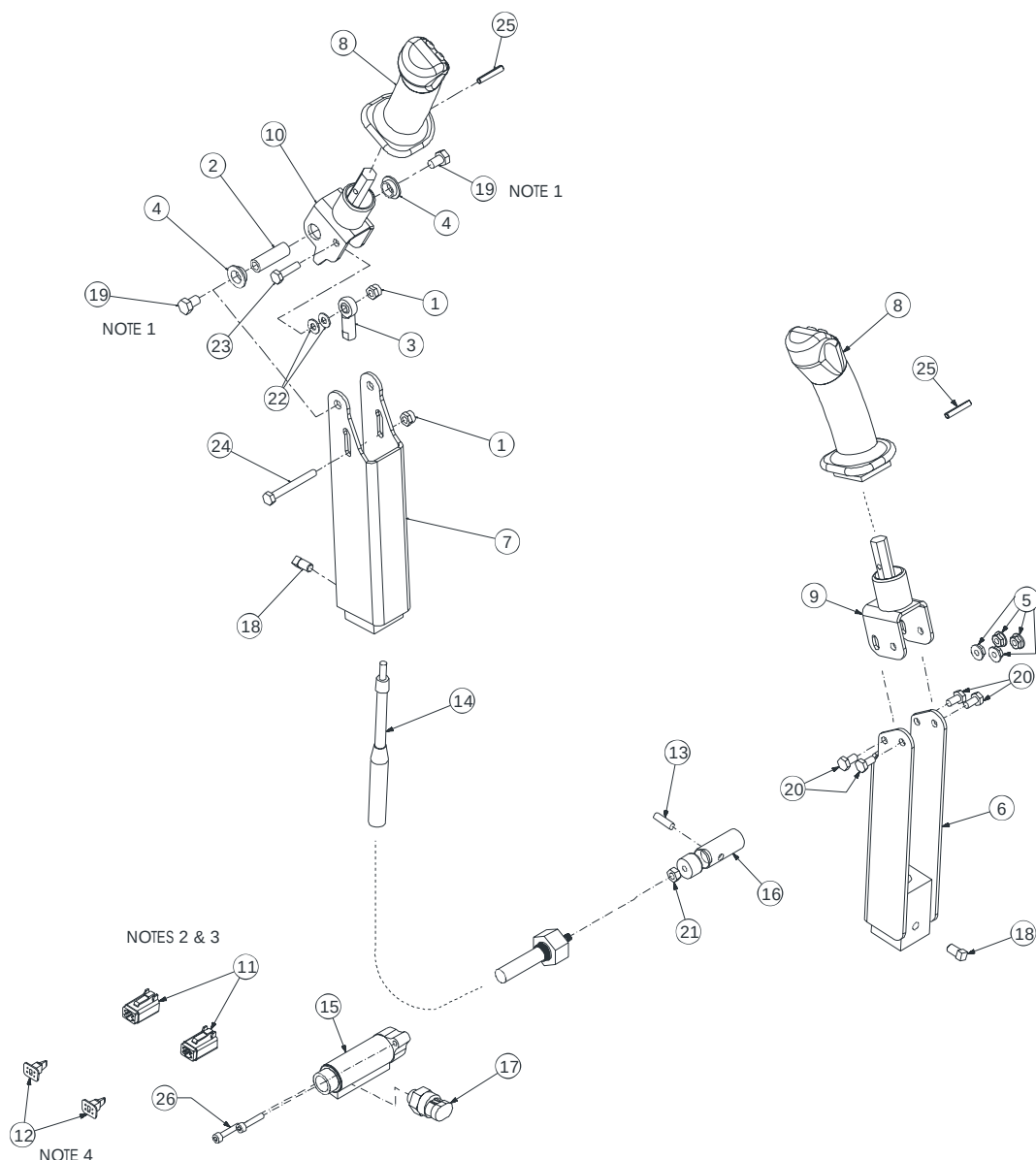
- | | | |
|---------------------|----------------------|-----------------------|
| 1 NUT/LOCK | 9 BUSHING/PIVOT | 17 SUPPORT ASSY/PEDAL |
| 2 END/YOKE | 10 AUX ASSY/PEDAL | 18 SCREW/CAP |
| 3 NUT/LOCK | 11 BAR/PEDAL SUPPORT | 19 NUT/HEX |
| 4 NUT/LOCK | 12 PIN | 20 NUT/HEX MACHINE |
| 5 PIN/SPRING CLEVIS | 13 CABLE/AUXILIARY | 21 SCREW/CAP |
| 6 U-BOLT/LD CABLE | 14 BRACKET/VALVE | 22 SCREW/CAP |
| 7 JOURNAL/PIVOT | 15 KIT/VALVE CABLE | 23 WASHER/FLAT |
| 8 NUT/LOCK | 16 SWITCH/DX | 24 WASHER/FLAT |

High-Flow Auxiliary Hydraulics Controls - Dual Hand Controls



- | | | |
|---------------------|-----------------------|--------------------|
| 1 NUT/LOCK | 10 MODULE/HIGH FLOW | 19 CLEVIS |
| 2 NUT/LOCK | 11 SWITCH/HIGH FLOW | 20 SCREW/CAP |
| 3 NUT/LOCK | 12 PIN | 21 NUT/HEX |
| 4 NUT/FLANGE | 13 CABLE/AUXILIARY | 22 NUT/HEX MACHINE |
| 5 JOURNAL/PIVOT | 14 KIT/VALVE CABLE | 23 SCREW/CAP |
| 6 BUSHING/PIVOT | 15 BRACKET/VALVE | 24 SCREW/CAP |
| 7 AUX ASSY/PEDAL | 16 SWITCH/DX | 25 NUT/HEX JAM |
| 8 U-BOLT/LD CABLE | 17 SUPPORT ASSY/PEDAL | 26 WASHER/FLAT |
| 9 PIN/SPRING CLEVIS | 18 BAR/PEDAL SUPPORT | 27 WASHER/FLAT |

Auxiliary Hydraulics Controls - Hand/Foot Controls

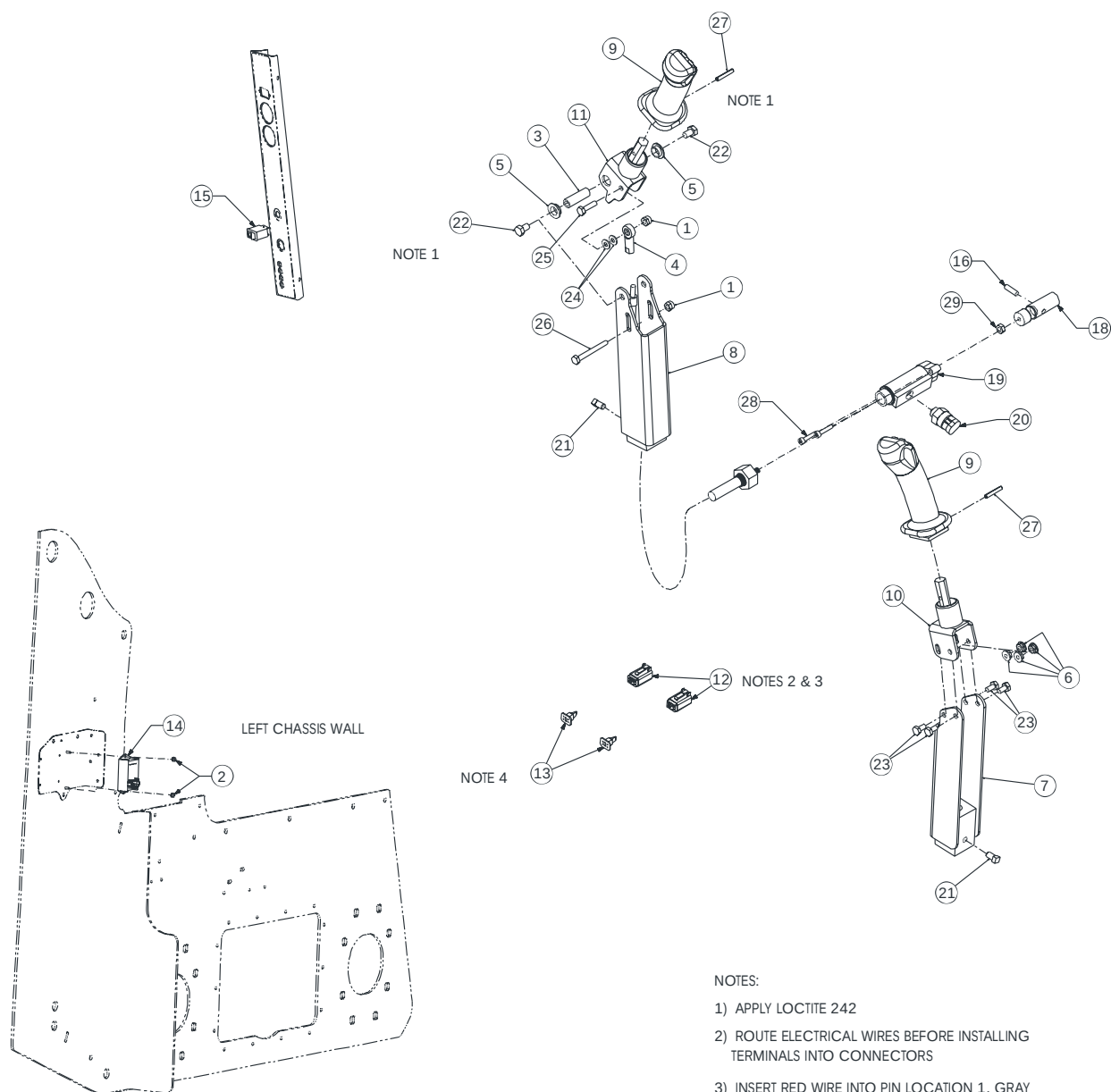


NOTES:

- 1) APPLY LOCTITE 242
- 2) ROUTE ELECTRICAL WIRES BEFORE INSTALLING TERMINALS INTO CONNECTORS
- 3) INSERT RED WIRE INTO PIN LOCATION 1, GRAY INTO 2, BLUE INTO 3, AND BLACK INTO 4
- 4) INSERT WEDGE AFTER ALL TERMINALS ARE INSTALLED

1	NUT/LOCK	10	MOUNT/GRIP RIGHT	19	SCREW/CAP
2	PIVOT/SPACER	11	PLUG 4-PIN	20	SCREW/CAP
3	ROD END/ELASTOMERIC	12	WEDGE 4-PIN	21	NUT/HEX
4	BEARING/FLANGED	13	PIN	22	WASHER/FLAT
5	NUT/SPIRALLOCK™	14	CABLE/AUXILIARY	23	SCREW/CAP
6	HANDLE/LOWER	15	BRACKET/VALVE	24	SCREW/CAP
7	HANDLE/LOWER	16	KIT/VALVE CABLE	25	PIN/ROLL
8	GRIP	17	SWITCH/DX	26	SCREW/CAP
9	MOUNT/GRIP LEFT	18	SCREW/SET		

High-Flow Auxiliary Hydraulics Controls - Hand/Foot Controls



NOTES:

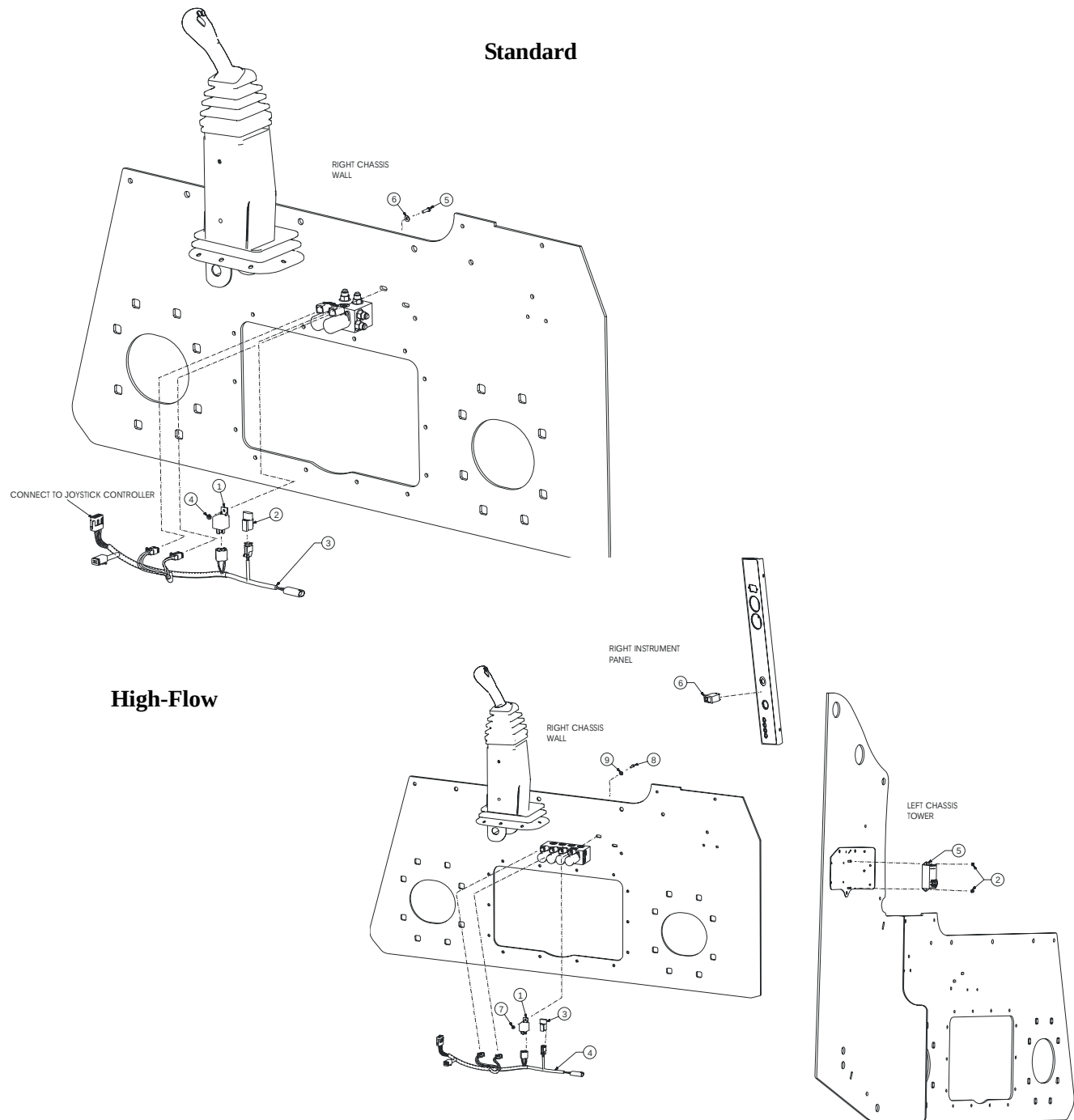
- 1) APPLY LOCTITE 242
- 2) ROUTE ELECTRICAL WIRES BEFORE INSTALLING TERMINALS INTO CONNECTORS
- 3) INSERT RED WIRE INTO PIN LOCATION 1, GRAY INTO 2, BLUE INTO 3, AND BLACK INTO 4
- 4) INSERT WEDGE AFTER ALL TERMINALS ARE INSTALLED

- 1 NUT/LOCK
- 2 NUT/FLANGE
- 3 PIVOT/SPACER
- 4 ROD END/ELASTOMERIC
- 5 BEARING/FLANGED
- 6 NUT/SPIRALOCK™
- 7 HANDLE/LOWER
- 8 HANDLE/LOWER
- 9 GRIP
- 10 MOUNT/GRIP LEFT

- 11 MOUNT/GRIP RIGHT
- 12 PLUG 4-PIN
- 13 WEDGE 4-PIN
- 14 MODULE/HIGH FLOW
- 15 SWITCH/HIGH FLOW
- 16 PIN
- 17 CABLE/AUXILIARY
- 18 KIT/VALVE CABLE
- 19 BRACKET/VALVE
- 20 SWITCH/DX

- 21 SCREW/SET
- 22 SCREW/CAP
- 23 SCREW/CAP
- 24 WASHER/FLAT
- 25 SCREW/CAP
- 26 SCREW/CAP
- 27 PIN/ROLL
- 28 SCREW/CAP
- 29 NUT/HEX

Standard and High-Flow Auxiliary Hydraulics Controls - Dual Joystick Controls



Standard Auxiliary

- 1 RELAY ISO SPDT
- 2 DIODE
- 3 HARNESS/NO REVERSE
- 4 NUT/HEX MACHINE
- 5 SCREW/MACHINE
- 6 WASHER/FLAT

High-Flow Auxiliary

- 1 RELAY ISO SPDT
- 2 NUT/FLANGE
- 3 DIODE
- 4 HARNESS/NO REVERSE
- 5 MODULE/HIGH FLOW
- 6 SWITCH/HIGH FLOW
- 7 NUT/HEX MACHINE
- 8 SCREW/MACHINE
- 9 WASHER/FLAT

Auxiliary Hydraulics Cable Removal and Installation - Dual Hand and Hand/Foot Controls

Refer to the exploded views as a reference in identifying the parts and components.

Removal Procedure - Dual Hand Controls



WARNING

BEFORE beginning this service procedure, perform the following **SAFETY** procedures:

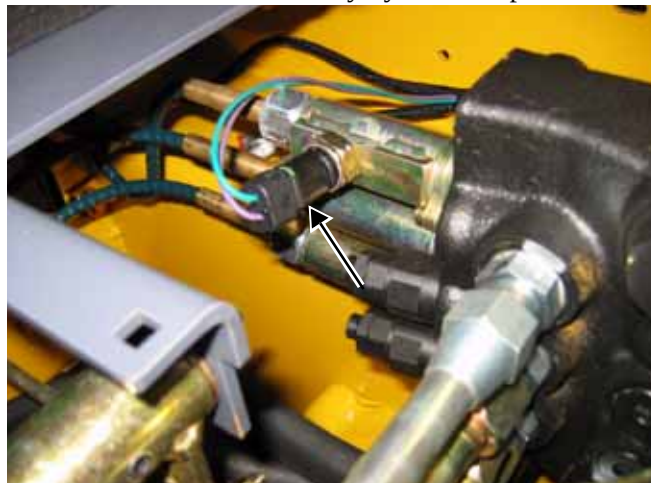
Raise lift arm; engage lift arm support device.

Shut off the engine.

Tilt back ROPS/FOPS until lock engages.

(For detailed instructions, refer to the *Safety* chapter of this manual.)

1. At the main control valve, disconnect the electrical connector on the auxiliary hydraulics spool.



2. Loosen the large jam nut on the auxiliary control cable.



3. Unscrew the cable end from the bonnet.



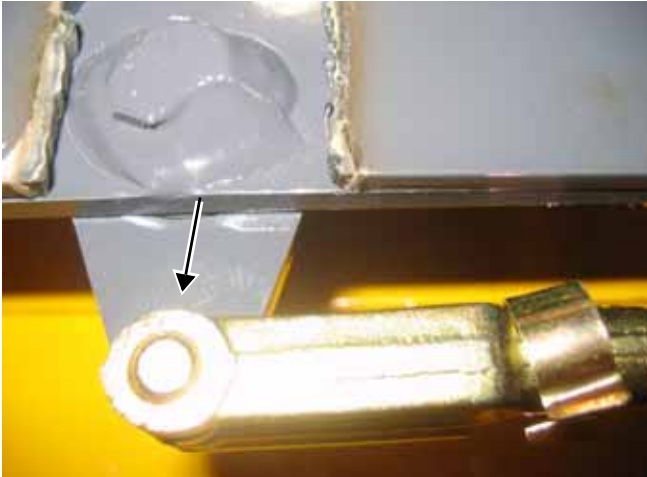
4. Remove the two socket-head capscrews securing the bonnet to the main control valve.



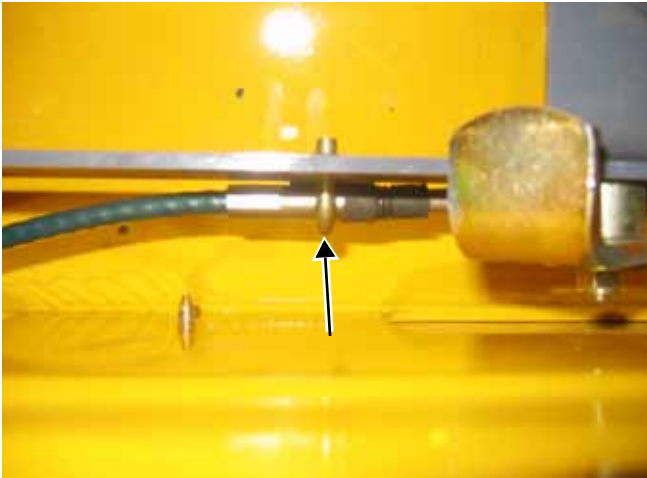
5. Remove the pin securing the auxiliary cable to the control valve, and remove the cable.



6. Remove the toe plate cover at the front of the chassis.
7. Disconnect the rod end on the auxiliary cable from the auxiliary pedal assembly by removing the clevis spring pin.



8. Loosen the cable's u-bolt securing the cable to the pedal support weldment.



9. Remove the cable. If replacing the cable, remove the clevis pin, rod end and jam nuts from the old cable.

Installation Procedure - Dual Hand Controls:
Follow all warnings first, then reverse the removal steps.*

* For cable adjustment, refer to the "Auxiliary Hydraulics Cable Adjustment" procedure in this chapter.

Removal Procedure - Hand/Foot Controls



WARNING

BEFORE beginning this service procedure, perform the following **SAFETY** procedures:

Raise lift arm; engage lift arm support device.

Shut off the engine.

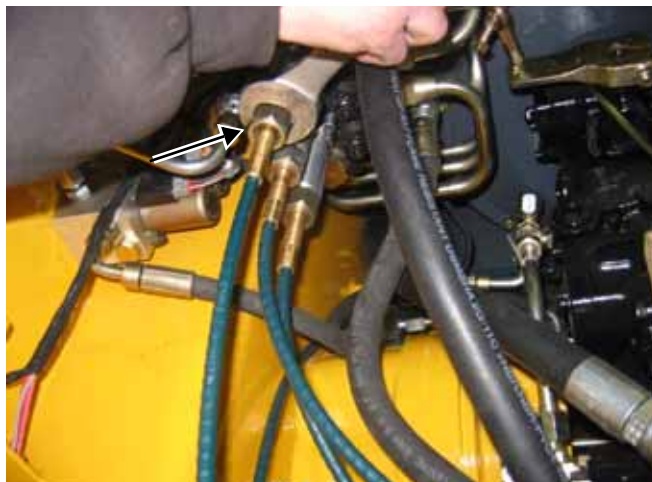
Tilt back ROPS/FOPS until lock engages.

(For detailed instructions, refer to the *Safety* chapter of this manual.)

1. At the main control valve, disconnect the electrical connector on the auxiliary hydraulics spool.



2. Loosen the large jam nut on the auxiliary control cable.



3. Unscrew the cable end from the bonnet.



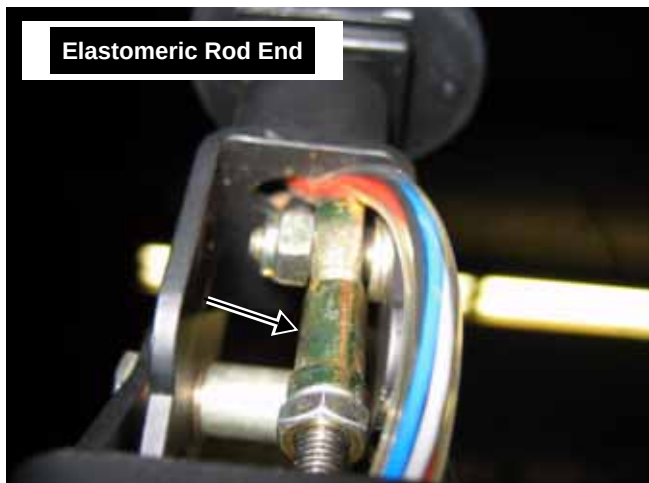
4. Remove the two socket-head capscrews securing the bonnet to the main control valve.



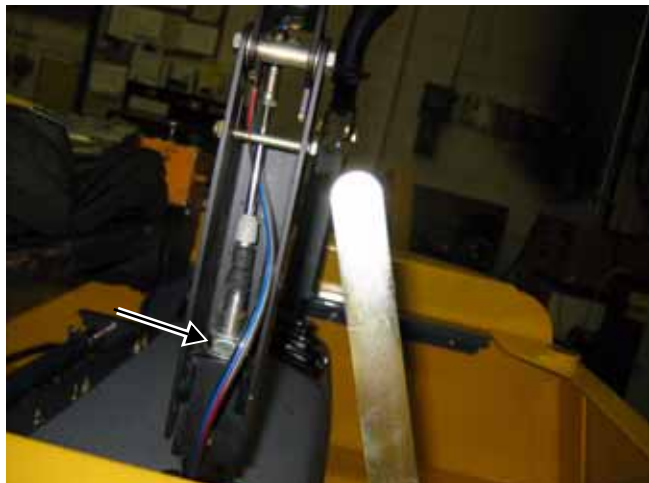
5. Remove the pin securing the auxiliary cable to the control valve, and remove the cable.



6. Remove the capscrew, locknut and two washers on the rod end inside the control handle. Loosen the jam nut on the rod end and remove the rod end from the cable.



7. Remove the jam nut on the auxiliary cable in the lower handle of the control handle.



8. Pull the auxiliary cable down through the control handle.

9. Remove the auxiliary control cable from the skid-steer loader.

Installation Procedure - Hand/Foot Control: Follow all warnings first, then reverse the removal steps.*

* For cable adjustment, refer to the "Auxiliary Hydraulics Cable Adjustment" procedure in this chapter.

Auxiliary Hydraulics Cable Adjustment - Dual Hand and Hand/Foot Controls

Adjustment Procedure - Dual Hand Controls

The auxiliary hydraulics cable should be adjusted so that the hydraulic control valve is engaged when the foot pedal is locked open with the lock bar. Refer to the exploded views for identifying the parts and components.



WARNING

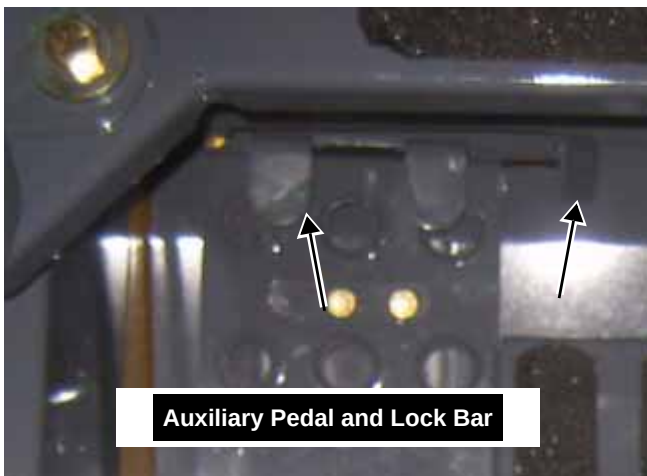
BEFORE beginning this service procedure, perform the following SAFETY procedures:

Raise lift arm; engage lift arm support device.

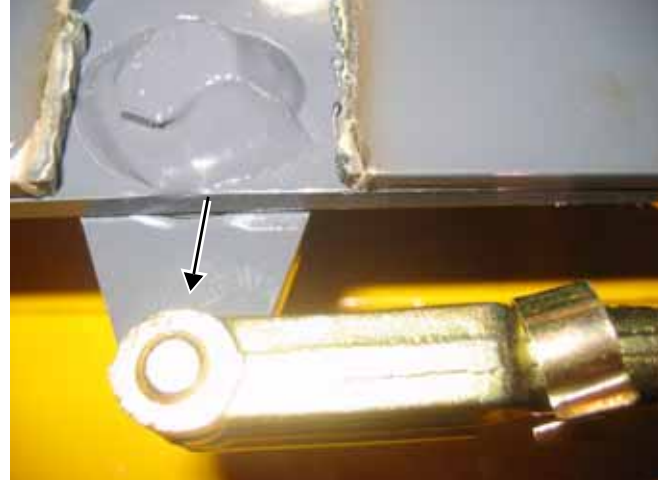
Shut off the engine.

(For detailed instructions, refer to the Safety chapter of this manual.)

1. Sit in the seat, pull the restraint bar down and turn the key to the ON or ACCESSORY position (DO NOT START ENGINE) to release the electrical detent on the auxiliary hydraulics valve spool.
2. Pivot the auxiliary hydraulics pedal assembly to the right and lock it in place with the lock bar.



3. Turn the key back to the OFF position.
4. Remove the toe plate cover at the front of the chassis.
5. Disconnect the rod end on the cable from the auxiliary pedal assembly by removing the clevis spring pin.



6. Loosen the jam nut on the clevis.



7. Twist the clevis in to tighten or out to loosen the auxiliary hydraulics cable. Most adjustments will require a tightening of the cable.
8. Reinstall the clevis spring onto the clevis and secure it to the auxiliary hydraulics pedal assembly.
9. Retighten the jam nut snug against the clevis to set the adjustment.
10. Check operation of auxiliary hydraulics cable by using an appropriate attachment.

Adjustment Procedure - Hand/Foot Controls

Hand/Foot operated skid-steer loaders are equipped with electrically-controlled auxiliary hydraulics. Follow the procedure below to adjust the cable.

The auxiliary hydraulics cable of a skid-steer loader needs to be adjusted when either of two things occur: 1) the auxiliary hydraulics are not fully engaged because the cable is too loose, or 2) the cable is too tight to allow the handle to be locked in the vertical auxiliary-on position.



WARNING

BEFORE beginning this service procedure, perform the following SAFETY procedures:

Raise lift arm; engage lift arm support device.

Shut off the engine.

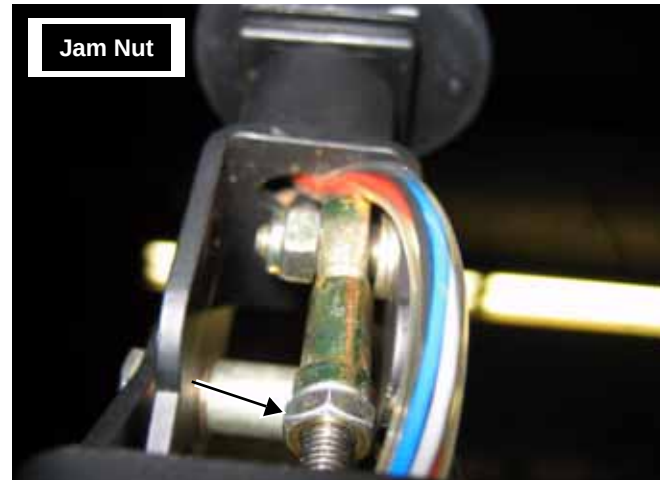
(For detailed instructions, refer to the *Safety* chapter of this manual.)

1. Sit in the seat, pull the restraint bar down and turn the key to ON or ACCESSORY position (DO NOT START ENGINE) to release the electrical detent on the auxiliary hydraulics valve spool.
2. On the right control handle, lock open the auxiliary hydraulics circuit.



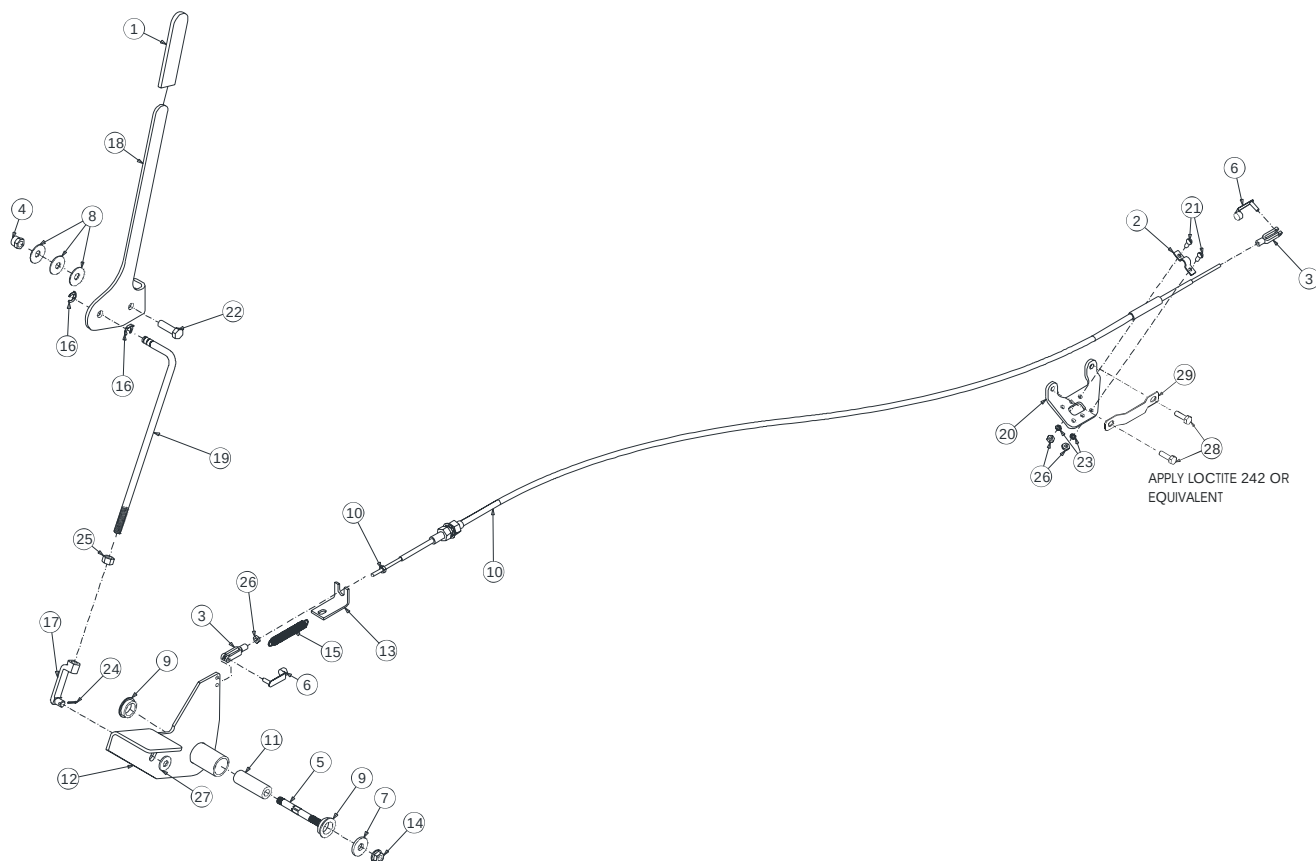
3. Turn the key back to the OFF position.
4. Remove the capscrew, washers and locknut securing the auxiliary hydraulics cable to the grip assembly.

5. Loosen the jam nut on the auxiliary hydraulics cable.



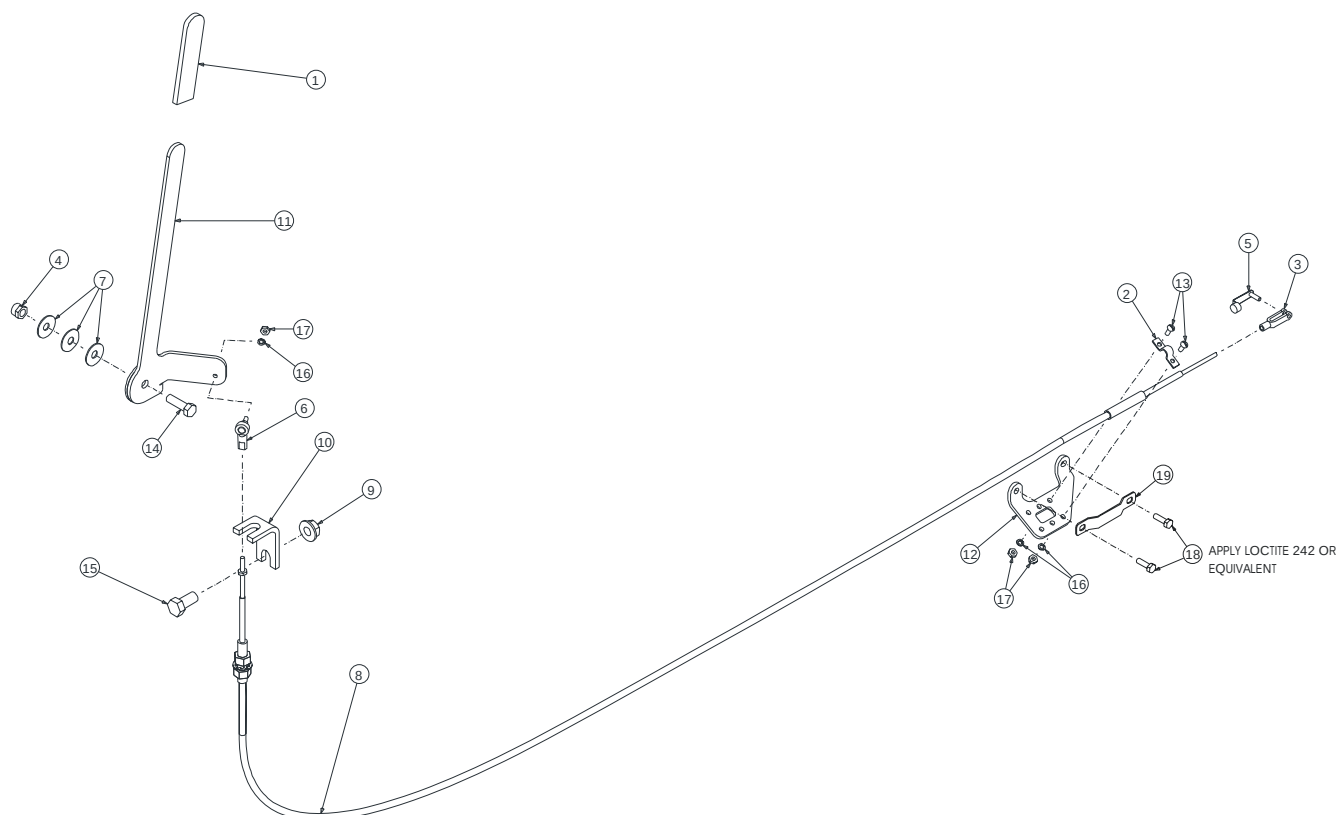
6. Twist the rod end clockwise to tighten the auxiliary hydraulics cable, or counter-clockwise to loosen the auxiliary hydraulics cable.
7. Attach the capscrew, washers and locknut securing the cable to the grip assembly, but do not tighten.
8. Test the control handle in the locked-on auxiliary hydraulics position. There should be no problem getting the lock in place, and the cable attached to the main control valve should open the auxiliary hydraulics spool valve completely. Readjust if necessary.
9. Retighten the jam nut. Tighten the locknut on the capscrew.
10. Check the operation of the auxiliary hydraulics cable by using an appropriate attachment.

Hand Throttle Controls - Dual Hand Controls



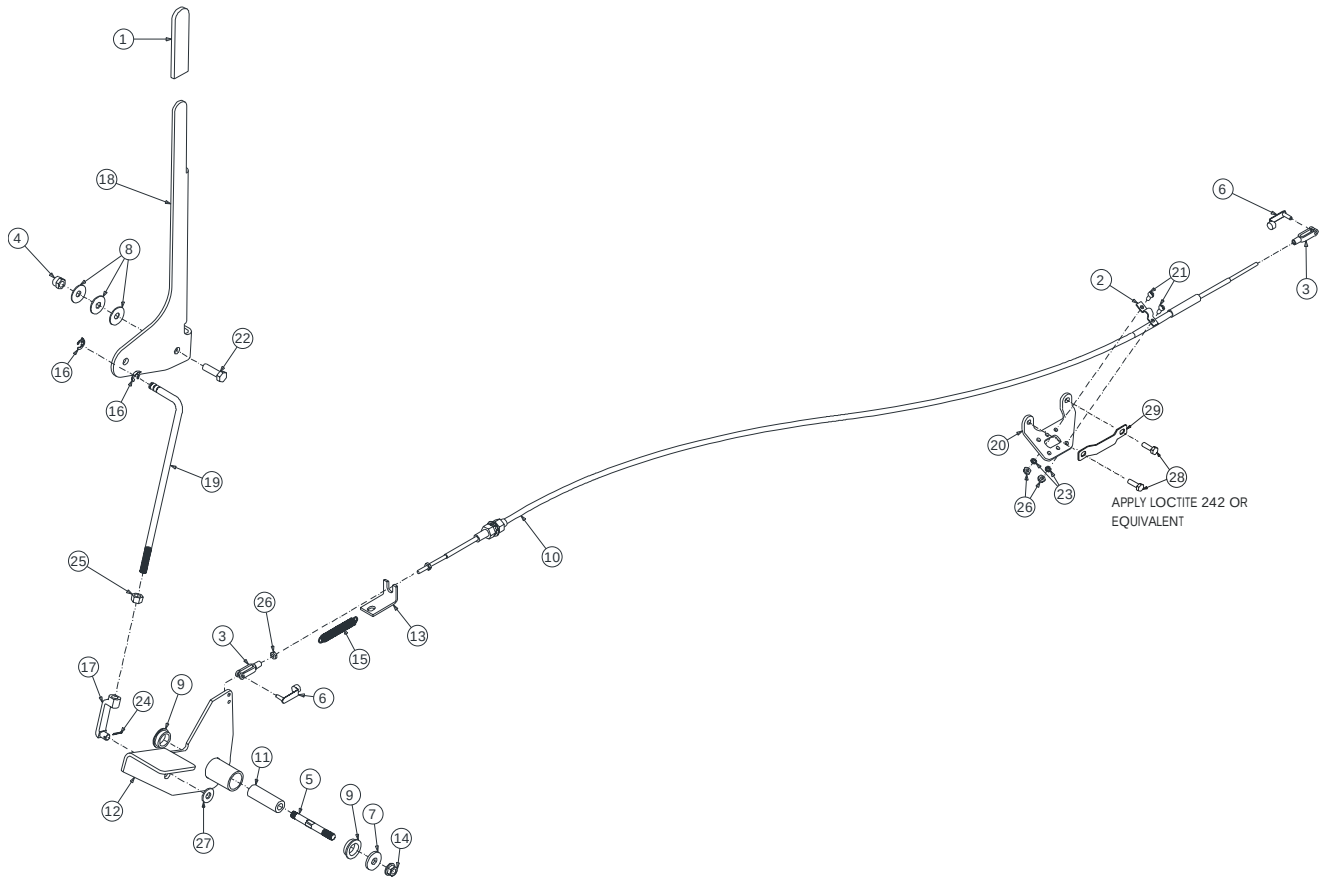
- | | | |
|---------------------|------------------------|-------------------------|
| 1 GRIP/FLAT HANDLE | 11 SPACER/PIVOT | 21 SCREW/MACHINE |
| 2 CLAMP/CABLE | 12 ASSY/PEDAL | 22 SCREW/CAP |
| 3 END/YOKE | 13 CLIP/SPRING | 23 WASHER/LOCK |
| 4 NUT/LOCK | 14 NUT/SPIRALOCK™ | 24 PIN/COTTER |
| 5 STUD | 15 SPRING | 25 NUT/HEX |
| 6 PIN/SPRING CLEVIS | 16 CLIP/RETAINING | 26 NUT/HEX MACHINE |
| 7 WASHER/FLAT | 17 CLEVIS/HALF | 27 WASHER/FLAT |
| 8 WASHER/BELLEVILLE | 18 ASSY/THROTTLE LEVER | 28 SCREW/CAP |
| 9 BUSHING/PIVOT | 19 ROD/CONTROL | 29 CLAMP/INJECTION LINE |
| 10 CABLE/THROTTLE | 20 BRACKET/THROTTLE | |

Hand Throttle Controls - Hand/Foot Controls



- | | | |
|-----------------------|--------------------------|-------------------------|
| 1 GRIP/FLAT HANDLE | 8 CABLE/THROTTLE | 15 SCREW/CAP |
| 2 CLAMP/CABLE | 9 NUT/SPIRALOCK™ | 16 WASHER/LOCK |
| 3 END/YOKE | 10 BRACKET/CABLE SUPPORT | 17 NUT/HEX MACHINE |
| 4 NUT/LOCK | 11 LEVER/THROTTLE ASSY | 18 SCREW/CAP |
| 5 PIN/SPRING CLEVIS | 12 BRACKET/THROTTLE | 19 CLAMP/INJECTION LINE |
| 6 ROD END/ELASTOMERIC | 13 SCREW/MACHINE | |
| 7 WASHER/BELLEVILLE | 14 SCREW/CAP | |

Hand Throttle Controls - Dual Joystick Controls



- | | | |
|---------------------|---------------------|-------------------------|
| 1 GRIP/FLAT HANDLE | 11 SPACER/PIVOT | 21 SCREW/MACHINE |
| 2 CLAMP/CABLE | 12 ASSY/PEDAL | 22 SCREW/CAP |
| 3 END/YOKE | 13 CLIP/SPRING | 23 WASHER/LOCK |
| 4 NUT/LOCK | 14 NUT/SPIRALOCK™ | 24 PIN/COTTER |
| 5 STUD | 15 SPRING | 25 NUT/HEX |
| 6 PIN/SPRING CLEVIS | 16 CLIP/RETAINING | 26 NUT/HEX MACHINE |
| 7 WASHER/FLAT | 17 CLEVIS/HALF | 27 WASHER/FLAT |
| 8 WASHER/BELLEVILLE | 18 LEVER/THROTTLE | 28 SCREW/CAP |
| 9 BUSHING/PIVOT | 19 ROD/CONTROL | 29 CLAMP/INJECTION LINE |
| 10 CABLE/THROTTLE | 20 BRACKET/THROTTLE | |

Hand Throttle, Foot Throttle Pedal and Throttle Cable Removal and Installation - Dual Hand and Dual Joystick Controls

Removal Procedure

WARNING

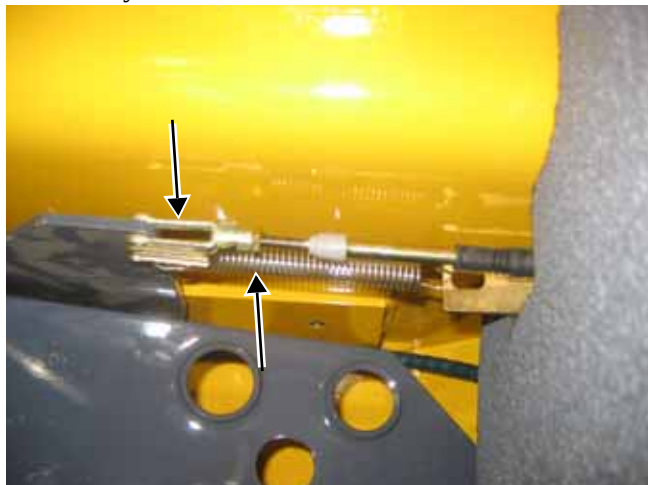
BEFORE beginning this service procedure, perform the following **SAFETY** procedures:

Shut off the engine.

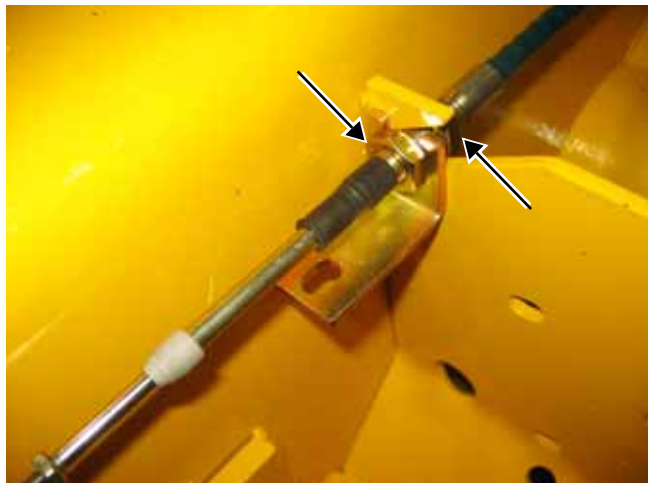
Tilt back ROPS/FOPS until lock engages.

(For detailed instructions, refer to the *Safety* chapter of this manual.)

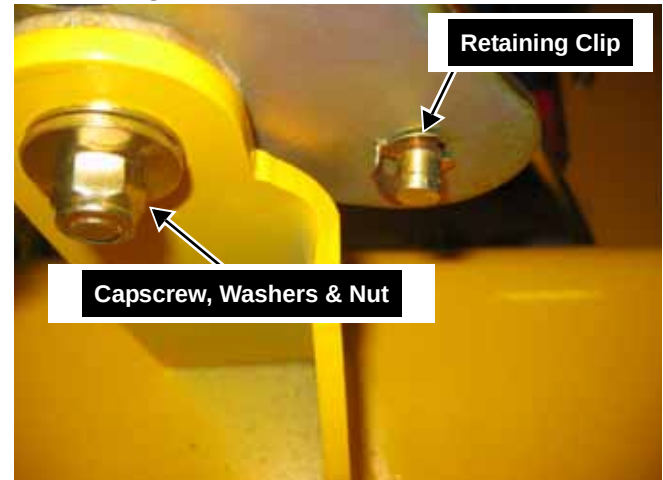
1. Remove the floor cover/control cover per the procedure in the *Mainframe* chapter.
2. Remove the clevis spring pin from the cable yoke and the spring from foot throttle pedal. Remove the cable yoke from the throttle cable.



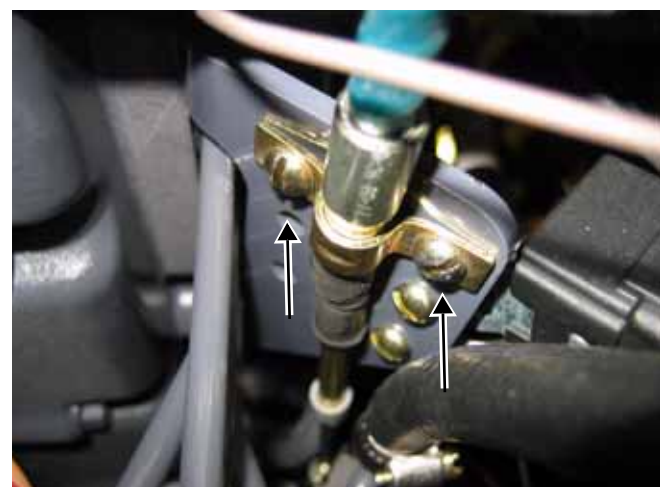
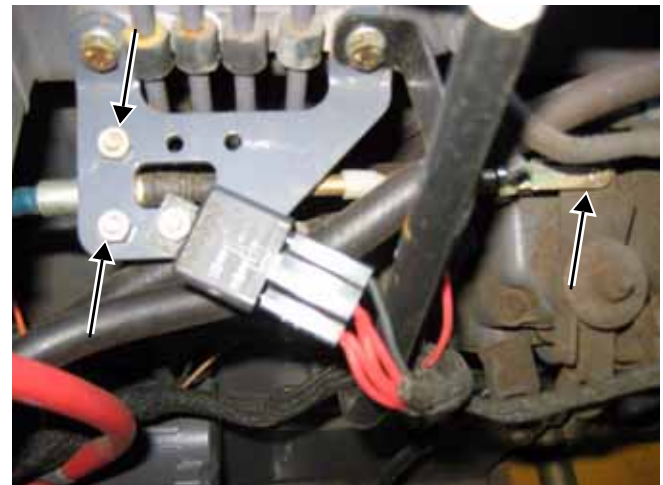
3. Loosen the two nuts on the throttle cable bracket.



4. Remove the outside (one of two) retaining clips securing the throttle rod to the hand throttle.



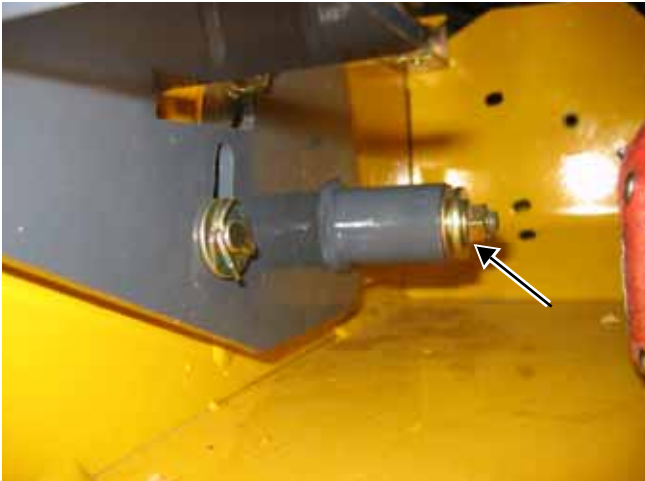
5. Remove the hex nut, cap screw and three washers on the hand throttle securing it to the chassis.
6. At the engine's throttle lever, disconnect the clevis pin from the yoke end at the throttle lever. Disconnect the cable clamp from the throttle bracket on the engine and remove the throttle cable from the skid-steer loader.



7. Remove the cotter pin and washer securing the throttle rod to the throttle pedal.



8. Remove the locknut and washer securing the pedal to the chassis.



9. Slide the foot pedal assembly off the pivot spacer and remove from the skid-steer loader.

Installation Procedure: Follow all warnings first, then reverse the removal steps.*

* Perform "Throttle Adjustment" procedure in this chapter after the installation is complete.

Hand Throttle Tension Adjustment

Hand throttle tension should be tight enough to maintain any desired engine RPM, but loose enough to allow easy operation. The hand throttle tension can be INCREASED or DECREASED.

Adjustment Procedure



WARNING

BEFORE beginning this service procedure, perform the following **SAFETY** procedures:

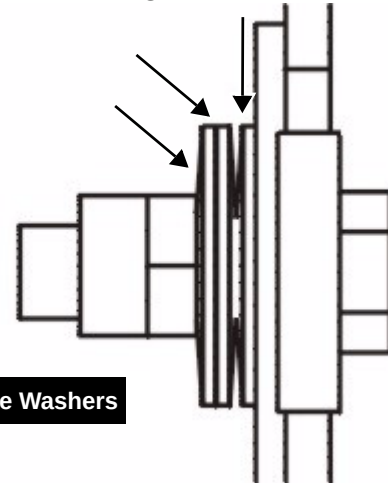
Raise lift arm; engage lift arm support device.

Shut off the engine.

Tilt back ROPS/FOPS until lock engages.

(For detailed instructions, refer to the *Safety* chapter of this manual.)

NOTE: The Belleville-type washers must be installed properly to provide tension against the hand throttle.



Belleville Washers

1. To INCREASE TENSION tighten locknut securing hand throttle pivot assembly to chassis.
2. To DECREASE TENSION loosen locknut securing hand throttle pivot assembly to chassis.

Hand Throttle and Throttle Cable Removal and Installation - Hand/Foot Controls

Removal Procedure



WARNING

BEFORE beginning this service procedure, perform the following **SAFETY** procedures:

Raise lift arm; engage lift arm support device.

Shut off the engine.

Tilt back ROPS/FOPS until lock engages.

(For detailed instructions, refer to the **Safety** chapter of this manual.)

1. At the hand throttle, remove the hex nut and lock washer on the elastomeric rod end of the throttle cable and remove the cable from the throttle lever.

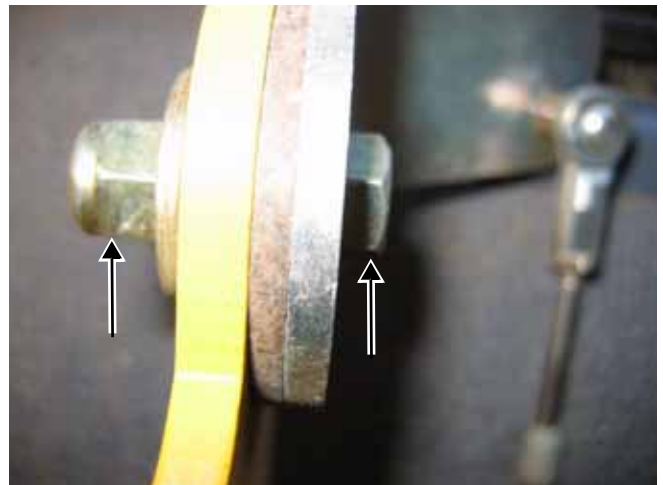


2. Loosen the two jam nuts holding the throttle cable to the cable bracket. Disconnect the elastomeric

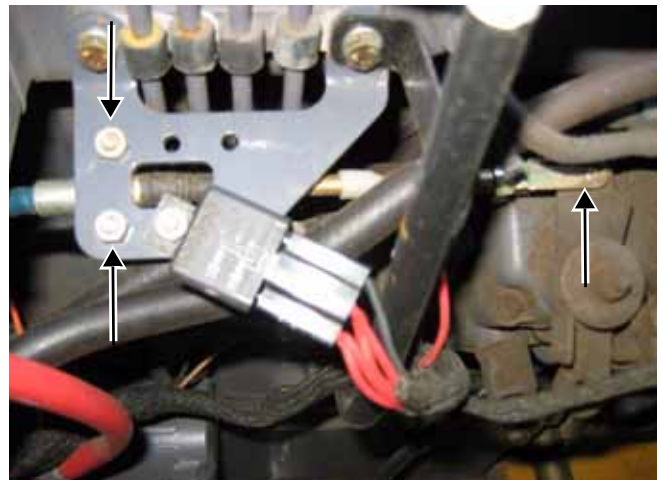
rod end from the throttle cable. Remove the throttle cable from the bracket.

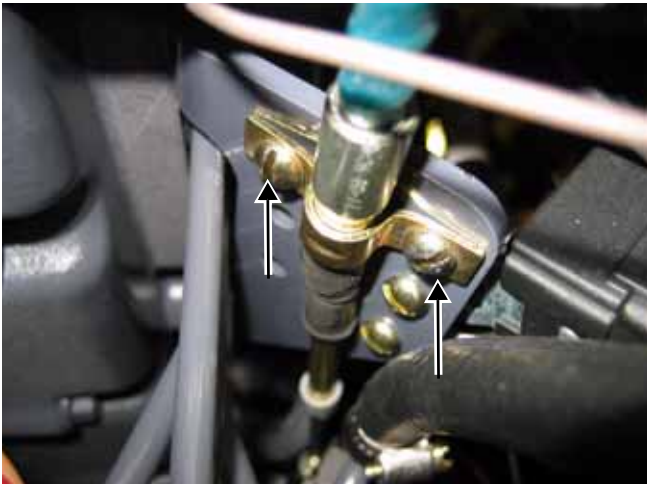


3. Remove the capscrew, locknut and three washers from the hand throttle lever that attaches the lever to the throttle bracket. Remove the hand throttle lever.



4. Disconnect the yoke end and clevis pin from the rear throttle lever attached to the engine. Disconnect the cable clamp from the throttle bracket on the engine and remove the throttle cable from the skid-steer loader.





Installation Procedure: Follow all warnings first, then reverse the removal steps.*

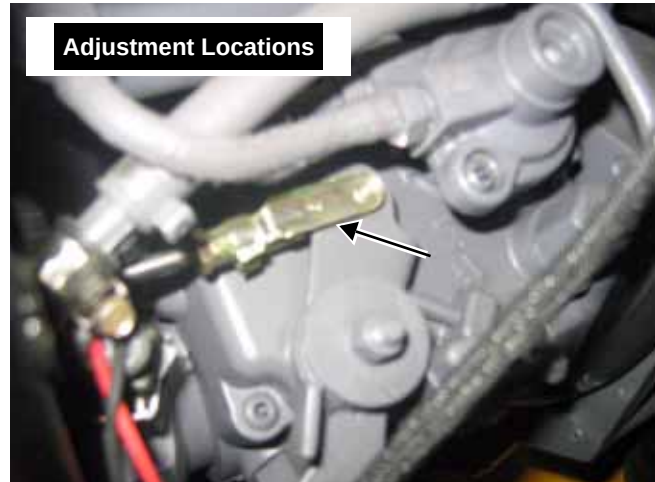
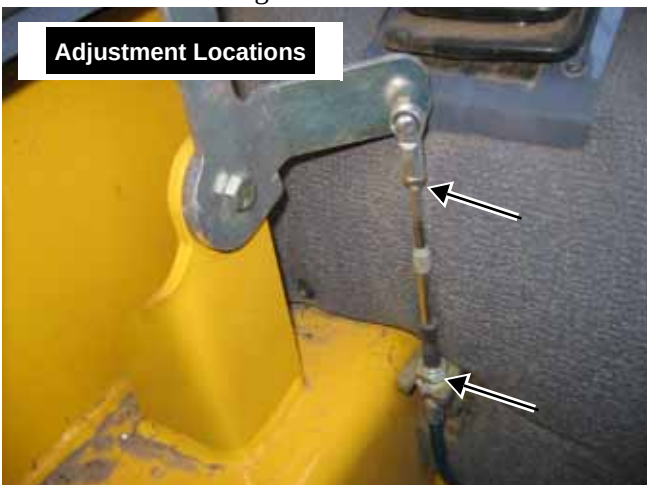
* Perform “Throttle Adjustment” procedure in this chapter after the installation is complete.

Hand Throttle Adjustment - Hand/Foot Controls

The hand throttle is adjusted at the factory to provide a full range of engine speed adjustment, from IDLE to FULL throttle.

Adjustment Procedure

The hand throttle can be adjusted at three different locations: at the rod end attached to the throttle lever, at the throttle cable on the cable bracket, and at the yoke end attached to the engine.



WARNING

BEFORE beginning this service procedure, perform the following **SAFETY** procedure:

Shut off the engine.

(For detailed instructions, refer to the *Safety* chapter of this manual.)

NOTE: DO NOT attempt to adjust the hand throttle lever at the two fuel injection pump adjustment screws.

1. Test the throw of the hand throttle to determine if the cable needs shortening or lengthening. When the hand throttle and the fuel injection pump are at low idle simultaneously, the proper adjustment is achieved. Be sure that the throttle lever does not interfere with the rod end attached to it.
2. If the cable needs adjustment, choose a location:
 - » Loosen the jam nut on the yoke end of the throttle cable or elastomeric rod end.
 - » Remove the spring pin on the yoke end, or the lockwasher and hex nut on the elastomeric rod end.
 - » Twist the yoke end to shorten or lengthen the throttle cable as needed. If adjusting at the throttle cable bracket, pull or push throttle cable through its sheath until the correct length is achieved.
3. Reattach the yoke end or the rod end. If adjusting at the throttle cable bracket, tighten the jam nut. Push the hand throttle to check for correct operation. Repeat as needed.
4. Tighten the jam nut against the yoke end or rod end to secure the adjustment.

Foot Throttle Adjustment - Dual Hand and Dual Joystick Controls

A foot throttle is used to control the engine RPM to match increased power requirements. The foot throttle is coupled to the hand throttle through a foot throttle rod assembly. The foot throttle is at the proper adjustment when pushing the hand throttle FULLY FORWARD causes the foot pedal to be pressed flush against the floor plate.

Adjustment Procedure



WARNING

BEFORE beginning this service procedure, perform the following **SAFETY** procedures:

Raise lift arm; engage lift arm support device.

Shut off the engine.

Tilt back ROPS/FOPS until lock engages.

(For detailed instructions, refer to the *Safety* chapter of this manual.)

1. With the hand throttle pulled back to an IDLE position, remove the cotter pin and washer to disconnect the half-clevis from the foot throttle assembly.

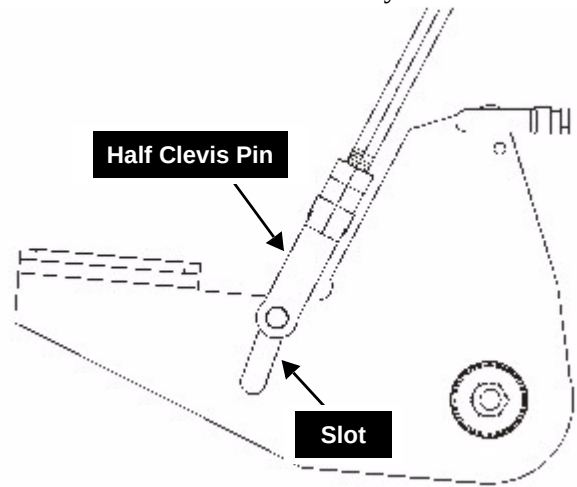


2. Push down on the foot pedal until it is flush with the floor plate.

3. Loosen the jam nut on the half-clevis and adjust the half-clevis so that the hand throttle lever is at high idle.



4. With the foot pedal down and the hand throttle pulled back, the clevis pin should just touch the top of the slot in the lever assembly.



CHAPTER NOTES

Introduction

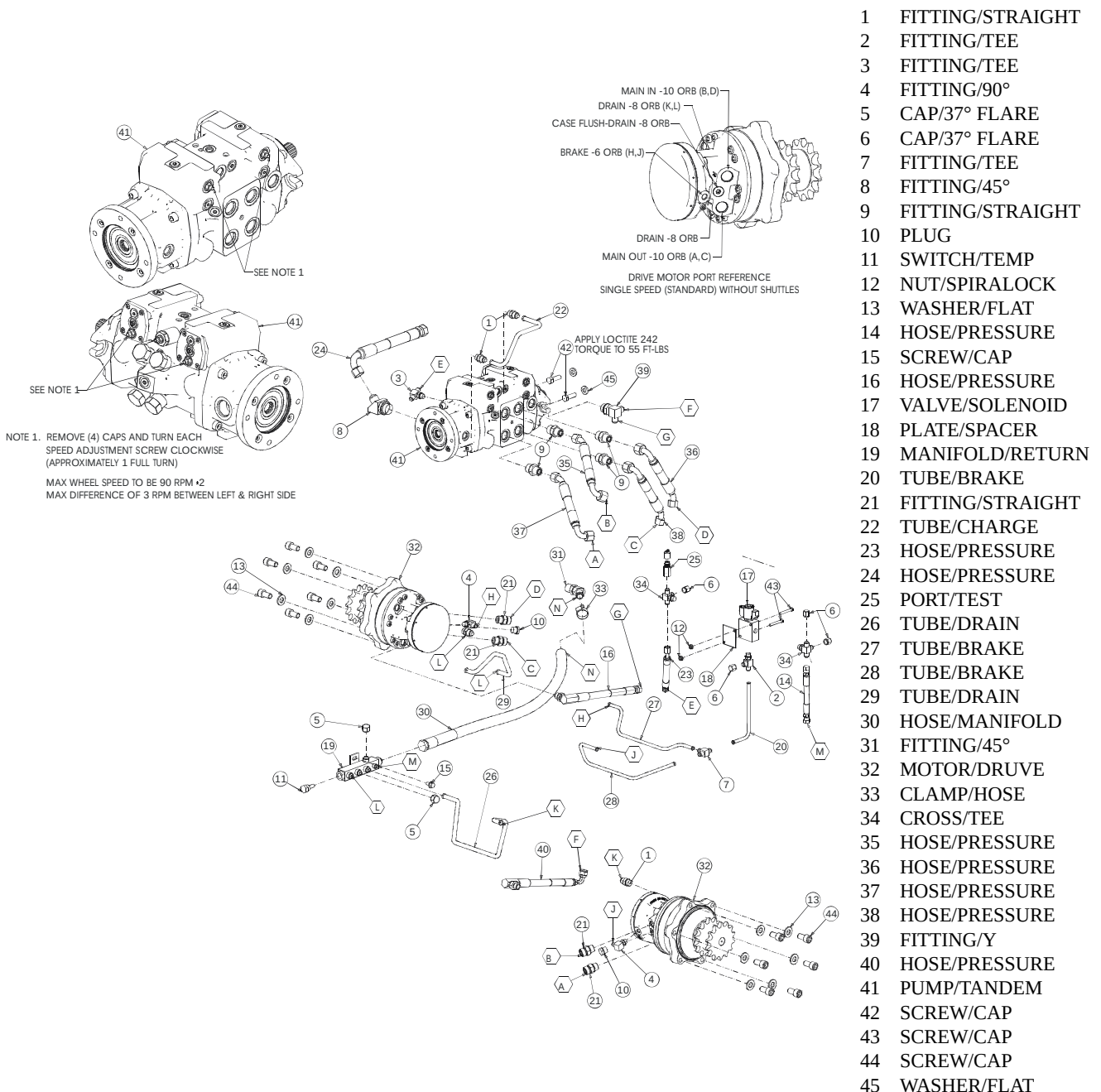
This chapter covers troubleshooting, testing, removal, installation, and adjustment procedures for the tandem pump system on 2056 model skid-steer loaders.

A hydrostatic pump assembly coupled to the engine provides power to two fixed-displacement hydrostatic drive motors. The motors drive the wheels on each side

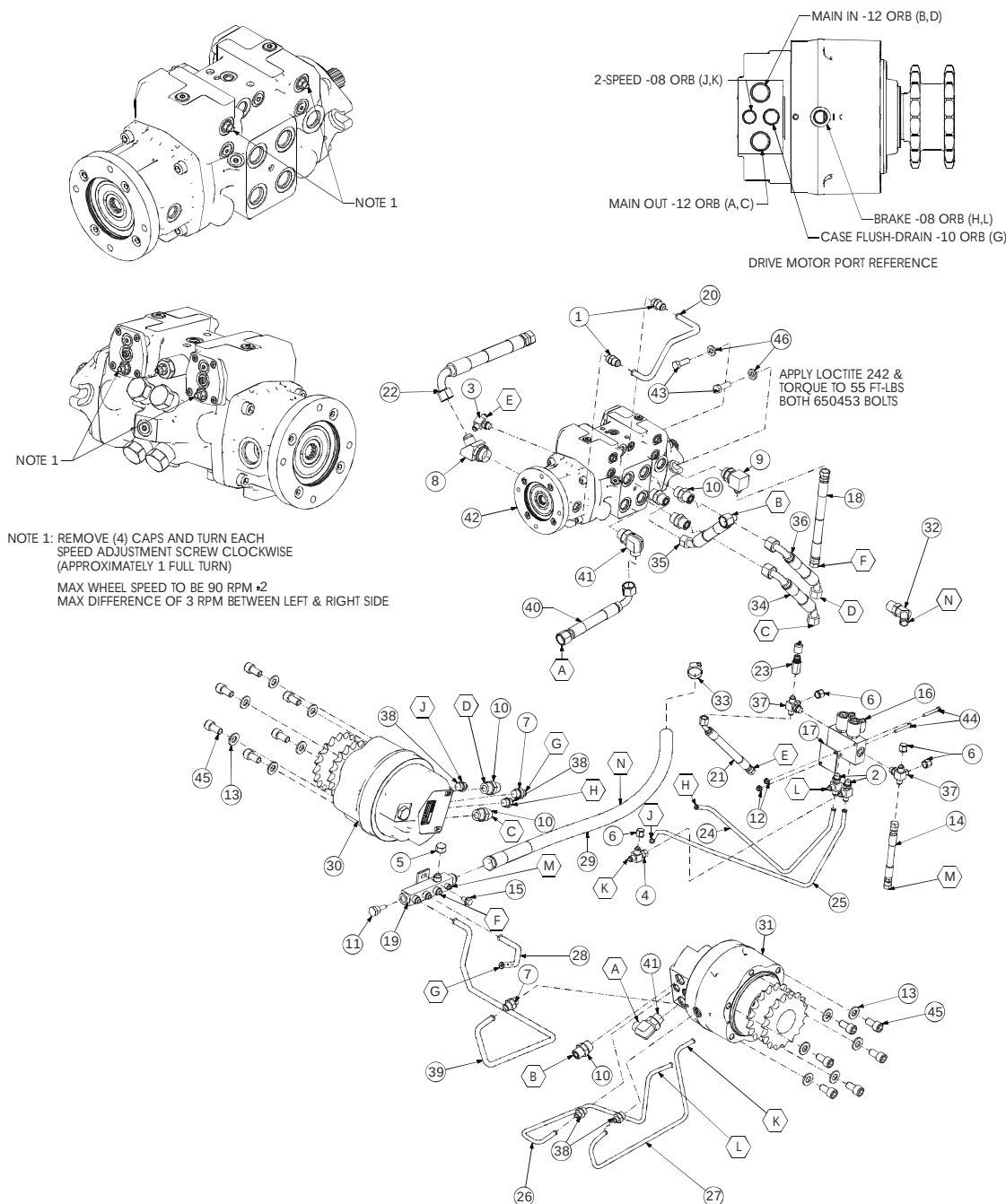
of the loader through a chain-and-sprocket system. The pumps and motors are controlled individually, allowing complete flexibility in forward, reverse, gradual, pivot and spin turns.

For detailed information on pump and motor internal repairs, consult the Mustang Service Department or the component manufacturer's service manual. Related hydraulic components are covered in the *Hydraulic System* chapter of this manual.

Single-Speed Hydrostatic Components - Dual Joystick Controls

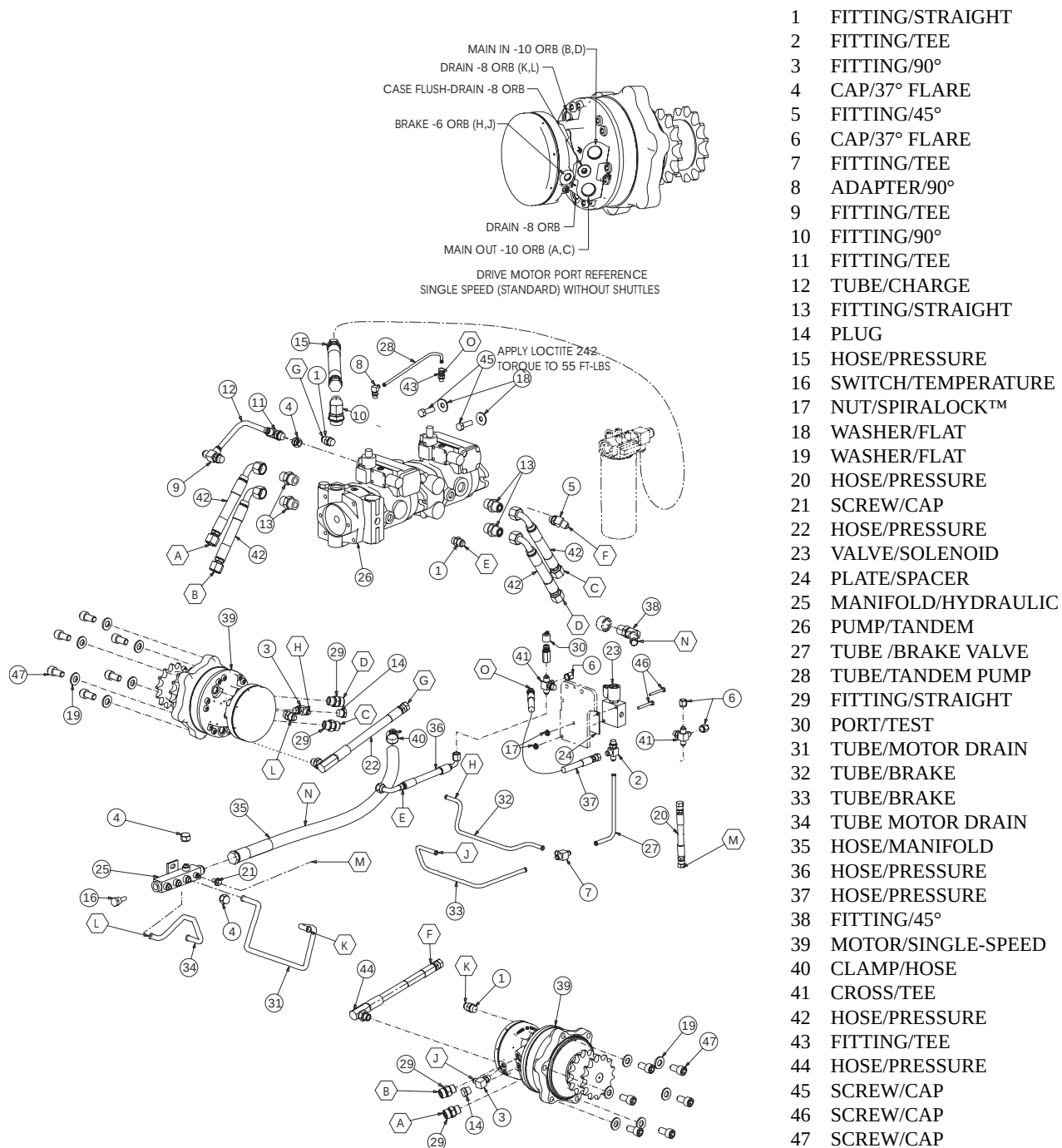


Two-Speed Hydrostatic Components - Dual Joystick Controls

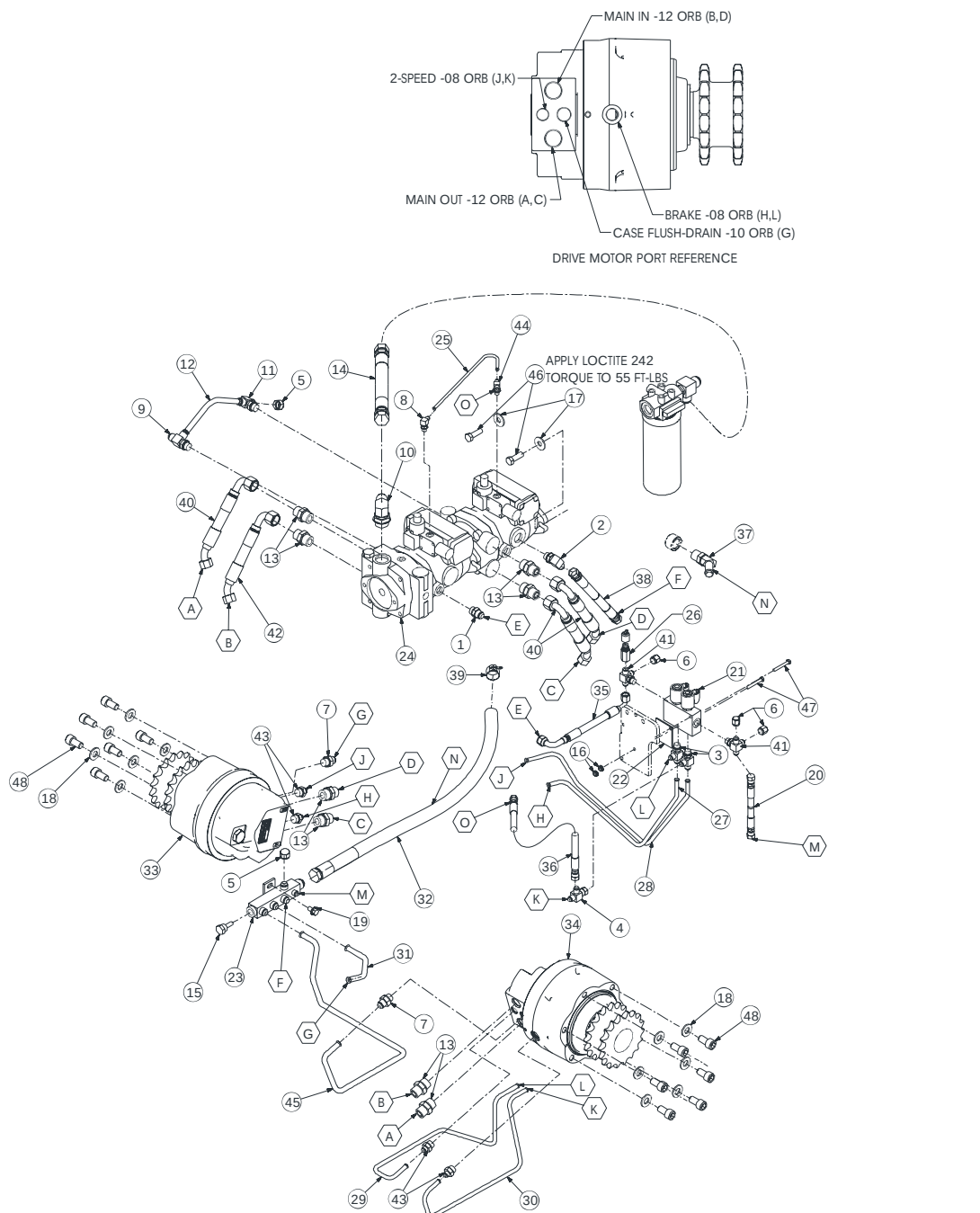


1 FITTING/STRAIGHT	13 WASHER/FLAT	25 TUBE/BRAKE	37 CROSS/TEE
2 FITTING/TEE	14 HOSE/PRESSURE	26 TUBE/MOTOR	38 FITTING/STRAIGHT
3 FITTING/TEE	15 SCREW/CAP	27 TUBE/BRAKE	39 TUBE/DRAIN
4 FITTING/TEE	16 MANIFOLD/VALVE	28 TUBE/DRAIN	40 HOSE/PRESSURE
5 CAP/37° FLARE	17 PLATE/SPACER	29 HOSE/MANIFOLD	41 FITTING/90°
6 CAP/37° FLARE	18 HOSE/PRESSURE	30 MOTOR/DRIVE RIGHT	42 PUMP/TANDEM
7 FITTING/STRAIGHT	19 MANIFOLD/RETURN	31 MOTOR/DRIVE LEFT	43 SCREW/CAP
8 FITTING/45°	20 TUBE/CHARGE	32 FITTING/45°	44 SCREW/CAP
9 FITTING/90°	21 HOSE/PRESSURE	33 CLAMP/HOSE	45 SCREW/CAP
10 FITTING/STRAIGHT	22 HOSE/PRESSURE	34 HOSE/PRESSURE	46 WASHER/FLAT
11 SWITCH/TEMP	23 PORT/TEST	35 HOSE/PRESSURE	
12 NUT/SPIRALOCK	24 TUBE/MOTOR	36 HOSE/PRESSURE	

Single-Speed Hydrostatic Components - Hand/Foot and Dual Hand Controls



Two-Speed Hydrostatic Components - Hand/Foot and Dual Hand Controls



1	FITTING/STRAIGHT	13	FITTING/STRAIGHT	25	TUBE/TANDEM PUMP	37	FITTING/45°
2	FITTING/90°	14	HOSE/PRESSURE	26	PORT/TEST	38	HOSE/PRESSURE
3	FITTING/TEE	15	SWITCH/TEMP	27	TUBE/TWO-SPEED	39	CLAMP/HOSE
4	FITTING/TEE	16	NUT/SPIRALOCK™	28	TUBE/MOTOR BRAKE	40	HOSE/PRESSURE
5	CAP/37° FLARE	17	WASHER/FLAT	29	TUBE/TWO-SPEED	41	CROSS/TEE
6	CAP/37° FLARE	18	WASHER/FLAT	30	TUBE/MOTOR BRAKE	42	HOSE/PRESSURE
7	UNION/FITTING	19	SCREW/CAP	31	TUBE/DRAIN	43	FITTING/STRAIGHT
8	ADAPTER/90°	20	HOSE/PRESSURE	32	HOSE/MANIFOLD	44	FITTING/TEE
9	FITTING/TEE	21	MANIFOLD/VALVE	33	MOTOR/TWO-SPEED	45	TUBE/MOTOR DRAIN
10	FITTING/90°	22	PLATE/SPACER	34	MOTOR/TWO-SPEED	46	SCREW/CAP
11	FITTING/TEE	23	MANIFOLD	35	HOSE/PRESSURE	47	SCREW/CAP
12	TUBE/CHARGE	24	PUMP/TANDEM	36	HOSE/PRESSURE	48	SCREW/CAP

Charge Pressure Test and Adjustment

2056 model skid-steer loaders have, as standard equipment, a charge pressure test port as part of the hydrostatic pump system. Before performing the following test, run the skid-steer loader to be sure the hydraulic oil is at normal operating temperature.

NOTE: This test requires a minimum of a 500 PSI (34.5 bar) pressure gauge.



WARNING

BEFORE beginning this service procedure, perform the following SAFETY procedures:

Shut off the engine.

Tilt back ROPS/FOPS until lock engages.

(For detailed instructions, refer to the *Safety* chapter of this manual.)

Test Procedure

1. Remove the metal cap from the test port.



2. Install the pressure gauge on the charge pressure test port.
3. Restart the engine and check the pressure reading on the gauge. The gauge should read as follows:

Hand/Foot and Dual Hand Controls: 250 - 300 PSI (17 - 21 bar)

Dual Joystick Controls: 435 PSI (30 bar)

4. If the pressure reading on the gauge is either lower or higher than specified, refer to the manufacturer's service manual for the hydrostatic pump, and the charge pressure adjustment procedure that follows.

5. When finished, reinstall the metal cap to the test port.

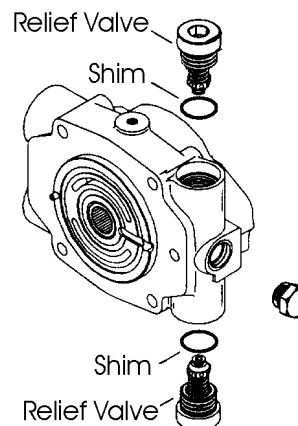
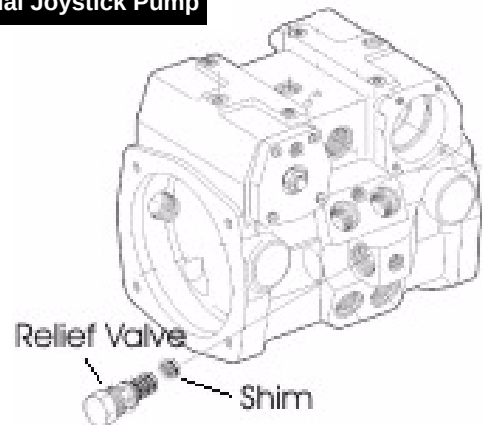
Adjustment Procedure

Add or remove shims on the charge pressure relief valve (next section) to adjust the charge pressure. Add shims to increase the charge pressure; remove shims to decrease the charge pressure.

Hydrostatic Pump Relief Valves

Each hydrostatic pump is equipped with two high pressure relief valves, for a total of four hydrostatic pump relief valves in the hydrostatic drive system. The two front relief valves on the hydrostatic pump assembly control the front hydrostatic pump, which drives the left side of the skid loader. The two rear relief valves on the hydrostatic pump assembly control the rear hydrostatic pump, which drives the right side of the skid-steer loader. **Refer to the manufacturer's manual for service procedures.**

Dual Joystick Pump



Non-Dual Joystick Pump

Hydrostatic Pump Removal / Installation



WARNING

BEFORE beginning this service procedure, perform the following SAFETY procedures:

Raise lift arm; engage lift arm support device.

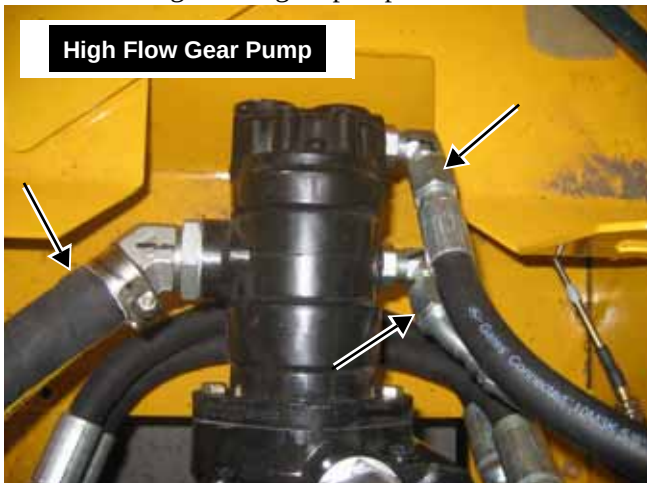
Shut off the engine.

Tilt back ROPS/FOPS until lock engages.

(For detailed instructions, refer to the *Safety* chapter of this service manual.)

Removal Procedure

1. Drain the oil from the hydraulic reservoir per the procedure in the *Lubrication* chapter.
2. Remove the control cover and the floor cover per the procedure in the *Mainframe* chapter.
3. Remove the crossmember per the procedure in the *Mainframe* chapter.
4. Disconnect all the hydraulic pressure hoses from their fittings at the gear pump.



5. Support the gear pump. Remove two capscrews securing the gear pump to the hydrostatic pump.

Pull the gear pump forward and up, out of the chassis.



6. Label and disconnect all the hydraulic hoses connected to the hydrostatic pump.

NOTE: Mark the hoses and fittings for reassembly, and cap or plug them after they are disconnected to prevent contaminants from entering the hydraulic system.

7. Position a hoist above the hydrostatic pump. Attach lifting straps around the pump or use a lifting hook and raise the hoist to remove slack from the strap/hook. The hoist should now support the weight of the pump.



8. Remove the two capscrews securing the hydrostatic pump to the flywheel housing.



9. Shift the hydrostatic pump forward to disengage the splined shaft drive (with a part of the coupler assembly attached) of the pump.



10. Lift and maneuver the hydrostatic pump out of the skid-steer loader.

Installation Procedure - Follow all warnings first, then reverse the removal steps.

Hydrostatic Pump Drive Coupling Removal and Installation

Removal Procedure

WARNING

BEFORE beginning this service procedure, perform the following **SAFETY** procedures:

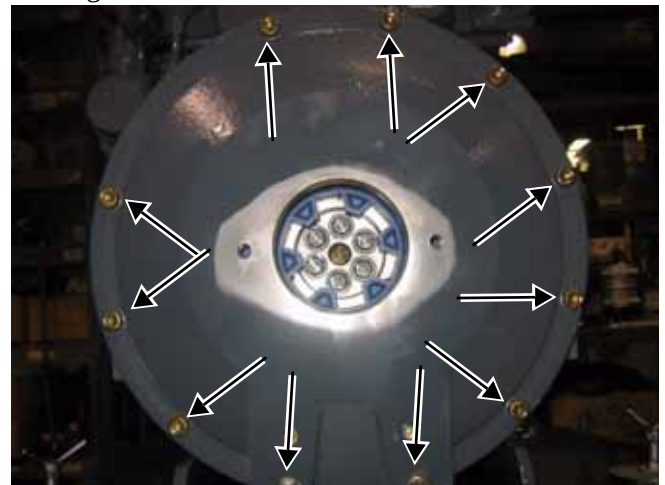
Raise lift arm, engage lift arm support device.

Shut off the engine.

Tilt back ROPS/FOPS until lock engages.

(For detailed instructions, refer to the **Safety** chapter of this manual.)

1. Remove the hydrostatic pump per the procedure in this chapter.
2. Remove the nine socket head screws and the two capscrews securing the flywheel housing to the engine.



3. Remove the eight socket head capscrews attaching the flywheel coupling plate to the flywheel.



Installation Procedure - Follow all warnings first, then reverse the removal steps.

Drive Motor Removal and Installation



WARNING

BEFORE beginning this service procedure, perform the following **SAFETY** procedures:

Raise lift arm; engage lift arm support device.

Shut off the engine.

Tilt back ROPS/FOPS until lock engages.

Raise and securely block the loader so all four tires are off the ground.

(For detailed instructions, refer to the *Safety* chapter of this manual.)

Removal Procedure

1. Underneath the skid-steer loader, remove the two capscrews securing the front belly pan and then remove the belly pan from the chassis.

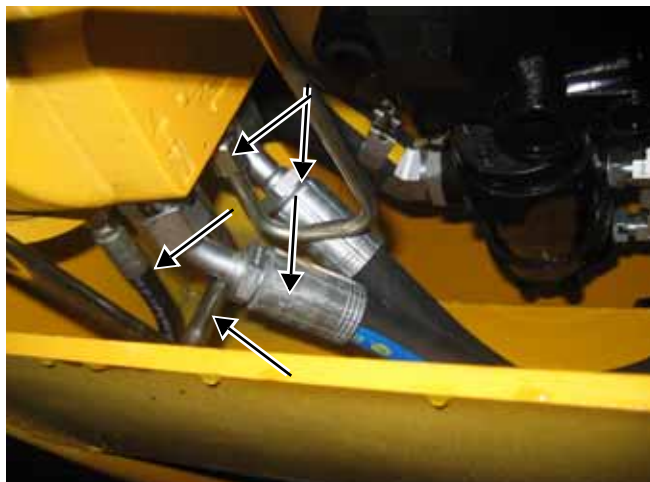


2. Remove drive chains per the procedure in the *Wheel Drives* chapter.
3. If necessary, drain oil from hydraulic reservoir per the procedure in the *Hydraulic System* chapter.

NOTE: If the hydraulic hoses and tubes are plugged after removal to prevent oil leakage, it should not be necessary to drain the hydraulic reservoir. Hydraulic hoses and tubes should be plugged to prevent contaminants from entering the hydraulic system.

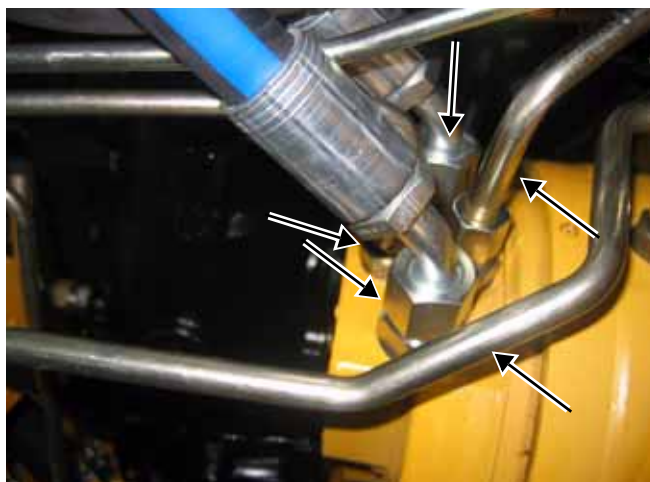
4. **BEFORE** disconnecting hydraulic hoses and tubes from the drive motor, mark each hose/tube and the port where it attaches to the drive motor (so that hoses/tubes can be correctly reattached during installation).

5. Disconnect all hydraulic hoses and tubes on each drive motor.

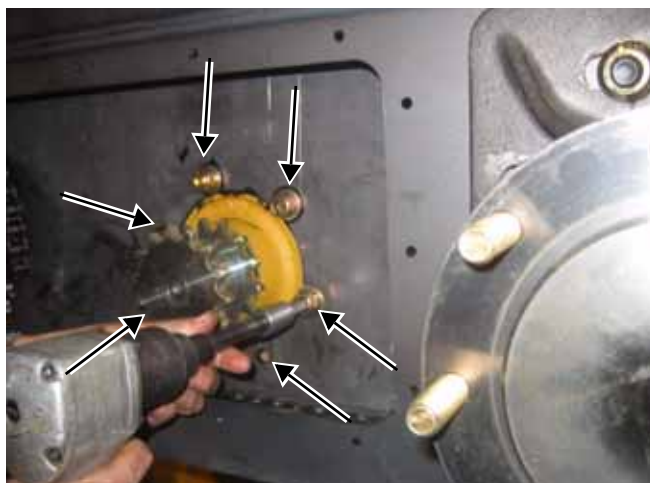


Installation Procedure - Follow all warnings first, then reverse the removal steps.

NOTE: Scrape off old gasket material and apply new sealant to mating surface of the drive motor before reassembly to the chassis.



6. Remove six hex nuts and washers attaching the drive motor to the chaincase. Remove the drive motor with a suitable hoist.



Troubleshooting Guide

The troubleshooting guide lists potential hydrostatic system problems, as well as possible causes and remedies.

If you cannot locate a particular hydrostatic system problem in this chart, consult the troubleshooting chart in the *Hydraulic System* chapter.

When a problem occurs, don't overlook simple causes. A malfunction could be caused by something as simple as low fluid level in the hydraulic reservoir. After a mechanical failure has been corrected, be sure to locate the cause of the problem.

Troubleshooting Guide - Dual Joystick Controls

Problem	Possible Cause	Remedy
Traction drive will not operate in either direction	Inadequate pilot supply oil pressure to joystick control	Check pilot supply oil pressure. Check pilot supply cut out solenoid.
Drive wheels do not turn in proper direction for movement	Joystick pilot controller hoses connected incorrectly	Reconnect hoses to proper ports on hydrostatic pump. Refer to schematic and figures.
Neutral is difficult to maintain	Joystick control valve malfunction	Replace joystick control valve.
Right side/Left side doesn't drive in one direction	Joystick control valve malfunction	Replace joystick control valve.
Creeps in NEUTRAL	Hydrostatic pump needs adjustment	Refer to the "Neutral Centering Adjustment" procedure in the <i>Controls</i> chapter of this manual.
Turns slightly left or right in FORWARD or REVERSE position when using the traction drive control handle	Hydrostatic pump needs adjustment	Refer to the "Control Handle Tracking Adjustment" procedure in the <i>Controls</i> chapter of this manual.

Troubleshooting Guide - Non-Dual Joystick Controls

Problem	Possible Cause	Remedy
No response from the hydrostatic drive or the lift/tilt systems	Hydraulic oil viscosity too high	Allow longer warm-up or replace oil with the proper viscosity oil.
	Hydraulic oil supply too low	Check for low oil level in reservoir. Add oil as needed.
	Hydrostatic pump drive disconnected Drive coupling failure.	Check for broken or worn pump drive coupling and replace, as needed.
Traction drive will not operate in either direction	Parking brake engaged.	Disengage parking brake.
	Hydraulic oil supply too low	Check for low oil level in reservoir. Add oil if necessary.
	Control rod linkage disconnected	Check linkage connection at control levers and neutral centering mechanisms. Reconnect linkage.
	Low or no charge pressure	See hydrostatic pump manual.
	Hydrostatic pump relief valves malfunctioning	Inspect and clean the relief valves. Replace them as needed.
Lift/tilt controls fail to respond	Hydraulic oil viscosity too high	Allow longer warm-up or replace with the proper viscosity oil.
	Hydraulic oil level low	Check oil level in reservoir. If oil is low, check for an external leak. Repair and add oil.
	Solenoid valve(s) malfunctioning	Check electrical connections to lift/tilt solenoids and repair.
	Restraint bar or seat switch malfunction	Check switches.

Troubleshooting Guide - Non-Dual Joystick Controls

Problem	Possible Cause	Remedy
Neutral difficult to maintain	Rod ends loose on centering mechanism or servo rod	Check and tighten or replace components.
	Neutral centering mechanism(s) out of adjustment	Adjust neutral centering mechanism(s). See <i>Controls</i> chapter for procedure.
	Clamping bolt loose	Tighten clamp bolt.
	Hydrostatic pump out of adjustment	See hydrostatic pump manual.
Sluggish acceleration	Air in the hydraulic system	Cycle the lift and tilt cylinders to maximum stroke and maintain pressure for a short time to clear air from system. Check hydraulic oil reservoir; fill as needed.
	Hydraulic oil supply too low	Check hydraulic oil reservoir. Add oil, if necessary.
	Low hydrostatic system charge pressure	See hydrostatic pump manual.
	Drive motor(s) or hydrostatic pump(s) have internal damage or leakage	Refer to component manufacturer's service manual.
	Engine not responding under load	Troubleshoot engine.
Hydrostatic drive overheating	Drive system overloaded continuously	Improve efficiency of operation.
	Lift and tilt system overloaded continuously	Improve efficiency of operation.
	Drive motor(s) or hydrostatic pump(s) have internal damage or leakage	Refer to component manufacturer's service manual.
	Oil cooler plugged with debris	Clean oil cooler fins.
	Loader being operated in a high temperature area with no air circulation	Reduce duty cycle and improve air circulation.

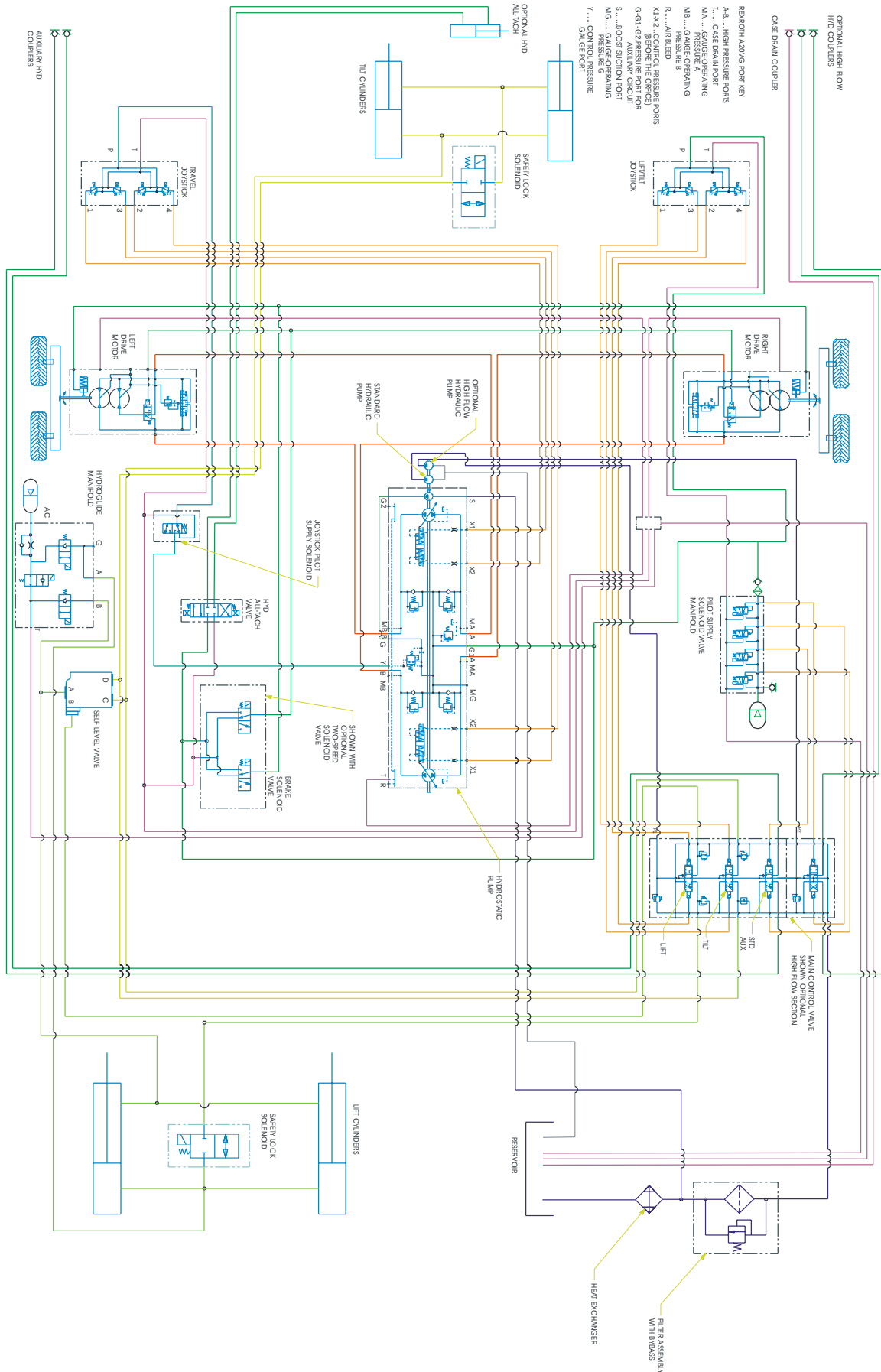
Troubleshooting Guide - Non-Dual Joystick Controls

Problem	Possible Cause	Remedy
Hydrostatic (drive) system noisy	Hydraulic oil viscosity too high Drive motor(s) or hydrostatic pump(s) have internal damage or leakage Air in hydraulic system.	Allow longer warm-up or replace oil with the proper viscosity oil. Refer to component manufacturer's service manual. Cycle lift and tilt cylinders to maximum stroke and maintain pressure for a short time to clear air from system. Check oil level in reservoir; fill as needed.
Right side doesn't drive in either direction. Left side operates normally	Excessive internal leakage in right drive motor Excessive leakage in engine-end hydrostatic pump Servo controller malfunctioning Relief valves on engine-end hydrostatic pump malfunctioning Control rod linkage to engine-end hydrostatic servo is disconnected	Repair or replace as needed. Refer to motor manufacturer's service manual. Refer to the pump manufacturer's manual for service procedures. Repair or replace rear pump as needed. Refer to the pump manufacturer's manual for service procedures. Repair or replace rear pump as needed. Switch valves with those on front hydrostatic pump. See "Hydrostatic Pump Relief Valves" information in this chapter; problem should switch to the left side. Replace defective relief valve. Reattach control rod linkage.
Right side doesn't drive in one direction	Relief valve on engine-end hydrostatic pump malfunctioning Engine-end hydrostatic pump malfunctioning Servo controller malfunctioning	Switch one relief valve with the other relief valve on rear pump; problem should switch to reverse direction. Clean or replace the faulty valve as needed. Refer to pump manufacturer's manual for service procedures. Repair or replace rear pump as needed. Refer to pump manufacturer's manual for service procedures. Repair or replace rear pump as needed.

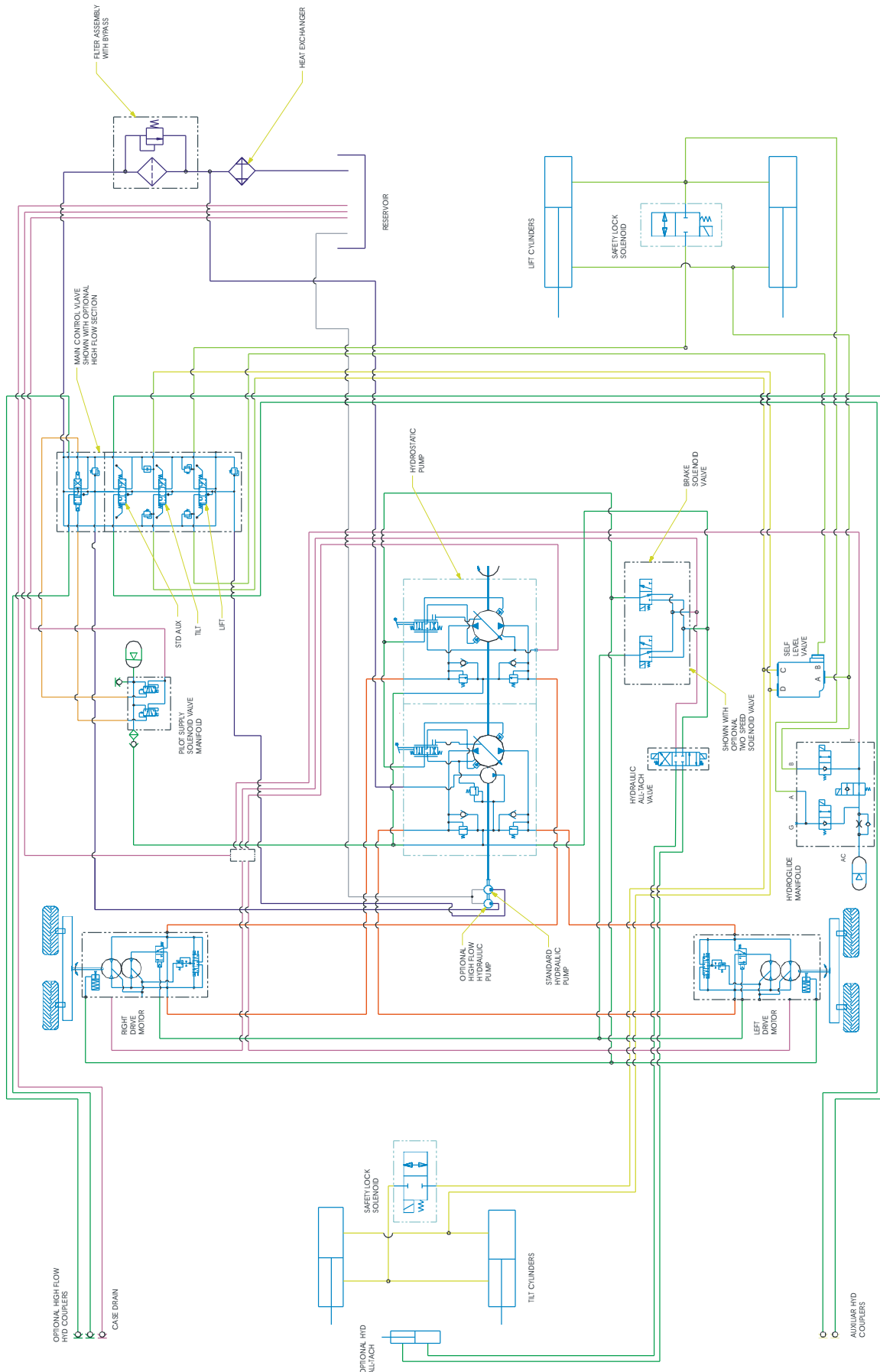
Troubleshooting Guide - Non-Dual Joystick Controls

Problem	Possible Cause	Remedy
Left side doesn't drive in either direction. Right side operates normally	Excessive internal leakage in left drive motor	Repair or replace as needed. Refer to motor manufacturer's service manual.
	Excessive leakage in gear-end hydrostatic pump	Refer to pump manufacturer's manual for service procedures. Repair or replace the front pump as needed.
	Relief valves on gear-end hydrostatic pump malfunctioning	Switch valves with those on rear hydrostatic pump. See "Hydrostatic Pump Relief Valves" information in this chapter; problem should switch to the right side. Replace defective relief valve as needed.
	Servo controller malfunctioning	Refer to the pump manufacturer's manual for service procedures. Repair or replace rear pump as needed.
	Control rod linkage to gear-end hydrostatic servo disconnected	Reattach control rod linkage.
Left side doesn't drive in one direction	Relief valve on gear-end hydrostatic pump malfunctioning	Switch relief valve with other relief valve on front pump; problem should switch to the reverse direction. Clean or replace the faulty valve as needed.
	Gear-end hydrostatic pump malfunctioning	Refer to pump manufacturer's manual for service procedures. Repair or replace front pump as needed.
	Servo controller malfunctioning	Refer to pump manufacturer's manual for service procedures. Repair or replace front pump as needed.

Hydrostatic/Hydraulic Schematic - Dual Joystick Controls



Hydrostatic/Hydraulic Schematic - Non-Dual Joystick Controls



CHAPTER NOTES

Introduction

This chapter covers troubleshooting, testing, removal, installation and adjustment procedures for hydraulic system components on 2056 model skid-steer loaders. Primary hydraulic system components in this chapter are shown below and on following pages.

Power for the lift arm functions and auxiliary hydraulics is provided by a gear pump attached to the front of the tandem pumps.

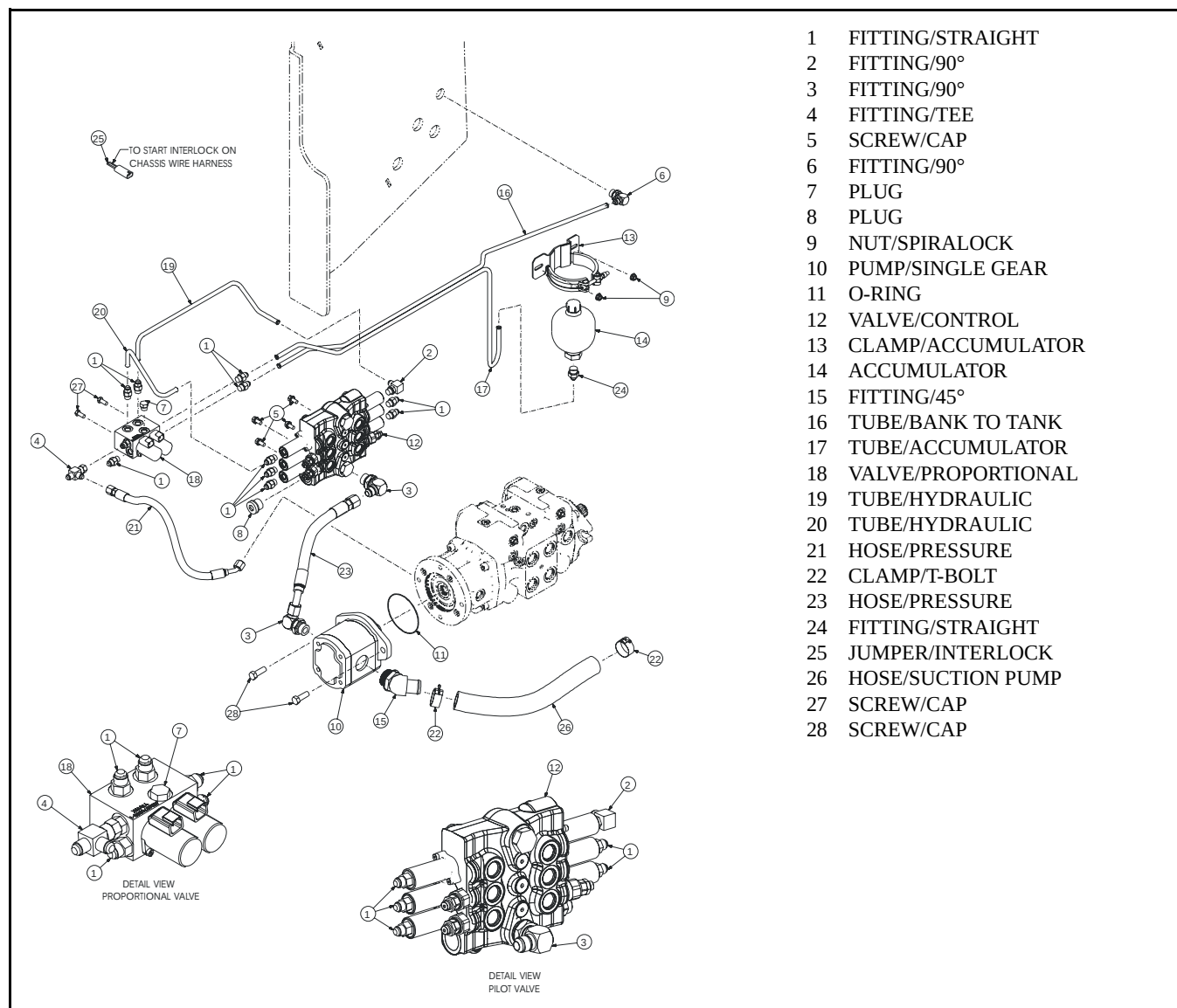
Standard and high-flow models include a standard-flow auxiliary hydraulics system with two hydraulic couplers on the left lift arm for attachment hookup. High-flow models are equipped with high-flow hydraulics, which includes three hydraulic couplers on the right lift arm,

for operating attachments that require higher hydraulic flow.

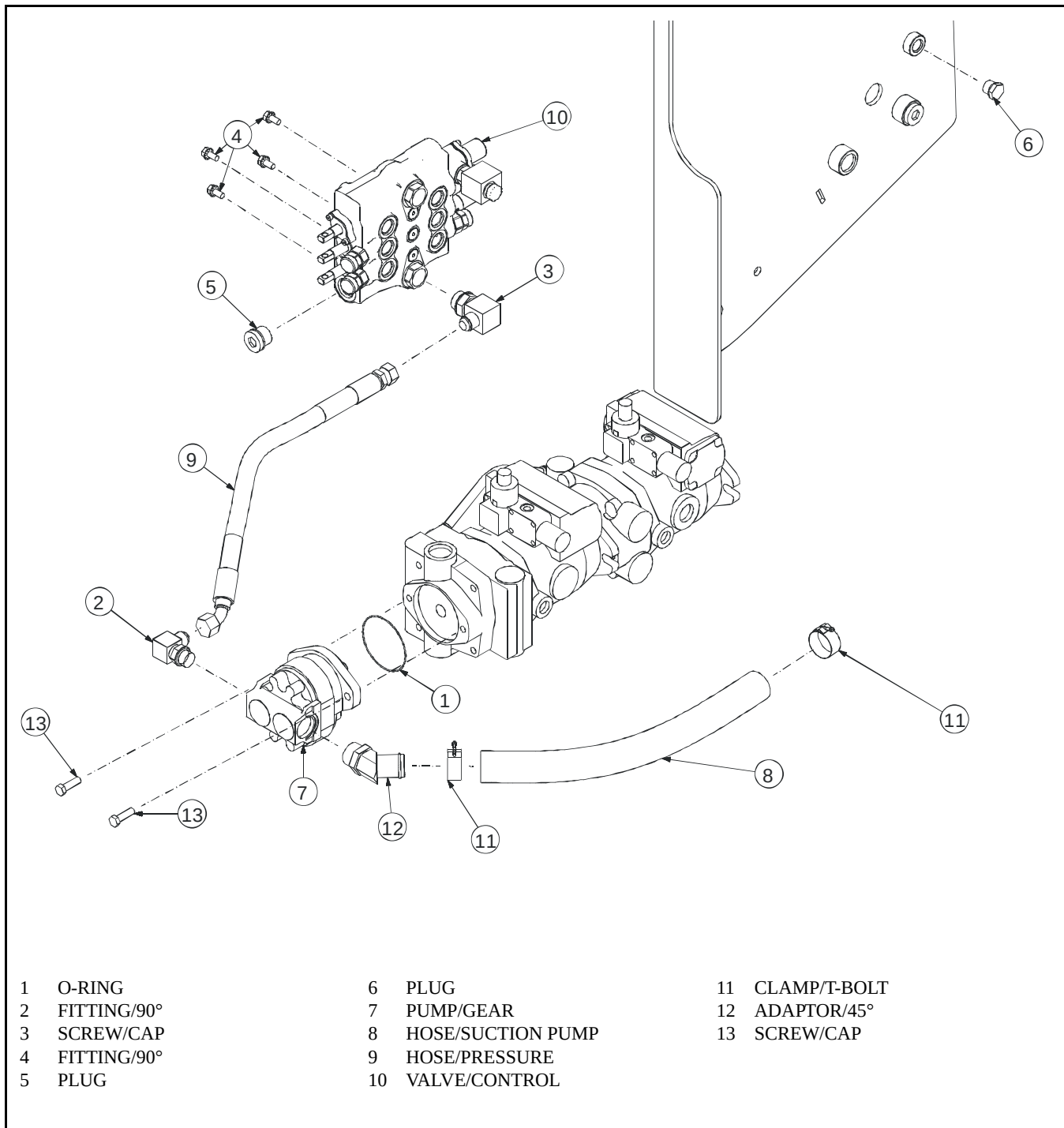
Information on recommended hydraulic fluids, capacities and filter change intervals is in the *Lubrication* chapter. For detailed information on gear pump or control valve internal repair, consult the Mustang Service Department and/or the hydraulic component manufacturer's service manual. Hydraulic components related to the drive system are covered in the *Hydrostatic System* chapter.

When a problem occurs, don't overlook simple causes. A malfunction could be caused by something as simple as low fluid level in the hydraulic reservoir. After a mechanical failure has been corrected, be sure to locate the cause of the problem.

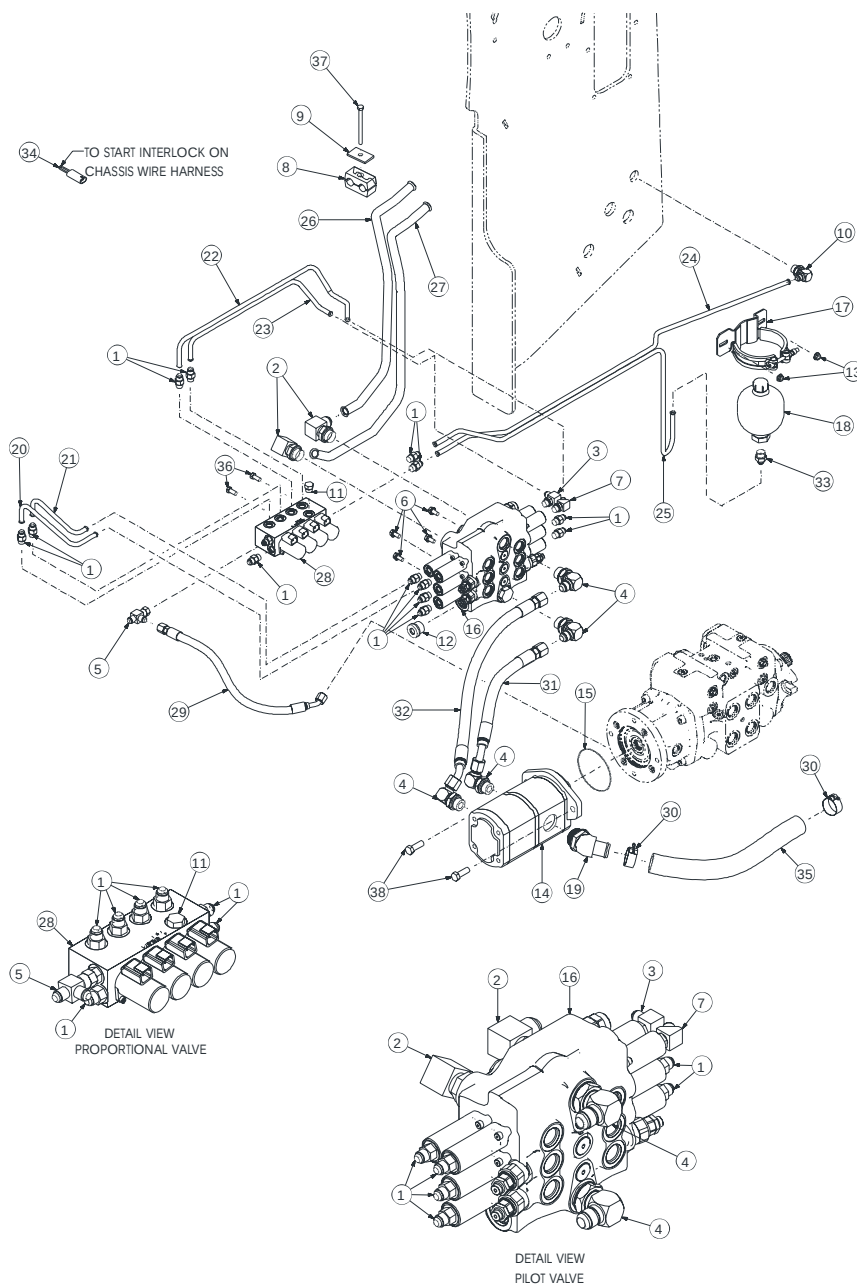
Standard Auxiliary - Dual Joystick Controls



Standard Auxiliary - Dual Hand and Hand/Foot Controls

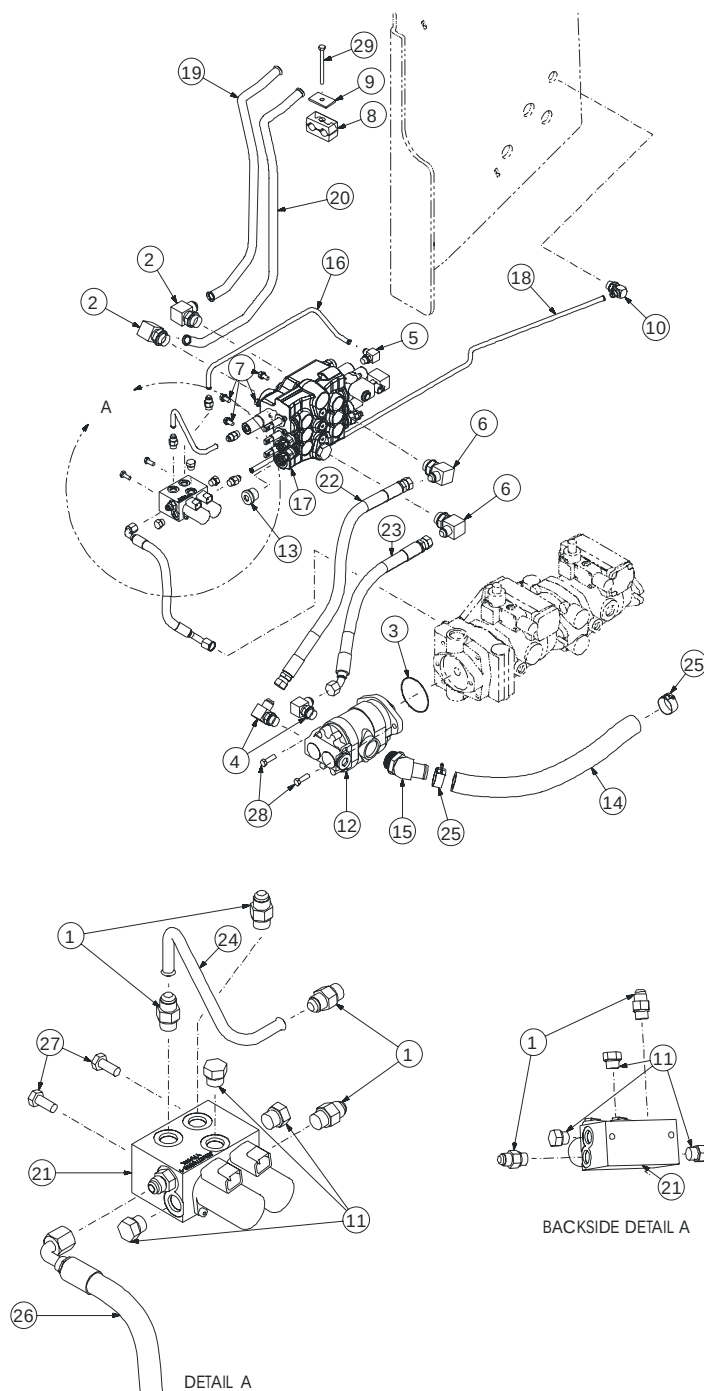


High-Flow Auxiliary - Dual Joystick Controls



- | | | |
|--------------------|----------------------|-----------------------|
| 1 FITTING/STRAIGHT | 14 PUMP/DOUBLE GEAR | 27 TUBE/HIGH FLOW |
| 2 FITTING/90° | 15 O-RING | 28 VALVE/PROPORTIONAL |
| 3 FITTING/90° | 16 VALVE/CONTROL | 29 HOSE/PRESSURE |
| 4 FITTING/90° | 17 CLAMP/ACCUMULATOR | 30 CLAMP/T-BOLT |
| 5 FITTING/TEE | 18 ACCUMULATOR | 31 HOSE/PRESSURE |
| 6 SCREW/CAP | 19 FITTING/45° | 32 HOSE/PRESSURE |
| 7 FITTING/45° | 20 TUBE/FRONT LOW | 33 FITTING/STRAIGHT |
| 8 CLAMP/TUBE | 21 TUBE/FRONT HIGH | 34 JUMPER/INTERLOCK |
| 9 PLATE/TWIN COVER | 22 TUBE/BACK LOW | 35 HOSE/SUCTION PUMP |
| 10 FITTING/90° | 23 TUBE/BACK HIGH | 36 SCREW/CAP |
| 11 PLUG | 24 TUBE/TANK | 37 SCREW/CAP |
| 12 PLUG | 25 TUBE/ACCUMULATOR | 38 SCREW/CAP |
| 13 NUT/SPIRALOCK | 26 TUBE/HIGH FLOW | |

High-Flow Auxiliary - Dual Hand and Hand/Foot Controls

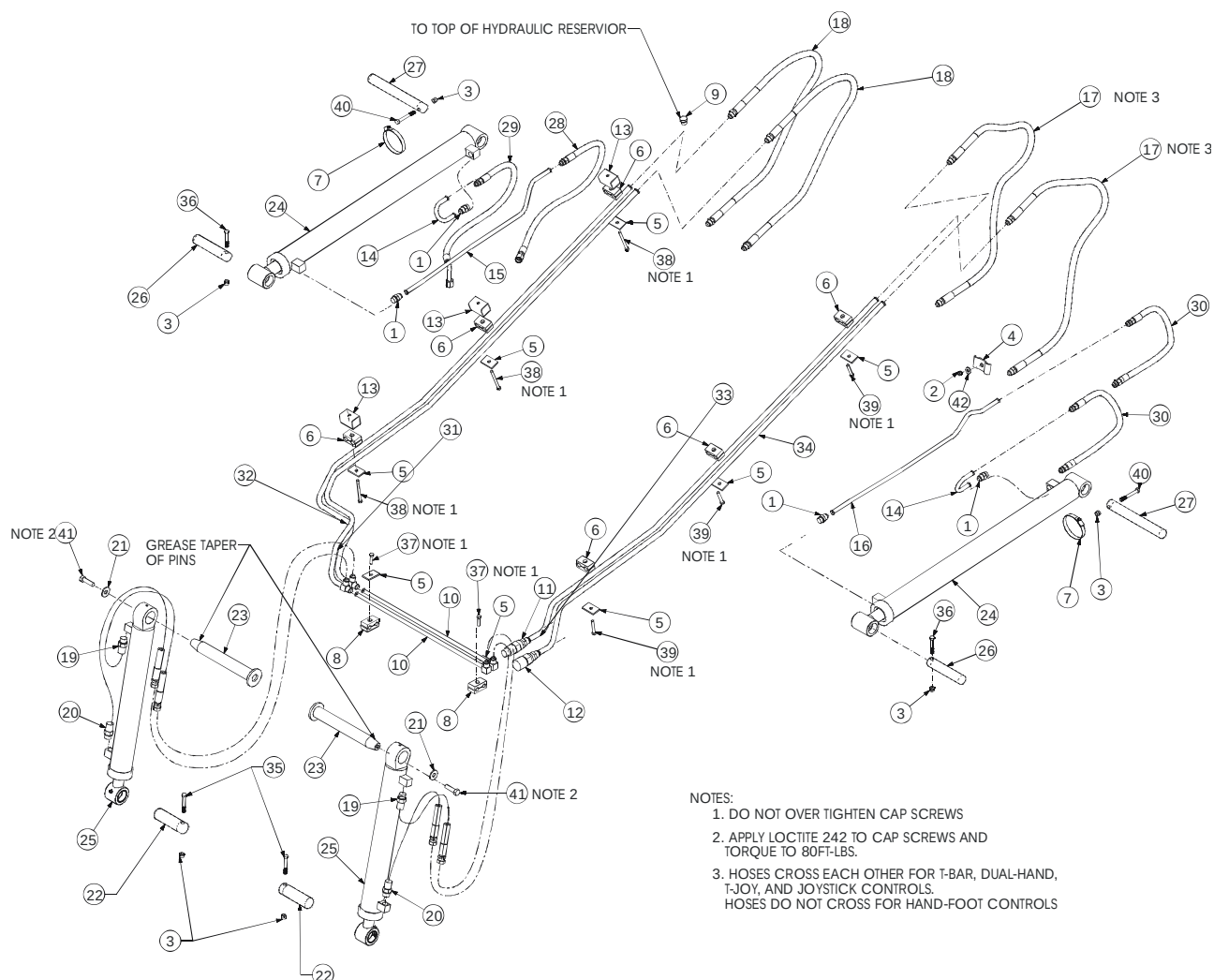


- 1 FITTING/STRAIGHT
- 2 FITTING/90°
- 3 O-RING
- 4 FITTING/90°
- 5 FITTING/90°
- 6 FITTING/90°
- 7 SCREW/CAP
- 8 CLAMP/TUBE
- 9 PLATE/TWIN COVER
- 10 FITTING/90° ELBOW

- 11 PLUG
- 12 PUMP/DOUBLE GEAR
- 13 PLUG
- 14 HOSE/SUCTION PUMP
- 15 FITTING/45°
- 16 TUBE/HYDRAULIC
- 17 VALVE/CONTROL
- 18 TUBE/BANK TO TANK
- 19 TUBE/HIGH FLOW
- 20 TUBE/HIGH FLOW

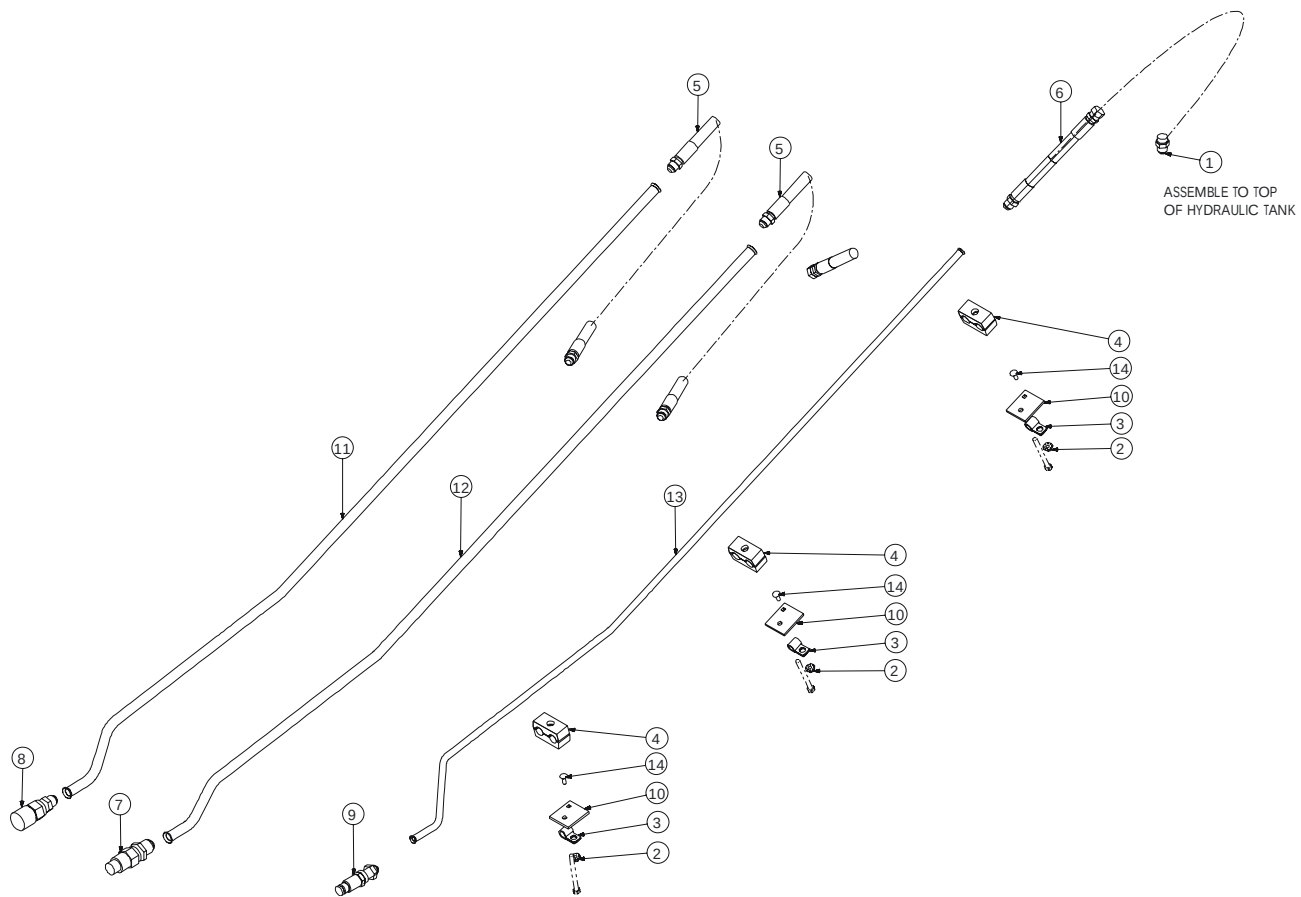
- 21 VALVE/PROPORTIONAL
- 22 HOSE/PRESSURE
- 23 HOSE/PRESSURE
- 24 TUBE/HYDRAULIC
- 25 CLAMP/T-BOLT
- 26 HOSE/PRESSURE
- 27 SCREW/CAP
- 28 SCREW/CAP
- 29 SCREW/CAP

Standard Lift Arm Hydraulics



- | | | | | | |
|----|--------------------|----|--------------------------|----|----------------------|
| 1 | FITTING/STRAIGHT | 15 | TUBE/LIFT CYLINDER RIGHT | 29 | HOSE/PRESSURE |
| 2 | NUT/LOCK | 16 | TUBE/LIFT CYLINDER LEFT | 30 | HOSE/PRESSURE |
| 3 | NUT/HEX LOCK | 17 | HOSE/PRESSURE | 31 | TUBE/TILT INNER |
| 4 | CLAMP/HOSE | 18 | HOSE/PRESSURE | 32 | TUBE/TILT OUTER |
| 5 | PLATE/TWIN COVER | 19 | HOSE/PRESSURE | 33 | TUBE/AUXILIARY INNER |
| 6 | CLAMP/TUBE | 20 | HOSE/PRESSURE | 34 | TUBE/AUXILIARY OUTER |
| 7 | CLAMP/HOSE | 21 | WASHER/FLAT | 35 | SCREW/CAP |
| 8 | CLAMP/TUBE | 22 | PIN | 36 | SCREW/CAP |
| 9 | PLUG | 23 | PIN/TILT CYLINDER | 37 | SCREW/CAP |
| 10 | TUBE/TILT | 24 | CYLINDER/LIFT | 38 | SCREW/CAP |
| 11 | COUPLER/MALE | 25 | CYLINDER/TILT | 39 | SCREW/CAP |
| 12 | COUPLER/FEMALE | 26 | PIN | 40 | SCREW/CAP |
| 13 | SPACER/TILT TUBE | 27 | PIN | 41 | SCREW/CAP |
| 14 | TUBE/LIFT CYLINDER | 28 | HOSE/PRESSURE | 42 | WASHER/FLAT |

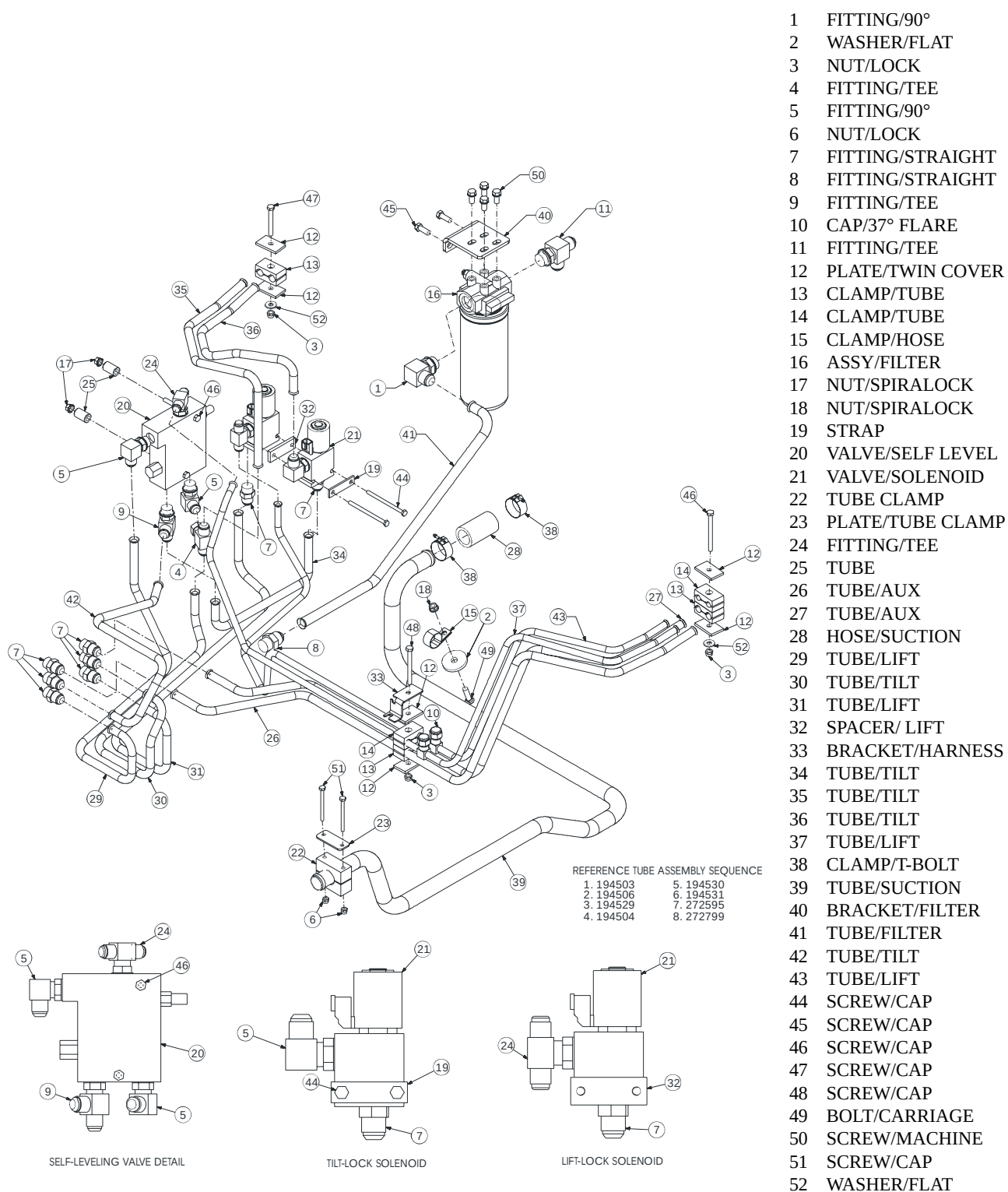
High-Flow Lift Arm Hydraulics



- 1 FITTING/STRAIGHT
- 2 NUT/LOCK
- 3 CLAMP/TUBE
- 4 CLAMP/TUBE
- 5 HOSE/PRESSURE
- 6 HOSE/PRESSURE
- 7 COUPLER/MALE

- 8 COUPLER/FEMALE
- 9 COUPLER/MALE
- 10 BAR
- 11 TUBE/OUTER
- 12 TUBE/INNER
- 13 TUBE/DRAIN
- 14 BOLT/CARRIAGE

Chassis Hydraulics



Pressure Tests, Control Valve and High-Flow

The control valve on the skid loader controls lift and tilt functions of the lift arm and standard and high-flow auxiliary hydraulics. It is located on the right side of the chassis. The relief valve in the control valve can be tested at the lift arm couplers.

Test Procedure



WARNING

BEFORE beginning this service procedure, perform the following **SAFETY** procedures:

Shut off the engine.

Relieve hydraulic system pressure.

(For detailed instructions, refer to the *Safety* chapter of this manual.)

NOTE: To prevent contamination, ALWAYS clean the area around hydraulic fittings before disconnecting any hydraulic plug, hose or tube.

1. What you'll need: an assistant and a minimum 5000 PSI (345 bar) pressure gauge.
2. Perform the pressure tests at the auxiliary hydraulic couplers located on the left lift arm and the high-flow couplers (if so equipped) located on the right lift arm of high-flow auxiliary loaders.



3. Install the pressure gauge in the end of the male coupler and activate the auxiliary hydraulic circuit (or turn on high-flow) to pressurize the line.
4. For this test, engine should be at HIGH IDLE.
5. Have assistant observe the pressure reading on the gauge. The pressure reading on the loader should be:
 - a. for standard flow units, at least 2750 PSI (190 bar), but NOT more than 2800 PSI (193 bar), and
 - b. for high-flow units, at least 2650 PSI (183 bar), but NOT more than 2700 PSI (186 bar).
6. If the pressure reading is NOT between the specified pressures, adjust pressure as follows:



WARNING

BEFORE continuing this service procedure, perform the following **SAFETY** procedures:

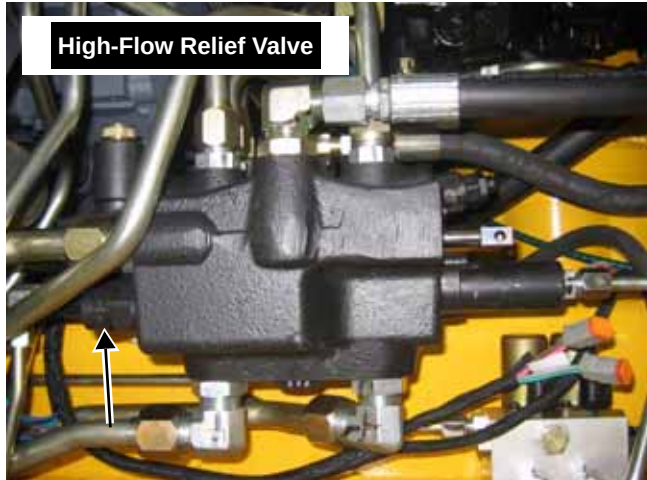
Shut off the engine.

Tilt back ROPS/FOPS until lock engages.

(For detailed instructions, refer to the *Safety* chapter in this manual.)

- a. Remove the cap on the relief valve adjuster screw(s). The high-flow relief valve is located at the top rear area of the control valve. Standard auxiliary relief valve can be found beneath the

high-flow relief valve at the bottom rear of the control valve.



- b. With a flat-edge screwdriver, turn the adjuster screw IN to increase pressure or OUT to decrease pressure.



- c. Repeat steps 4 and 5.
- d. After the pressure is within the correct PSI range, tighten the locknut on the control valve adjuster screw to secure the adjustment.
7. If, after the adjustment, there is NO CHANGE in the pressure reading, this indicates either a defective hydraulic gear pump or relief valve cartridge (on the control valve). To determine which is the cause, first replace the relief valve cartridge. If the pressure reading still does not change, the hydraulic gear pump should be repaired or replaced.

Tilt Cylinder Test

If the bucket (or attachment) drifts down with the tilt control in the NEUTRAL position, first check the tilt cylinders for external leakage. If external leakage is evident, a new seal kit should be installed in the leaking cylinder(s). If no external leakage is evident, check the tilt cylinders for internal leakage according to the following procedure.

NOTE: When checking for drifting, the ignition key **MUST BE** in the ON position, operator in the seat, and the restraint bar lowered. The maximum allowable tilt cylinder circuit drifting with a loaded bucket is 0.4" (10 mm) of cylinder extension in 15 minutes.

Test Procedure



WARNING

BEFORE beginning this service procedure, perform the following **SAFETY** procedures:

Shut off the engine.

Relieve hydraulic system pressure.

(For detailed instructions, refer to the *Safety* chapter of this manual.)

1. Load the bucket and allow it to rest on the ground.

NOTE: To prevent contamination, **ALWAYS** clean the area around hydraulic fittings before disconnecting any hydraulic hose or tube.

2. Checking one tilt cylinder at a time, remove the lower hydraulic hose from the cylinder being tested, and cap or plug the hose and cylinder port. Caps or plugs **MUST BE** able to withstand full hydraulic pressure.





WARNING

BEFORE raising a loaded bucket, **BE SURE** no personnel are near the loader. Serious personal injury can result if bucket drops suddenly or its contents spill out.

3. Climb back into the operator's seat, lower the restraint bar, and start the engine.
4. Raise the lift arm enough for the bucket (or attachment) to clear the ground.
5. Shut off the engine, turn the ignition key to the ON position (engine OFF) and operate the tilt control in both directions.
6. If the bucket drifts, the blocked tilt cylinder has leaking piston seals. If it **DOES NOT** drift, lower the lift arm and reconnect the hydraulic hose to the cylinder. Then test the other tilt cylinder in the same way, repeating steps 2-5.
7. After both tilt cylinders have been tested, be sure the hydraulic hoses are reconnected.

NOTE: If both tilt cylinders have good seals, and the bucket still drifts, the fault could be in either the control valve or the self-leveling valve. Continue the test procedure with step 8, below. Also, refer to the Troubleshooting Guide in this chapter.

8. To determine if either the control valve or self-leveling valve is faulty and causing the bucket to drift, perform the "Self-Leveling Valve Test" procedure in this chapter.

Self-Leveling Valve Test

Test Procedure



WARNING

BEFORE beginning this service procedure, perform the following **SAFETY** procedures:

Raise lift arm; engage lift arm support device.

Shut off the engine.

Tilt back ROPS/FOPS until lock engages.

(For detailed instructions, refer to the Safety chapter in this manual.)

1. With the engine OFF and the ROPS raised and locked, loosen the jam nut on the self-leveling valve adjuster screw.



NOTE: For step 2, **BE SURE** to count and record the number of turns, so the adjuster screw can be returned to its original setting after the test.

2. With an Allen wrench, turn the adjuster screw in (clockwise) until it bottoms out. The self-leveling valve is now disabled and will not affect the tilt operations.
3. Lower the ROPS and perform steps 3-5 in the "Tilt Cylinder Test" procedure. If the bucket no longer drifts, the self-leveling valve is defective. If the bucket continues to drift, the control valve is defective and in need of repair or replacement.
4. Refer to the "Self-Leveling Valve Adjustment" procedure in this chapter for correct adjustment of the self-leveling valve.

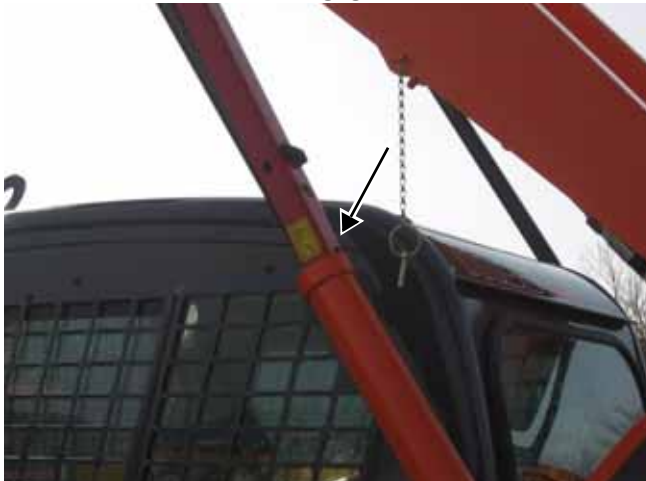
Lift Cylinder Test

If the lift arm drifts with the lift control in NEUTRAL position, and the ignition key OFF, first check the lift cylinders for external leakage. If external leakage is evident, a new seal kit should be installed in the leaking cylinder(s). If no external leakage is evident, check the lift cylinders for internal leakage according to the following procedure.

NOTE: When checking lift arm for drifting, BE SURE the ignition key is in the OFF position. The maximum allowable lift cylinder drifting is 0.75" (19 mm) of cylinder retraction in 15 minutes.

Test Procedure

1. Remove the bucket or attachment from the attachment bracket.
2. Raise the lift arm to maximum height. Then release the lift cylinder lift arm support device and slowly lower the lift arm to engage the device.



WARNING

BEFORE continuing this service procedure, perform the following SAFETY procedures:

Shut off the engine.

Relieve hydraulic system pressure.

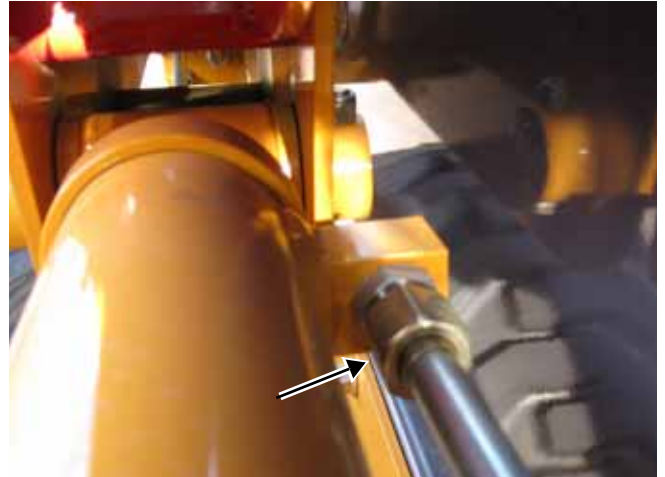
(For detailed instructions, refer to the *Safety* chapter in this manual.)

3. Remove the clamp securing the hydraulic tubes to the lift cylinder on the side being tested.



NOTE: To prevent contamination, ALWAYS clean around hydraulic fittings before disconnecting any hydraulic lines.

4. Disconnect the hydraulic tube from the rod end port of the lift cylinder to be tested.



5. Install a plug on hydraulic tube. Attach a hose to rod end port of the cylinder and run other end of hose into a suitable container. Lower the ROPS.
6. Climb back into the operator's seat, lower the restraint bar and start the engine.
7. Hold the lift control in the RAISE position. If the seals in the cylinder are defective and leaking, oil will flow out of the rod end port.
8. Lower the lift arm support device back against the lift cylinder. Shut off the engine and move the lift control in both directions to relieve hydraulic pressure.
9. Reconnect the hydraulic tube to the cylinder, then reattach the clamp around the hydraulic tubes and cylinder.

NOTE: If neither lift cylinder shows signs of external or internal leakage, and the lift arm still drifts, the problem could be due to leaking hydraulic hose fittings between the control valve and the lift cylinders. Check all hydraulic hose fittings thoroughly. The fault could also be in either the control valve or the self-leveling valve. Continue the test procedure with step 11. Also refer to the Troubleshooting Guide in this chapter.

10. The other cylinder can be checked the same way.
11. To determine if either the control valve or the self-leveling valve is faulty, perform the “Self-Leveling Valve Test” procedure in this chapter.

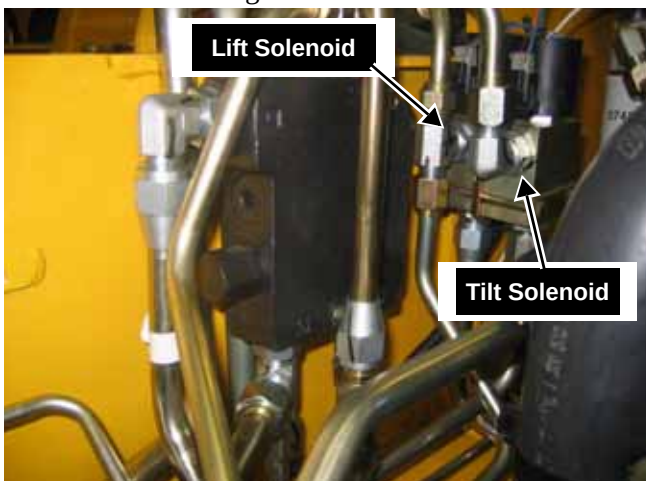
Solenoid Valve Test - Tilt, Lift, Brake and Two-Speed

During normal operations, the solenoid valves should prevent operation of the lift arm and drive functions if any of the safety interlock system switches are open, for example:

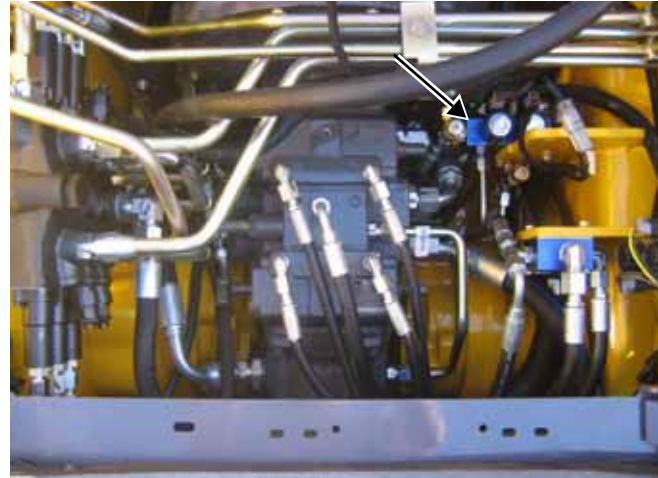
- » Operator not sitting on the seat.
- » Restraint bar not lowered.
- » Optional front door is open.

Test Procedure

1. Climb into the operator’s seat, lower the restraint bar and start the engine.
2. Using the lift control, raise the lift arm off the ground enough so that the attachment can be tilted.
3. Raise the restraint bar, use the lift and tilt controls (one at a time) to see if either function will operate.
 - » If the lift arm can be raised or lowered, the lift solenoid is malfunctioning.
 - » If the attachment can be tilted, the tilt solenoid is malfunctioning.



4. Lower the restraint bar. BE SURE the parking brake on the instrument panel is in the OFF position.
5. Raise the restraint bar. Use the drive controls (one at a time) to see if the tires will move.
 - » If the skid loader moves forward or backward, the brake solenoid is malfunctioning.



6. If any solenoid in the above tests appears to be malfunctioning, test that solenoid coil as follows:



WARNING

BEFORE continuing this service procedure, perform the following SAFETY procedure:

Raise lift arm; engage lift arm support device.

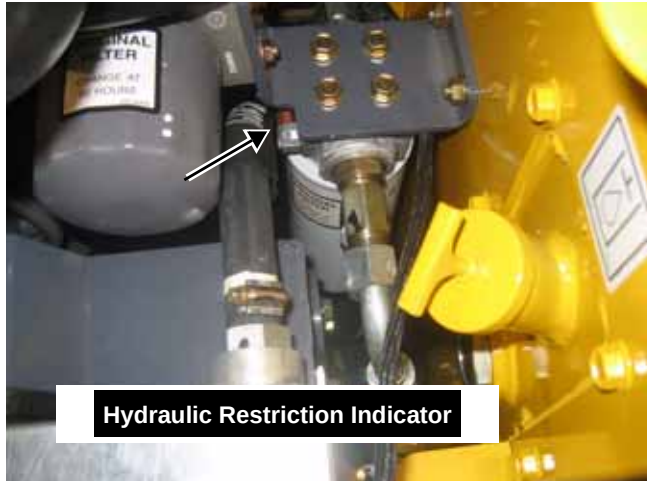
(For detailed instructions, refer to the Safety chapter of this manual.)

- » Have an assistant sit in the operator’s seat, lower the restraint bar and turn the keyswitch to ON. DO NOT start the engine.
 - » Using a thin strip of steel (such as a pocket ruler), check the suspected solenoid by moving the steel strip close to the solenoid coil.
 - » If the steel strip is magnetically attracted to the solenoid coil, the coil works and the solenoid cartridge may be causing the malfunction.
7. For service procedures, refer to “Solenoid Valve Removal and Installation/Disassembly and Reassembly” procedure in this chapter.

Hydraulic Oil Filter Element Replacement

2056 model skid-steer loaders have one hydraulic oil filter. The hydraulic oil filter must be replaced when the restriction indicator shows red.

NOTE: When reading the restriction indicator, run the engine at HIGH idle with the hydraulic oil temperature at 70°F (21°C) or warmer.



Replacement Procedure

WARNING

BEFORE beginning this service procedure, perform the following **SAFETY** procedure:

Shut off the engine.

(For detailed instructions, refer to the *Safety* chapter in this manual.)

1. Open the engine access cover and rear grille.
2. Remove the hydraulic reservoir drain plug and drain oil (into a suitable container) to a level below the point where the filter attaches to the reservoir.
3. Reinstall the drain plug.
4. Using a filter wrench, turn the filter element counterclockwise to remove it from the filter head.
5. Install the filter element. Before installation, apply a light coat of oil to the gasket, and then install it on the filter head.
6. Hand-tighten the element until the gasket contacts the filter head. Turn the element another 3/4 turn to seat the gasket.
7. Refill the hydraulic reservoir. Refer to the *Lubrication* chapter in this manual for the hydraulic fluid requirements and specifications.

WARNING

 **NEVER** use your hands to search for hydraulic fluid leaks. Use a piece of cardboard or paper. Escaping fluid under pressure can be invisible and penetrate the skin causing serious injury. If any fluid is injected into your skin, see a doctor at once. Injected fluid **MUST** be surgically removed by a doctor familiar with this type of injury or gangrene may result.

WARNING

 **ALWAYS** wear safety glasses when checking for hydraulic fluid leaks. Escaping fluid under pressure can be invisible and can cause permanent eye-sight damage if safety glasses are not worn.

8. **ALWAYS** check for hydraulic fluid leaks after reassembling components of the hydraulic system.

Tilt Cylinder Removal and Installation

Removal Procedure

NOTE: Refer to the “Lift Arm Removal/Disassembly” procedure in the *Mainframe* chapter for instructions on removing the complete lift arm group, including the tilt cylinders.

1. Remove the bucket or attachment.
2. With the engine running, lower the lift arm until it is in contact (or near contact) with the lift arm stops (on front of chassis).



WARNING

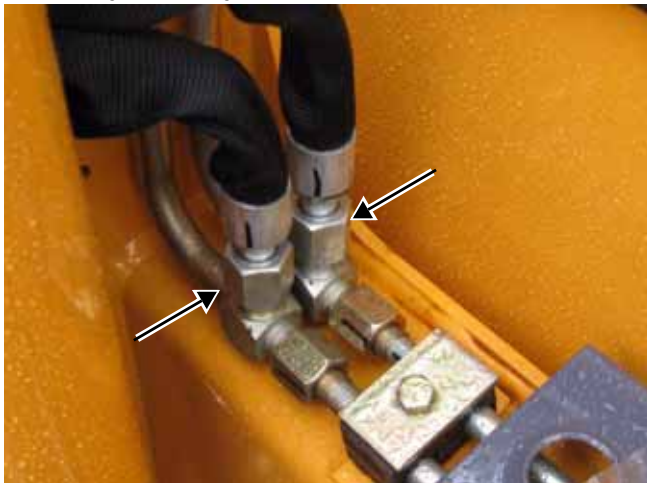
BEFORE continuing this service procedure, perform the following SAFETY procedures:

Shut off the engine.

Relieve hydraulic system pressure.

(For detailed instructions, refer to the *Safety* chapter in this manual.)

3. First, disconnect the upper and lower tilt cylinder hoses from the tubes on top of the crossmember. BE SURE to install plugs in the hoses and cap the fittings to prevent fluid loss and contamination of the hydraulic system.



4. While supporting the weight of the tilt cylinder, remove the capscrew and locknut securing the

lower tilt cylinder pivot pin. Then drive the pivot pin out to release the lower end of the tilt cylinder.



5. Loosen the capscrew on the end of the upper tilt cylinder pin by two to three counterclockwise turns. Strike the bolt head to drive the pin into the lift arm to break the pin free of the taper. Remove the capscrew and flat washer. Remove the upper tilt cylinder pin while supporting the tilt cylinder.



6. Remove upper and lower hoses from the cylinder.

Installation Procedure

1. Connect the upper and lower cylinder hoses to the tilt cylinder.
2. Install the upper end of the tilt cylinder in position on the lift arm and insert the pivot pin. Use Loctite® 242 or equivalent on the capscrew before reinstalling and torque to 80 ft.-lbs. (108 N•m).
3. Position the lower end of the tilt cylinder and insert the pivot pin through the cylinder and attachment mount. Secure the pivot pin with a capscrew and locknut.

NOTE: The grease fitting on the rod end of the tilt cylinder should face inward as installed.



4. Remove plugs/caps and attach the upper and lower tilt cylinder hoses to the cylinder, and then reconnect hoses to the tubes on top of the crossmember.

NOTE: After removing/replacing any component in the hydraulic system, ALWAYS check the level of hydraulic fluid in the reservoir. Add fluid if necessary. Refer to the *Lubrication* chapter in this manual for the hydraulic fluid requirements and specifications.



WARNING



NEVER use your hands to search for hydraulic fluid leaks. Use a piece of cardboard or paper. Escaping fluid under pressure can be invisible and penetrate the skin causing serious injury. If any fluid is injected into your skin, see a doctor at once. Injected fluid **MUST** be surgically removed by a doctor familiar with this type of injury or gangrene may result.



WARNING



ALWAYS wear safety glasses when checking for hydraulic fluid leaks. Escaping fluid under pressure can be invisible and can cause permanent eye-sight damage if safety glasses are not worn.

5. ALWAYS check for hydraulic fluid leaks after reassembling components of the hydraulic system.

Lift Cylinder Removal and Installation

Removal Procedure

1. Remove the bucket or attachment.



WARNING

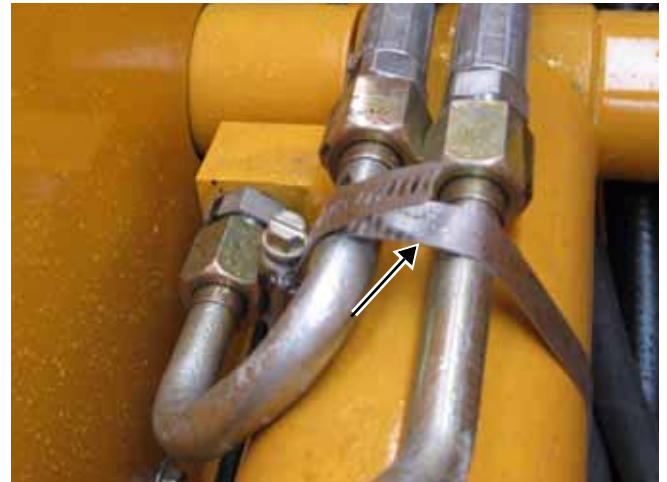
BEFORE continuing this service procedure, perform the following **SAFETY** procedures:

Shut off the engine.

Relieve hydraulic system pressure.

(For detailed instructions, refer to the *Safety* chapter in this manual.)

2. Attach a suitable hoist to the hitch and raise the lift arm to a position where access to the tubes and hoses on the lift cylinder is maximized.
3. Remove the clamp that secures the hydraulic tubes to the lift cylinder.



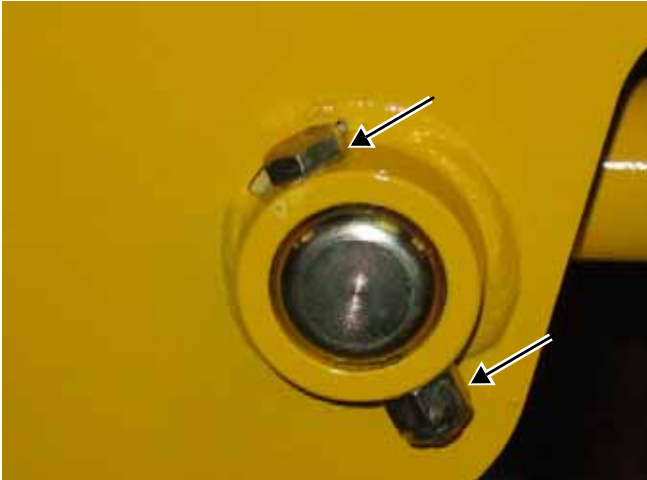
NOTE: To aid in correct reassembly of the hydraulic hoses/tubes, mark the hoses/tubes to be removed **BEFORE** disassembly in step 3.

4. Disconnect the two hydraulic hoses from their two hydraulic tubes on the lift cylinder. **BE SURE** to install plugs/caps in the hoses/tubes to prevent

fluid loss and contamination of the hydraulic system.



5. Remove the capscrew and locknut securing the front lift cylinder pivot pin. Then drive the pivot pin out to release the rod end of the lift cylinder.



6. While supporting the weight of the lift cylinder, remove the capscrew and locknut securing the rear lift cylinder pivot pin. Drive the pivot pin out the hole on the outside of the chassis. Remove the lift cylinder from the chassis.

Installation Procedure

1. Attach a suitable hoist to the hitch and raise the lift arm to a position where access to the tubes and hoses on the lift cylinder is maximized.
2. Install the lift cylinder on the chassis so the rod end is facing forward and the hydraulic tube ports on the cylinder are facing inward.
3. Insert the rear and front pivot pins through the lift cylinder pivots and secure them with capscrews and locknuts.

4. Remove the plugs/caps and connect the two hydraulic hoses to their hydraulic tubes on the lift cylinder according to the markings made at removal. If no markings were made or new parts were installed, refer to the *Hydraulic System* chapter exploded views.

NOTE: After removing and/or replacing any component in the hydraulic system, ALWAYS check the level of hydraulic fluid in the reservoir. Add fluid if necessary. Refer to the *Lubrication* chapter in this manual for the hydraulic fluid requirements and specifications.



WARNING



NEVER use your hands to search for hydraulic fluid leaks. Use a piece of cardboard or paper. Escaping fluid under pressure can be invisible and penetrate the skin causing serious injury. If any fluid is injected into your skin, see a doctor at once. Injected fluid **MUST** be surgically removed by a doctor familiar with this type of injury or gangrene may result.



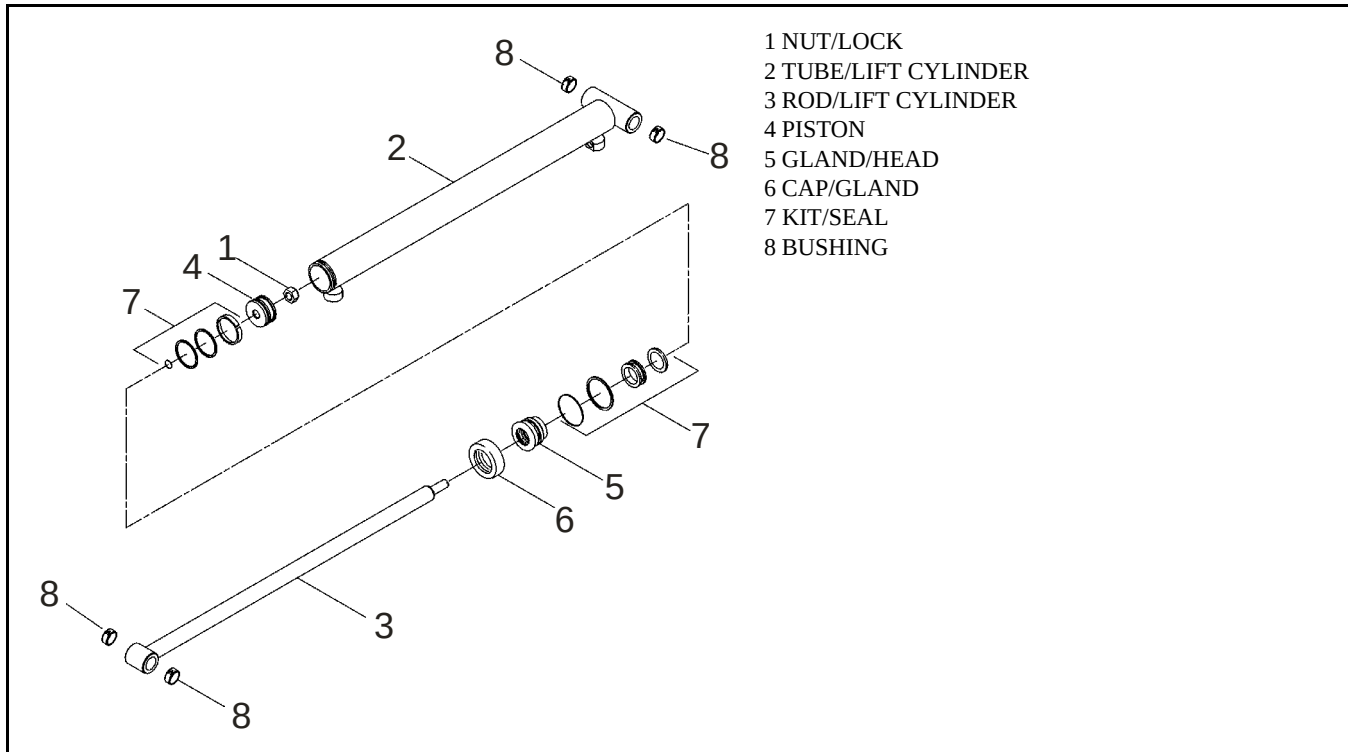
WARNING



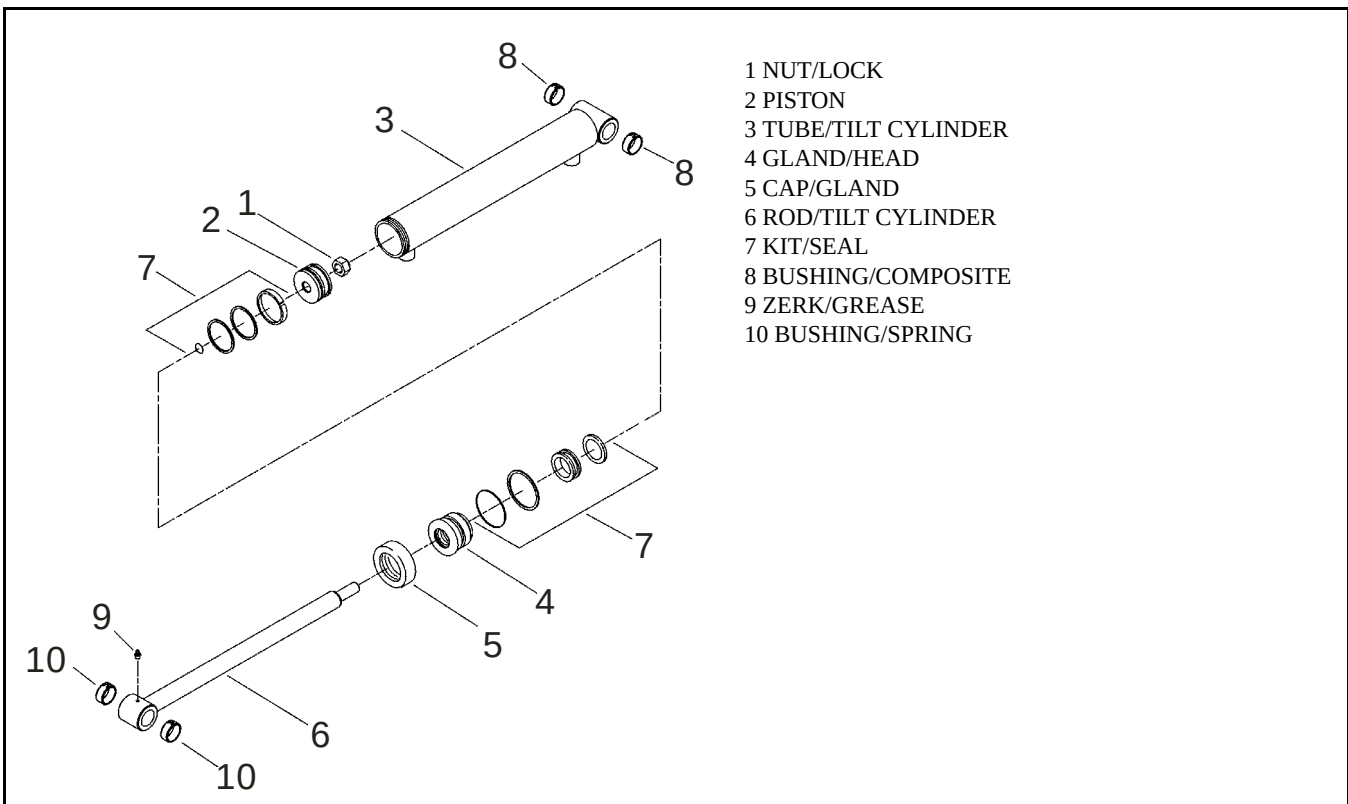
ALWAYS wear safety glasses when checking for hydraulic fluid leaks. Escaping fluid under pressure can be invisible and can cause permanent eye-sight damage if safety glasses are not worn.

5. ALWAYS check for hydraulic fluid leaks after reassembling components of the hydraulic system.
6. Remove the hoist.

Lift Cylinder Components



Tilt Cylinder Components

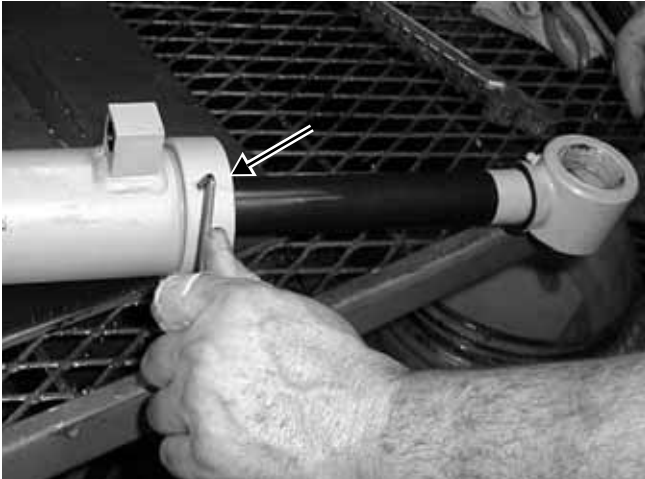


Lift/Tilt Cylinder Disassembly / Assembly

Disassembly Procedure

Remove the cylinder from the skid-steer loader. See “Lift Cylinder Removal” or “Tilt Cylinder Removal” in this chapter.

1. Purge the oil from the cylinder by facing the ports downward and pumping the cylinder rod back and forth several times.
2. Use an Allen wrench to loosen the set screw on the cylinder collar.



3. Clamp a suitable shaft in a vise and slide the cylinder onto the shaft to prevent the cylinder tube from turning.



4. Use a chain clamp to remove the collar from the cylinder tube.



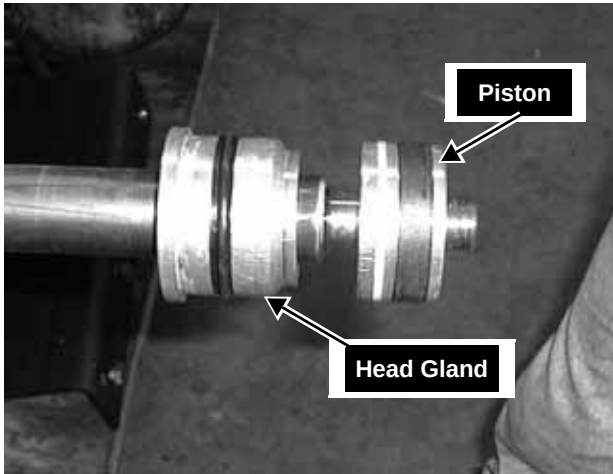
5. Remove the rod assembly and inspect both the cylinder rod and the tube for dents or nicks that may cause damage to the o-rings and seals.



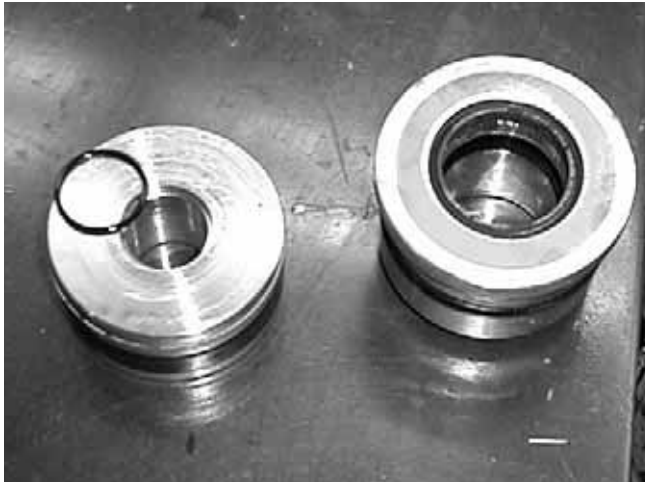
6. Loosen and remove the locknut that secures the head gland, seal kit and piston on the cylinder rod.



7. Remove the piston assembly.



8. Slide the head gland, seals, and o-rings off the cylinder rod and inspect them for wear.



9. Change the seals as needed.

NOTE: Soaking the seals in warm water prior to installation will make them pliable and easier to install. However, BE SURE to dry them and coat with hydraulic oil for proper installation.

Assembly Procedure

1. Slide the collar onto the cylinder rod (threaded end of the collar should face the threaded end of the cylinder rod).
2. Slide the head gland, larger diameter first, onto the cylinder rod.
3. Install the piston on the cylinder rod.
4. Secure the head gland and piston on the cylinder rod with a locknut. The locknut should be torqued to 350 ft.-lbs. (474 N•m).
5. Install the cylinder rod into the tube.

6. Slide the collar down to the cylinder tube, thread it onto the tube and tighten with a chain clamp wrench. Tighten the set screw on the collar.
7. Install the cylinder on loader. See the “Lift Cylinder Installation” or the “Tilt Cylinder Installation” procedures in this chapter.

Gear Pump Removal and Installation

Removal Procedure



WARNING

BEFORE beginning this service procedure, perform the following **SAFETY** procedures:

Raise lift arm; engage lift arm support device.

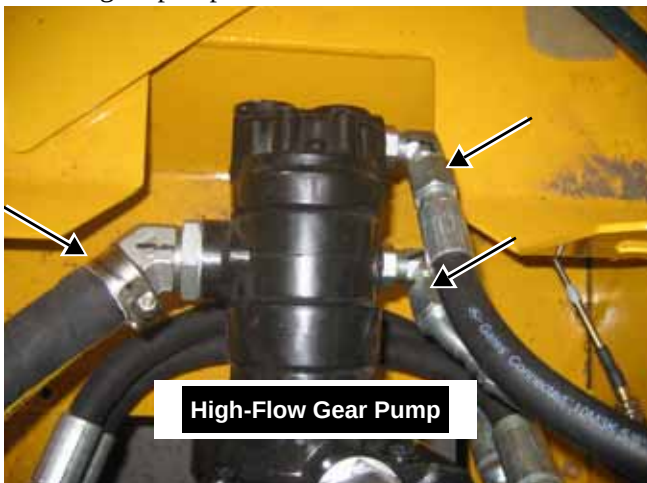
Shutdown the engine.

Relieve hydraulic system pressure.

Tilt back ROPS/FOPS until lock engages.

(For detailed instructions, refer to the **Safety** chapter in this manual.)

1. Remove the hydraulic reservoir drain plug and drain the hydraulic oil into a suitable container.
2. Remove the control cover/floor cover per the procedure in the *Mainframe* chapter.
3. Remove the crossmember per the procedure in the *Mainframe* chapter.
4. Disconnect the hydraulic hoses from their fittings on the gear pump. The high-flow auxiliary hydraulics gear pump has an additional hose to remove.



NOTE: Cap or plug hydraulic hoses and fittings to prevent fluid loss/contamination of hydraulic system.

5. Remove two capscrews and washers attaching the gear pump to the hydrostatic pump.



6. Pull the gear pump forward and out of the hydrostatic pump. **BE CAREFUL** not to lose the o-ring.

Installation Procedure

1. Install the o-ring on the mating surface of the gear pump.
2. Attach the gear pump to the hydrostatic pump (**BE SURE** the gear pump shaft engages the splined coupler). Install two capscrews with Loctite® 242 applied to secure the gear pump to the hydrostatic pump.
3. Remove the caps/plugs and connect the hydraulic hoses to the gear pump.
4. Reinstall the crossmember and the floor cover/control cover per the procedures in the *Mainframe* chapter.
5. Reinstall the hydraulic reservoir drain plug.
6. Replace the hydraulic oil drained out of the reservoir in step 1.

NOTE: After removing and/or replacing any component in the hydraulic system, **ALWAYS** check the level of the hydraulic fluid in the reservoir. Add fluid if necessary. Refer to the *Lubrication* chapter for the hydraulic fluid requirements and specifications.



WARNING



NEVER use your hands to search for hydraulic fluid leaks. Use a piece of cardboard or paper. Escaping fluid under pressure can be invisible and penetrate the skin causing serious injury. If

any fluid is injected into your skin, see a doctor at once. Injected fluid **MUST** be surgically removed by a doctor familiar with this type of injury or gangrene may result.



WARNING



ALWAYS wear safety glasses when checking for hydraulic fluid leaks. Escaping fluid under pressure can be invisible and can cause permanent eye-sight damage if safety glasses are not worn.

7. **ALWAYS** check for hydraulic fluid leaks after reassembling components of the hydraulic system.

Self-Leveling Valve Removal and Installation

Removal Procedure



WARNING

BEFORE beginning this service procedure, perform the following **SAFETY** procedures:

Raise lift arm; engage lift arm support device.

Shut off the engine.

Relieve hydraulic system pressure.

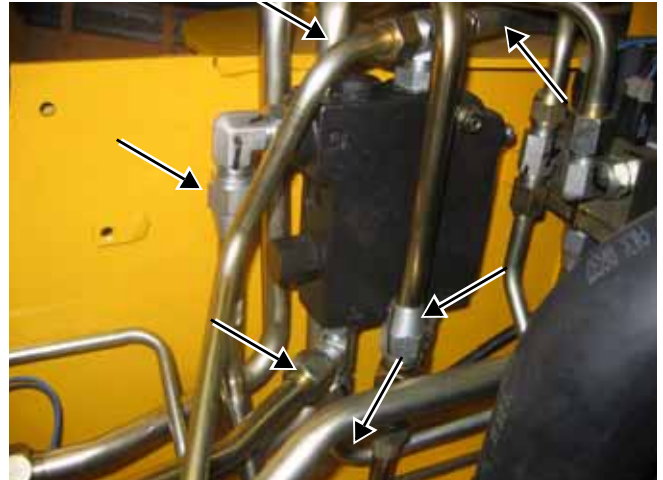
Tilt back ROPS/FOPS until lock engages.

(For detailed instructions, refer to the **Safety** chapter in this manual.)

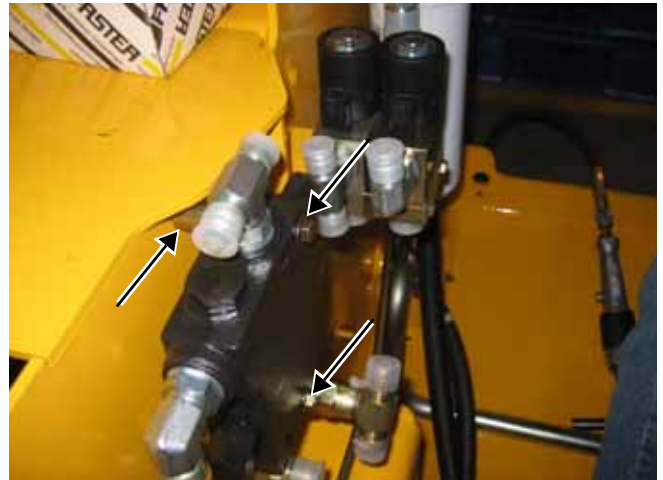
NOTE: Cap or plug the hydraulic hoses and fittings after disconnecting them to prevent fluid loss and contamination of the hydraulic system.

NOTE: In order to remove the hydraulic tubes from their fittings on the self-leveling valve, it may be necessary to loosen the hydraulic tube at the other end to give it some free-play.

1. Disconnect all the hydraulic tubes and hoses from their hydraulic fittings on the self-leveling valve.



2. Remove the two capscrews, spacers and locknuts securing the self-leveling valve to side of the chassis.



3. Remove the self-leveling valve.

NOTE: After removing and/or replacing any component in the hydraulic system, **ALWAYS** check the level of the hydraulic fluid in the reservoir. Add fluid if necessary. Refer to the *Lubrication* chapter for the hydraulic fluid requirements and specifications.

Installation Procedure - Follow all warnings first, then reverse the removal steps.

ALWAYS check for hydraulic fluid leaks after reassembling components of the hydraulic system.



WARNING



NEVER use your hands to search for hydraulic fluid leaks. Use a piece of cardboard or paper. Escaping fluid under pressure can be invisible and penetrate the skin causing serious injury. If any fluid is injected into your skin, see a doctor at once. Injected fluid MUST be surgically removed by a doctor familiar with this type of injury or gangrene may result.



WARNING



ALWAYS wear safety glasses when checking for hydraulic fluid leaks. Escaping fluid under pressure can be invisible and can cause permanent eye-sight damage if safety glasses are not worn.

Self-Leveling Valve Adjustment

Adjustment Procedure

1. Raise and lower the lift arm several times to ensure there is no air in the hydraulic system.
2. Lower the lift arm completely then fully retract the tilt cylinders (roll back).
3. Raise the lift arm to its maximum height; then lower it to the ground.
4. Measure how far the tilt cylinder rod extends from the tilt cylinder. The distance should be between 8 and 8-1/4" (203-210 mm). If measurement is outside this range, the self-leveling valve should be adjusted according to steps 5 - 9 of this procedure.



WARNING

BEFORE continuing this service procedure, perform the following SAFETY procedures:

Raise lift arm; engage lift arm support device.

Shut off the engine.

Tilt back ROPS/FOPS until lock engages.

(For detailed instructions, refer to the *Safety* chapter in this manual.)



WARNING



Surfaces inside the engine compartment may be extremely hot, particularly the engine muffler and exhaust pipes. Serious

injury may occur from touching components that have become hot while the engine was running.

5. The self-leveling valve can be accessed from the right side of the chassis.
6. Loosen adjuster screw locknut on self-leveling valve.



7. Insert an Allen wrench into the adjuster screw on the self-leveling valve and adjust the valve. Turn the screw IN (clockwise) to shorten the cylinder extension. Turn the screw OUT (counterclockwise) to lengthen the cylinder extension.



8. To check for proper operation, lower the ROPS, climb into the operator's seat, lower the restraint bar and start the engine. Disengage the lift arm support device and secure it to the lift arm.
9. Repeat steps 2 through 4 above to check for proper operation of the self-leveling valve. If further adjustment is needed, perform the safety procedures again and repeat steps 5 through 7.
10. After adjustment is complete, tighten the adjuster screw locknut.

Safety Lock Valves - Removal/Installation

2056 model skid-steer loaders have separate electric solenoid safety interlock valves for the lift and tilt functions of the hydraulic system. The lift and tilt safety interlock valves are located on the right side of the chassis above and behind the self-leveling valve. The brake or brake/two-speed solenoid valve is located on the left side of the chassis forward of the engine flywheel.

Lift and Tilt Solenoid Valve Removal Procedure



WARNING

BEFORE beginning this service procedure, perform the following **SAFETY** procedures:

Raise lift arm; engage lift arm support device.

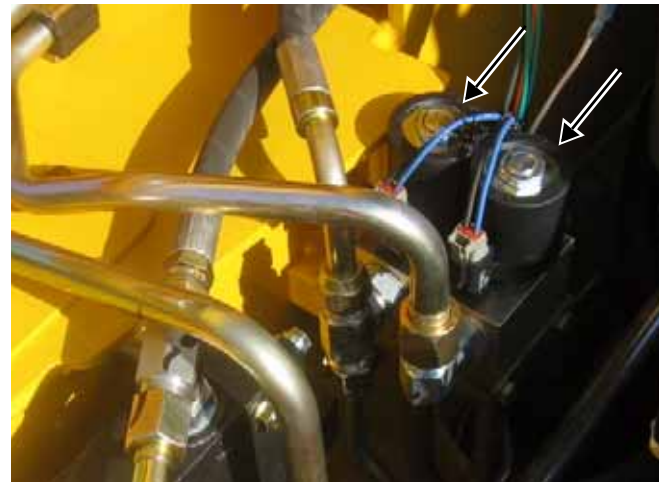
Shut off the engine.

Relieve hydraulic system pressure.

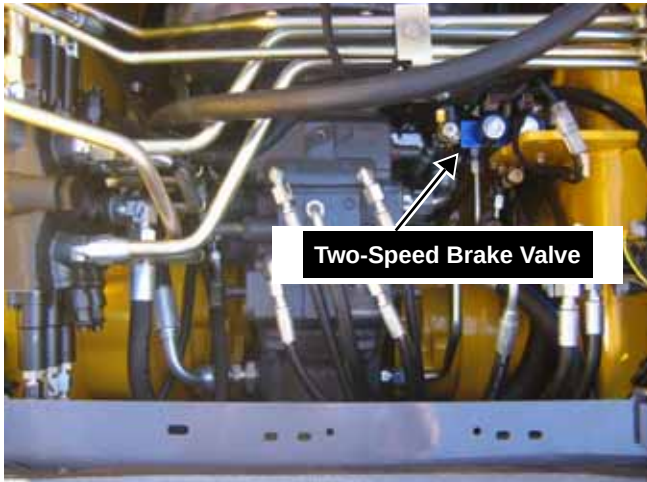
Tilt back ROPS/FOPS until lock engages.

(For detailed instructions, refer to the *Safety* chapter in this manual.)

1. Disconnect the electrical connectors on the solenoid coils. Disconnect the hydraulic tubes from their fittings on the solenoid body. Remove the two capscrews, straps and locknuts securing the solenoid to the chassis.



2. Remove the solenoids from the skid-steer loader.

Brake Solenoid Valve Removal Procedure

1. **Single-Speed:** Disconnect one electrical connector on the solenoid coil. Remove hydraulic tubes and hoses on the solenoid body. Remove two cap-screws and locknuts securing the interlock valve to a welded tab in the chassis.
2. **Two-Speed:** Disconnect two electrical connectors on the dual solenoid coils. Remove hydraulic tubes and hoses on the solenoid body. Remove two cap-screws and locknuts securing the interlock valve to a welded tab in the chassis.

NOTE: Cap or plug ALL hydraulic hoses, tubes, fittings, and control valve ports immediately after they are disconnected to prevent fluid loss and contamination of the hydraulic system.

Installation Procedure - Follow all warnings first, then reverse the removal steps.

NOTE: After removing and/or replacing any component in the hydraulic system, ALWAYS check the level of hydraulic fluid in the reservoir. Add fluid if necessary. Refer to the *Lubrication* chapter for hydraulic fluid requirements and specifications.

Lift and Tilt Solenoid Valve - Disassembly and Assembly

Lift and tilt solenoid valves can be removed from the loader for parts replacement, but it may not be necessary. If it is necessary, refer to the procedure in this chapter.

Disassembly Procedure

1. Remove the nut that secures the coil to the cartridge.



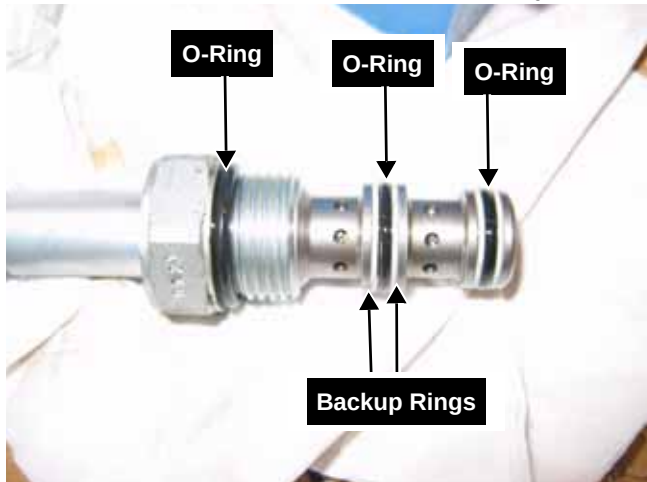
2. Remove the coil from the cartridge.



3. Unscrew cartridge from the valve body.



4. Install seal kit (or other new parts). Assemble solenoid valve in reverse order of disassembly.



IMPORTANT

DO NOT torque coil retaining nut more than 45 in.-lbs. (5.1 N•m).

5. If removed from the loader, install the lift or tilt solenoid on the hydraulic system. Refer to the procedure in this chapter.

Control Valve Removal and Installation

The main hydraulic control valve is located on the right side of the chassis, in front of the engine. This procedure highlights steps for removing the hydraulic hoses/tubes that connect to the control valve in order to remove the control valve. The removal of the lift, tilt and auxiliary connections at the control valve are highlighted in their respective procedures in the *Controls* chapter of this manual. The control valve ports are numbered for reference.

Removal Procedure



WARNING

BEFORE beginning this service procedure, perform the following SAFETY procedures:

Raise lift arm; engage lift arm support device.

Shut off the engine.

Relieve hydraulic system pressure.

Tilt back ROPS/FOPS until lock engages.

(For detailed instructions, refer to the *Safety* chapter of this manual.)

1. If necessary (see following NOTE), drain oil from hydraulic reservoir. For this procedure refer to "Hydraulic Reservoir" in the *Lubrication* chapter.

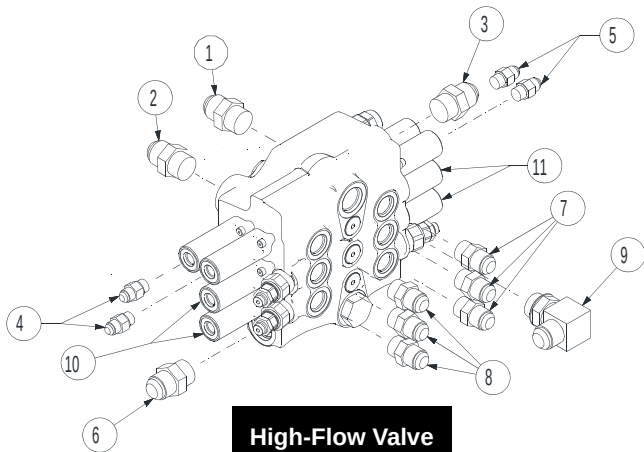
NOTE: If hydraulic hoses and tubes are plugged to prevent oil leakage, it should not be necessary to drain hydraulic reservoir. BE SURE to plug/cap ALL hydraulic hose and tube fittings to prevent contamination of the hydraulic system.

2. **Dual Hand and Hand/Foot Units Only:** Remove control rods and/or cables that control the lift, tilt and auxiliary hydraulics of the skid-steer loader. Refer to their removal procedures in the *Controls* chapter of this service manual.

3. Disconnect the electrical connector on the auxiliary spool lock solenoid at the back of the control valve.



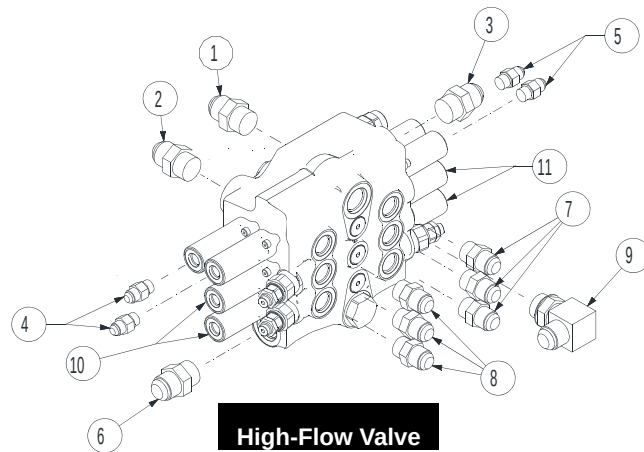
NOTE: To aid in reassembly of hydraulic hoses and tubes, mark hoses and tubes to be removed before disassembly.



4. Ports 1 and 2 (high-flow only): Disconnect the high-flow tubes at the straight fittings on the valve.
5. Port 3: Disconnect the hydraulic filter tube from the straight fitting on the control valve.
6. Ports 4: Disconnect the auxiliary feed tube and high-flow feed tube (high-flow only) from straight fittings on the control valve.
7. Ports 5: Disconnect the auxiliary return tube and high-flow return tube (high-flow only) from straight fittings on the control valve.
8. Port 6: Disconnect the pressure hose from the straight fitting on the control valve (other end connects to gear pump).
9. Ports 7: Disconnect a lift, tilt and auxiliary tube from the straight fittings on the control valve.
10. Ports 8: Disconnect a lift, tilt and auxiliary tube from the straight fittings on the control valve.

11. Port 9 (high-flow only): Disconnect the pressure hose from the 90° fitting on the control valve (other end connects to gear pump).
12. Ports 10 and 11: Disconnect four remaining hoses from straight fittings on the control valve, two hoses in front and two in the rear.
13. Remove four locking capscrews securing the control valve to the welded mounting bracket.
14. Lift out the control valve. Removal may require loosening the opposite ends of some of the disconnected tubes.

NOTE: Cap or plug ALL hydraulic hoses, tubes, fittings and control valve ports immediately after being disconnected to prevent fluid loss and contamination of the hydraulic system.



Installation Procedure

1. Secure the control valve to the welded bracket with four locking capscrews. If straight or 90° fittings are not in the valve, install them at this time.
2. Ports 10 and 11: Connect four hoses to straight fittings on the control valve, two hoses in front and two in the rear.
3. Port 9 (high-flow only): Connect the pressure hose to the 90° fitting on the control valve (other end connects to gear pump).
4. Port 8: Connect a lift, tilt and auxiliary tube to the straight fittings on the control valve.
5. Port 7: Connect a lift, tilt and auxiliary tube to the straight fittings on the control valve.
6. Port 6: Connect the pressure hose to the straight fitting on the control valve (other end connects to gear pump).

7. Port 5: Connect the auxiliary return tube and high-flow return tube (high-flow only) to straight fittings on the control valve.
8. Port 4: Connect the auxiliary feed tube and high-flow feed tube (high-flow only) to straight fittings on the control valve.
9. Port 3: Connect the hydraulic filter tube to the straight fitting on control valve.
10. Ports 1 and 2 (high-flow only): Connect the high-flow tubes at the straight fittings on the valve.
11. Reconnect the auxiliary hydraulics spool lock electrical connector at the rear of the control valve.
12. Connect control rods and/or cables that control the lift, tilt and auxiliary hydraulics of the skid-steer loader. Refer to their installation procedures in the *Controls* chapter of this service manual.
13. Install hydraulic reservoir drain plug and refill with correct type of hydraulic oil. Refer to *Lubrication* chapter for hydraulic oil requirements and specifications.
14. ALWAYS check for hydraulic fluid leaks after reassembling any component of the hydraulic system.



WARNING



NEVER use your hands to search for hydraulic fluid leaks. Use a piece of cardboard or paper. Escaping fluid under pressure can be invisible and penetrate the skin causing serious injury. If any fluid is injected into your skin, see a doctor at once. Injected fluid **MUST** be surgically removed by a doctor familiar with this type of injury or gangrene may result.



WARNING



ALWAYS wear safety glasses when checking for hydraulic fluid leaks. Escaping fluid under pressure can be invisible and can cause permanent eye-sight damage if safety glasses are not worn.

Manifold Valve Removal and Installation

2056 model skid-steer loaders are equipped with a 2-bank (standard) or 4-bank (high-flow) manifold valve, located beside the control valve, that is part of the standard or high-flow auxiliary hydraulics system.

Removal Procedure



WARNING

BEFORE beginning this service procedure, perform the following **SAFETY** procedures:

Raise lift arm; engage lift arm support device.

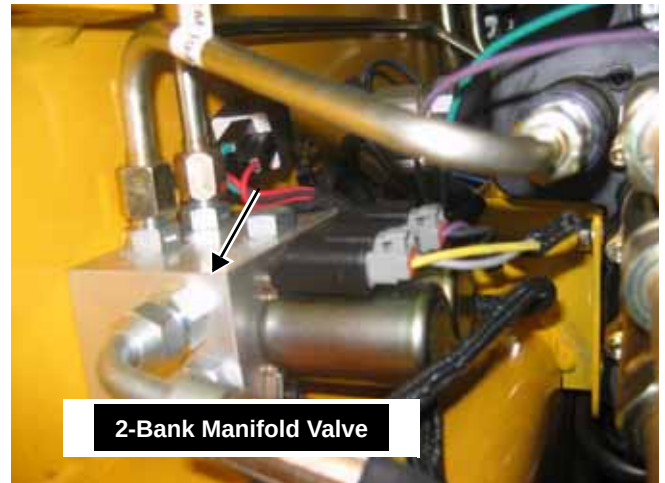
Shut off the engine.

Relieve hydraulic system pressure.

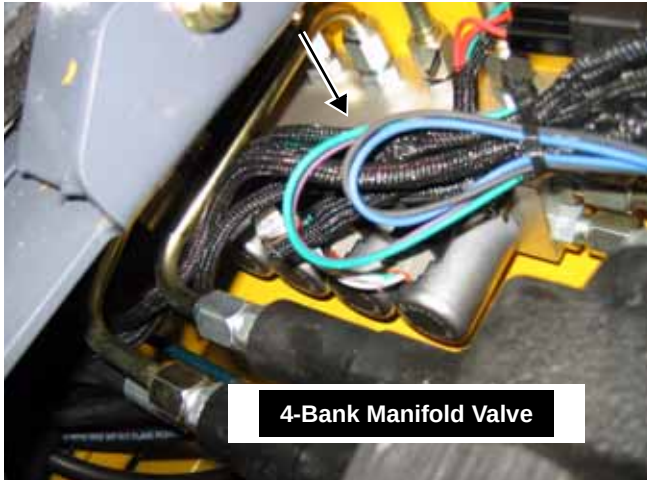
Tilt back ROPS/FOPS until lock engages.

(For detailed instructions, refer to the *Safety* chapter in this manual.)

1. Disconnect the two or four electrical connectors from the manifold valve.



2. Disconnect the six or eight hydraulic tubes/hoses from the manifold valve.



3. Remove two capscrews securing the 2- or 4-bank manifold valve to the chassis. Removal may require loosening the opposite ends of some of the disconnected tubes.

Installation Procedure - Follow all warnings first, then reverse the removal steps.

NOTE: After removing and/or replacing any component in the hydraulic system, ALWAYS check the level of the hydraulic fluid in the reservoir. Add fluid if necessary. Refer to the *Lubrication* chapter for hydraulic fluid requirements and specifications.

ALWAYS check for hydraulic fluid leaks after reassembling any component of the hydraulic system.

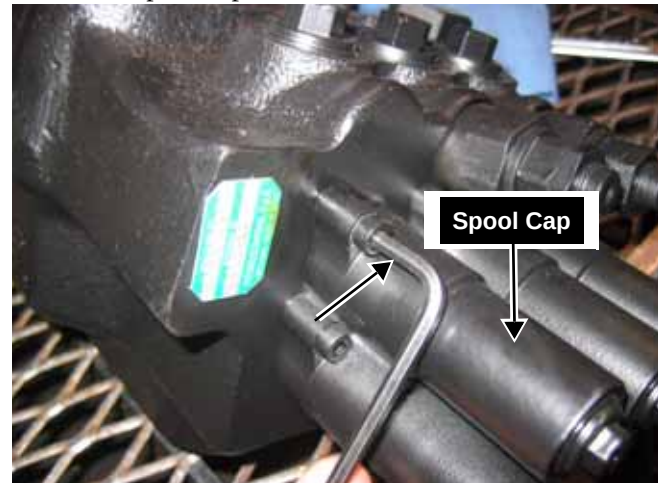
Control Valve Disassembly and Assembly

The main control valve is a mono-block control valve with spools.

Disassembly Procedure

1. Remove the main control valve per the procedure in this chapter and place valve on a flat surface that can retain or collect any hydraulic oil spill.

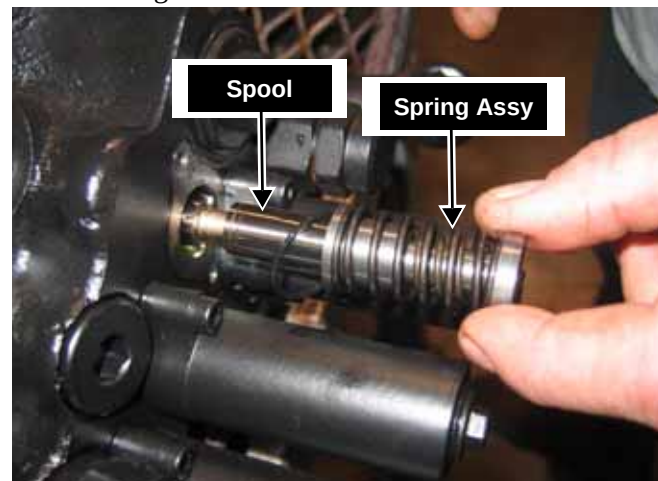
2. To access the spools, use an Allen wrench to loosen two hex socket capscrews, one on each side of the spool cap.



3. Pull spool cap off the spool and retain the o-ring.

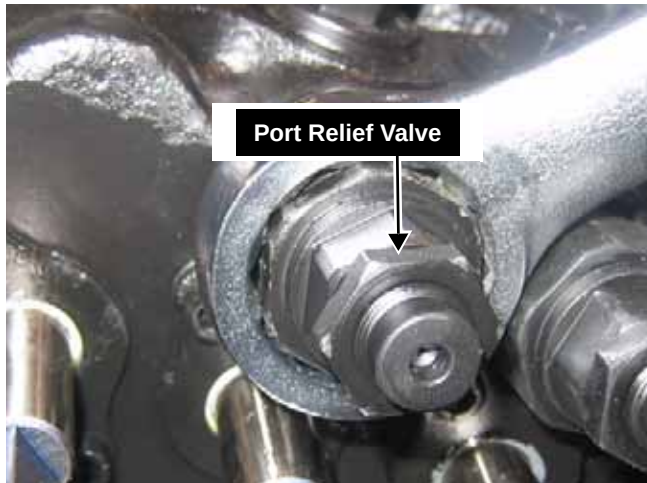


4. Grab the spring assembly on the end of the spool and pull the spool out of the control valve. Retain all o-rings.



5. Repeat steps 1-4 for all spools needing to be removed from the control valve.

6. To remove port relief valves from the control valve, use a wrench to loosen the valve from the control valve.



Assembly Procedure - Reverse the disassembly steps.

Main Relief Valve Removal and Installation

An anti-cavitation/relief valve is integrated within the standard-flow control valve. Two anti-cavitation relief valves are integrated within the high-flow control valve. A relief valve activates when oil pressure inside the control valve reaches an unacceptable level, to relieve that pressure and prevent damage to valve and hydraulic system.

Removal Procedure



WARNING

BEFORE beginning this service procedure, perform the following **SAFETY** procedures:

Shut off the engine.

Relieve hydraulic system pressure.

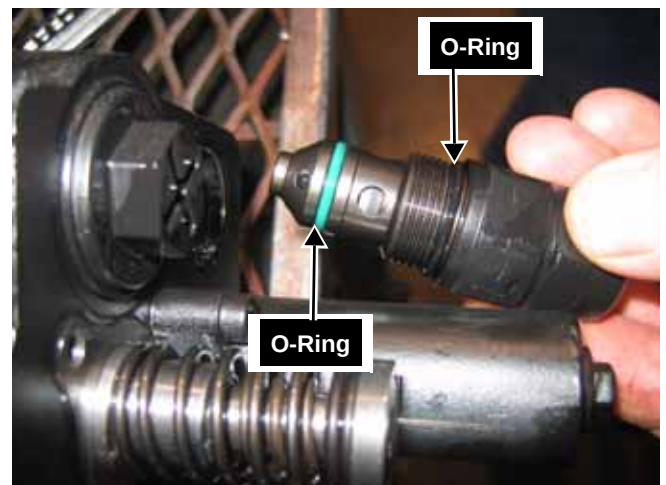
Tilt back ROPS/FOPS until lock engages.

(For detailed instructions, refer to the *Safety* chapter of this manual.)

1. With a wrench, loosen and remove the anti-cavitation/relief valve from the main control valve.



2. Check condition of o-rings and clean off any debris.



Installation Procedure - Follow all warnings first, then reverse removal steps.

Auxiliary Hydraulics Spool Lock Solenoid Removal and Installation

The control valve contains one spool lock solenoid. The spool lock is for the auxiliary hydraulic system. The spool lock activates when the operator raises the restraint bar or leaves the seat, locking the auxiliary hydraulics.

Removal Procedure



WARNING

BEFORE beginning this service procedure, perform the following **SAFETY** procedures:

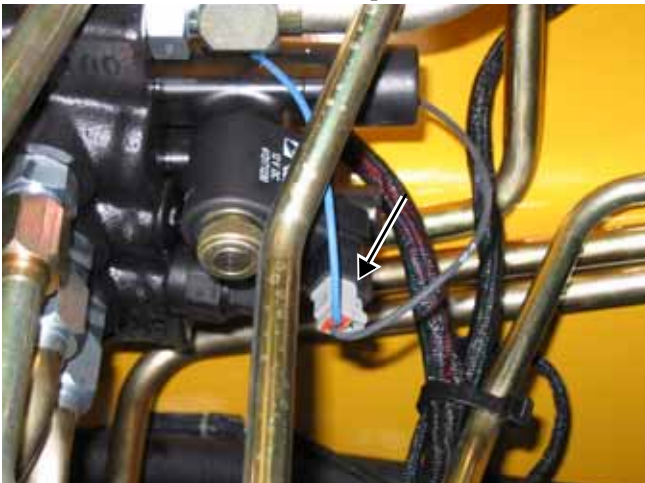
Shut off the engine.

Relieve hydraulic system pressure.

Tilt back ROPS/FOPS until lock engages.

(For detailed instructions, refer to the *Safety* chapter of this manual.)

1. At the rear of the main control valve, unplug the electrical connector at the spool lock solenoid.



2. Loosen and remove round cap on top of the spool lock solenoid.

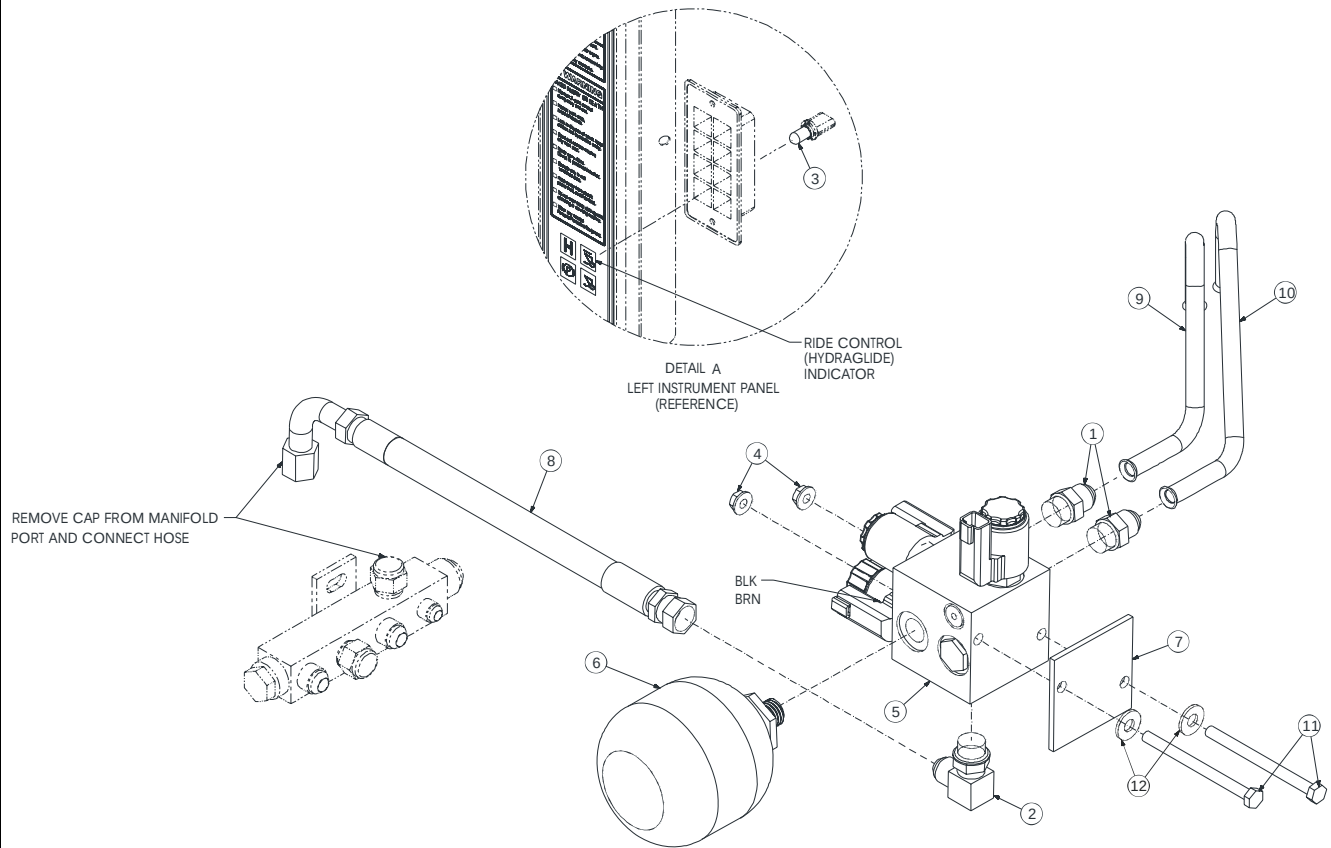


3. Check condition of o-rings and locking cylinder plunger. Clean off any debris.



Installation Procedure - Follow all warnings first, then reverse removal steps.

Hydraglide™ Ride Control Hydraulics



1 FITTING/STRAIGHT
 2 FITTING/90°
 3 BULB/LAMP
 4 NUT/SPIRALOCK™

5 MANIFOLD/HYDRAGLIDE™
 6 ACCUMULATOR
 7 PLATE/VALVE SPACER
 8 HOSE/PRESSURE

9 HYDRAGLIDE™ TUBE
 10 HYDRAGLIDE™ TUBE
 11 SCREW/CAP
 12 WASHER/FLAT

Hydraglide™ Ride Control Accumulator Removal and Installation

2056 model skid-steer loaders offer an optional ride control system. This system includes a hydraulic accumulator that is electrically controlled from the right control handle. It has its own solenoid.

Removal Procedure



WARNING

BEFORE beginning this service procedure, perform the following **SAFETY** procedures:

Raise lift arm; engage lift arm support device.

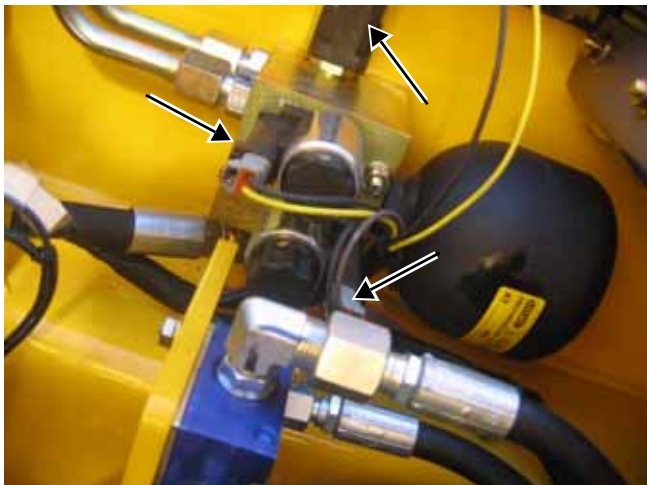
Shut off the engine.

Relieve hydraulic system pressure.

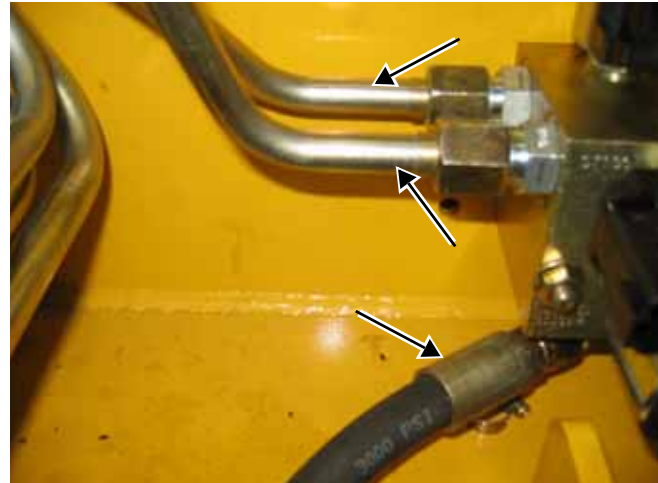
Tilt back ROPS/FOPS until lock engages.

(For detailed instructions, refer to the **Safety** chapter of this manual.)

1. Remove three machine screws securing the left interior fender (ROPS filler panel) to the side of the chassis. The machine screws can be accessed from outside the chassis.
2. Disconnect three electrical connectors on the manifold from the wire harness.



3. Remove two hydraulic tubes from straight fittings on the manifold and one hydraulic hose from the 90° fitting at the bottom of the manifold.



NOTE: Cap or plug ALL hydraulic hoses, tubes, fittings and control valve ports immediately after being disconnected to prevent fluid loss and contamination of the hydraulic system.

4. Remove two locknuts on capscrews securing manifold (with accumulator attached) to chassis and remove both from the loader.
5. Place the manifold in a vise. Use a wrench to remove the accumulator from the manifold.

Installation Procedure - Follow all warnings first, then reverse the removal steps.

NOTE: After removing and/or replacing any component in the hydraulic system, ALWAYS check the level of the hydraulic fluid in the reservoir. Add fluid if necessary. Refer to the *Lubrication* chapter for hydraulic fluid requirements and specifications.

ALWAYS check for hydraulic fluid leaks after reassembling any component of the hydraulic system.



WARNING



NEVER use your hands to search for hydraulic fluid leaks. Use a piece of cardboard or paper. Escaping fluid under pressure can be invisible and penetrate the skin causing serious injury. If any fluid is injected into your skin, see a doctor at once. Injected fluid **MUST** be surgically removed by a doctor familiar with this type of injury or gangrene may result.



WARNING



ALWAYS wear safety glasses when checking for hydraulic fluid leaks. Escaping fluid under pressure can be invisible and can cause permanent eye-sight damage if safety glasses are not worn.

SECTION NOTES

Troubleshooting Guide

Problem	Possible Cause	Remedy
Lift/tilt controls fail to respond	Hydraulic oil viscosity too heavy	Allow longer warm-up or replace with proper viscosity oil.
	Solenoid valve(s) malfunctioning	Check electrical connections to solenoid and repair connections as needed. Perform "Solenoid Valve Test." Replace solenoid as needed.
	Hydraulic oil level low	Check oil level in reservoir. If oil is low, check for an external leak. Repair and add oil.
	Hydraulic oil flow to the gear pump blocked	Inspect suction hose. Clean or replace as needed.
	System relief valve malfunctioning	Adjust or replace relief valve as needed.
	Drive disconnected	Check for broken or worn pump drive coupling. Replace as needed.
	Sheared spline or broken shaft in hydrostatic pump assembly	Check splined shaft of pump closest to engine. Replace shaft if broken or if splines are sheared.
	Sheared spline or broken shaft in gear pump	Remove gear pump from hydrostatic pump and inspect the splined shaft and coupler. Replace components as needed.
	Restraint bar switch or seat switch not closing	Check switches and wiring. Replace as needed.

The troubleshooting guide lists potential hydraulic system problems, as well as possible causes and remedies, for 2056 skid-steer loaders.

If you cannot locate a particular hydraulic system problem in this chart, consult the *Hydrostatic System* chapter troubleshooting chart.

When a problem occurs, don't overlook simple causes. A malfunction could be caused by something as simple as low fluid level in the hydraulic reservoir. After a mechanical failure has been corrected, be sure to locate the cause of the problem.

Troubleshooting Guide

Problem	Possible Cause	Remedy
Hydraulic cylinder action slow for lift/tilt function	Low engine speed	Operate engine at higher speeds.
	Hydraulic oil viscosity too heavy	Allow longer warm-up or replace existing oil with proper viscosity oil.
	Hydraulic oil leaking past cylinder piston seals	Replace cylinder seals and o-rings as needed.
	Hydraulic oil level low	Check oil level in reservoir. If oil is low, check for an external leak. Repair and add oil.
	Inadequate pilot supply oil pressure to joystick or foot controls	Check pilot supply oil pressure.
	Inadequate pilot signal from control to the main control valve	Check signal pressure. Clean or replace as needed.
Lift arm does not raise; bucket tilt works properly	Lift spool in control valve not actuated or leaking	Check hose or tube connection to valve. Check pressure and flow.
Jerky lift arm and bucket action	Restraint bar switch or seat switch malfunction	Check electrical connections to the switch. Replace switch as needed.
	Air in hydraulic system	Cycle lift and tilt cylinders to maximum stroke and maintain pressure for short time to clear air from system.
	Oil in hydraulic reservoir low	Check and add oil to reservoir as needed.
Standard-flow auxiliary hydraulics function slowly	Low engine speed	Operate engine at higher engine speeds.
	Hydraulic oil level low	Add oil to reservoir.
	Hydraulic oil viscosity is heavy	Allow long warm-up period.
	Auxiliary spool in control valve leaking or not fully activated	Repair any leak found; readjust the auxiliary spool for full travel.

Troubleshooting Guide

Problem	Possible Cause	Remedy
Lift arm doesn't maintain raised position with lift control in NEUTRAL	Oil leaking past lift cylinder seals (internal or external)	Check cylinder tube bore condition. Replace seals or cylinder tube as needed.
	Oil leaking past lift spool in control valve	Check valve body for scores or cracks. Replace control valve as needed.
	Self-leveling valve malfunctioning	Repair or replace as needed.
	Leaking hydraulic hoses, tubes or fittings between control valve and cylinders	Inspect hoses and tubes; tighten fittings as needed. Replace hoses or tubes as needed.
	Hydraglide/Float control with internal leakage.	Repair or replace as needed.
	Float control activated	Deactivate float control by pressing the button on the control handle.
Lift arm will not lower or raise	Lift cylinder lift arm support device engaged	Raise lift arm and disengage the lift arm support device.
	Solenoid valve malfunctioning	Check electrical connections to solenoid. Repair or replace as needed.
	Restraint bar not lowered	Lower restraint bar.
	Restraint bar switch or seat switch malfunction	Check electrical connections to the switch. Replace switches as needed.
	Blown fuse or relay	Replace fuse or relay.
Bucket drifts downward with tilt control in NEUTRAL	Oil leaking past tilt cylinder seals (external or internal)	Check cylinder tube bore condition. Replace seals, o-rings or cylinder as needed.
	Self-leveling valve malfunctioning	Repair or replace as needed.
	Leaking hydraulic hoses, tubes; or fittings between control valve and cylinders	Inspect hoses and tubes, tighten fittings as needed. Replace hoses or tubes as needed.
Slow or no response for bucket tilt; lift works properly (Hand/Foot units only)	Pilot control lines have air in them	Bleed pilot control line from the main control valve.
	Low charge pressure	See hydrostatic pump manual.
	Linkage misadjusted	Readjust for full travel without restriction.

Troubleshooting Guide

Problem	Possible Cause	Remedy
Lift arm will not raise a heavy load or any load	Lift port relief in control valve malfunctioning	Replace lift port relief or contact Mustang Service Department.
	Float control activated	Deactivate float control by pressing button on control handle.
	Main relief valve malfunctioning	Check pressures in relief valve. Repair or replace as needed.
No downward pressure on bucket	Control valve in "float" position	Take control out of "float" position.
	Tilt cylinders malfunctioning	Check condition of cylinder tube bore. Replace seals, o-rings and/or cylinder tube as needed.
	Float control activated	Deactivate float control by pressing button on control handle.
Bucket does not level on the lift cycle	Self-leveling valve misadjusted or malfunctioning	Repair or replace self-leveling valve as needed.
Bucket will not tilt; lift arm works properly	Tilt solenoid valve malfunctioning	Check electrical connections to tilt solenoid and repair connections as needed. Replace solenoid as needed.
	Tilt spool in control valve not actuated or leaking	Check hose or tube connection to valve. Check pressure and flow.
High-flow auxiliary does not function	Solenoid valves malfunctioning	Check electrical connections to solenoid. Repair or replace solenoid.
	Restraint bar raised	Lower restraint bar.
	Restraint bar switch or seat switch malfunctioning	Replace malfunctioning switch.
	Faulty fuse connections	Check fuse connections for security, damaged or broken wires. Repair or replace as needed.
	Control modules malfunctioning	Contact your authorized Mustang dealer.
Standard auxiliary or high-flow auxiliary functions slowly	Control linkage misadjusted	Check linkage; readjust for full spool travel.
	Low engine speed	Operate engine at higher speeds.
	Hydraulic oil level low	Add oil to reservoir.
	Hydraulic oil viscosity too heavy	Allow for longer warm-up period.
	Control valve relief pressure low	Check pressure at control valve. Readjust if necessary.

Troubleshooting Guide

Problem	Possible Cause	Remedy
Standard-flow auxiliary hydraulics do not function	Restraint bar raised	Lower restraint bar
	Restraint bar switch or seat switch malfunctioning	Replace malfunctioning switch
	Blown fuse or relay	Replace fuse or relay.
	Faulty electrical connections	Check electrical connections for security, broken or damaged wires. Replace as needed.
	Solenoid valve malfunctioning	Check electrical connections to solenoid. Repair or replace as needed.

Introduction

Description of Operation - Right and Left Instrument Panels

Right Instrument Panel

The right instrument panel for 2056 model skid-steer loaders includes a bank of four circuit breakers.

The following items describe the normal operation of electrical system components on the skid-steer loaders.

1. When the operator is in the seat, with the restraint bar down, and the keyswitch turned to the "ON" position, but with the engine not running the following indicator lamps will light:

Glow Indicator (momentary above 113° F, 45° C) (longer on time below 113° F, 45° C)

Fasten Seat Belt (momentary)

Low Engine Oil Pressure

Battery Condition

Fasten Seat Belt buzzer will sound for five seconds

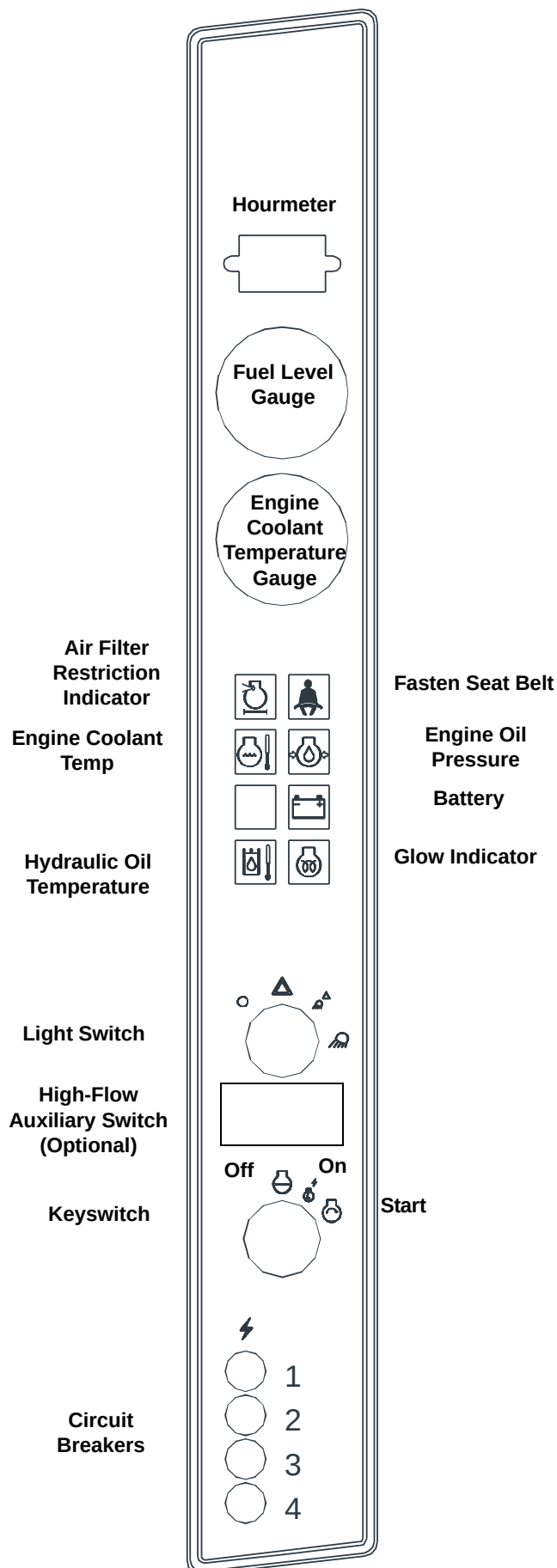
NOTE: The glow plugs automatically cycle ON and OFF when the key is ON. Glow plugs WILL NOT cycle if ambient temperature is above 113° F (45° C). Refer to Glow Control Module test in this chapter.

2. The keyswitch can then be turned to the START position.

The engine oil pressure and battery lamps will go out after the engine starts.

3. The lift and tilt safety lock valves should be energized when the operator is on the seat, the restraint bar is down, and the keyswitch is turned to the ON position.

NOTE: To verify that the seat and restraint bar switches are working properly, after the keyswitch is turned to ON, raise the restraint bar or lift body off the seat. Either action should prevent the engine from cranking with the keyswitch turned to START.



Left Instrument Panel

The left instrument panel for 2056 model skid-steer loaders holds the parking brake switch and indicator lamp. Optional switches, power outlet and light indicators are also on this panel.

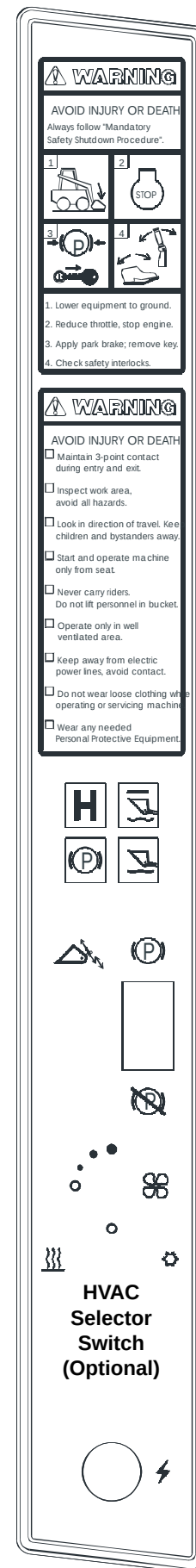
1. Two-Speed Indicator Lamp - it lights when the two-speed HIGH option is engaged.
2. Parking Brake Indicator Lamp - it lights when the parking brake is engaged.
3. Hydraglide™ Ride Control Indicator Lamp - it lights when the (optional) ride control is engaged.
4. Fan Switch - controls the (optional) fan for the heater and air conditioning package.
5. HVAC Switch - controls the selection of heat or air conditioning option.
6. 12-VDC Power Outlet - a plug-in outlet with rubber boot used for external electrical connections.
7. Parking Brake Switch - used to apply the parking brake.
8. Power-A-Tach® - used to actuate the (optional) Power-A-Tach® system.
9. Float Indicator Switch - it lights when the float function is activated.

Two-Speed
Control
(Optional)
Parking Brake

Power-A-Tach
Switch
(Optional)

Fan
Switch
(Optional)

12-VDC Power
Outlet



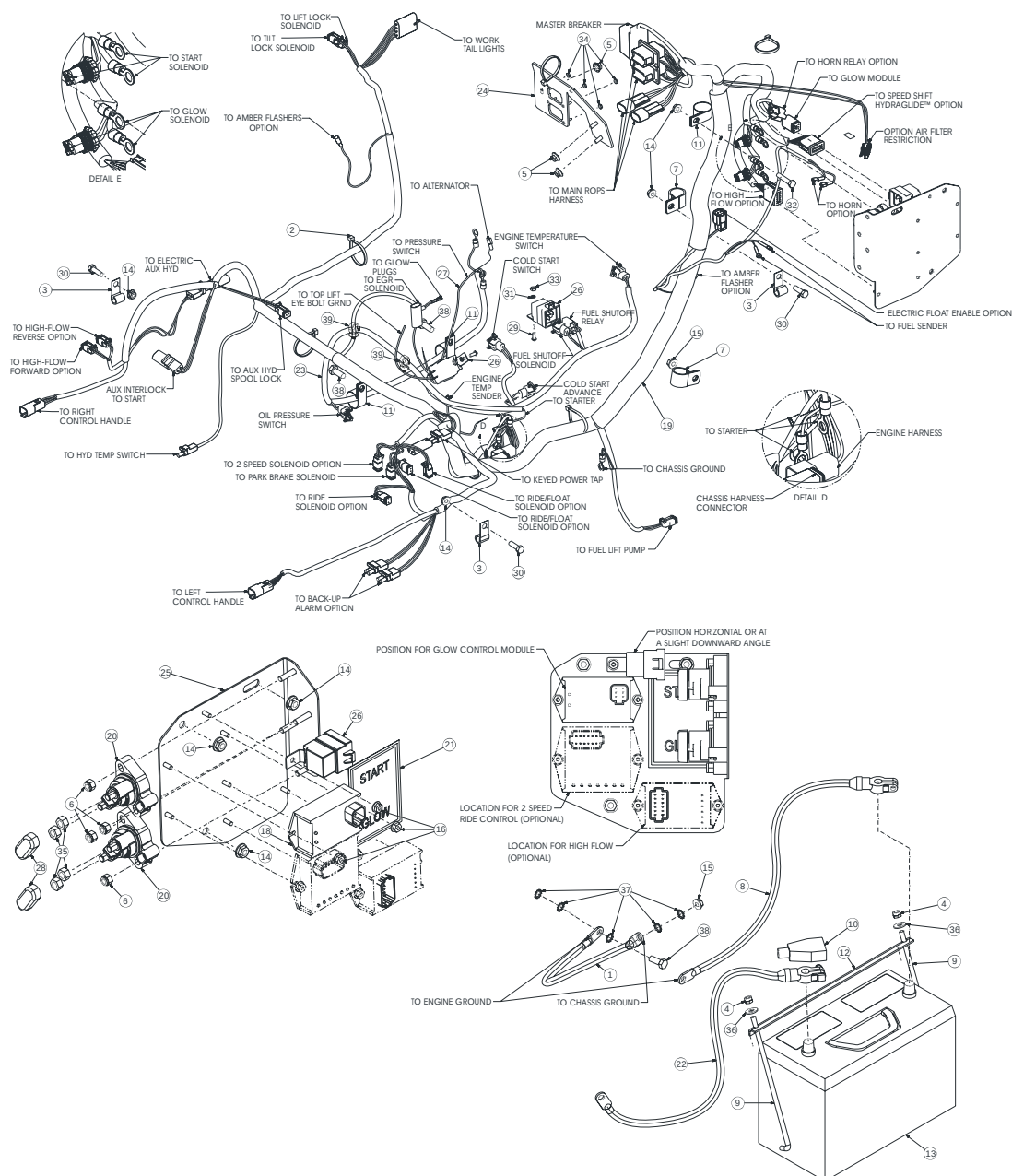
Troubleshooting Guide

Problem	Possible Cause	Remedy
Entire electrical system does not function.	Battery disconnect switch is "OFF" Circuit breaker(s) tripped Main wiring harness connectors at rear of ROPS not properly plugged in Battery terminals or cables loose or corroded Battery faulty Main wiring harness connectors at rear of ROPS not properly plugged in	Turn battery disconnect switch to "ON". Consult wiring diagram, check circuit and locate trouble i.e. pinched wires, faulty connections, etc. before resetting breaker. Check main connectors. Clean battery terminals and cables and tighten them. Test battery and replace as needed. Check main connectors.
No instrument panel lamps light with keyswitch turned to "ON".	Circuit breaker tripped Main fuse blown Battery terminals or cables loose or corroded	Consult wiring diagram, check circuit and locate trouble before resetting breaker. Test main fuse and replace as needed. Clean battery terminals and cables and tighten them.
No glow indicator lamp with keyswitch turned to "ON".	Ambient temperature above 59° F (15° C) Bulb is burned out. Faulty glow module	Proceed with starting engine Replace bulb. Check connection and voltage, replace as needed.
Seat belt buzzer indicator not sounding when keyswitch turned to "ON", indicator lamps work properly.	Plugged or obstructed buzzer. Faulty buzzer	Clean out buzzer. Replace Interlock Control Module.
Fuel gauge does not work.	Faulty fuel gauge sender Loose wiring/terminal connections Faulty fuel gauge	Replace fuel gauge sender. Verify wiring connections. Replace fuel gauge.
Engine temperature gauge does not work.	Faulty sender Loose wiring/terminal connections Faulty temperature gauge	Replace temperature sender. Verify wiring connections. Replace temperature gauge.
Hourmeter does not work.	Loose wiring/terminal connections Faulty alternator Faulty hourmeter	Verify wiring connections Repair or replace alternator. Replace hourmeter.

Troubleshooting Guide

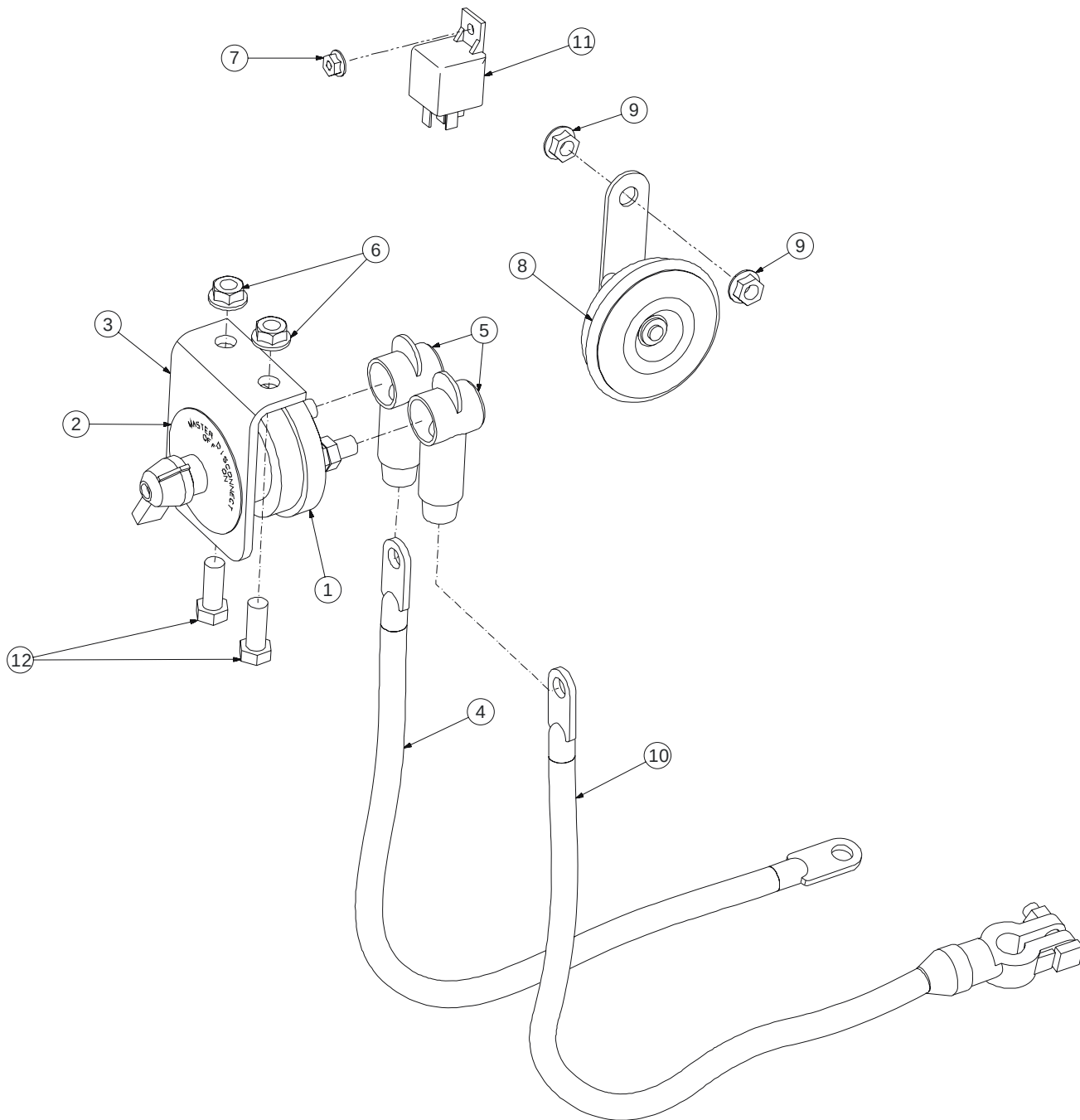
Problem	Possible Cause	Remedy
Starter will not engage when keyswitch is turned to "START".	Seat or restraint bar switch malfunctioning or not activated	Operator is in the seat with the restraint bar down. Replace switches as needed.
	Poor connections to starter relay in instrument panel	Verify relay connections.
	Faulty starter relay in panel	Test starter relay. Replace as needed.
	Battery terminals or cables are loose or corroded	Clean battery terminals and cables and tighten them.
	Battery discharged or defective	Recharge or replace battery.
	Starter solenoid in chassis malfunctioning	Troubleshoot circuit per wiring diagram, located trouble. Replace starter solenoid.
	Ignition wiring, seat switch, restraint bar switch, etc. loose or disconnected	Check wiring for poor connections, broken leads; repair wiring or connection.
	Starter or pinion faulty	Remove starter; repair or replace as needed.
	Faulty connections to Interlock Control Module	Check diagnostic lights on Interlock Control Module for proper inputs.
Battery will not recharge.	Battery terminals or cables loose or corroded	Clean battery terminals and cables and tighten them. Replace cables as needed.
	Battery or alternator defective	Test battery and alternator. Replace as needed.
Work lights not functioning properly.	Single light doesn't work; light bulb is burned out or faulty wiring	Check and replace light bulb.
	No lights at all; circuit breaker #2 tripped	Consult wiring diagram, check circuit and find trouble before resetting breaker.
	Faulty light switch or poor ground	Replace light switch. Check ground wire connections.
Lift/Tilt and/or Drive Solenoids do not work.	Wiring to solenoids disconnected or faulty	Refer to wiring diagram, locate trouble and repair as needed.
	Faulty seat or restraint bar switch	Replace seat or restrain bar switches as needed.
	Faulty solenoid valve coil	Replace solenoid valve coil.
	Faulty hydraulic solenoid relay in the instrument panel	Test relay, replace as needed.
	Faulty interlock module	Test module, replace as needed.

Electrical Chassis Components



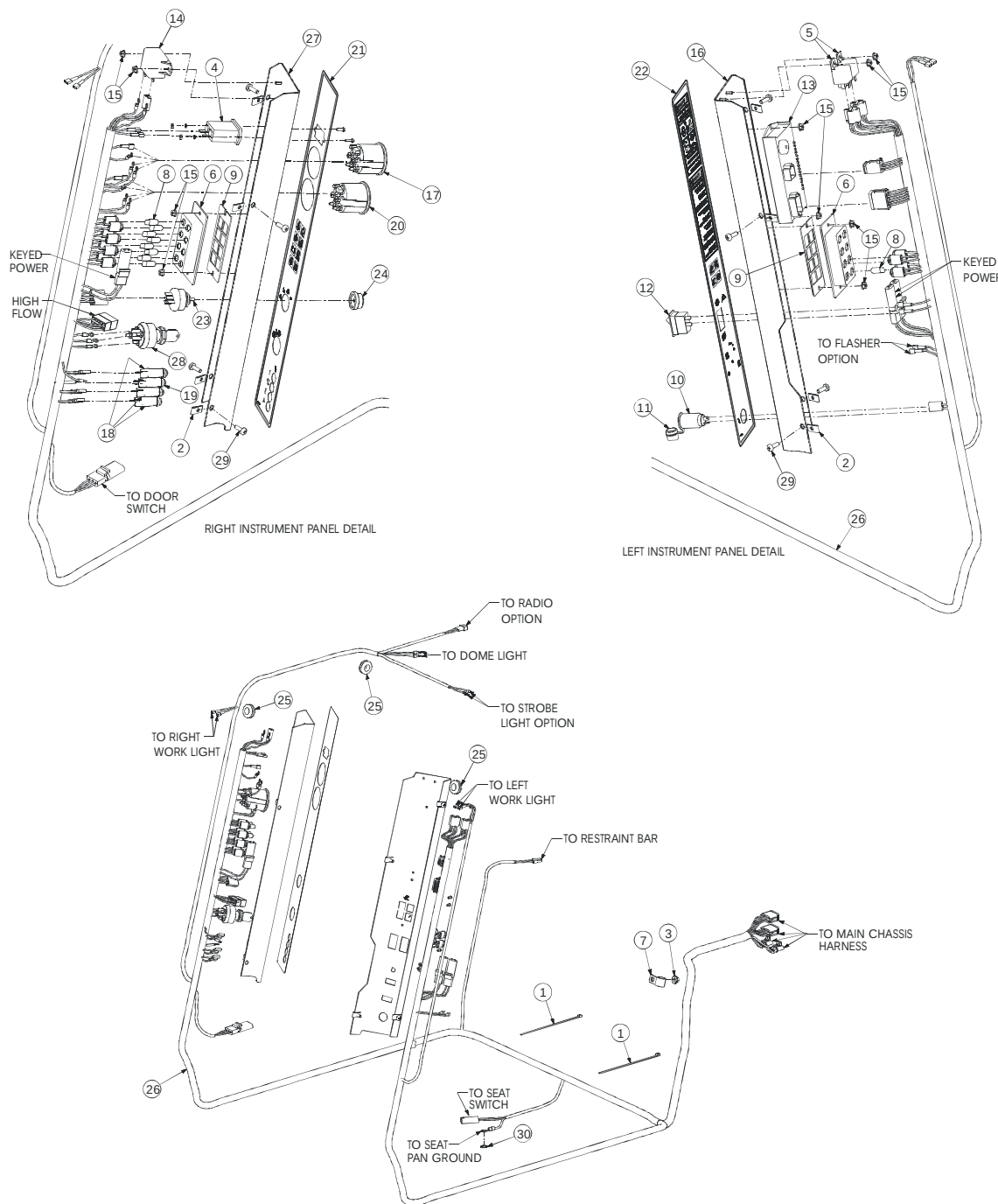
- | | | |
|-------------------|---------------------------|----------------------|
| 1 CABLE/BATTERY | 14 NUT/SPIRALOCK | 27 HARNESS/EGR |
| 2 TIE/WIRE | 15 NUT/SPIRALOCK | 28 COVER/ELECTRICAL |
| 3 CLAMP/HOSE | 16 NUT/SERRATED | 29 SCREW/MACHINE |
| 4 NUT/LOCK | 17 FUSE/MAXI 50 A | 30 SCREW/CAP |
| 5 NUT/LOCK | 18 MODULE/GLOW CONTROL | 31 WASHER/LOCK |
| 6 NUT/HEX | 19 HARNESS/CHASSIS | 32 SCREW/CAP |
| 7 CLAMP/TUBE | 20 SOLENOID | 33 NUT/HEX |
| 8 CABLE/BATTERY | 21 DECAL/GLOW START | 34 NUT/HEX |
| 9 ROD/HOLDDOWN | 22 CABLE/BATTERY POSITIVE | 35 NUT/HEX |
| 10 COVER/TERMINAL | 23 HARNESS/ENGINE | 36 WASHER/FLAT |
| 11 CLAMP/HOSE | 24 ASSY/HARNESS BRACKET | 37 WASHER/LOCK |
| 12 ANGLE/HOLDDOWN | 25 ASSY/ELECTRICAL PANEL | 38 SCREW/CAP |
| 13 BATTERY/12-VDC | 26 RELAY 40 A | 39 CLIP/WIRE HARNESS |

Electrical Battery Disconnect Switch Components



- | | | | |
|---|--------------------|----|---------------|
| 1 | SWITCH/DISCONNECT | 7 | NUT/SERRATED |
| 2 | PLATE/FACE | 8 | HORN/WARNING |
| 3 | PLATE/SWITCH MOUNT | 9 | NUT/LOCK |
| 4 | CABLE/BATTERY | 10 | CABLE/BATTERY |
| 5 | BOOT/INSULATOR | 11 | RELAY/SEALED |
| 6 | NUT/SPIRALOCK | 12 | SCREW/CAP |

Electrical ROPS/FOPS Components



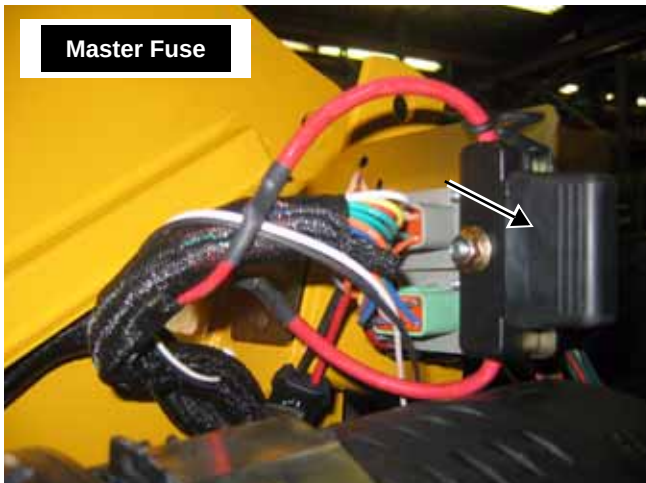
- | | | |
|-------------------------|-----------------------------|----------------------|
| 1 TIE/WIRE | 11 COVER/POWER PORT | 21 DECAL/PANEL |
| 2 NUT/SPEED | 12 SWITCH/PARK BRAKE | 22 DECAL/PANEL |
| 3 NUT/LOCK | 13 MODULE/CONTROL INTERLOCK | 23 SWITCH/LIGHT |
| 4 GAUGE/HOURMETER | 14 RELAY/POWER | 24 KNOB/LIGHT SWITCH |
| 5 RELAY ISO SPDT | 15 NUT/SERRATED | 25 GROMMET |
| 6 HOUSING/DISPLAY | 16 PANEL/LEFT INSTRUMENT | 26 HARNESS/PANEL |
| 7 CLAMP/TUBE | 17 GAUGE/FUEL LEVEL | 27 PANEL/INSTRUMENT |
| 8 BULB/LAMP | 18 BREAKER/CIRCUIT 20 A | 28 SWITCH/IGNITION |
| 9 GASKET/HOUSING | 19 BREAKER/CIRCUIT 30 A | 29 SCREW/PHILLIPS |
| 10 CONNECTOR/POWER PORT | 20 GAUGE/TEMPERATURE | 30 WASHER/LOCK |

Master Fuse, Module and Relay Test and Operation

2056 model skid-steer loaders utilize many types of fuses, modules and relays in the electrical system to maximize the efficiency of engine, hydraulic, power and electrical operations. Following in this section are test and operation procedures.

Master Fuse Test

The following procedure can be used to test the master fuse located on the left side of the chassis above the air cleaner.



WARNING

BEFORE beginning this service procedure, perform the following SAFETY procedure:

Shut off the engine.

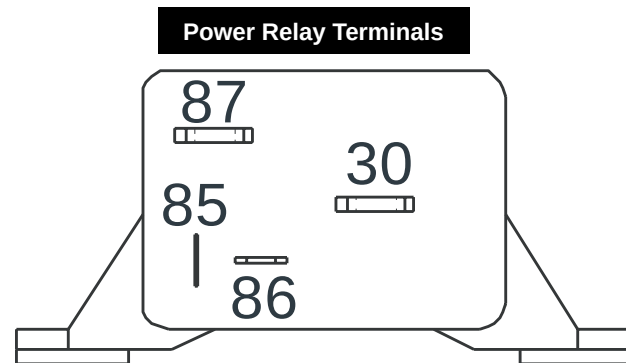
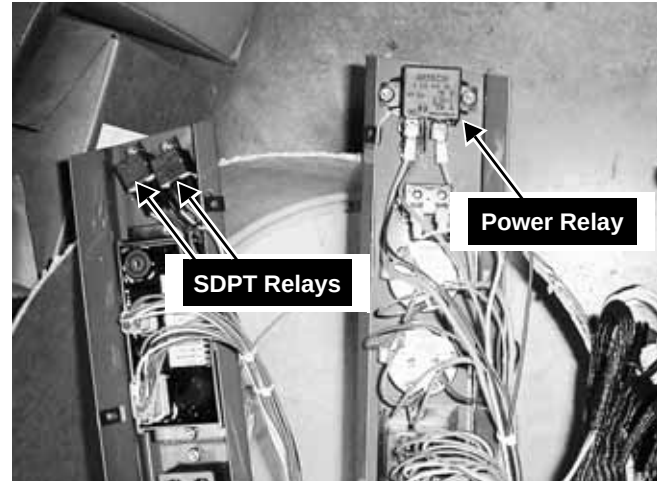
Raise engine cover; lock open the rear grille.

(For detailed instructions, refer to the *Safety* chapter of this manual.)

1. Remove the soft cover from the fuse housing.
2. Using a volt/ohm multimeter or a test lamp, measure between test points and the chassis ground for 12-VDC with the wiring connected and the key-switch in the "ON" position. The test lamp lights for functioning fuses, or the volt/ohm multimeter will read 12-VDC on both sides of the fuse.

Power Relay Test

The following procedure can be used to test the power relay located inside the right instrument panel.



WARNING

BEFORE beginning this service procedure, perform the following SAFETY procedure:

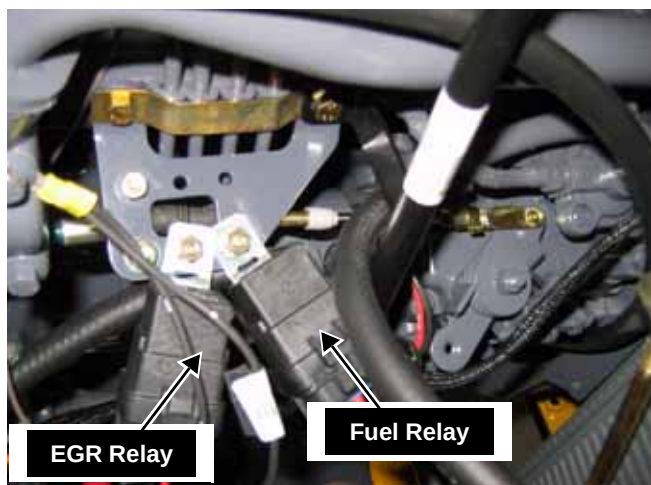
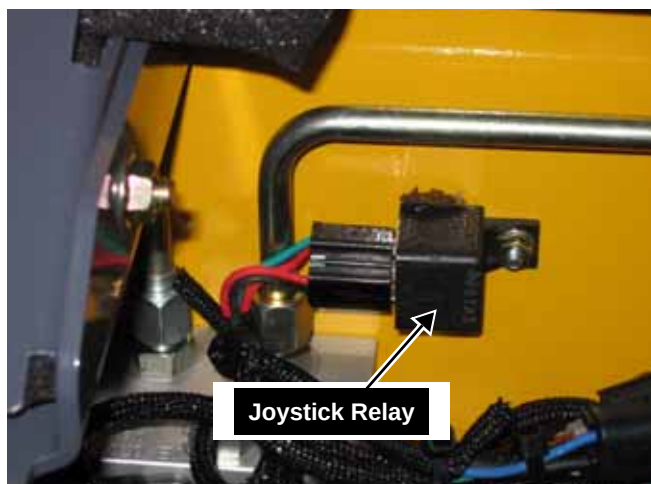
Shut off the engine.

(For detailed instructions, refer to the *Safety* chapter of this manual.)

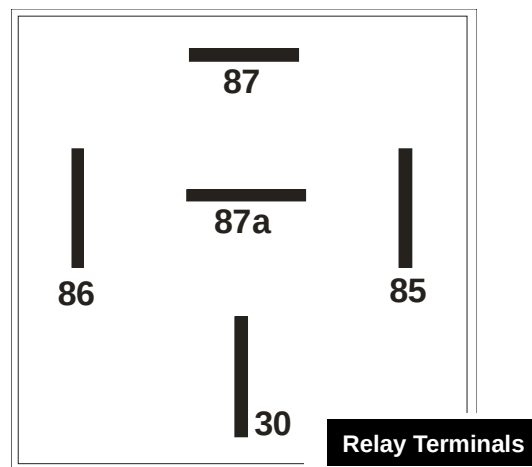
1. Remove four Phillips head screws securing right instrument panel to ROPS. It should then be possible to expose wiring and relay without disconnecting any wires from panel.
2. Using a volt/ohm multimeter, confirm the following conditions with wiring plug connected to relay terminals #85 and #86 and wires disconnected from screw terminals #30 and #87.

3. With the keyswitch in OFF position, there should not be continuity between terminals #30 and #87.
4. Turning keyswitch to "ON" position should provide 12-VDC to terminal #86 and produce an audible "click" from the relay. There should be continuity between terminals #30 and #87.
5. If 12-VDC cannot be measured at terminal #86, check for disconnected or damaged wiring. A dead battery may also be the cause. If the relay does not pass the above test conditions, it should be replaced.
6. **Relay Coil Test:** Using a volt/ohm multimeter with all wires disconnected, measure the resistance across terminals #85 and #86. There should be 46 ohms $\pm$ 5 ohms. There should be no continuity between terminals #30 and #87.

ISO SPDT Interlock, Joystick, EGR, Fuel and Horn Relays Test

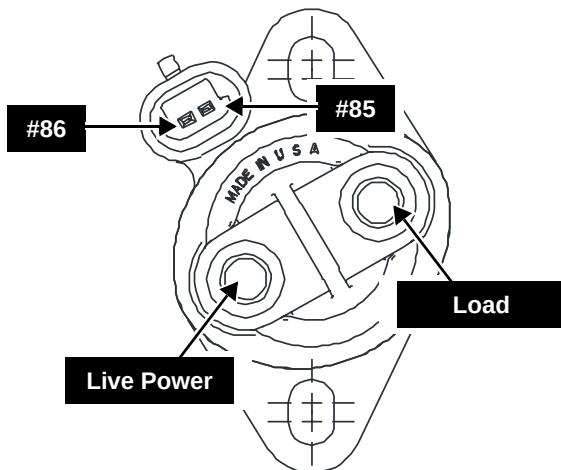


1. There should be 12-VDC on terminal #87 (#2 red wire from battery supply) at all times. Pushing horn button on left control handle should provide 12-VDC to terminal #86 and produce an audible "click" from relay. There should be 12-VDC on terminal #30 while horn button is pressed.
2. **Relay coil test:** Using a volt/ohm multimeter with all wires disconnected, measure the resistance across terminals #85 and #86. There should be 75 ohms $\pm$ 5 ohms. There should be no continuity between terminals #30 and #87.



Starter and Glow Solenoid Test

The following procedure can be used to test the starter and glow solenoids located near the air cleaner. Start and glow solenoids are labeled with a large decal.



WARNING

BEFORE beginning this service procedure, perform the following **SAFETY** procedure:

Shut off the engine.

Raise engine cover, lock open the rear grille.

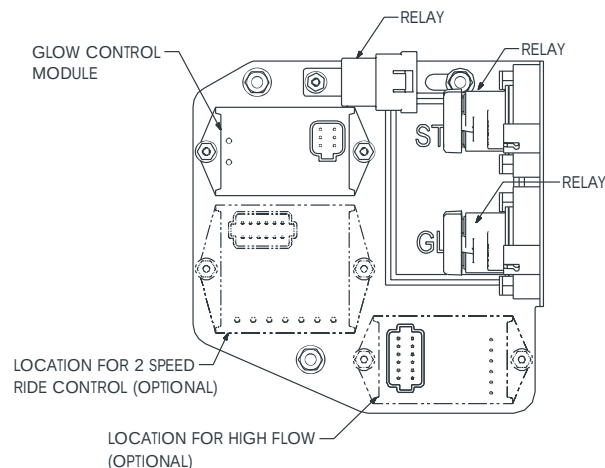
(For detailed instructions, refer to the *Safety* chapter of this manual.)

1. Using a volt/ohm multimeter or test lamp, confirm the following condition with the wiring connected. With keyswitch in "OFF" position, there should be 12 VDC only on left large copper stud of each solenoid.

2. **The engine starter solenoid:** With keyswitch in "START" position, the external solenoid will engage. Unplug the control current connector and install a test lamp between #85 and #86. Have an assistant turn the keyswitch to the "START" position and the test lamp should light.
3. **The engine glow solenoid:** The external solenoid will engage when ambient temperature is below 113° F (45° C). The green LED (Light Emitting Diode) indicator on the glow control module will be "ON" when the glow solenoid is engaged. Unplug the control current connector and install a test lamp between #85 and #86. Have an assistant turn the keyswitch to the "ON" position and the test lamp should light if ambient temperature is low enough.

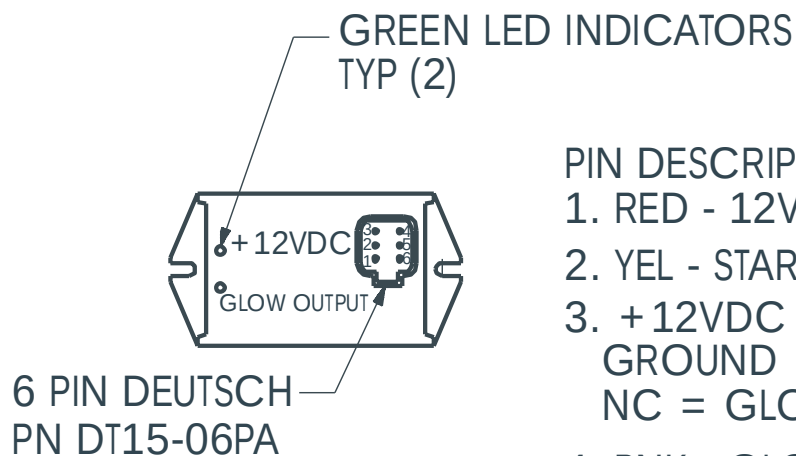
Glow Control Module Test

The glow control module, located on the left engine electrical panel, is a timed control module that powers the glow solenoid. The timing cycle varies relative to ambient temperature. The glow solenoid cycles power ON and OFF to the glow element on the engine.



1. Turn keyswitch to "ON" position. Check green LED indicator on module labeled "+12-VDC" to verify it is ON. If indicator light is not ON, check for 12-VDC across terminals #1 (13 red) and #6 (0 black) on harness connector to module.
2. The glow indicator lamp in the right instrument panel will come on momentarily (approximately 1 second) each time the keyswitch is turned to the ON position to test the lamp. If ambient temperature is below 113° F (45° C), glow indicator lamp in right instrument panel will come on while glow element is activated for pre-glow cycle. After indicator lamp goes out, then crank engine to start.

Glow Control Module



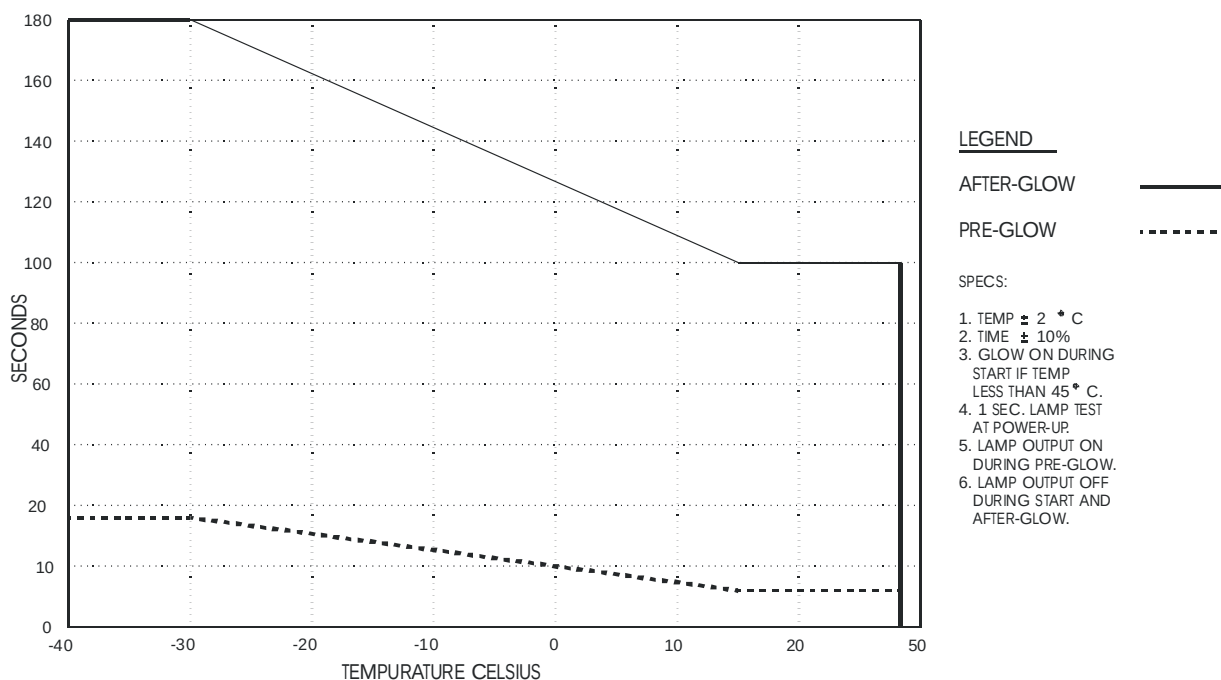
PIN DESCRIPTIONS:

1. RED - 12VDC IN
2. YEL - STARTER SIGNAL IN
3. +12VDC = GLOW CYCLE 1
GROUND = GLOW CYCLE 2
NC = GLOW CYCLE 3
4. PNK - GLOW RELAY OUTPUT
(5 AMP OUTPUT)
5. BLU - GLOW LIGHT OUTPUT
6. BLK - GROUND

MATING CONNECTOR:

DEUTSCH PN DT06-06S

Glow Control Module Time/Temp Cycle



TIME/TEMP CYCLE 3 (PIN 3 = NO CONNECT)

TYPICAL APPLICATION: DEUTZ 2011 SERIES ENGINE- GLOW PLUG PROTOCOL

3. The green LED indicator on module labeled “Glow Output” will be ON when the module is activating the glow solenoid for both pre-glow and after-glow cycles.
4. If “Glow Output” indicator is on but glow plugs on engine are not activated, check function of glow solenoid near the air cleaner.
5. Glow control module is restarted by returning key-switch to OFF position and back to ON position.

Interlock Control Module Test

The following procedure can be used to test interlock control module inside the left instrument panel.



WARNING

BEFORE beginning this service procedure, perform the following SAFETY procedure:

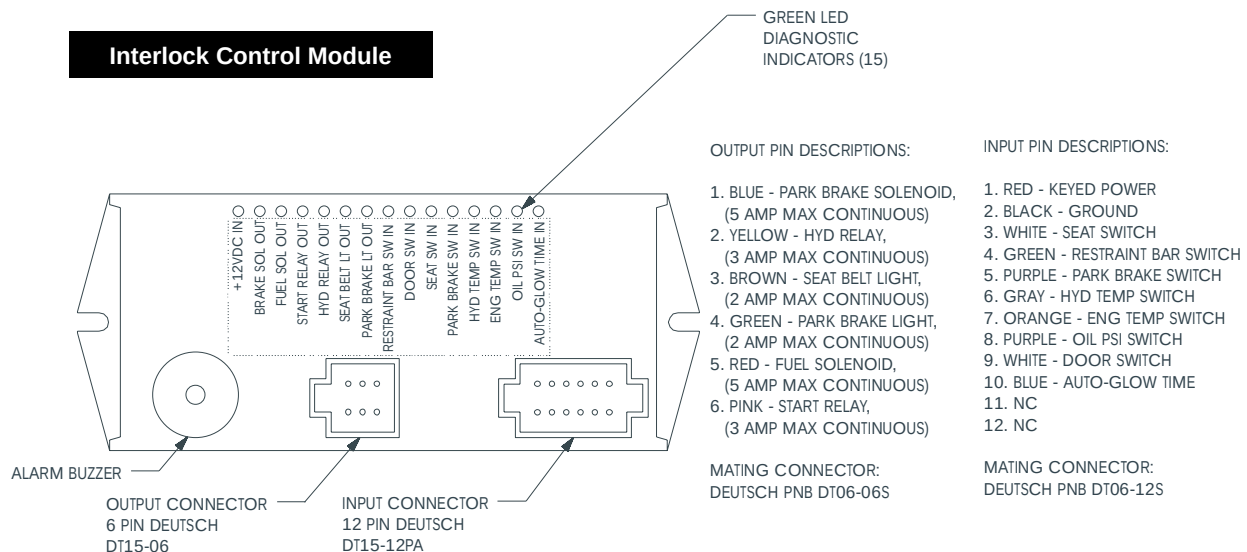
Shut off the engine.

(For detailed instructions, refer to the *Safety* chapter of this manual.)

6. Remove four Phillips-head screws securing left instrument panel to ROPS. It should be possible to expose wiring and interlock control module without disconnecting any wires from panel.
7. Most module troubleshooting can be done by observing green diagnostic LED indicators. Disconnect 12-pin and 6-pin connectors and inspect terminals. Be sure no pins are bent on module and no sockets are damaged on harness. Replace dam-

aged components and reconnect harness to control module.

8. Refer to truth table on the following page to analyze functionality of module. The module controls operation of components listed in OUTPUTS section of truth table. The ON or OFF state of various outputs is determined by ON or OFF state of various input conditions listed in INPUTS section of truth table. The keyswitch must be in ON position.
9. **Example 1** (initial keyswitch ON): At initial keyswitch ON, input LED “12-VDC In” should light, output LED “Fuel Solenoid” should light, and internal seat belt alarm should sound for five seconds.
10. **Example 2** (low engine oil pressure condition): At initial keyswitch ON, allow seat belt alarm condition to time out. Input LED “12-VDC In” and “Oil Pressure Switch” should be lit. In output section, internal “Engine Shut Down Alarm” will sound intermittently and output LED “Fuel Solenoid” will shut OFF after 30 seconds.
11. On the following page, the truth table section “Diagnostic LED States” specifies active (ON) state of each input and output. **Example:** Active (ON) state of engine oil pressure switch input (connector #1, pin #8) is a low or grounded input. Active state of seat switch input (connector #1, pin #3) is a high or 12-VDC input.



Interlock Control Module Truth Table

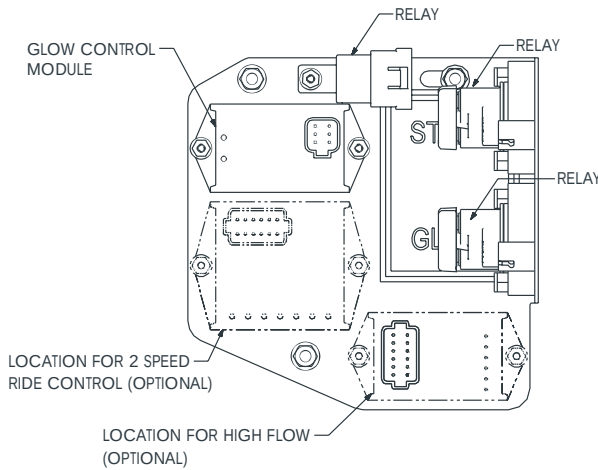
Function	Pin No.	INPUTS (12 Pin Connector #1.X)												OUTPUTS (6 Pin Connector #2.X)						NOTES
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	
AT POWER ON		ON	X													ON FOR 5 SEC		ON		Seat Belt Warning Light and Intermitent Chirp Alarm
HYD OVER TEMP WARNING		ON	X				ON													Intermitent Alarm Sounds when Input Signal is Present or until Power Off
AUTO-GLOW TIME		ON	X								ON							ON		Engine Shut Down Timer and Alarm Disabled During Auto-Glow
ENGINE OVER TEMP SHUT DOWN		ON	X					ON										OFF AFTER 30 SEC		Fuel Solenoid Shut Down and Intermitent Alarm Sounds until Power Off
ENGINE LOW OIL PSI		ON	X						ON									OFF AFTER 30 SEC		Fuel Solenoid Shut Down and Intermitent Alarm Sounds until Power Off
SHUT DOWN		ON	X																	Solenoid "ON" Releases Hyd Brake to Allow Loader Movement
PARK BRAKE RELEASE		ON	X	ON	ON												ON			Seat Switch has 1 Second Delay for Park Brake Function
SOLENOID ON		ON	X	OFF AFTER 1 SEC													ON			Instantaneous; Park Brake Stops Loader Movement
SOLENOID OFF		ON	X		OFF												ON			Instantaneous; Park Brake Stops Loader Movement
RELEASE		ON	X																	Instantaneous; Hyddraulics and Start Functions are Able to Operate
PARK BRAKE RELEASE		ON	X		OFF												ON			Instantaneous; Hyddraulics and Start Functions are Disabled
SOLENOID OFF		ON	X	ON	ON					OFF						ON				Instantaneous; Hyddraulics and Start Functions are Disabled
SAFETY RELAYS ENABLE		ON	X	ON	ON															Instantaneous; Hyddraulics and Start Functions are Disabled
SAFETY RELAYS DISABLE		ON	X	OFF												OFF				Instantaneous; Hyddraulics and Start Functions are Disabled
SAFETY RELAYS		ON	X		OFF											OFF				Instantaneous; Hyddraulics and Start Functions are Disabled
SAFETY RELAYS		ON	X													OFF				Instantaneous; Hyddraulics and Start Functions are Disabled
SAFETY RELAYS		ON	X													OFF				Instantaneous; Hyddraulics and Start Functions are Disabled
SAFETY RELAYS		ON	X													OFF				Instantaneous; Hyddraulics and Start Functions are Disabled

INTERLOCK CONTROL MODULE TRUTH TABLE

DIAGNOSTIC LED STATES			
LED Title	Pin No.	Type of Active Input/Output	LED State
+12VDC (IN)	1.1	HIGH (12VDC)	ON
Brake Sol (OUT)	2.1	HIGH (12VDC)	ON
Fuel Sol (OUT)	2.5	HIGH (12VDC)	ON
Start Relay (OUT)	2.6	HIGH (12VDC)	ON
Hyd Relay (OUT)	2.2	HIGH (12VDC)	ON
Seat Switch (OUT)	2.3	HIGH (12VDC)	ON
Park Brake I (OUT)	2.4	LOW (GND)	ON
Restraint Bar Sw (IN)	1.4	HIGH (12VDC)	ON
Door Sw (IN)	1.9	HIGH (12VDC)	ON
Seat Sw (IN)	1.3	HIGH (12VDC)	ON
Park Brake Sw (IN)	1.5	HIGH (12VDC)	ON
Hyd Temp Sw (IN)	1.6	LOW (GND)	ON
Engine Temp Sw (IN)	1.7	LOW (GND)	ON
Oil PSI Sw (IN)	1.8	LOW (GND)	ON
Auto-Glow Time (IN)	1.10	LOW (GND)	ON

Two-Speed, Ride Control and Float Module Test

The following procedure can be used to test the two-speed, ride control and float module mounted on the left riser, just below the engine cover.



WARNING

BEFORE beginning this service procedure, perform the following **SAFETY** procedure:

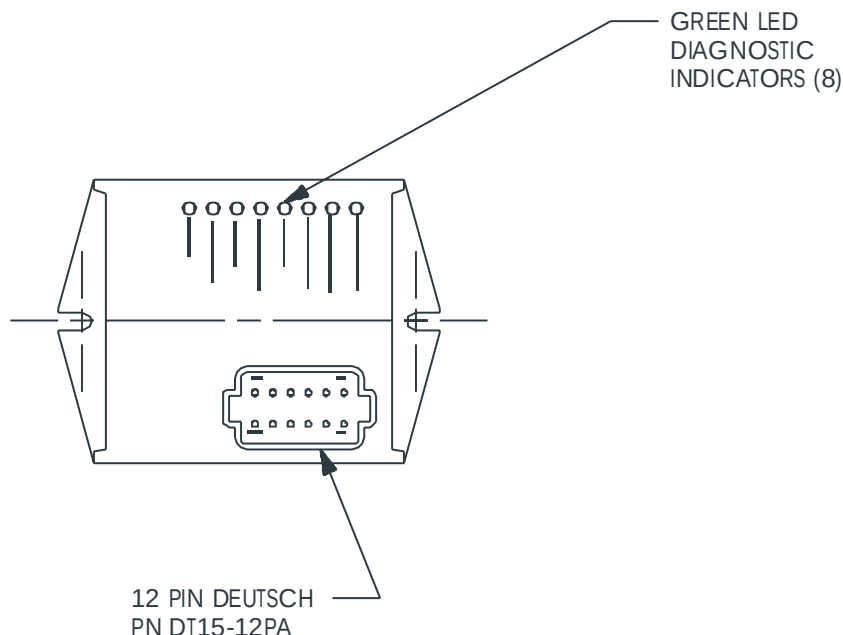
Shut off the engine.

Raise engine cover; lock open the rear grille.

(For detailed instructions, refer to the *Safety* chapter of this manual.)

1. Most troubleshooting of the two-speed, ride control and float module can be done by observing the green diagnostic LED indicators on the module.
2. Disconnect the 12-pin connector and inspect the terminals. Be sure no pins are bent on the module and no sockets are damaged on the harness. Replace any damaged components and reconnect the harness to the control module.
3. Refer to the truth table on the following page to analyze the functionality of the module.
4. With keyswitch "ON", press the #1 button on the left control handle. The "High/Low Toggle" LED should be lit while the button is depressed. The "High Gear Sol" LED should toggle ON (light) and OFF with alternate pushes of the button.
5. With keyswitch "ON", press the #2 button on the right control handle. The "Ride Ctrl Toggle" LED should be lit while the button is depressed. The "Ride Ctrl Sol" LED should toggle ON (light) and OFF with alternate pushes of the button.
6. With the keyswitch "ON", press the #1 button on the right control handle. The "Float Toggle" LED should blink while the button is depressed. The "Float Sol" LED should blink ON (light) and OFF with alternate pushes of the button. Press and hold the #1 button for five seconds to lock the "Float" into a continuous "ON" state.

Two-Speed, Ride Control and Float Module



PIN DESCRIPTIONS:

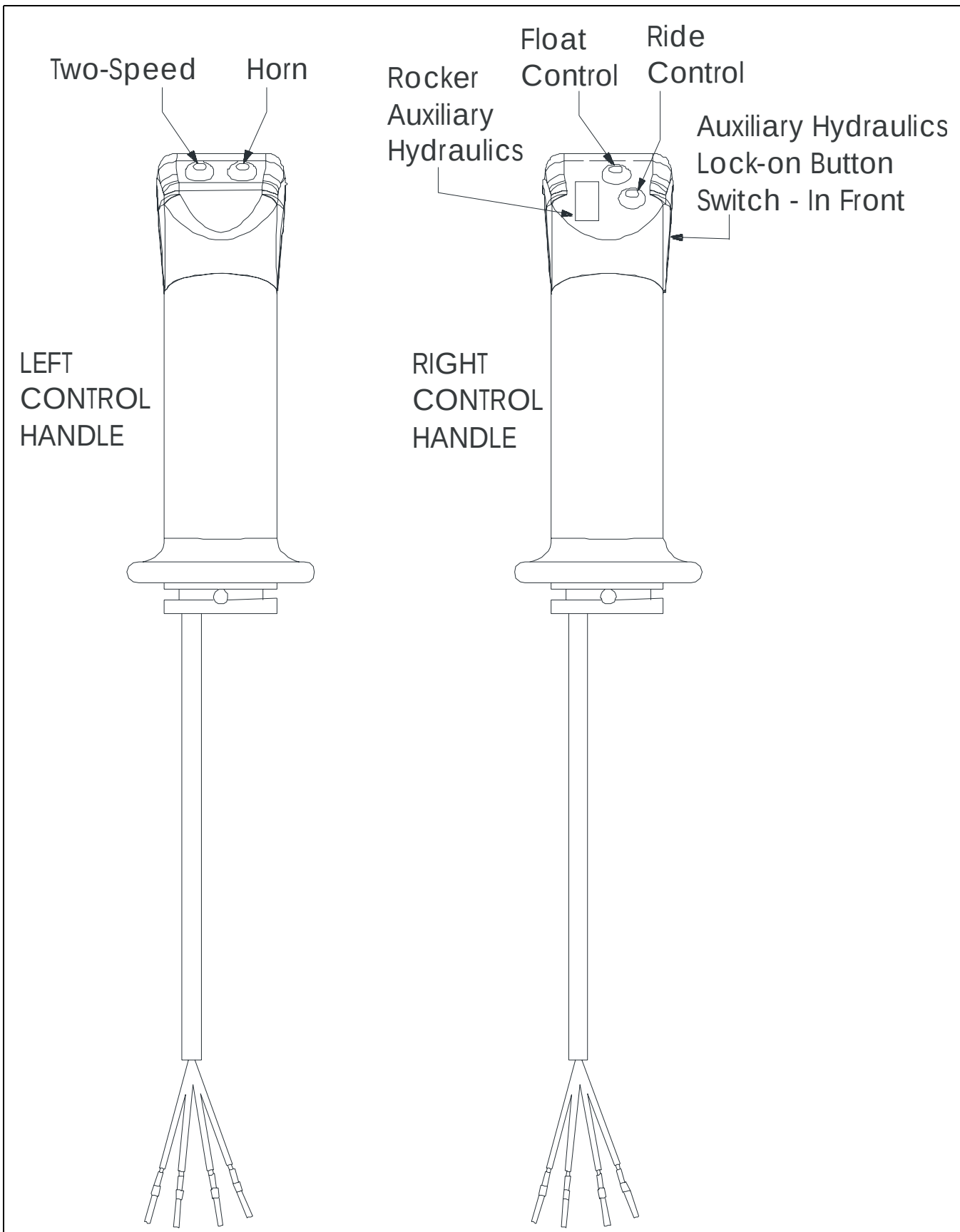
1. BLK GROUND
2. TAN FLOAT LAMP
3. GRY RIDE CONTROL TOGGLE
4. PNK FLOAT SWITCH
5. RED +12VDC
6. WHT LOW/HIGH GEAR TOGGLE
7. BLU RIDE CONTROL LAMP
8. BRN RIDE CONTROL SOLENOID (5 AMP OUTPUT)
9. YEL FLOAT/RIDE SOLENOID (10 AMP OUTPUT)
10. OPERATOR PRESENCE INPUT
11. ORG HIGH GEAR LAMP
12. PUR HIGH GEAR SOLENOID (5 AMP OUTPUT)

MATING CONNECTOR:
DEUTSCH PNB DT06-12S

Two-Speed, Ride Control and Float Module Truth Table

MODULE TRUTH TABLE

ACTION	Low/High Gear Toggle Switch	Ride Control Toggle Switch	Float Momentary Switch	Seat State (Relay Output)	Float/Ride Control Solenoid	Ride Control Solenoid	High Gear Solenoid	Ride Control Lamp	High Gear Lamp	Float Lamp	COMMENTS
At Power Up				0	0	0	0	0	0	0	
Toggle High Gear ON				X			1		1		Momentary press toggles high gear.
Toggle High Gear OFF				X			0		0		
Toggle Ride Control ON				1	1	1		1			Momentary press toggles ride control.
Toggle Ride Control OFF				1	0	0 (after .25 S delay)		0			
Ride Control No Effect				0	0	0		0			Momentary press has no effect. Seat state overrides press.
Activate Float				1	1	0 (after .25 S delay)		0		1	Float is activated only as long as switch is pressed. Lamp blinks at 2 Hz rate. Float control has priority over ride control. If ride control is ON when float is pressed, ride control solenoid has .25 sec OFF delay. Float control solenoid returns to prior state when float deactivated.
Float Hold ON			(hold for 5 sec)	1	1	0		0		1	Lamp blinks at 2 Hz rate for 5 sec, then locks to continuous ON state. Solenoid output locks ON after 5 sec.
Toggle Float OFF				1	Prev State	Prev State		Prev State		0	Momentary press when float hold condition is engaged, causes float/ride sol, ride sol & ride lamp to revert to previous condition and turns off float lamp.
Float No Effect				0	0	0		0		0	Momentary Press Has No Effect. Seat State Overrides Press.
Operator Leaving Seat					0	0 (after .25 S delay)		0 (after .25 S delay)		0	
Operator Taking Seat					0	0		0		0	

Control Handle Actuation Buttons - Two-Speed and Ride Control and Float Module

Seat Switch Removal and Installation

Removal Procedure

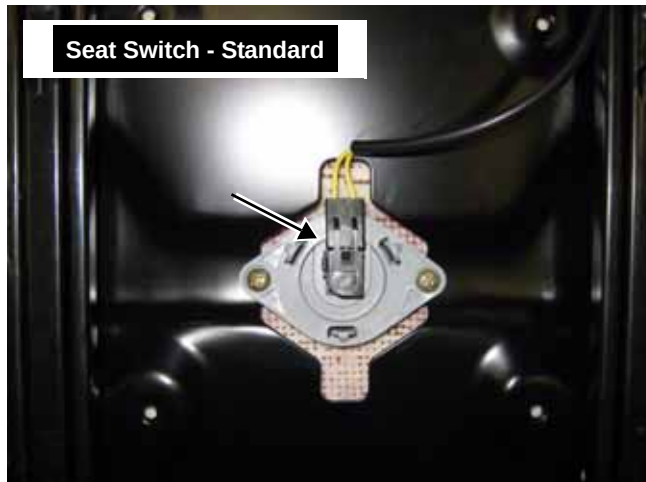
! WARNING

BEFORE beginning this service procedure, perform the following **SAFETY** procedure:

Shut off the engine.

(For detailed instructions, refer to the *Safety* chapter of this manual.)

1. Remove the seat from the skid-steer loader per the procedure found in the *Mainframe* chapter. Turn the seat over.
2. **Standard Seat:** Remove the two Phillips-head screws and nuts securing the seat switch to the seat. Press the three tabs to separate the dome from the base. Press the two tabs to remove the switch from the base.



3. **Deluxe Seat:** Press two tabs, one on each side of seat switch. Push switch through bracket and pull out of seat.



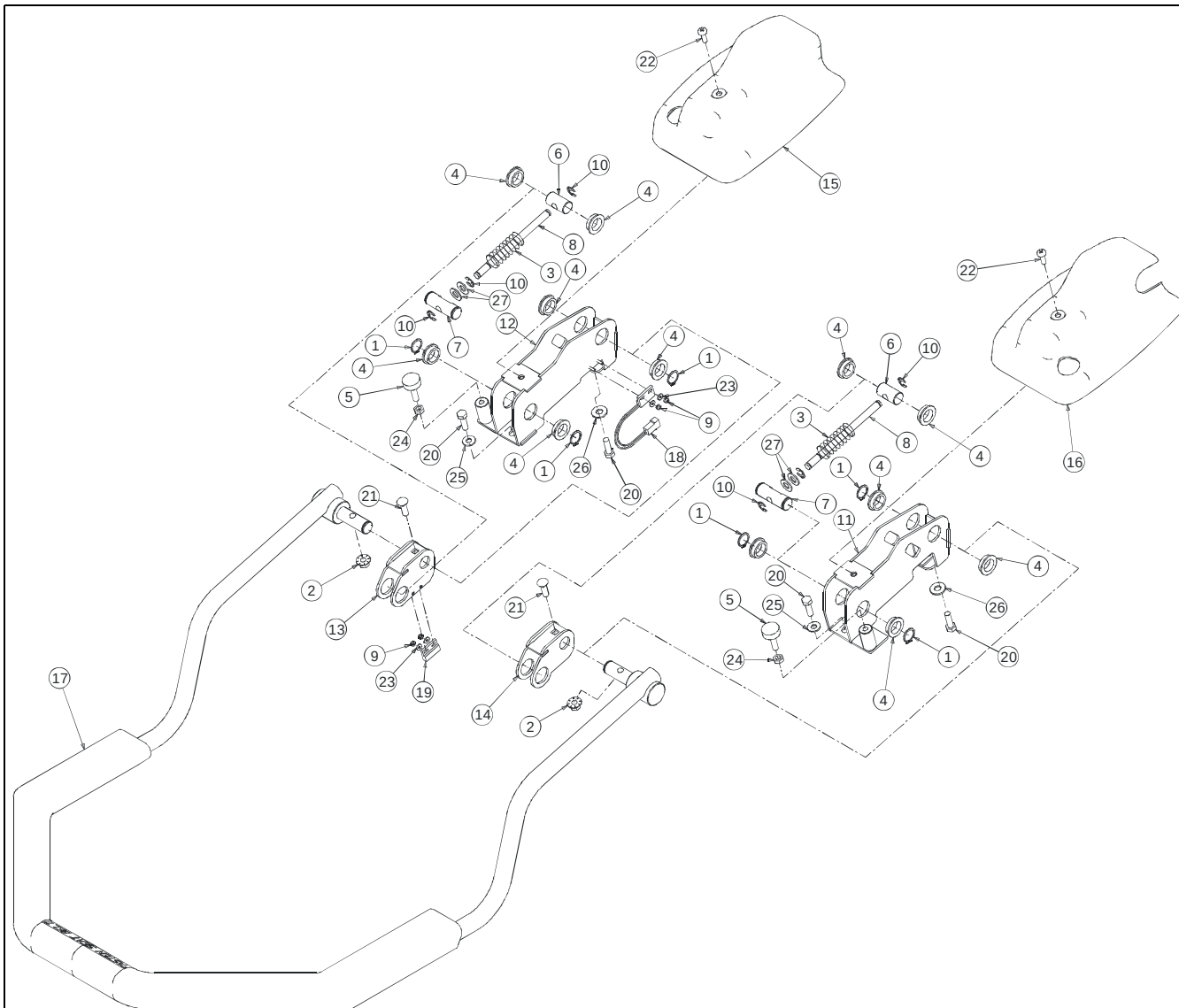
! WARNING

DO NOT attempt to operate the loader without the seat switch installed.

Installation Procedure - Follow all warnings first, then reverse the removal steps*.

* Install seat on loader per the procedure in the *Mainframe* chapter.

Restraint Bar Components



- | | |
|------------------------|------------------------------|
| 1 RING/RETAINING | 15 COVER/RIGHT/RESTRAINT BAR |
| 2 NUT/LOCK | 16 COVER/LEFT/RESTRAINT BAR |
| 3 SPRING/COMPRESSION | 17 BAR/RESTRAINT W/PAD |
| 4 BUSHING/PIVOT | 18 SWITCH/PROXIMITY |
| 5 BUMPER | 19 MAGNET/SWITCH ACTUATOR |
| 6 PIN/PIVOT | 20 SCREW/CAP |
| 7 PIN/PIVOT GROOVED | 21 BOLT/CARRIAGE |
| 8 ROD/SPRING GUIDE | 22 SCREW/PHILLIPS |
| 9 NUT/HEX NYLON INSERT | 23 WASHER/FLAT |
| 10 CLIP/RETAINING | 24 NUT/HEX JAM |
| 11 ASSY/PIVOT BRACKET | 25 WASHER/FLAT |
| 12 BRACKET/PIVOT | 26 WASHER/FLAT |
| 13 ASSY/PIVOT BRACKET | 27 WASHER/FLAT |
| 14 ASSY/PIVOT BRACKET | |

Restraint Bar Switch Removal and Installation

Removal Procedure

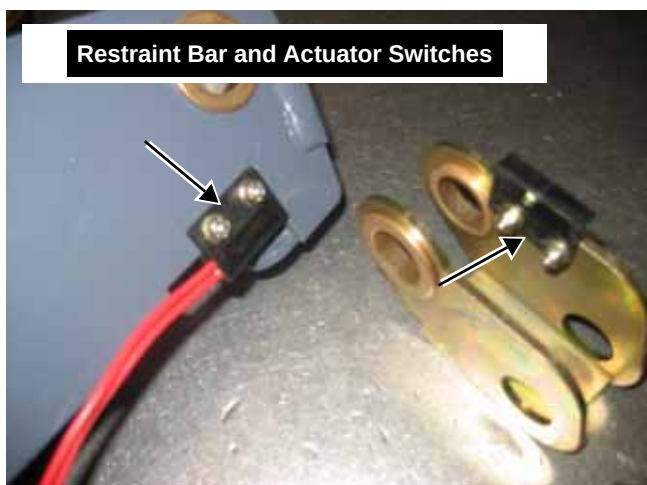
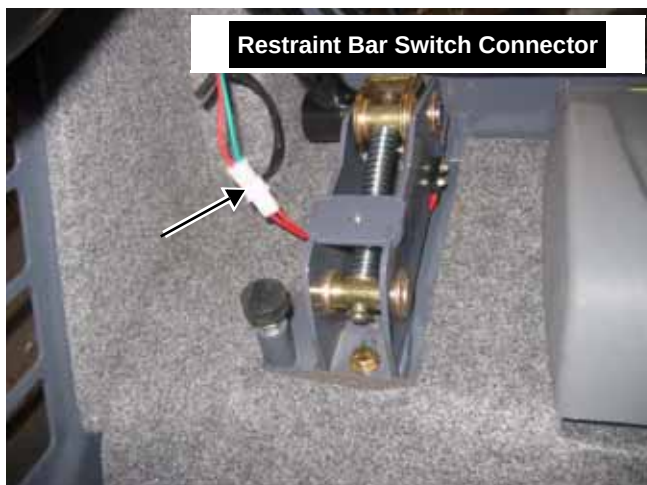
WARNING

BEFORE beginning this service procedure, perform the following **SAFETY** procedure:

Shut off the engine.

(For detailed instructions, refer to the *Safety* chapter of this manual.)

1. Remove the restraint bar assembly per the procedure in the *Mainframe* chapter.
2. Remove the two washers and hex nuts that secure the restraint bar switches to the pivot assembly bracket.



3. Remove the switches from the bracket assembly.



WARNING

DO NOT attempt to operate loader without the restraint bar switch installed.

Installation Procedure - Follow all warnings first, then reverse the removal steps*.

* Adjust position of restraint bar switch and actuator switch so they are aligned with each other when restraint bar is down against the rubber stops.

* Install the restraint bar according to the procedure in the *Mainframe* chapter.

Engine Disconnect Switch - Remote Battery Terminal Removal and Installation

2056 model skid-steer loaders have, as an option, a master electrical disconnect switch located underneath the battery at the rear of the loader.

Removal Procedure



WARNING

BEFORE beginning this service procedure, perform the following **SAFETY** procedure:

Shut off the engine.

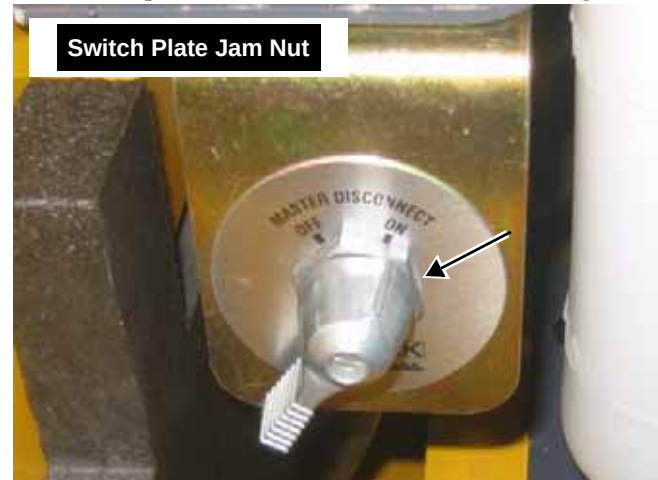
Turn electrical disconnect switch to OFF.

(For detailed instructions, refer to the *Safety* chapter of this manual.)

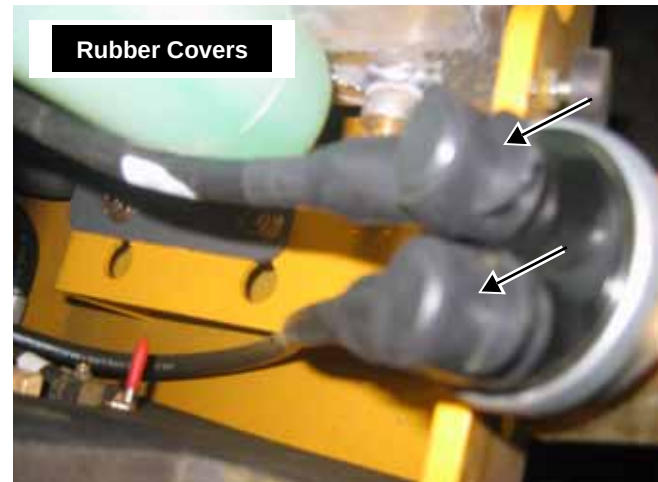
1. Raise the engine access cover and lock open the rear grille.
2. On the switch, find a small screw securing the switch knob to the switch. Remove the screw from the switch and remove the knob.



3. Remove the switch plate jam nut securing the switch plate and the switch into the mounting hole.



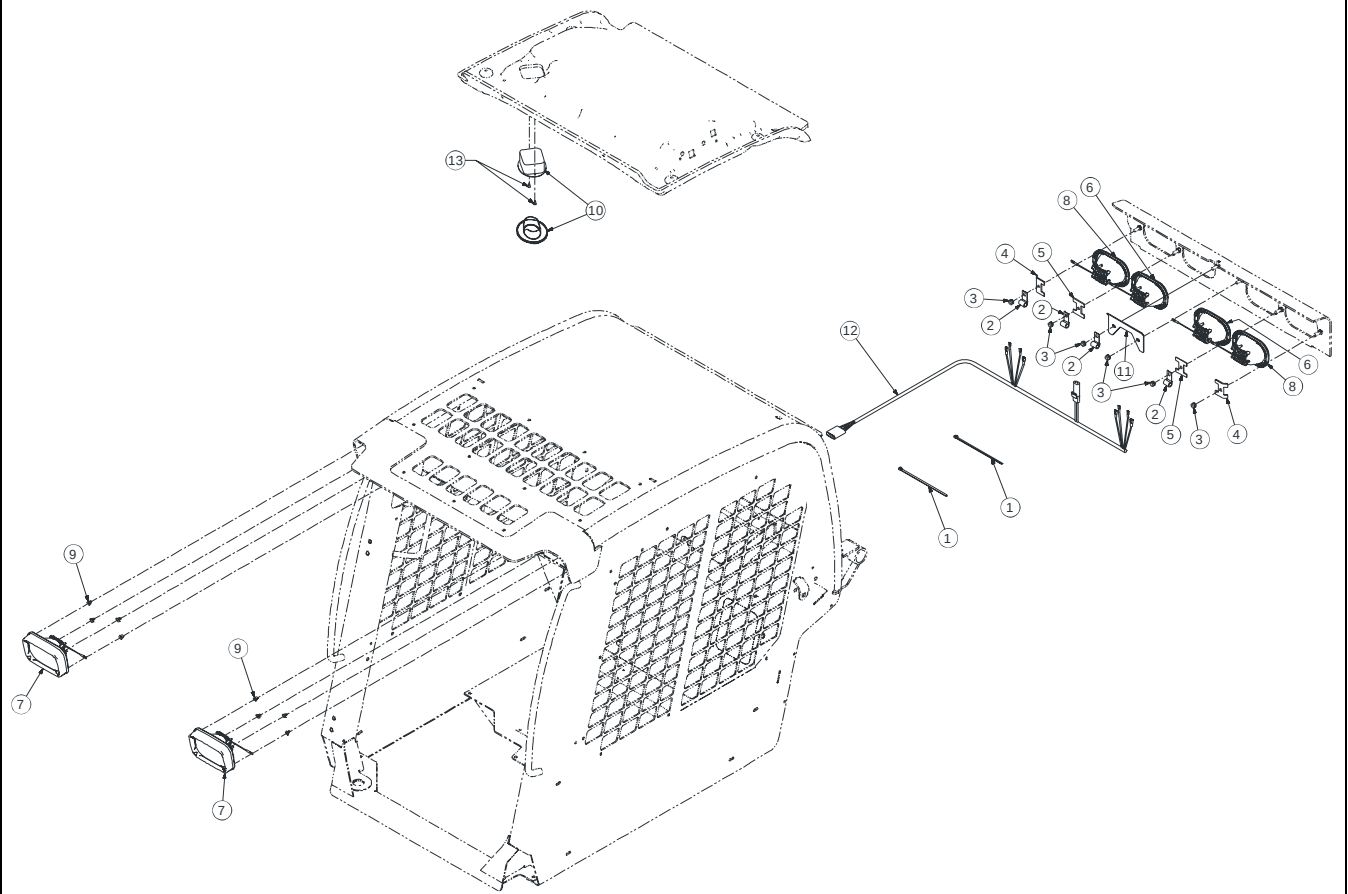
4. Unbolt the capscrews and locknuts securing the disconnect switch to the battery tray.
5. On the back of the disconnect switch, remove the rubber covers on two nuts attaching the cables. Remove the two nuts with a socket wrench. Pull the disconnect switch rearward and out of the skid-steer loader.



NOTE: Keep a record of the cable connections for reinstallation.

Installation Procedure - Follow all warnings first, then reverse the removal steps.

Electrical Lights Components



- 1 TIE/WIRE
- 2 CLAMP/INSULATED HOSE
- 3 NUT/HEX WHIZLOCK
- 4 CLIP/SINGLE
- 5 CLIP/DOUBLE
- 6 LIGHT/WORK
- 7 LAMP/WORK BEZEL

- 8 LIGHT/RED
- 9 GROMMET/PANEL FASTENER
- 10 LIGHT/DOME
- 11 CLIP/MIDDLE
- 12 HARNESS/REAR LIGHTS
- 13 SCREW/PHILLIPS

Front and Rear Work Light Bulb Replacement

Removal Procedure



WARNING

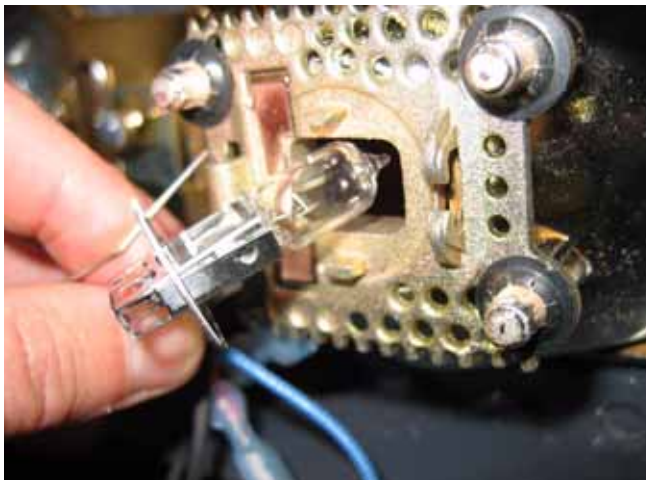
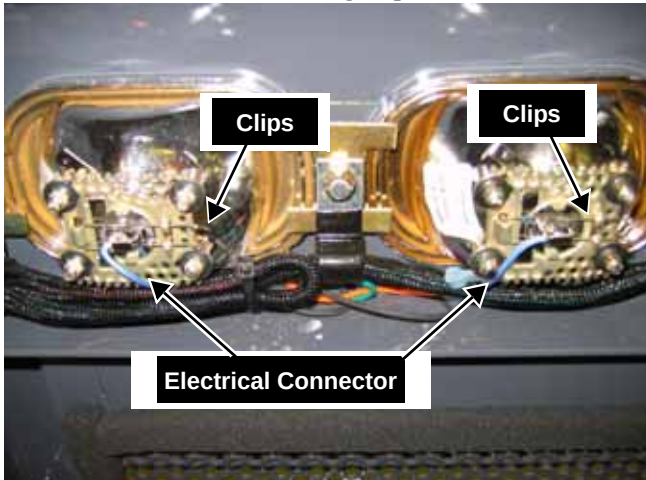
BEFORE beginning this service procedure, perform the following **SAFETY** procedure:

Shut off the engine.

Raise engine cover; lock open the rear grille.

(For detailed instructions, refer to the *Safety* chapter of this manual.)

1. Remove four screws on the front work light and tip forward. Rear work lights are in the rear grille.
2. Detach the electrical connector on the halogen bulbs.
3. Release the bulb retaining clips and remove bulb.



IMPORTANT

Halogen bulbs **SHOULD NOT** be touched with bare fingers; they can fail prematurely. Wear clean gloves or use a clean rag if you must handle the halogen bulbs.

4. Replace the used bulb with a new 55 W H3 bulb.

Installation Procedure - Follow all warnings first, then reverse the removal steps.

Dome Light Bulb Replacement

Removal Procedure



WARNING

BEFORE beginning this service procedure, perform the following **SAFETY** procedure:

Shut off the engine.

(For detailed instructions, refer to the *Safety* chapter of this manual.)

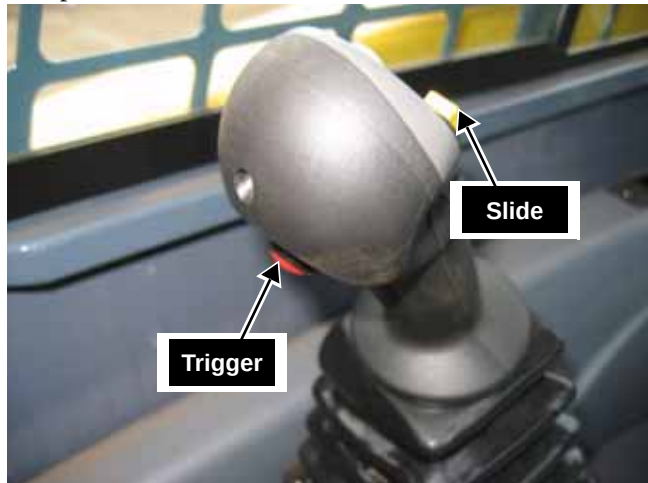
1. Climb into the cab and find dome light assembly on ceiling of the cab.
2. Find the notches and pop the dome light lens cover out of the recessed base with a flat-tipped screwdriver.



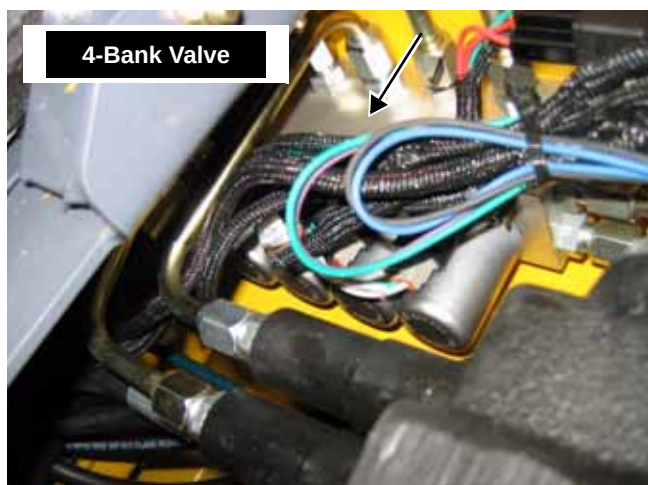
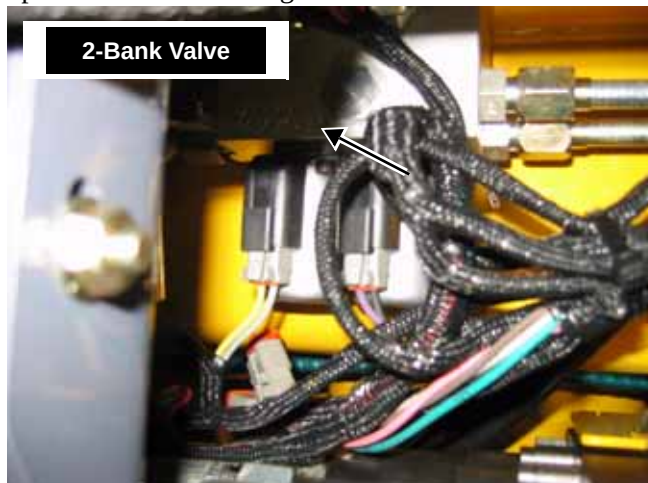
3. Replace the used bulb with a new GE168 bulb.

Electrically-controlled Standard Auxiliary Hydraulic Flow System Test and Operation

The standard auxiliary hydraulics flow is controlled by the slider and trigger switch in the right control handle, except on Hand/Foot and Dual Hand models.



The control handle contains an integrated circuit that controls the signal to two proportional solenoid valves (a 2-bank or 4-bank, see below) located beneath the operator's seat on the right chaincase.



Troubleshooting Test

1. Check connections at the control handle and coils.
2. Be sure that the interlock control module is sending a signal for the auxiliary lock solenoid on the valve body. The standard auxiliary slide and trigger will actuate only with the keyswitch in the "ON" position, the restraint bar down and the seat switched closed.
3. Using a volt/ohm multimeter or a test lamp, probe the two wires going into pin 1 and pin 2 of the solenoid coil. DO NOT disconnect the plug. If the plug is disconnected the controller will shut down.

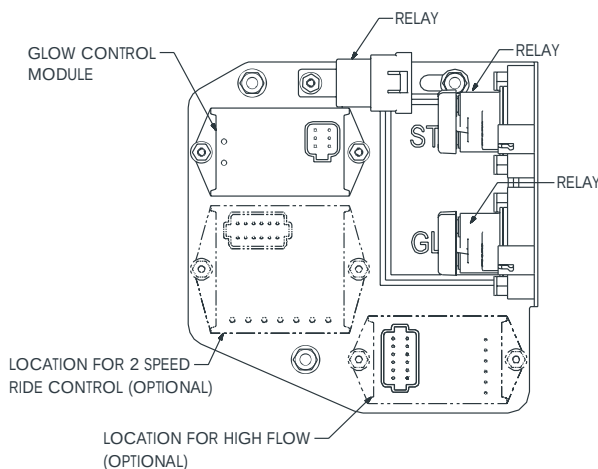
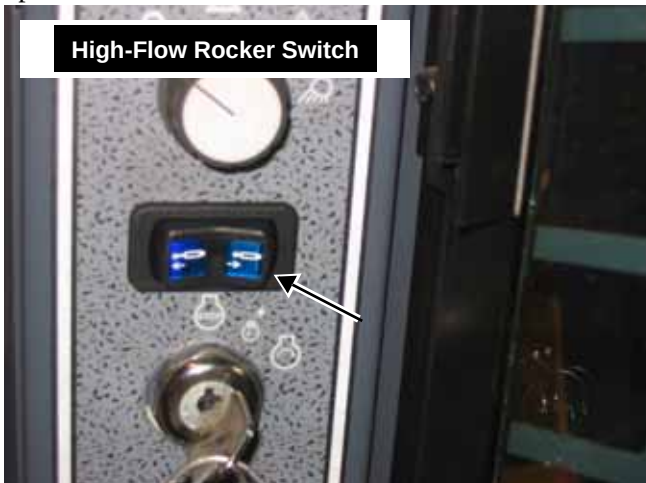


4. The solenoid will actuate only with the keyswitch in the "ON" position, the restraint bar down and the seat switched closed. If the solenoid is unplugged, turn the keyswitch to "OFF", wait two seconds and then turn the keyswitch to the "ON" position to reset the circuit.
5. Monitor the voltage between pin 1 and pin 2 while operating the slider switch. Probe the wires going into pin 1 and 2 of the connector and monitor the voltage. With the help of an assistant, apply pressure to the operator's seat and actuate the slider switch. The voltage should vary between 5.5 volts and 7.0 volts.
6. If performing this test alone, make a test harness to plug in between the chassis harness and the solenoid valve. Sit in the operator's seat and monitor the voltage while actuating the slider switch.
7. The coil resistance can be checked as well and should read 5.4 ohms.

For further assistance with coil function control information, see the chart on page 178.

Electrically-controlled High-Flow Auxiliary Hydraulic Flow System Test and Operation

The high-flow auxiliary hydraulics flow is controlled by a rocker switch (see below) located beneath the light switch in the right instrument panel and a high-flow module (see below) located in the engine compartment on the left riser tower, below the two-speed ride control and float module. The rocker switch contains an integrated circuit that controls the signal to a proportional solenoid valve (2-bank, or 4-bank) located on the right chaincase beneath and to the right of the operator's seat.

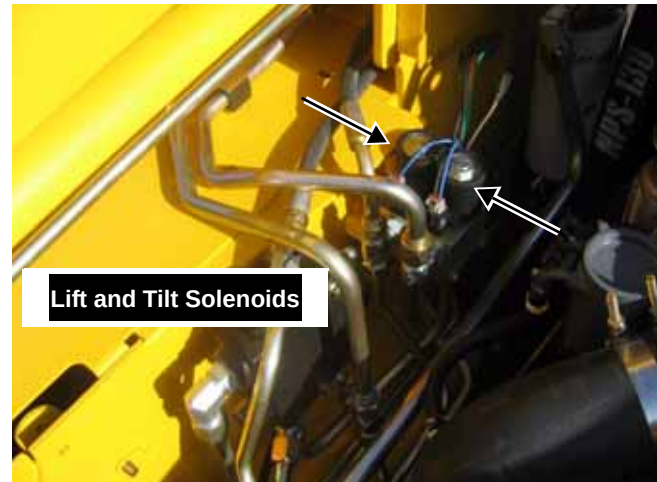


3. Using a test lamp, probe the wire going into pin 1 of the coil. DO NOT disconnect the plug. If the plug is disconnected the controller will shut down.
4. The solenoid will actuate only with the keyswitch in the "ON" position, the restraint bar down and the seat switched closed. If the solenoid is unplugged, turn the keyswitch to "OFF", wait two seconds and then turn the keyswitch to the "ON" position to reset the circuit.
5. With the help of an assistant, apply pressure to the operator's seat and actuate the high-flow switch. The light will be dimmer than normal due to reduced voltage in this circuit.
6. The coil resistance can be checked as well and should read 5.4 ohms.

For further assistance with coil function control information, see the chart on page 178.

Lift and Tilt Solenoid Test and Operation

The lift and tilt control functions are located on the right side of the chassis to the rear of the cab structure. The solenoids are controlled by the interlock control module. When the restraint bar and seat switch are closed, the module sends a 12 VDC signal to the solenoids.

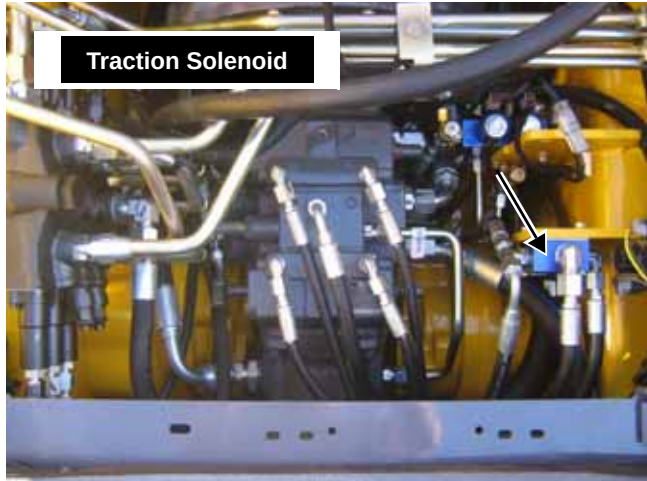


Troubleshooting Test

1. There are indicators on the high-flow module to aid in diagnosis. Have an assistant actuate the rocker switch and monitor the indicators on the module. This will provide direction on what to troubleshoot.
2. Check the electrical connections at the 2- or 4-bank proportional solenoid valve.

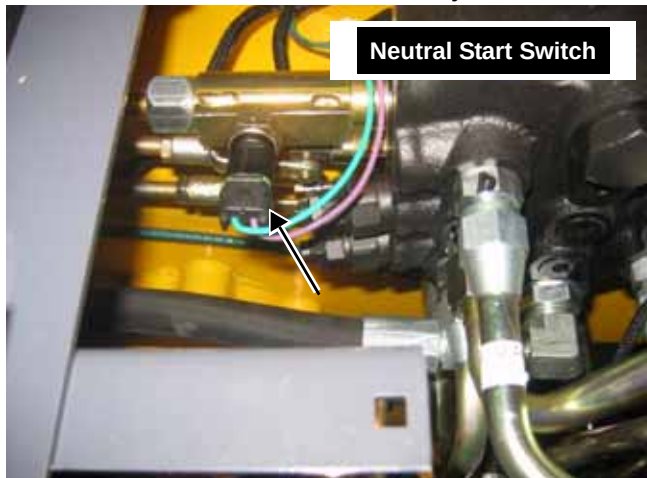
Traction Solenoid Test and Operation

The solenoid valve that supplies oil to the left joystick (wheel drive functions) is located on the left side of the chassis. The solenoid is controlled by the interlock control module. When the restraint bar and seat switch are closed, the module sends a 12 VDC signal to the open solenoid to supply oil to the left joystick control to engage the wheel drive functions.



Auxiliary Neutral Start Switch

The mechanically-operated standard auxiliary control models (Dual Hand and Hand/Foot) have a switch to ensure the start circuit will not function if the standard auxiliary is engaged. The neutral start switch is located on the valve/cable connection assembly.

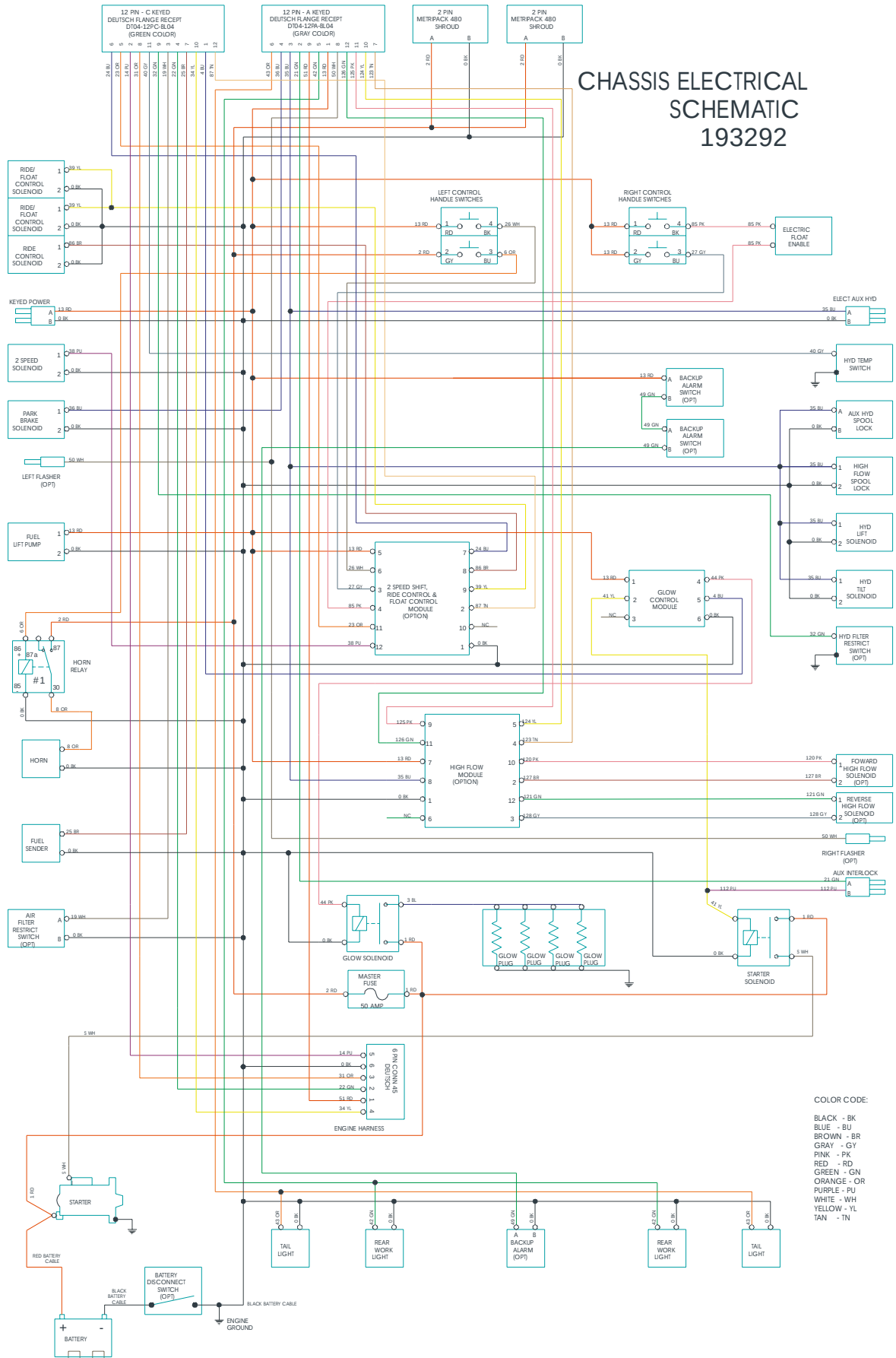


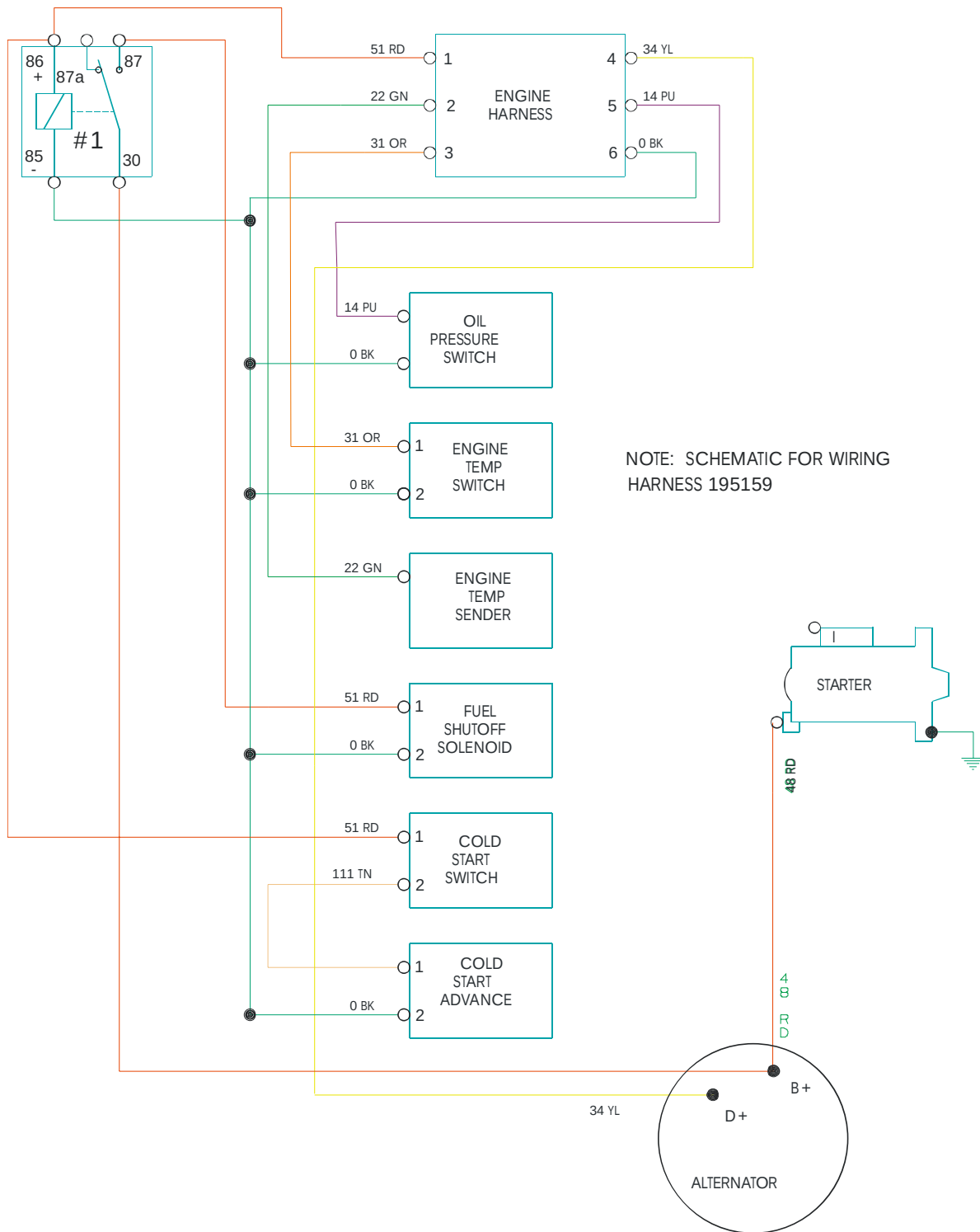
The neutral start switch is open when the auxiliary valve spool is not in the neutral position. Once the auxiliary valve spool is in the neutral position, the switch closes and the signal from the interlock control module to the start solenoid is complete. The restraint bar and seat switch must also be closed for the start solenoid to engage.

NOTES

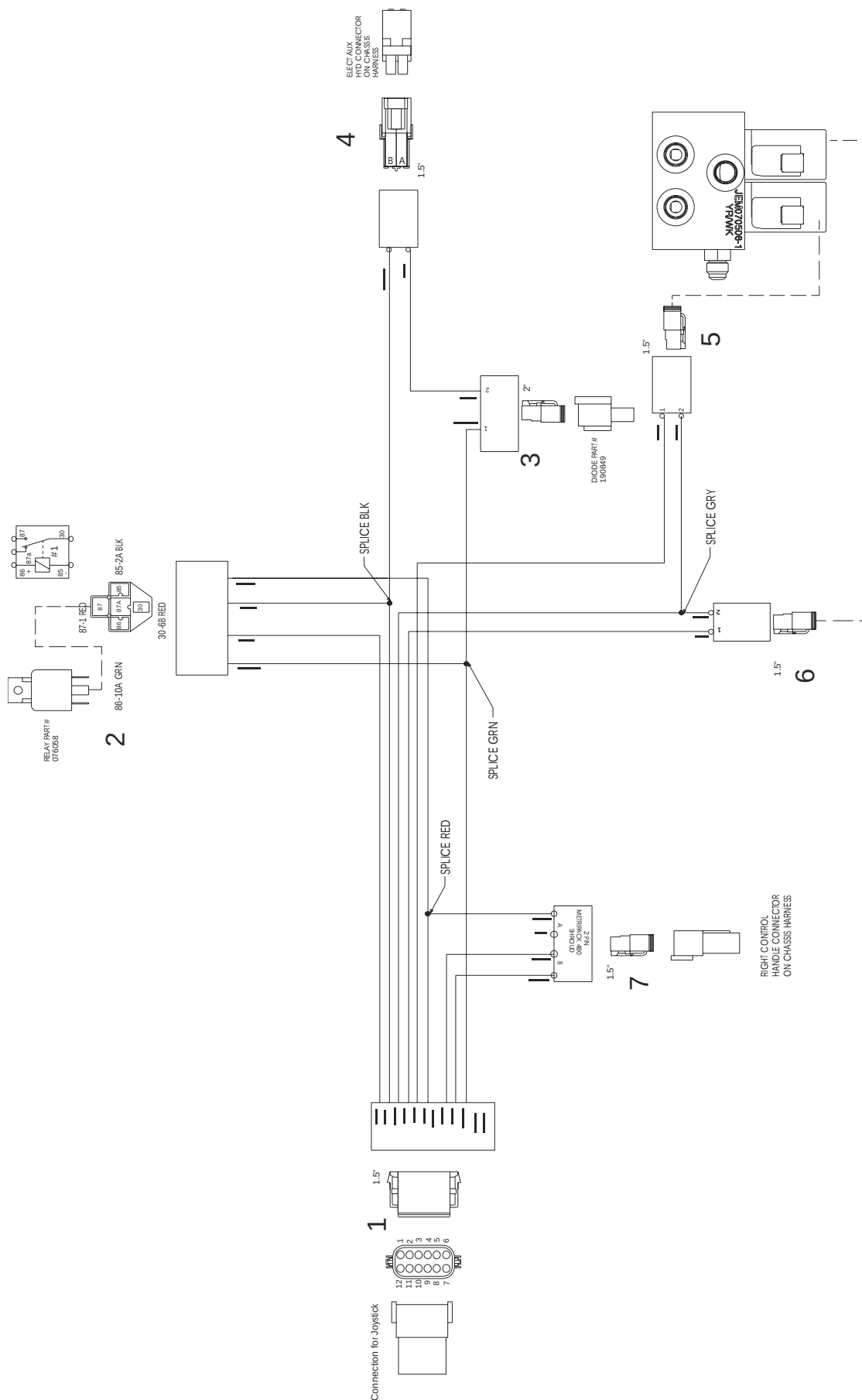
[illegible]

Chassis - Electrical Schematic

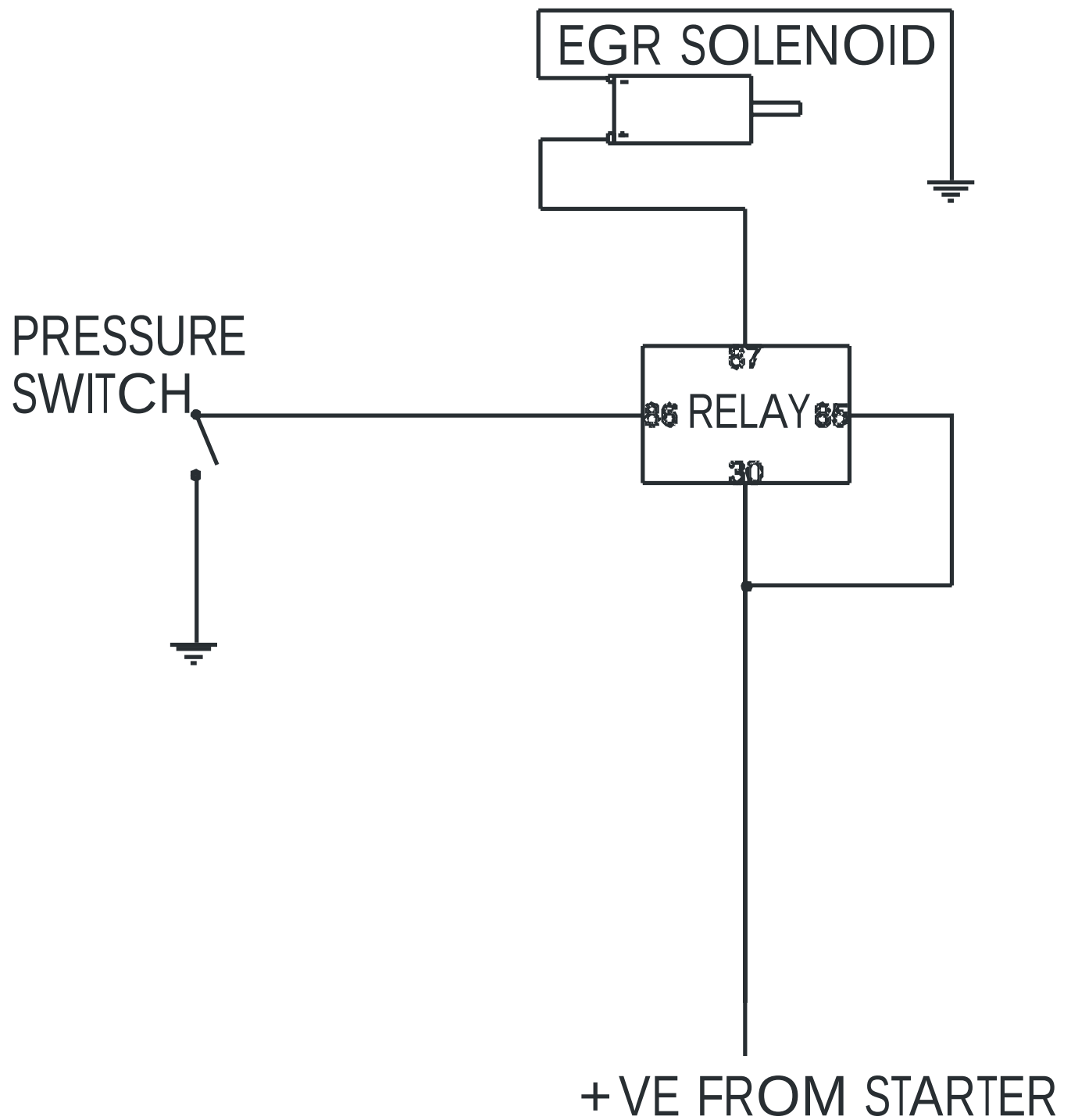


Engine - Electrical Schematic

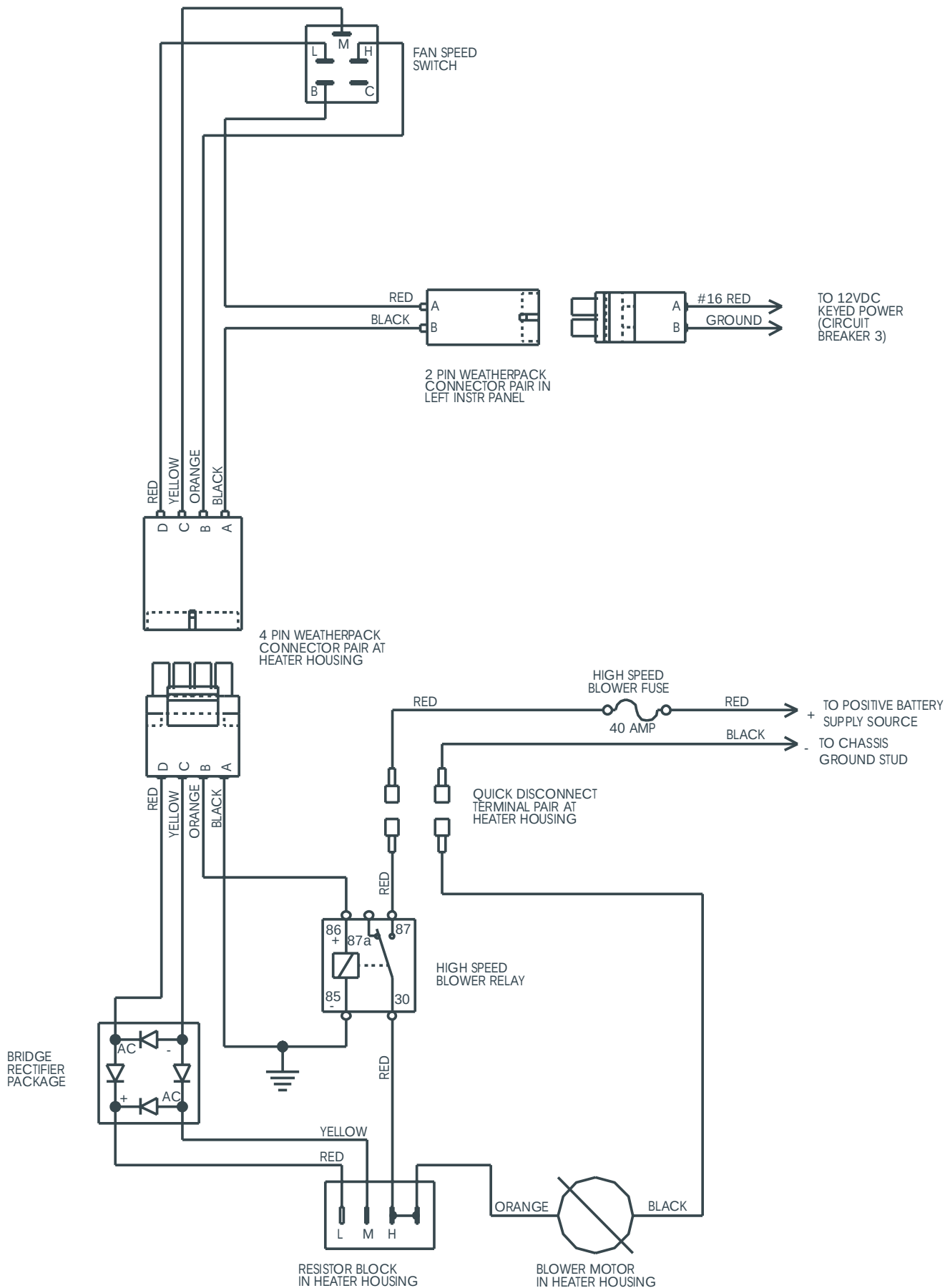
Electrical Auxiliary Schematic



EGR Solenoid - Electrical Schematic



Heater Schematic



Introduction

This chapter covers troubleshooting, removal, installation, and adjustment procedures for engine components on Mustang 2056 skid-steer loaders. The primary engine system components are shown on the following pages.

They are equipped with a Deutz model TD2009L04 turbocharged diesel engine. The four-cylinder engine is 140 cubic inch (2,29 L) displacement engine with an 17:1 compression ratio. The direct injection four-stroke engine has a firing order of 1, 3, 4, 2.

A “full-flow” remote oil filter is used in the lubrication system. As with any engine, clean oil, fuel and air are critical to satisfactory performance and long engine life. If properly maintained, this engine can be expected to provide thousands of hours of trouble-free operation.

When ordering engine parts, always check the Mustang Parts Manual to see if a special part has been fitted to the engine. If Mustang parts are required, they can be ordered from Mustang Manufacturing Company.

Troubleshooting Guide

The following troubleshooting guide lists potential engine problems, as well as possible causes and remedies, for Mustang 2056 skid-steer loaders.

When a problem occurs, don't overlook simple causes. A malfunction could be caused by something as simple as an empty fuel tank. After a mechanical failure has been corrected, be sure to locate the cause of the problem. For further troubleshooting information, refer to the engine manufacturer's manual.

Troubleshooting Guide

Problem	Possible Cause	Remedy
Starter will not engage when keyswitch is turned to “START”	Seat or restraint bar switch malfunctioning or not activated	Replace switches as needed.
	Poor connections to starter relay in instrument panel	Verify relay connections.
	Faulty starter relay in panel	Test starter relay. Replace as needed.
	Battery terminals or cables are loose or corroded	Clean battery terminals and cables and tighten them.
	Battery discharged or defective	Recharge or replace battery.
	Starter solenoid in chassis malfunctioning	Troubleshoot circuit per wiring diagram to locate trouble. Replace starter solenoid.
	Ignition wiring, seat switch, restraint bar switch, etc. loose or disconnected	Check wiring for poor connections, broken leads; repair wiring or connection.
	Starter or pinion faulty	Remove starter; repair or replace as needed.
	Faulty connections to Interlock Control Module	Check diagnostic lights on Interlock Control Module for proper inputs.
	Mechanical auxiliary pedal not in NEUTRAL position	Ensure pedal is in NEUTRAL position. Neutral switch located on main control valve. Replace switch as needed.

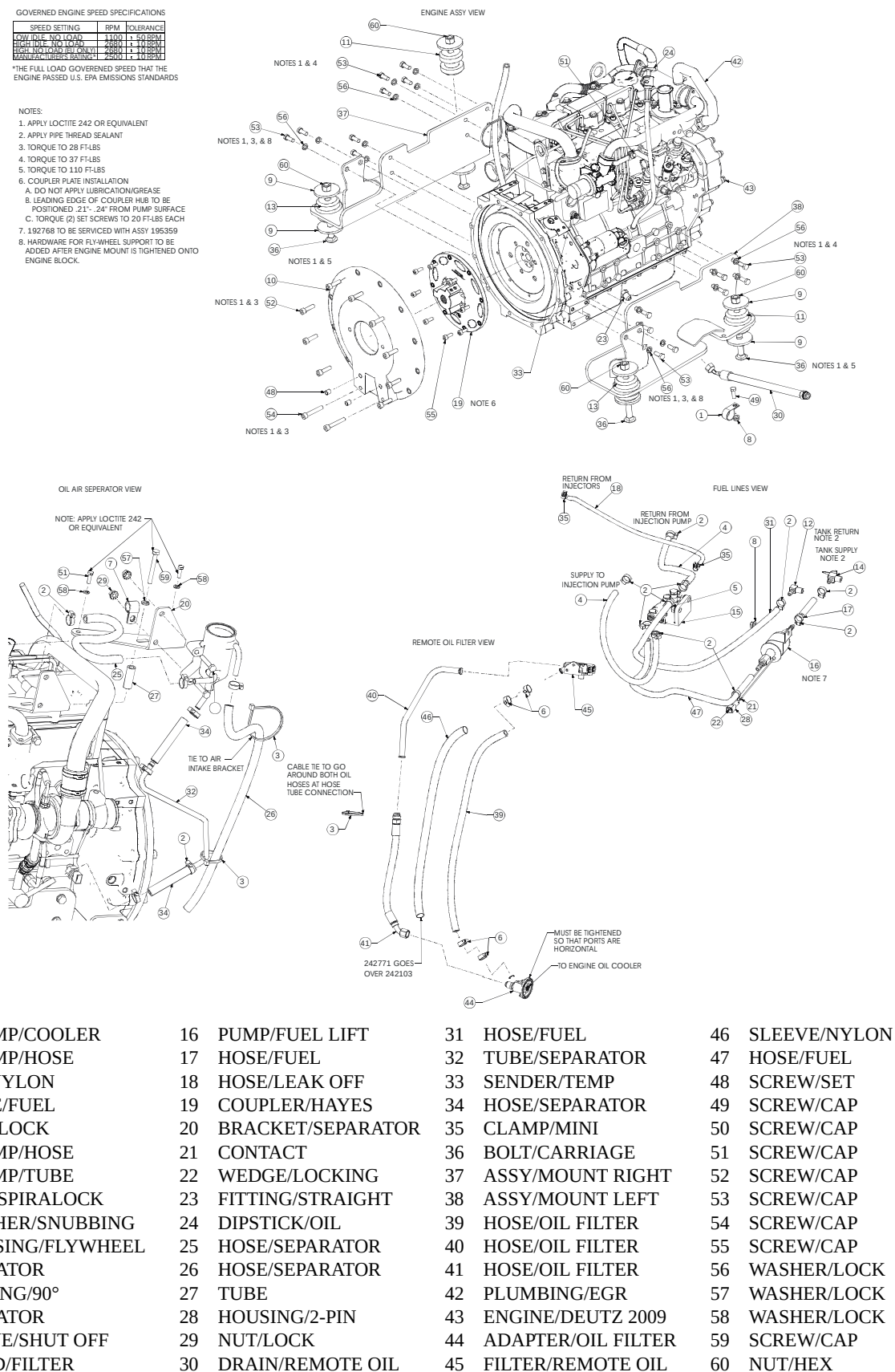
Troubleshooting Guide

Problem	Possible Cause	Remedy
Engine turns over but will not start	Engine cranking speed too slow	Battery requires recharging or replacing, or, in cold temperatures, pre-warm the engine.
	Fuel tank empty or faulty fuel gauge sender	Refill fuel tank. Replace fuel gauge sender.
	Glow module malfunctioning	Check connection and voltage; replace as needed.
	Fuel shutoff solenoid not energizing	Check electrical connections and voltage to shutoff solenoid.
	Engine oil not warm enough	Cycle glow plug; check glow plug wiring connections
	Ambient temperature too low	Install a block heater.
	Fuel pump not working	Refer to engine manual or contact Mustang Service.
	Moisture in the fuel line	Bleed water out of fuel filter and fuel tank.
	High-flow or auxiliary valve engaged	Return the control valve to NEUTRAL.
Engine overheats	Crankcase oil level too low or too high	Add or remove oil as required.
	Engine overloaded	Reduce operating load.
	Fan air circulation blocked or restricted	Turn engine OFF, wait for fan to stop, remove blockage or restriction.
	Fan shroud improperly positioned	Perform "Fan Shroud Adjustment" procedure in this chapter.
	Grade of oil improper or excessively dirty	Drain and replace with clean oil of proper grade.
	Exhaust restricted	Allow exhaust to cool and remove the restriction.
	Air filter restricted	Replace the filter(s).
	Oil cooler flow restricted	Flush cooler inside and out.

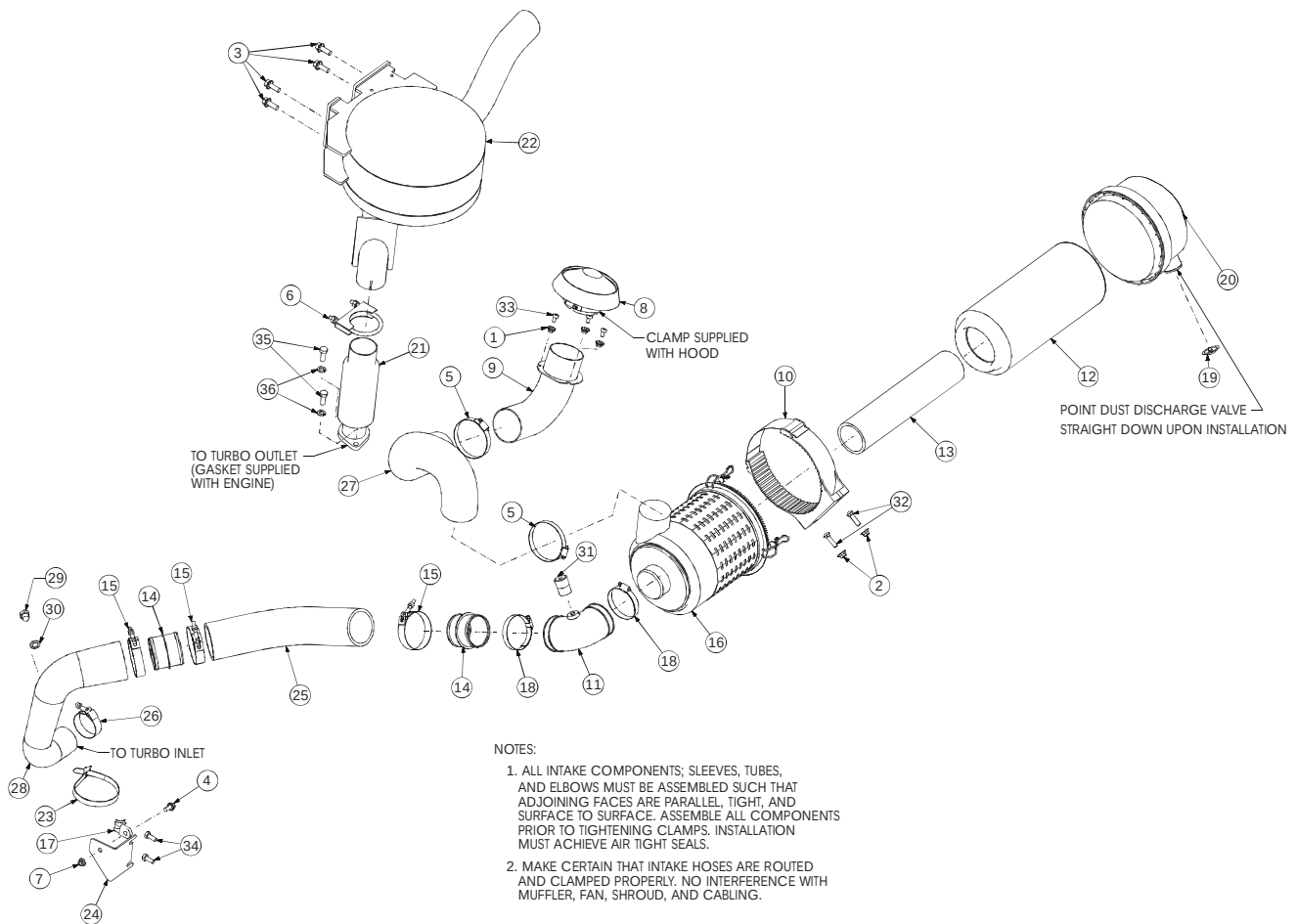
IMPORTANT

DO NOT attempt to service or repair major components, such as the fuel injector pump, unless authorized to do so by your Mustang dealer. Any unauthorized repair will void the warranty.

Engine Components

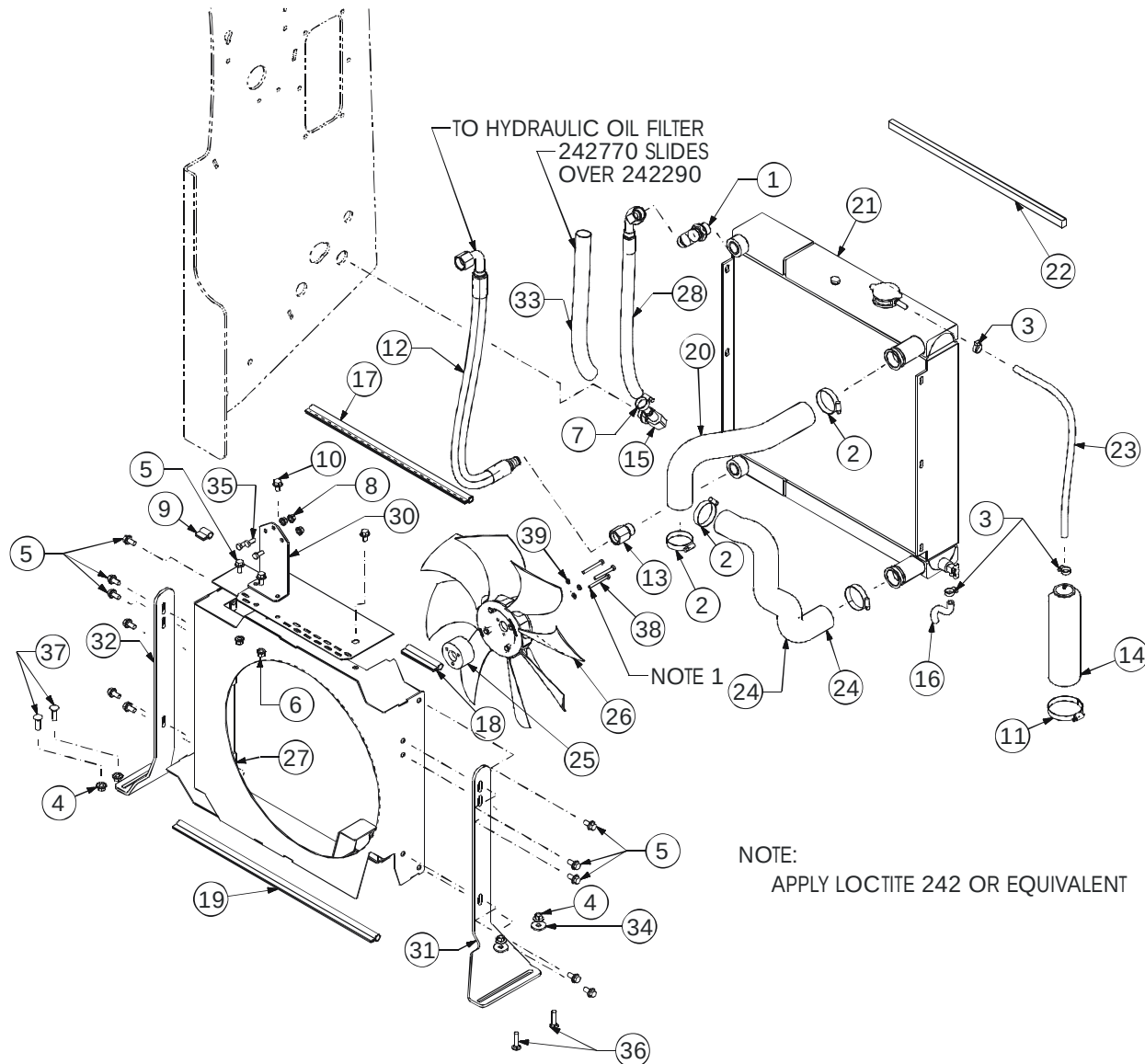


Air Cleaner and Exhaust Components



- | | |
|-----------------------------|--------------------------------|
| 1 NUT/LOCK | 19 VALVE/VACUATOR |
| 2 NUT/LOCK | 20 END CAP/AIR CLEANER |
| 3 SCREW/CAP | 21 TUBE/EXHAUST |
| 4 SCREW/CAP | 22 MUFFLER |
| 5 CLAMP/HOSE | 23 TIE/NYLON ZIP |
| 6 CLAMP/MUFFLER | 24 BRACKET/INTAKE TUBE SUPPORT |
| 7 NUT/SPIRALOCK | 25 INTAKE/MOLDED HOSE |
| 8 HOOD/AIR INLET | 26 CLAMP/T-BOLT |
| 9 TUBE/FLANGED 90° | 27 HOSE/AIR INTAKE |
| 10 CLAMP/AIR CLEANER | 28 HOSE/TURBO PORT |
| 11 ELBOW/90° | 29 PLUG/METRIC |
| 12 FILTER ELEMENT/PRIMARY | 30 SEAL/METRIC BONDED |
| 13 FILTER ELEMENT/SECONDARY | 31 GAUGE/RESTRICTION |
| 14 COUPLING/INTAKE HOSE | 32 BOLT/CARRIAGE |
| 15 CLAMP/T-BOLT | 33 SCREW/MACHINE |
| 16 ASSY/AIR CLEANER | 34 SCREW/CAP |
| 17 MOUNT/HOSE CLAMP | 35 SCREW/CAP |
| 18 CLAMP/HOSE | 36 WASHER/LOCK |

Radiator/Cooler Components



- | | | |
|------------------|------------------------|---------------------------|
| 1 FITTING/90° | 14 BOTTLE/OVERFLOW | 27 ASSY/SHROUD |
| 2 CLAMP/HOSE | 15 FITTING/90° | 28 HOSE |
| 3 CLAMP/HOSE | 16 HOSE/DRAIN | 29 COVER/OIL FILTER MOUNT |
| 4 NUT/LOCK | 17 SEAL/SHROUD | 30 BRACKET/OIL FILTER |
| 5 SCREW/CAP | 18 SEAL/BULB | 31 BRACKET/COOLER MOUNT |
| 6 NUT/LOCK | 19 SEAL/BULB | 32 BRACKET/COOLER MOUNT |
| 7 CLAMP/HOSE | 20 HOSE/RADIATOR | 33 SLEEVE/NYLON |
| 8 NUT/SPIRALLOCK | 21 COOLER | 34 WASHER |
| 9 SEAL/SHROUD | 22 SEAL/FOAM | 35 SCREW/CAP |
| 10 SCREW/CAP | 23 HOSE/FUEL | 36 BOLT/CARRIAGE |
| 11 CLAMP/HOSE | 24 HOSE/LOWER RADIATOR | 37 BOLT/CARRIAGE |
| 12 HOSE/PRESSURE | 25 SPACER/FAN | 38 SCREW/CAP |
| 13 ADAPTER | 26 FAN | 39 WASHER/LOCK |

Remote Oil Filter Element Removal and Installation

The remote engine oil filter, above and right of the radiator cooler, is attached high to the right side of the engine compartment, behind and below the muffler.



WARNING

BEFORE beginning this service procedure, perform the following **SAFETY** procedures:

Shut off the engine and allow to cool.

(For detailed instructions, refer to the *Safety* chapter of this manual.)

Removal Procedure

1. Open the engine access cover and the rear grille. Lock the grille open with the latch pin on the grille's lower pivot area.
2. On the right side of the engine compartment, locate the remote oil filter element.



3. Clean area around oil filter element.

4. Place a suitable container beneath the oil filter mount assembly to catch any leaking oil.



5. Turning counterclockwise, loosen oil filter element with a filter wrench.
6. Turn filter element by hand until it is free of oil filter head.



Installation Procedure

1. Clean oil filter mating surface of any debris before installing new element.
2. Apply a thin film of oil to seal on filter element before installing.
3. Hand-tighten filter element, turning it clockwise, until gasket contacts filter mating surface, then turn element another 3/4 turn to seat gasket.
4. If old oil has been removed, fill crankcase with 8.5 qts. (8,0 L) of oil. (See *Lubrication* chapter.)
5. Start engine and check for leaks near oil filter. Shut off engine, recheck oil level, and fill as needed.

Air Cleaner Assembly Removal and Installation

Removal Procedure

! WARNING

BEFORE beginning this service procedure, perform the following **SAFETY** procedure:

Shut off the engine and allow to cool.

(For detailed instructions, refer to the *Safety* chapter of this manual.)

1. Open the engine access cover and rear grille.
2. Clean area around the hose connections.
3. At the front of the air cleaner assembly, loosen the hose clamp securing the 90° elbow to the assembly and pull the elbow away from the air cleaner.



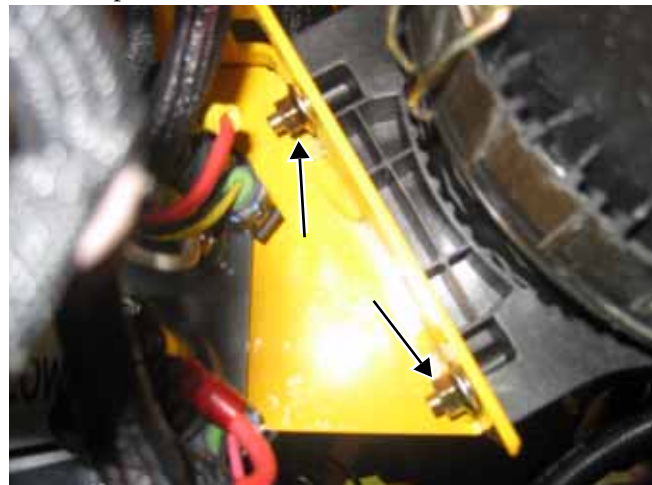
4. Loosen the hose clamp on the air intake hose and pull the hose off the air cleaner assembly. Cover air cleaner hose opening to prevent contamination.



5. Release the air cleaner clamp to release the air cleaner canister.



6. Remove two capscrews and locknuts on filter clamp attached to filter bracket.



Installation Procedure - Follow all warnings first, then reverse the removal steps.

Air Filter Element Removal and Installation

Service the air filter element when the restriction gauge shows in the red zone. The red zone indicates a clogged air filter. If the gauge shows red with the engine stopped, replace the air filter element. After fitting a clean element, push the gauge reset button.

Removal Procedure



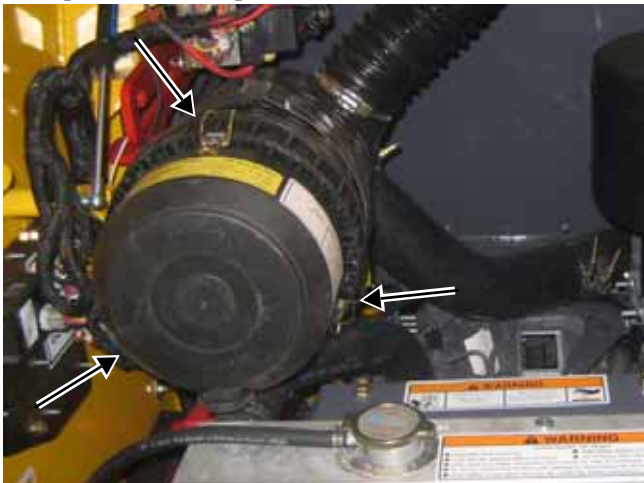
WARNING

BEFORE beginning this service procedure, perform the following **SAFETY** procedure:

Shut off the engine and allow to cool.

(For detailed instructions, refer to the *Safety* chapter of this manual.)

1. Open the engine access cover and lock open the rear grille.
2. Release the three spring clips securing the end cap and remove the end cap. Clean out any dirt build-up in the end cap.



3. Pull the primary and secondary air filters from the air cleaner assembly.



4. Replace both air filter elements, if needed. (See *Service* chapter of the Operator's Manual.)
5. Check the condition of the dust ejector.

Installation Procedure - Follow all warnings first, then reverse the removal steps.*

* Clean the radial seal surfaces of the mating plastic body.

Battery and Battery Tray Removal and Installation

Removal Procedure



WARNING

BEFORE beginning this service procedure, perform the following **SAFETY** procedure:

Shut off the engine and allow to cool.

(For detailed instructions, refer to the *Safety* chapter of this manual.)



WARNING

Review the following safety considerations before working on or around the battery:

Keep sparks and flames away from battery. Gas given off by the battery's electrolyte solution is extremely explosive.

Avoid contact with battery electrolyte; wash off any electrolyte immediately.

Wear safety glasses when working near battery.

Do not tip battery more than 45° to avoid spilling electrolyte solution.

To avoid injury from spark or short circuit, disconnect negative (-) battery cable before servicing electrical system.

1. Open the engine access cover and lock open the rear grille to access the battery connections.

2. First, disconnect and remove the negative (-) battery cable and then disconnect the positive (+) battery cable from the battery.



3. Remove the two locknuts from the battery clamp rods and the hold-down battery angle.



4. Remove the hose clamp securing the plastic coolant overflow bottle to the battery tray and position it out of the way.



5. Lift the battery rearward and out of the chassis.

6. If equipped with an engine disconnect switch, refer to its removal procedure in the *Electrical System* chapter of this manual.
7. Remove three capscrews securing the battery tray to the chassis.

Installation Procedure - Follow all warnings first, then reverse the removal steps.

Starter Removal and Installation

For wiring connections to the starter and solenoid, refer to the *Electrical System* chapter of this manual.

Removal Procedure



WARNING

BEFORE beginning this service procedure, perform the following **SAFETY** procedures:

Raise lift arm; engage lift arm support device.

Shut off the engine.

Tilt back ROPS/FOPS until lock engages.

(For detailed instructions, refer to the *Safety* chapter of this manual.)

1. Disconnect and remove the negative (-) battery cable from the battery.
2. On the starter solenoid, remove the nut that secures the positive (+) battery cable and two smaller wires.



3. Remove the two capscrews securing the starter to the engine.



4. Remove the starter from the engine.

Installation Procedure - Follow all warnings first, then reverse the removal steps.

Exhaust Assembly Removal and Installation

Removal Procedure

WARNING

BEFORE beginning this service procedure, perform the following **SAFETY** procedures:

Lower the lift arm completely.

Shut off the engine and allow to cool.

(For detailed instructions, refer to the *Safety* chapter of this manual.)

1. Open the engine access cover and lock open the rear grille.
2. Loosen the muffler clamp securing the muffler to the exhaust tube.



3. Inside the right riser, loosen the two top capscrews and remove the two bottom capscrews securing the muffler to the right riser.



4. Lift the muffler up and pull the top capscrews out of the larger hole openings and remove the muffler.

Installation Procedure - Follow all warnings first, then reverse the removal steps.*

*Tighten the mounting hardware only after checking the alignment of the exhaust assembly so that the tailpipe is centered in the opening on the engine cover when closed.

Fan Belt Adjustment

Adjustment Procedure

WARNING

BEFORE beginning this service procedure, perform the following **SAFETY** procedure:

Shut off the engine and allow to cool.

(For detailed instructions, refer to the *Safety* chapter of this manual.)

1. Open the engine access cover and lock open the rear grille.
2. Test the fan belt tension by pushing on the belt midway between the alternator and the engine crankshaft pulley. The belt should deflect about ½" (13 mm) under a load of 20 lbs. (90 N). If adjustment is needed, follow the steps below.



3. Loosen the two bolts on the alternator, one at the low pivot area and one on top in the slide bracket.



4. Rotate the alternator in a clockwise direction (viewed from the engine end) until the correct belt tension is achieved.
5. Retighten the bolts.

Radiator/ Oil Cooler Removal and Installation

The radiator/oil cooler is mounted on a shroud located just behind the engine.

Removal Procedure



WARNING

BEFORE beginning this service procedure, perform the following **SAFETY** procedure:

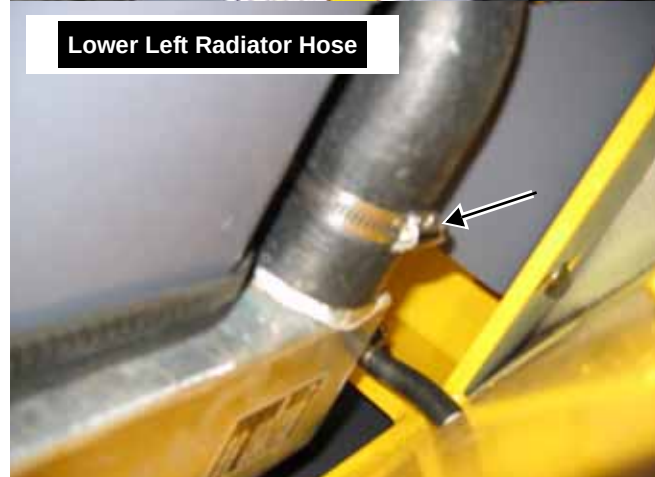
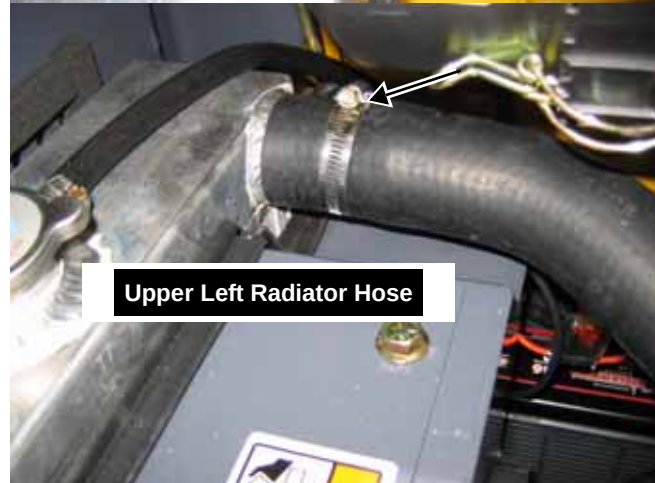
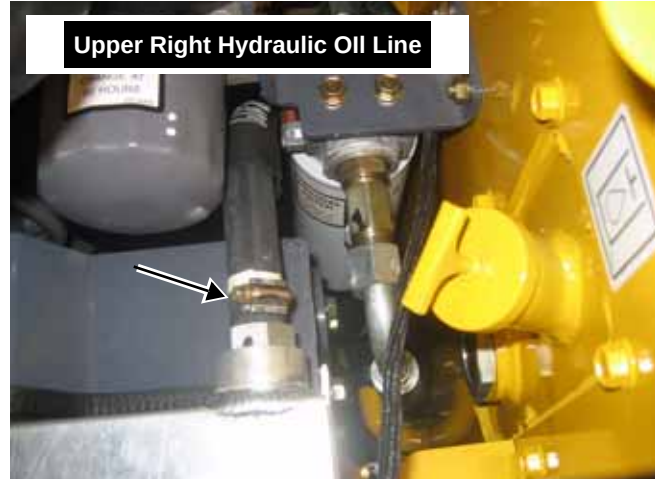
Shut off the engine and allow to cool.

(For detailed instructions, refer to the *Safety* chapter of this manual.)

1. If necessary, drain the oil from the hydraulic reservoir per the procedure in the *Lubrication* chapter.
2. If necessary, drain the engine coolant from the radiator per the procedure in the *Lubrication* chapter.

NOTE: Hydraulic hoses should be plugged to prevent contaminants from entering the hydraulic system. If the hydraulic hoses are plugged after removal to prevent oil leakage, it should not be necessary to drain the hydraulic reservoir.

3. Open the engine access cover and lock open the rear grille.
4. Remove coolant hoses and hydraulic oil lines from the inlets and outlets of the radiator/oil cooler. Disconnect the hose clamps on the two left radiator hoses and the right upper hydraulic oil line.

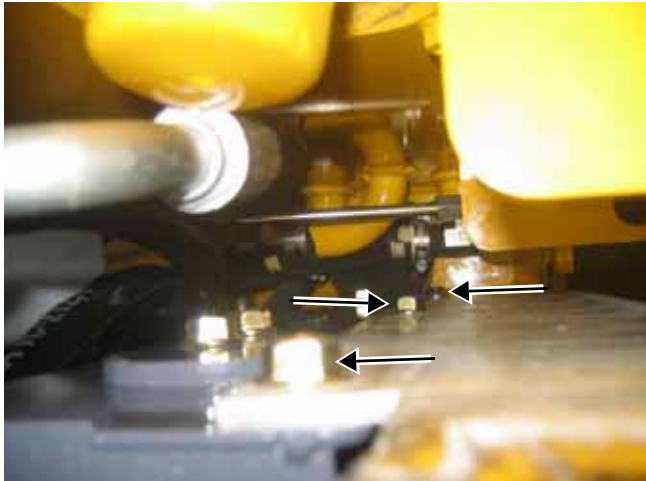


5. Put a wrench on the lower right hydraulic oil line and disconnect it from the radiator/oil cooler.

6. Remove remote radiator overflow line at the top of the radiator.



7. Remove three locking capscrews on each side securing the radiator/oil cooler to the shroud.



8. Using a suitable hoist, remove the radiator/oil cooler from the skid-steer loader.



Installation Procedure - Follow all warnings first, then reverse the removal steps.



WARNING



NEVER use your hands to search for hydraulic fluid leaks. Use a piece of cardboard or paper. Escaping fluid under pressure can be invisible and penetrate the skin causing serious injury. If any fluid is injected into your skin, see a doctor at once. Injected fluid **MUST** be surgically removed by a doctor familiar with this type of injury or gangrene may result.



WARNING



ALWAYS wear safety glasses when checking for hydraulic fluid leaks. Escaping fluid under pressure can be invisible and can cause permanent eye-sight damage if safety glasses are not worn.

9. **ALWAYS** check for hydraulic fluid leaks after installing any components of the hydraulic system.

Fan Shroud and Radiator/Oil Cooler Mounting Brackets Removal and Installation

Removal Procedure



WARNING

BEFORE beginning this service procedure, perform the following **SAFETY** procedure:

Shut off the engine and allow to cool.

(For detailed instructions, refer to the *Safety* chapter of this manual.)



WARNING

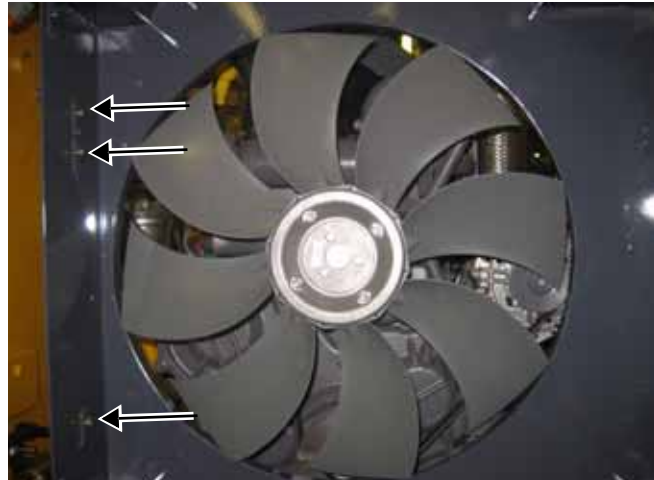
DO NOT attempt to service any part of radiator/oil cooler system until engine has been allowed to cool. Serious injury may result from high temperature oil or water coolant or high pressure.

1. Remove the hydraulic reservoir drain plug and drain the hydraulic oil into a suitable container. Refer to the procedure in the *Lubrication* chapter.

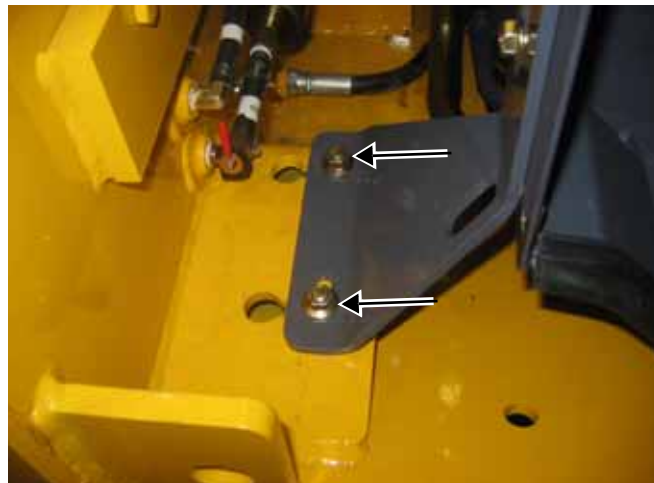
NOTE: Hoses should be plugged after disconnecting to prevent contaminants from entering the hydraulic system. If the hydraulic hoses are plugged after disconnecting to prevent leakage, it should not be necessary to drain the hydraulic reservoir.

2. Remove the radiator/oil cooler per the procedure in this chapter.
3. Remove three locking capscrews on each side of the shroud assembly securing the shroud assembly

to the cooler mounting brackets secured to the floor of the chassis.



4. Remove the fan shroud assembly.
5. Loosen two lock nuts on carriage bolts securing the cooler mounting brackets to the floor of the chassis, one on each side of the skid-steer loader.



6. Slide the mounting brackets outward until the carriage bolts slip through larger opening on the welded plate.

Installation Procedure - Follow all warnings first, then reverse the removal steps.*

* BE SURE and uncap/unplug the hydraulic hoses prior to reconnecting them to the radiator/oil cooler.

Fan Shroud Adjustment

Adjustment Procedure



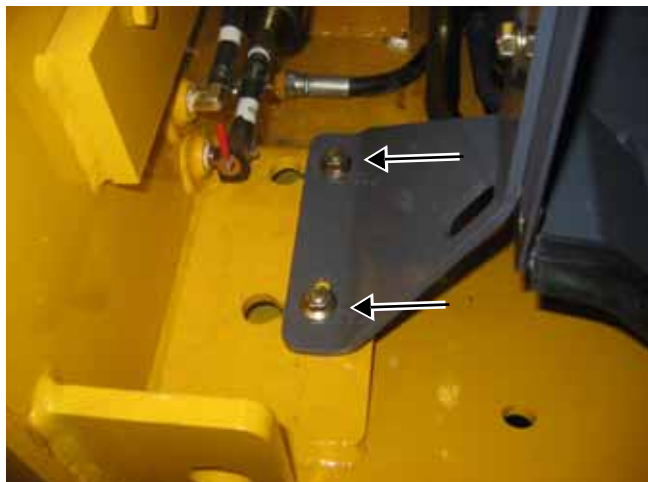
WARNING

BEFORE beginning this service procedure, perform the following **SAFETY** procedure:

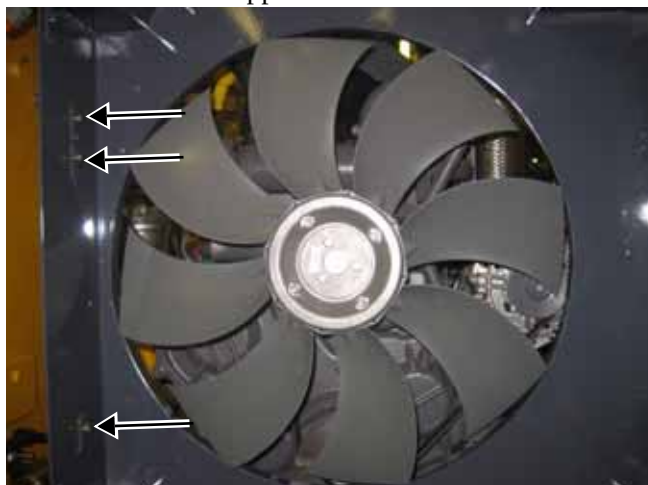
Shut off the engine and allow to cool.

(For detailed instructions, refer to the **Safety** chapter of this manual.)

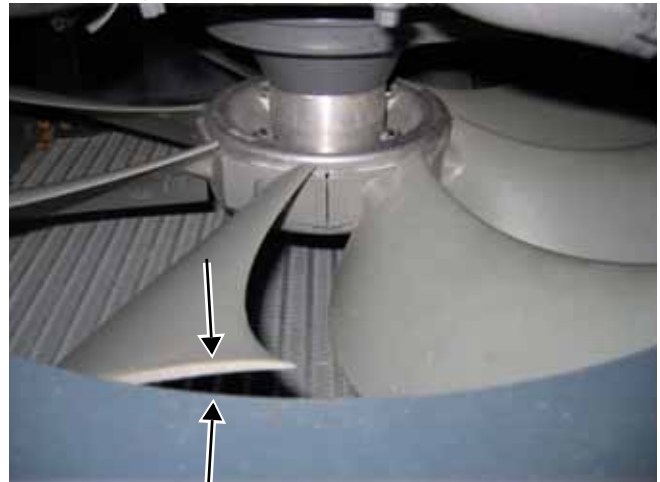
1. Loosen, but do not remove, the carriage bolts and locknuts securing the shroud supports to the chassis.



2. Loosen, but do not remove, the locking capscrews on the shroud support connected to the shroud.



3. Slide the shroud assembly and the mounting brackets and the supports back and forth until the front edge of the fan blades (engine side of fan) are $\frac{3}{8}$ " – $\frac{1}{2}$ " (9,6 mm – 12,7 mm) outside the shroud.



4. Partially tighten the carriage bolts fastening the shroud supports to the chassis to secure the depth adjustment.
5. Without disturbing the shroud depth adjustment, slide the shroud assembly and the mounting brackets and the supports sideways until the fan is centered horizontally in the shroud. Tighten the capscrews and locknuts securing the shroud support to the chassis.
6. Move the shroud assembly up or down until the fan is centered in the shroud opening.
7. Tighten the locking capscrews on the fan shroud sides to secure the height adjustment.

Fan Removal and Installation

The engine fan can be removed or replaced through an opening in the top of the shroud assembly.

Removal Procedure



WARNING

BEFORE beginning this service procedure, perform the following **SAFETY** procedure:

Shut off the engine and allow to cool.

(For detailed instructions, refer to the *Safety* chapter of this manual.)

1. Open the engine access cover and lock open the rear grille.
2. Locate the shroud cover plate at the top of the shroud assembly.
3. Unbolt two locking capscrews on the cover plate and remove the plate from the shroud assembly.



4. Unbolt four nuts securing the fan to the engine.



5. Carefully pull the fan up and through the opening in the shroud assembly.



6. Repair or replace the engine fan.

Installation Procedure - Follow all warnings first, then reverse the removal steps.

Engine Removal and Installation

The following procedure allows removal of diesel engine without removing hydrostatic pump assembly. Some hydraulic hoses need to be disconnected in this procedure, and if they cannot be capped/plugged to prevent fluid loss, the hydraulic reservoir should be drained **BEFORE** disconnecting any hydraulic hoses.

Removal Procedure

WARNING

BEFORE beginning this service procedure, perform the following **SAFETY** procedures:

Raise lift arm; engage lift arm support device.

Shut off the engine.

(For detailed instructions, refer to the *Safety* chapter of this manual.)

1. Drain the hydraulic oil reservoir and the engine oil.
2. Remove engine access covers per the procedure in the *Mainframe* chapter.
3. Remove rear grille per the procedure in the *Mainframe* chapter.

NOTE: The following step is not required, but it is recommended.

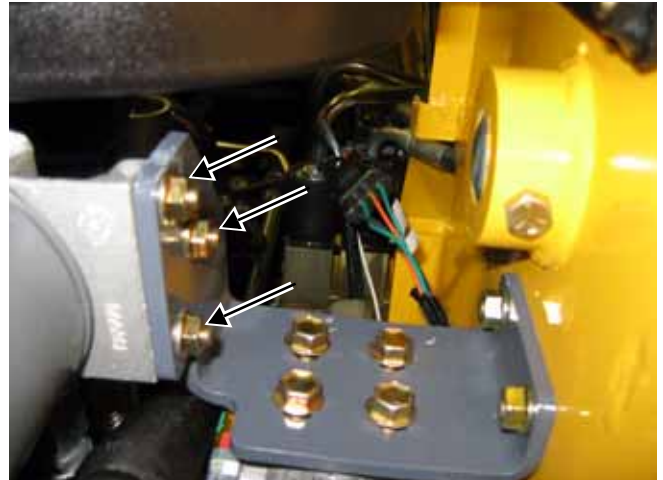
4. Remove the ROPS per the procedure found in the *Mainframe* chapter.
5. Remove the battery and battery tray per the procedure in this chapter.
6. Remove the air cleaner assembly per the procedure in this chapter.

WARNING

DO NOT PROCEED with the following steps unless engine has completely cooled and is safe to touch.

7. Remove exhaust assembly per the procedure in this chapter.

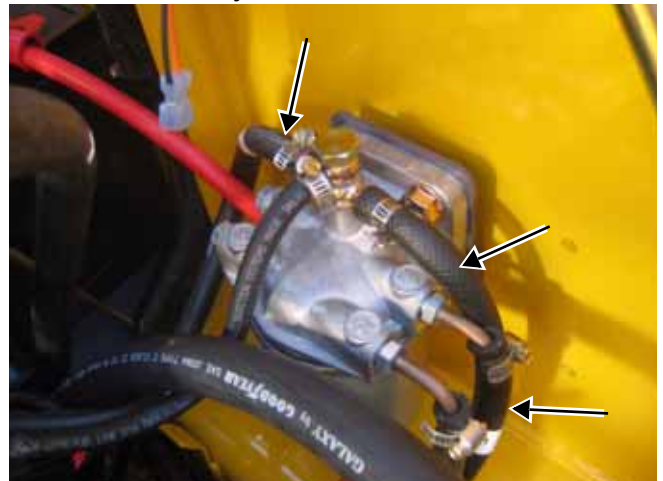
8. Unbolt the remote oil filter assembly from the filter bracket.



9. Remove radiator/oil cooler per the procedure in this chapter.
10. Remove fan shroud and cooler mounting brackets per the procedure in this chapter.
11. Turn fuel separator petcock (small red petcock) to the OFF position.



12. Disconnect three fuel lines from the fuel filter mount assembly.



13. Disconnect the fuel line in front of the fuel pump and unplug the electrical connector on the fuel pump.
14. Remove the engine throttle cable per the procedure in the *Controls* chapter.



15. Unplug the engine harness connector located near the starter solenoid on the engine.



NOTE: The following step includes disconnection of hydraulic hoses. If hoses cannot be capped/plugged to prevent fluid loss, the hydraulic reservoir should be drained BEFORE disconnecting hoses. Refer to the *Hydraulic System* chapter for the procedure.

NOTE: ALWAYS clean area around hydraulic fittings BEFORE disconnecting any hydraulic hose or tube.

16. Label and disconnect all the hydraulic hoses connected to the hydrostatic pump. Refer to the “Hydrostatic Pump Removal” procedure in the *Hydrostatic System* chapter for hydraulic hose removal procedure on the pump.

17. Through the rear belly pan, disconnect the remote oil drain hose.



18. On the lower left bottom end of the engine, disconnect two ground cables on the left engine mount plate.

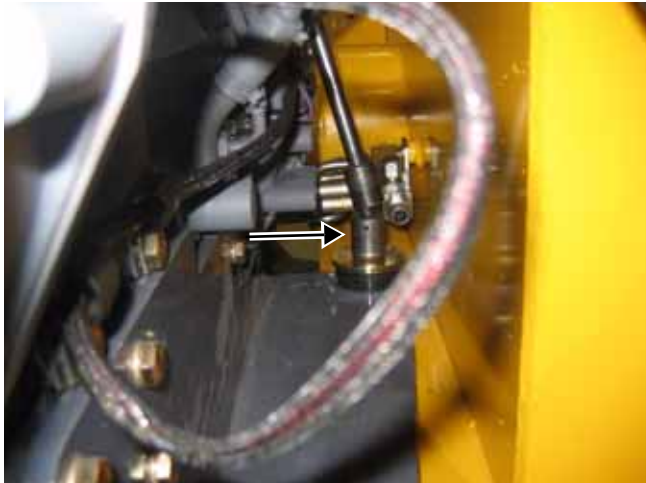


19. Disconnect the positive battery cable from the engine.



20. Attach lift hooks to engine lifting locations on the front and rear of the cylinder head.

21. Remove one carriage bolt, lock nut (110 ft-lbs) (149 N•m) and two washers on four engine mounts.



22. With the hoist attached to the engine, lift slightly and pull the engine rearward. Continue pulling the engine rearward until the pump is free from the drive coupling, then remove the engine from the chassis.



Installation Procedure - Follow all warnings first, then reverse the removal steps.*

* Bleed the fuel system. Also check engine oil and hydraulic oil levels prior to starting the engine.

* Safely check for hydraulic fluid leaks observing the correct procedure in doing so (refer to *Hydraulic System* chapter).



WARNING



NEVER use your hands to search for hydraulic fluid leaks. Use a piece of cardboard or paper. Escaping fluid under pressure can be invisible and penetrate the skin causing serious injury. If any fluid is injected into your skin, see a doctor at once. Injected fluid **MUST** be surgically removed by a doctor familiar with this type of injury or gangrene may result.



WARNING



ALWAYS wear safety glasses when checking for hydraulic fluid leaks. Escaping fluid under pressure can be invisible and can cause permanent eye-sight damage if safety glasses are not worn.

ALWAYS check for hydraulic fluid leaks after installing any components of the hydraulic system.

CHAPTER NOTES

A

Additional Safety Reminders	3
Air Cleaner and Exhaust Components	188
Air Cleaner Assembly Removal and Installation	191
Air Duct Louver Replacement	21
Air Duct Removal and Installation	21
Air Filter Element Removal and Installation	192
Auxiliary Hydraulics Cable Adjustment - Dual Hand and Hand/Foot Controls	86
Auxiliary Hydraulics Cable Removal and Installation - Dual Hand and Hand/Foot Controls	83
Auxiliary Hydraulics Controls - Dual Hand Controls	78
Auxiliary Hydraulics Controls - Hand/Foot Controls	80
Auxiliary Hydraulics Spool Lock Solenoid Removal and Installation	144
Auxiliary Neutral Start Switch	177
Axle and Wheel Bearing Disassembly and Assembly	46
Axle Assembly Components	45
Axle Housing Assembly Removal and Installation	43

B

Battery and Battery Tray Removal and Installation	193
---	-----

C

Chaincases	13
Charge Pressure Test and Adjustment	101
Chassis - Electrical Schematic	179
Chassis Hydraulics	121
Control Cover Components	32
Control Handle Actuation Buttons - Two-Speed and Ride Control and Float Module	168
Control Handle Assembly Removal and Installation - Dual Joystick Controls	58
Control Handle Position Adjustment - Dual Hand and Hand/Foot Controls	62
Control Handle Removal and Installation - Dual Hand and Hand/Foot Controls	57
Control Handle Tracking Adjustment, Wheel Drive Controls - Dual Hand and Hand/Foot Controls	63
Control Handle Tracking Adjustment, Wheel Drive Controls - Dual Joystick Controls	64
Control Locations - Dual Hand	50
Control Locations - Dual Joysticks	50
Control Locations - Hand/Foot	51
Control Valve Disassembly and Assembly	142
Control Valve Removal and Installation	139
Cooling System Drain Procedure	14
Crankcase Oil	12
Crossmember Removal and Installation	35

D

Description of Operation - Right and Left Instrument Panels	153
Dome Light Bulb Replacement	174
Drive Chain Adjustment.	42
Drive Chain Removal and Installation	44
Drive Motor Removal and Installation.	104
Dual Joystick Assembly	67

E

EGR Solenoid - Electrical Schematic.	183
Electrical Auxiliary Grip Removal and Installation - Dual Joystick Controls.	60
Electrical Auxiliary Schematic.	182
Electrical Battery Disconnect Switch Components	158
Electrical Chassis Components	157
Electrical Lights Components	173
Electrical ROPS/FOPS Components	159
Electrically-controlled High-Flow Auxiliary Hydraulic Flow System Test and Operation.	176
Electrically-controlled Standard Auxiliary Hydraulic Flow System Test and Operation	175
Engine - Electrical Schematic	181
Engine Access Cover - Removal and Installation	17
Engine Components	187
Engine Disconnect Switch - Remote Battery Terminal Removal and Installation	172
Engine Removal and Installation	201
Exhaust Assembly Removal and Installation.	195

F

Fan Belt Adjustment.	195
Fan Removal and Installation.	200
Fan Shroud Adjustment	199
Fan Shroud and Radiator/Oil Cooler Mounting Brackets Removal and Installation.	198
Floor Cover/Control Cover Removal and Installation	33
Foot Throttle Adjustment - Dual Hand and Dual Joystick Controls	95
Front and Rear Work Light Bulb Replacement	174
Fuel Sensor Removal and Installation	38

G

Gear Pump Removal and Installation.	134
General Information	3
General Information	11
Glow Control Module.	163
Glow Control Module Test.	162
Glow Control Module Time/Temp Cycle	163
Grease Fitting Locations.	14

H

Hand Throttle Adjustment - Hand/Foot Controls	94
Hand Throttle and Throttle Cable Removal and Installation - Hand/Foot Controls	93
Hand Throttle Controls - Dual Hand Controls	88
Hand Throttle Controls - Dual Joystick Controls	90
Hand Throttle Controls - Hand/Foot Controls	89
Hand Throttle Tension Adjustment	92
Hand Throttle, Foot Throttle Pedal and Throttle Cable Removal and Installation - Dual Hand and Dual Joystick Controls	91
Hand/Foot and Dual Hand Control Handle Assembly	65
Heater Schematic	184
High-Flow Auxiliary - Dual Hand and Hand/Foot Controls	118
High-Flow Auxiliary - Dual Joystick Controls	117
High-Flow Auxiliary Hydraulics Controls - Dual Hand Controls	79
High-Flow Auxiliary Hydraulics Controls - Hand/Foot Controls	81
High-Flow Lift Arm Hydraulics	120
Hydraglide™ Ride Control Accumulator Removal and Installation	146
Hydraglide™ Ride Control Hydraulics	145
Hydraulic Oil Filter Element Replacement	127
Hydraulic Oil Reservoir	11
Hydrostatic Pump Drive Coupling Removal and Installation	103
Hydrostatic Pump Relief Valves	101
Hydrostatic Pump Removal / Installation	102
Hydrostatic/Hydraulic Schematic - Dual Joystick Controls	111
Hydrostatic/Hydraulic Schematic - Non-Dual Joystick Controls	112

I

INDEX	205
Interlock Control Module Test	164
Interlock Control Module Truth Table	165
Introduction	15
Introduction	41
Introduction	49
Introduction	97
Introduction	115
Introduction	153
Introduction	185
ISO SPDT Interlock, Joystick, EGR, Fuel and Horn Relays Test	161

L

Lift and Tilt Components - Dual Hand Controls	54
Lift and Tilt Components - Dual Joystick Controls	55
Lift and Tilt Components - Hand/Foot Controls	56
Lift and Tilt Solenoid Test and Operation	176
Lift and Tilt Solenoid Valve - Disassembly and Assembly	138
Lift Arm Bushing Replacement	31
Lift Arm Components.	26
Lift Arm Removal and Installation.	27
Lift Arm Stop Installation and Adjustment	31
Lift Arm Support Device	5
Lift Arm Support Device Disengagement	6
Lift Arm Support Device Engagement.	5
Lift Cylinder Components	131
Lift Cylinder Removal and Installation	129
Lift Cylinder Test.	125
Lift/Tilt Control Adjustment	76
Lift/Tilt Controls Removal and Installation	73
Lift/Tilt Cylinder Disassembly / Assembly	132
Loader Lowering Procedure.	9
Loader Raising Procedure	9

M

Main Relief Valve Removal and Installation	143
Mainframe (Chassis) Components.	15
Mandatory Safety Shutdown Procedure.	4
Manifold Valve Removal and Installation	141
Master Fuse Test.	160
Master Fuse, Module and Relay Test and Operation	160
Multi-Tach™ Components.	23
Mustang Multi-Tach® or Power-A-Tach® Hitch Removal and Installation.	25

N

Neutral Centering Adjustment - Dual Joystick Controls	71
Neutral Centering Device Adjustment - Dual Hand and Hand/Foot Controls.	70

P

Pivot Tube Removal and Installation - Dual Hand and Hand/Foot Controls.	69
Power Relay Test	160
Power-A-Tach® Components	24
Pressure Tests, Control Valve and High-Flow.	122
Pump Control Arm Assembly Removal and Installation.	72

R

Radiator/ Oil Cooler Removal and Installation	196
Radiator/Cooler Components.	189
Rear Grille and Engine Cover Components.	16
Rear Grille Latch Removal and Installation	39
Rear Grille Removal and Installation.	39
Relieving Hydraulic Pressure.	8
Remote Oil Filter Element Removal and Installation	190
Restraint Bar Components.	23
Restraint Bar Components.	170
Restraint Bar Removal and Installation	25
Restraint Bar Switch Removal and Installation	171
Roll Over and Falling Object Protective Structure Components - ROPS/FOPS	18
ROPS – Lowering	7
ROPS – Raising	6
ROPS Rear Window Removal and Installation	21
ROPS Removal and Installation	19
ROPS/FOPS - Electrical Schematic.	180

S

Safety Lock Valves - Removal/Installation	137
Seat Removal and Installation	20
Seat Slide Replacement	20
Seat Switch Removal and Installation	169
Self-Leveling Valve Adjustment	136
Self-Leveling Valve Removal and Installation	135
Self-Leveling Valve Test	124
Signal Words	3
Single-Speed Hydrostatic Components - Dual Joystick Controls	97
Single-Speed Hydrostatic Components - Hand/Foot and Dual Hand Controls	99
Solenoid Valve Test - Tilt, Lift, Brake and Two-Speed	126
SPECIFICATIONS	1
Standard and High-Flow Auxiliary Hydraulics Controls - Dual Joystick Controls	82
Standard Auxiliary - Dual Hand and Hand/Foot Controls	116
Standard Auxiliary - Dual Joystick Controls	115
Standard Lift Arm Hydraulics	119
Starter and Glow Solenoid Test	162
Starter Removal and Installation	194

T

Tilt Cylinder Components 131

Tilt Cylinder Removal and Installation 128

Tilt Cylinder Test 123

Traction Solenoid Test and Operation 177

Troubleshooting Guide. 106

Troubleshooting Guide. 185

Two-Bank and Four-Bank Coil Function Colored Wire Connector Chart 178

Two-Speed Hydrostatic Components - Dual Joystick Controls. 98

Two-Speed Hydrostatic Components - Hand/Foot and Dual Hand Controls 100

Two-Speed, Ride Control and Float Module Test 166

Two-Speed, Ride Control and Float Module Truth Table 167

W

Wheel Drive Components 41

Wheel Drive Components - Dual Hand and Hand/Foot Controls 53

Wheel Drive Components - Dual Joystick Controls 52



Mustang Manufacturing Co., Inc.
143 Water Street, P.O. Box 179, West Bend, WI 53095-0179 USA
www.mustangmfg.com