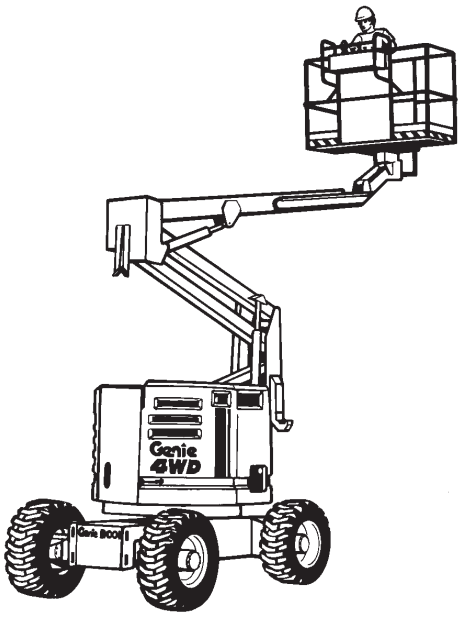
Genie Industries

Technical Publications

Genie® Z-45/22

Service Manual



First Edition
Part No. 29487

Genie® Z-45/22

Important

Read, understand and obey the safety rules and operating instructions in the Genie Z-45/22 Operating Instruction Manual before attempting any maintenance or repair procedure.

This service manual covers the Genie Z-45/22 2WD and 4WD models introduced in 1991.

This manual provides detailed scheduled maintenance information for the machine owner and user. It also provides troubleshooting and repair procedures for qualified service professionals.

Basic mechanical, hydraulic and electrical skills are required to perform most procedures. However, several procedures require specialized skills, tools, lifting equipment and a suitable workshop. In these instances, we strongly recommend that maintenance and repair be performed at a Genie dealer service center.

Genie Industries has endeavored to deliver the highest degree of accuracy possible. However, continuous improvement of our products is a Genie policy. Therefore product specifications are subject to change without notice.

Readers are encouraged to notify Genie of errors and send in suggestions for improvement. All communications will be carefully considered for future printings of this and other manuals. Please write to the technical publications team in care of Genie Industries, PO Box 69, Redmond WA 98073-0069 USA.

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First Edition, October 1992

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Printed on recycled paper

Printed in U.S.A.

Safety Rules



Danger

Failure to obey the instructions and safety rules in this manual, and the Genie Z-45/22 Operating Instruction Manual will result in death or serious injury.

Many of the hazards identified in the operating instruction manual are also safety hazards when maintenance and repair procedures are performed.

Do Not Perform Maintenance Unless:

- ☑ You are trained and qualified to perform maintenance on this machine.
- ☑ You read, understand and obey:
  - manufacturer's instructions and safety rules
  - employer's safety rules
  - applicable governmental regulations
- ☑ You have the appropriate tools, lifting equipment and a suitable workshop.

SAFETY RULES

Personal Safety

Any person working on or around a machine must be aware of all known safety hazards. Personal safety and the continued safe operation of the machine should be your number one priority.



Read each procedure thoroughly. This manual and the decals, on the machine, use signal words to identify the following:

⚠ DANGER Indicates the presence of a hazard that **will** cause death or serious injury.

⚠ WARNING Indicates the presence of a hazard that **may** cause death or serious injury.

⚠ CAUTION Indicates the presence of a hazard that **will** or **may** cause serious injury or damage to the machine.

NOTICE Indicates special operation or maintenance information.



Be sure to wear protective eye wear and other protective clothing if the situation warrants it.



Be aware of potential crushing hazards such as moving parts, free swinging or unsecured components, and lifting or placing loads. Always wear approved steel-toed shoes.

Workplace Safety



Be sure to keep sparks, flames and lighted tobacco away from flammable and combustible materials like battery gases and engine fuels. Always have an approved fire extinguisher within easy reach.



Be sure that all tools and working areas are properly maintained and ready for use. Keep work surfaces clean and free of debris that could get into machine components and cause damage.



Be sure that your workshop or work area is well ventilated and safely and adequately illuminated.



Be sure any forklift, overhead crane or other lifting or supporting device is fully capable of supporting and stabilizing the weight to be lifted. Use only chains or straps that are in good condition and of ample capacity.



Be sure that fasteners intended for one time use (i.e., cotter pins and self-locking nuts) are not reused. These components may fail if they are used a second time.



Be sure to properly dispose of old oil or other fluids. Use an approved container. Please be mindful of the environment.

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Specifications

Machine Specifications

Stowed dimension	2WD	4WD
Length	17 ft 8 1/2 in 5.4m	17 ft 10 3/4 in 5.45m
Width		
Rough terrain	6 ft 8 1/4 in 203.8cm	6 ft 4 5/8 in 194.6cm
Industrial	5 ft 9 5/8 in 176.8cm	
Height	6 ft 6 in 1.98m	7 ft 4 in 2.23m
Weight	13860 lbs 6287kg	14410 lbs 6536kg
Ground clearance	8 in 20.3cm	11 in 27.9cm
Platform dimensions		
Length	6 ft 182.8cm	6 ft 182.8cm
Width	30 in 76.2cm	30 in 76.2cm
Operational dimensions		
Maximum plaform height	45 ft 13.72m	45 ft 13.72m
Maximum platform reach	23 ft 7m	23 ft 7m
Maximum up-and-over clearance	21 ft 7 in 6.58m	21 ft 7 in 6.58m
Maximum turret tailswing	1 inch 2.54cm	none
Wheelbase	6 ft 3 in 190.5cm	6 ft 3 in 190.5cm
Minimum turning radius, outside	14 ft 4 in 4.37m	14 ft 9 in 4.49m
Minimum turning radiius, inside	7 ft 2.13m	6 ft 8 in 2.03m
Turret rotation	359°	359°
Platform rotation	180°	180°

Tires and wheels	Rough terrain	Industrial
Wheel diameter	17.5 inches	14.5 inches
Wheel width	10.5 inches	7 inches
Wheel lugs - 4WD	9 @ 5/8-18	
Wheel lugs - 2WD		
Front	8 @ 5/8-18	8 @ 5/8-18
Rear	9 @ 5/8-18	9 @ 5/8-18
Lug nut torque	125 ft-lbs 169.5 Nm	125 ft-lbs 169.5 Nm
Tire size	14-17.5NHS	9-14.5 LT
Tire ply rating	8	Tread 8 Sidewall 6
Tire contact area	59 sq in 380sq cm	43.5 sq in 280sq cm
Overall tire diameter	35.8 inches 91cm 71cm	28 inches
Tire pressure - 2WD	40 psi 2.76 bar	100 psi 6.89 bar
4WD	28 psi 1.93 bar	

Fluid capacities	
Fuel tank	15 gallons 56.8 liters
Propane tank	33.5 pounds 15.2kg
Hydraulic tank	25 gallons 95 liters
Hydraulic system (including tank)	30 gallons 114 liters
Torque hubs	17 ounces 0.5 liters

Continuous improvement of our products is a Genie policy. Product specifications are subject to change without notice.

SPECIFICATIONS

Performance Specifications

Drive speeds, maximum	2WD	4WD
Boom lowered, high range	5.0 mph 8.0km/h	4.8 mph 7.7km/h
Boom lowered, low range	1.1 mph 1.8km/h or 5 feet in 3 sec.	0.9 mph 1.4km/h or 4 feet in 3 sec.
Boom raised, high range	0.68 mph / 1km/h or 1 foot per second	
Boom raised, low range	0.4 mph / 0.65km/h or 0.59 feet per second	
Gradeability (stowed)	30%	40%

Boom function speeds maximum from platform controls	
Boom extend	29 seconds
Boom retract	25 seconds
Primary boom lift	27 seconds
Primary boom lower	35 seconds
Secondary boom lift	25 seconds
Secondary boom lower	25 seconds
Turntable rotate (359°)	73 seconds
Platform rotate (180°)	15 seconds
Platform level up	25 seconds
Platform level down	15 seconds
Multiple function stowed to full raised	60 seconds
Multiple function full lowered to stowed	60 seconds

Hydraulic Specifications

Hydraulic fluid	Dexron II equivalent
Drive pump	
Type	bi-directional variable displacement piston pump
Displacement	0 - 25 gpm 0 - 1.6 liters/second
Maximum drive pressure	3500 psi 241.3 bar
Charge pressure	360 psi / 24.8 bar
Medium pressure filter	3 micron
Medium pressure filter bypass pressure	50 psi / 345kPa
Drive manifold	
Motor shift/brake relief pressure	350 psi 24.1 bar
4WD front motor flow regulators	3.0 gpm 11.4 liters/minute
4WD rear motor flow regulators	4.5 gpm 17.0 liters/minute

SPECIFICATIONS

Front drive motors - 4WD models	
Displacement per revolution	2.1 cu in / 34.4cc

Rear drive motor	
Displacement per revolution	High - 2.8 cu in / 45.9cc Low - 0.15 cu in / 2.5cc

Function pump	
Type	fixed displacement gear pump
Displacement	6.4 gpm @ 2150 rpm 0.4 liters/second
Function circuit return line filter	10 micron with 25psi / 172kPa bypass

Function manifold	
Function relief valve pressure	2200psi 138 bar
Secondary down relief valve pressure	1200 psi 83 bar
Primary down relief valve pressure	1200 psi 83 bar
Steer/oscillate flow regulator	1.5 gpm 5.7 liters/minute

Steer/oscillate manifold	
Sequencing valve pressure	1800 psi
Accumulator pre-charge pressure	1600 psi

Auxillary pump	
Type	fixed displacement gear pump
Displacement	0.85 gpm 3.2 liters/minute
Auxillary pump relief pressure	2030 psi 138 bar

SPECIFICATIONS

Bolt Torque Specifications

Size	Threads	SAE Grade 5 Bolts			SAE Grade 8 Bolts		
		Torque - Dry inch-pounds	Torque - Dry foot-pounds	Torque - Dry Newton meters	Torque - Dry inch-pounds	Torque - Dry foot-pounds	Torque - Dry Newton meters
10	24	43		5	60		7
	32	49		6	68		8
1/4	20	96		11	144		16
	28	120		14	168		19
5/16	18		17	23		25	34
	24		19	28		25	34
3/8	16		30	41		45	61
	24		35	48		50	68
7/16	14		50	68		70	95
	20		55	75		80	109
1/2	13		75	102		110	149
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	18		120	163		170	231
5/8	11		150	204		220	298
	18		170	231		240	326
3/4	10		260	353		380	515
	16		300	407		420	570
7/8	9		430	583		600	814
	14		470	637		660	895
1	8		640	868		900	1221
	12		700	949		1000	1356

Torque specification for lubricated bolts is 25% less than dry torque specification for bolt size.

SPECIFICATIONS

Ford Engine LSG-423

Displacement	140 cu in / 2.3 liters
Number of cylinders	4
Bore and stroke	3.780 x 3.126 inches 96 x 79.4mm
Horsepower	63 @4000 rpm
Firing order	1 - 3 - 4 - 2
High engine speed	2150 rpm
Low engine speed	1200 rpm
Governing	Precision electronic
Compression pressure	psi of lowest cylinder must be at least 75% of highest cylinder
Valve clearances	
Intake	0.0010 - 0.0027 inches 0.025 - 0.068mm
Exhaust	0.0015 - 0.0032 inches 0.038 - 0.081mm
Lubrication System	
Oil pressure (operating temp. @ 2150 rpm)	40 - 60 psi 275.8 - 413.7kPa
Oil capacity (including filter)	5 quarts / 4.71 liters
Oil viscosity requirements	
Below 60°F / 15.5°C	5W - 30
-10 to 90°F / -23 to 32°C	10W - 30
above -10°F / -23°C	10W - 40 or 10W - 50
above 25°F / -4°C	20W - 40 or 20W - 50
Use oils meeting API classification SF (labeled SF/CC or SF/CD) as they offer improved wear protection.	

Starter motor	
Normal engine cranking speed	110 rpm
Current draw, normal load	150A
Current draw, maximum load	460A
Current draw, no load	70A
Maximum circuit voltage drop (normal temp)	0.5V DC
Brush length, new	0.50 inches / 12.7mm
Brush length, wear limit	0.25 inches / 6.35mm
Brush spring tension	40 ounces
Bolt torque through brush	55 - 75 inch-pounds 98 - 134gm-cm
Brush mounting bolt torque	15 - 20 foot-pounds 2.1 - 2.7kg-m
Maximum commutator runout	0.005 inches / 0.127mm
Battery	
Type	12V, Group 24
Ampere hour	75A
Cold Cranking Ampere	875A
Reserve capacity @ 25A rate	125 minutes
Fuel Pump	
Static pressure	5.0 - 7.0 psi
Minimum volume flow	1 pint / 473cc in 25 seconds

SPECIFICATIONS

Ignition System	
Ignition spark advance	10° BTDC
Ignition coil primary resistance	1.13 - 1.25Ω (75°F)
Ignition coil secondary resistance	7700 - 9300Ω (75°F)
Type	Motorcraft AWSF-52
Gap	0.042 - 0.046 inches 1.07 - 1.18mm
Coolant capacity	11.5 quarts/10.9 liters
Alternator output	35A, 14.5V
Fan belt tension	
new	120 - 150 foot-pounds
used	90 - 120 foot-pounds

Bolt torque specifications

Item / Size	Torque (ft-lbs)	Torque (Nm)
Auxiliary shaft gear bolt / M-10	28 - 40	38 - 54
Auxiliary shaft thrust plate bolt / M-6	6 - 9	8 - 12
Belt tensioner (timing) pivot bolt / M-10	28 - 40	38 - 54
Belt tensioner (timing) adjusting bolt / M-8	14 - 21	19 - 28
Camshaft gear bolt / M-12	50 - 71	68 - 96
Camshaft thrust plate bolt / M-6	6 - 9	8 - 12
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Crankshaft damper bolt / M-14	103 - 133	140 - 180
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Inner timing belt cover stud / M-8	14 - 21	19 - 28
Outer timing belt cover bolt / M-6	6 - 9	8 - 12

SPECIFICATIONS

Kubota Engine V1702-B

Displacement	105.7 cu in / 1.732 liters
Number of cylinders	4
Bore and stroke	3.23 x 3.23 inches 82 x 82mm
Horsepower	36 @2800 rpm
Firing order	1 - 3 - 4 - 2
Compression ratio	22:1
Compression pressure	427 - 469 psi 29.4 - 32.3 bar
High engine speed	2150 rpm
Low engine speed	1200 rpm
Governing	centrifugal ball mechanical
Valve clearance, cold	0.0071 - 0.0087 inches 0.18 - 0.22mm
Lubrication System	
Oil pressure	42.7 - 64 psi 294.2 - 441.3kPa
Oil capacity including filter	9.5 quarts / 9 liters
Oil viscocity requirements	10W - 30
Engine oil should be MIL-L-2104C or have properties of API classification CC/CD/CE grades.	
Injection System	
Injection pump	Bosch K Type
Injection pump pressure	1991 psi / 1437 bar
Injection timing	25° BTDC
Fuel requirement	Diesel number 2-D
Coolant capacity	7.25 quarts / 6.9 liters
Alternator output	35A, 14V

Thermostat	
Beginning opening	176.9 - 182.3°F 80.5 - 83.5°C
Full-open	203°F / 95°C
Starter motor	
Current draw, no load	90A
Brush length, new	0.7480 in. / 19mm
Brush length, minimum	0.5 in. / 12.7mm
Battery	
Type	12V, Group 24
Ampere hour	75A
Cold cranking ampere	875A
Reserve capacity @ 25A rate	125 minutes
Glow plug resistance	1.5Ω
Fan belt tension	0.275-0.354 in / 7 - 9mm

Bolt torque specifications

Item	Torque (ft-lbs)	Torque (Nm)
Cylinder head bolt	65 - 68	88 - 93
Fuel injector nozzle holder to cylinder head	22 - 36	29 - 49
Fuel injector retaining nut to nozzle holder body	43 - 58	59 - 78
Flywheel to crankshaft bolt	72 - 79	98 - 108
Oil pressure sending unit to block	8 - 18	11 - 24
Oil pan drain plug to pan	15 - 25	20 - 34
Rocker arm cover to cylinder head	5 - 7	7 - 9
Rocker arm mounting nuts	17 - 24	24 - 27
Temperature sending unit to block	8 - 18	11 - 24

SPECIFICATIONS

Bolt torque specifications - continued

Size - Standard	ft-lbs	Nm
M-6	5 - 7	8 - 9
M-8	13 - 15	18 - 20
M-10	29 - 33	39 - 45
M-12	46 - 53	63 - 72
M-14	79 - 92	108 - 125
M-16	123 - 141	167 - 191
M-18	180 - 210	245 - 284
M-20	246 - 289	334 - 392
Size - Grade 7		
M-6	7 - 8	10 - 11
M-8	17 - 20	24 - 27
M-10	35 - 41	48 - 56
M-12	57 - 66	78 - 90
M-14	91 - 108	124 - 147
M-16	145 - 166	196 - 225
M-18	203 - 235	275 - 318
M-20	271 - 318	368 - 431
Size - Grade 9		
M-6	9 - 10	12 - 14
M-8	22 - 25	30 - 34
M-10	45 - 52	61 - 70
M-12	76 - 86	103 - 117
M-14	123 - 144	168 - 196
M-16	192 - 224	260 - 304
M-18	253 - 296	343 - 402
M-20	362 - 419	490 - 568

Scheduled Maintenance Inspections



Observe and Obey:

- ☑ Maintenance inspections shall be completed by a person trained and qualified on the maintenance of this machine.
- ☑ Scheduled maintenance inspections shall be completed daily, frequently (every 3 months), annually and every 2 years as specified on the maintenance inspection report.

⚠WARNING Failure to properly complete each inspection when required may result in death, serious injury or substantial machine damage.

- ☑ Immediately tag and remove from service a damaged or malfunctioning machine.
- ☑ Repair any machine damage or malfunction before operating machine.
- ☑ Keep records on all inspections for three years.

About This Section

There are two components to this section, maintenance tables and an inspection reporting form.

Maintenance Tables

The maintenance tables provide summary information on the specific physical requirements for each inspection.

Complete step-by-step instructions for each scheduled maintenance procedure is provided in section 4, *Scheduled Maintenance Details*.

Maintenance Inspection Report

The maintenance inspection report contains checklists for each type of scheduled inspection.

- **Daily** inspection
  Use checklist A
- **Frequent** inspection (every 150 hours or three months)
  Use checklists A and B
- **Annual** inspection
  Use checklists A, B and C
- **Two year** inspection
  Use checklists A, B, C and D

Make copies of this form to use for each inspection. Store completed forms for three years.

Maintenance Tables

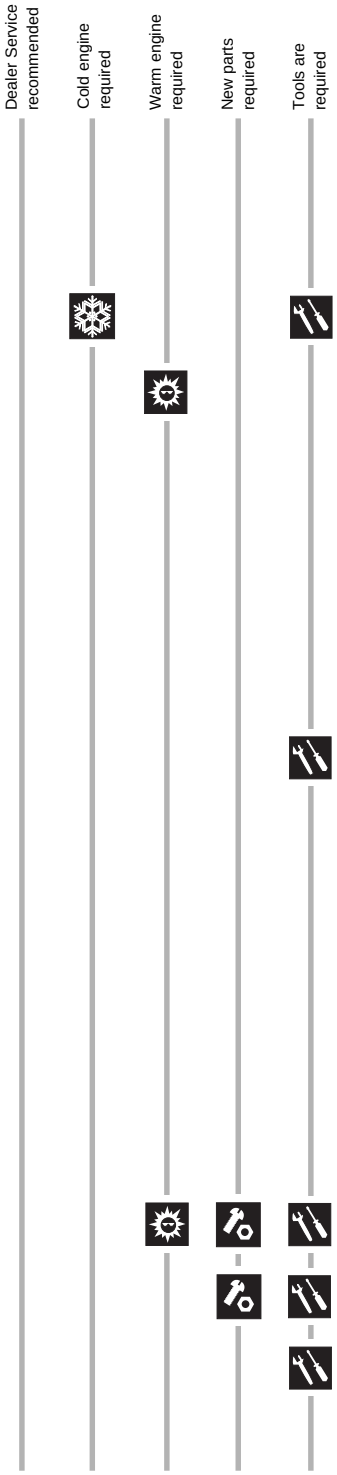


Table A

A-1 Inspect the Operating Instruction and Safety Manuals

A-2 Inspect the Decals and Placards

A-3 Inspect for Damage, Loose or Missing Parts

A-4 Check the Engine Oil Level

A-5 Check the Engine Coolant Level

A-6 Check for Fuel Leaks

A-7 Check the Hydraulic Oil Level

A-8 Check for Hydraulic Leaks

A-9 Check Tire Pressure

A-10 Test the Platform and Ground Controls

A-11 Test Auxiliary Power Operation

A-12 Test the Tilt Level Sensor

A-13 Test the Limit Switches

Every 100 hours, check for and/or perform as necessary the engine maintenance procedures listed below.

A-14 Replace the Engine Oil and Filter

A-15 Change the Engine Air Filter

A-16 Drain the Fuel Filter/Water Separator - Diesel Models

MAINTENANCE TABLES

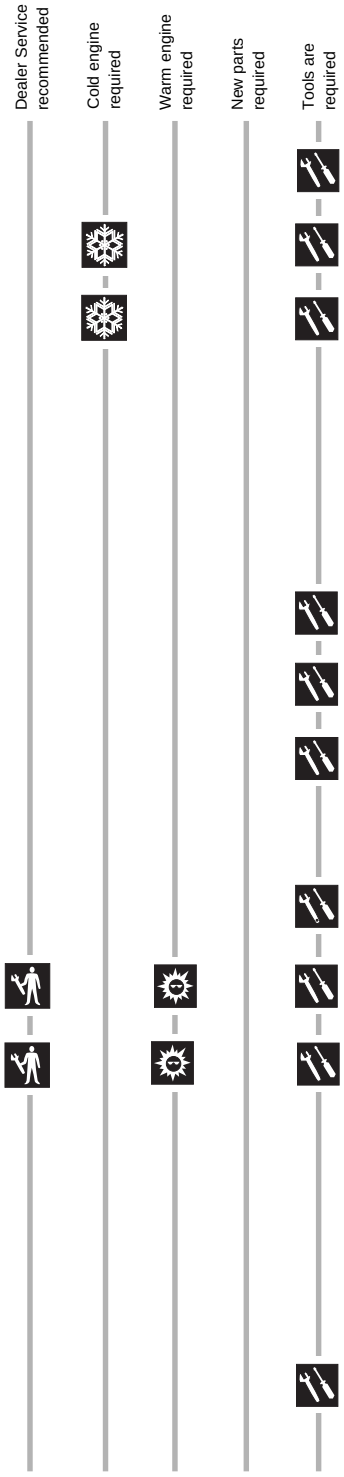


Table B

B-1 Check the Engine Fan Belts

B-2 Check the Radiator

B-3 Check the Exhaust System

B-4 Check the Battery

B-5 Check the Hydraulic Reservoir Filter Condition Indicator

B-6 Inspect Electrical Wiring

B-7 Inspect the Tires and Wheels
including lug nut torque

B-8 Confirm Proper Brake Configuration

B-9 Check the Oil Level in the Torque Hubs

B-10 Check the Engine Choke - Gasoline/LPG Models

B-11 Check the Glow Plugs - Diesel Models

B-12 Check and Adjust the Engine Idle Mixture
- Gasoline/LPG Models

B-13 Check and Adjust the Engine RPM

B-14 Test the Key Switch

B-15 Test the Emergency Stop Buttons

B-16 Test the Ground Control Override

B-17 Test the Oscillate Lock-out
oscillating axle equipped models

MAINTENANCE TABLES

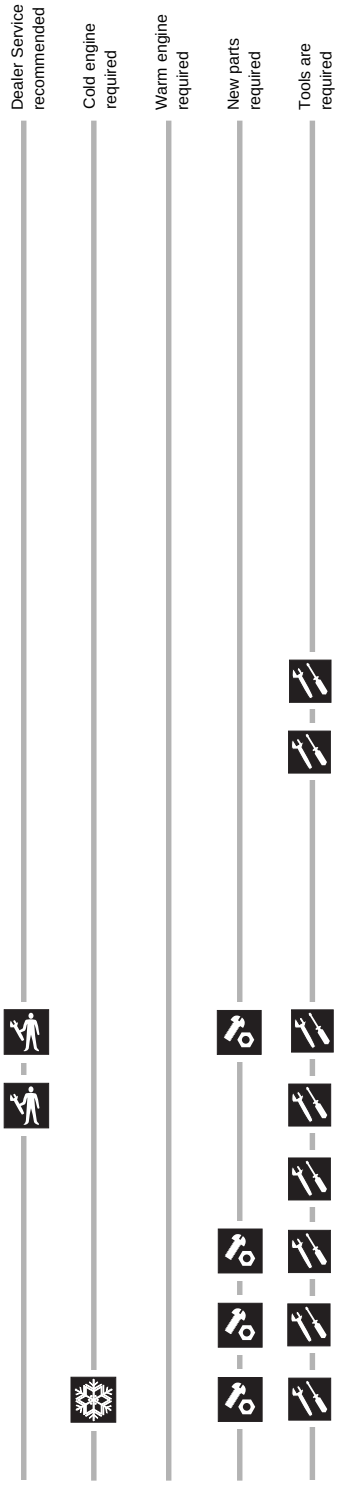


Table B, continued

B-18 Test Platform Self-leveling

B-19 Test the Service Horn

B-20 Test the Foot Switch

B-21 Test the Engine Speed Select

B-22 Test Fuel Select Operation - Gasoline/LPG Models

B-23 Test the Turntable Rotation Stop

B-24 Test the Drive Enable System

B-25 Test the Drive Brakes

B-26 Test Drive Speed - Stowed Position

B-27 Test the Alarm Package (optional equipment)
travel alarm, descent alarm, flashing beacon

Table C

C-1 Check the Primary Boom Wear Pads

C-2 Check the Turntable Rotation Bearing Bolts

C-3 Check the Free-wheel Feature

C-4 Grease the Worm Drive Gear
including turntable rotation bearing

C-5 Replace the Torque Hub Oil

C-6 Replace the Hydraulic Reservoir Filter

MAINTENANCE TABLES

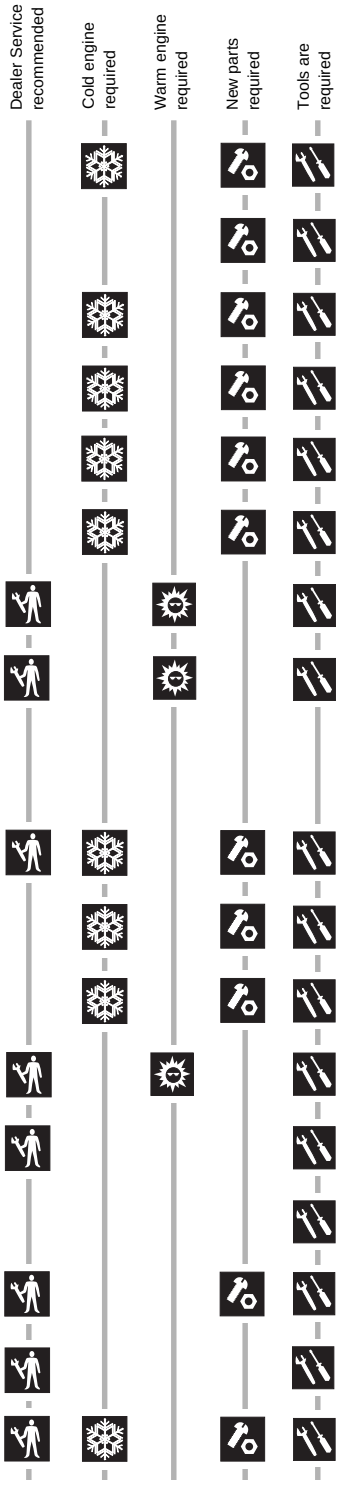


Table C, continued

C-7 Replace the Drive Loop Hydraulic Filter

C-8 Replace the Diesel Fuel Filter

C-9 Replace the Gasoline Fuel Filter

C-10 Replace the PCV Valve - Gasoline/LPG Models

C-11 Clean or Replace the Distributor Cap and Rotor - Gasoline/LPG Models

C-12 Replace the Spark Plugs - Gasoline/LPG Models

C-13 Check and Adjust the Air/Propane Mixture - Gasoline/LPG Models

C-14 Check and Adjust the Ignition Timing - Gasoline/LPG Models

Table D

D-1 Change the Hydraulic Oil
includes cleaning the suction strainers

D-2 Change or Recondition the Engine Coolant
including all coolant hoses and clamps

D-3 Change the Fuel Lines

D-4 Check Engine Valve Clearance - Gasoline/LPG Models

D-5 Check Engine Cylinder Compression - Gasoline/LPG Models

D-6 Clean PCV Hoses and Fittings - Gasoline/LPG Models

D-7 Check the Engine Nozzle Injection Pressure - Diesel Models

D-8 Check Injection Timing - Diesel Models

D-9 Replace the Timing Belt - Ford

Maintenance Inspection Report

Model

Serial number

Date

Hour meter

Machine owner

Inspected by (print)

Inspector signature

Inspector title

Inspector company

Instructions

- Make copies of this page to use for each inspection.
- Select the appropriate checklist(s) for the type of inspection to be performed.

☐	**Daily Inspection: A**
☐	**Frequent Inspection: A+B**
☐	**Annual Inspection: A+B+C**
☐	**2 Year Inspection: A+B+C+D**

- Place a check in the appropriate box after each inspection procedure is completed.
- Use the maintenance tables in this section and the step-by-step procedures in section 4 to learn how to perform these inspections.
- If any inspection receives an “N”, remove the machine from use , repair and re-inspect it. After repair, place a check in the “R” box.

Legend

Y = yes, acceptable

N = no, unacceptable

R = repaired

Comments

Checklist A	**Y**	**N**	**R**
Refer to Table A			
A-1 Operation and Safety manuals			
A-2 Decals and placards			
A-3 Damage, loose or missing parts			
A-4 Engine oil			
A-5 Engine coolant			
A-6 Fuel leaks			
A-7 Hydraulic oil			
A-8 Hydraulic leaks			
A-9 Tire pressure			
A-10 Platform and ground controls			
A-11 Auxiliary power			
A-12 Tilt alarm			
A-13 Limit switches			
Perform every 100 hours:			
A-14 Change engine oil and filter			
A-15 Change engine air filter			
A-16 Drain fuel filter/water separator-diesel			

Checklist B	**Y**	**N**	**R**
Refer to Table B			
B-1 Fan belts			
B-2 Engine radiator			
B-3 Exhaust system			
B-4 Battery			
B-5 Hydraulic reservoir filter			
B-6 Electrical wiring			
B-7 Tires and wheels			
B-8 Brake configuration			
B-9 Drive torque hubs			
B-10 Engine choke-gasoline			
B-11 Glow plugs-diesel			
B-12 Idle mixture-gasoline			
B-13 Engine RPM			
B-14 Key switch			
B-15 Emergency Stop button			
B-16 Ground control override			
B-17 Oscillate lock-out			
B-18 Platform leveling			
B-19 Service horn			
B-20 Foot switch			
B-21 Engine speed select			
B-22 Fuel select-gasoline			
B-23 Turntable rotation stop			
B-24 Drive enable system			
B-25 Drive brakes			
B-26 Drive speed			
B-27 Alarm package			

Checklist C	**Y**	**N**	**R**
Refer to Table C			
C-1 Wear pads			
C-2 Turntable bolts			
C-3 Free-wheel configuration			
C-4 Worm drive gear			
C-5 Drive torque hubs			
C-6 Hydraulic reservoir filter			
C-7 Drive loop hydraulic filter			
C-8 Fuel filter-diesel			
C-9 Fuel filter-gasoline			
C-10 PCV valve-gasoline			
C-11 Distibutor cap-gasoline			
C-12 Spark plugs			
C-13 Propane adjustments			
C-14 Ignition timing-gasoline			

Checklist D	**Y**	**N**	**R**
Refer to Table D			
D-1 Hydraulic oil			
D-2 Engine coolant, hoses and clamps			
D-3 Fuel lines and clamps			
D-4 Engine valve clearance -gasoline			
D-5 Cylinder compression			
D-6 PCV hoses and fittings-gasoline			
D-7 Engine injection nozzle -diesel			
D-8 Injection timing-diesel			
D-9 Timing belt-Ford			

Scheduled Maintenance Procedures



Observe and Obey:

- ☑ Maintenance inspections shall be completed by a person trained and qualified on the maintenance of this machine.
- ☑ Scheduled maintenance inspections shall be completed daily, frequently (every 3 months), annually and every 2 years as specified on the mainentance report.

⚠WARNING Failure to properly complete each inspection when required may result in death, serious injury or substantial machine damage.

- ☑ Immediately tag and remove from service a damaged or malfunctioning machine.
- ☑ Repair any machine damage or malfunction before operating machine.
- ☑ Keep records on all inspections for three years.

About This Section

This section contains detailed procedures for each scheduled maintenance inspection.

Each procedure includes a description, safety warnings and step-by-step instructions.

Symbols Legend

⚠ DANGER Indicates the presence of a hazard that **will** cause death or serious injury.

⚠WARNING Indicates the presence of a hazard that **may** cause death or serious injury.

⚠CAUTION Indicates the presence of a hazard that **will** or **may** cause serious injury or damage to the machine.

NOTICE Indicates special operation or maintenance information.

⊙ Indicates that a specific result is expected after performing a series of steps.

Table A Procedures

A-1
Inspect the Operating Instruction and Safety Manuals

Maintaining the Operating Instruction and Safety manuals in good condition is essential to safe machine operation. Manuals are included with each machine and should be stored in the box provided in the platform. An illegible or missing manual will not provide safety and operational information necessary for a safe operating condition.

1 Check to make sure that the Operating Instruction and Safety manuals are present in the storage box in the platform.

2 Examine the pages of each manual to be sure that they are legible and in good condition.

3 Always return the manuals to the storage box after use.

NOTICE Contact your Genie distributor or Genie Industries if replacement manuals are needed.

A-2
Inspect the Decals and Placards

Maintaining all of the safety and instructional decals and placards in good condition is mandatory for safe machine operation. Decals alert operators and ground personnel to the many possible hazards associated with using this machine. They also provide users with operation and maintenance information. An illegible decal will fail to alert personnel of a procedure or hazard and could result in unsafe operating conditions.

1 Refer to the *Decals* section in the Operating Instructions and use the decal list and illustrations to determine that all decals and placards are in place.

2 Inspect all decals for damage or illegibility. Replace any illegible decal immediately.

NOTICE Contact your Genie distributor or Genie Industries if replacement decals are needed.

A-3
Inspect for Damage, Loose or Missing Parts

Daily machine condition inspections are essential to safe machine operation and good machine performance. Failure to locate and repair damage, and discover loose or missing parts may result in an unsafe operating condition.

1 Inspect the entire machine for damage and improperly installed or missing parts including:

- electrical components, wiring and electrical cables
- hydraulic hoses, fittings, cylinders and manifolds
- fuel tanks
- drive and swing motors and gear boxes
- boom components and wear pads
- tires and wheels
- engine and related components
- limit switches, alarms, horns and beacon
- nuts, bolts and other fasteners
- cracks in welds or structural components

A-4
Check the Engine Oil Level

Maintaining proper engine oil level is essential to good engine performance and service life. Operating the machine at an improper oil level can damage engine components.

NOTICE Check the oil level with the engine off.

1 Check the oil level dipstick. Add oil as needed.

Specifications	
Ford Engine LSG 423 Lubrication System	
Oil capacity	5 quarts / 4.7 liters
Oil viscosity requirements	
below 60F / 15.5C	5W-30
-10 to 90F / -23 to 32C	10W-30
above -10F / -23C	10W-40 or 10W-50
above 25F / -4C	20w-40 or 20W-50
Kubota Engine V1702-B Lubrication System	
Oil capacity	9.5 quarts / 9 liters
Oil viscosity requirements	10W-30
Engine oil should be MIL-L-2104C or have the properties of AI classification CC/CD/CE grades.	

A-5
Check the Engine Coolant Level

Maintaining engine coolant at the proper level is essential to engine life. Improper coolant level will affect the engines cooling capability and damage engine components. Daily checks will allow the inspector to identify dramatic changes in coolant level that might indicate cooling system problems.

1 Check the fluid level in the coolant recovery tank. Add water as needed.

⊙ Result: The fluid level should be in the *normal* range.

A-6
Check for Fuel Leaks

Failure to detect and correct fuel leaks will result in an unsafe condition. An explosion or fuel fire may cause death or serious injury.

⚠ DANGER Engine fuels are combustible. Inspect the machine in an open, well-ventilated area away from heaters, sparks, flames and lighted tobacco. Always have an approved fire extinguisher within easy reach.

1 Open the shutoff valve on the liquid propane gas (LPG) tank by turning it counterclockwise.

2 Perform a visual inspection around the following areas. An LPG detector may be necessary to locate propane leaks.

Gasoline/LPG models:

· LPG tank, hoses and fittings, solenoid shutoff valve, LPG regulator, and carburetor

· gasoline tank, shutoff valve, solenoid shutoff valve, hoses and fittings, fuel pump and carburetor

Diesel models:

· diesel tank, shutoff valve, solenoid shutoff valve, hoses and fittings, fuel pump, fuel filter/ water separator, fuel injection pump, fuel injectors

⚠ DANGER If a fuel leak is discovered, keep any additional personnel from entering the area and do not operate the machine. Repair the leak immediately.

TABLE A PROCEDURES

A-7
Check the Hydraulic Oil Level

Maintaining hydraulic oil at the proper level is essential to machine operation. Improper hydraulic oil levels can damage hydraulic components. Daily checks allow the inspector to identify changes in oil level that might indicate the presence of hydraulic system problems.

1 Be sure that the machine is in the fully stowed position, then visually inspect the sight gauge located on the side of the hydraulic oil reservoir.

⊙ Result: The hydraulic oil level should be within the top 2 inches (5cm) of the sight gauge.

Specifications	
Hydraulic oil type	Dexron II equivalent
Reservoir capacity	25 gallons / 95 liters Do not overfill

A-8
Check for Hydraulic Leaks

Detecting hydraulic fluid leaks is essential to operational safety and good machine performance. Undiscovered leaks can develop into hazardous situations, impair machine functions and damage machine components.

1 Inspect for hydraulic oil puddles, dripping or residue on or around the following areas:

- · hydraulic reservoir—fittings, hoses and turntable surface
- · engine compartment—fittings, hoses, auxiliary power unit, main pump and turntable surface
- · all cylinders
- · all valve manifolds
- · elevate and primary booms
- · the underside of the chassis
- · ground area under the machine

A-9
Check Tire Pressure

NOTICE This procedure does not need to be performed on machines equipped with the foam-filled tire option.

To safeguard maximum stability, achieve optimum machine handling and minimize tire wear, it is essential to maintain proper pressure in all air-filled tires.

1 Check each tire with an air pressure gauge and add air as needed.

Specifications	
2WD model	
industrial tire	9-14.5LT 100 psi / 6.89 bar
rough terrain tire	14-17.5NHS 40 psi / 2.76 bar
4WD model	
rough terrain tire	14-17.5NHS 28 psi / 1.93 bar

TABLE A PROCEDURES

A-10
Test the Platform and Ground Controls

Testing machine functions and the Emergency Stop buttons for malfunctions is essential for safe machine operation. An unsafe working condition exists if any function fails to operate properly or either Emergency Stop button fails to stop all the machine functions and shut off the engine. Each function should activate, operate smoothly and be free of hesitation, jerking and unusual noise.

1 Start the engine from the ground controls, and then operate each machine function through a full cycle.

⊙ Result: All machine functions should activate and operate smoothly.

2 Push in the Emergency Stop button to the *off* position.

⊙ Result: No function should operate, the engine should stop.

NOTICE Diesel models: All functions should stop immediately. The engine will shut off after 2 or 3 seconds.

3 Start the engine from the platform controls, and then operate each machine function through a full cycle.

⊙ Result: All machine functions should activate and operate smoothly.

4 Push in the Emergency Stop button to the *off* position.

⊙ Result: No function should operate, the engine should stop.

NOTICE As a safety feature, selecting and operating the ground controls can override the platform controls, including the Emergency Stop button.

A-11
Test Auxiliary Power Operation

Detection of auxiliary power system malfunctions is essential for safe machine operation. An unsafe working condition exists if the auxiliary powered functions do not operate in the event of a main power loss. Auxiliary power is designed for short term emergency use only, and excessive use will result in battery drain and pump damage.

NOTICE Oscillating axle equipped machines only: From the stowed position, auxiliary power can not raise the boom above the drive limit switch. Auxiliary power can raise the boom if it is already raised above the drive limit switch.

1 Turn the key switch to ground control and pull out the ground control Emergency Stop button to the *on* position.

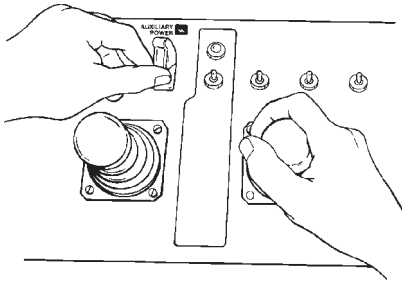
2 Simultaneously hold the auxiliary power switch *on* while activating the following functions through a partial cycle:

· primary boom up/down

· extend and retract

· elevate up/down

· turntable rotate right/left



⊙ Result: Each function should operate smoothly.

3 Turn the key switch to platform control.

4 At the platform controls, pull out the Emergency Stop button to the *on* position, press down the foot switch and repeat step 2.

TABLE A PROCEDURES

A-12
Test the Tilt Level Sensor

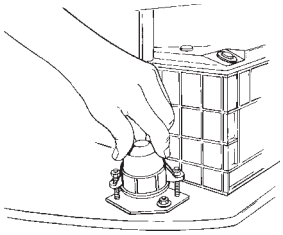
The tilt sensor sounds an alarm in the platform when the incline of the chassis exceeds 3°.

NOTICE Select a level test area.

1 Start the engine from the platform controls.

2 Open the engine side cover and press down on one side of the tilt sensor.

⊙ Result: After a 1 second delay, the alarm in the platform should sound.



A-13
Test the Limit Switches

Detecting limit switch malfunctions is essential to safe machine operation. The drive enable limit switch activates a signal light to inform the operator that the platform is over the steering wheels, and stops drive movement unless the drive enable override switch is used. The drive limit switch is used to restrict drive speed when the boom is raised and signal the oscillate cylinder to extend the lock-out wedges (oscillating axle equipped machines). Also, on oscillating axle equipped machines, there are two limit switches to stop the boom from being raised unless the lock out wedges are extended. Improperly functioning limit switches will allow the boom to raise and/or drive into an unsafe position.

Drive Limit Switch

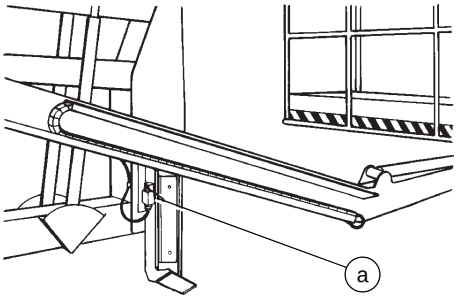
1 With the engine off and the machine in the stowed position, visually inspect the drive limit switch for the following:

- broken or missing rollers or arms
- missing fasteners
- loose wiring

2 Start the engine from the ground controls.

3 Raise the primary boom above the drive limit switch and turn the machine off.

4 Manually activate the drive limit switch.



a drive limit switch

⊙ Result: The drive limit switch arm should move freely and spring return to center. A distinct click should be felt and heard.

5 Restart the engine and lower the boom into the fully stowed position.

6 Move the key switch to platform control, and then start the engine from the platform controls.

7 Slowly move the drive control handle off center.

⊙ Result: The machine should move at normal drive speeds.

8 Raise the primary boom above the drive limit switch.

9 Slowly move the drive control handle off center.

⊙ Result: The machine should move at a reduced drive speed.

Specifications	
Elevated position	
2WD and 4WD	1 foot / 0.3 meter per second

TABLE A PROCEDURES

Drive Enable Limit Switch

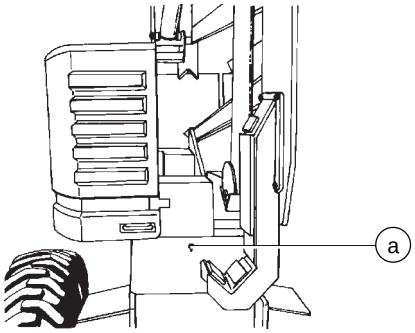
1 With the engine off and the machine in the stowed position, visually inspect the drive enable limit switch for the following:

· broken or missing rollers or arms

· missing fasteners

· loose wiring

2 Manually activate the drive enable limit switch.



a drive enable limit switch

⊙ Result: The drive enable limit switch roller should move freely and spring return to center. A distinct click should be felt and heard.

3 Start the engine from the platform controls and then swing the turntable to the left until the platform is positioned over the left steer wheel.

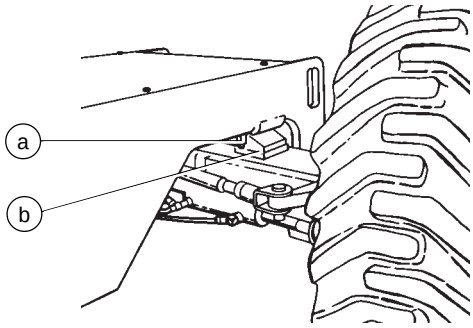
⊙ Result: The *platform over steer wheels* indicator light should be on. Drive movement should stop until the drive enable override switch is activated.

4 Swing the turntable to the right until the platform is positioned over the right steer wheel.

⊙ Result: The *platform over steer wheels* indicator light should be on. Drive movement should stop until the drive enable override switch is activated.

Oscillating Axle Limit Switches

1 With the engine off and the machine in the stowed position, visually inspect the oscillate lock-out switch for the following:



Oscillating axle limit switch
a limit switch
b oscillate lock out wedge

· broken or missing rollers or arms

· missing fasteners

· loose wiring

2 Start the engine from the ground controls and raise the boom above the drive speed limit switch.

⊙ Result: The oscillation cylinder should extend the lock-out wedges. The boom should stop moving until the wedges are fully extended.

TABLE A PROCEDURES

A-14
Replace the Engine Oil and Filter

NOTICE Engine specifications require that this procedure be performed every 100 hours. Perform this procedure more often if dusty conditions exist or the machine is subjected to extended low idle operation.

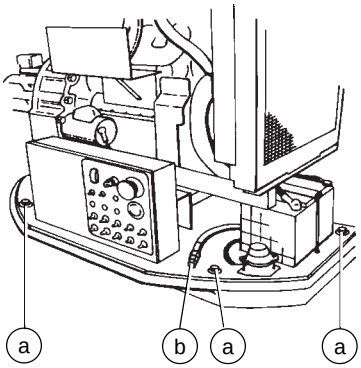
Periodic replacement of the engine oil and filter is essential to good engine performance. Operating the machine with an improper oil level or neglecting periodic oil and filter changes can damage engine components. A daily check of elapsed machine hours against the hours noted on the oil filter will allow the inspector to anticipate and perform oil and filter changes at the 100 hour interval.

NOTICE Perform this procedure after warming the engine to normal operating temperature.

⚠CAUTION Beware of hot engine parts and oil. Contact with hot engine oil and/or engine parts may cause severe burns.

1 Remove the oil filler cap located on the valve cover.

2 Pull the end of the oil drain hose out from under the engine.



a pivot plate bolts
b oil drain hose

3 Remove the plug from the end of the drain hose and allow all of the oil from the engine to drain into a container capable of holding 3 gallons.

4 Re-install the plug into the drain hose.

5 Use an oil filter wrench and remove the filter.

Ford models: Remove the 3 bolts from the engine pivot plate. Swing the engine pivot plate away from the machine to access the oil filter.

6 Apply a thin layer of oil to the new oil filter gasket. Then install the filter and tighten it securely by hand.

7 Fill the engine with new oil per specifications and replace the filler cap.

8 Start the engine from the ground controls. Allow the engine to run for 30 seconds and then turn the engine off.

9 Check the oil filter and the oil drain hose for leaks.

10 Use an indelible ink marker to write the date and number of hours from the hour meter on the oil filter.

Ford Models: Swing the engine pivoy plate back to its original position and replace the three retaining bolts.

11 Check the engine oil level dipstick. Add oil if needed.

Specifications	
Ford Engine LSG 423 Lubrication System	
Oil capacity	5 quarts / 4.7 liters
Oil viscosity requirements	
below 60F / 15.5C	5W-30
-10 to 90F / -23 to 32C	10W-30
above -10F / -23C	10W-40 or 10W-50
above 25F / -4C	20W-40 or 20W-50
Kubota Engine V1702-B Lubrication System	
Oil capacity	9.5 quarts / 9 liters
Oil viscosity requirements	10W-30
Engine oil should be MIL-L-2104C or have the properties of AI classification CC/CD/CE grades.	

A-15
Change the Engine Air Filter

NOTICE Engine specifications require that this procedure be performed every 100 hours. Perform this procedure more often if dusty conditions exist.

Maintaining the engine air filter in good condition is essential to good engine performance and service life. Failure to perform this procedure can lead to poor engine performance and component damage.

NOTICE Perform this procedure with the engine off.

1 Remove the end cap from the air cleaner canister.

NOTICE Kubota models: Remove the air cleaner canister mounting straps then the end cap.

2 Remove the mounting fastener from the air filter, and then remove the air filter.

3 Insert the new air filter and replace the mounting fasteners.

4 Replace the end cap on the canister.

TABLE A PROCEDURES

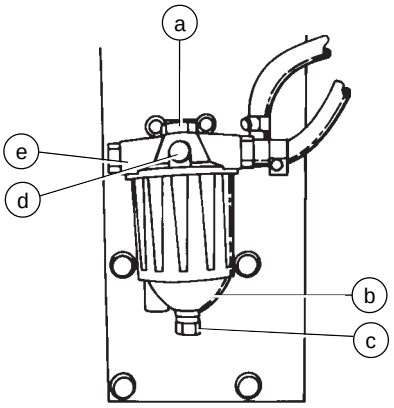
A-16
Drain the Fuel Filter/ Water Separator - Diesel Models

NOTICE Engine specifications require that this procedure be performed every 100 hours, along with an oil and filter change. Poor fuel quality or very wet conditions may necessitate performing this procedure more often.

Proper maintenance of the fuel filter/water separator is essential for good engine performance. Failure to perform this procedure can lead to poor engine performance and component damage.

NOTICE Perform this procedure with the engine off.

⚠ DANGER Engine fuels are explosive. Perform this procedure in an open, well-ventilated area away from heaters, sparks, flames and lighted tobacco. Always have an approved fire extinguisher within easy reach.



Fuel filter/water seperator

a head bolt
b filter bowl
c drain plug
d vent plug
e separator head

1 Loosen the vent plug located on the fuel filter/ water separator head.

2 Loosen the drain plug located at the bottom of the bowl. Allow the water to drain into a container until fuel starts to come out. Immediately tighten the drain plug.

3 Tighten the vent plug and clean up any spills or wet surfaces.

NOTICE If the fuel bowl is completely drained, you must prime the fuel filter/water separator before starting the engine. Refer to C-8 in this section, *Replace The Diesel Fuel Filter,* for instructions on how to prime the fuel filter/ water separator.

4 Start the engine from the ground controls and check the fuel filter/water separator for leaks.

Table B Procedures

B-1
Check the Engine Fan Belts

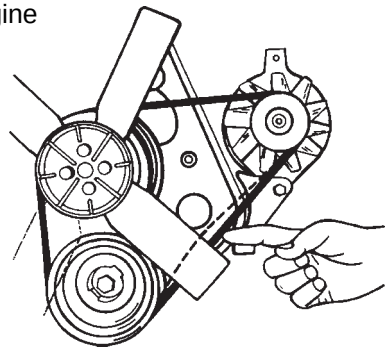
Maintaining the engine fan belts is essential to good engine performance and service life. The machine will not operate properly with a loose or defective belt and continued use may cause component damage.

⚠WARNING Do not inspect while the engine is running. Remove the key to secure from operation.

⚠CAUTION Beware of hot engine components. Contact with hot engine components may cause severe burns.

1 Inspect the engine fan belts for:

- · cracking
- · glazing
- · separation
- · breaks



2 Check the engine fan belts for proper tension.

Specifications	
Belt Deflection	3/8 inch - 1/2 inch 0.9cm - 1.2cm

B-2
Check the Radiator

Maintaining the radiator in good condition is essential for good engine performance. Operating a machine with a damaged or leaking radiator may result in engine damage. Also, restricting air flow through the radiator (i.e., dirt or debris) will affect the performance of the cooling system. A frequent check allows the inspector to identify changes in the condition of the radiator that might indicate cooling system problems.

⚠WARNING Do not inspect while the engine is running. Remove the key to secure from operation.

⚠CAUTION Beware of hot engine components. Contact with hot engine components may cause severe burns.

1 Inspect the radiator for leaks and physical damage.

2 Clean the radiator fins of debris and foreign materials.

B-3
Check the Exhaust System

Maintaining the exhaust system is essential to good engine performance and service life. Operating the machine with a damaged or leaking exhaust system can cause component damage and unsafe operating conditions.

⚠WARNING Do not inspect while the engine is running. Remove the key to secure from operation.

⚠CAUTION Beware of hot engine components. Contact with hot engine components may cause severe burns.

1 Be sure that all nuts and bolts are tight.

2 Inspect all welds for cracks.

3 Inspect for exhaust leaks; i.e., carbon buildup around seams and joints.

TABLE B PROCEDURES

B-4
Check the Battery

NOTICE The factory ships each machine with a sealed battery; checking the water level is not necessary. If the battery is replaced with another type, the battery acid level and specific gravity should be checked at this time.

Proper battery condition is essential to good engine performance and operational safety. Improper fluid levels or damaged cables and connections can result in engine component damage and extremely hazardous conditions.

⚠WARNING Batteries contain acid. Avoid spilling or contacting battery acid. Neutralize battery acid spills with baking soda and water.

1 Put on protective clothing and eye wear if batteries are to be opened.

2 Be sure that the battery cable connections are free of corrosion.

3 Be sure that the battery hold down and cable connections are tight.

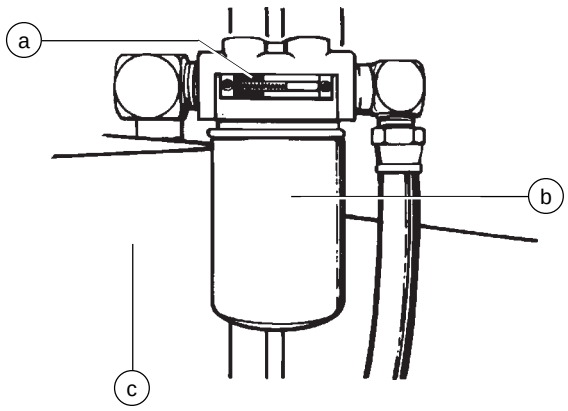
B-5
Check the Hydraulic Reservoir Filter Condition Indicator

Maintaining the hydraulic reservoir filter in good condition is essential to good system performance and safe machine operation. The filter condition indicator will show when the hydraulic flow is bypassing a clogged filter. If the filter is not frequently checked and replaced, impurities will remain in the hydraulic system and cause component damage.

1 Start the engine from the platform controls.

2 Switch the engine speed control to high idle (rabbit symbol).

3 Inspect the filter condition indicator.



a filter condition indicator
b filter
c hydraulic reservoir

⊙ Result: The filter should be operating in the *green* area. If the display shows *red,* this indicates that the hydraulic filter is being bypassed and the filter should be replaced.

TABLE B PROCEDURES

B-6
Inspect Electrical Wiring

Maintaining electrical wiring in good condition is essential to safe operation and good machine performance. Failure to find and replace burnt, chafed, corroded or pinched wires could result in unsafe operating conditions and may cause component damage.

⚠WARNING Electrocution hazard. Contact with hot or live circuits may result in death or serious injury. Remove all rings, watches and other jewelry.

1 Inspect the following areas for burnt, chafed, corroded and loose wires:

- · engine compartment relay panel
- · engine wiring harness
- · inside of the ground control box
- · turntable manifold wiring

2 Start the engine from the ground controls, and then raise the secondary boom until the upper pivot is above the turntable covers.

3 Inspect the upper pivot area for burnt, chafed and pinched cables.

4 Fully lower the boom into the stowed position and turn the engine off.

5 Inspect the following areas for burnt, chafed, corroded, pinched and loose wires:

- · cable track on the primary and secondary booms
- · primary boom to platform cable harness
- · inside of the platform control box

B-7
Inspect the Tires and Wheels

Maintaining the tires and wheels in good condition is essential to safe operation and good performance. Tire and/or wheel failure could result in a machine tip-over. Component damage may also result if problems are not discovered and repaired in a timely fashion.

1 Check all tire treads and sidewalls for cuts, cracks, punctures and unusual wear.

2 Check each wheel for damage, bends and cracked welds.

3 Check every lug nut for proper torque.

4 Check the pressure in each air-filled tire.

Specifications:

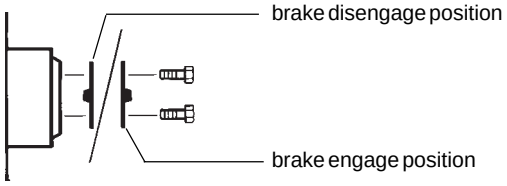
Tires and Wheels	Rough terrain	Industrial
Wheel lugs - 4WD	9 @ 5/8-18	
Wheel lugs - 2WD front rear	 8 @ 5/8-18 8 @ 5/8-18	
Lug nut torque	9 @ 5/8-18 9 @ 5/8-18 125 ft-lbs125 ft-lbs 169.5 Nm169.5 Nm	
Tire size		
Tire ply rating	14-17.5NHS 9 - 14.5 LT	
Tire pressure - 2WD	Tread 8 Tread 8	
Tire pressure - 4WD	Sidewall 6	
	40 psi 100 psi 2.76 bar6.89 bar	
	28 psi 1.93 bar	

TABLE B PROCEDURES

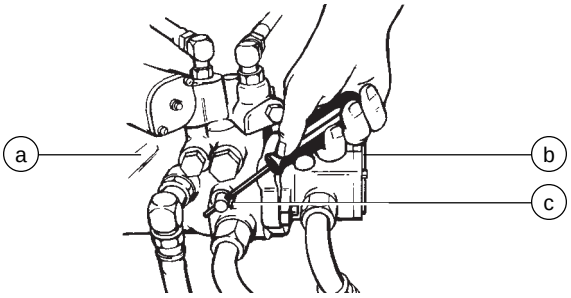
B-8
Confirm Proper Brake Configuration

Proper brake configuration is essential to safe operation and good machine performance. Hydrostatic brakes and hydraulically released, spring applied individual wheel brakes can appear to operate normally when they are actually not fully operational.

1 Check the torque hub disconnect caps to be sure they are in the engaged position.



2 On 4WD models, be sure the free-wheel valve on the drive pump is closed (clockwise).

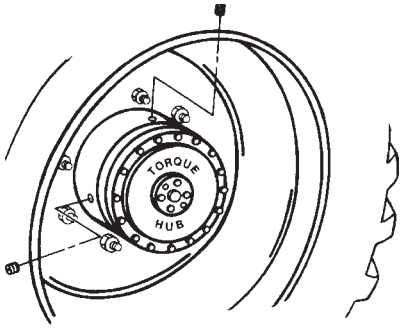


a drive pump
b lift pump
c free-wheel valve

B-9
Check the Oil Level in the Torque Hubs

Failure to maintain proper torque hub oil levels may cause the machine to perform poorly and continued use may cause severe component damage.

1 Drive the machine to rotate the hub until the side plugs are located one on top and the other at 90 degrees.



2 Remove the plug located at 90 degrees and check the oil level.

⊙ Result: The oil level should be even with the bottom of the plug hole.

3 If necessary, remove the top plug and add oil until the oil level is even with the bottom of the side plug hole, then re-install the plugs into the hub.

4 Repeat this procedure for each torque hub.

Specifications	
Capacity	17 fluid ounces / 0.5 liters
Type	SAE 90 multipurpose hypoid gear oil - API service classification GL5

B-10
Check the Engine Choke - Gasoline/LPG Models

Automatic Choke

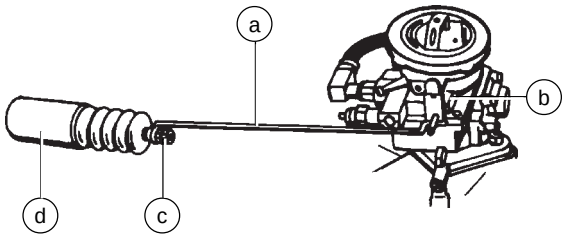
NOTICE The machine is equipped with an automatic choke if a choke switch can't be found near the start switch. The automatic choke does not need to be inspected or adjusted unless the following conditions exist:

- The machine does not start easily in cold temperatures.
- The engine does not run smoothly after a cold start. See 7-4, *Choke Adjustments.*

Manual Choke

A properly functioning choke is essential to good engine performance. An improperly functioning choke will result in difficulty with engine starting.

1 Check the choke linkage connections.



a linkage
b carburetor
c linkage lock nuts
d choke solenoid

2 Turn the key switch to ground control and then pull out the ground control Emergency Stop button to the *on* position.

3 While operating the choke switch, inspect the choke solenoid.

⊙ Result: The choke solenoid should be fully retracted when the choke switch is activated.

4 Turn the key switch to platform control.

5 Pull out the platform control Emergency Stop button to the *on* position and then operate the choke switch and listen for choke solenoid operation.

B-11
Check the Glow Plugs - Diesel Models

Maintaining the glow plugs in good condition is essential to good engine performance and service life. Improperly functioning glow plugs will cause the engine to perform poorly and may result in component damage.

NOTICE Perform this procedure with the engine turned off.

1 Connect an ohmmeter between the far left glow plug and machine ground.

⊙ Result: The resistance should be approximately 0.4Ω.

2 If the ohm reading is different than 0.4Ω, remove each wire from the four individual glow plugs. Then, one glow plug at a time, check the resistance between the glow plug and machine ground.

⊙ Result: The resistance should be approximately 1.6Ω for each individual glow plug.

3 Turn the machine on, but do not start the engine.

4 Connect a volt meter to the number four glow plug and machine ground.

5 Hold the glow plug switch in the *on* position.

⊙ Result: The volt meter should read 12 volts.

TABLE B PROCEDURES

B-12
Check and Adjust the Engine Idle Mixture - Gasoline/LPG Models

Complete information to perform this procedure is available in the Ford LSG-423 2.3 Litre Industrial Engine Service Manual (Ford number: 194-216). Genie part number 29586.

B-13
Check and Adjust the Engine RPM

Maintaining the engine rpm at the proper setting for both low and high idle is essential to good engine performance and service life. The machine will not operate properly if the rpm is incorrect and continued use may cause component damage.

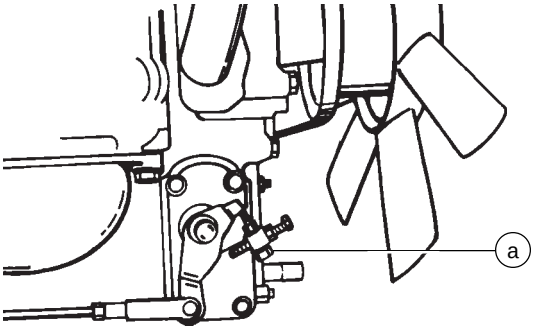
NOTICE Perform this procedure in gasoline mode with the engine at normal operating temperature.

1 Connect an rpm gauge to the engine, and then start the engine from the ground controls.

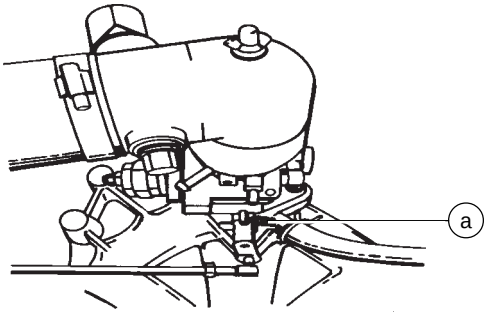
⊙ Result: Low idle should be 1200 rpm.

Skip to step 3 if the low idle rpm is correct.

2 Turn the idle adjustment screw clockwise to increase rpm or counterclockwise to decrease rpm.



Kubota low idle adjustment
a adjustment screw



Ford low idle adjustment
a adjustment screw

3 Move the engine speed control switch to high idle (rabbit symbol) from the ground controls.

⊙ Result: High idle should be 2150 rpm.

Adjust high idle rpm, if necessary, by following the appropriate steps for the engine model:

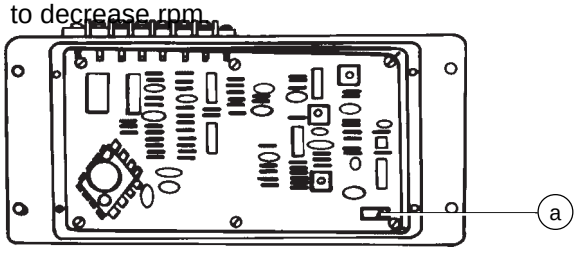
Ford engines: 4 through 7

4 Turn the engine off.

5 Remove the mounting fasteners from the electronic governor located on the relay panel, and then remove the back panel from the governor.

WARNING Electrocution Hazard. Contact with hot or live circuits may result in death or serious injury. Remove all rings, watches and other jewelry.

6 Restart the engine, turn the speed set screw clockwise to increase rpm or counterclockwise to decrease rpm.



Ford high idle adjustment

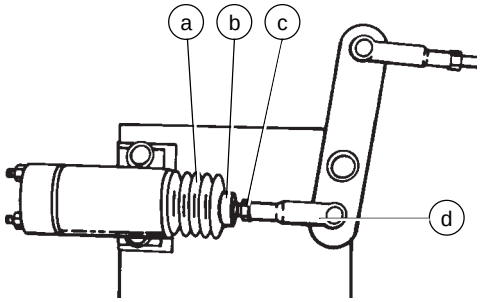
a high idle adjustment

7 Re-assemble the governor and recheck high idle rpm.

Kubota engines: 8 through 11

8 Turn the engine off.

9 Loosen the lock nut on the Trombetta solenoid, and then pull the rubber boot off the solenoid.



Kubota high idle adjustment

a rubber boot
b adjustment nut
c lock nut
d yoke

10 Screw the adjustment nut into the yoke to increase the rpm. Back the adjustment nut out of the yoke to decrease rpm.

NOTICE Be sure that the stop screw on the governor throttle lever does not limit solenoid travel. The solenoid must fully retract when energized to prevent solenoid damage.

11 Reconnect the rubber boot to the solenoid. Then tighten the lock nut and recheck the rpm.

Specifications	
Ford and Kubota Engines	
Low idle	1200 rpm
High idle	2150 rpm

B-14
Test the Key Switch

Proper key switch action and response is essential to safe machine operation. The machine can be operated from the ground or platform controls and the activation of one or the other is accomplished with the key switch. Failure of the key switch to activate the appropriate control panel could cause a hazardous operating situation.

1 Pull out the Emergency Stop button to the *on* position at both the ground and platform controls.

2 Turn the key switch to ground control, start the engine and then turn the key switch to **platform control**.

3 Operate each machine function from the **ground controls**.

⊙ Result: The machine functions should **not** operate.

4 Turn the key switch to ground control.

5 Operate each machine function from the **platform controls**.

⊙ Result: The machine functions should **not** operate.

6 Turn the key switch to the *off* position.

⊙ Result: The engine should stop and no functions should operate.

TABLE B PROCEDURES

B-15
Test the Emergency Stop Buttons

Properly functioning Emergency Stop buttons are essential for safe machine operation. An improperly operating Emergency Stop button will fail to shut off power and stop all machine functions resulting in a hazardous situation for ground and platform personnel.

NOTICE As a safety feature, selecting and operating the ground controls can override the platform controls, including the Emergency Stop button.

1 Start the engine from the ground controls.

2 Push down the Emergency Stop button to the *off* position.

⊙ Result: The engine should be off and no machine functions should operate.

NOTICE Diesel models: All functions should stop immediately. The engine will shut off after 2 or 3 seconds.

3 Start the engine from the platform controls.

4 Push down the Emergency Stop button to the *off* position.

⊙ Result: The engine should be off and no machine functions should operate.

NOTICE The ground Emergency Stop button will stop all machine operation, even if the key switch is switched to platform control.

B-16
Test the Ground Control Override

A properly functioning ground control override is essential to safe machine operation. The ground control override function is intended to allow ground personnel to operate the machine from the ground controls whether or not the Emergency Stop button on the platform controls is in the *on* or *off* position. This function is particularly useful if the operator at the platform controls can not return the boom to the stowed position.

1 Push in the platform Emergency Stop button to the *off* position.

2 Start the engine from the ground controls.

3 Operate each boom function through a partial cycle.

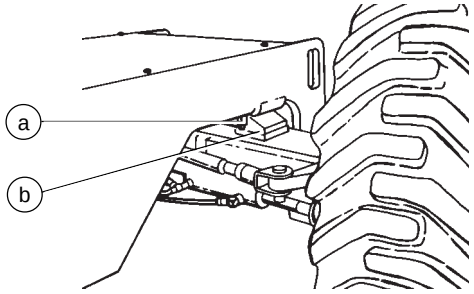
⊙ Result: All boom functions should operate.

B-17
Test the Oscillate Lock-out

NOTICE Perform this test on oscillating axle equipped machines only.

Proper axle oscillate lock-out when the boom is raised is essential to safe machine operation. If the lock-out wedges do not extend when the boom is raised, the stability of the machine is compromised and it may tip over.

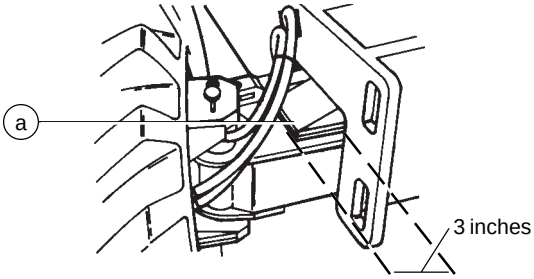
1 From the ground controls, raise the primary boom above the drive speed limit switch.



Oscillating axle limit switch
a limit switch
b oscillating lock out wedge

⊙ Result: The oscillate cylinder should extend the lock-out wedges 3 inches (7.6cm) past the chassis frame. The boom should stop moving until the wedges are fully extended.

TABLE B PROCEDURES



a oscillate lock out wedge

2 Lower the primary boom onto its resting pad.

⊙ Result: The oscillate lock-out wedges should fully retract.

NOTICE When the primary and secondary booms are fully lowered into the stowed position and the engine is turned off, the oscillate lock-out wedges may partially extend. This should not be mistaken for the full lock-out position.

B-18
Test Platform Self-leveling

Precise automatic platform self-leveling throughout the full cycle of boom raising and lowering is essential for safe machine operation. The platform is maintained at level by a hydraulic cylinder (leveling slave cylinder) which is controlled by the master cylinder located at the base of the primary boom. A platform self-leveling failure creates an unsafe working condition for platform and ground personnel.

1 Start the engine from the ground controls, then fully lower the boom into the stowed position.

2 Adjust the platform to a level position using the manual platform leveling switch.

3 Raise and lower the primary boom through a full cycle.

⊙ Result: The platform should remain level at all times to within ±5 degrees.

B-19
Test the Service Horn

A functional service horn is essential to safe machine operation. The service horn is activated at the platform controls and sounds at the ground as a warning to ground personnel. An improperly functioning horn will prevent the operator from alerting ground personnel of hazards or unsafe conditions.

1 Turn the key switch to platform control and pull out the Emergency Stop button to the *on* position.

2 Push down the service horn button at the platform controls.

⊙ Result: The service horn should sound.

B-20
Test the Foot Switch

A properly functioning foot switch is essential to safe machine operation. Machine functions should activate and operate smoothly as long as the foot switch is pressed down, and promptly stop when the foot switch is released. The foot switch will also shift the engine into *high idle* mode if the idle select is switched to the rabbit and foot switch symbol. An improperly functioning foot switch can cause an unsafe working condition and endanger platform and ground personnel.

NOTICE The engine should not start if the foot switch is pressed down.

1 Start the engine from the platform controls.

2 Without pressing down the foot switch, operate the machine functions.

⊙ Result: The machine functions should not operate.

3 Press down the foot switch and operate the machine functions.

⊙ Result: The machine functions should operate.

TABLE B PROCEDURES

B-21
Test the Engine Speed Select

A properly operating engine rpm select switch is essential to good engine performance and safe machine operation. There are three rpm settings:

The foot switch activated high idle (rabbit and foot switch symbols) should be sued for normal machine operation. This selection activates high idle only when the foot switch is pressed down.

Low idle (turtle symbol) mode allows the operator to control individual boom functions only.

High idle (rabbit symbol) mode allows the operator to control multiple boom and/or drive functions simultaneously. This setting maintains a consistent high idle and usually selected only when the generator option is being used.

1 Pull out the Emergency Stop button to the *on* position at both the ground and platform controls.

2 Start the engine from the ground controls. Then move the engine speed control switch to high idle (rabbit symbol) and hold in the *on* position.

⊙ Result: The engine should change to high idle.

3 Release the engine speed control switch.

⊙ Result: The engine should return to low idle.

4 Turn the key switch to platform controls.

5 At the platform controls, move the engine speed control switch to high idle (rabbit symbol).

⊙ Result: The engine should change to high idle.

6 Move the engine speed control switch to low idle (turtle symbol).

⊙ Result: The engine should change to low idle.

7 Move the engine speed control switch to foot switch activated high idle (rabbit and foot switch symbol).

⊙ Result: The engine should not change to high idle.

8 Press down the foot switch.

⊙ Result: The engine should change to high idle.

Specifications	
High idle	2150 rpm
Low idle	1200 rpm

B-22
Test Fuel Select Operation - Gasoline/LPG Models

The ability to select and switch between gasoline and LP fuels as needed is essential to safe machine operation. A fuel selection can be made when the engine is running or not. Switching malfunctions and/or the failure of the engine to run properly in both fuel modes and through all idle speeds can indicate fuel system problems that could develop into a hazardous situation.

NOTICE Perform this test after checking the gasoline and propane gas fuel levels, and warming the engine to normal operating temperature.

1 Move the fuel select switch to gasoline and then move the engine speed control switch to foot switch activated high idle (rabbit and foot switch symbol).

2 Start the engine from the platform controls and allow it to run at low idle.

3 Press down the foot switch to allow the engine to run at high idle.

⊙ Result: The engine should start promptly and operate smoothly in low and high idle.

4 Release the foot switch and stop the engine.

5 Move the fuel select switch to propane gas.

6 Restart the engine and allow it to run at low idle.

7 Press down the foot switch to allow the engine to run at high idle.

⊙ Result: The engine should start promptly and operate smoothly in low and high idle.

NOTICE The engine may hesitate momentarily and then continue to run on the selected fuel if the fuel source is switched while the engine is running.

B-23
Test the Turntable Rotation Stop

The turntable is capable of rotating the boom 359 degrees and is stopped midpoint between the steering wheels by the rotation stop. Detecting a rotation stop malfunction is essential to safe operation and good machine performance. If the turntable rotates past the rotation stop, component damage may result.

1 Start the engine from the platform controls.

2 Swing the turntable to the left as far as it will go.

⊙ Result: Movement should stop when the boom reaches mid-point between the steer tires.

3 Swing the turntable to the right full circle as far as it will go.

⊙ Result: Movement should stop when the boom reaches mid-point between the steer tires.

B-24
Test the Drive Enable System

Proper drive enable system operation is essential to safe machine operation. When the platform is over the steering wheels, drive movement is stopped and the indicator light turns *on* and the drive enable switch must be used to reactivate the drive function. This should inform the operator that the machine will move in the opposite direction that the drive and steer controls are moved. An improperly functioning drive enable system may allow the boom to be moved into an unsafe position.

1 Start the engine from the platform controls.

2 Swing the turntable to the right until the platform is positioned over the right steer wheel.

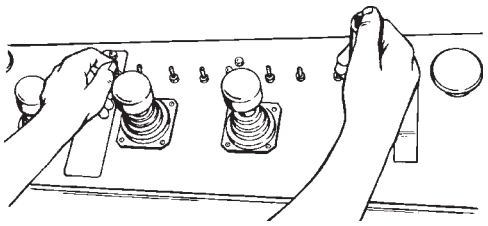
⊙ Result: *Platform over steer wheel* indicator light should turn on.

3 Slowly move drive control handle off center.

⚠CAUTION Always use the color coded direction arrows on the platform control panel and the drive chassis to identify which direction the machine will travel.

⊙ Result: Drive function should not operate.

4 Hold drive enable toggle switch to either side and slowly move the drive control handle off center.



⊙ Result: Drive function should operate.

5 Swing the turntable to the left until platform is positioned over the left steer tire.

⊙ Result: *Platform over steer wheel* indicator light should come on.

6 Repeat steps 3 and 4.

TABLE B PROCEDURES

B-25
Test the Drive Brakes

Proper brake action is essential to safe machine operation. The Brake function should operate smoothly, free of hesitation, jerking and unusual noise. Hydrostatic brakes and hydraulically released individual wheel brakes can appear to operate normally when not fully operational.

NOTICE Be sure that the machine is not in free-wheel or partial free-wheel configuration. Refer to B-8 in this section, *Confirm Proper Brake Configuration*.

NOTICE Select a test area that is firm, level and free of obstructions.

1 Mark a test line on the ground for reference.

2 Start the engine from the platform controls, and then select high drive mode (2 wheel symbol).

3 Fully lower the boom into the stowed position.

4 Choose a point on the machine; i.e., contact patch of a rear tire, as a visual reference for use when crossing the test line.

5 Bring the machine to top drive speed before reaching the test line. Release the drive joystick when your reference point on the machine crosses the test line.

6 Measure the distance between the test line and your machine reference point.

NOTICE The brakes must be able to hold the machine on any slope it is able to climb.

Specifications: high range, paved surface	
Stopping distance, normal operating temp.	5.5 to 6 feet / 1.67 to 1.82 meters

B-26
Test Drive Speed - Stowed Position

Proper drive function movement is essential to safe machine operation. The drive function should respond quickly and smoothly to operator control. Drive performance should also be free of hesitation, jerking and unusual noise over the entire proportionally controlled speed range.

NOTICE Select a test area that is firm, level and free of obstructions.

1 Create start and finish lines by marking two lines on the ground 20 feet (6m) apart.

2 Start the engine from the platform controls, and then select high drive mode (2 wheel symbol).

3 Move the engine speed control switch to high idle (rabbit & foot switch), and then fully lower the boom into the stowed position.

4 Choose a point on the machine; i.e., contact patch of a rear tire, as a visual reference for use when crossing the start and finish lines.

5 Bring the machine to top drive speed before reaching the start line. Begin timing when your reference point on the machine crosses the start line.

6 Continue at full speed and note the time when the machine reference point passes over the finish line.

Specifications: stowed position, high range	
Distance: 20 feet / 6 meters	
4WD	2.85 seconds (±0.25 seconds)
2WD	2.75 seconds (±0.25 seconds)

B-27
Test the Alarm Package (optional equipment)

The alarm package includes:

- travel alarm
- descent alarm
- flashing beacon

Alarms and beacons are installed to alert operators and ground personnel of machine proximity and motion. The alarm package components are installed on the right side, on top of the turntable cover.

NOTICE The alarm and beacons will operate with the engine running or not.

1 At the ground controls pull out the Emergency Stop button to the *on* position and turn the key switch to ground control.

⊙ Result: The flashing beacon should be on and flashing.

2 Move the primary boom switch to the *down* position, hold for a moment and then release it. Now move the secondary boom switch to the *down* position, hold for a moment and then release it.

⊙ Result: The descent alarm should sound when each switch is held down.

3 Turn the key switch to platform control, then from the platform controls, pull out the Emergency Stop button to the *on* position.

⊙ Result: The flashing beacon should be on and flashing.

4 Press down the foot switch. Move the primary boom control handle to the *down* position, hold for a moment and then release it. Move the secondary boom control handle to the *down* position, hold for a moment and then release it.

⊙ Result: The descent alarm should sound when each control handle is held down.

6 Press down the foot switch. Slowly move the drive control handle off center, hold for a moment and then release it. Slowly move the drive control handle off center in the opposite direction, hold for a moment and then release it.

⊙ Result: The travel alarm should sound when the drive control handle is moved off center in either direction.

Table C Procedures

C-1
Check the Primary Boom Wear Pads

Maintaining the primary boom wear pads in good condition is essential to safe machine operation. Wear pads are placed on boom surfaces to provide a low friction, replaceable wear pad between moving parts. Improperly shimmed wear pads or continued use of worn out wear pads may result in component damage and unsafe operating conditions.

1 Start the engine from the ground controls, then raise the end of the primary boom to a comfortable working height (chest high).

2 Extend the extension boom 10 inches (25cm).

3 Measure each wear pad. Replace the pad if it is less than 0.41 inches (1cm) thick. If the pad is more than 0.41 inches (1cm) thick, shim as necessary to obtain zero clearance and zero drag.

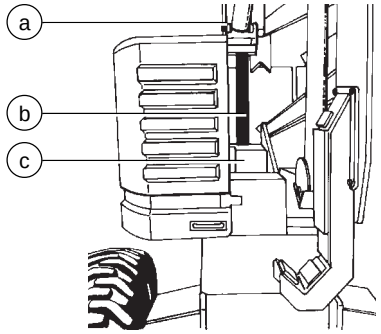
4 Extend and retract through the entire range of motion to check for tight spots that could cause binding.

NOTICE Always maintain squareness between the primary boom outer and inner tubes.

C-2
Check the Turntable Rotation Bearing Bolts

Maintaining proper torque on the turntable bearing bolts is essential to safe machine operation. Improper bolt torque could result in an unsafe operating condition and component damage.

1 Raise the secondary boom and place a 4x4x31 inch (78cm) block between the chassis counterweight and the upper mid-pivot. Carefully lower the secondary boom onto the block.

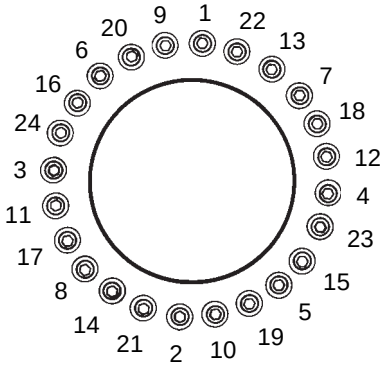


a upper mid-pivot
b 4x4x31 inch block
c counterweight

WARNING Crushing hazard. Keep hands away from the block and all moving parts when lowering the secondary boom.

2 Raise the primary boom until the end of the boom is approximately 7 feet (2m) off the ground.

3 Be sure that each turntable bolt is torqued to 190 foot-pounds (258 Newton meters).



Bolt torque sequence

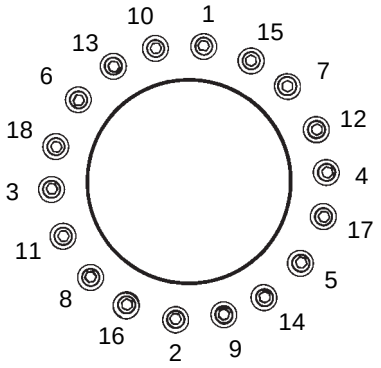
4 Remove the support block and then lower the primary and secondary booms to the fully stowed position.

5 Use a forklift to support the chassis counterweight, directly below the turntable bearing.

6 Loosen the counterwight positioning bolt, then remove the 2 mounting bolts.

7 Carefully lower and remove the counterweight.

8 Be sure that each bearing mounting bolt. is torqued to 190 foot-pounds (258 Newton meters).



Bolt torque sequence

9 Reinstall the counterweight.

C-3
Check the Free-wheel Feature

Proper use of the free-wheel configuration is essential to safe machine operation. The free-wheel configuration is used primarily for towing. A machine configured to free-wheel without operator knowledge may result in death or serious injury and property damage.

⚠WARNING Collision hazard. Select a work site that is firm and level.

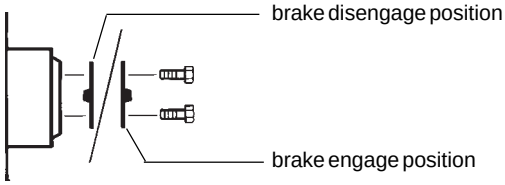
Rear drive wheels: All models

1 Chock the steer wheels to prevent the machine from rolling.

2 Center a lifting jack of ample capacity (5000 lbs / 2268kg) under the chassis between the rear drive wheels.

3 Lift the wheels off the ground and then place jack stands under the chassis for support.

4 Disengage the rear brakes by turning over the torque hub disconnect caps on each rear wheel hub.



5 Manually rotate each rear wheel.

⊙ Result: Each rear wheel should rotate with minimum effort.

6 Re-engage the brakes by turning over the hub disconnect caps. Carefully remove the jack stands, lower the machine and remove the jack.

⚠WARNING Collision hazard. Failure to re-engage the brakes may result in death or serious injury and property damage.

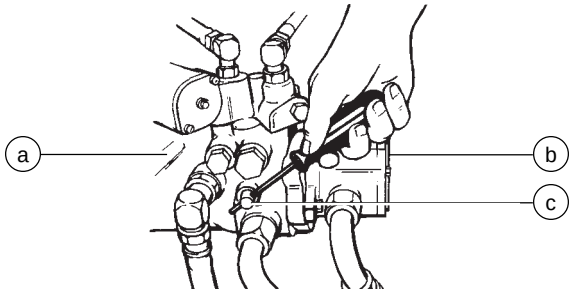
Steer wheels: 4WD models

7 Chock the drive wheels to prevent the machine from rolling.

8 Position the lifting jack under the front axle and center it between the steering wheels.

9 Lift the wheels off the ground and then place jack stands under the chassis for support.

10 Open the free wheel valve, located on the drive pump, by turning it counterclockwise two turns.



a drive pump
b lift pump
c free-wheel valve

TABLE C PROCEDURES

11 Manually rotate each steer wheel.

⊙ Result: Each steer wheel should rotate with minimal effort.

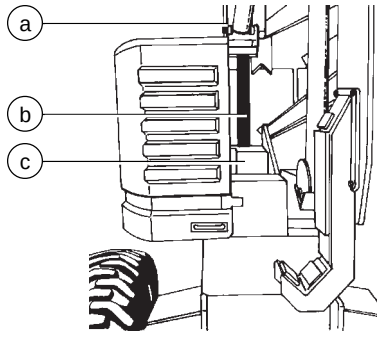
12 Close the free wheel valve (clockwise). Carefully remove the jack stands, lower the machine and remove the jack.

⚠WARNING Collision hazard. Failure to close the free-wheel valve may result in death or serious injury and property damage.

C-4
Grease the Turntable Rotation Bearing and Worm Drive Gear

Yearly application of lubrication to the turntable bearing and worm drive gear is essential to good machine performance and service life. Continued use of an improperly greased gear will result in component damage.

1 Raise the secondary boom and place a 4x4x31 (78cm) block between the chassis counterweight and the upper mid-pivot. Carefully lower the secondary boom onto the block.



a upper mid-pivot
b 4x4x31 inch block
c counterweight

⚠WARNING Crushing hazard. Keep hands away from the block and all moving parts when lowering the secondary boom.

2 Raise the primary boom until the end of the boom is approximately 7 feet (2m) off the ground. Then shut off the engine.

3 Locate the grease fitting on the inside of the bearing in the middle of the turntable.

4 Pump grease into the rotation bearing until you see it coming out of the bearing seal gap. Repeat this step with the platform in the following locations.

· platform over the drive wheels

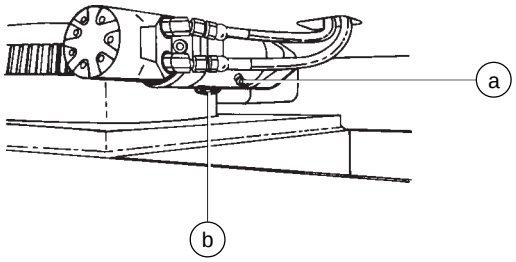
· platform over the left side

· platform over the drive wheels

· platform over the right side

⚠WARNING Crushing hazard. Turn the key switch to the *off* position and remove the key while pumping grease.

5 Locate the grease fitting on the worm drive housing.



a grease fitting
b grease overflow

6 Pump grease into the gear until you see it coming out of the side of the gear housing.

Specification
Multipurpose grease

TABLE C PROCEDURES

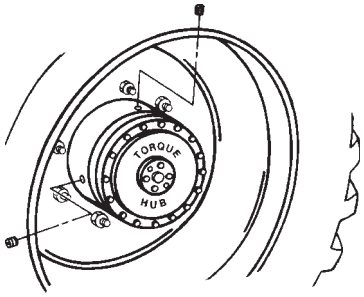
C-5
Replace the Torque Hub Oil

Replacing the torque hub oil is essential for good machine performance and service life. Failure to replace the torque hub oil at yearly intervals may cause the machine to perform poorly and continued use may cause component damage.

1 Select the torque hub to be serviced. Then drive the machine until one of the two plugs is at the lowest point.

2 Remove both plugs and drain the oil.

3 Drive the machine until one plug is at the top and the other is at 90 degrees.



4 Fill the hub with oil from the top hole until the oil level is even with the bottom of the side hole. Then re-install the plugs.

5 Repeat steps 1 through 4 for all the other drive torque hubs.

Specifications	
Capacity	17 fluid ounces 0.5 liters
Type	SAE 90 multipurpose hypoid gear oil. API classification GL5

C-6
Replace the Hydraulic Reservoir Filter

Replacement of the hydraulic reservoir filter is essential for good machine performance and service life. A dirty or clogged filter may cause the machine to perform poorly and continued use may cause component damage. Extremely dirty conditions may require that the filter be replaced more frequently.

⚠ CAUTION Beware of hot oil. Contact with hot oil may cause severe burns.

NOTICE Perform this procedure with the engine off.

1 Remove the filter with an oil filter wrench.

2 Apply a thin layer of oil to the new oil filter gasket.

3 Install the new filter and tighten it securely by hand. Clean up any oil that may have spilled during the installation procedure.

4 Start the engine from the ground controls.

5 Inspect the filter and related components to be sure that there are no leaks.

TABLE C PROCEDURES

C-7
Replace the Drive Loop Hydraulic Filter

Replacing the drive loop hydraulic filter is essential to good machine performance and service life. A dirty or clogged filter may cause the machine to perform poorly and continued use may cause component damage. Extremely dirty conditions may require that the filter be replaced more frequently.

⚠ CAUTION Beware of hot oil. Contact with hot oil may cause severe burns.

NOTICE Perform this procedure with the engine off.

1 Rotate the filter housing counterclockwise and remove the housing.

2 Remove the filter element from the housing.

3 Inspect the housing seal and replace it if necessary.

4 Install the new filter and hand tighten the housing onto the filter head. Clean up any oil that may have spilled during the installation procedure.

5 Start the engine from the ground controls.

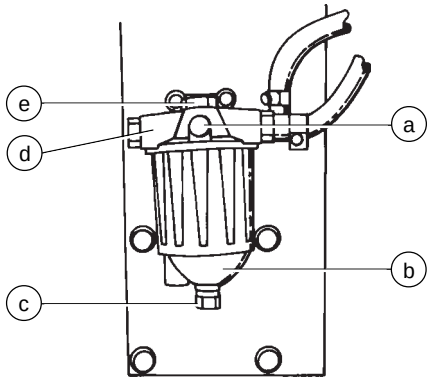
6 Inspect the filter assembly to ensure that there are no leaks.

C-8
Replace the Diesel Fuel Filter

Replacing the diesel fuel filter is essential to good engine performance and service life. A dirty or clogged filter may cause the engine to perform poorly and continued use may cause component damage. Extremely dirty conditions may require that the filter be replaced more frequently.

⚠ DANGER Engine fuels are combustible. Replace the fuel filter in an open, well-ventilated area away from heater, sparks, flames and lighted tobacco. Always have an approved fire extinguisher within easy reach.

NOTICE Perform this procedure with the engine off.



Fuel filter/water seperator
- a vent plug
- b filter bowl
- c drain plug
- d seperator head
- e head bolt

1 Loosen the vent plug located on the fuel filter/ water separator head.

2 Place a container under the bowl and then loosen the drain plug located at the bottom of the bowl. Completely drain the bowl.

3 Loosen the head bolt then rotate the bowl counterclockwise and remove it.

4 Remove the filter element from the bowl.

5 Apply a thin layer of oil onto the bowl gasket and then install the new filter element.

6 Tighten the drain plug and fill the bowl with clean diesel fuel.

7 Install the bowl onto the filter head, and then tighten the head bolt to 65 inch-pounds (7Nm).

8 Tighten the vent plug.

9 Clean up any diesel that may have spilled during the installation procedure.

10 Start the engine from the ground controls, then inspect the fuel filter water separator and hoses for leaks.

⚠ DANGER If a fuel leak is discovered, keep any additional personnel from entering the area and do not operate the machine. Repair the leak immediately.

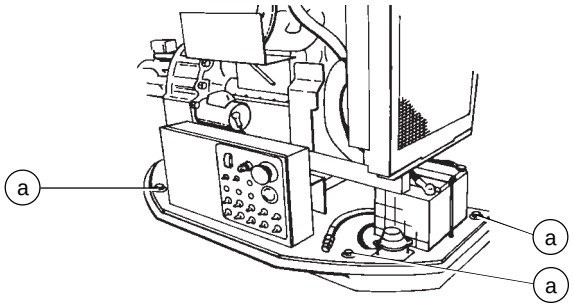
C-9
Replace the Gasoline Fuel Filter

Replacing the gasoline fuel filter is essential to good engine performance and service life. A dirty or clogged filter may cause the engine to perform poorly and continued use may cause component damage. Extremely dirty conditions may require that the filter be replaced more frequently.

⚠ DANGER Engine fuels are combustible. Replace the fuel filter in an open, well-ventilated area away from heaters, sparks, flames and lighted tobacco. Always have an approved fire extinguisher within easy reach.

NOTICE Perform this procedure with the engine off.

1 Remove the 3 bolts from the engine pivot plate. Swing the engine pivot plate away from the machine to access the fuel filter, located near the carburetor.



a pivot plate bolts

2 Loosen the filter bracket mounting bolt. Disconnect the fuel hoses from the filter, then slide the filter out of the bracket.

3 Install the new fuel filter in the bracket with the flow direction arrow, on the filter, pointing toward the carburetor. Tighten the bracket mounting bolt, then reconnect the fuel hoses to the filter.

4 Clean up any fuel that may have spilled during the installation procedure.

5 Swing the engine pivot plate back to its original position and replace the three retaining bolts.

6 Start the machine from the ground controls, then inspect the fuel filter and hoses for leaks.

⚠ DANGER If a fuel leak is discovered, keep any additional personnel from entering the area and do not operate the machine. Repair the leak immediately.

TABLE C PROCEDURES

C-10
Replace the PCV Valve - Gasoline/ LPG Models

Yearly replacement of the PCV valve is essential to good engine performance. A malfunctioning valve can impair crankcase ventilation and may cause engine damage.

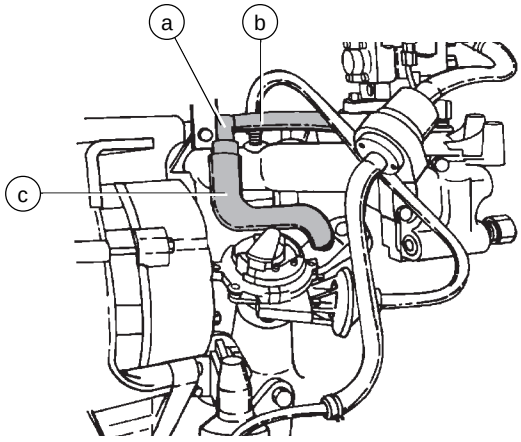
NOTICE Perform this procedure with the engine off.

1 Remove the 3 bolts from the engine pivot plate. Swing the engine pivot plate away from the machine to access the PCV valve.

2 Remove the hoses from the valve, then remove the valve.

3 Install the new valve.

4 Swing engine pivot plate back to its original position and replace the three retaining bolts.

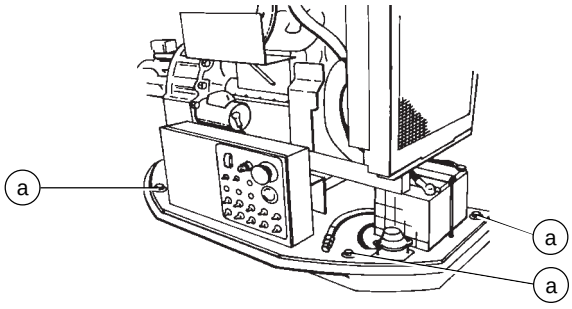


a PCV valve
b hose, PCV valve to carburetor
c hose, PCV valve to crankcase

C-11
Clean or Replace the Distributor Cap and Rotor - Gasoline/LPG Models

Distributor caps and rotors that are clean and free of damage, wear and corrosion are essential to good engine performance and service life. A dirty or worn cap and rotor may cause the engine to perform poorly and continued use may cause component damage. Extremely dirty conditions may require that the cap and rotor be replaced more frequently.

NOTICE Perform this procedure with the engine off.



a pivot bolt plates

1 Remove the 3 bolts from the engine pivot plate. Swing the engine pivot plate away from the machine to access the distributor.

2 Label and remove the coil and spark plug wires from the distributor cap.

3 Remove the cap and rotor from the distributor.

4 Clean the cap and rotor using electrical contact cleaner or a damp cloth.

5 Completely dry the cap and rotor.

NOTICE Moisture in the distributor cap will cause the engine to run poorly.

6 Inspect the cap and rotor for corrosion, cracks and abrasion. Replace the cap and rotor if they are damaged.

7 Install the rotor and cap, then re-attach the coil and spark plug wires.

8 Swing engine pivot plate back to its original position and replace the three retaining pins.

C-12
Replace the Spark Plugs - Gasoline/LPG Models

Periodic replacement of the spark plugs is essential to good engine performance and service life. Worn, loose or corroded spark plugs will cause the engine to perform poorly and may result in component damage.

NOTICE Perform this procedure with the engine turned off.

1 Label, then disconnect the plug wires from the spark plugs by grasping the molded boot. Do not pull on the plug wire.

2 Blow out any debris around spark plugs.

3 Remove all the spark plugs from the engine.

4 Adjust the gap on each new spark plug.

5 Install the new plugs, the reconnect the plug wires. Be sure that each spark plug wire is attached to the correct spark plug.

Specifications	
Spark Plugs (Motorcraft)	AWSF-42
Gap	0.032 - 0.036 inches 0.81 - 0.91mm
Torque specs	5 - 10 foot-pounds 6.8 - 13.6 Nm

C-13
Check and Adjust the Air/Propane Mixture

Maintaining the proper air-to-fuel mixture during propane operation is essential to good engine performance.

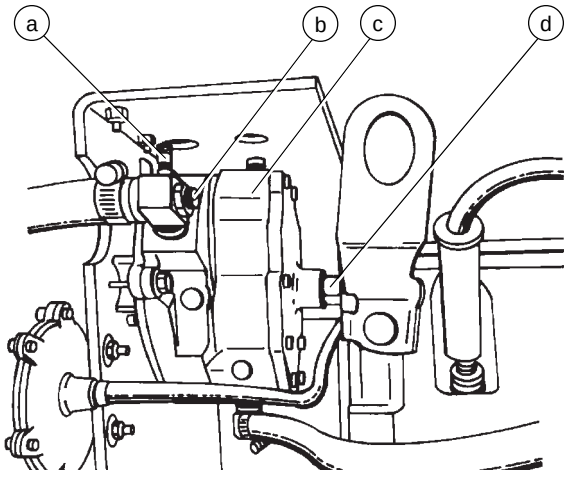
⚠ DANGER Engine fuels are combustible. Perform this procedure in an open, well-ventilated area away from heaters, sparks, flames and lighted tobacco. Always have an approved fire extinguisher within easy reach..

NOTICE The engine rpm needs to be preset for gasoline fuel operation before adjusting the propane idle mixture.

NOTICE The engine should be warmed to normal operating temperature before performing this procedure.

1 Move the fuel select switch to propane fuel and start the engine from the ground controls.

2 Loosen the high idle mixture adjustment lock nut.



a low idle mixture adjustment screw
b high idle mixture adjustment screw
c propane regulator
d pressure adjustment

TABLE C PROCEDURES

3 Load the system by pressing the primary boom extension retract switch, and then move the engine speed control switch to high idle (rabbit symbol).

4 Adjust the high idle adjustment nut to obtain an air-to-fuel mixture ratio of 13.0:1 to 13.2:1, using an exhaust gas analyzer.

NOTICE If an exhaust gas analyzer is not available, adjust to obtain peak or optimum rpm.

5 Hold the adjustment screw and tighten the lock nut.

6 Move the engine speed control switch to low idle (turtle symbol) and adjust the low idle screw to obtain an air-to-fuel mixture ratio of 13.0:1 to 13.2:1.

C-14
Check and Adjust the Ignition Timing - Gasoline/LPG Models

Complete information to perform this procedure is available in the Ford LSG-423 2.3 Litre Industrial Engine Service Manual (Ford number: 194-216). Genie part number 29586.

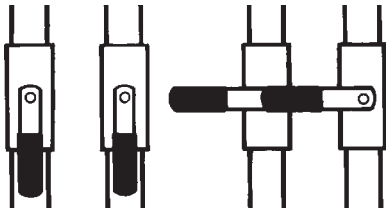
Table D Procedures

D-1
Change the Hydraulic Oil

Replacement of the hydraulic oil is essential for good machine performance and service life. Dirty oil and suction strainers may cause the machine to perform poorly and continued use may cause component damage. Extremely dirty conditions may require oil changes to be performed more frequently.

NOTICE Perform this procedure with the machine in the fully stowed position.

1 Close the two hydraulic tank valves located at the main pump.



open closed

2 Remove the drain plug from the hydraulic reservoir.

⚠CAUTION Beware of hot oil. Contact with hot oil may cause severe burns.

3 Completely drain the reservoir into a container. See capacity specifications listed below.

4 Disconnect and cap the two 1 inch (2.5cm) suction hoses that are attached to the reservoir.

5 Remove the strainer assemblies from the reservoir.

6 Carefully clean any foreign material from the strainers.

7 Apply pipe thread sealant to the strainer mounting threads, and then re-install them.

8 Apply pipe thread sealant to the drain plug, and then re-install it in the reservoir.

9 Re-install the two suction hoses.

10 Fill the reservoir with hydraulic oil until the level is within the top 2 inches (5cm) of the sight gauge. Do not overfill.

11 Clean up any oil that may have spilled and re-open the hydraulic tank valves.

12 Prime the pump by doing the following:

Gasoline/LPG models:

Disconnect the ignition coil wire and isolate it from ground.

Diesel models:

Disconnect the wiring to the injection pump fuel-on solenoid

All models:

Crank the engine with the starter motor for 15 seconds.

13 Reconnect the wiring and start the engine from the ground controls. Check the hydraulic reservoir for leaks.

Specifications	
Hydraulic tank capacity	25 gallons 95 liters
Hydraulic system capacity (including tank)	30 gallons 114 liters
Hydraulic fluid	Dexron II equivalent

TABLE D PROCEDURES

D-2
Change or Recondition the Engine Coolant

Replacing or reconditioning the engine coolant is essential to good engine performance and service life. Old or dirty coolant may cause the engine to perform poorly and continued use may cause engine damage. Extremely dirty conditions may require coolant to be changed more frequently.

⚠CAUTION Beware of hot engine parts and coolant. Contact with hot engine parts and/or coolant will cause severe burns.

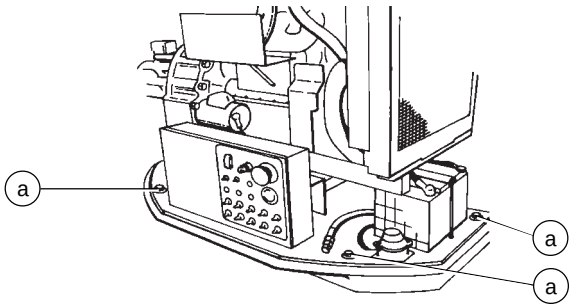
1 Put on protective clothing and eye wear.

2 Disconnect the coolant return hose at the radiator and drain the coolant return tank.

3 Remove the radiator cap from the radiator.

Ford models: Remove the 3 bolts from the engine pivot plate. Swing the engine pivot plate away from the machine to access the radiator petcock.

4 Open the petcock on the radiator and allow coolant to drain into a container.



a pivot plate bolt

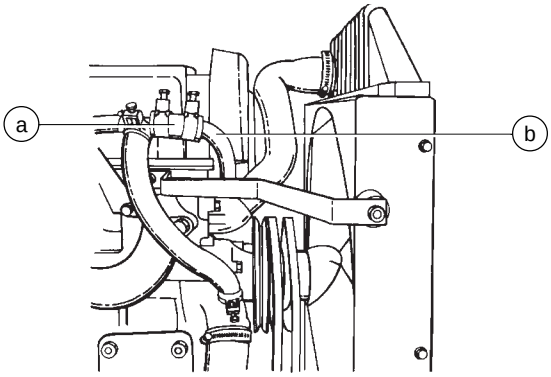
5 After all the coolant has drained, close the petcock. Reconnect the coolant return hose to the radiator.

6 Open the petcock on the engine block and allow the coolant to drain into a container. After the fluid is drained, close the petcock.

7 Replace all coolant hoses and clamps.

8 Pour the proper coolant mixture (anti-freeze & water) for your climate into the radiator until it is full.

9 Disconnect hose *a* from hard line *b* and hold until coolant starts to pour out of the open hose. Then immediately reconnect the hose.



a hose
b hard line

10 Re-fill the radiator and then fill the coolant recovery tank.

11 Clean up any coolant spilled during this procedure.

12 Start the engine from the ground controls, run it for 30 seconds, and then turn it off.

13 Inspect for leaks and then check the fluid level in the coolant recovery tank. Add water if needed.

Specifications	
Ford Engine LSG 423	
coolant capacity	11.5 quarts / 10.9 liters
Kubota Engine V1702-B	
coolant capacity	7.25 quarts / 6.9 liters

D-3
Change the Fuel Lines

Maintaining the fuel lines in good condition is essential to safe operation and good engine performance. Failure to detect a worn, cracked or leaking fuel line may result in an unsafe operating condition, poor engine performance and component damage.

⚠ DANGER Engine fuels are combustible. Replace the fuel lines in an open, well-ventilated area away from heaters, sparks, flames and lighted tobacco. Always have an approved fire extinguisher within easy reach.

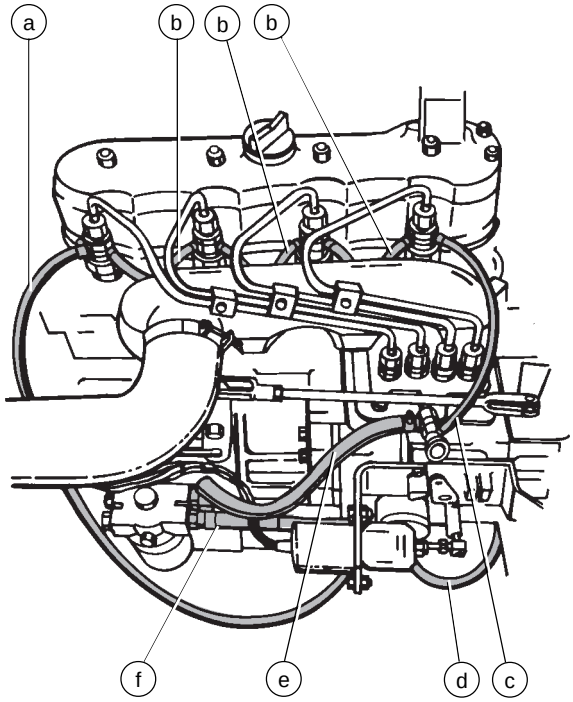
NOTICE Perform this procedure with the engine off.

1 Raise the primary boom, until the end of the boom is approximately eight feet off the ground.

2 Close the manual fuel shut off valve, located next to the fuel tank.

3 Remove and replace the fuel line hoses according to the following illustrations:

⚠ DANGER Fuel may be expelled under pressure. Wrap a cloth around fuel hoses to absorb leaking fuel before disconnecting them. Plug all open fuel lines.

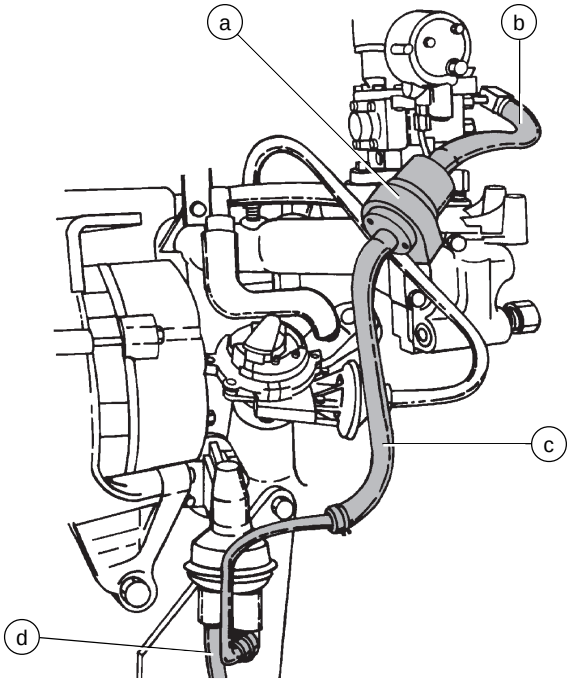


Diesel models

- a hose from the injector to the fuel tank
- b hoses connecting injectors
- c hose from the injection pump to the injectors
- d hose from the fuel shutoff valve to the fuel pump
- e hose from the fuel filter/water separator to the injection pump
- f hose from the fuel pump to the fuel/water separator

NOTICE Once air has been introduced into the diesel fuel injection system, the injectors must be bled before the engine is restarted. Refer to the Kubota V1702-B Diesel Engine Workshop Manual (Kubota code number: 97897-00691) for information on how to bleed the fuel system. Genie part number 29587.

TABLE D PROCEDURES



Gasoline/LPG models
- a fuel filter
- b hose from the fuel filter to the carburetor
- c hose from the fuel pump to the fuel filter
- d hose from the fuel shutoff valve to the fuel pump

4 Clean up any fuel that may have spilled during the installation procedure.

5 Start the machine from the ground controls, then inspect the fuel filter and hoses for leaks.

⚠ DANGER If a fuel leak is discovered, keep any additional personnel from entering the area and do not operate the machine. Repair the leak immediately.

D-4
Check Engine Valve Clearance - Gasoline/LPG Models

Complete information to perform this procedure is available in the Ford LSG-423 2.3 Litre Industrial Engine Service Manual (Ford number: 194-216). Genie part number 29586.

D-5
Check Engine Cylinder Compression - Gasoline/LPG Models

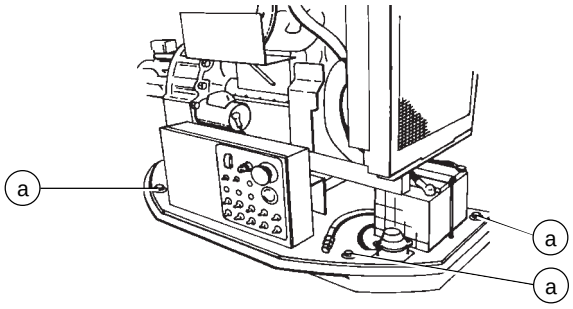
Complete information to perform this procedure is available in the Ford LSG-423 2.3 Litre Industrial Engine Service Manual (Ford number: 194-216). Genie part number 29586.

D-6
Clean PCV Hoses and Fittings - Gasoline/LPG Models

Maintaining PCV hoses is essential to good engine performance. Improperly functioning PCV hoses will fail to ventilate the crankcase and continued use of neglected hoses could result in component damage.

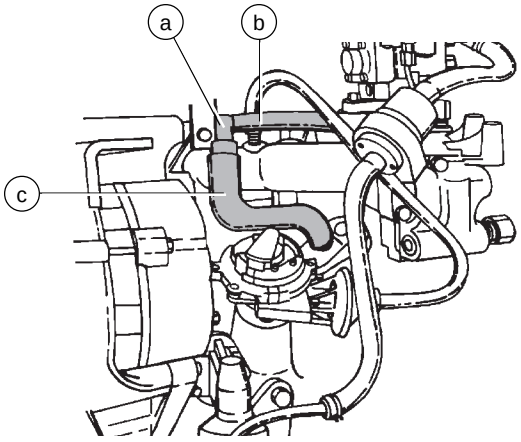
NOTICE Perform this procedure with the engine off.

1 Remove the 3 bolts from the engine pivot plate. Swing the engine pivot plate away from machine to access the PCV hoses.



a pivot plate bolt

2 Disconnect the 2 hoses from the PCV valve, then disconnect the 2 hoses from the engine.



Gasoline/LPG models
(shown with distributor cap removed)
a PCV valve
b hose, PCV valve to carburetor
c hose, PCV valve to crankcase

3 Clean the hoses with a mild cleaning solvent.

4 Dry both hoses and inspect them for cracks and damage. Replace the hoses if they are damaged.

TABLE D PROCEDURES

D-7
Check the Engine Nozzle Injection Pressure - Diesel Models

Complete information to perform this procedure is available in the Kubota V1702-B Diesel Engine Workshop Manual (Kubota code number: 97897-00691). Genie part number 29587.

D-8
Check Injection Timing - Diesel Models

Complete information to perform this procedure is available in the Kubota V1702-B Diesel Engine Workshop Manual (Kubota code number: 97897-00691). Genie part number 29587.

D-9
Replace the Timing Belt - Ford

Complete information to perform this procedure is available in the Ford LSG-423 2.3 Litre Industrial Engine Service Manual (Ford number: 194-216). Genie part number 29586.

Chart 1

Engine Will Not Crank Over

Be sure the key switch is in the appropriate position.

Be sure the emergency stop button is pulled up into the on position.

Be sure the circuit breaker is not tripped.

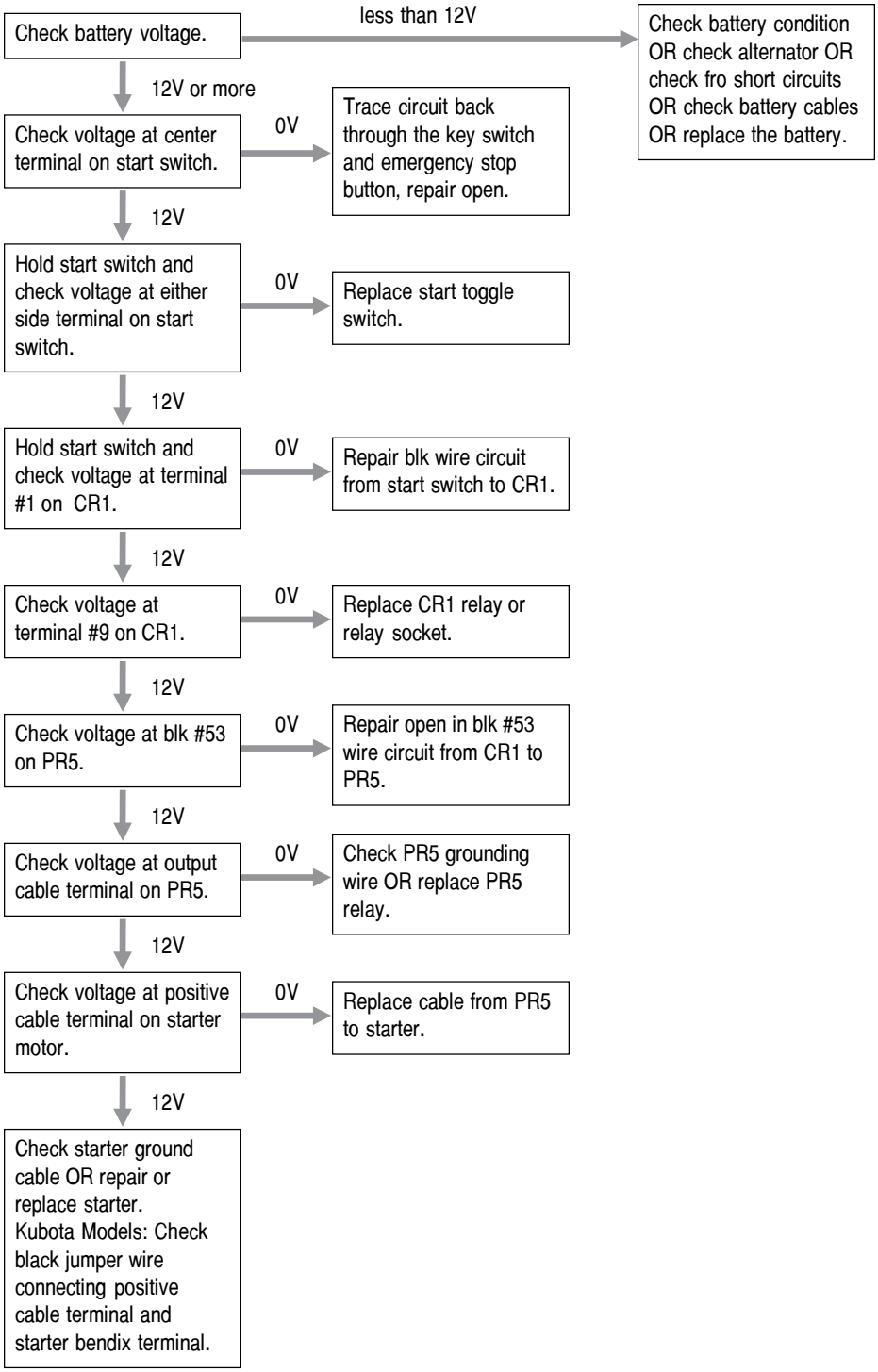


Chart 2

Engine Cranks Over But Will Not Start - Gasoline/LPG Models

Be sure to check the engine oil level and fill as needed.

Be sure to check fuel levels and engine coolant level.

Be sure the gasoline shut-off valve is in the on position.

Perform these tests in gasoline mode.

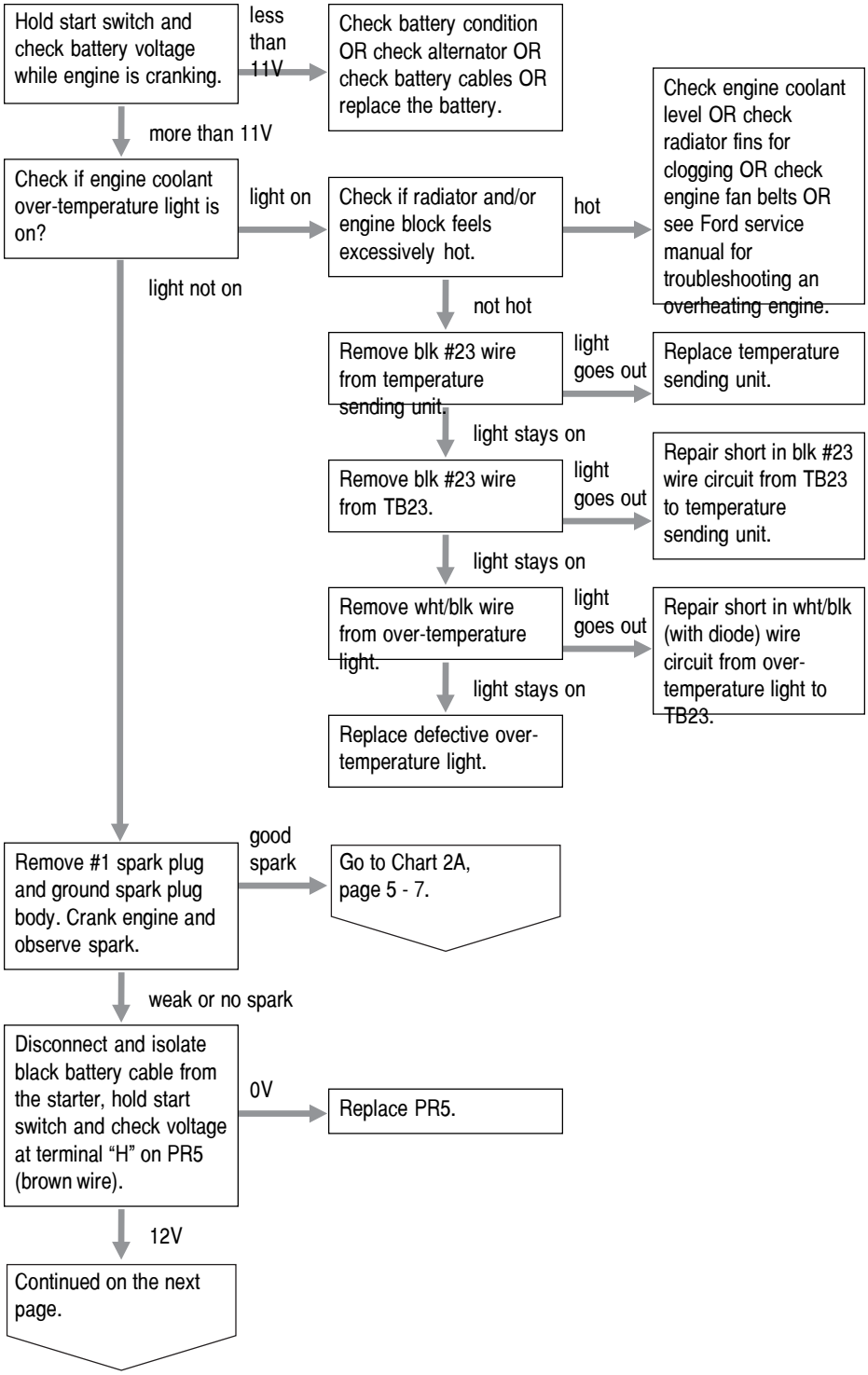


CHART 2

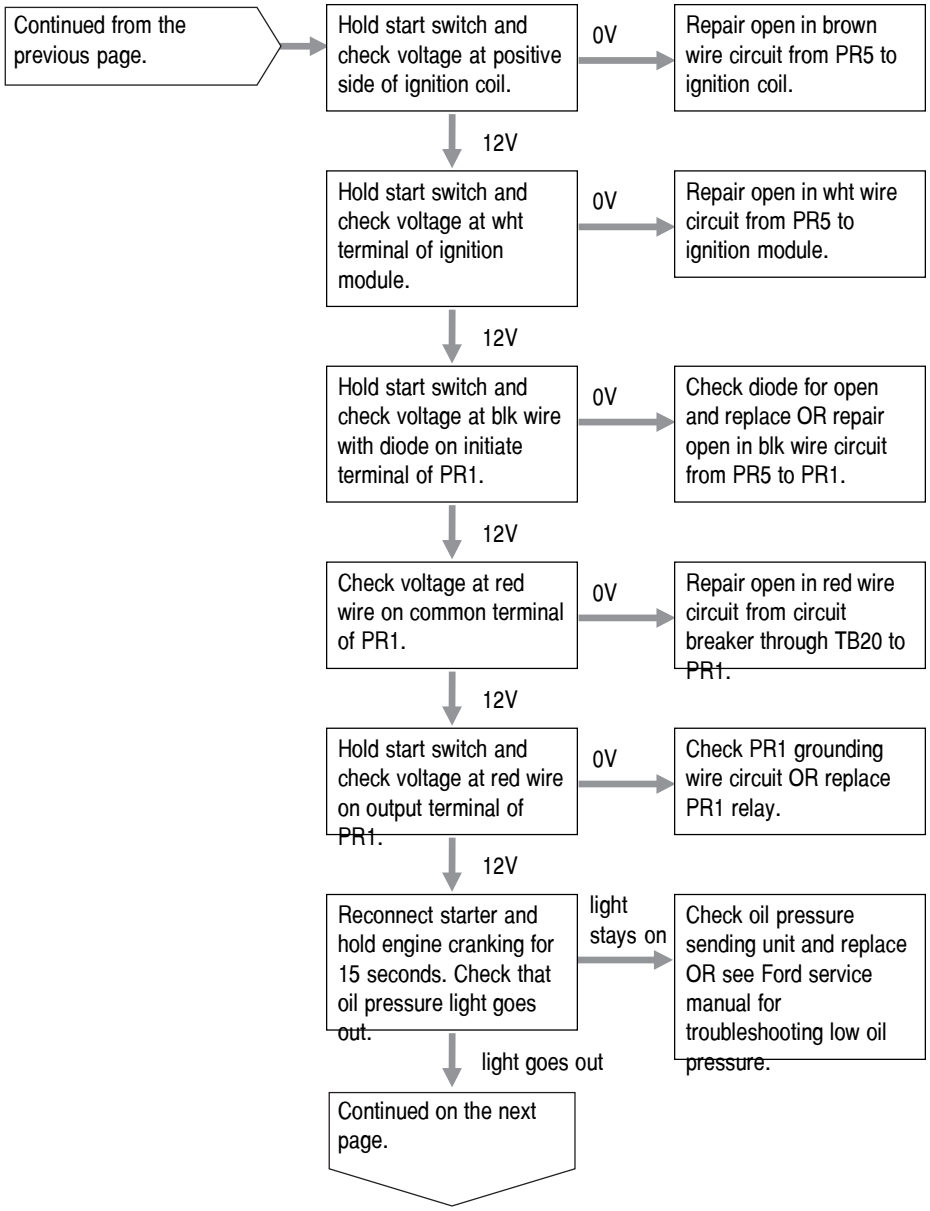

Continued from the previous page.
Hold start switch and check voltage at positive side of ignition coil.
0V
Repair open in brown wire circuit from PR5 to ignition coil.
12V
Hold start switch and check voltage at wht terminal of ignition module.
0V
Repair open in wht wire circuit from PR5 to ignition module.
12V
Hold start switch and check voltage at blk wire with diode on initiate terminal of PR1.
0V
Check diode for open and replace OR repair open in blk wire circuit from PR5 to PR1.
12V
Check voltage at red wire on common terminal of PR1.
0V
Repair open in red wire circuit from circuit breaker through TB20 to PR1.
12V
Hold start switch and check voltage at red wire on output terminal of PR1.
0V
Check PR1 grounding wire circuit OR replace PR1 relay.
12V
Reconnect starter and hold engine cranking for 15 seconds. Check that oil pressure light goes out.
light stays on
Check oil pressure sending unit and replace OR see Ford service manual for troubleshooting low oil pressure.
light goes out
Continued on the next page.

CHART 2

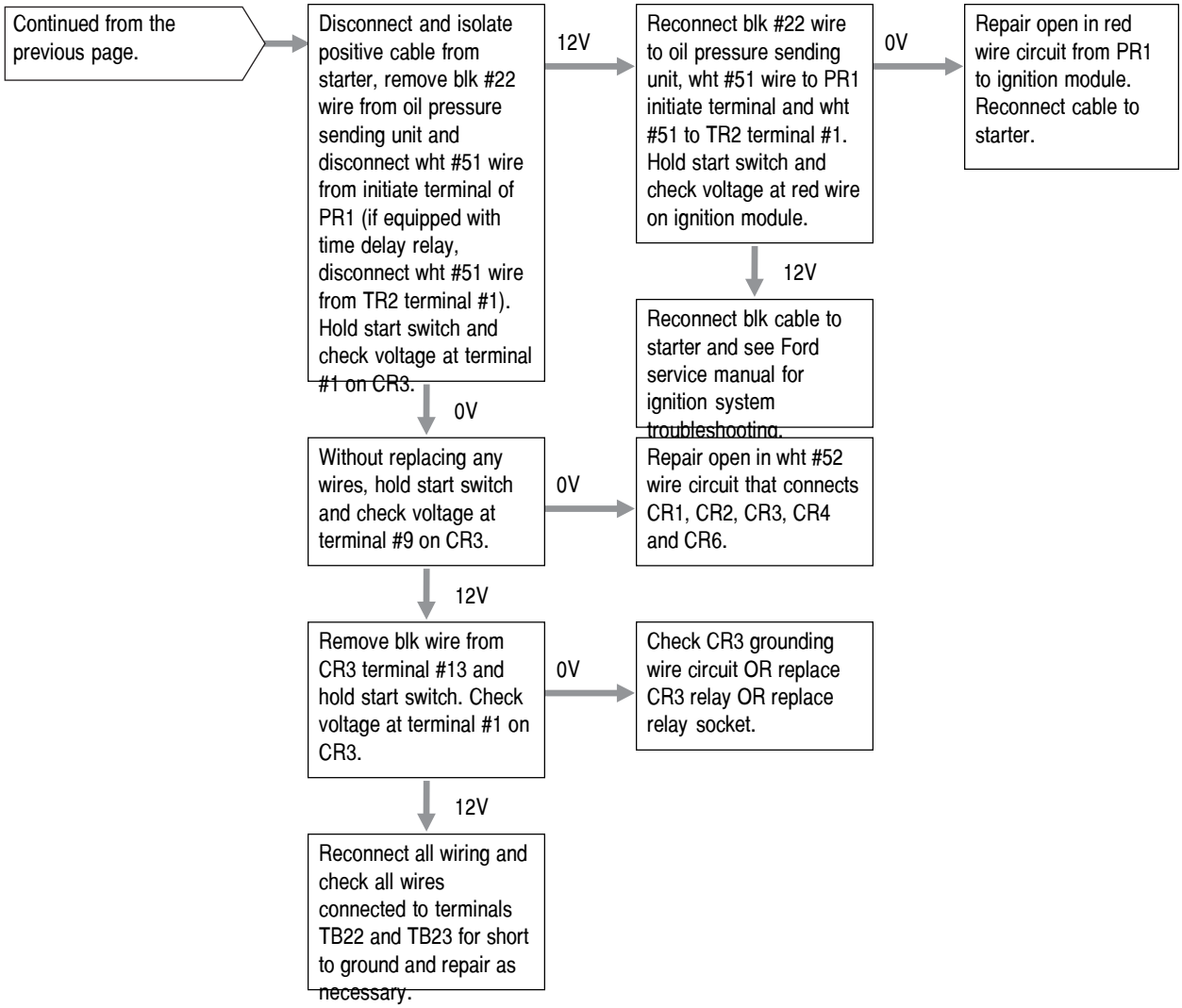

Continued from the previous page.
Disconnect and isolate positive cable from starter, remove blk #22 wire from oil pressure sending unit and disconnect wht #51 wire from initiate terminal of PR1 (if equipped with time delay relay, disconnect wht #51 wire from TR2 terminal #1). Hold start switch and check voltage at terminal #1 on CR3.
12V
Reconnect blk #22 wire to oil pressure sending unit, wht #51 wire to PR1 initiate terminal and wht #51 to TR2 terminal #1. Hold start switch and check voltage at red wire on ignition module.
0V
Repair open in red wire circuit from PR1 to ignition module. Reconnect cable to starter.
12V
Reconnect blk cable to starter and see Ford service manual for ignition system troubleshooting.
0V
Without replacing any wires, hold start switch and check voltage at terminal #9 on CR3.
0V
Repair open in wht #52 wire circuit that connects CR1, CR2, CR3, CR4 and CR6.
12V
Remove blk wire from CR3 terminal #13 and hold start switch. Check voltage at terminal #1 on CR3.
0V
Check CR3 grounding wire circuit OR replace CR3 relay OR replace relay socket.
12V
Reconnect all wiring and check all wires connected to terminals TB22 and TB23 for short to ground and repair as necessary.

Chart 2A

Engine Cranks Over But Will Not Start - Gasoline/LPG Models

Continuation of "good spark" fault path from previous flow chart.

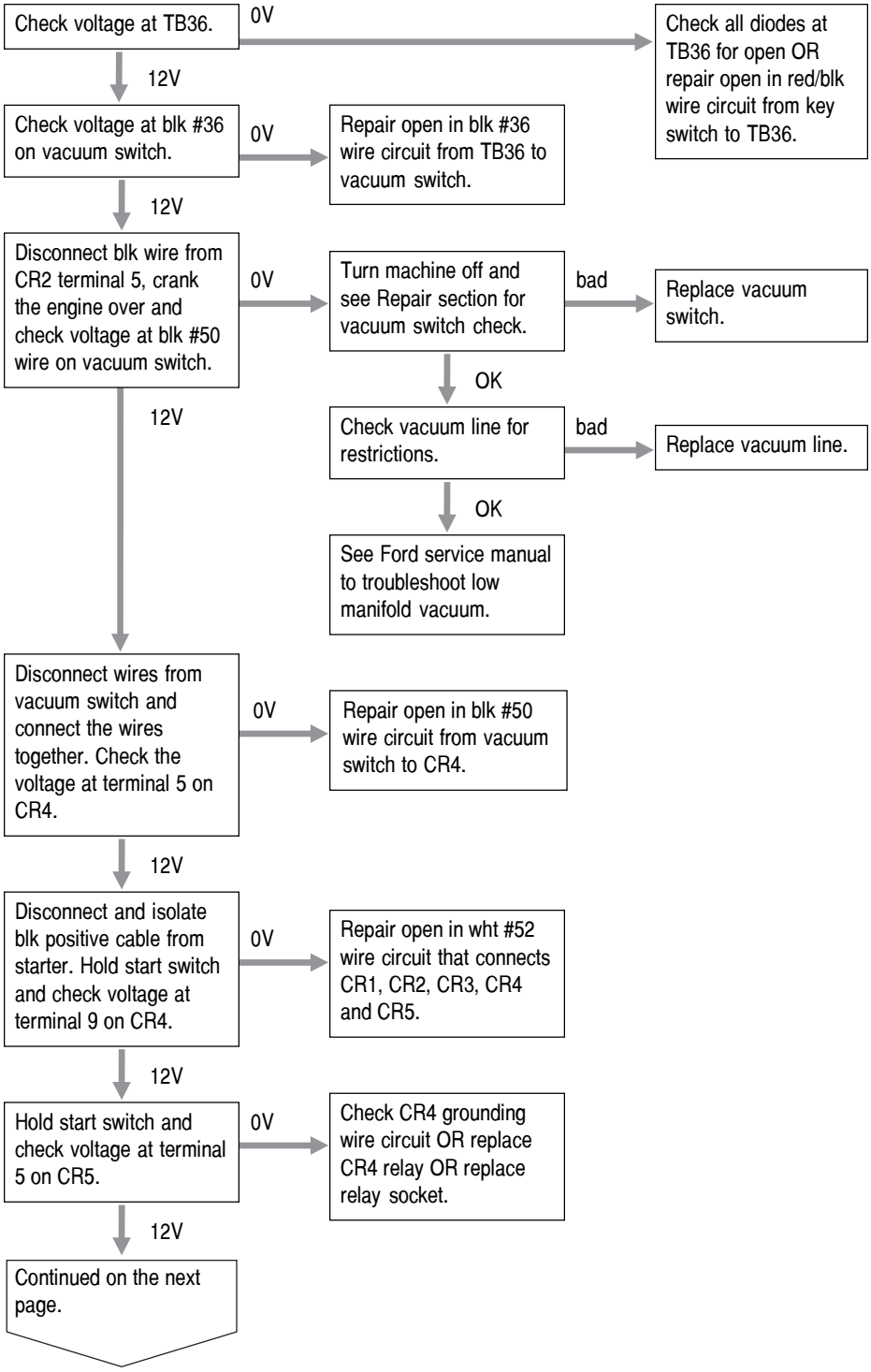


CHART 2A

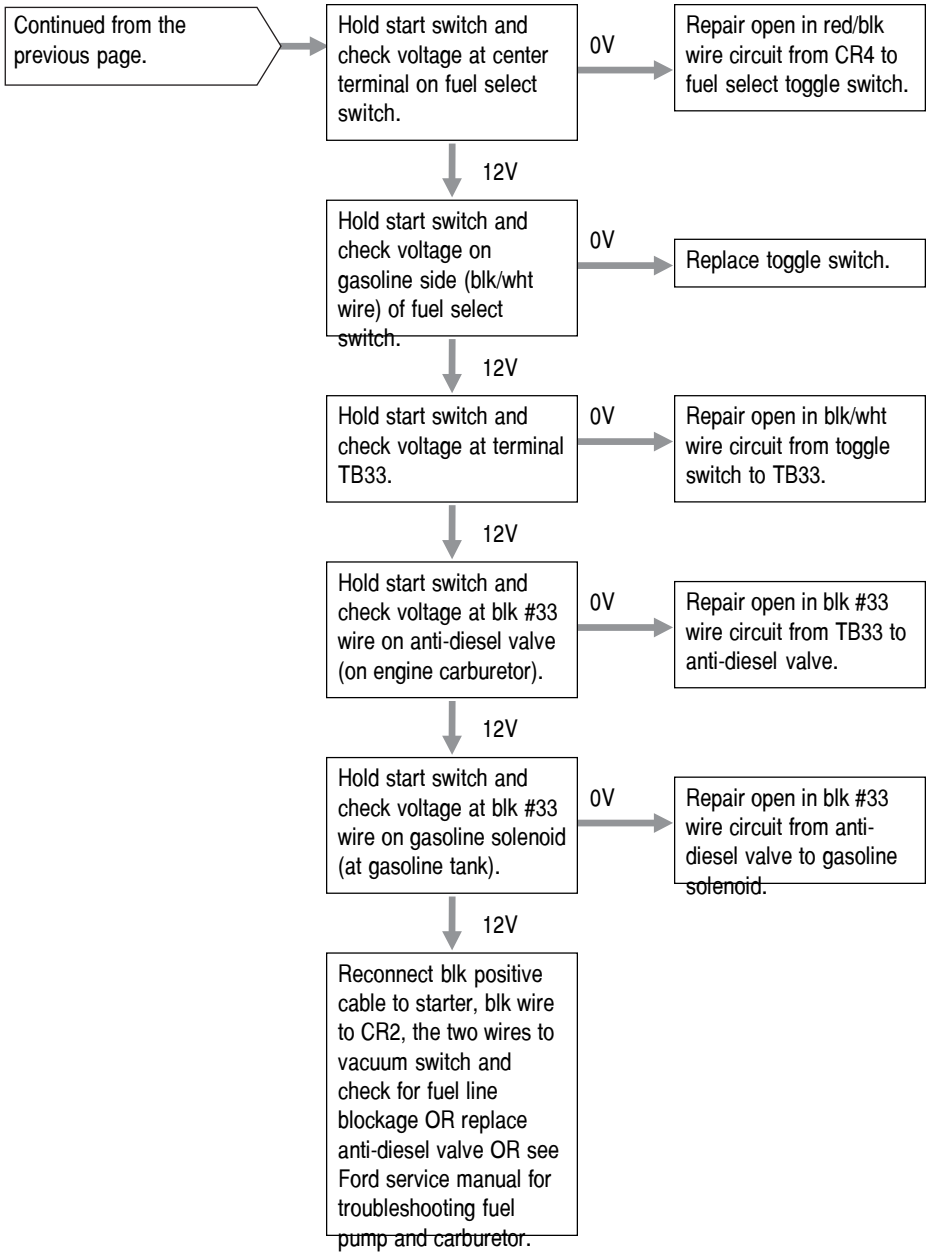

Continued from the previous page.
Hold start switch and check voltage at center terminal on fuel select switch.
0V
Repair open in red/blk wire circuit from CR4 to fuel select toggle switch.
12V
Hold start switch and check voltage on gasoline side (blk/wht wire) of fuel select switch.
0V
Replace toggle switch.
12V
Hold start switch and check voltage at terminal TB33.
0V
Repair open in blk/wht wire circuit from toggle switch to TB33.
12V
Hold start switch and check voltage at blk #33 wire on anti-diesel valve (on engine carburetor).
0V
Repair open in blk #33 wire circuit from TB33 to anti-diesel valve.
12V
Hold start switch and check voltage at blk #33 wire on gasoline solenoid (at gasoline tank).
0V
Repair open in blk #33 wire circuit from anti-diesel valve to gasoline solenoid.
12V
Reconnect blk positive cable to starter, blk wire to CR2, the two wires to vacuum switch and check for fuel line blockage OR replace anti-diesel valve OR see Ford service manual for troubleshooting fuel pump and carburetor.

Chart 3

Engine Cranks Over But Will Not Start - Diesel Models

Be sure to check the engine oil level and fill as needed.

Be sure to check fuel levels and engine coolant level.

Be sure the diesel shut-off valve is in the on position. Be sure engine glow plugs operate normally, see Maintenance section.

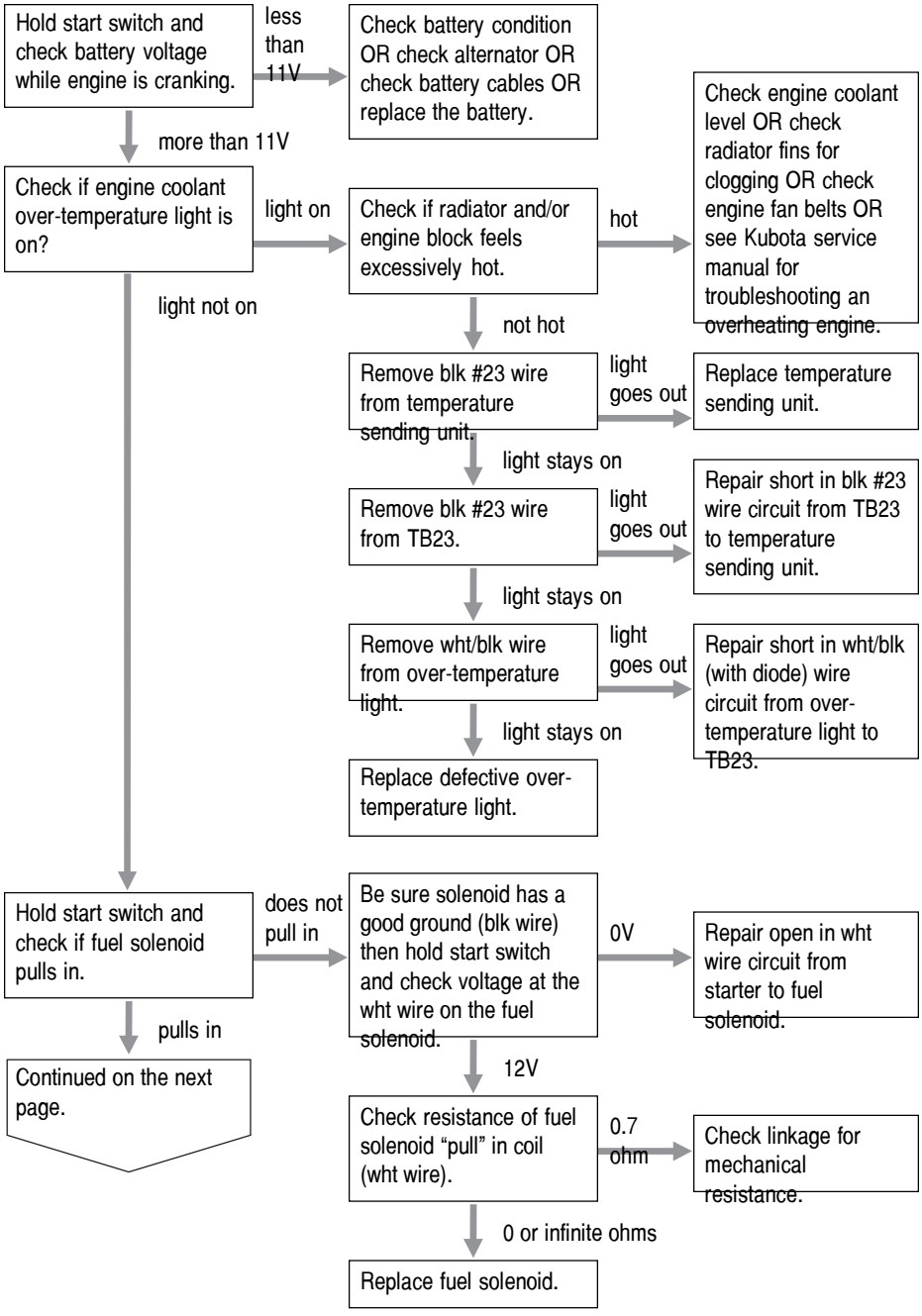


CHART 3

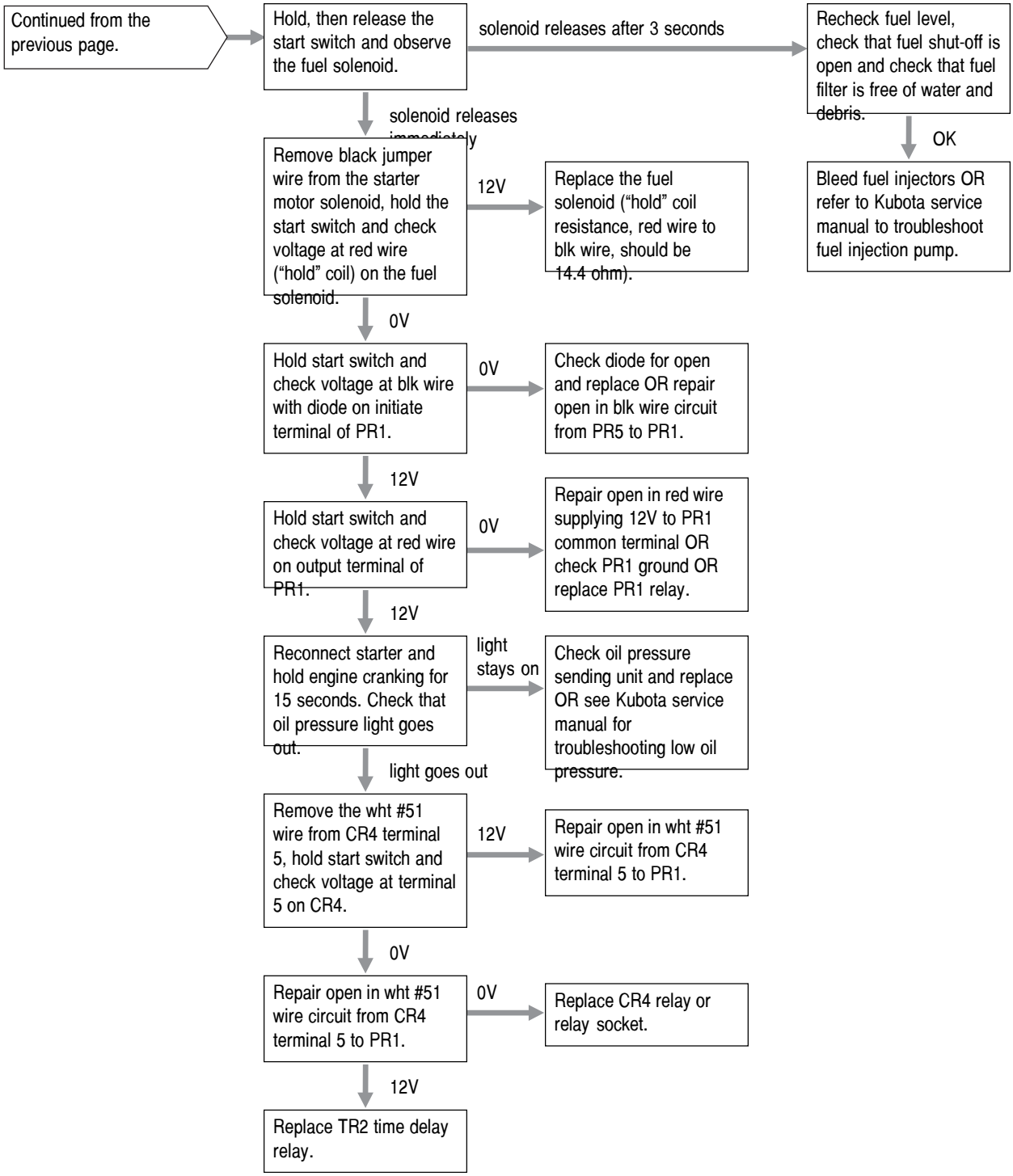

Continued from the previous page.
Hold, then release the start switch and observe the fuel solenoid.
solenoid releases after 3 seconds
Recheck fuel level, check that fuel shut-off is open and check that fuel filter is free of water and debris.
OK
Bleed fuel injectors OR refer to Kubota service manual to troubleshoot fuel injection pump.
solenoid releases immediately
Remove black jumper wire from the starter motor solenoid, hold the start switch and check voltage at red wire ("hold" coil) on the fuel solenoid.
12V
Replace the fuel solenoid ("hold" coil resistance, red wire to blk wire, should be 14.4 ohm).
0V
Hold start switch and check voltage at blk wire with diode on initiate terminal of PR1.
0V
Check diode for open and replace OR repair open in blk wire circuit from PR5 to PR1.
12V
Hold start switch and check voltage at red wire on output terminal of PR1.
0V
Repair open in red wire supplying 12V to PR1 common terminal OR check PR1 ground OR replace PR1 relay.
12V
Reconnect starter and hold engine cranking for 15 seconds. Check that oil pressure light goes out.
light stays on
Check oil pressure sending unit and replace OR see Kubota service manual for troubleshooting low oil pressure.
light goes out
Remove the wht #51 wire from CR4 terminal 5, hold start switch and check voltage at terminal 5 on CR4.
12V
Repair open in wht #51 wire circuit from CR4 terminal 5 to PR1.
0V
Repair open in wht #51 wire circuit from CR4 terminal 5 to PR1.
0V
Replace CR4 relay or relay socket.
12V
Replace TR2 time delay relay.

Chart 4

Engine Choke Inoperative - Gasoline/LPG Models

Be sure machine is equipped with manual choke.

Be sure choke solenoid to carburetor linkage is in place and properly attached.

Be sure choke solenoid plunger can be manually pushed into the solenoid and the linkage in turn rotates the choke plate linkage.

Be sure fuel select switch is in the gasoline position.

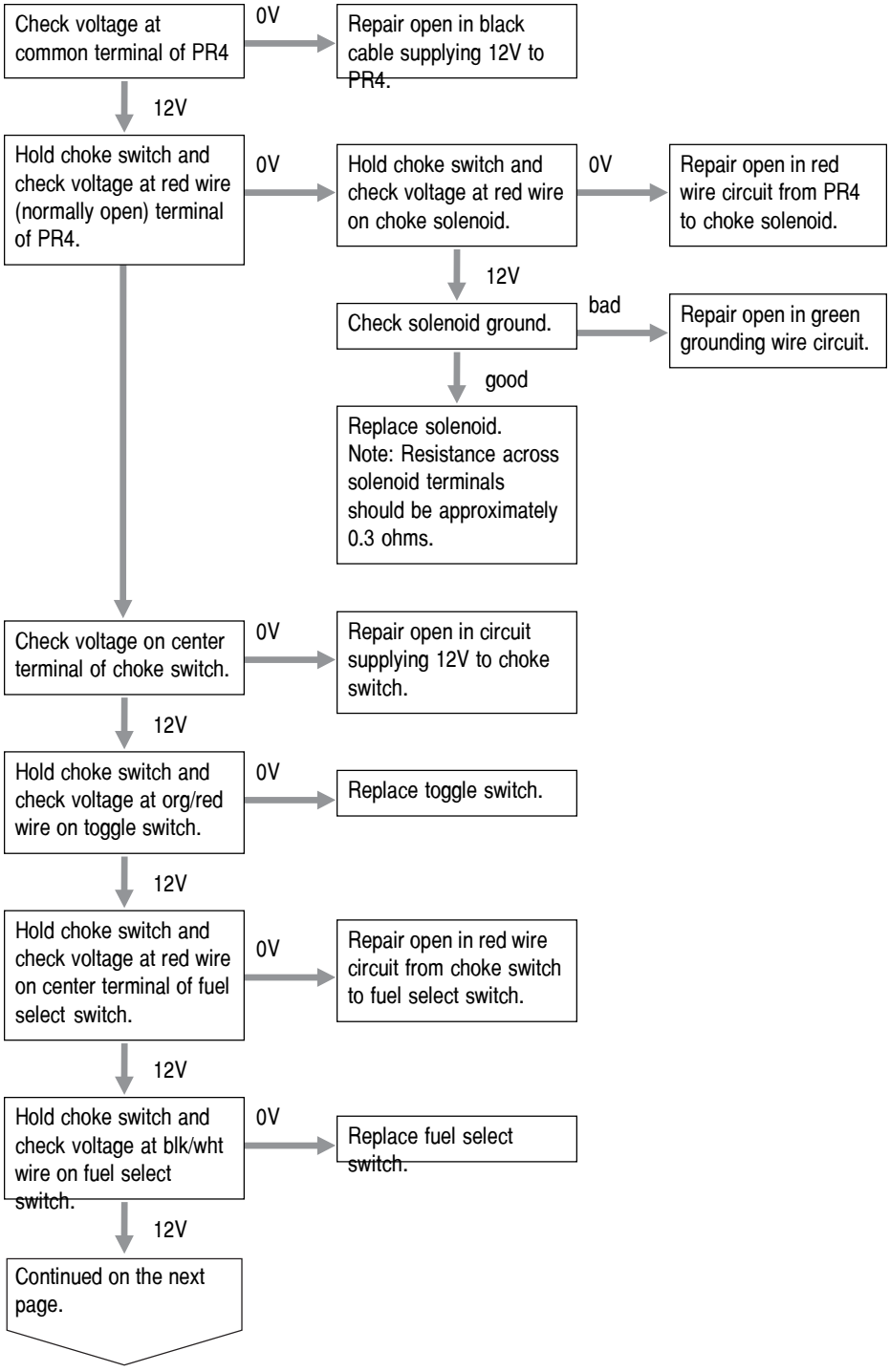


CHART 4

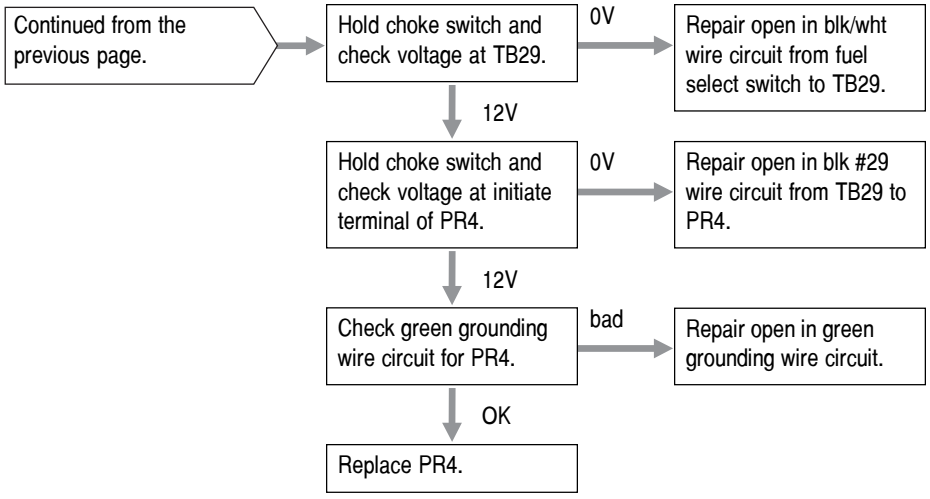

Continued from the previous page.
Hold choke switch and check voltage at TB29.
0V
Repair open in blk/wht wire circuit from fuel select switch to TB29.
12V
Hold choke switch and check voltage at initiate terminal of PR4.
0V
Repair open in blk #29 wire circuit from TB29 to PR4.
12V
Check green grounding wire circuit for PR4.
bad
Repair open in green grounding wire circuit.
OK
Replace PR4.

Chart 6

Engine Will Not Start On LPG, But Will Start On Gasoline - Gasoline/LPG Models

Be sure fuel select switch is switched to LPG.

Be sure to check LPG fuel level.

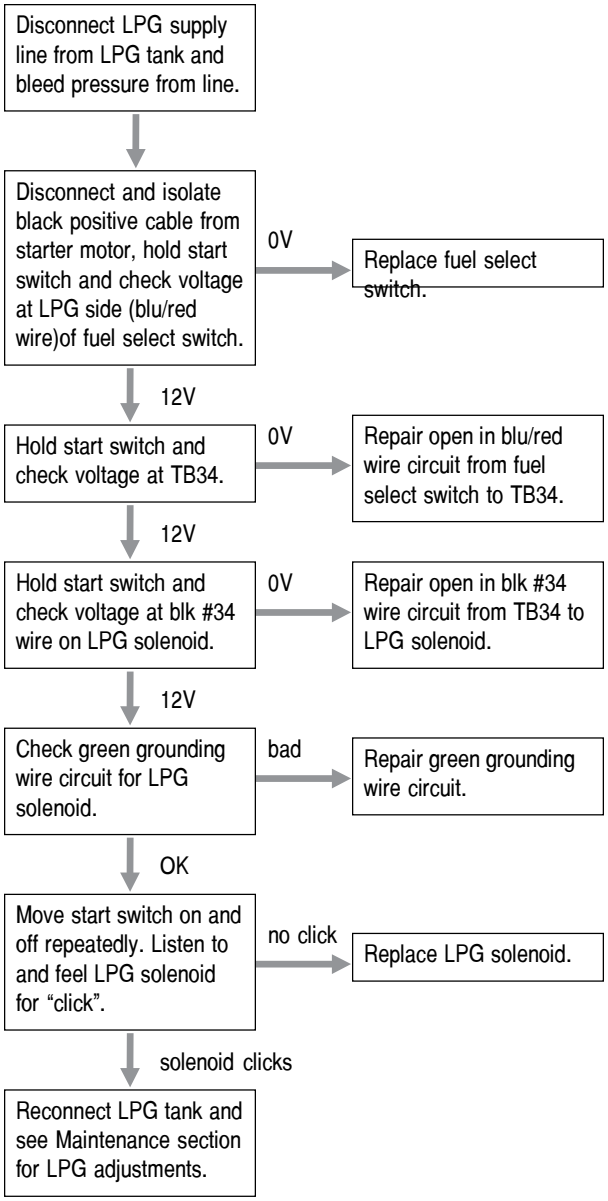


Chart 7

Engine Will Not Start on Gasoline, But Will Start on LPG - Gasoline/LPG Models

Be sure fuel select switch is switched to gasoline.

Be sure to check gasoline fuel level.

Be sure that engine choke is operating properly.

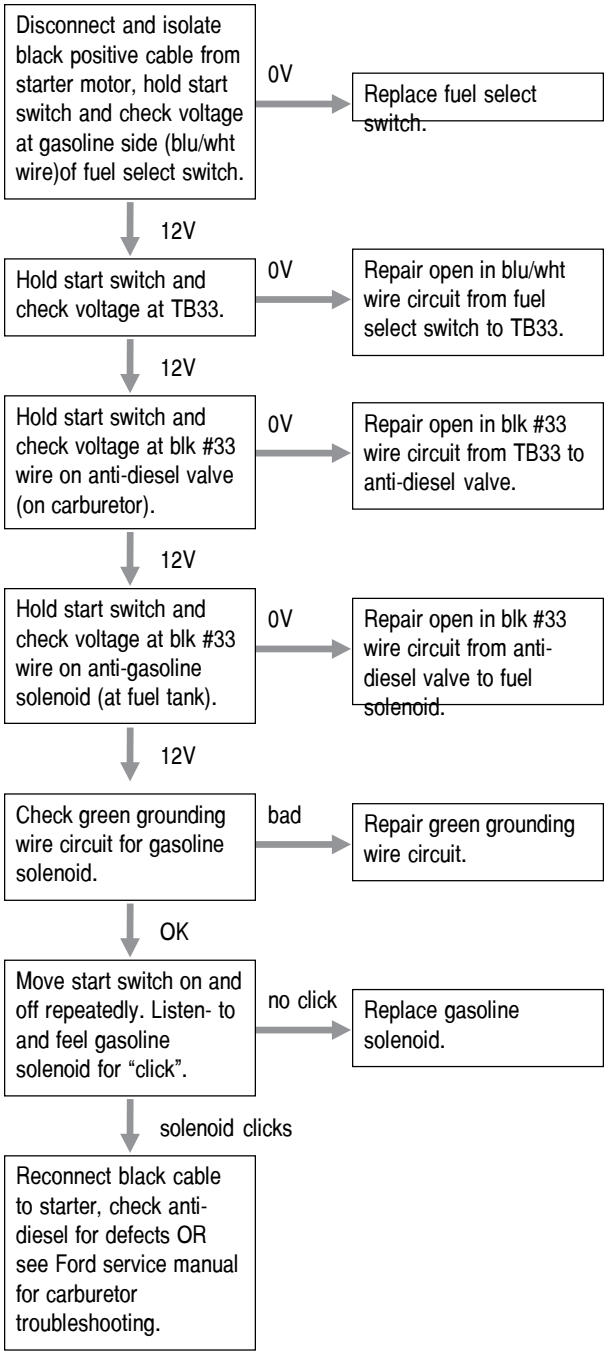


Chart 8

Engine High Idle Inoperative - Gasoline/LPG Models

If high idle operates on LPG but not on gasoline, see Ford service manual for carburetor troubleshooting.

If high idle operates on gasoline but not on LPG, see Repair section for LPG regulator adjustments.

Be sure throttle linkage from governor to carburetor is not binding, see Repair section.

Be sure high idle can be achieved by grasping the governor actuator arm and momentarily pulling to throttle the carburetor.

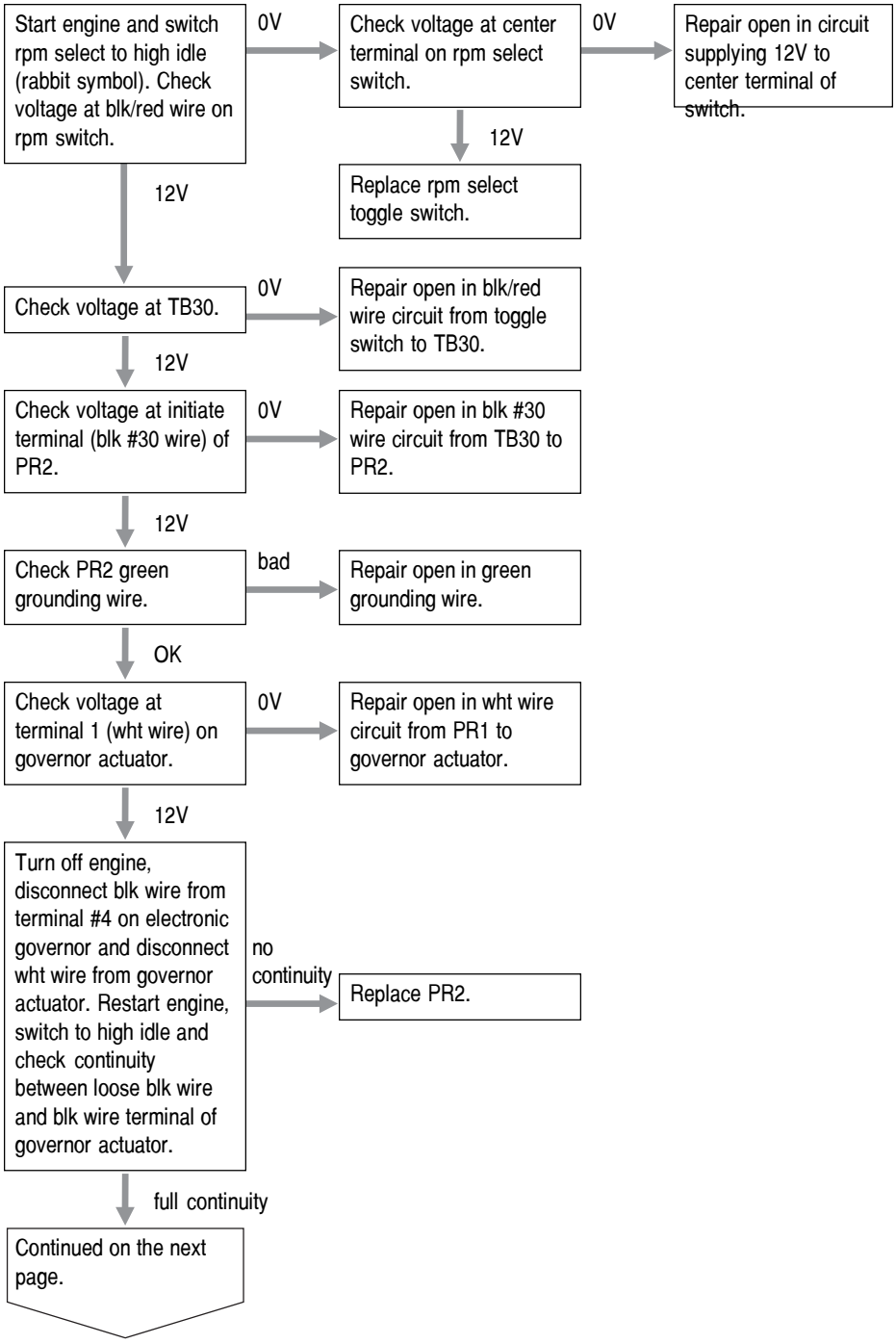


CHART 8

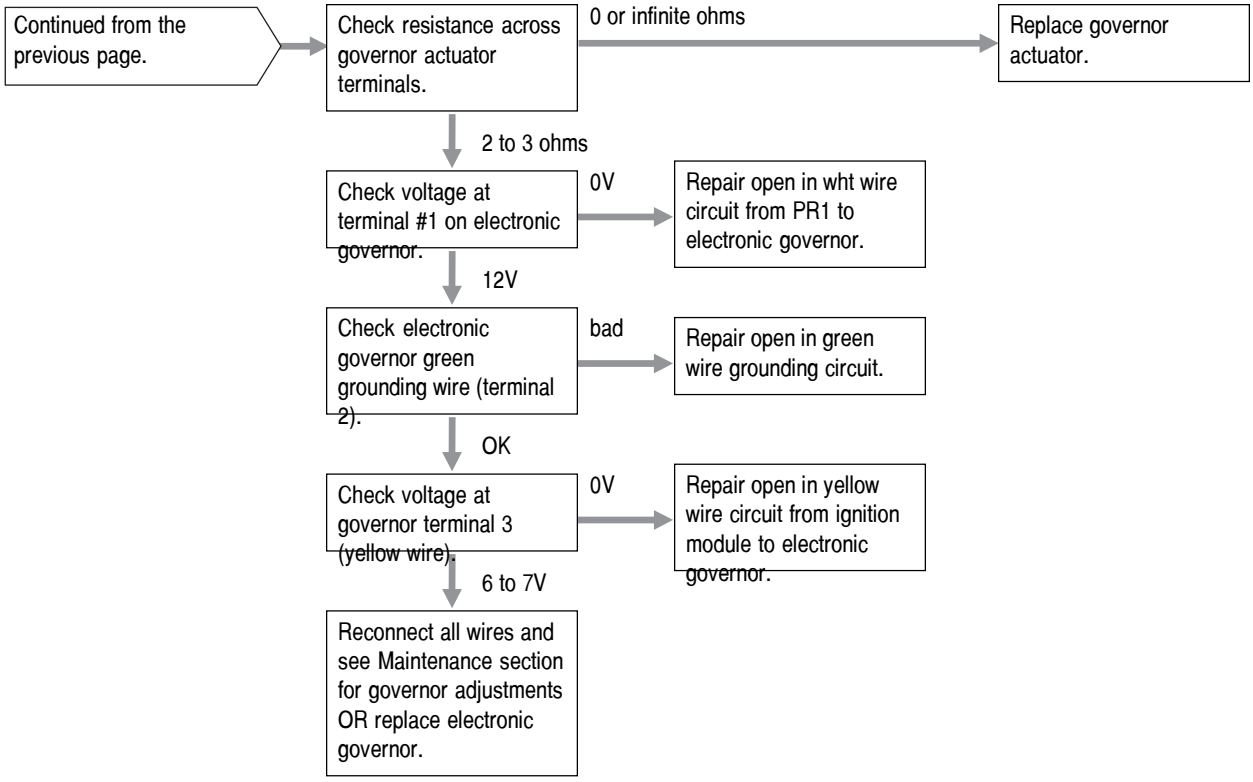

Continued from the previous page.
Check resistance across governor actuator terminals.
0 or infinite ohms
Replace governor actuator.
2 to 3 ohms
Check voltage at terminal #1 on electronic governor.
0V
Repair open in wht wire circuit from PR1 to electronic governor.
12V
Check electronic governor green grounding wire (terminal 2).
bad
Repair open in green wire grounding circuit.
OK
Check voltage at governor terminal 3 (yellow wire).
0V
Repair open in yellow wire circuit from ignition module to electronic governor.
6 to 7V
Reconnect all wires and see Maintenance section for governor adjustments OR replace electronic governor.

Chart 9

Engine Low Idle Inoperative - Gasoline/LPG Models

If low idle operates on LPG but not on gasoline, see Ford service manual for carburetor troubleshooting.

If low idle operates on gasoline but not on LPG, see Repair section for LPG regulator adjustments.

Be sure throttle linkage from governor to carburetor is not binding, see Repair section.

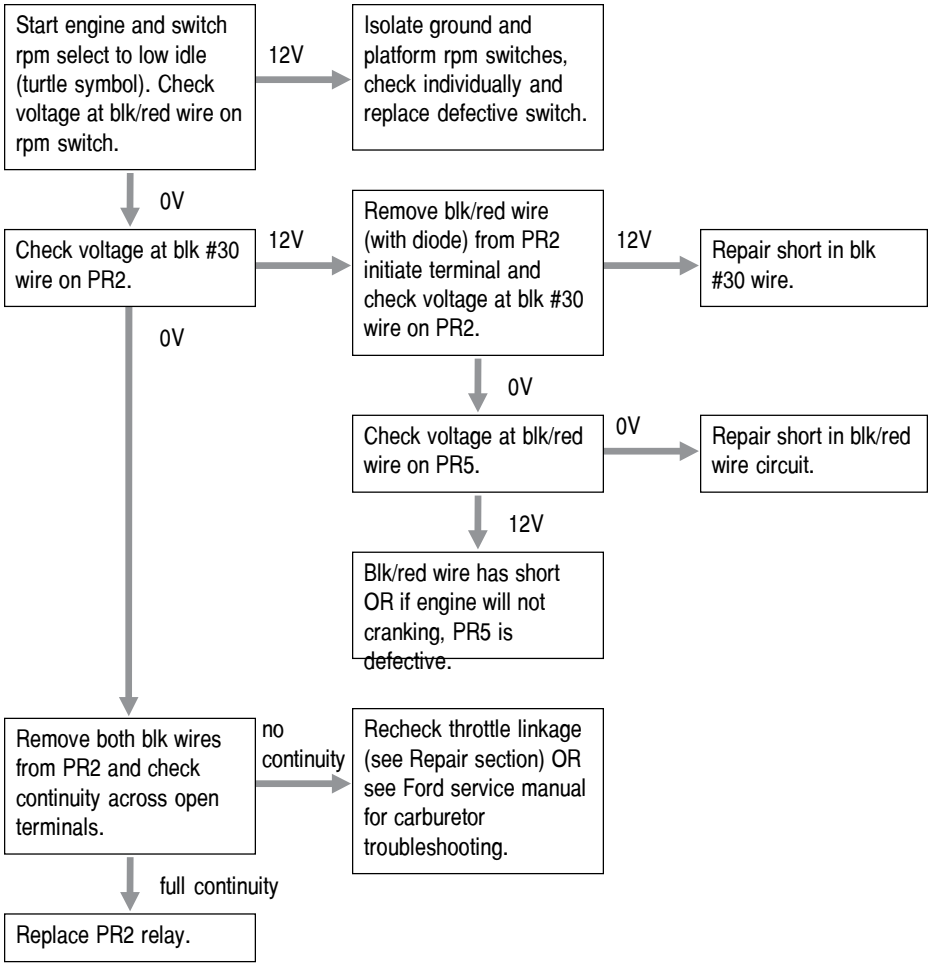


Chart 10

Engine High Idle Inoperative - Diesel Models

Be sure mechanical linkage from 2-speed to fuel injector pump is not binding or defective.

Be sure PR2 relay and 2-speed solenoid grounding wires are free of corrosion and have full continuity to ground.

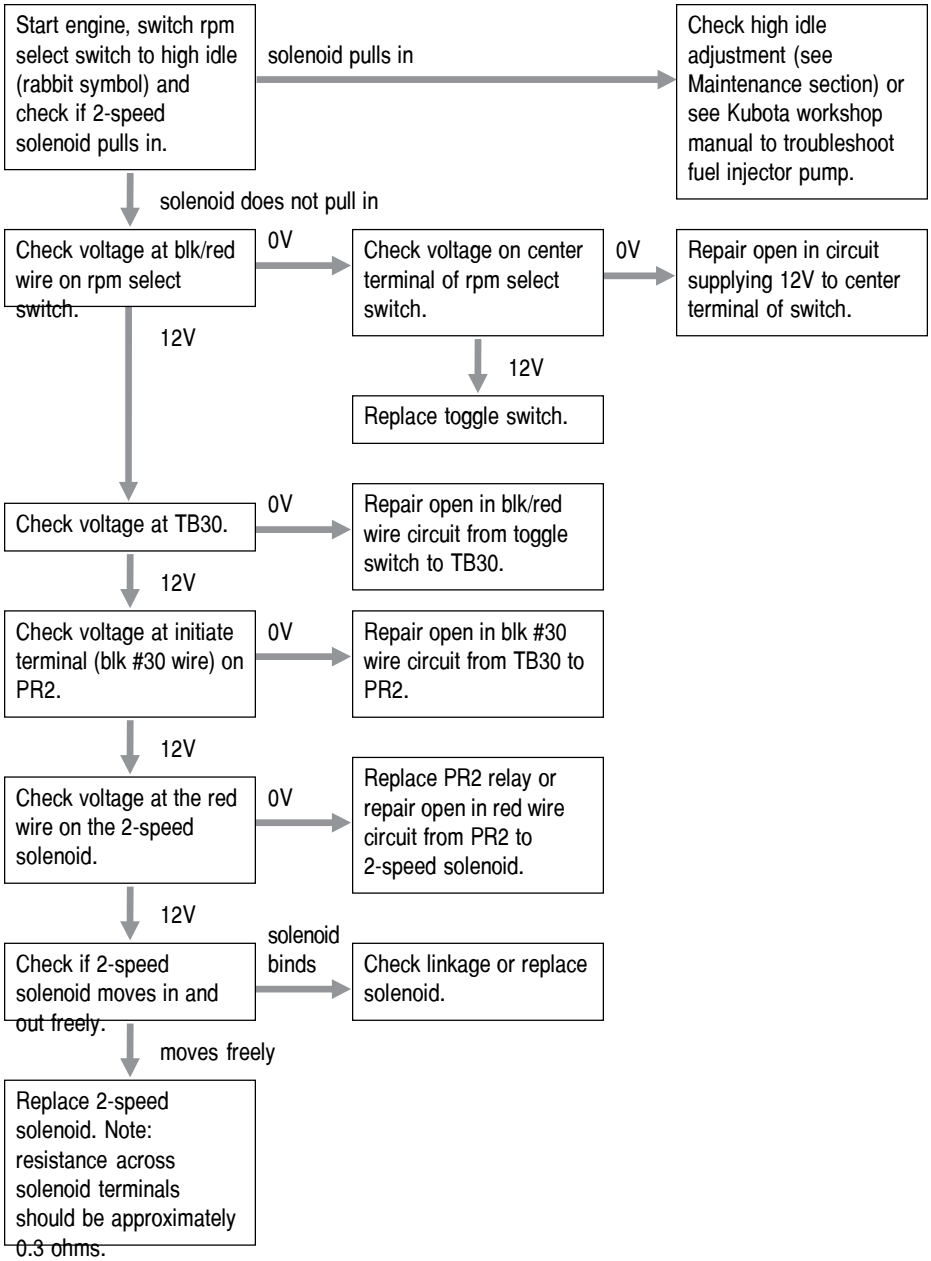


Chart 11

Engine Low Idle Inoperative - Diesel Models

Check if mechanical linkage from 2-speed solenoid to fuel injection pump is binding or defective.

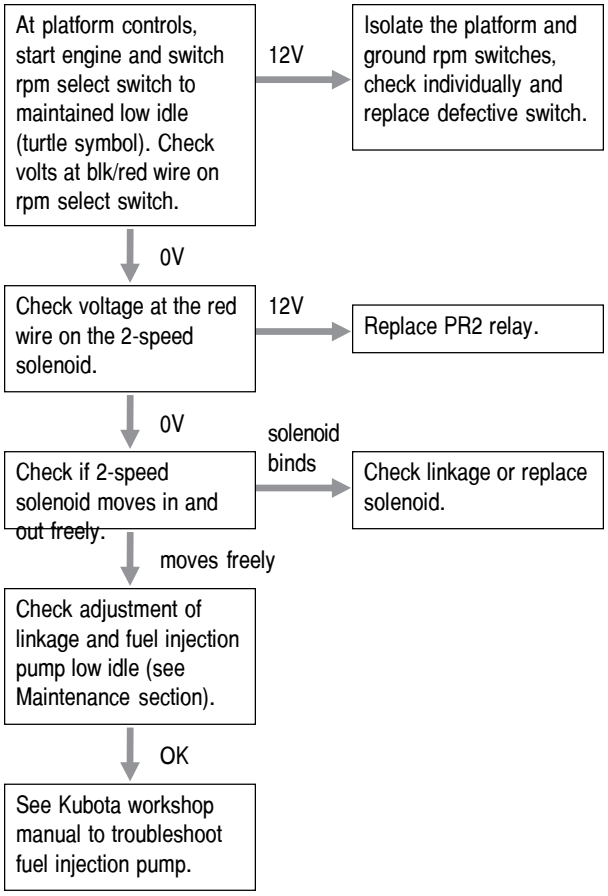


Chart 12

All Functions Inoperative, Engine Starts and Runs

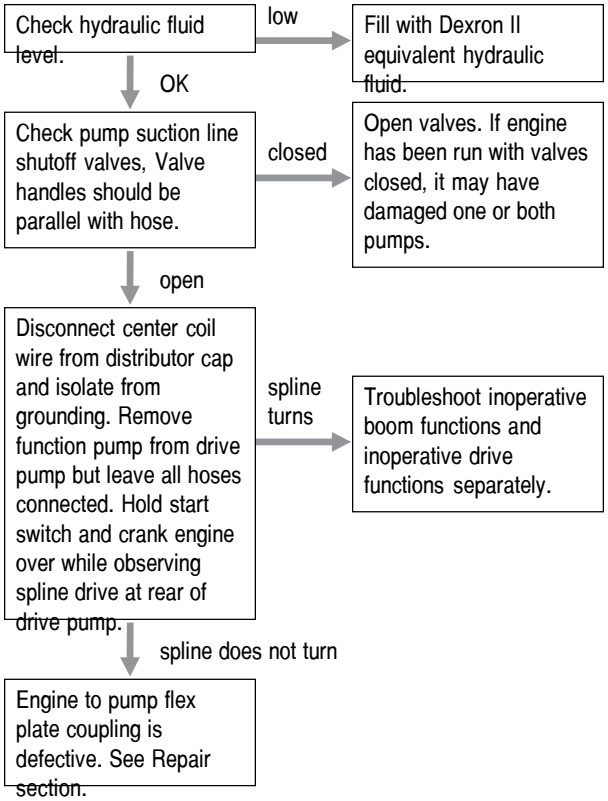


Chart 13

All Lift and Steer Functions Inoperative, Drive Functions Operational

Be sure the hydraulic suction line shutoff valve for the lift/steer pump is in the open position.

Be sure all grounding wires for the hydraulic manifold valves are free of corrosion and have full continuity to ground.

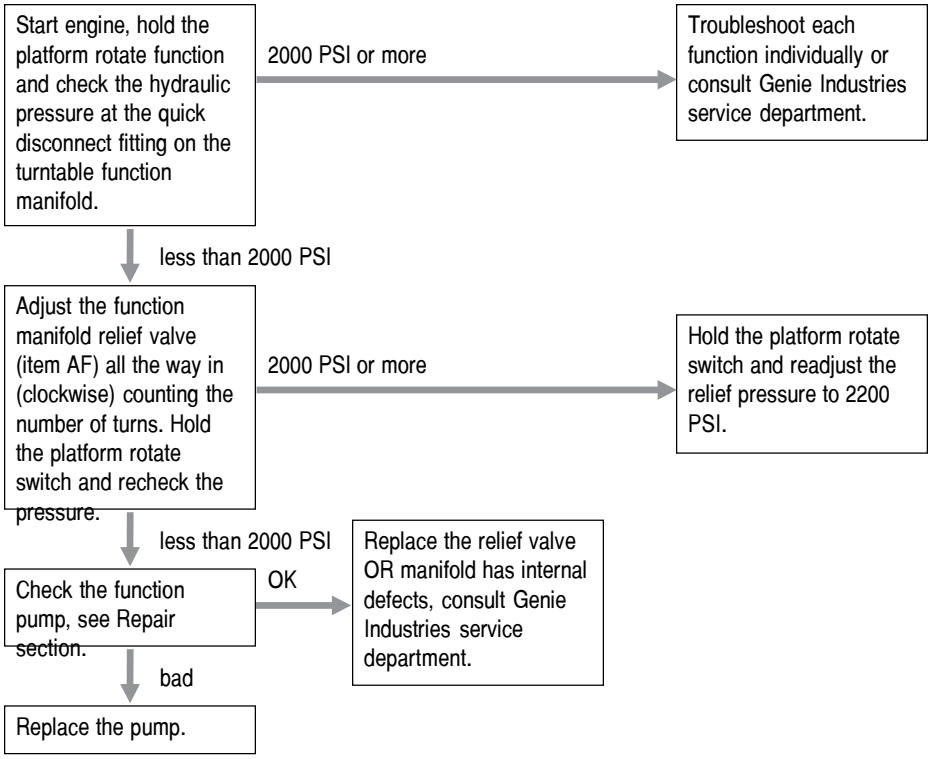


Chart 14

Ground Controls Inoperative, Platform Controls Operate Normally

Be sure all other functions operate normally, including platform controls.

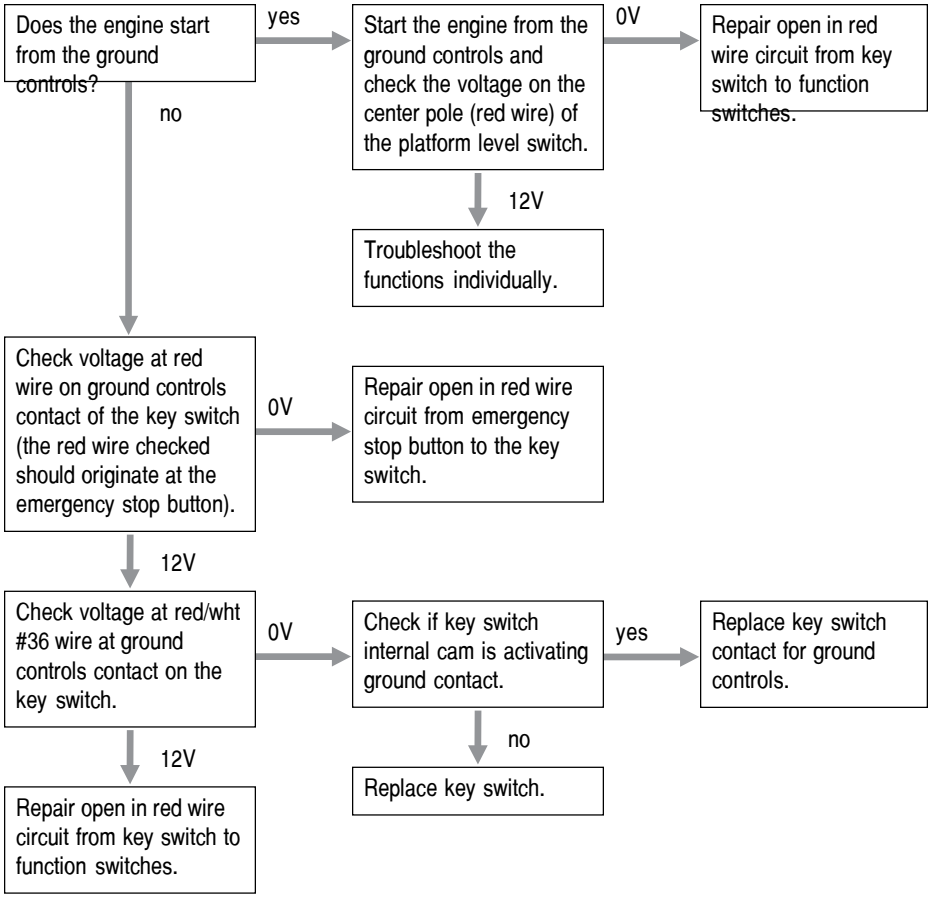


Chart 15

Platform Controls Inoperative, Ground Controls Operate Normally

Be sure all cables are in good condition with no kinks or abrasions.

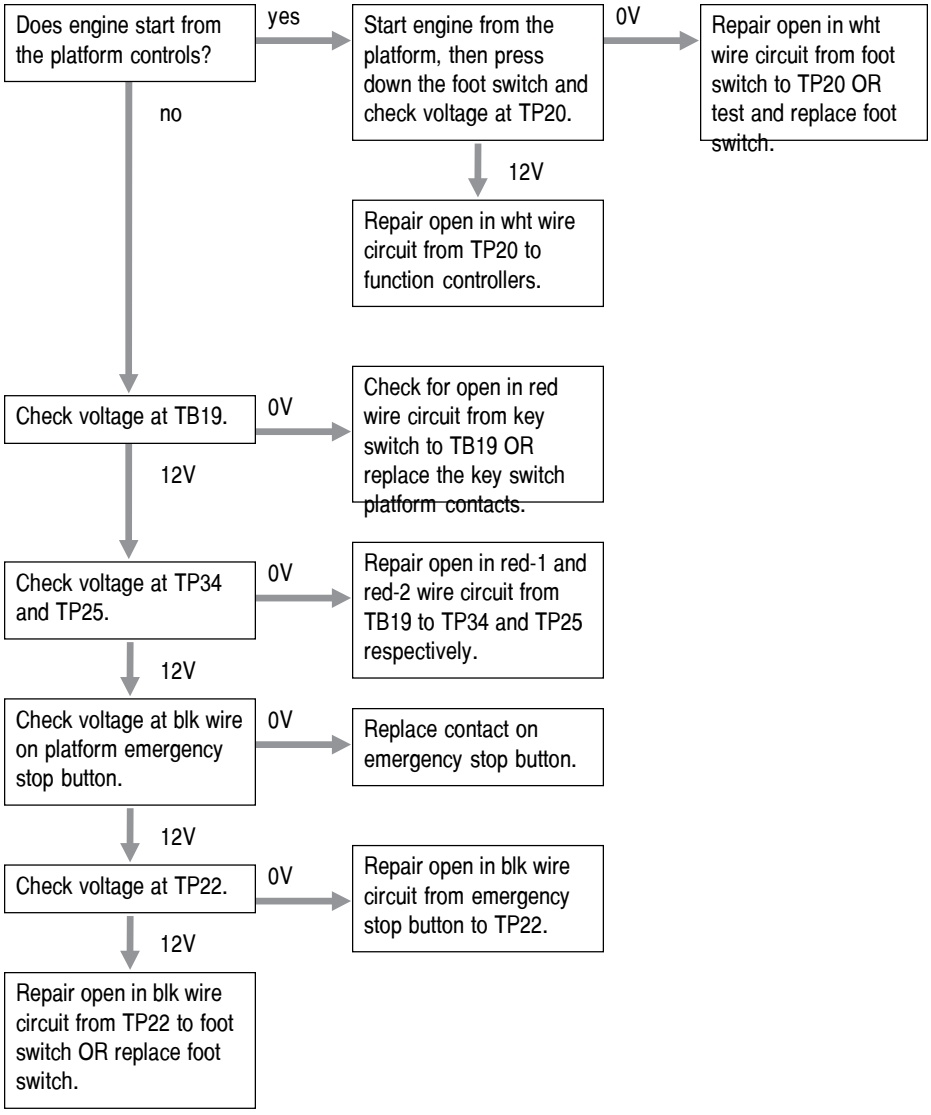


Chart 16

Secondary Boom Up Function Inoperative

Perform this test only if the boom is in the fully lowered position.

Be sure all other functions operate normally.

If secondary boom up function operates normally from the ground controls but not from the platform controls, troubleshoot the platform controller. See Repair section.

If secondary boom up function operates normally from the platform controls but not from the ground controls, troubleshoot the ground control toggle switch. See Repair section.

Note: Oscillating axle equipped models, from the stowed position the auxiliary power can not raise the boom above the drive limit switch. Auxiliary power can raise the boom if it is already raised above the drive limit switch.

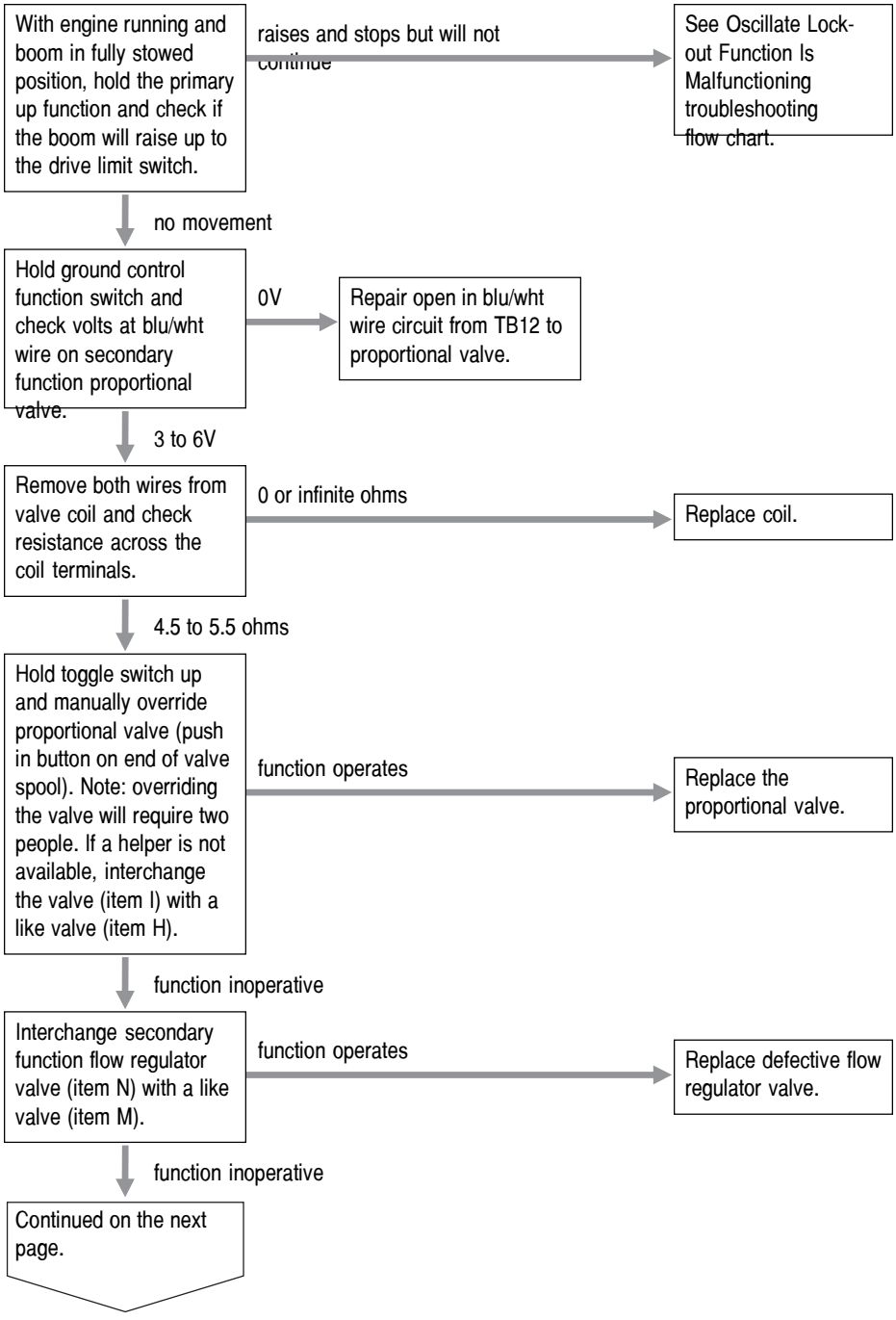


CHART 16

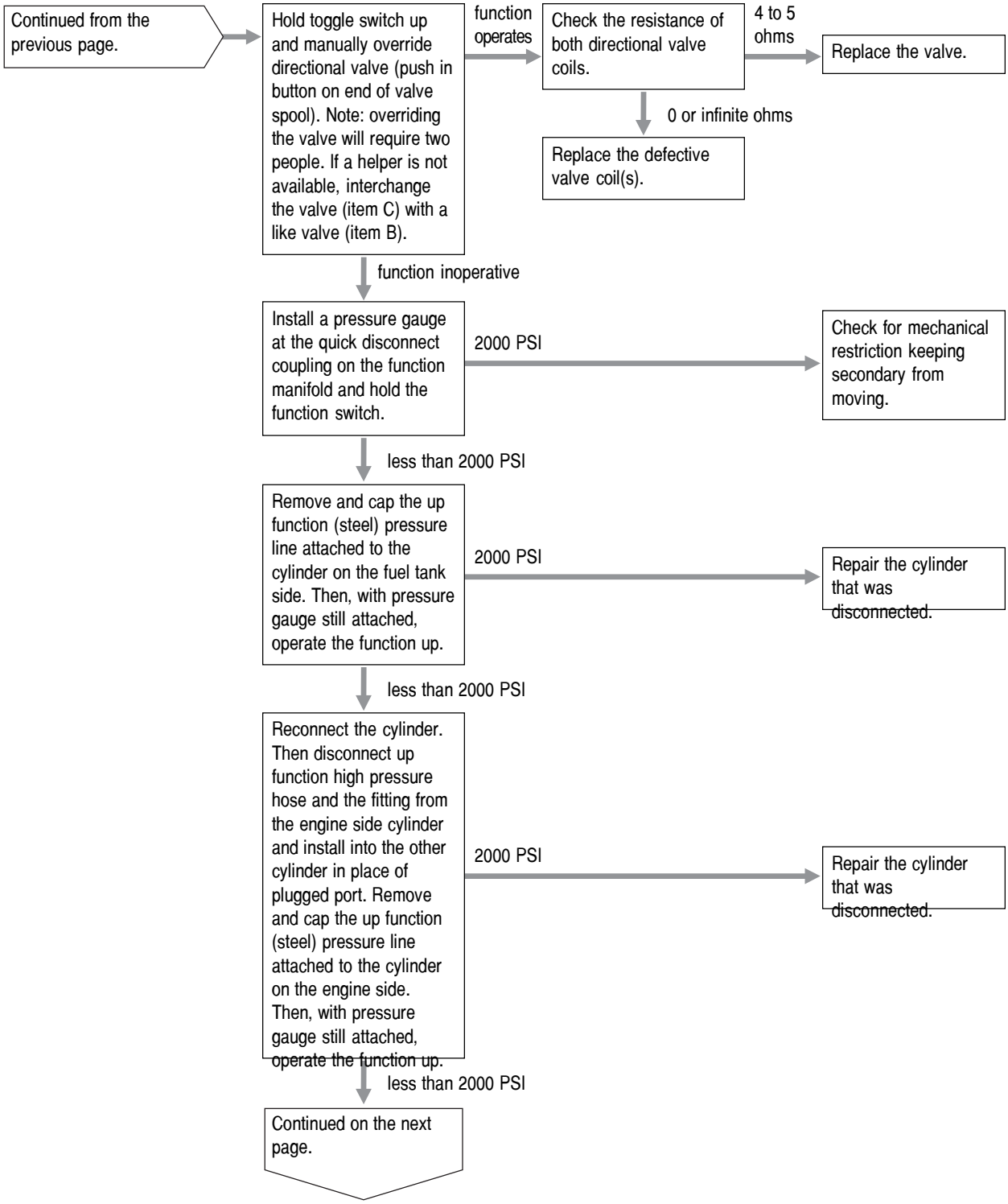

Continued from the previous page.
Hold toggle switch up and manually override directional valve (push in button on end of valve spool). Note: overriding the valve will require two people. If a helper is not available, interchange the valve (item C) with a like valve (item B).
function operates
Check the resistance of both directional valve coils.
4 to 5 ohms
Replace the valve.
0 or infinite ohms
Replace the defective valve coil(s).
function inoperative
Install a pressure gauge at the quick disconnect coupling on the function manifold and hold the function switch.
2000 PSI
Check for mechanical restriction keeping secondary from moving.
less than 2000 PSI
Remove and cap the up function (steel) pressure line attached to the cylinder on the fuel tank side. Then, with pressure gauge still attached, operate the function up.
2000 PSI
Repair the cylinder that was disconnected.
less than 2000 PSI
Reconnect the cylinder. Then disconnect up function high pressure hose and the fitting from the engine side cylinder and install into the other cylinder in place of plugged port. Remove and cap the up function (steel) pressure line attached to the cylinder on the engine side. Then, with pressure gauge still attached, operate the function up.
2000 PSI
Repair the cylinder that was disconnected.
less than 2000 PSI
Continued on the next page.

CHART 16

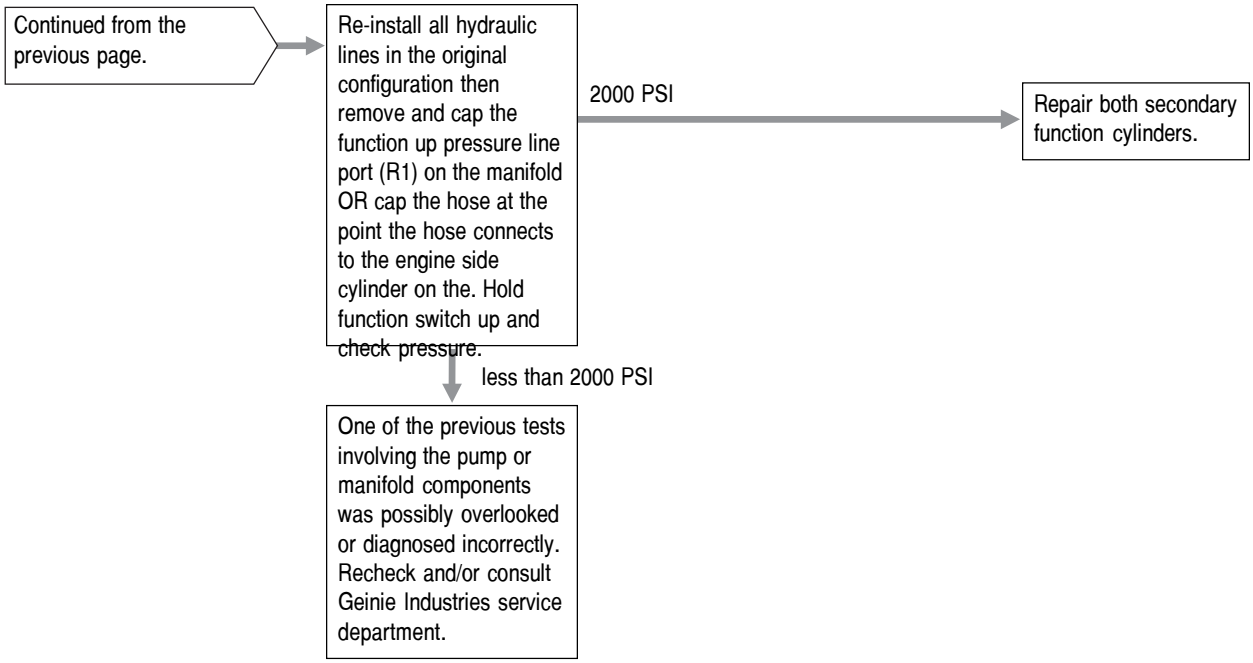

Continued from the previous page.
Re-install all hydraulic lines in the original configuration then remove and cap the function up pressure line port (R1) on the manifold OR cap the hose at the point the hose connects to the engine side cylinder on the. Hold function switch up and check pressure.
2000 PSI
Repair both secondary function cylinders.
less than 2000 PSI
One of the previous tests involving the pump or manifold components was possibly overlooked or diagnosed incorrectly. Recheck and/or consult Geinie Industries service department.

Chart 17

Secondary Boom Down Function Inoperative

Be sure all other functions operate normally including secondary up function.

If secondary boom down function operates normally from the ground controls but not from the platform controls, troubleshoot the platform controller. See Repair section.

If secondary boom down function operates normally from the platform controls but not from the ground controls, troubleshoot the ground control toggle switch. See Repair section.

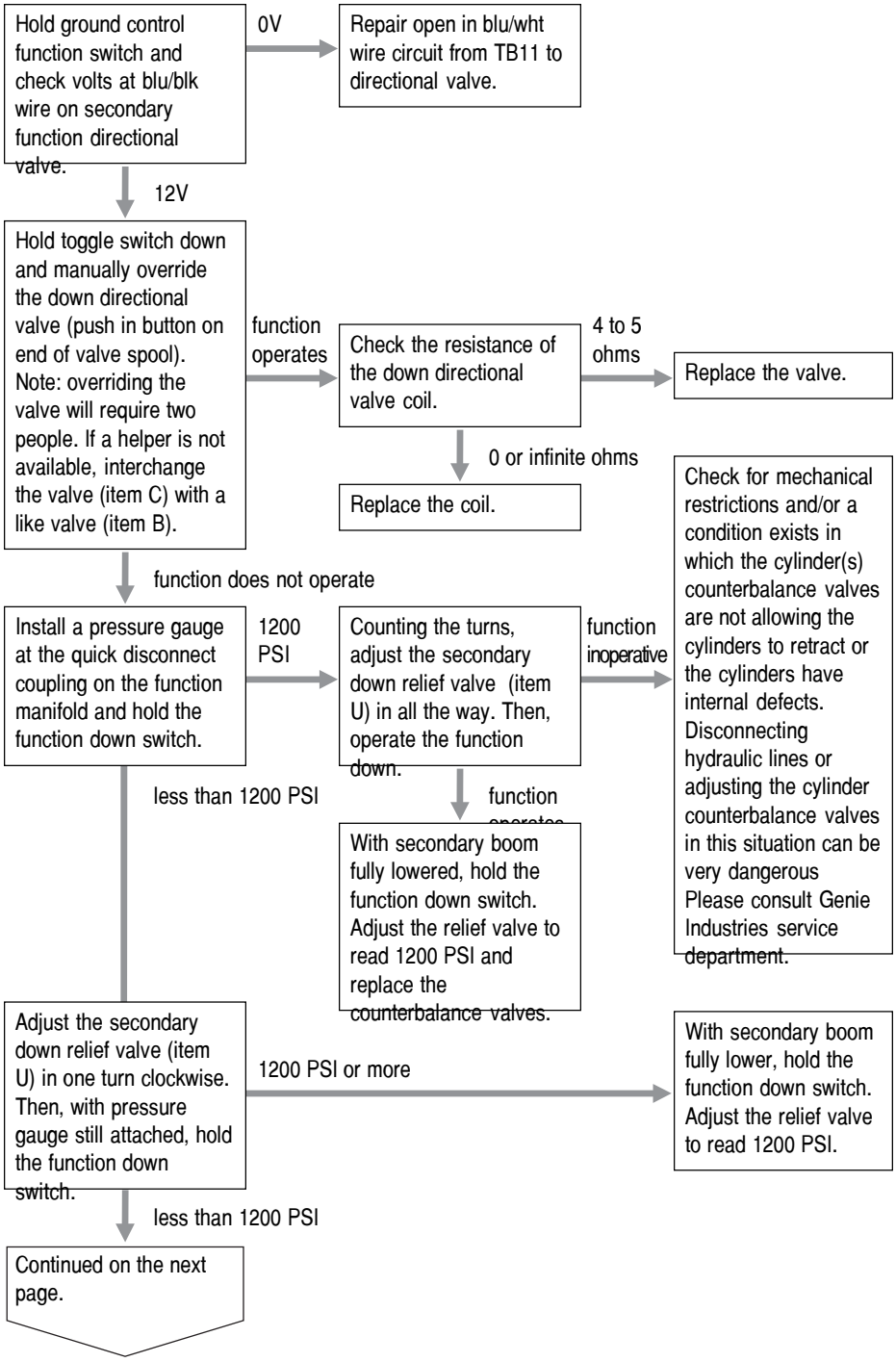


CHART 17

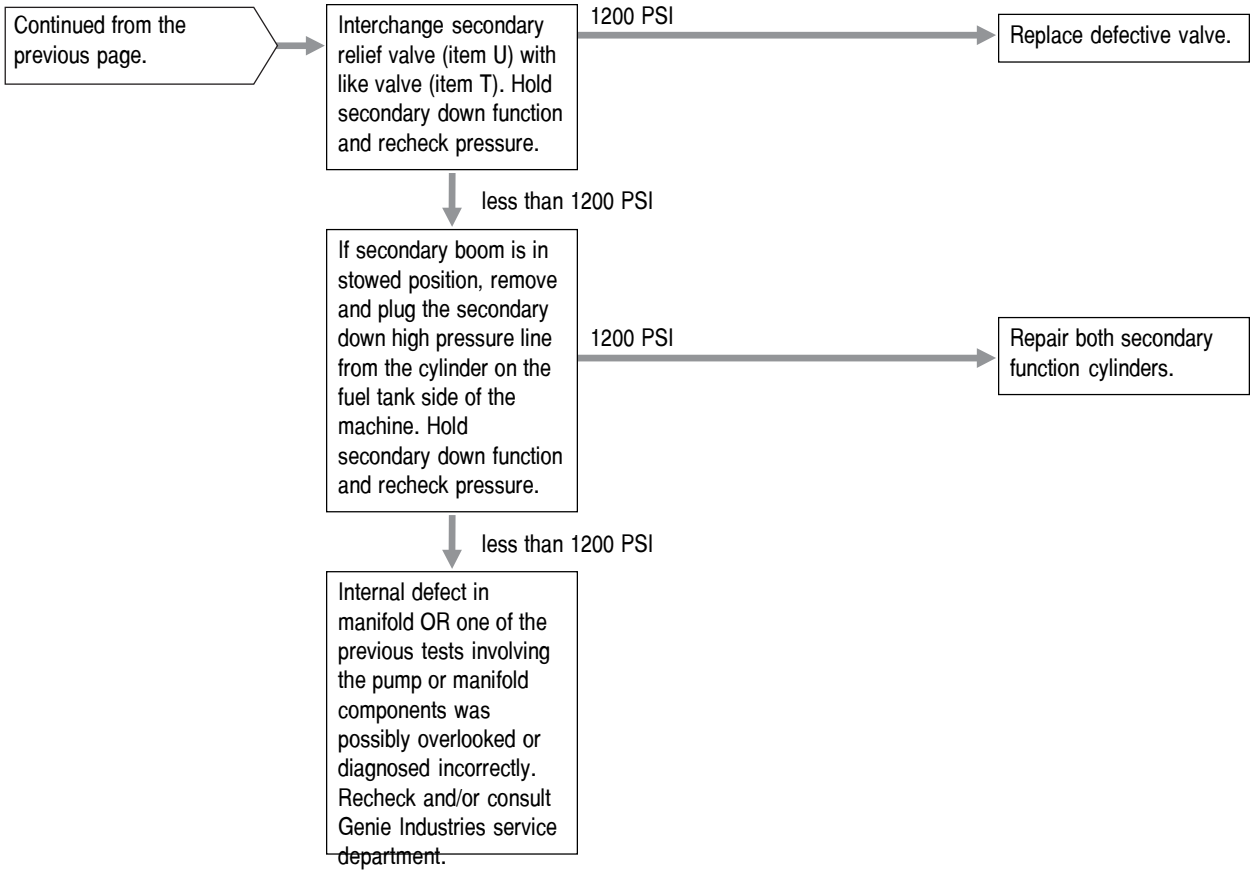

Continued from the previous page.
Interchange secondary relief valve (item U) with like valve (item T). Hold secondary down function and recheck pressure.
1200 PSI
Replace defective valve.
less than 1200 PSI
If secondary boom is in stowed position, remove and plug the secondary down high pressure line from the cylinder on the fuel tank side of the machine. Hold secondary down function and recheck pressure.
1200 PSI
Repair both secondary function cylinders.
less than 1200 PSI
Internal defect in manifold OR one of the previous tests involving the pump or manifold components was possibly overlooked or diagnosed incorrectly. Recheck and/or consult Genie Industries service department.

Chart 18

Primary Boom Up Function Inoperative

Be sure all other functions operate normally.

If primary boom up function operates normally from the ground controls but not from the platform controls, troubleshoot the platform controller. See Repair section.

If primary boom up function operates normally from the platform controls but not from the ground controls, troubleshoot the ground control toggle switch. See Repair section.

Note: Oscillating axle equipped models, from the stowed position the auxiliary power can not raise the boom above the drive limit switch. Auxiliary power can raise the boom if it is already raised above the drive limit switch.

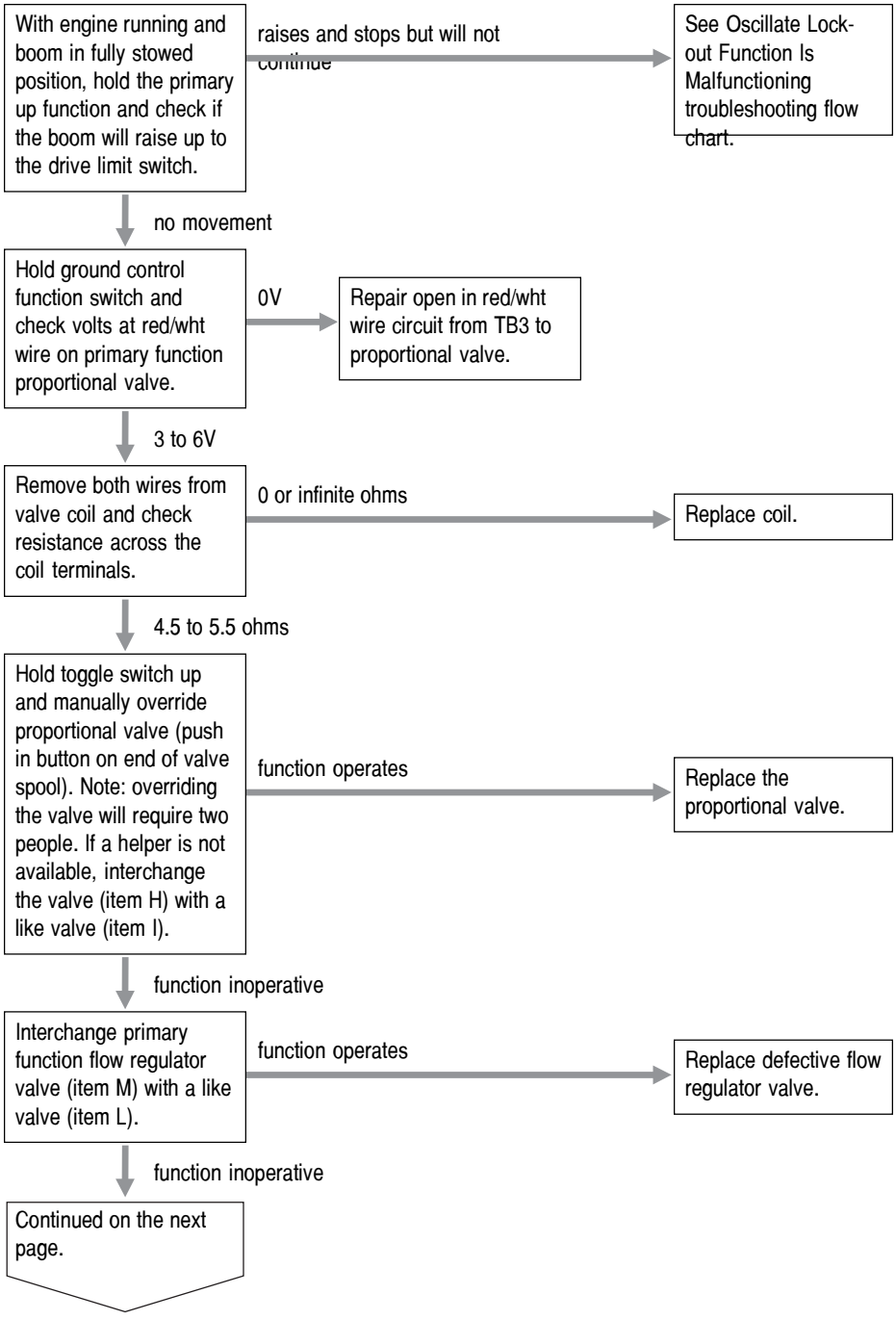


CHART 18

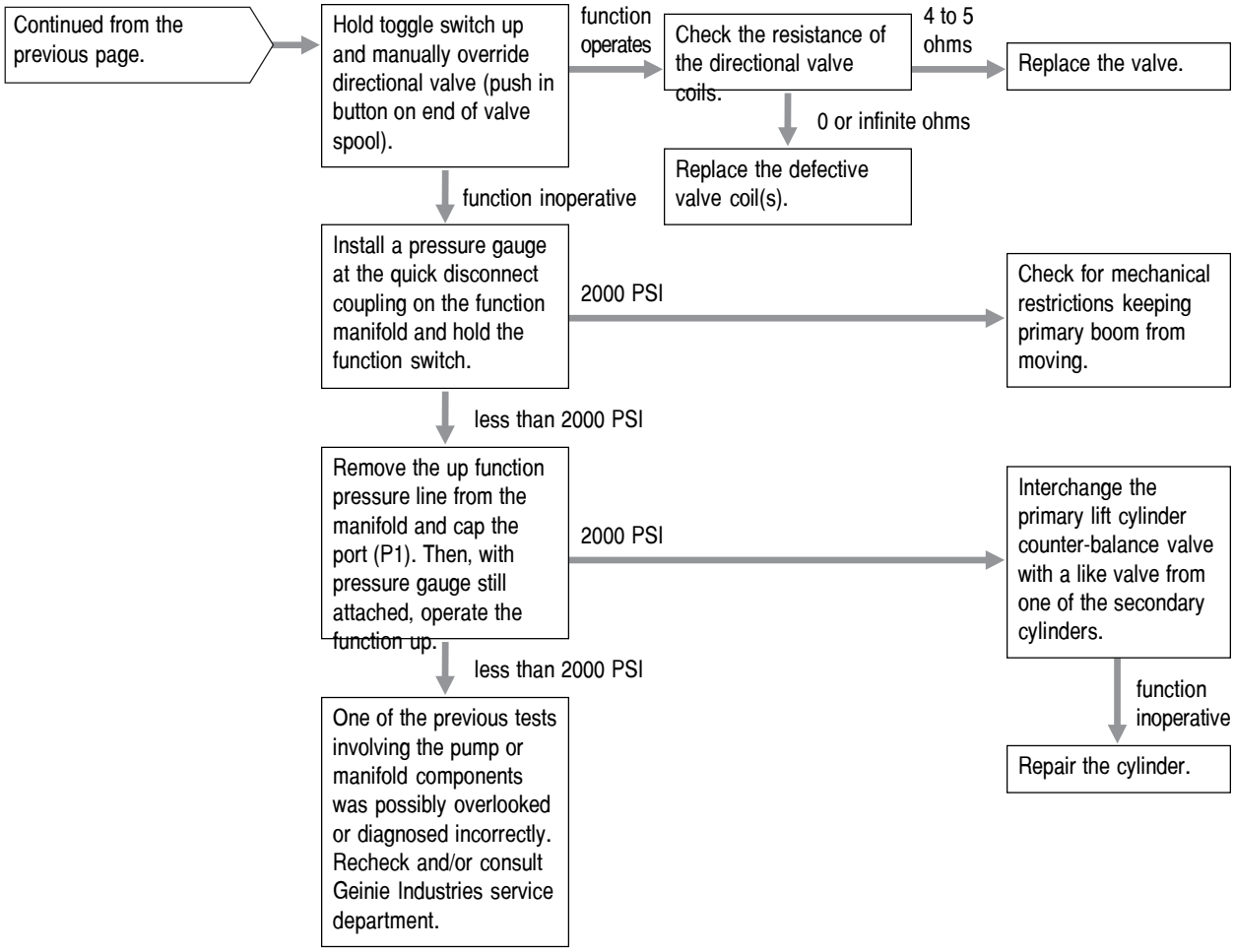

Continued from the previous page.
Hold toggle switch up and manually override directional valve (push in button on end of valve spool).
function operates
Check the resistance of the directional valve coils.
4 to 5 ohms
Replace the valve.
0 or infinite ohms
Replace the defective valve coil(s).
function inoperative
Install a pressure gauge at the quick disconnect coupling on the function manifold and hold the function switch.
2000 PSI
Check for mechanical restrictions keeping primary boom from moving.
less than 2000 PSI
Remove the up function pressure line from the manifold and cap the port (P1). Then, with pressure gauge still attached, operate the function up.
2000 PSI
Interchange the primary lift cylinder counter-balance valve with a like valve from one of the secondary cylinders.
function inoperative
Repair the cylinder.
less than 2000 PSI
One of the previous tests involving the pump or manifold components was possibly overlooked or diagnosed incorrectly. Recheck and/or consult Geinie Industries service department.

Chart 19

Primary Boom Down Function Inoperative

Be sure all other functions operate normally including primary up function.

If primary boom down function operates normally from the ground controls but not from the platform controls, troubleshoot the platform controller. See Repair section.

If primary boom down function operates normally from the platform controls but not from the ground controls, troubleshoot the ground control toggle switch. See Repair section.

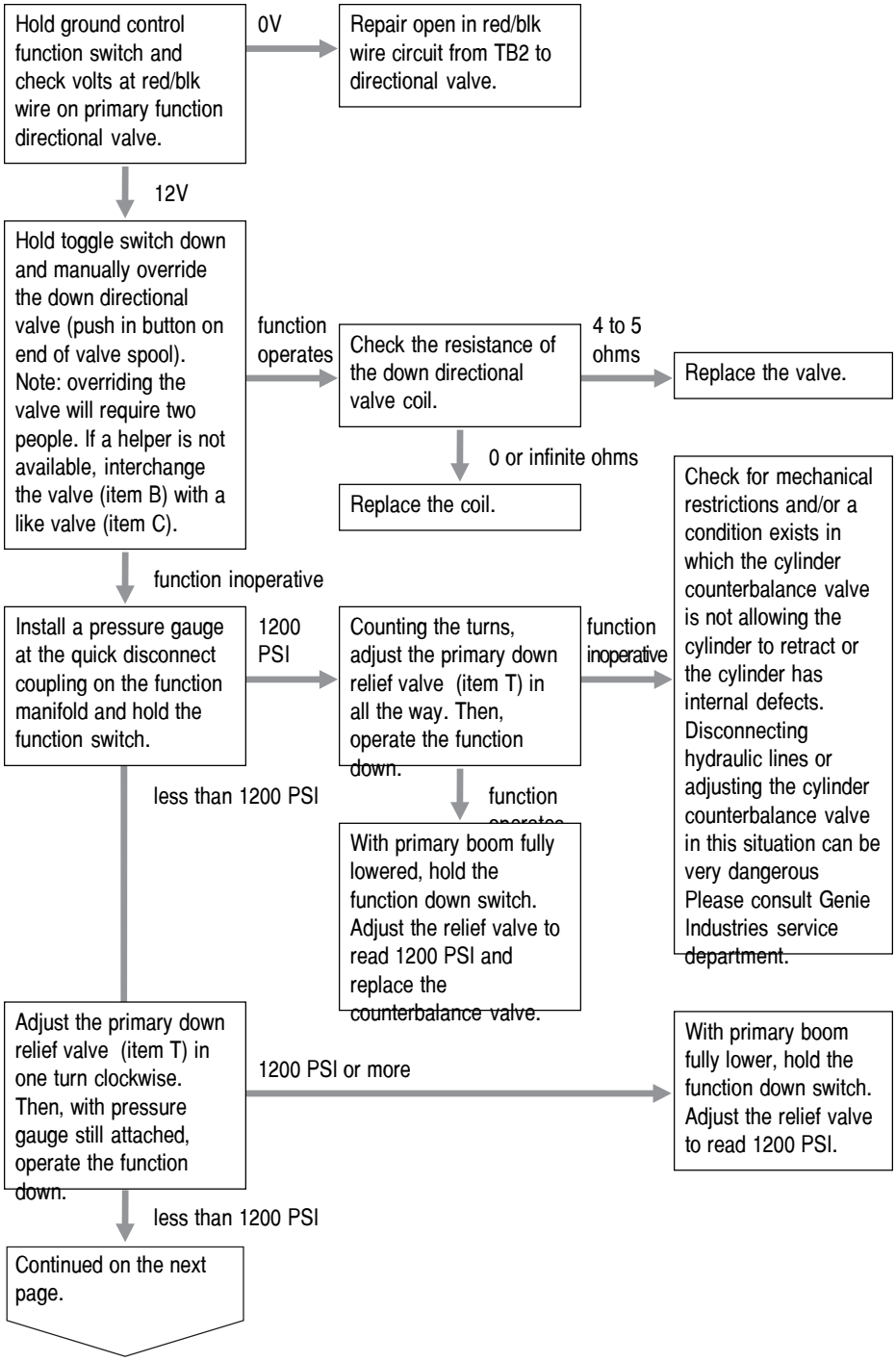


CHART 19

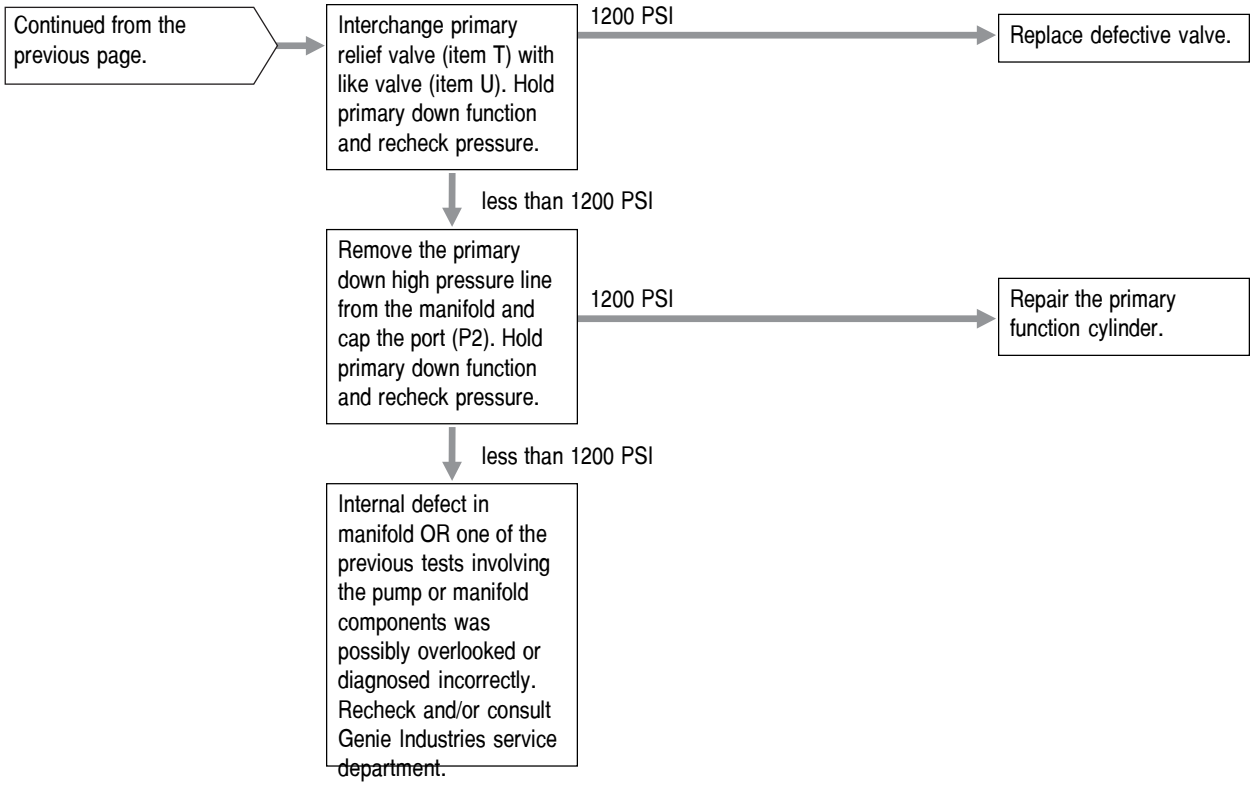

Continued from the previous page.
Interchange primary relief valve (item T) with like valve (item U). Hold primary down function and recheck pressure.
1200 PSI
Replace defective valve.
less than 1200 PSI
Remove the primary down high pressure line from the manifold and cap the port (P2). Hold primary down function and recheck pressure.
1200 PSI
Repair the primary function cylinder.
less than 1200 PSI
Internal defect in manifold OR one of the previous tests involving the pump or manifold components was possibly overlooked or diagnosed incorrectly. Recheck and/or consult Genie Industries service department.

Chart 20

Primary Boom Extend Function Inoperative

Be sure all other functions operate normally.

If primary boom extend function operates normally from the ground controls but not from the platform controls, troubleshoot the platform controller. See Repair section.

If primary boom extend function operates normally from the platform controls but not from the ground controls, troubleshoot the ground control toggle switch. See Repair section.

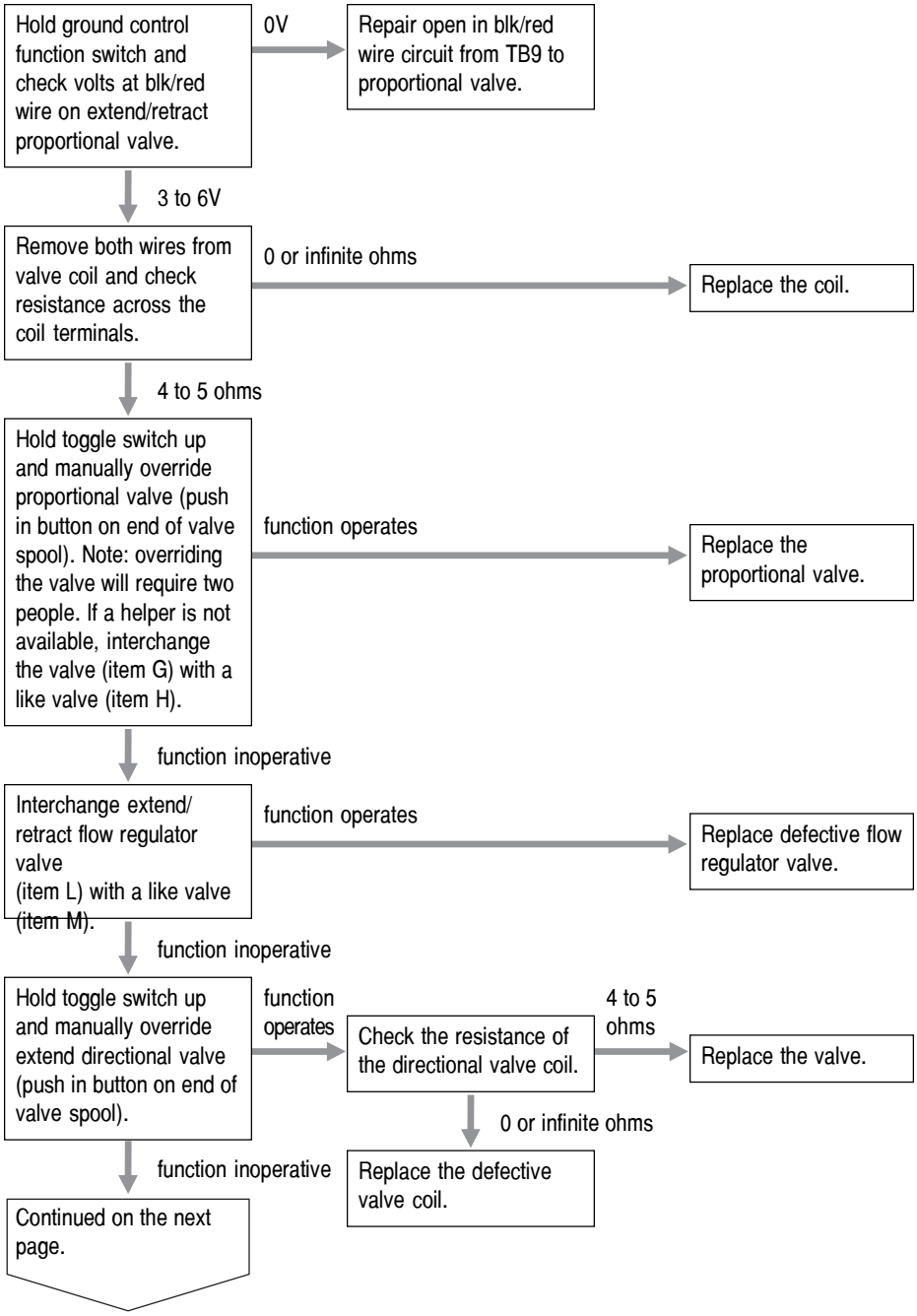


CHART 20

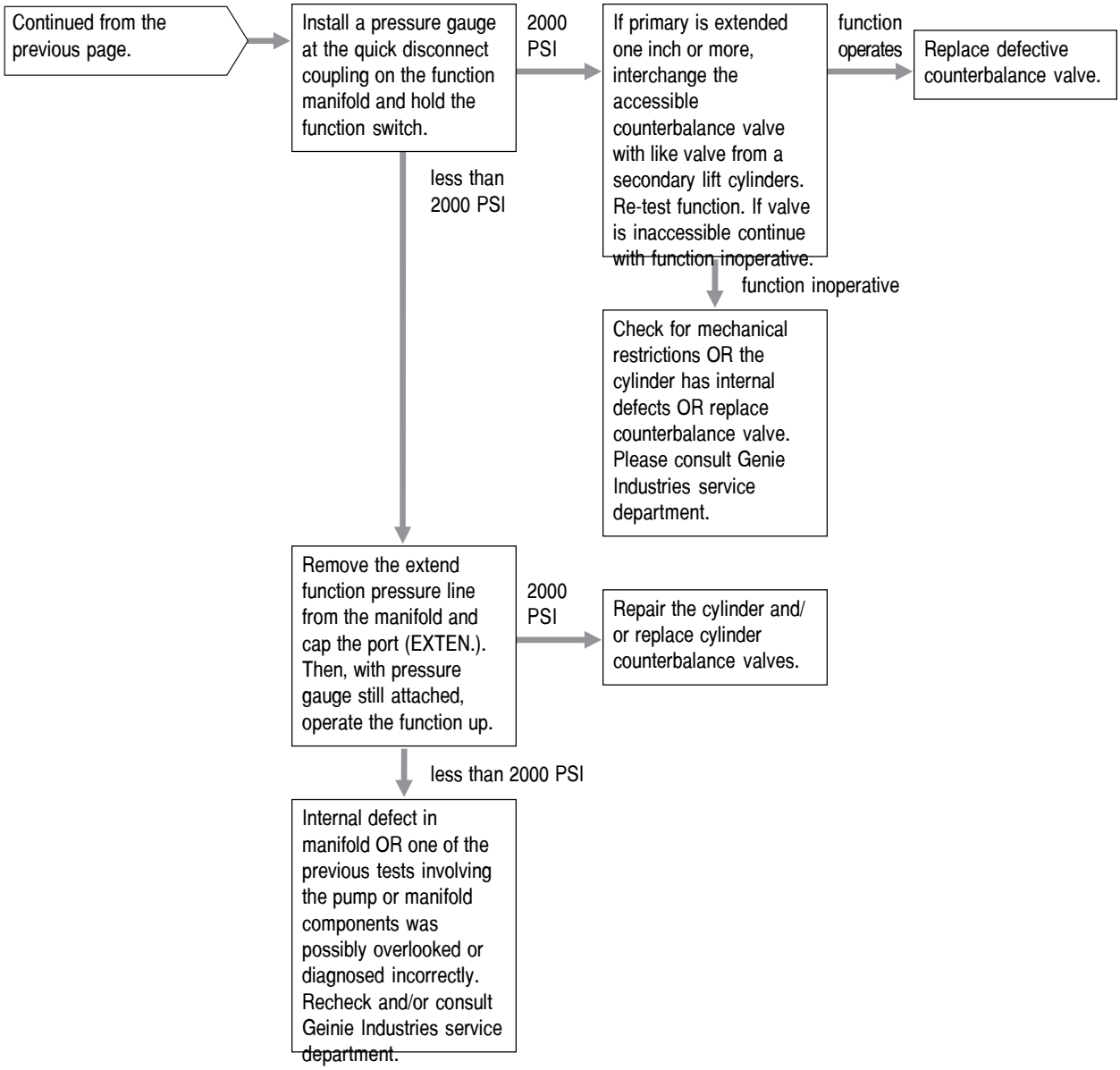

Continued from the previous page.
Install a pressure gauge at the quick disconnect coupling on the function manifold and hold the function switch.
2000 PSI
If primary is extended one inch or more, interchange the accessible counterbalance valve with like valve from a secondary lift cylinders. Re-test function. If valve is inaccessible continue with function inoperative.
function operates
Replace defective counterbalance valve.
less than 2000 PSI
function inoperative
Check for mechanical restrictions OR the cylinder has internal defects OR replace counterbalance valve. Please consult Genie Industries service department.
Remove the extend function pressure line from the manifold and cap the port (EXTEN.). Then, with pressure gauge still attached, operate the function up.
2000 PSI
Repair the cylinder and/ or replace cylinder counterbalance valves.
less than 2000 PSI
Internal defect in manifold OR one of the previous tests involving the pump or manifold components was possibly overlooked or diagnosed incorrectly. Recheck and/or consult Geinie Industries service department.

Chart 21

Primary Boom Retract Function Inoperative

Be sure all other functions operate normally including primary extend function.

If primary boom retract function operates normally from the ground controls but not from the platform controls, troubleshoot the platform controller. See Repair section.

If primary boom retract function operates normally from the platform controls but not from the ground controls, troubleshoot the ground control toggle switch. See Repair section.

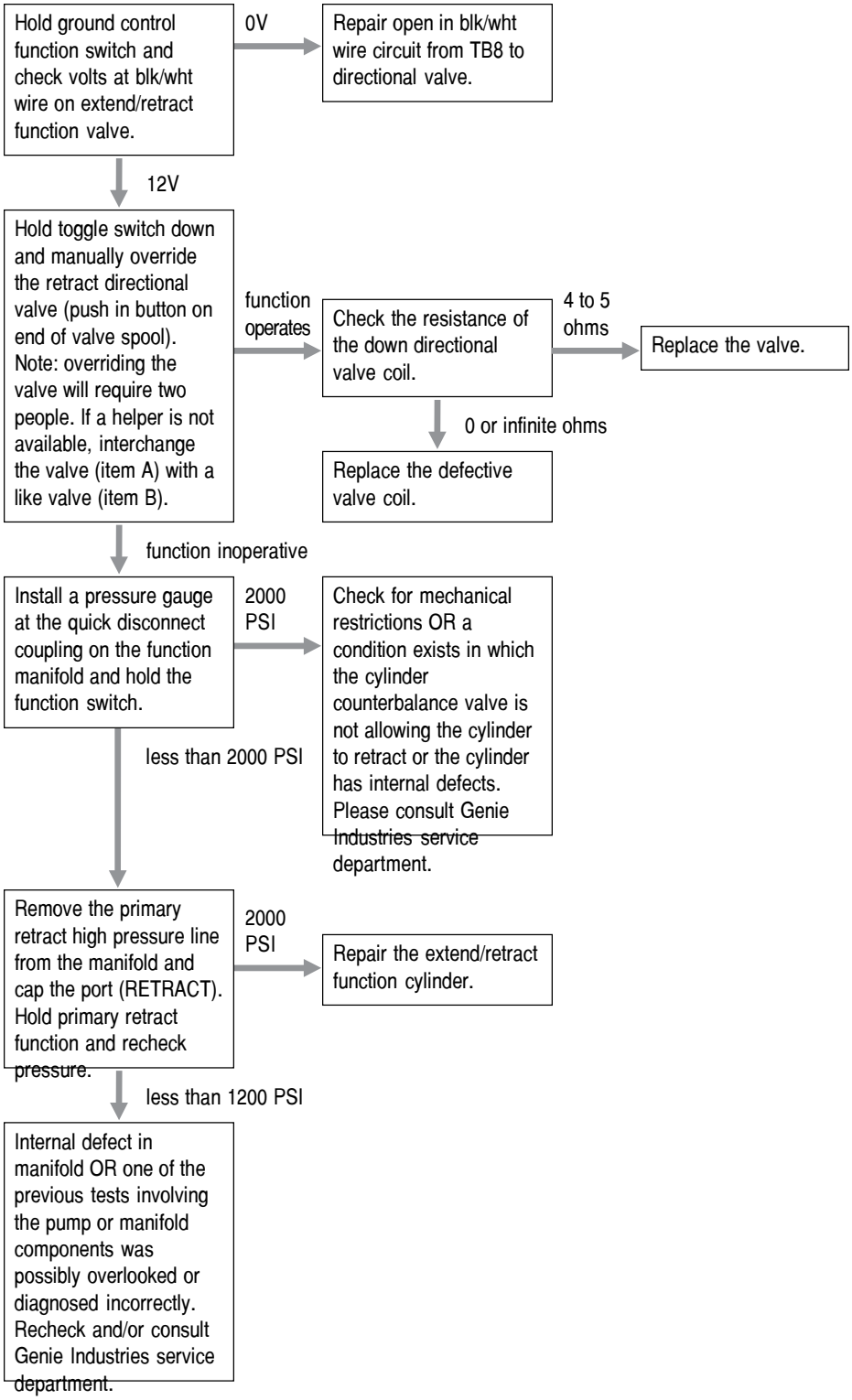


Chart 22

Turntable Rotate Function Inoperative

Be sure all other functions operate normally.

If turntable rotate function operates normally from the ground controls but not from the platform controls, troubleshoot the platform controller. See Repair section.

If turntable rotate function operates normally from the platform controls but not from the ground controls, troubleshoot the ground control toggle switch. See Repair section.

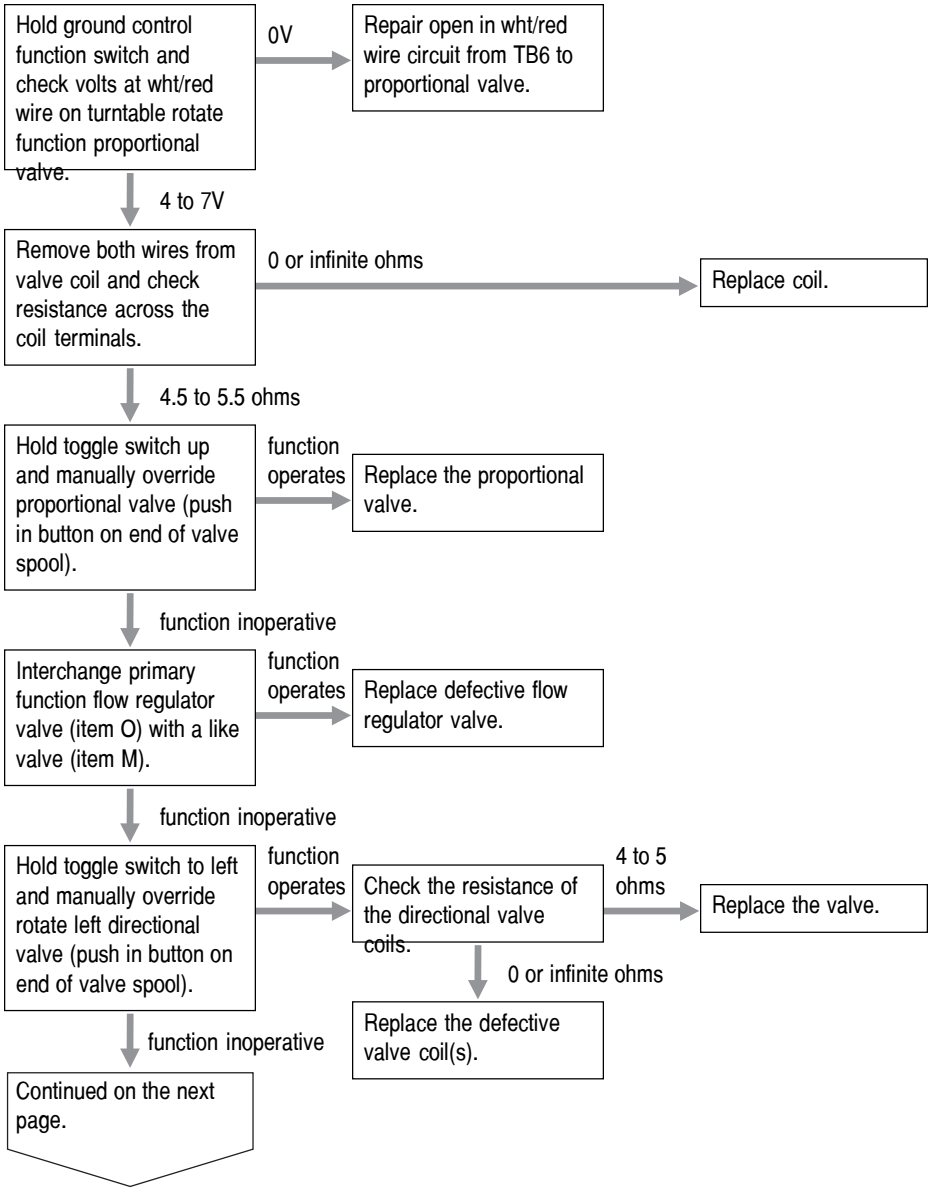


CHART 22

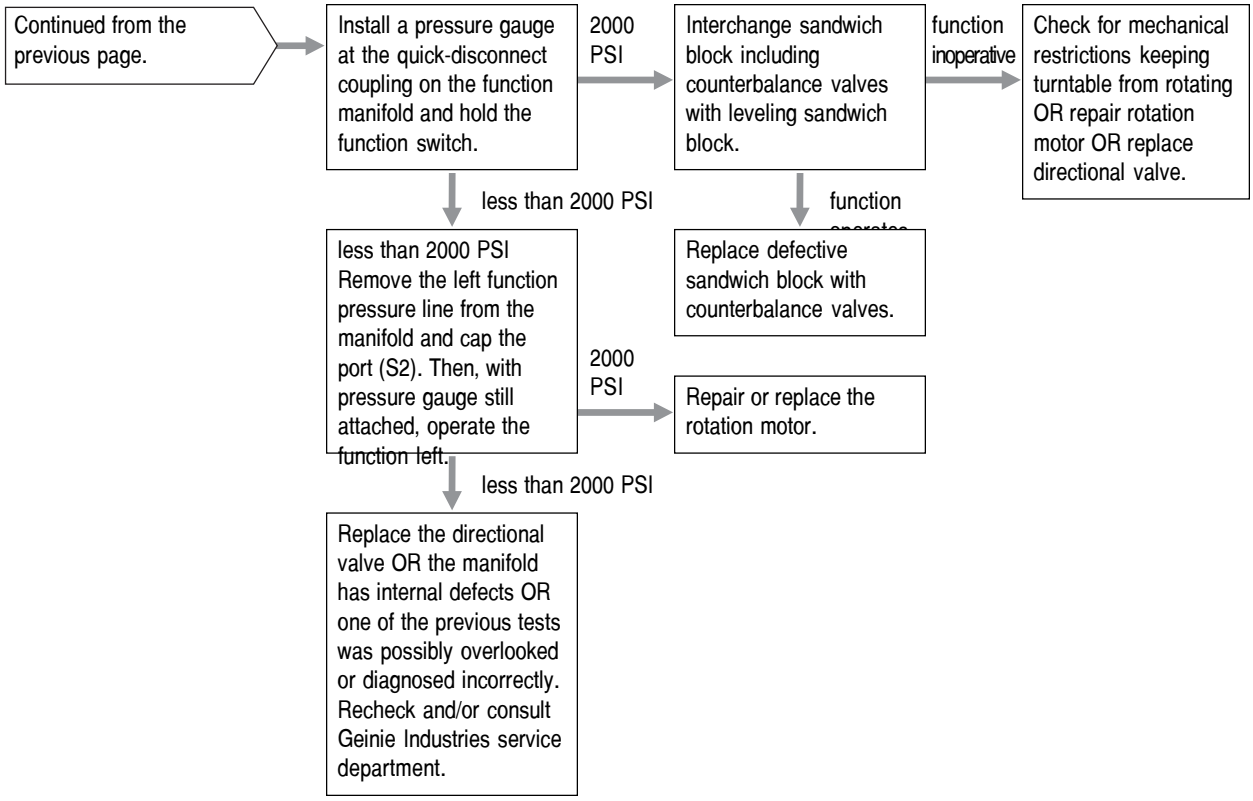

Continued from the previous page.
Install a pressure gauge at the quick-disconnect coupling on the function manifold and hold the function switch.
2000 PSI
Interchange sandwich block including counterbalance valves with leveling sandwich block.
function inoperative
Check for mechanical restrictions keeping turntable from rotating OR repair rotation motor OR replace directional valve.
less than 2000 PSI
function
less than 2000 PSI Remove the left function pressure line from the manifold and cap the port (S2). Then, with pressure gauge still attached, operate the function left.
Replace defective sandwich block with counterbalance valves.
2000 PSI
Repair or replace the rotation motor.
less than 2000 PSI
Replace the directional valve OR the manifold has internal defects OR one of the previous tests was possibly overlooked or diagnosed incorrectly. Recheck and/or consult Geinie Industries service department.

Chart 23

Turntable Rotate Left Function Inoperative

Be sure all other functions operate normally including turntable rotate right function.

If turntable rotate left function operates normally from the ground controls but not from the platform controls, troubleshoot the platform controller. See Repair section.

If turntable rotate left function operates normally from the platform controls but not from the ground controls, troubleshoot the ground control toggle switch. See Repair section.

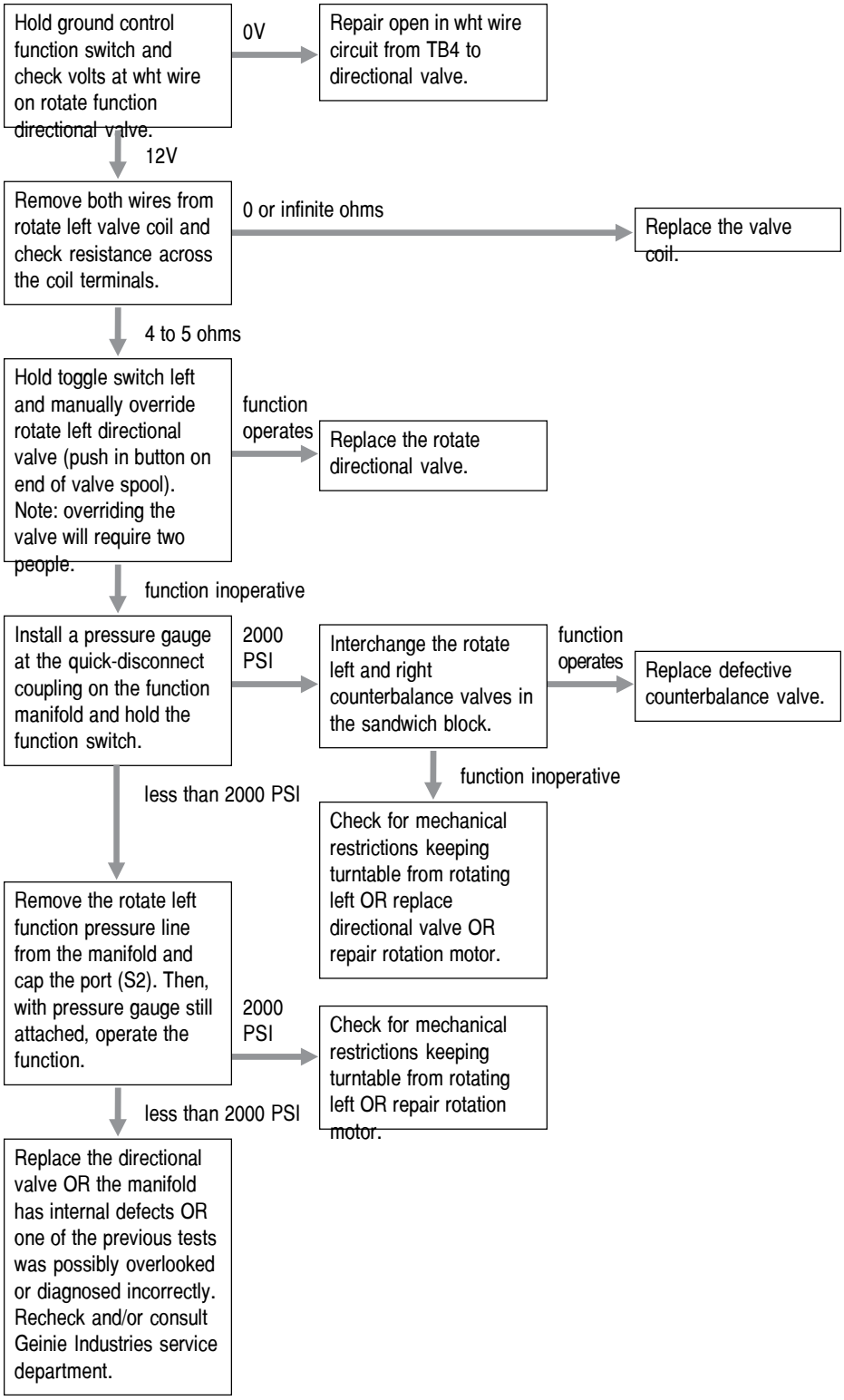


Chart 24

Turntable Rotate Right Function Inoperative

Be sure all other functions operate normally including turntable rotate left function.

If turntable rotate right function operates normally from the ground controls but not from the platform controls, troubleshoot the platform controller. See Repair section.

If turntable rotate right function operates normally from the platform controls but not from the ground controls, troubleshoot the ground control toggle switch. See Repair section.

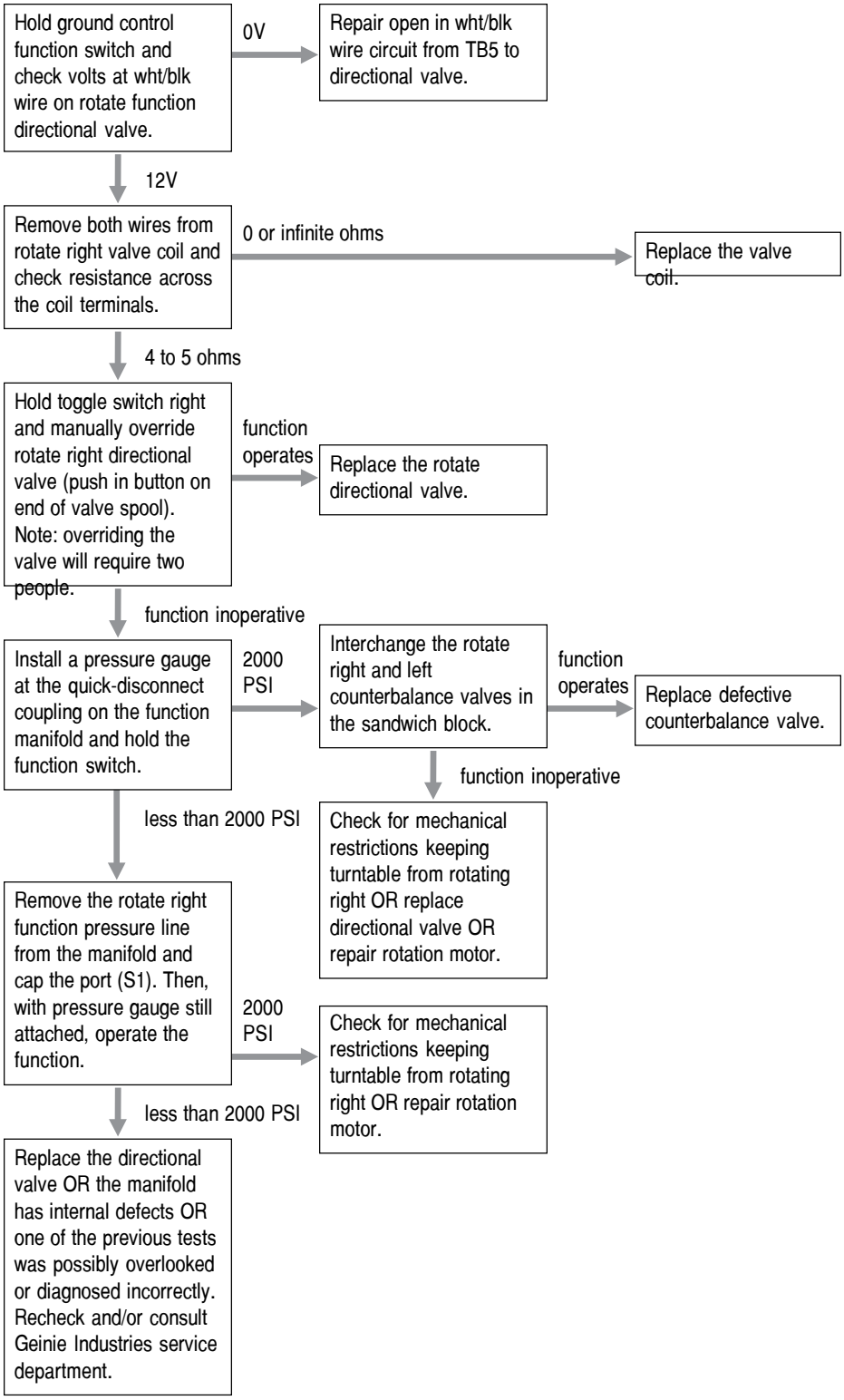


Chart 25

All Platform Leveling Functions Inoperative

Be sure all other functions operate normally.

Be sure both automatic and manual platform leveling do not operate.

If automatic leveling operates but manual leveling does not, troubleshoot *Platform Leveling Up Function Inoperative*.

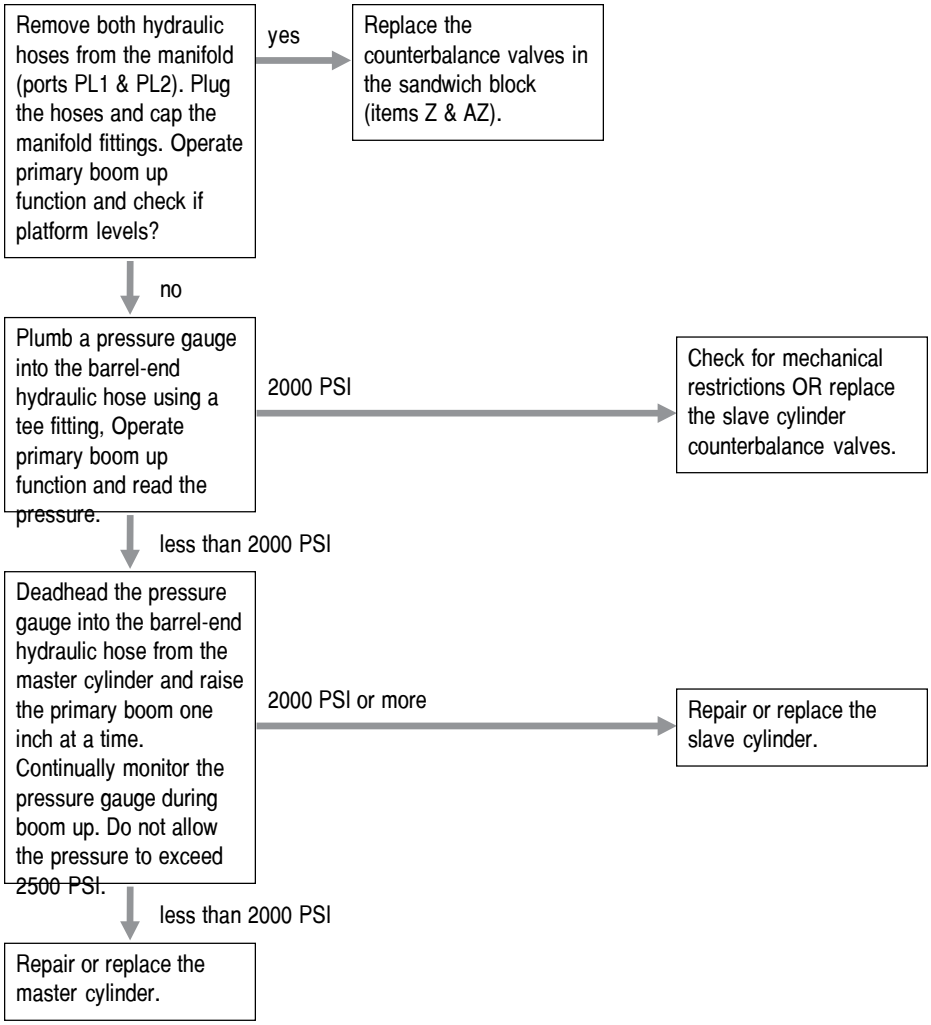


Chart 26

Platform Level Up Function Inoperative

Be sure all other functions operate normally.

If platform level up function operates normally from the ground controls but not from the platform controls, troubleshoot the platform control toggle switch. See Repair section.

If platform level up function operates normally from the platform controls but not from the ground controls, troubleshoot the ground control toggle switch. See Repair section.

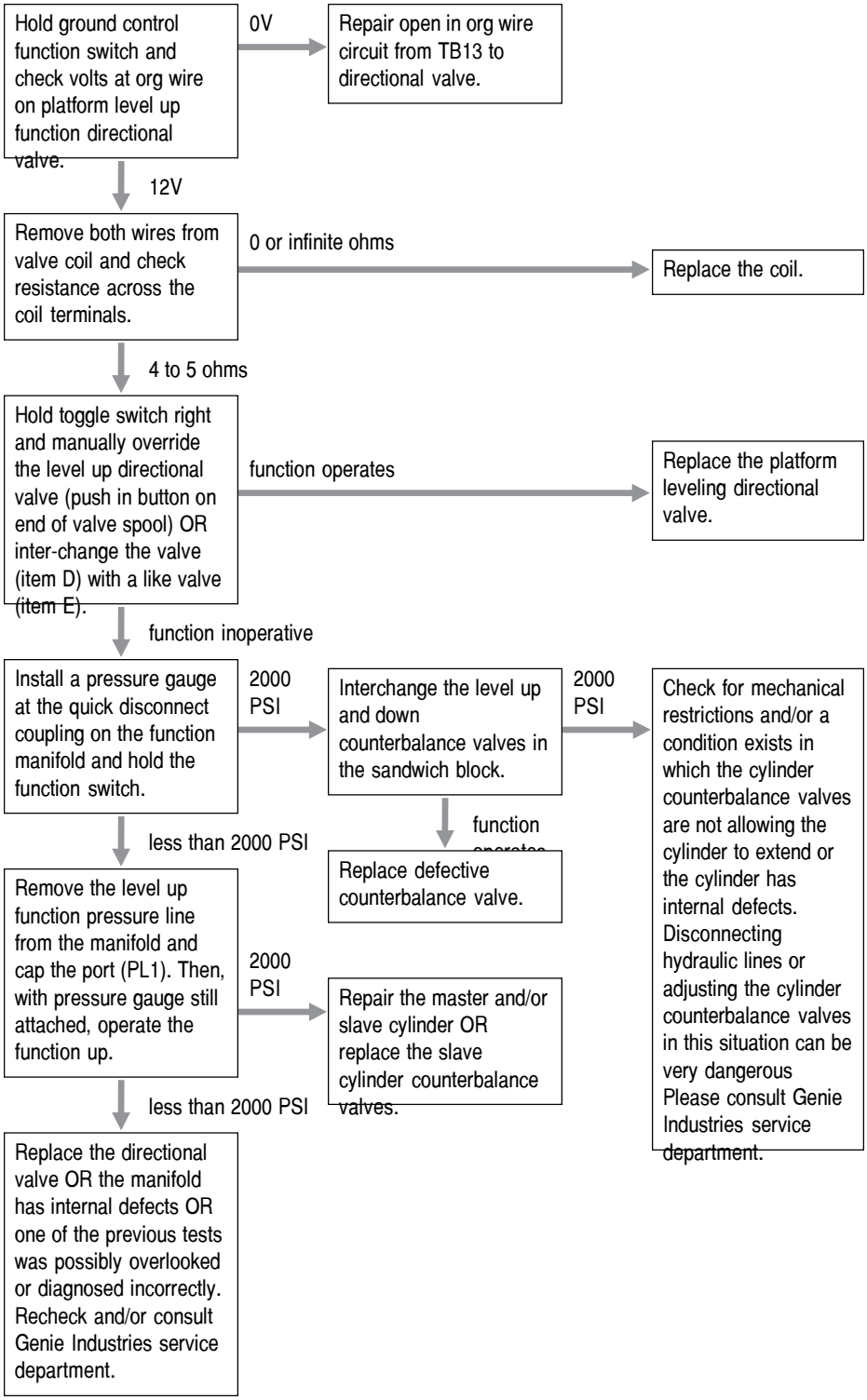


Chart 27

Platform Level Down Function Inoperative

Be sure all other functions operate normally.

If platform level down function operates normally from the ground controls but not from the platform controls, troubleshoot the platform control toggle switch. See Repair section.

If platform level down function operates normally from the platform controls but not from the ground controls, troubleshoot the ground control toggle switch. See Repair section.

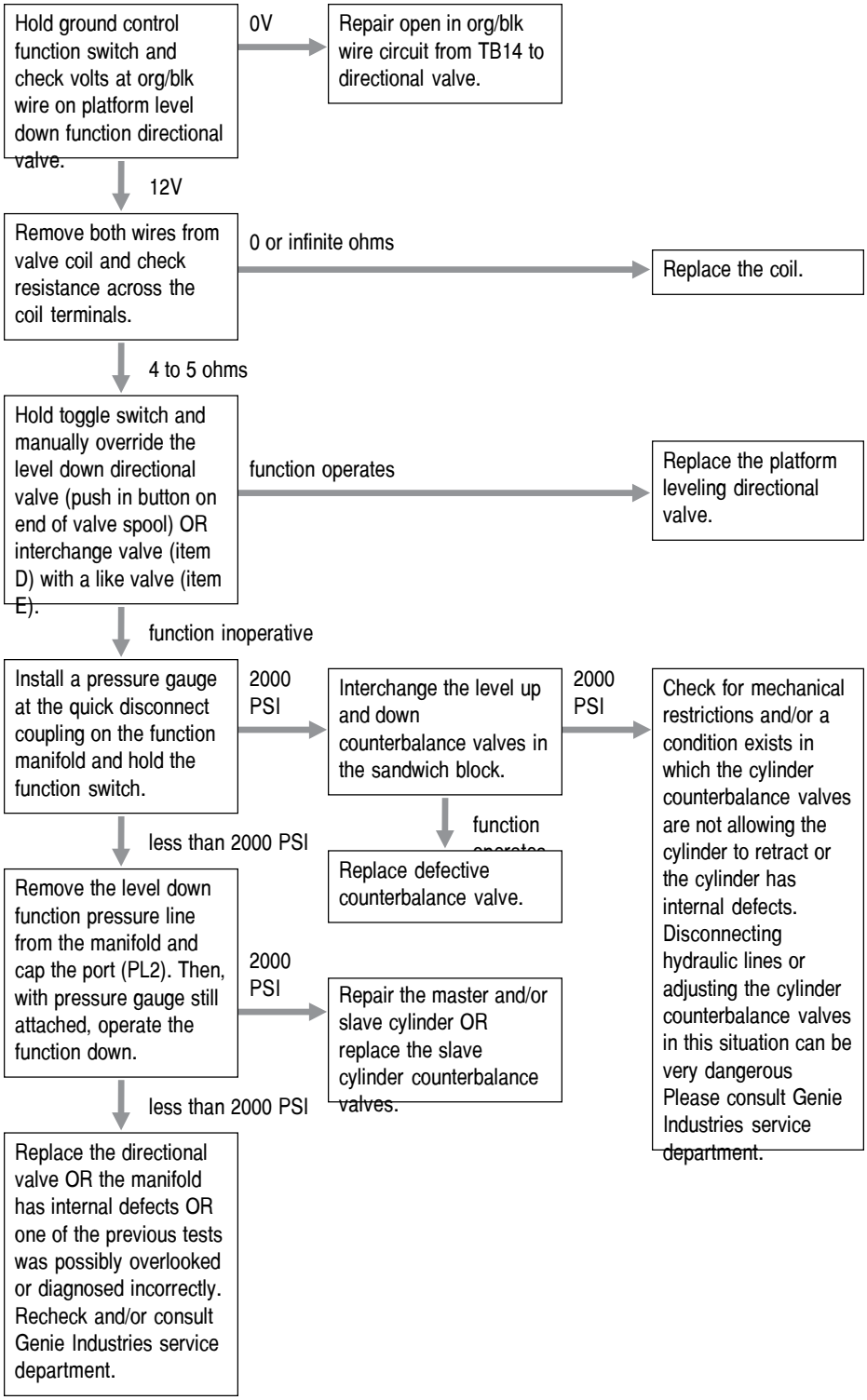


Chart 28

Platform Rotate Left Function Inoperative

Be sure all other functions operate normally.

If platform rotate left function operates normally from the ground controls but not from the platform controls, troubleshoot the platform control toggle switch. See Repair section.

If platform rotate left function operates normally from the platform controls but not from the ground controls, troubleshoot the ground control toggle switch. See Repair section.

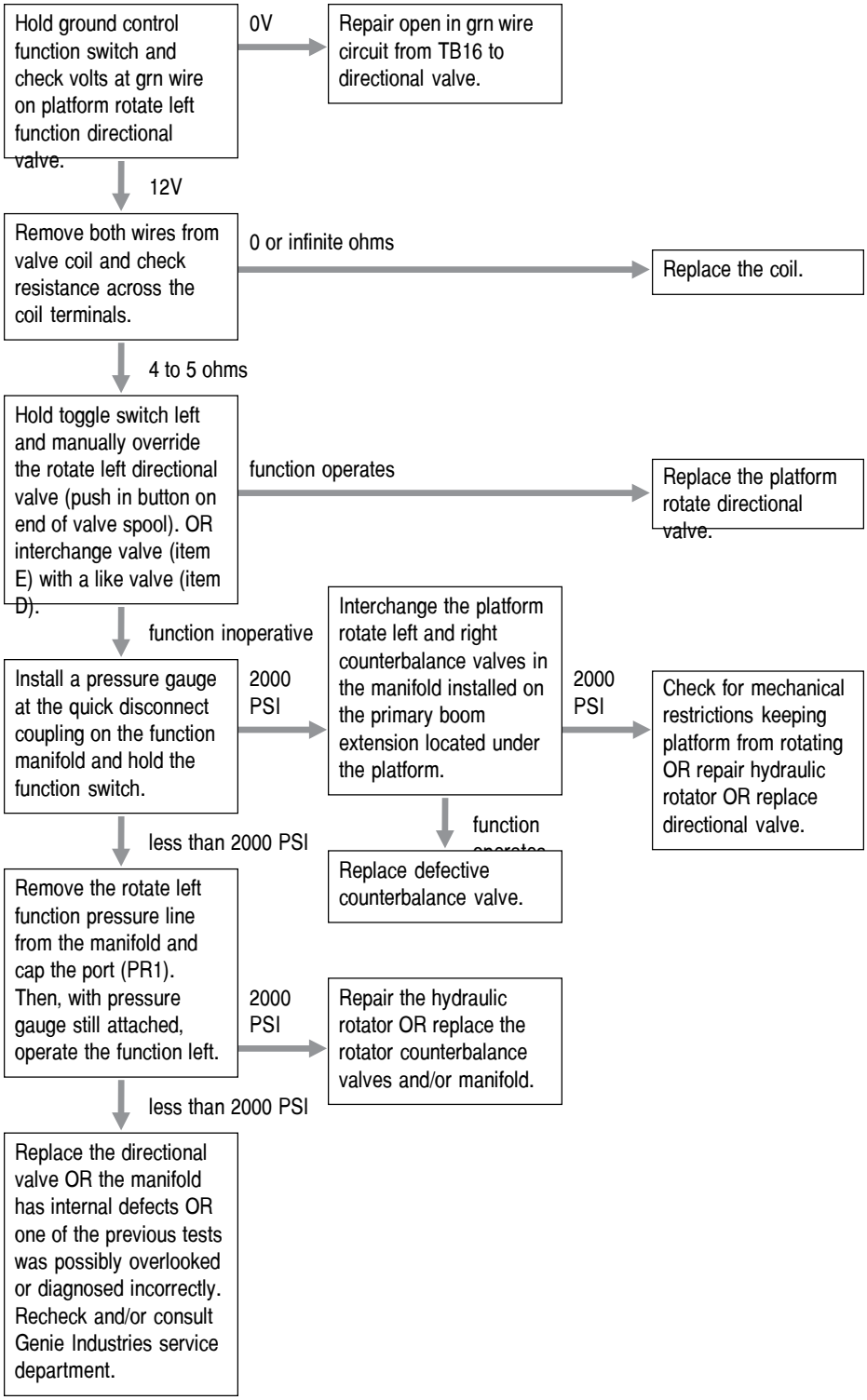


Chart 29

Platform Rotate Right Function Inoperative

Be sure all other functions operate normally.

If platform rotate right function operates normally from the ground controls but not from the platform controls, troubleshoot the platform control toggle switch. See Repair section.

If platform rotate right function operates normally from the platform controls but not from the ground controls, troubleshoot the ground control toggle switch. See Repair section.

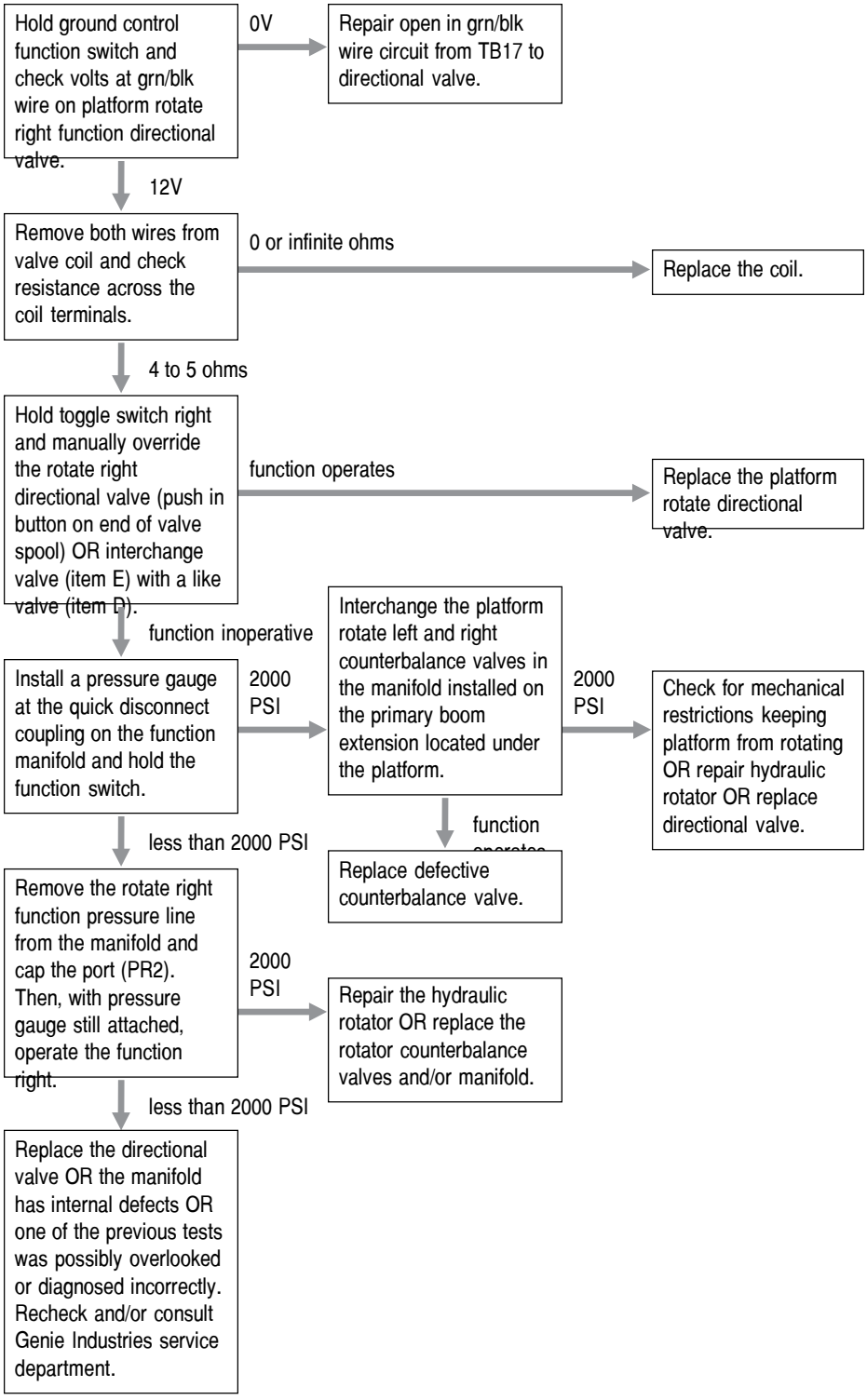


Chart 30

Oscillate Lock-out Function Inoperative

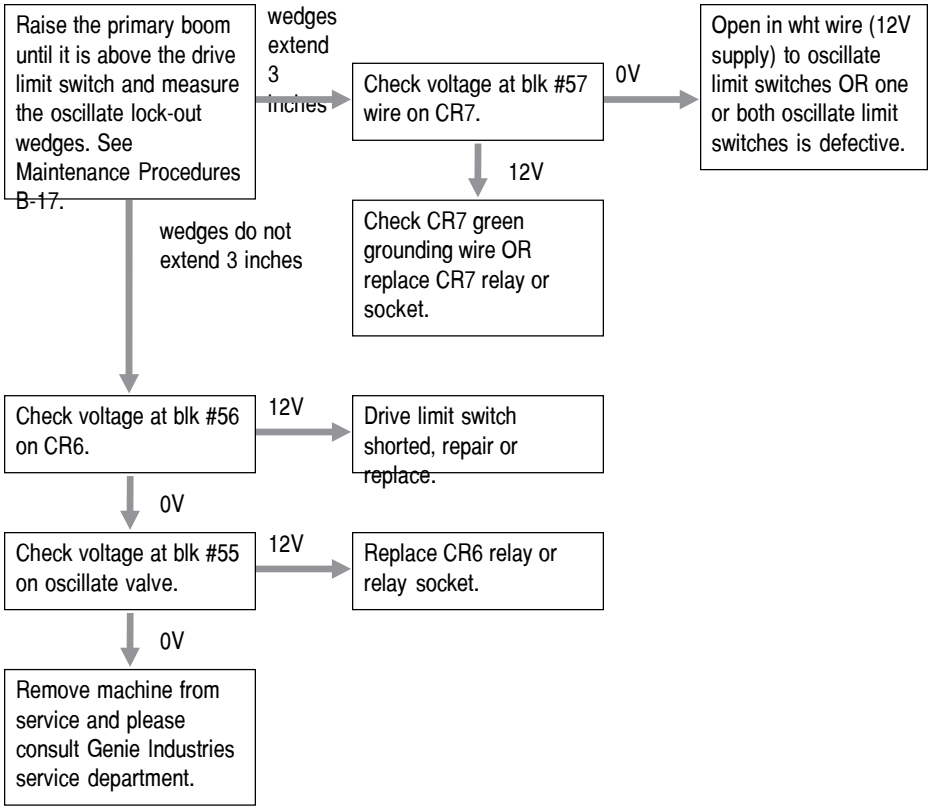


Chart 31

Steer Left Function Inoperative

Be sure all other functions operate normally.

Machines not equipped with oscillating axle, disregard the steer unloader valve troubleshooting.

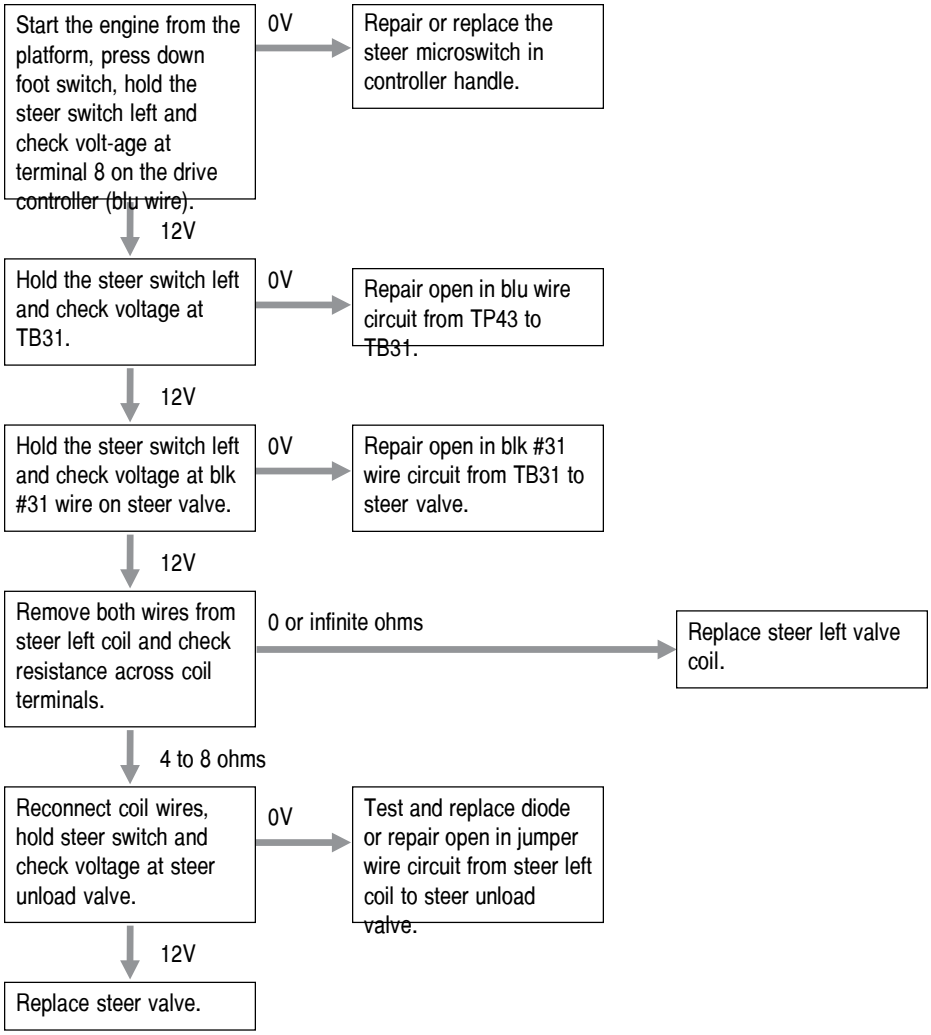


Chart 32

Steer Right Function Inoperative

Be sure all other functions operate normally.

Machines not equipped with oscillating axle, disregard the steer unloader valve troubleshooting.

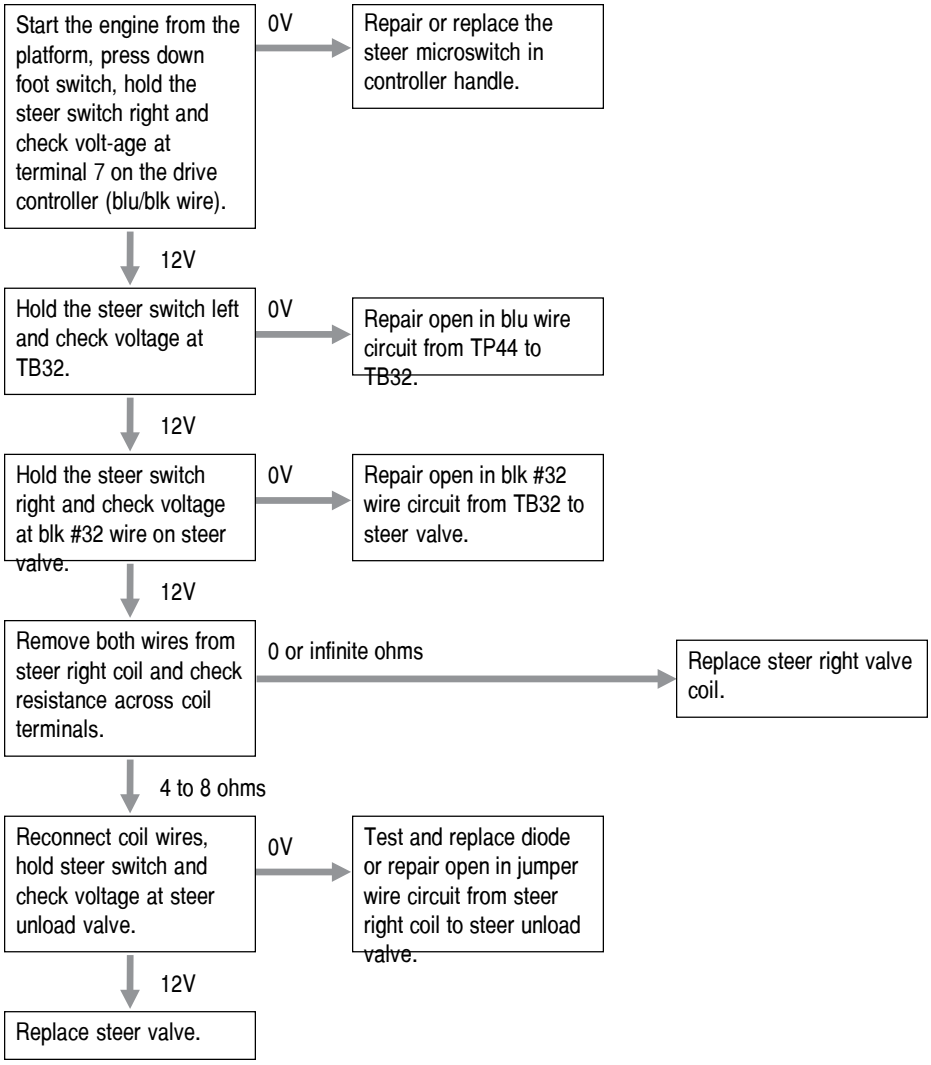


Chart 33

All Drive Functions Inoperative, All Other Functions Operate Normally

Be sure the hydraulic suction line valve is in the open position.

Be sure machine is not in the free wheel configuration.

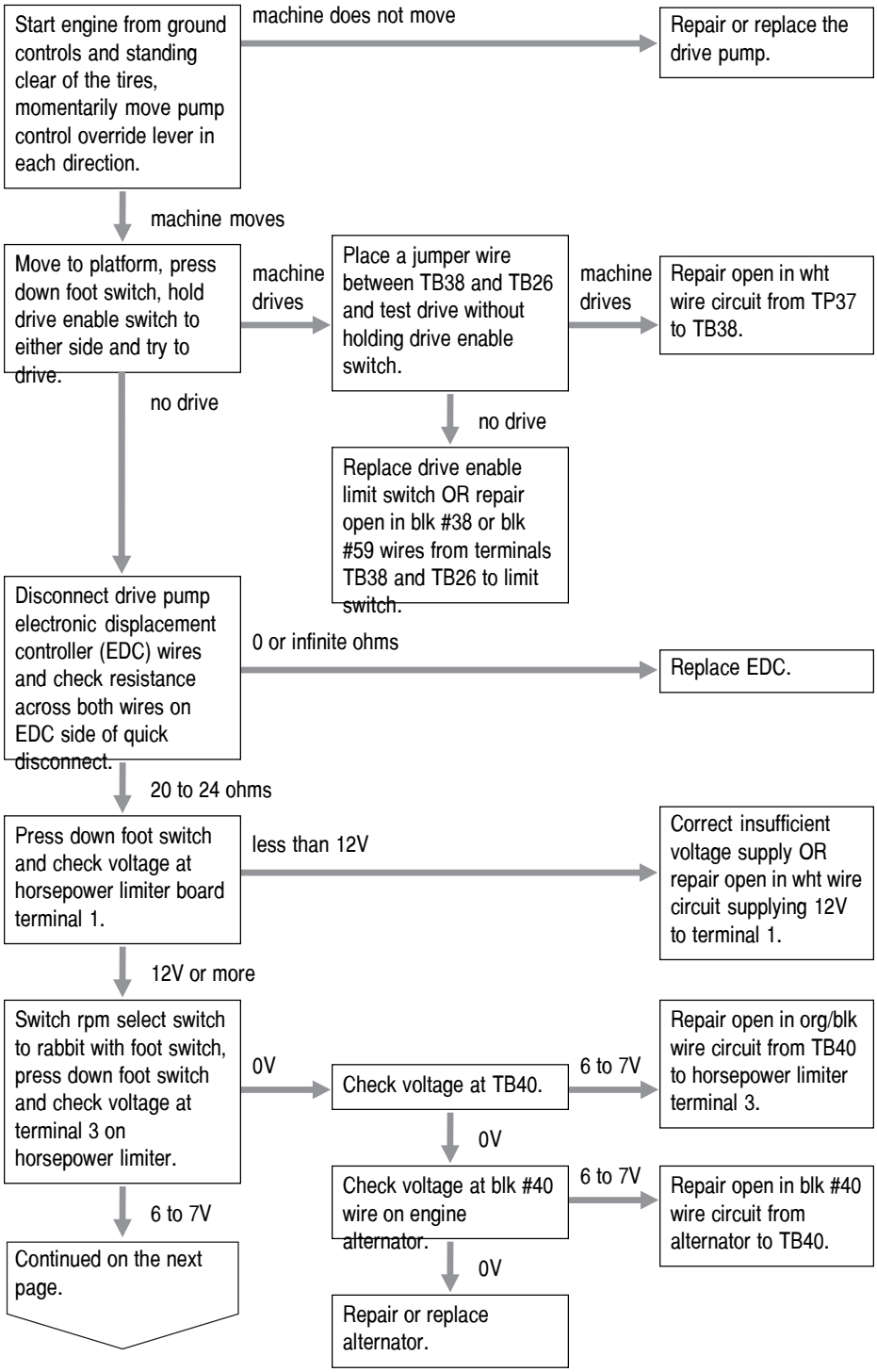


CHART 33

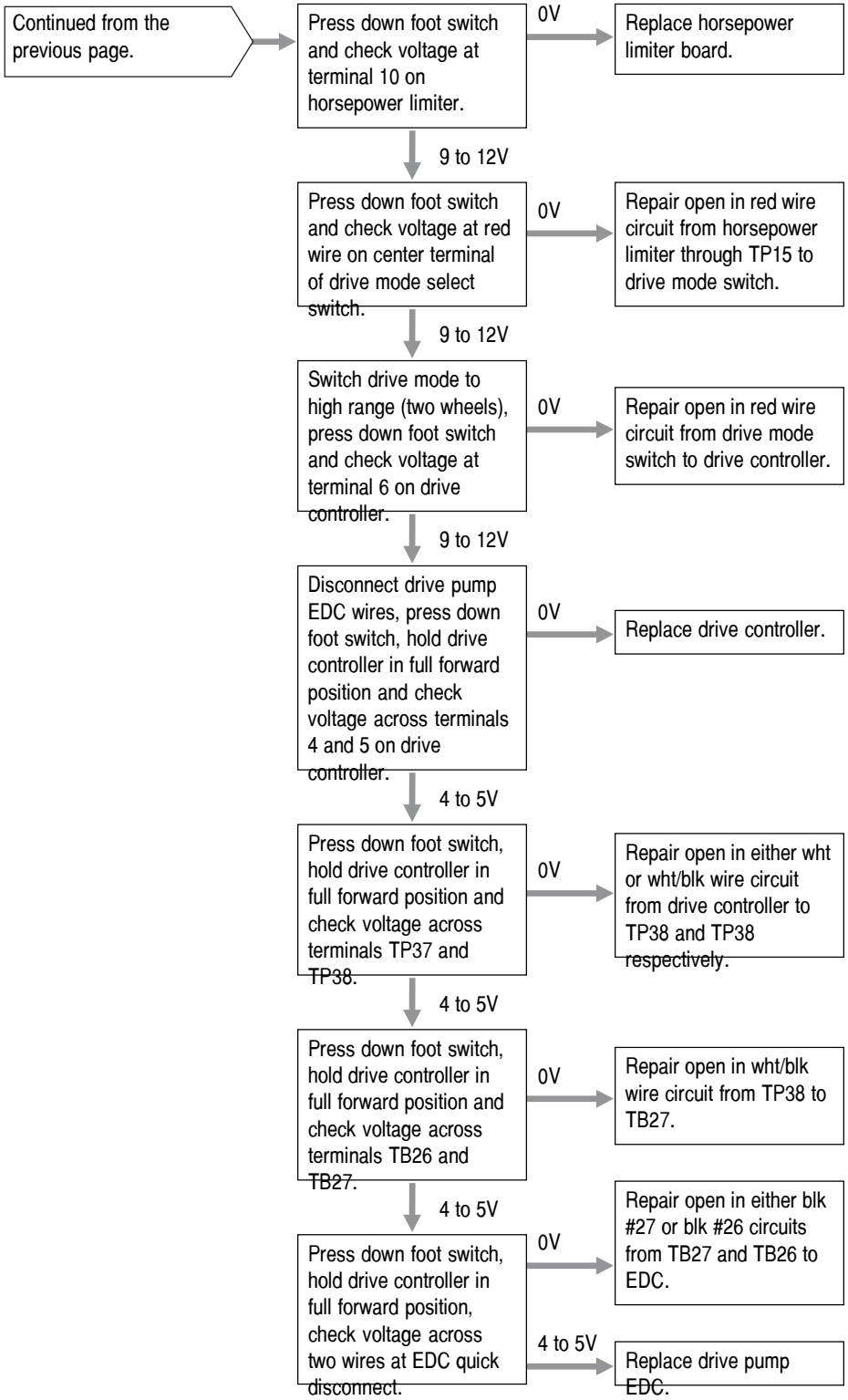

Continued from the previous page.
Press down foot switch and check voltage at terminal 10 on horsepower limiter.
0V
Replace horsepower limiter board.
9 to 12V
Press down foot switch and check voltage at red wire on center terminal of drive mode select switch.
0V
Repair open in red wire circuit from horsepower limiter through TP15 to drive mode switch.
9 to 12V
Switch drive mode to high range (two wheels), press down foot switch and check voltage at terminal 6 on drive controller.
0V
Repair open in red wire circuit from drive mode switch to drive controller.
9 to 12V
Disconnect drive pump EDC wires, press down foot switch, hold drive controller in full forward position and check voltage across terminals 4 and 5 on drive controller.
0V
Replace drive controller.
4 to 5V
Press down foot switch, hold drive controller in full forward position and check voltage across terminals TP37 and TP38.
0V
Repair open in either wht or wht/blk wire circuit from drive controller to TP38 and TP38 respectively.
4 to 5V
Press down foot switch, hold drive controller in full forward position and check voltage across terminals TB26 and TB27.
0V
Repair open in wht/blk wire circuit from TP38 to TB27.
4 to 5V
Press down foot switch, hold drive controller in full forward position, check voltage across two wires at EDC quick disconnect.
0V
Repair open in either blk #27 or blk #26 circuits from TB27 and TB26 to EDC.
4 to 5V
Replace drive pump EDC.

Chart 34

Drive Forward Or Reverse Function Inoperative

Be sure all other functions operate normally including drive in opposite direction of malfunction.

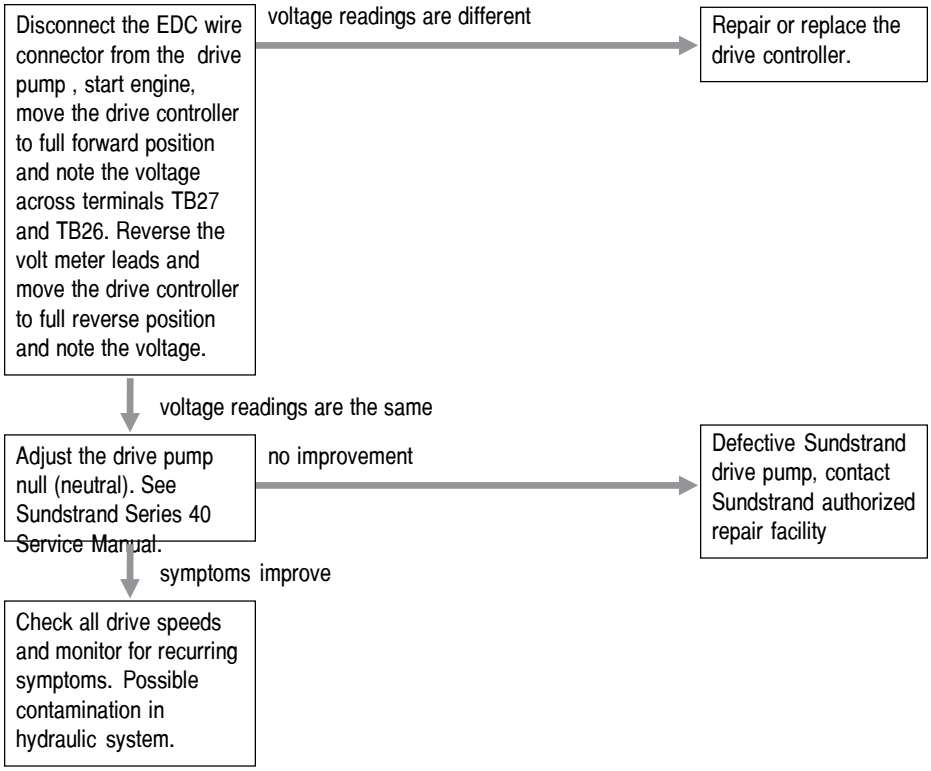


Chart 35

High Range Drive Function Inoperative

Be sure all other functions operate normally including drive low range (four wheel symbol).

Be sure all drive manifold solenoid valve grounding wires are free of corrosion and have full continuity to ground.

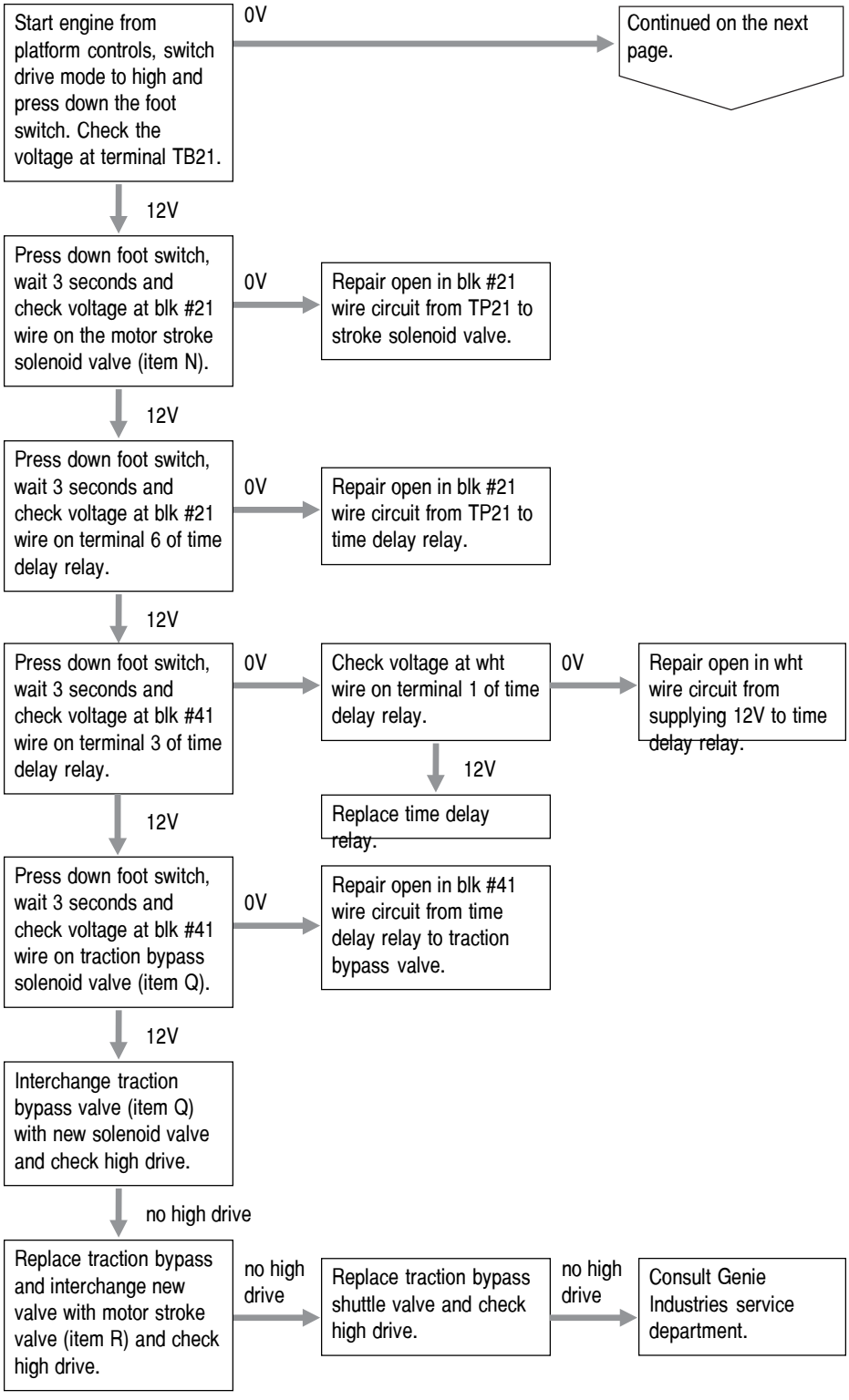


CHART 35

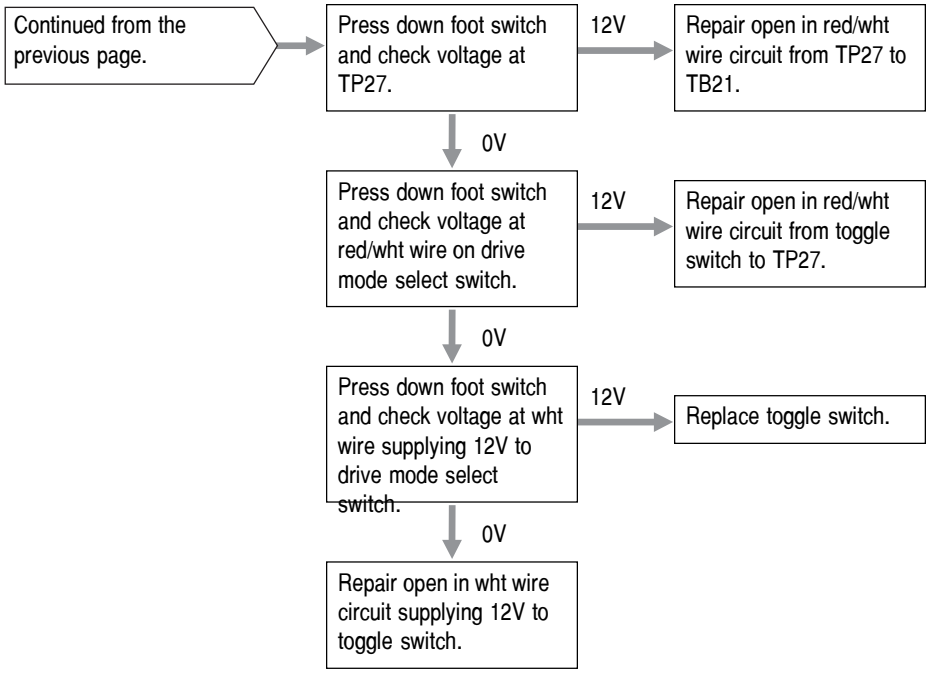

Continued from the previous page.
Press down foot switch and check voltage at TP27.
12V
Repair open in red/wht wire circuit from TP27 to TB21.
0V
Press down foot switch and check voltage at red/wht wire on drive mode select switch.
12V
Repair open in red/wht wire circuit from toggle switch to TP27.
0V
Press down foot switch and check voltage at wht wire supplying 12V to drive mode select switch.
12V
Replace toggle switch.
0V
Repair open in wht wire circuit supplying 12V to toggle switch.

Chart 36

Low Range Drive Function Inoperative

Be sure all other functions operate normally including drive high range (two wheel symbol).

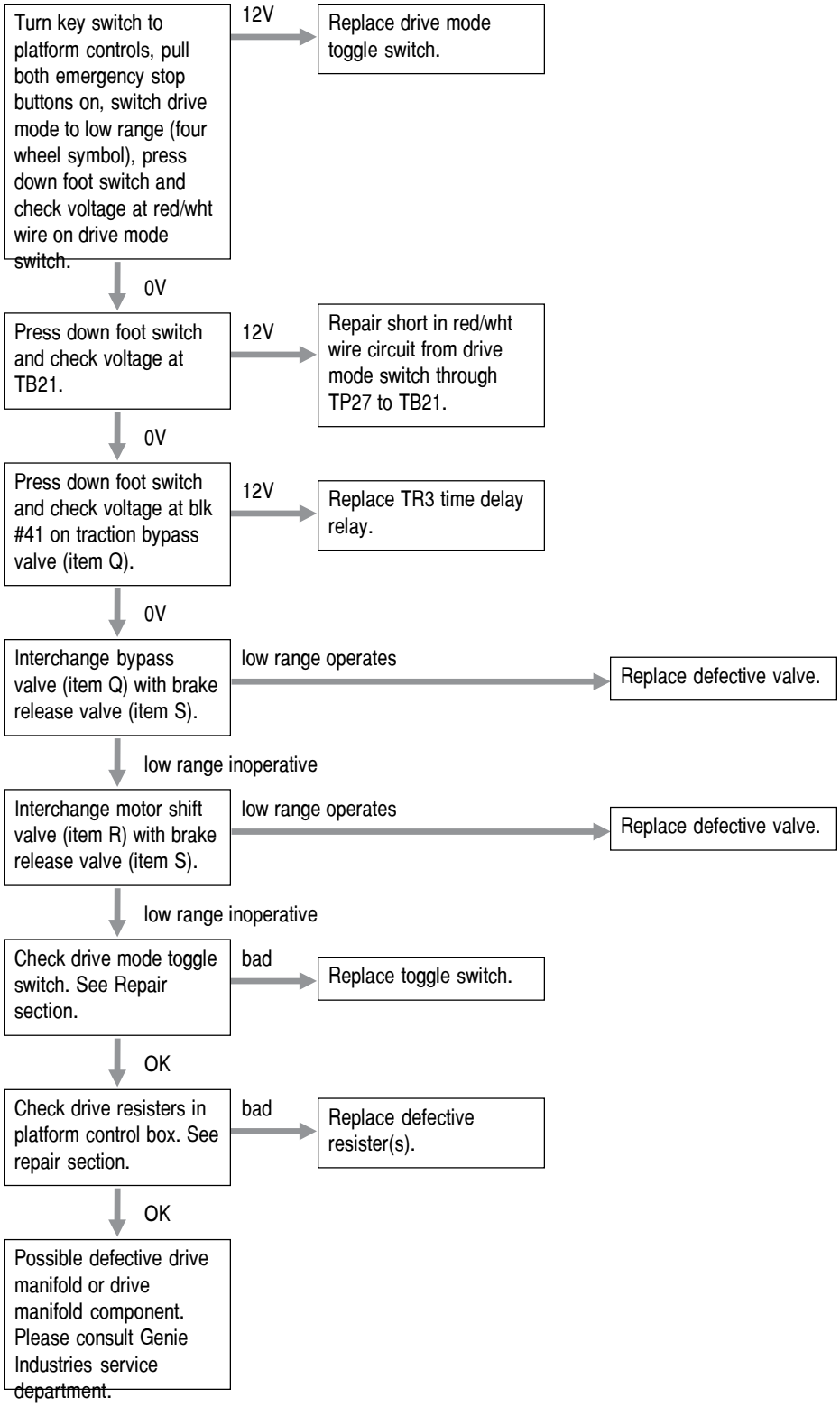
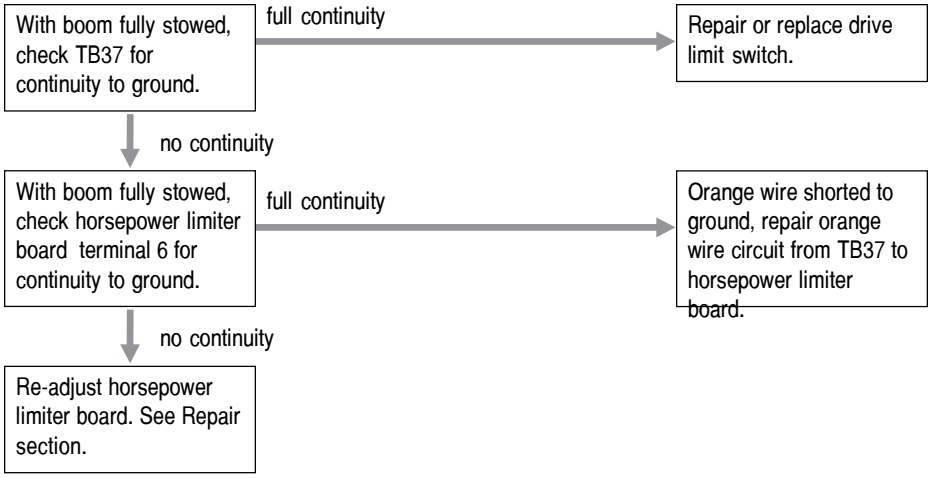


Chart 37

Machine Will Not Drive At Full Speed

Be sure all other functions operate normally.



Schematics

Observe and Obey:

- ☑ Troubleshooting and repair procedures shall be completed by a person trained and qualified on the repair of this machine.
- ☑ Immediately tag and remove from service a damaged or malfunctioning machine.
- ☑ Repair any machine damage or malfunction before operating the machine.

Before Troubleshooting:

- ☑ Read, understand and obey the safety rules and operating instructions printed in the *Genie Z-45/22 Operating Instruction Manual*.
- ☑ Be sure that all necessary tools and test equipment are available and ready for use.

About This Section

There are two groups of schematics in this section. An illustration legend precedes each group of drawings.

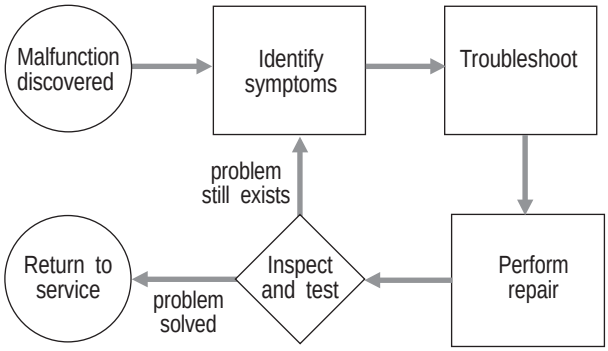
Electrical Schematics

⚠WARNING Electrocution hazard. Contact with hot or live circuits may result in death or serious injury. Remove all rings, watches and other jewelry.

Hydraulic Schematics

⚠WARNING Bodily injury hazard. Spraying hydraulic oil can perforate and burn skin. Loosen hydraulic connections very slowly to allow the oil pressure to dissipate gradually. Do not allow oil to squirt or spray.

General Repair Process



Electrical Symbol Legend



Wire color with cable number



Terminal



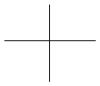
Quick disconnect terminal



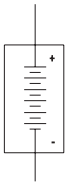
T-circuits connect at terminal

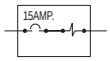

T-circuits connect


Connection no terminal


Circuits crossing no connection

Diode


Battery

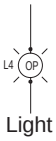


Circuit breaker


Solenoid or relay coil



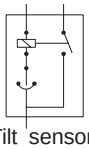
Horn



Light

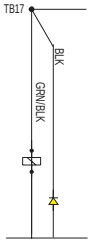


Resistor


Tilt sensor

Spark plug


Glow plug



Ground supression circuit



Limit switch



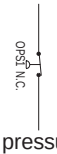
Limit switch normally open held closed



Limit switch normally closed held open



Vacuum switch



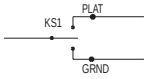
Oil pressure switch normally closed



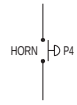
Water temperature switch normally closed



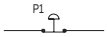
Foot switch



Key switch



Horn button normally open



Emergency Stop button normally closed



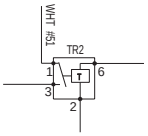
Relay contact normally open



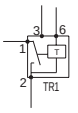
Relay panel contactor



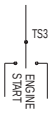
Starter motor relay



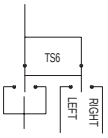
Time delay relay



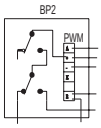
Time delay relay



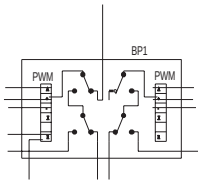
Toggle switch SPDI



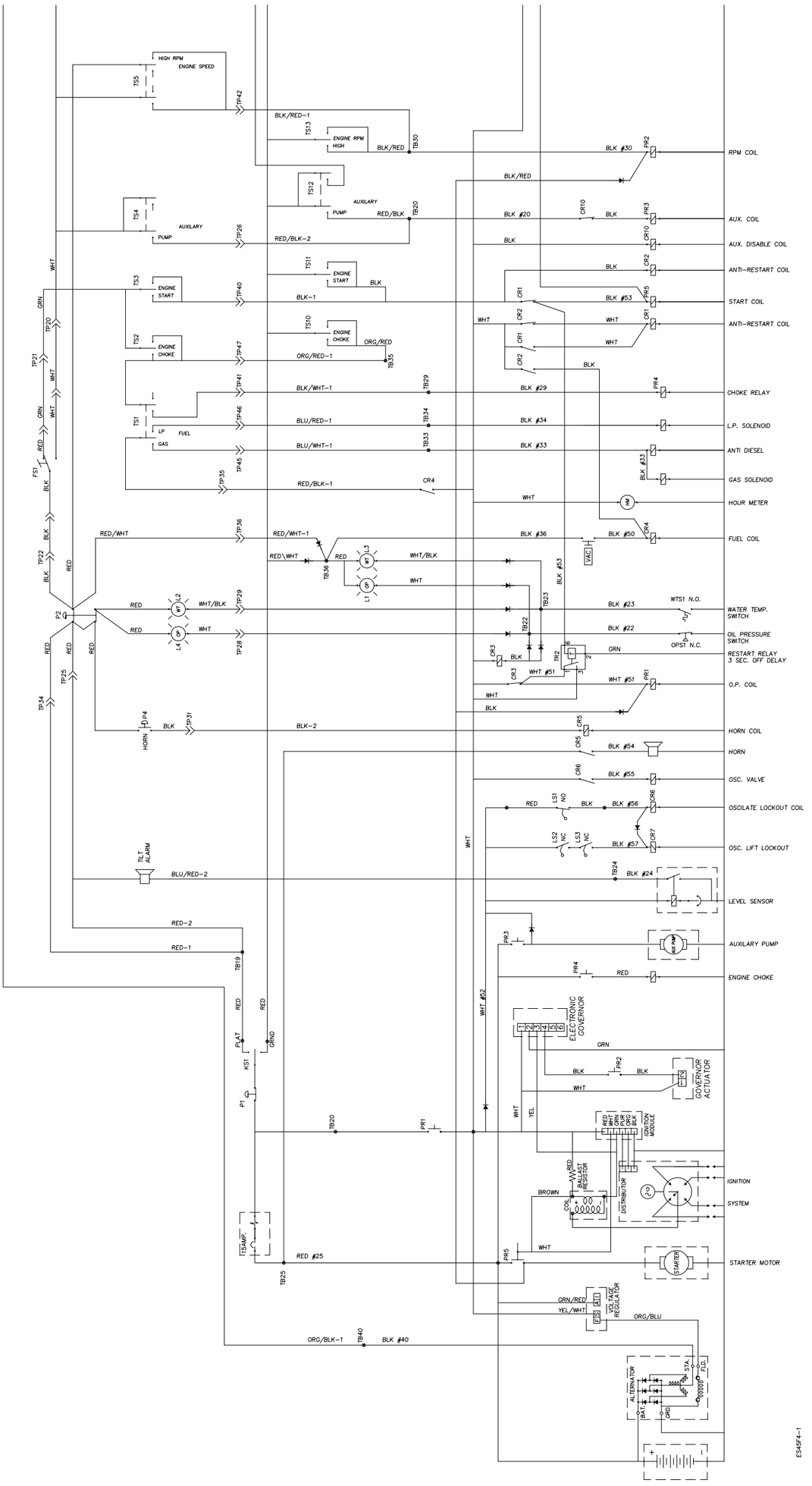
Toggle switch DPDT



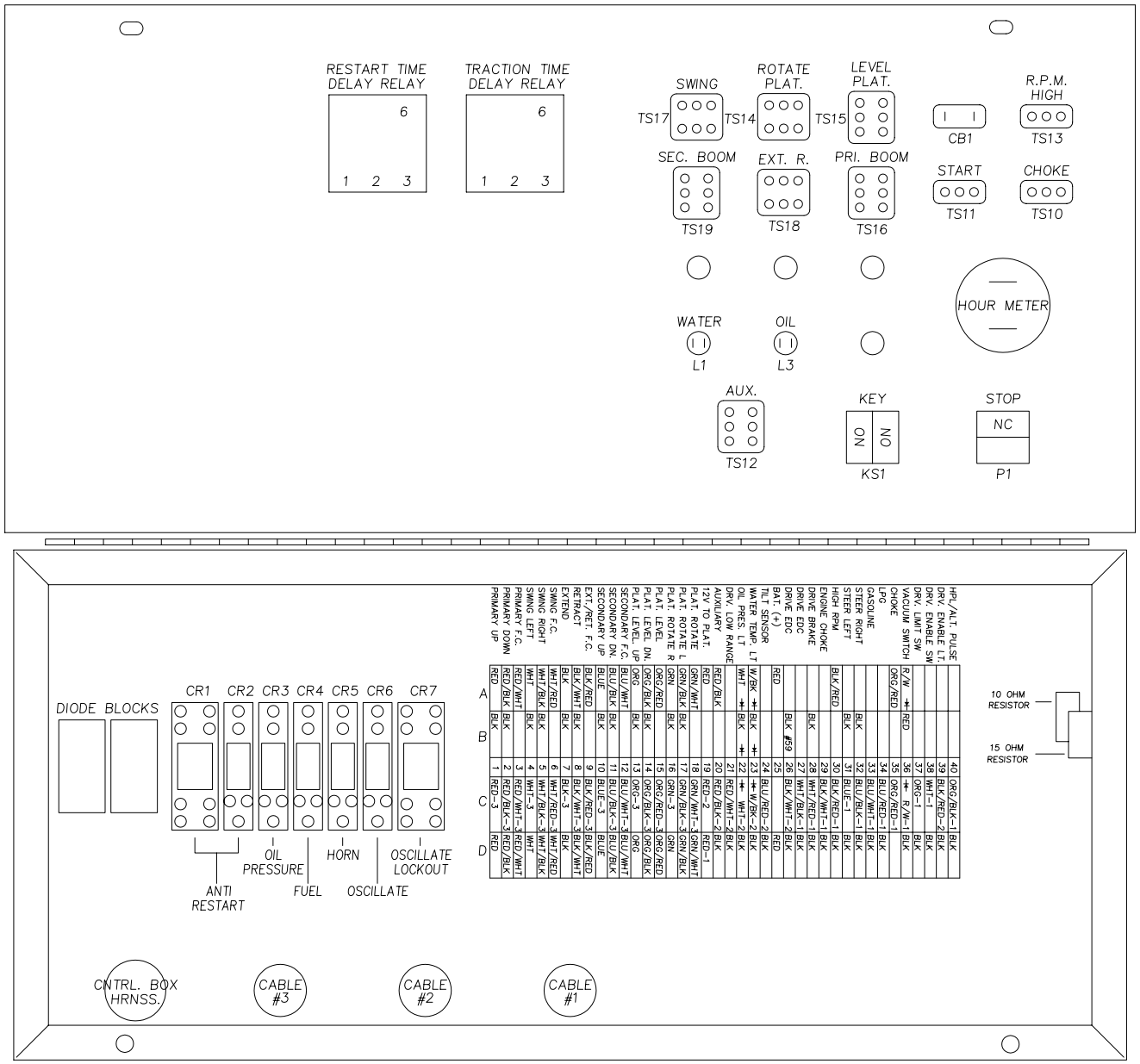
Single axis proportional controller

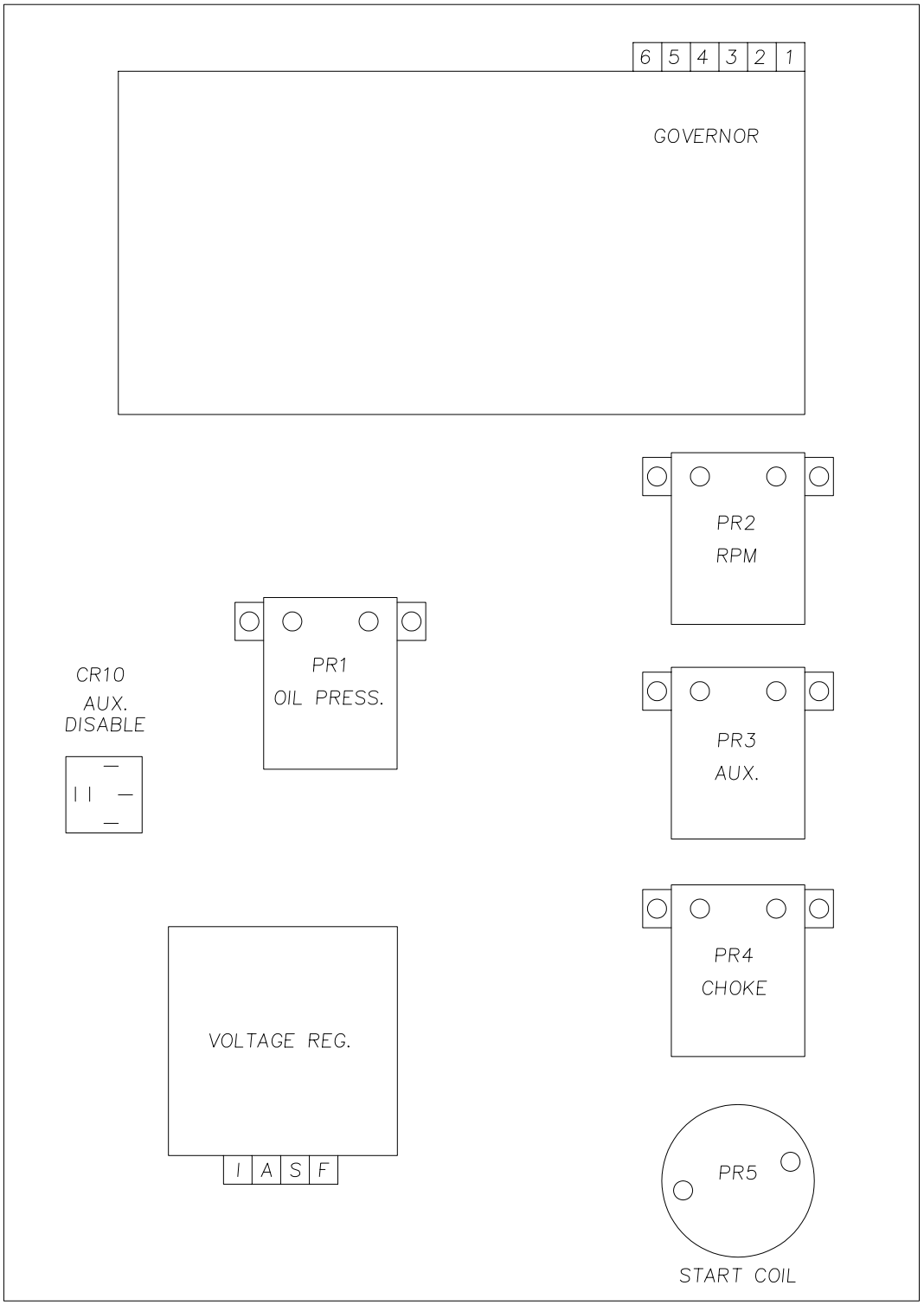


Dual axis proportional controller

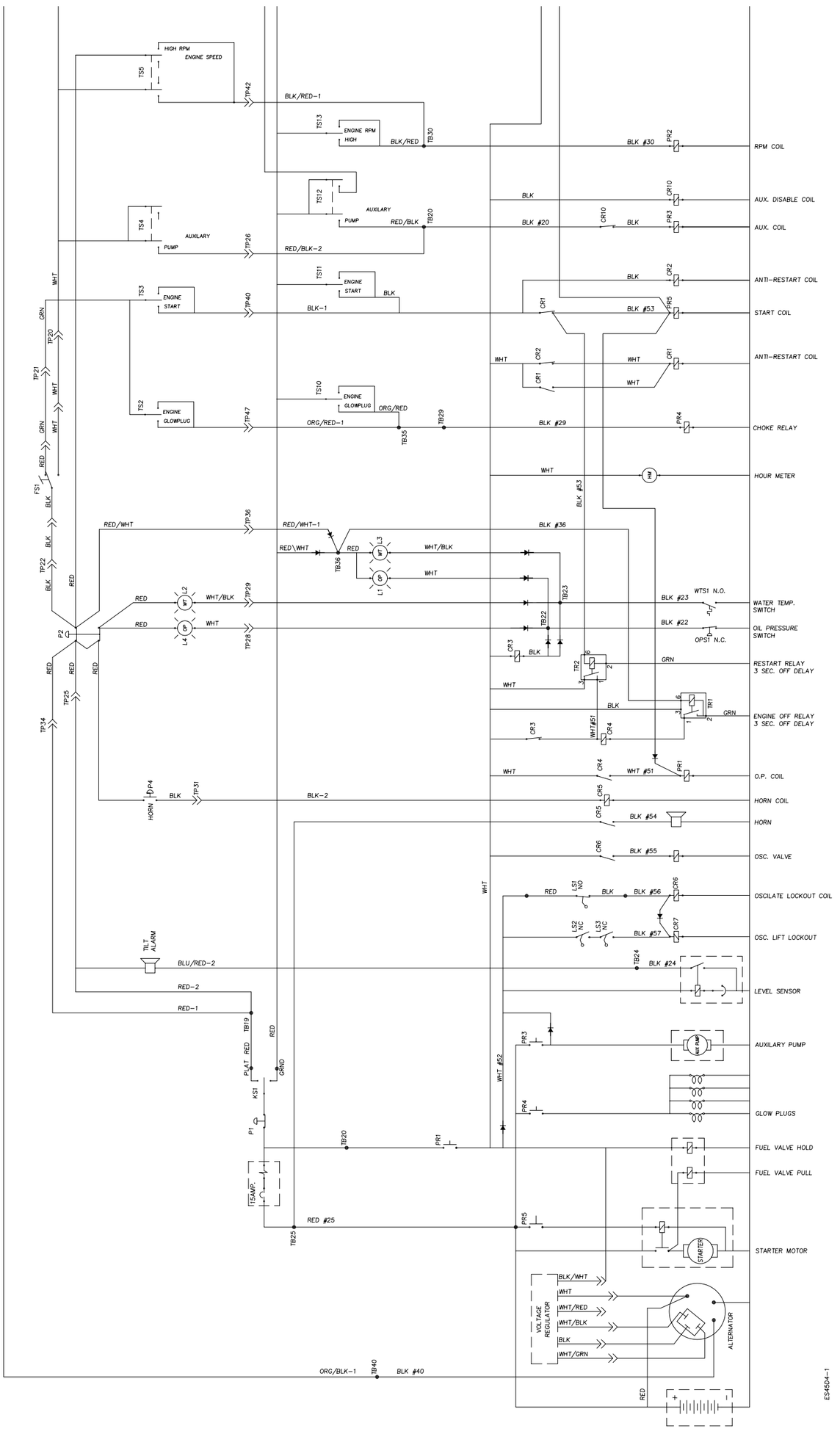

HIGH RPM
ENGINE SPEED
TS5
TP42
BLK/RED-1
TS13
ENGINE RPM
HIGH
BLK/RED
TB30
BLK #30
PR2
RPM COIL
BLK/RED
TS12
AUXILARY
PUMP
RED/BLK
TB20
BLK #20
CR10
BLK
PR3
AUX. COIL
TS4
AUXILARY
PUMP
TP26
RED/BLK-2
CR10
BLK
AUX. DISABLE COIL
BLK
CR2
BLK
ANTI-RESTART COIL
TS11
ENGINE
START
BLK
TS3
ENGINE
START
TP40
BLK-1
CR1
BLK #53
PR5
START COIL
WHT
CR2
WHT
CR1
ANTI-RESTART COIL
TS10
ENGINE
CHOKE
ORG/RED
TS2
ENGINE
CHOKE
TP47
ORG/RED-1
TB35
CR1
WHT
CR2
BLK
TP41
BLK/WHT-1
TB29
BLK #29
PR4
CHOKE RELAY
TS1
LP
FUEL
GAS
TP46
BLU/RED-1
TB34
BLK #34
L.P. SOLENOID
BLU/WHT-1
TB33
BLK #33
ANTI DIESEL
BLK #33
GAS SOLENOID
TP45
TP35
RED/BLK-1
CR4
WHT
HOUR METER
RED/WHT
TP36
RED/WHT-1
BLK #36
BLK #50
PR4
FUEL COIL
VAC1
RED\WHT
TB36
RED
L3
WHT/BLK
L1
WHT
BLK #53
TB23
WTS1 N.O.
WATER TEMP.
SWITCH
RED
L2
WHT/BLK
TP29
P2
BLK #23
TB22
BLK #22
OPS1 N.C.
OIL PRESSURE
SWITCH
RED
L4
WHT
TP28
CR3
BLK
TR2
GRN
RESTART RELAY
3 SEC. OFF DELAY
CR3
WHT #51
WHT #51
PR1
O.P. COIL
WHT
BLK
TP25
TP34
HORN
TP4
BLK
TP31
BLK-2
CR5
HORN COIL
CR5
BLK #54
HORN
CR6
BLK #55
OSC. VALVE
RED
LS1
NO
BLK
BLK #56
CR6
OSCILATE LOCKOUT COIL
LS2
NC
LS3
NC
BLK #57
CR7
OSC. LIFT LOCKOUT
TILT
ALARM
BLU/RED-2
TB24
BLK #24
LEVEL SENSOR
RED-2
RED-1
TB19
PR3
AUXILARY PUMP
PR4
RED
ENGINE CHOKE
RED
PLAT
RED
GRND
KS1
P1
WHT #52
ELECTRONIC
GOVERNOR
GRN
BLK
PR2
BLK
GOVERNOR
ACTUATOR
WHT
WHT
YEL
TB20
PR1
IGNITION
SYSTEM
BROWN
WHT
TSTART
RED #25
TB25
PR5
WHT
STARTER
STARTER MOTOR
GRN/RED
YEL/WHT
VOLTAGE
REGULATOR
ORG/BLU
ORG/BLK-1
TB40
BLK #40
ALTERNATOR
BAT+
ES45F4-1

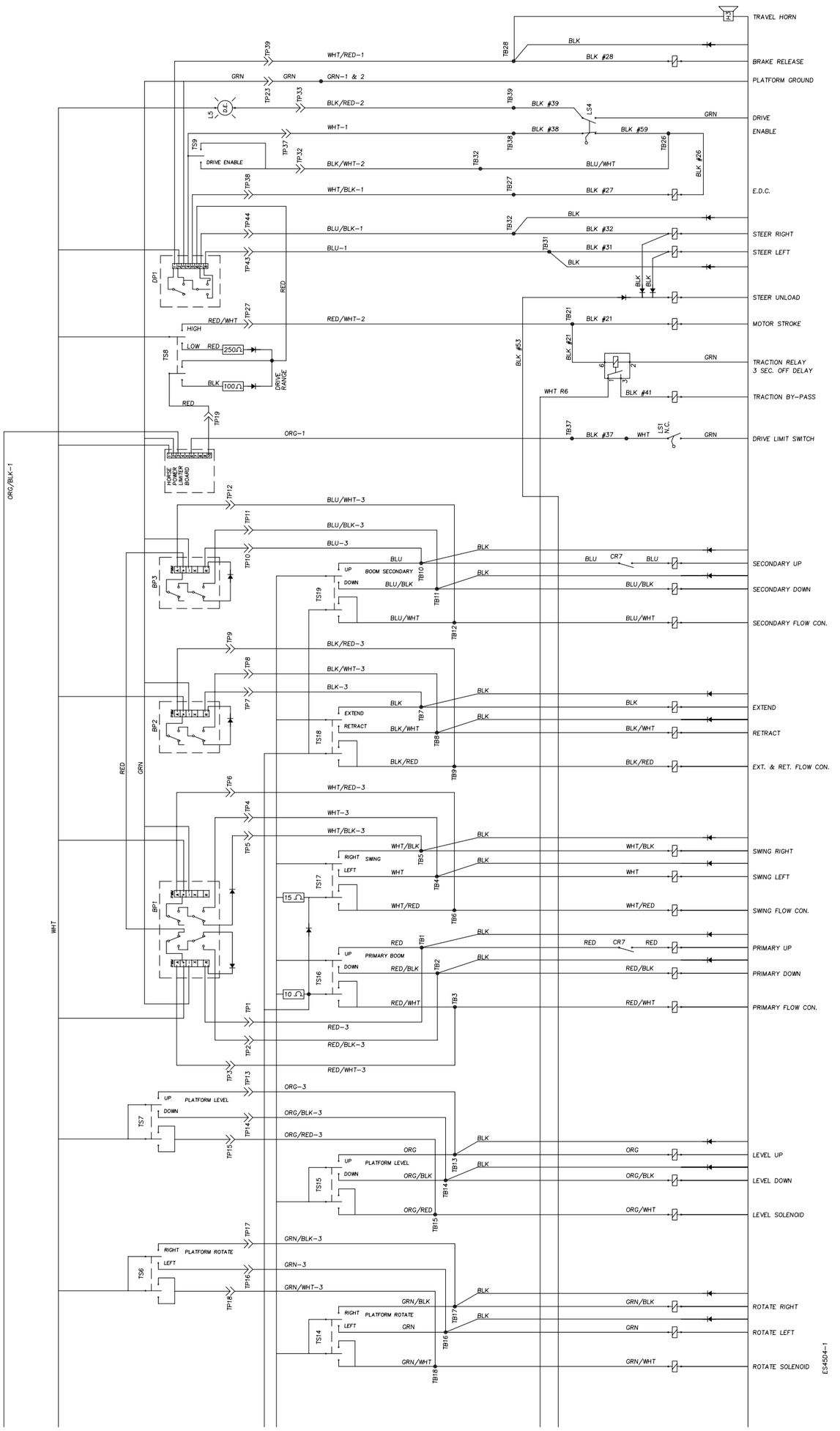
ES45F4-1

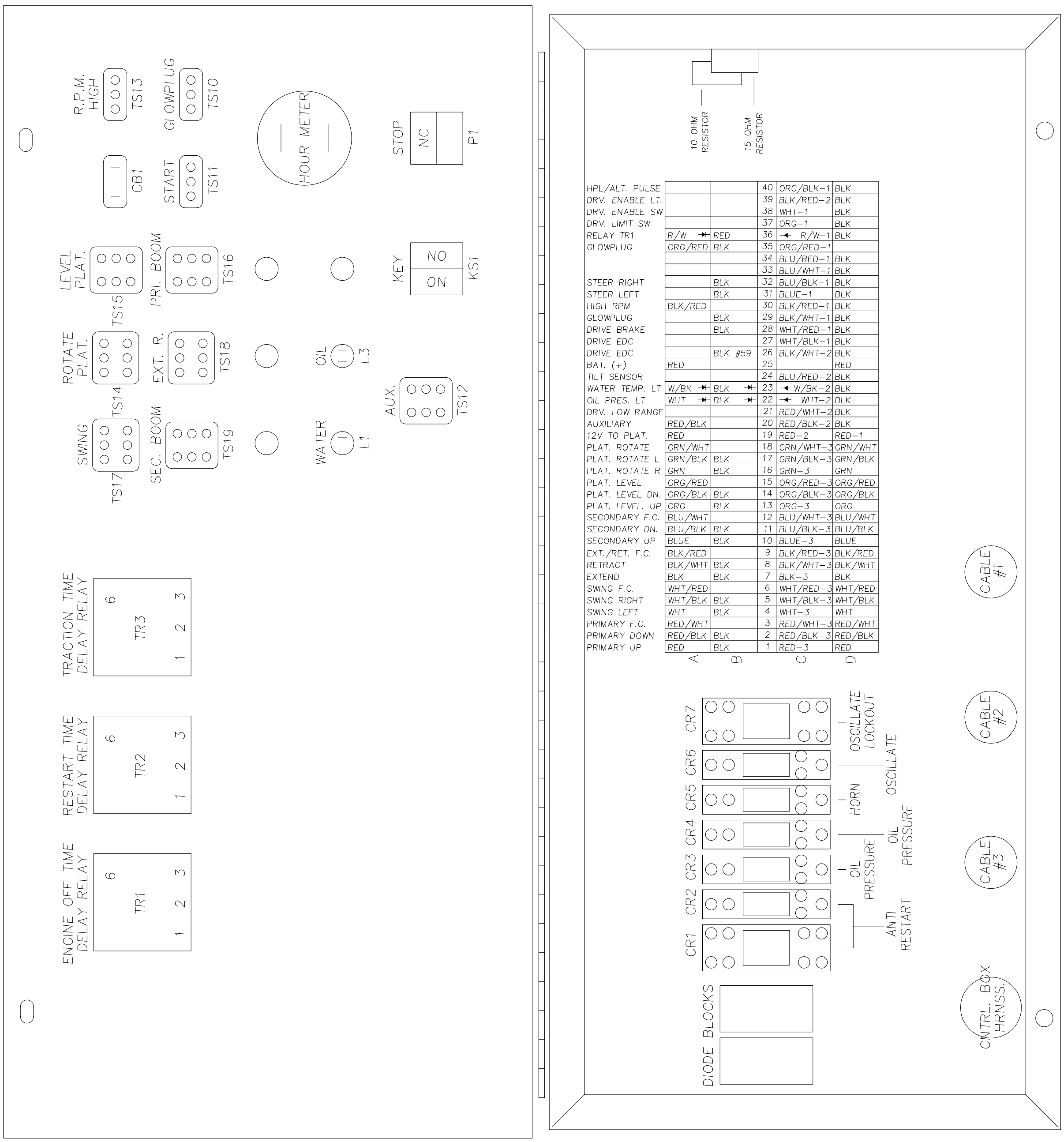

RESTART TIME DELAY RELAY
6
1 2 3
TRACTION TIME DELAY RELAY
6
1 2 3
SWING
TS17
TS14
ROTATE PLAT.
TS15
LEVEL PLAT.
CB1
R.P.M. HIGH
TS13
SEC. BOOM
TS19
EXT. R.
TS18
PRI. BOOM
TS16
START
TS11
CHOKE
TS10
HOUR METER
WATER
L1
OIL
L3
AUX.
TS12
KEY
ON
NO
KS1
STOP
NC
P1
DIODE BLOCKS
CR1
CR2
CR3
CR4
CR5
CR6
CR7
ANTI RESTART
OIL PRESSURE
FUEL
HORN
OSCILLATE
OSCILLATE LOCKOUT
10 OHM RESISTOR
15 OHM RESISTOR
CNTRL. BOX HRNSS.
CABLE #3
CABLE #2
CABLE #1
HPU/ALT. PULSE
DRV. ENABLE LT.
DRV. ENABLE SW
DRV. LIMIT SW
VACUUM SWITCH
CHOKE
LPG
GASOLINE
STEER RIGHT
STEER LEFT
HIGH RPM
ENGINE CHOKE
DRIVE BRAKE
DRIVE EDC
DRIVE EDC
BATT. (+)
TILT SENSOR
WATER TEMP. LT
OIL PRESS. LT
DRV. LOW RANGE
AUXILIARY
12V TO PLAT.
PLAT. ROTATE
PLAT. ROTATE L
PLAT. ROTATE R
PLAT. LEVEL
PLAT. LEVEL DN.
PLAT. LEVEL UP
SECONDARY F.C.
SECONDARY DN.
SECONDARY UP
EXT./RET. F.C.
RETRACT
EXTEND
SWING F.C.
SWING RIGHT
SWING LEFT
PRIMARY F.C.
PRIMARY DOWN
PRIMARY UP
A
B
C
D
R/W
RED
ORG/RED
BLK
BLK/RED
WHT/RED
RED/BLK
WHT/BLK
RED/WHT
BLU/WHT
GRN/WHT
ORG/BLK
BLU/BLK
GRN/BLK
BLK/WHT
W/BLK
BLU/RED
BLK #59
ORG/RED-1
ORG/RED-2
ORG/RED-3
ORG/BLK-1
ORG/BLK-2
ORG/BLK-3
RED-1
RED-2
RED-3
RED/BLK-2
RED/WHT-2
RED/WHT-3
RED/BLK-3
WHT-1
WHT-2
WHT-3
WHT/BLK-1
WHT/BLK-2
WHT/BLK-3
WHT/RED-1
WHT/RED-2
WHT/RED-3
BLK/RED-1
BLK/RED-2
BLK/RED-3
BLK/WHT-1
BLK/WHT-2
BLK/WHT-3
BLU/RED-1
BLU/RED-2
BLU/RED-3
BLU/WHT-1
BLU/WHT-2
BLU/WHT-3
BLU/BLK-1
BLU/BLK-2
BLU/BLK-3
GRN/WHT-1
GRN/WHT-2
GRN/WHT-3
GRN/BLK-1
GRN/BLK-2
GRN/BLK-3
ORG-1
ORG-2
ORG-3
BLUE-1
BLUE-2
BLUE-3
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40


6 5 4 3 2 1
GOVERNOR
PR2
RPM
PR1
OIL PRESS.
CR10
AUX.
DISABLE
PR3
AUX.
PR4
CHOKE
VOLTAGE REG.
I A S F
PR5
START COIL

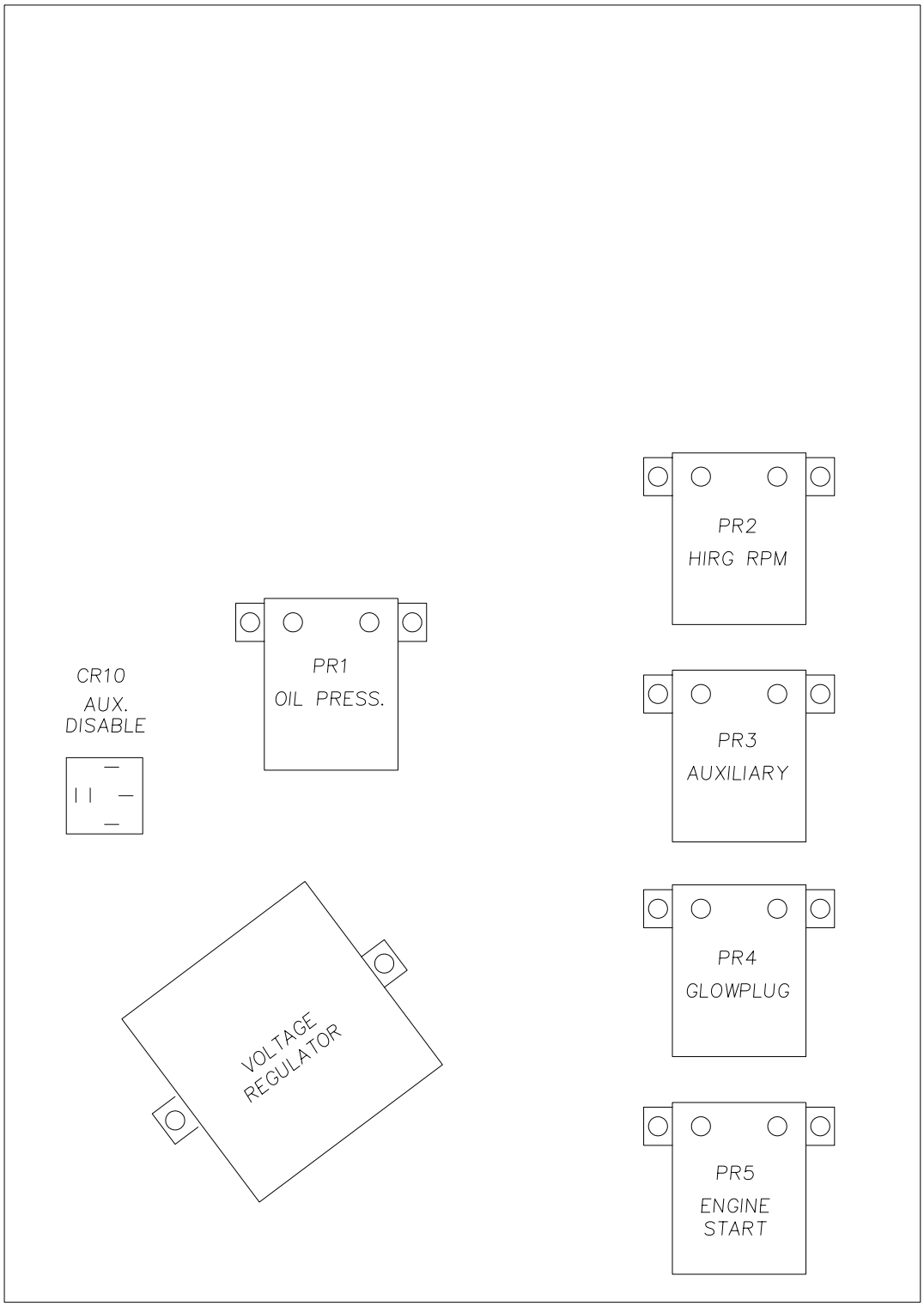
HORSE POWER LIMITER
1 2 3 4 5 6 7 8 9 10
CABLE #3
CABLE #2
CABLE #1
F.S.
110
100 OHM
250 OHM
TILT ALARM
SPARE 48 GRN/BLK–1
CHOKE 47 ORG/RED–1
L.P. 46 BLU/RED–1
GAS 45 BLU/WHT–1
STEER RIGHT 44 BLU/BLK–1
STEER LEFT 43 BLU–1
R.P.M. 42 BLK/RED–1
CHOKE 41 BLK/WHT–1
START 40 BLK–1
BRAKE 39 WHT/RED–1
E.D.C. 38 WHT/BLK–1
E.D.C. 37 WHT–1
VAC. POWER 36 RED/WHT–1
12V+ (F. SEL.) 35 RED/BLK–1
12V SUPPLY 34 RED–1
DRIVE EN. LT. 33 BLK/RED–2
DRIVE ENABLE 32 BLK/WHT–2
HORN 31 BLK–2
SPARE 30 WHT/RED–2
WTR. TEMP. LT. 29 WHT/BLK–2
OIL PRESS. LT. 28 WHT–2
4WD 27 RED/WHT–2
AUXILIARY 26 RED/BLK–2
12V SUPPLY 25 RED–2 (ALARM)
24
12V GROUND 23 GREEN
PWR. TO F.S. 22 BLK (F.S.)
PWR. (START) 21 GREEN (F.S.)
PWR. (CONT.) 20 WHT (H.P.L.)
2/4WD 19 RED (H.P.L.)
PLAT. ROTATE 18 GRN/WHT–3
PLAT. ROT. R. 17 GRN/BLK–3
PLAT. ROT. L. 16 GRN–3
PLAT. LEVEL 15 ORG/RED–3
PLAT. LVL. DN. 14 ORG/BLK–3
PLAT. LVL. UP 13 ORG–3
SEC. BOOM F.C. 12 BLU/WHT–3
SEC. BOOM DN. 11 BLU/BLK–3
SEC.BOOM UP 10 BLU–3
EXT. RET. F.C. 9 BLK/RED–3
RETRACT 8 BLK/WHT–3
EXTEND 7 BLK–3
SWING F.C. 6 WHT/RED–3
SWING RIGHT 5 WHT/BLK–3
SWING LEFT 4 WHT–3
PRIMARY F.C. 3 RED/WHT–3
PRIMARY DN. 2 RED/BLK–3
PRIMARY UP 1 RED–3
P2 NC NC STOP
P4 NO HORN
DP1 1 2 3 4 5 6 7 8
TS1 FUEL SELECT
TS5 HIGH R.P.M.
TS3 START
TS2 CHOKE
BP1 A + – X R
BP2 R X – + A
BP3 R X – + A
TS7 PLATFORM LEVEL
TS6 PLATFORM ROTATE
TS8 HIGH/LOW DRIVE
TS9 DRIVE ENABLE
TS4 AUX.
L1 WATER
L3 OIL
L5 DRIVE ENABLE LIGHT

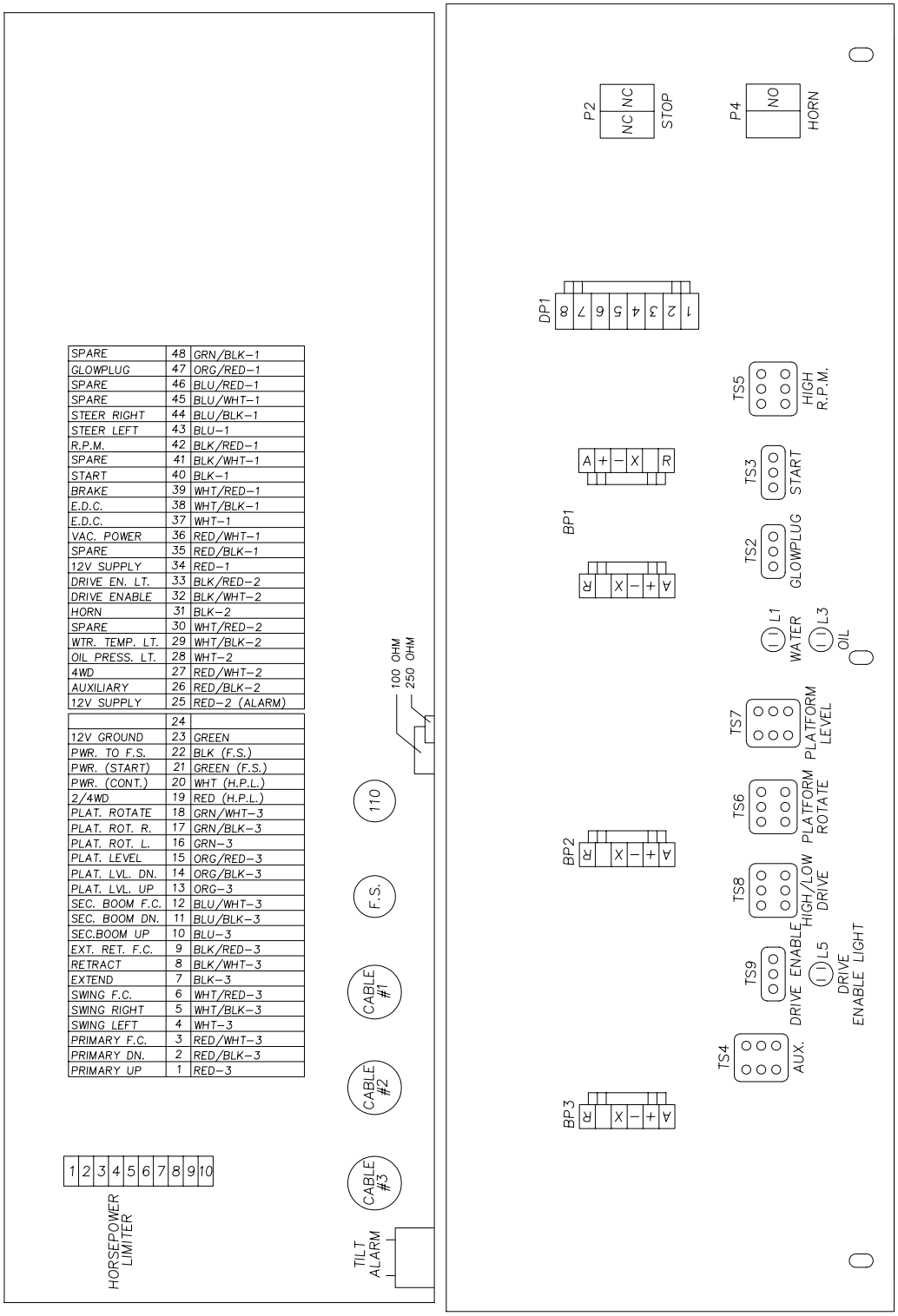

HIGH RPM ENGINE SPEED
TS5
TP42
BLK/RED-1
TS13
ENGINE RPM HIGH
BLK/RED
TB30
BLK #30
PR2
RPM COIL
TS12
AUXLARY PUMP
BLK
CR10
AUX. DISABLE COIL
TS4
AUXLARY PUMP
RED/BLK
TB20
BLK #20
CR10
BLK
PR3
AUX. COIL
TP26
RED/BLK-2
TS11
ENGINE START
BLK
CR2
ANTI-RESTART COIL
WHT
TS3
ENGINE START
TP40
BLK-1
CR1
BLK #53
PR5
START COIL
GRN
TP20
TP21
WHT
WHT
CR2
CR1
ANTI-RESTART COIL
CR1
WHT
TS10
ENGINE GLOWPLUG
ORG/RED
TS2
ENGINE GLOWPLUG
TP47
ORG/RED-1
TB29
TB35
BLK #29
PR4
CHOKE RELAY
GRN
WHT
RED
FS1
WHT
HM
HOUR METER
BLK
BLK #53
RED/WHT
TP36
RED/WHT-1
BLK #36
BLK
TP22
BLK
RED
RED\WHT
TB36
RED
L3
WHT/BLK
L1
WHT
TB23
WTS1 N.O.
WATER TEMP. SWITCH
BLK #23
RED
L2
WHT/BLK
TP39
L4
WHT
TP28
TB22
BLK #22
OPS1 N.C.
OIL PRESSURE SWITCH
P2
CR3
BLK
TR2
GRN
RESTART RELAY 3 SEC. OFF DELAY
RED
RED
RED
TP25
WHT
BLK
TR1
GRN
ENGINE OFF RELAY 3 SEC. OFF DELAY
TP34
CR3
WHT #51
CR4
CR4
WHT
WHT #51
PR1
O.P. COIL
PR4
HORN
BLK
TP31
BLK-2
CR5
HORN COIL
CR5
BLK #54
HORN
CR6
BLK #55
OSC. VALVE
WHT
RED
LS1 NO
BLK
BLK #56
CR6
OSCILATE LOCKOUT COIL
LS2 NC
LS3 NC
BLK #57
CR7
OSC. LIFT LOCKOUT
TILT ALARM
BLU/RED-2
TB24
BLK #24
LEVEL SENSOR
RED-2
RED-1
TB19
PLT RED
RED
GRND
PR3
AUX PUMP
AUXILARY PUMP
WHT #52
KS1
P1
PR4
GLOW PLUGS
TB20
PR1
FUEL VALVE HOLD
FUEL VALVE PULL
LAMP
RED #25
TB25
PR5
STARTER
STARTER MOTOR
BLK/WHT
WHT
WHT/RED
WHT/BLK
BLK
WHT/GRN
VOLTAGE REGULATOR
ALTERNATOR
ORG/BLK-1
TB40
BLK #40
RED
+
-
ES4504-1


TRAVEL HORN
BRAKE RELEASE
PLATFORM GROUND
DRIVE ENABLE
E.D.C.
STEER RIGHT
STEER LEFT
STEER UNLOAD
MOTOR STROKE
TRACTION RELAY 3 SEC. OFF DELAY
TRACTION BY-PASS
DRIVE LIMIT SWITCH
SECONDARY UP
SECONDARY DOWN
SECONDARY FLOW CON.
EXTEND
RETRACT
EXT. & RET. FLOW CON.
SWING RIGHT
SWING LEFT
SWING FLOW CON.
PRIMARY UP
PRIMARY DOWN
PRIMARY FLOW CON.
LEVEL UP
LEVEL DOWN
LEVEL SOLENOID
ROTATE RIGHT
ROTATE LEFT
ROTATE SOLENOID
ES4504-1



	A	B		C	D
HPL/ALT. PULSE			40	ORG/BLK-1	BLK
DRV. ENABLE LT.			39	BLK/RED-2	BLK
DRV. ENABLE SW			38	WHT-1	BLK
DRV. LIMIT SW			37	ORG-1	BLK
RELAY TR1	R/W →|	RED	36	|← R/W-1	BLK
GLOWPLUG	ORG/RED	BLK	35	ORG/RED-1	
			34	BLU/RED-1	BLK
			33	BLU/WHT-1	BLK
STEER RIGHT		BLK	32	BLU/BLK-1	BLK
STEER LEFT		BLK	31	BLUE-1	BLK
HIGH RPM	BLK/RED		30	BLK/RED-1	BLK
GLOWPLUG		BLK	29	BLK/WHT-1	BLK
DRIVE BRAKE		BLK	28	WHT/RED-1	BLK
DRIVE EDC			27	WHT/BLK-1	BLK
DRIVE EDC		BLK #59	26	BLK/WHT-2	BLK
BAT. (+)	RED		25		RED
TILT SENSOR			24	BLU/RED-2	BLK
WATER TEMP. LT	W/BK →|	BLK →|	23	|← W/BK-2	BLK
OIL PRES. LT	WHT →|	BLK →|	22	|← WHT-2	BLK
DRV. LOW RANGE			21	RED/WHT-2	BLK
AUXILIARY	RED/BLK		20	RED/BLK-2	BLK
12V TO PLAT.	RED		19	RED-2	RED-1
PLAT. ROTATE	GRN/WHT		18	GRN/WHT-3	GRN/WHT
PLAT. ROTATE L	GRN/BLK	BLK	17	GRN/BLK-3	GRN/BLK
PLAT. ROTATE R	GRN	BLK	16	GRN-3	GRN
PLAT. LEVEL	ORG/RED		15	ORG/RED-3	ORG/RED
PLAT. LEVEL DN.	ORG/BLK	BLK	14	ORG/BLK-3	ORG/BLK
PLAT. LEVEL. UP	ORG	BLK	13	ORG-3	ORG
SECONDARY F.C.	BLU/WHT		12	BLU/WHT-3	BLU/WHT
SECONDARY DN.	BLU/BLK	BLK	11	BLU/BLK-3	BLU/BLK
SECONDARY UP	BLUE	BLK	10	BLUE-3	BLUE
EXT./RET. F.C.	BLK/RED		9	BLK/RED-3	BLK/RED
RETRACT	BLK/WHT	BLK	8	BLK/WHT-3	BLK/WHT
EXTEND	BLK	BLK	7	BLK-3	BLK
SWING F.C.	WHT/RED		6	WHT/RED-3	WHT/RED
SWING RIGHT	WHT/BLK	BLK	5	WHT/BLK-3	WHT/BLK
SWING LEFT	WHT	BLK	4	WHT-3	WHT
PRIMARY F.C.	RED/WHT		3	RED/WHT-3	RED/WHT
PRIMARY DOWN	RED/BLK	BLK	2	RED/BLK-3	RED/BLK
PRIMARY UP	RED	BLK	1	RED-3	RED


CR10
AUX.
DISABLE
PR1
OIL PRESS.
PR2
HIRG RPM
PR3
AUXILIARY
PR4
GLOWPLUG
PR5
ENGINE
START
VOLTAGE
REGULATOR


SPARE 48 GRN/BLK-1
GLOWPLUG 47 ORG/RED-1
SPARE 46 BLU/RED-1
SPARE 45 BLU/WHT-1
STEER RIGHT 44 BLU/BLK-1
STEER LEFT 43 BLU-1
R.P.M. 42 BLK/RED-1
SPARE 41 BLK/WHT-1
START 40 BLK-1
BRAKE 39 WHT/RED-1
E.D.C. 38 WHT/BLK-1
E.D.C. 37 WHT-1
VAC. POWER 36 RED/WHT-1
SPARE 35 RED/BLK-1
12V SUPPLY 34 RED-1
DRIVE EN. LT. 33 BLK/RED-2
DRIVE ENABLE 32 BLK/WHT-2
HORN 31 BLK-2
SPARE 30 WHT/RED-2
WTR. TEMP. LT. 29 WHT/BLK-2
OIL PRESS. LT. 28 WHT-2
4WD 27 RED/WHT-2
AUXILIARY 26 RED/BLK-2
12V SUPPLY 25 RED-2 (ALARM)
24
12V GROUND 23 GREEN
PWR. TO F.S. 22 BLK (F.S.)
PWR. (START) 21 GREEN (F.S.)
PWR. (CONT.) 20 WHT (H.P.L.)
2/4WD 19 RED (H.P.L.)
PLAT. ROTATE 18 GRN/WHT-3
PLAT. ROT. R. 17 GRN/BLK-3
PLAT. ROT. L. 16 GRN-3
PLAT. LEVEL 15 ORG/RED-3
PLAT. LVL. DN. 14 ORG/BLK-3
PLAT. LVL. UP 13 ORG-3
SEC. BOOM F.C. 12 BLU/WHT-3
SEC. BOOM DN. 11 BLU/BLK-3
SEC.BOOM UP 10 BLU-3
EXT. RET. F.C. 9 BLK/RED-3
RETRACT 8 BLK/WHT-3
EXTEND 7 BLK-3
SWING F.C. 6 WHT/RED-3
SWING RIGHT 5 WHT/BLK-3
SWING LEFT 4 WHT-3
PRIMARY F.C. 3 RED/WHT-3
PRIMARY DN. 2 RED/BLK-3
PRIMARY UP 1 RED-3
100 OHM
250 OHM
110
F.S.
CABLE #1
CABLE #2
CABLE #3
TILT ALARM
1 2 3 4 5 6 7 8 9 10
HORSEPOWER LIMITER
P2
NC NC
STOP
P4
NO
HORN
DP1
1 2 3 4 5 6 7 8
BP1
A + - X R
BP2
A + - X R
BP3
A + - X R
TS2 GLOWPLUG
TS3 START
TS4 AUX.
TS5 HIGH R.P.M.
TS6 PLATFORM ROTATE
TS7 PLATFORM LEVEL
TS8 HIGH/LOW DRIVE
TS9 DRIVE ENABLE
L1 WATER
L3 OIL
L5 DRIVE ENABLE LIGHT

Hydraulic Symbol Legend



Pressure gauge



Filter



Fixed displacement pump



Bi-directional, variable displacement pump



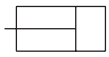
Bi-directional motor



2-speed, bi-directional motor



Pump prime mover (engine or motor)



Cylinder



Accumulator



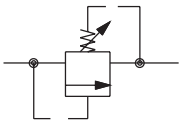
Orifice with size



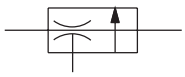
Variable orifice or shut-off valve



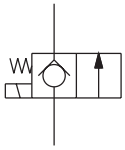
Check valve



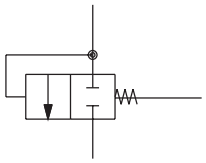
Relief valve



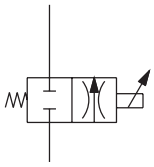
Priority flow divider



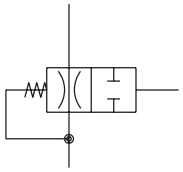
Solenoid operated dump valve



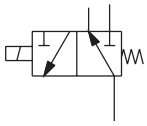
Differential sensing valve



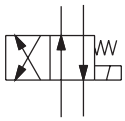
Solenoid operated proportional valve



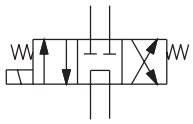
Flow regulator valve



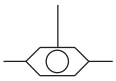
Solenoid operated 2 pos., 3 way, directional valve



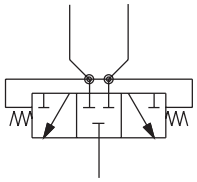
Solenoid operated 2 pos., 4 way, directional valve



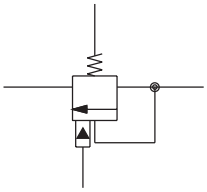
Solenoid operated 3 pos., 4 way, directional valve (DO1)



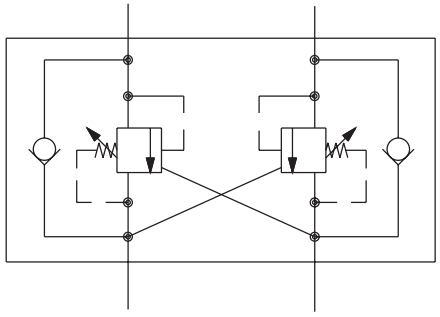
2 pos., 3 way, shuttle valve



3 pos., 4 way, directional valve

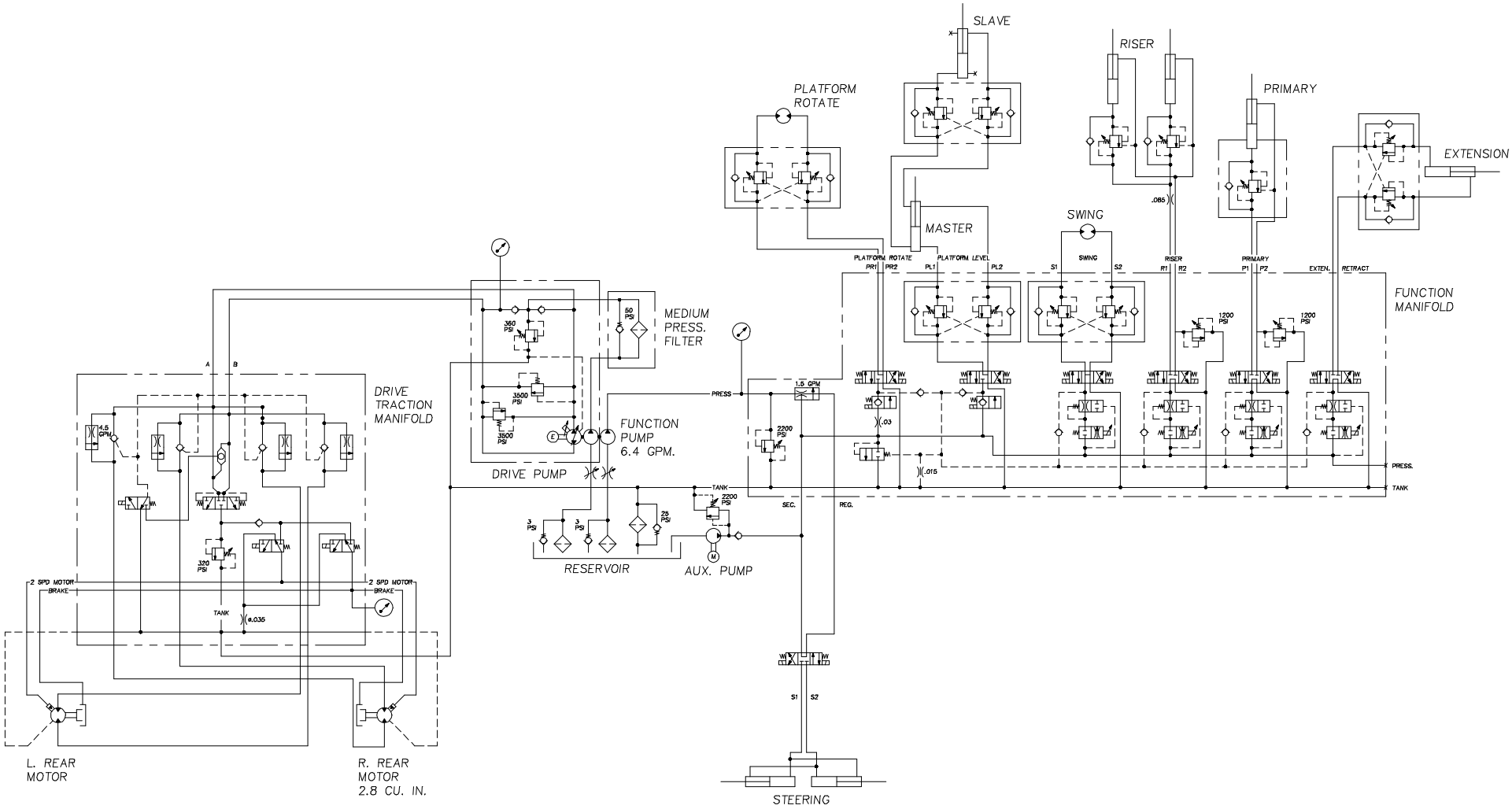


Sequencing valve



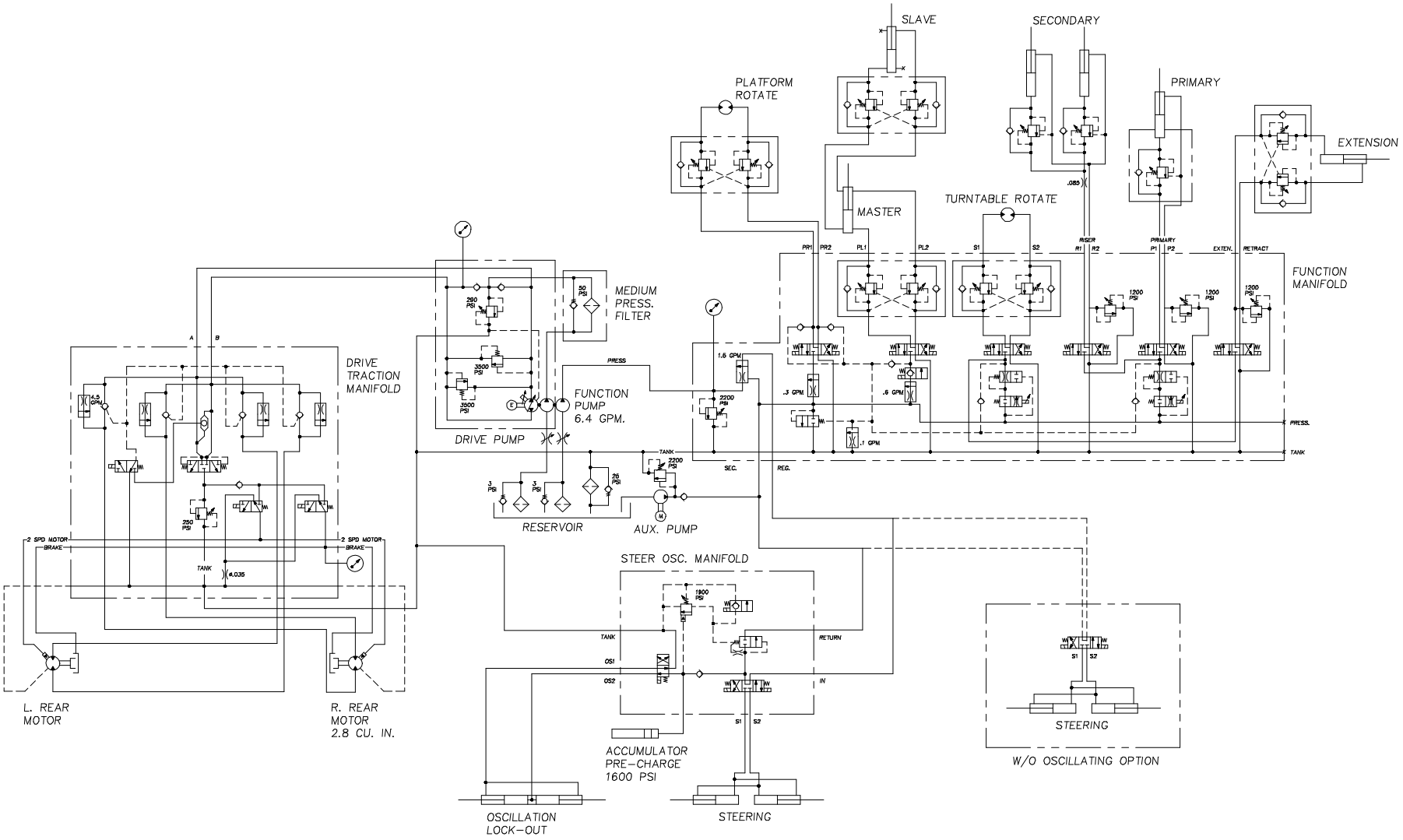
Counterbalance valve

Z45/22 HP 2WD
HYDRAULIC SCHEMATIC
SERIAL #Z45-000170 TO Z45-000987



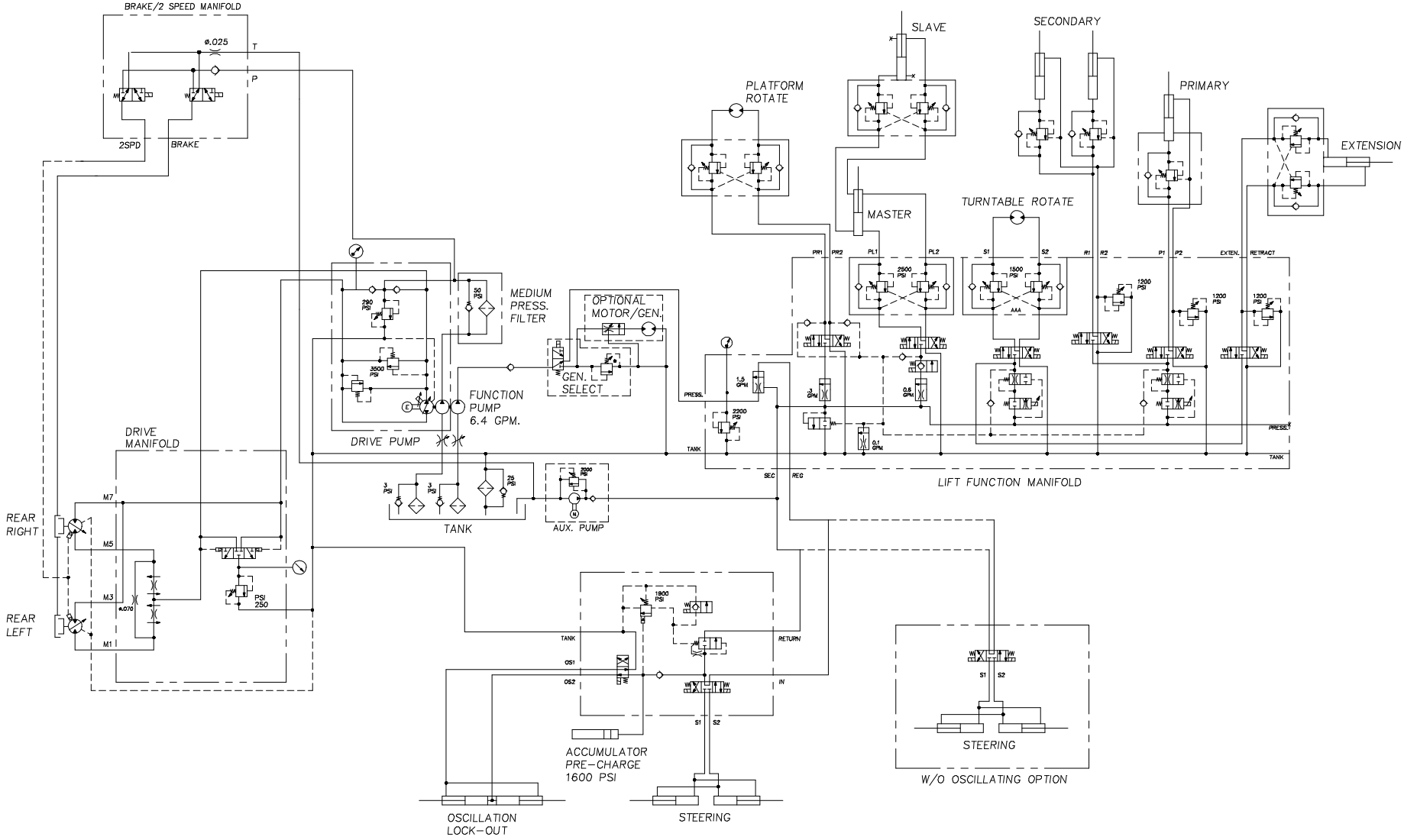
DWG. #HS2WD A

Z45/22 HP 2WD
HYDRAULIC SCHEMATIC
SERIAL #Z45-000989 TO Z45-002536



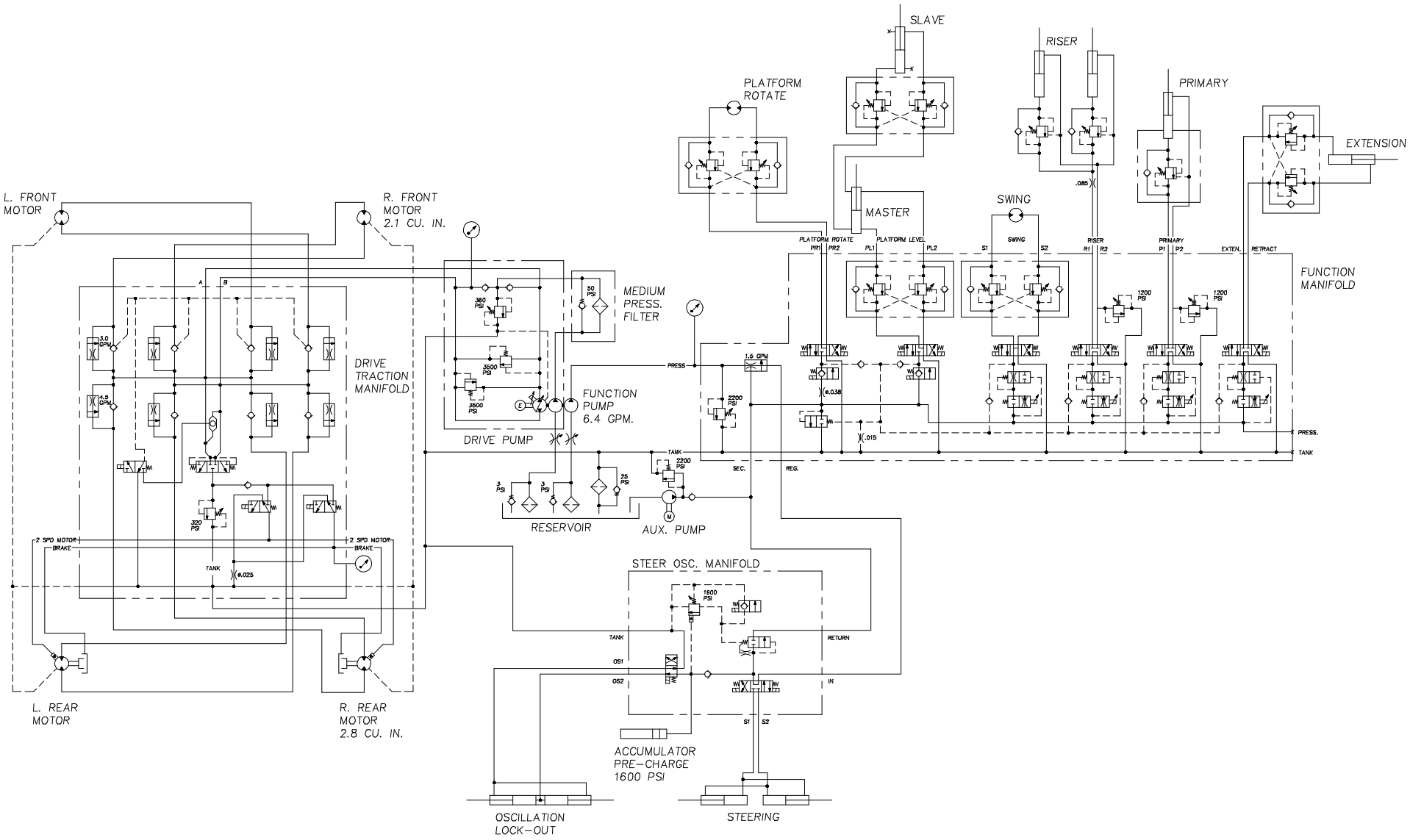
DWG. #HS4WD B

Z45/22 HP 2WD
HYDRAULIC SCHEMATIC
SERIAL #Z45-002541 & ABOVE



DWG. #HS2WD F

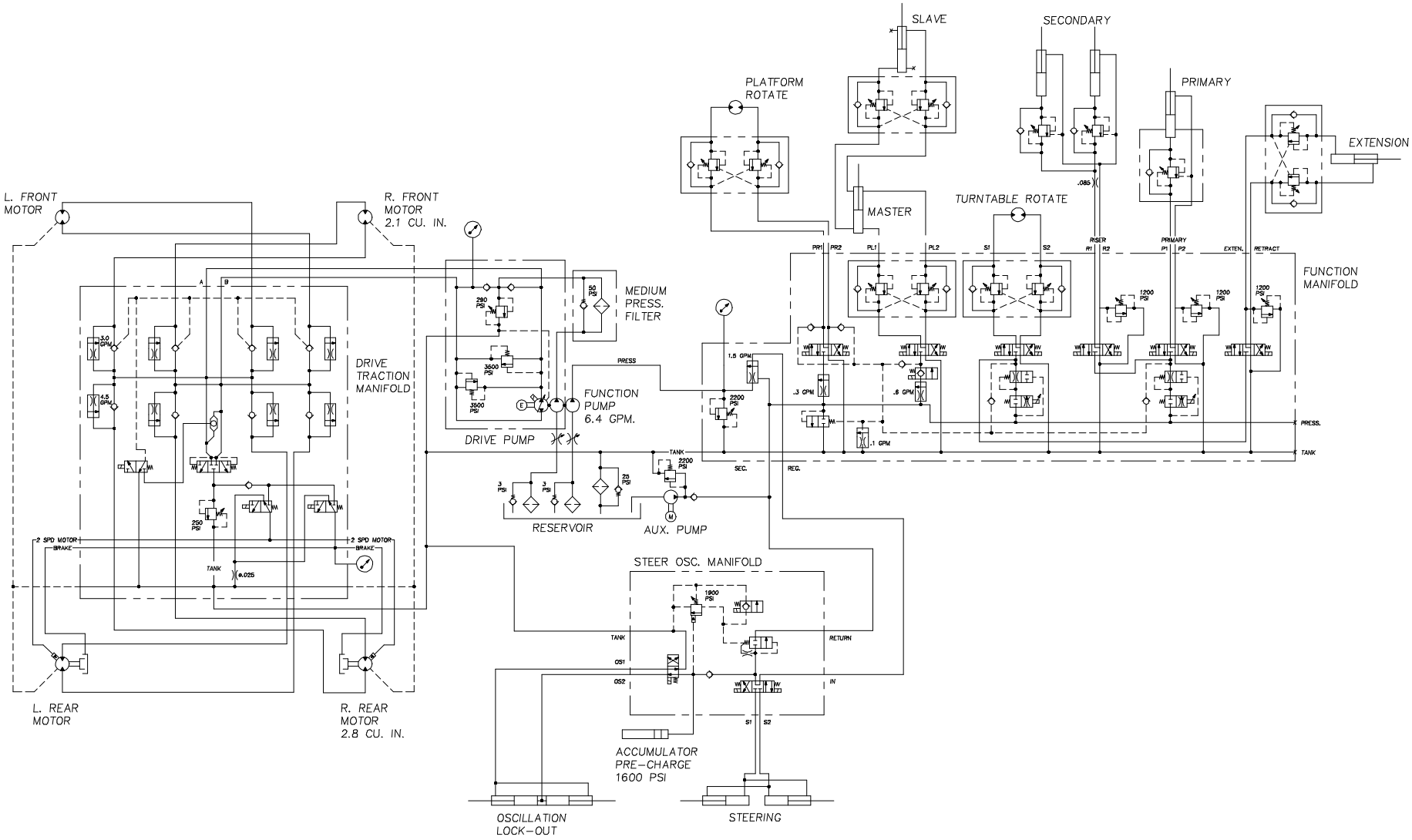
Z45/22 HP 4WD
HYDRAULIC SCHEMATIC
SERIAL #Z45-000001 TO Z45-000981



DWG. #HS4WD B

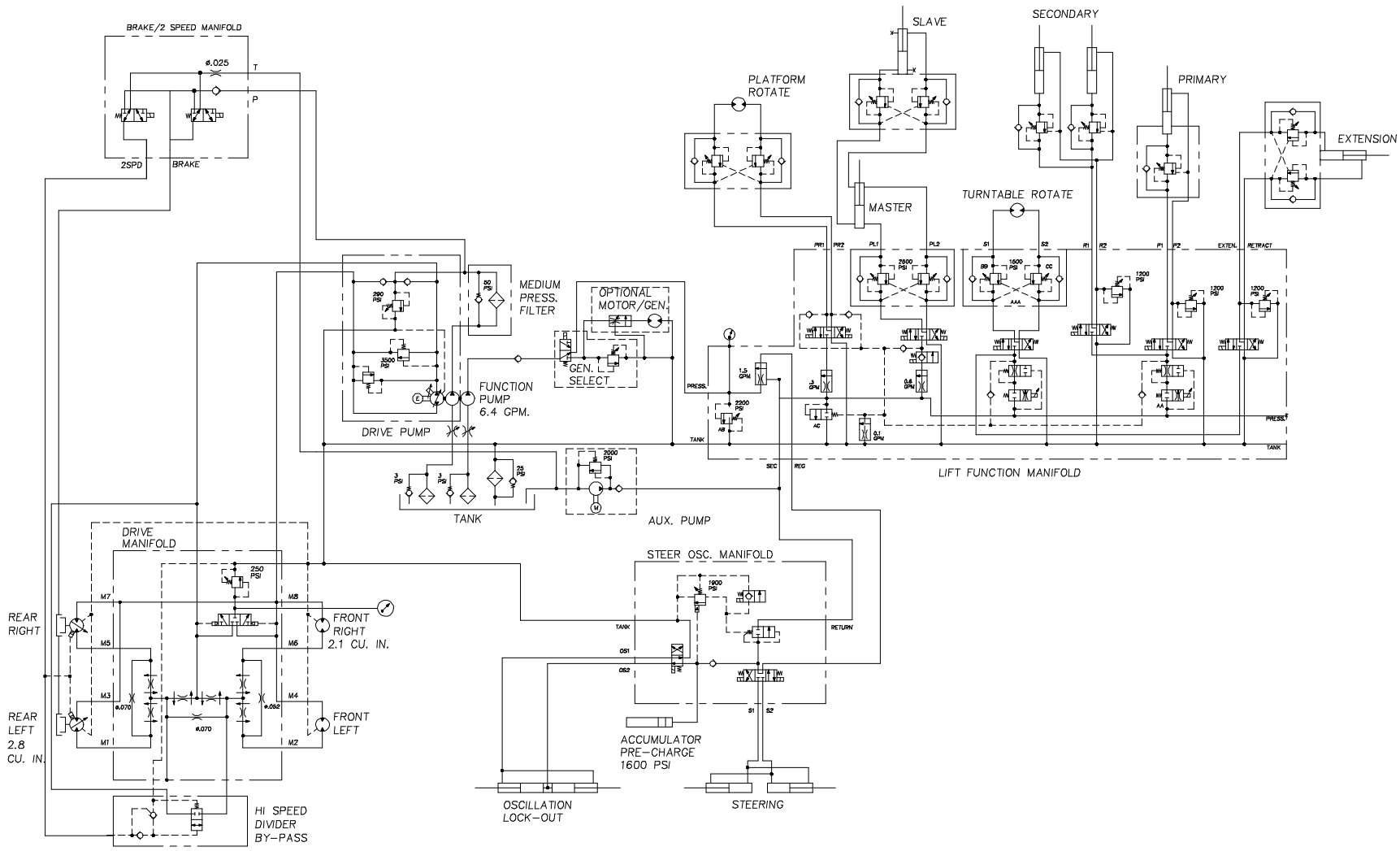
Z45-22 Hyd. Index

Z45/22 HP 4WD
HYDRAULIC SCHEMATIC
SERIAL #Z45-000990 TO Z45-002535



DWG. #HS4WD B

Z45/22 HP GP & DIESEL 4WD
HYDRAULIC SCHEMATIC
SERIAL #Z45-002539 AND ABOVE



DWG. #HS4WD F

Repair Procedures

Observe and Obey:

- ☑ Repair procedures shall be completed by a person trained and qualified on the repair of this machine.
- ☑ Immediately tag and remove from service a damaged or malfunctioning machine.
- ☑ Repair any machine damage or malfunction before operating the machine.

Before Repairs Start:

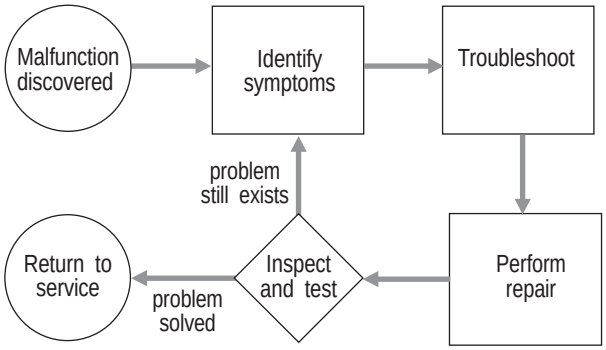
- ☑ Read, understand and obey the safety rules and operating instructions printed in the *Genie Z-45/22 Operating Instruction Manual*.
- ☑ Be sure that all necessary tools and parts are available and ready for use.
- ☑ Read each procedure thoroughly. Attempting shortcuts may produce hazardous conditions.

About This Section

Most of the procedures in this section should only be performed by a trained service professional in a suitably equipped workshop. Select the appropriate repair procedure after troubleshooting the problem.

Perform disassembly procedures to the point where repairs can be completed. Then to re-assemble, perform the disassembly steps in reverse order.

General Repair Process



Symbols Legend

⚠ DANGER Indicates the presence of a hazard that **will** cause death or serious injury.

⚠WARNING Indicates the presence of a hazard that **may** cause death or serious injury.

⚠CAUTION Indicates the presence of a hazard that **will** or **may** cause serious injury or damage to the machine.

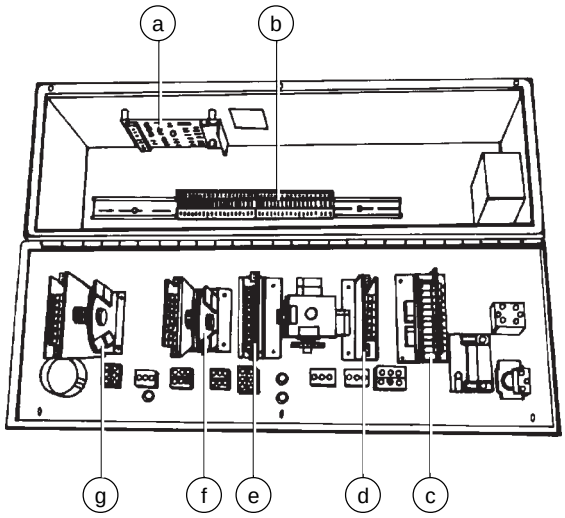
NOTICE Indicates special operation or maintenance information.

⊙ Indicates that a specific result is expected after performing a series of steps.

Platform Controls

1-1 Joystick Controllers

Maintaining each joystick controller at the proper settings is essential to safe machine operation. Every joystick controller should operate smoothly and provide proportional speed control over its entire range of motion.



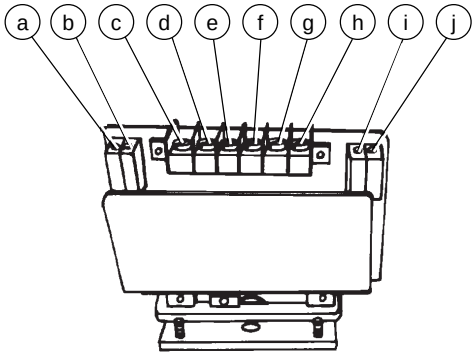
a horsepower limiter
b quick disconnect terminal strip
c drive proportional controller
d primary boom proportional controller
e turntable rotate proportional controller
f extend/retract proportional controller
g secondary boom proportional controller

Primary Boom Up/Down Controller Adjustments

1 Check the battery condition with a volt meter. The reading should be 12V DC or more to accurately adjust the controller.

2 Turn the key switch to platform control and pull the Emergency Stop button to the *on* position at both the ground and platform controls. Do not start the engine.

3 Open the platform control box lid and locate the primary up/down controller.



a dual (lo) adjustable trimpot
b ramp rate adjustable trimpot
c terminal "R" - activates max-out range
d terminal unused
e terminal "X" auxiliary
f terminal "-" - ground
g terminal "+" - battery, positive
h terminal "A" - proportional output
i threshold adjustable trimpot
j max-out adjustable trimpot

4 Set the ramp rate: Turn the trimpot adjustment screw clockwise 15 turns or until you hear a click, then turn the screw counterclockwise 5 turns.

5 Connect the red lead(+) from a volt meter to the “A” terminal on the controller PC board. Connect the black lead(-) to ground.

6 Set the threshold: Press down the foot switch, then slowly move the control handle off center until the moment a voltage reading appears. Adjust the voltage to 2.50V DC. Turn the threshold trimpot adjustment screw clockwise to increase the voltage or counterclockwise to decrease the voltage.

7 Set the max-out: Press down the foot switch, then move the control handle all the way to the *up* position. Adjust the voltage to 5.02V DC. Turn the max-out trimpot adjustment screw clockwise to increase the voltage or counterclockwise to decrease the voltage.

8 Set the dual (lo) range: Press down the foot switch, then move the control handle all the way to the *down* position. Adjust the voltage to 4.33V DC. Turn the dual range trimpot adjustment screw clockwise to increase the voltage or counterclockwise to decrease the voltage.

7 Start the engine and move the engine speed control switch to foot switch activated high idle (rabbit and foot switch symbol). Raise the primary boom 1 inch (2.5cm) above the drive limit switch.

NOTICE Engine should be at normal operating temperature.

8 Start a timer and record how long it takes for the primary boom to reach the *full up* position. Adjust the max-out trimpot to achieve a 25 to 29 second cycle time.

9 Start a timer and record how long it takes for the primary boom to lower into the *full down* position. Adjust the dual range trimpot to achieve a 33 to 37 second cycle time.

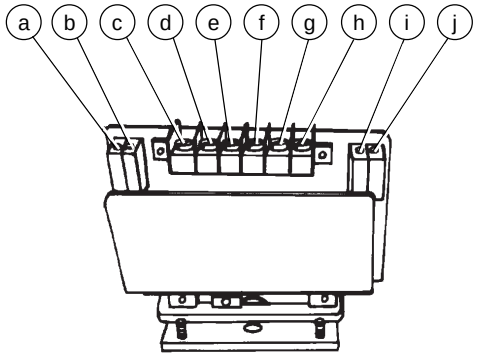
Specifications - Primary Boom Up/Down Function	
Threshold	2.50V DC
Primary boom up - Max-out time	5.02V DC 25-29 seconds
Primary boom down - Dual range time	4.33V DC 33-37 seconds

Primary Boom Extend/Retract Controller Adjustments

1 Check the battery condition with a volt meter. The reading should be 12V DC or more to accurately adjust the controller.

2 Turn the key switch to platform control and pull the Emergency Stop button to the *on* position at both the ground and platform controls. Do not start the engine.

3 Open the platform control box lid and locate the primary extend/retract controller.



a dual (lo) adjustable trimpot
b ramp rate adjustable trimpot
c terminal "R" - activates max-out range
d terminal unused
e terminal "X" auxiliary
f terminal "-" - ground
g terminal "+" - battery, positive
h terminal "A" - proportional output
i threshold adjustable trimpot
j max-out adjustable trimpot

4 Set the ramp rate: Turn the trimpot adjustment screw clockwise 15 turns or until you hear a click, then turn the screw counterclockwise 5 turns.

5 Connect the red lead(+) from a volt meter to the “A” terminal on the controller PC board. Connect the black lead(-) to ground.

PLATFORM CONTROLS

6 Set the threshold: Press down the foot switch, then slowly move the control handle off center until the moment a voltage reading appears. Adjust the voltage to 2.94V DC. Turn the threshold trimpot adjustment screw clockwise to increase the voltage or counterclockwise to decrease the voltage.

7 Set the max-out: Press down the foot switch, then move the control handle all the way to the *extend* position. Adjust the voltage to 7.00V DC. Turn the max-out trimpot adjustment screw clockwise to increase the voltage or counterclockwise to decrease the voltage.

8 Set the dual (lo) range: Press down the foot switch then move the control handle all the way to the *retract* position. Adjust the voltage to 7.00V DC. Turn the dual range trimpot adjustment screw clockwise to increase the voltage or counterclockwise to decrease the voltage.

NOTICE Engine should be at normal operating temperature.

9 Start the engine and move the engine speed control switch to foot switch activated high idle (rabbit and foot switch symbol). Raise the primary boom until it is level. Fully retract the primary boom.

10 Start a timer and record how long it takes for the primary boom to reach *full extension*. Adjust the max-out trimpot to achieve a 29 to 33 second cycle time.

11 Start a timer and record how long it takes for the primary boom to *fully retract*. Adjust the dual range trimpot to achieve a 22 to 26 second cycle time.

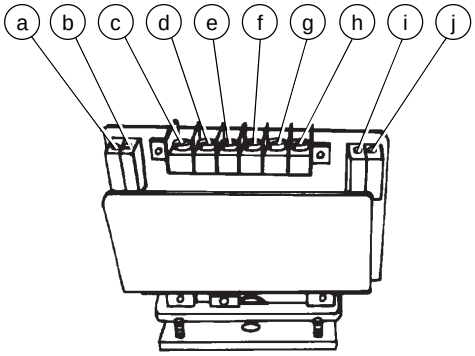
Specifications - Primary Boom Extend/Retract Function	
Threshold	2.50V DC
Primary boom extend - Max-out time	5.01V DC 23-27 seconds
Primary boom retract - Dual Range time	4.05V DC 23-27 seconds

Secondary Boom Up/Down Controller Adjustments

1 Check the battery condition with a volt meter. The reading should be 12V DC or more to accurately adjust the controller.

2 Turn the keyswitch to platform control and pull the Emergency Stop button to the *on* position at both the ground and platform controls. Do not start the engine.

3 Open the platform control box lid and locate the secondary boom up/down controller.



a dual (lo) adjustable trimpot
b ramp rate adjustable trimpot
c terminal "R" - activates max-out range
d terminal unused
e terminal "X" auxiliary
f terminal "-" - ground
g terminal "+" - battery, positive
h terminal "A" - proportional output
i threshold adjustable trimpot
j max-out adjustable trimpot

4 Set the ramp rate: Turn the trimpot adjustment screw clockwise 15 turns or until you hear a click, then turn the screw counterclockwise 5 turns.

5 Connect the red lead(+) from a volt meter to the “A” terminal on the controller PC board. Connect the black lead(-) to ground.

6 Set the threshold: Press down the foot switch, then slowly move the control handle off center until the moment a voltage reading appears. Adjust the voltage to 2.50V DC. Turn the threshold trimpot adjustment screw clockwise to increase the voltage or counterclockwise to decrease the voltage.

7 Set the max-out: Press down the foot switch, then move the control handle all the way to the *up* position. Adjust the voltage to 5.01V DC. Turn the max-out trimpot adjustment screw clockwise to increase the voltage or counterclockwise to decrease the voltage.

8 Set the dual range: Press down the foot switch, then move the control handle all the way to the *down* position. Adjust the voltage to 4.05V DC. Turn the dual range trimpot adjustment screw clockwise to increase the voltage or counterclockwise to decrease the voltage.

NOTICE Engine should be at normal operating temperature.

9 Start the engine and move the engine speed control switch to foot switch activated high idle (rabbit and foot switch symbol). Raise the primary boom 1 inch (2.5cm) above the drive limit switch.

10 Start a timer and record how long it takes for the secondary boom to reach the *full up* position. Adjust the max-out trimpot to achieve a 23 to 27 second cycle time.

11 Start a timer and record how long it takes for the secondary boom to lower into the *full down* position. Adjust the dual range trimpot to achieve a 23 to 27 second cycle time.

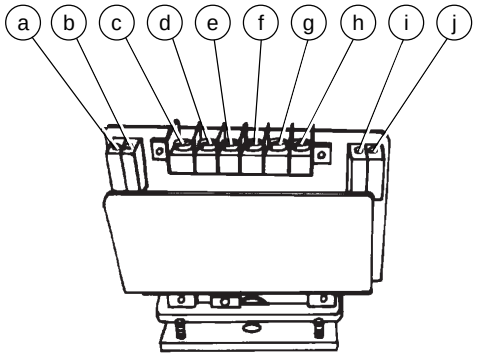
Specifications - Secondary Boom Up/Down Function	
Threshold	2.94V DC
Secondary boom up - Max-out time	7.00V DC 29-33 seconds
Secondary boom down - Dual Range time	7.00V DC 22-26 seconds

Turntable Rotation Controller Adjustments

1 Check the battery condition with a volt meter. The reading should be 12V DC or more to accurately adjust the controller.

2 Turn the key switch to platform control and pull the Emergency Stop button to the *on* position at both the ground and platform controls. Do not start the engine.

3 Open the platform control box lid and locate the secondary boom up/down controller.



a dual (lo) adjustable trimpot
b ramp rate adjustable trimpot
c terminal "R" - activates max-out range
d terminal unused
e terminal "X" auxiliary
f terminal "-" - ground
g terminal "+" - battery, positive
h terminal "A" - proportional output
i threshold adjustable trimpot
j max-out adjustable trimpot

PLATFORM CONTROLS

4 Set the ramp rate: Turn the trimpot adjustment screw clockwise 15 turns or until you hear a click, then turn the screw counterclockwise 5 turns.

5 Connect the red lead(+) from a volt meter to the “A” terminal on the controller PC board. Connect the black lead(-) to ground.

6 Set the threshold: Press down the foot switch then slowly move the control handle off center until the moment a voltage reading appears. Adjust the voltage to 3.35V DC. Turn the threshold trimpot adjustment screw clockwise to increase the voltage or counterclockwise to decrease the voltage.

7 Set the max-out: Press down the foot switch then move the control handle all the way to the *full right* or *full left* position. Adjust the voltage to 6.26V DC. Turn the max-out trimpot adjustment screw clockwise to increase the voltage or counterclockwise to decrease the voltage.

8 Set the dual (lo) range: Turn the trimpot adjustment screw clockwise 15 turns or until you hear a click. This is the only dual range adjustment for this controller.

NOTICE Engine should be at normal operating temperature.

6 Start the engine and move the engine speed control switch to foot switch activated high idle (rabbit and foot switch symbol). Rotate the turntable to the *full right* position.

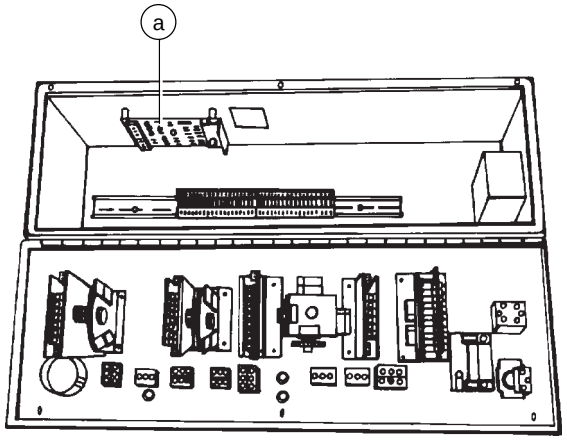
7 Start a timer and record how long it takes the turntable to rotate to the *full left* position. Adjust the max-out trimpot to achieve a 71 to 75 second cycle time.

Specifications - Turntable Rotation function	
Threshold	3.35V DC
Turntable rotation - Max-out time	6.26V DC 71-75 seconds

1-2 Horsepower Limiter Board

The horsepower limiter board is responsible for governing drive pump output. It reads engine rpm from the alternator. The horsepower limiter board senses drops in rpm normally due to increased drive resistance (rough terrain or incline) and decreases voltage to the drive controller which in turn decreases voltage to the drive pump thereby reducing pump output to keep the engine from stalling. Three adjustments are required for optimum performance.

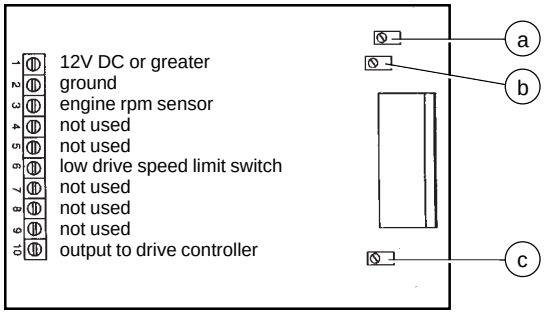
How to Adjust the Horsepower Limiter Board



a horsepower limiter board

1 Remove the fasteners from the platform control box lid.

2 Open the control box lid and locate the horsepower limiter board.



Horsepower limiter board

a "A" potentiometer-maximum voltage output to the controller in the stowed position

b "B" potentiometer-maximum voltage output to the drive controller in the boom elevated position

c "C" potentiometer-reaction rate or how fast the voltage output reacts to the change in engine rpm

⚠WARNING Electrocution hazard. Contact with hot or live circuits may result in death or serious injury. Remove all rings, watches and other jewelry.

3 Connect the black lead(-) from a DC volt meter to the number 2 terminal, and the red lead(+) to the number 10 terminal.

4 Start the engine from the platform controls.

5 Move the engine speed control switch to foot switch activated high idle (rabbit and foot switch symbol).

6 Press down the foot switch and adjust the "A" potentiometer counterclockwise to increase voltage or clockwise to decrease voltage.

Specifications - "A" Pot Setting	
Voltage setting - 2WD model	8.0V DC
Voltage setting - 4WD model	9.0V DC

7 Move the engine speed control switch to low idle (turtle symbol).

8 Press down the foot switch and then adjust the "C" potentiometer to obtain a 0.01V DC to 0.03V DC voltage reading.

9 Move the engine speed control switch to foot switch activated high idle (rabbit and foot switch symbol).

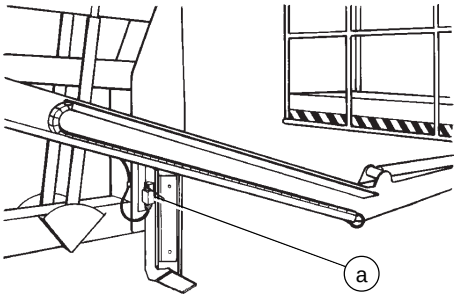
10 Press down the foot switch and re-adjust the "A" potentiometer to the previous voltage setting

11 Be sure that the boom is in the fully stowed position, then drive the boom and observe how the engine rpm reacts to drive control handle movement. If the machine surges or hunts, adjust the "C" potentiometer counterclockwise until surging is minimized..

NOTICE Under an extreme load, an excessive counterclockwise adjustment to the "C" potentiometer will cause the engine to stall. The "C" potentiometer adjustment is a compromise between engine stability and engine droop.

12 Disconnect the volt meter.

13 Raise the primary boom above the drive limit switch.



a drive limit switch

14 Drive the boom for 20 feet (6.1m) and record the elapsed time. Do this again in the opposite direction.

PLATFORM CONTROLS

15 Adjust the "B" potentiometer to obtain the correct elevated drive speed of 1 foot per second (30.5cm per second).

16 Close the platform control box lid and re-install the fasteners.

Specifications	
Stowed position, high range, distance: 20 ft / 6m	
2WD	2.85 seconds (±0.25 seconds)
4WD	2.75 seconds (±0.25 seconds)
Boom raised, high range, distance: 20 ft / 6m	
2WD and 4WD	1 foot per second / 30.5cm per second

1-3 Foot Switch

How to Test the Foot Switch

1 Turn the keyswitch to the *off* position and disconnect the wiring quick disconnect plug from the platform toe board.

2 Do not press down the foot switch. Connect the leads from an ohmmeter or continuity tester to each wire connector combination listed below and check for continuity.

Test	Desired result
red to black	continuity (zero Ω)
red to white	no continuity (infinite Ω)
black to white	no continuity

NOTICE Do not use the colors of the connector as a guide for these tests. Use the actual wire color to identify which contact to use for testing.

3 Press down the foot switch. Connect the leads from an ohmmeter or continuity tester to each wire connector combination listed below and check for continuity.

Test	Desired result
red to black	no continuity (infinite Ω)
red to white	no continuity
black to white	continuity (zero Ω)

1-4 Resistors

Two resistors are used to maintain proper control of drive speeds. Both resistors are located in the platform control box.

How to Test the Resistors

1 Turn the keyswitch to the off position and set the drive mode select switch to high range (two-wheel symbol).

2 Connect the leads from an ohmmeter to each end of the resistor being tested.

3 Compare the ohmmeter reading with the resistance rating printed on the resistor.

1-5 Toggle Switches

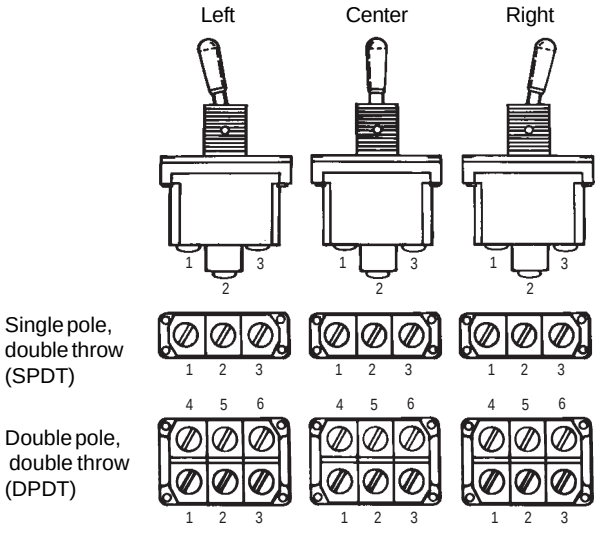
Toggle switches used for single function switching are single pole double throw (SPDT) switches. Two function switching requires a double pole double throw (DPDT) switch.

How to Test a Toggle Switch

This procedure covers fundamental switch testing and does not specifically apply to all varieties of toggle switches.

1 Turn the keyswitch to the *off* position and disconnect all wiring from the toggle switch to be tested.

2 Connect the leads of an ohmmeter to the switch terminals in the following combinations listed below to check for continuity.



Test	Desired result
Left Position	
terminal 1 to 2, 3, 4, 5, & 6	no continuity (infinite Ω)
terminal 2 to 3	continuity (zero Ω)
terminal 2 to 4, 5 & 6	no continuity
terminal 3 to 4, 5 & 6	no continuity
terminal 4 to 5 & 6	no continuity
terminal 5 to 6	continuity
Center position	There are no terminal combinations that will produce continuity (infinite Ω)
Right Position	
terminal 1 to 2	continuity
terminal 1 to 3, 4, 5 & 6	no continuity
terminal 2 to 3, 4, 5 & 6	no continuity
terminal 3 to 4, 5 & 6	no continuity
terminal 4 to 5	continuity
terminal 4 to 6	no continuity
terminal 5 to 6	no continuity

Platform Components

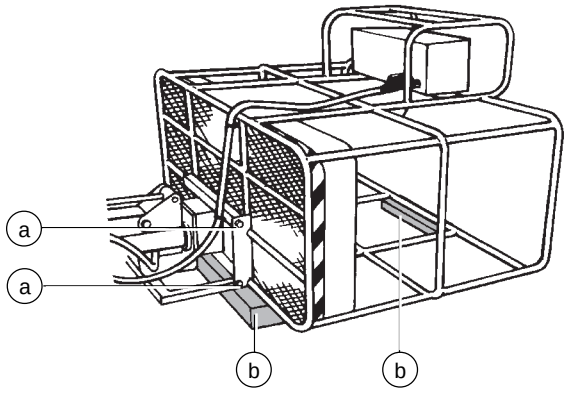
2-1 Platform

How to Remove the Platform

1 Remove the cable harness from the cable clamps located under the platform and disconnect the foot switch wiring plug.

2 Remove the platform control box mounting bolts, then lift it out and set it aside.

3 Tilt the platform with the ground controls manual platform leveling switch until the platform lays horizontal.



a platform mounting bolts
b block

4 Place blocks under the platform railing for support. Then carefully rest the platform on the blocks.

5 Remove the platform mounting bolts and remove the platform.

2-2 Platform Leveling Slave Cylinder

The slave cylinder and the rotator pivot are the two primary supports for the platform. The slave cylinder keeps the platform level through the entire range of primary boom motion. It operates in a closed-circuit hydraulic loop with the master cylinder. The slave cylinder is equipped with counterbalance valves to prevent movement in the event of a hydraulic line failure.

How to Remove the Slave Cylinder

NOTICE Before cylinder removal is considered, bleed the slave cylinder to be sure there is no air in the closed loop.

1 Tilt the platform with the ground controls platform leveling switch until the platform is horizontal.

2 Place blocks under the platform railing for support. Then carefully rest the platform on the blocks.

3 Disconnect the hydraulic hoses from the slave cylinder and connect them together with a straight line connector.

⚠CAUTION Bodily injury hazard. Spraying hydraulic oil can perforate and burn skin. Loosen hydraulic connections very slowly to allow the oil pressure to dissipate gradually. Do not allow oil to squirt or spray.

4 Remove the rod ends from both the barrel and rod end pins.

5 Use a soft metal drift and drive the pins out.

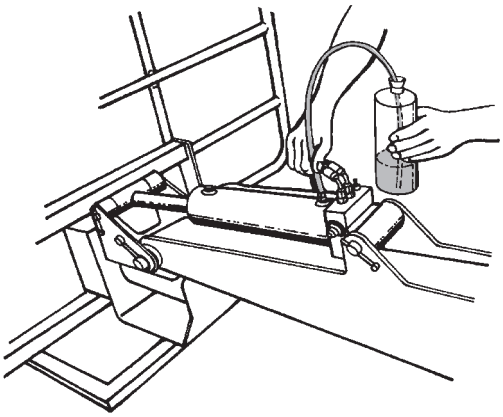
How to Bleed the Slave Cylinder

⚠CAUTION Do not start the engine. Use auxiliary power for all machine functions in this procedure.

1 Raise the primary boom 6 inches (15cm) above the primary boom rest.

2 Move the manual platform level switch to the right until the slave cylinder is fully extended. Continue to hold the platform level switch for 10 seconds.

3 Connect a clear hose to the bleed valve on the cylinder barrel. Place the other end of the hose in a container to collect any discharge.



4 Open the bleed valve, but do not remove it.

5 Hold the platform level switch to the right for 5 seconds, then release it.

6 Close the bleed valve, then remove the hoses.

7 Hold the platform level switch to the left until the slave cylinder is fully retracted.

8 Connect the clear hose to the bleed valve on the slave cylinder block.

9 Open the bleed valve and allow the slave cylinder to extend using gravity, until the cylinder is fully extended. Close the bleed valve.

2-3 Platform Rotator

The platform rotator is a hydraulically activated helical gear assembly used to rotate the platform 180 degrees. It is equipped with external counterbalance valves to hold platform in place and to provide pressure relief.

How to Remove the Platform Rotator

1 Remove the platform. See 2-1, *How to Remove the Platform*.

2 Disconnect the hydraulic hoses from the platform rotator and cap them.

⚠CAUTION Bodily injury hazard. Spraying hydraulic oil can perforate and burn skin. Loosen hydraulic connections very slowly to allow the oil pressure to dissipate gradually. Do not allow oil to squirt or spray.

3 Remove the 6 mounting bolts from the platform pivot weldment.

4 Remove the top nut from the threaded rod. Then pull the rod out the bottom of the platform rotator and remove the platform pivot weldment.

5 Support the platform rotator, but do not apply any lifting pressure.

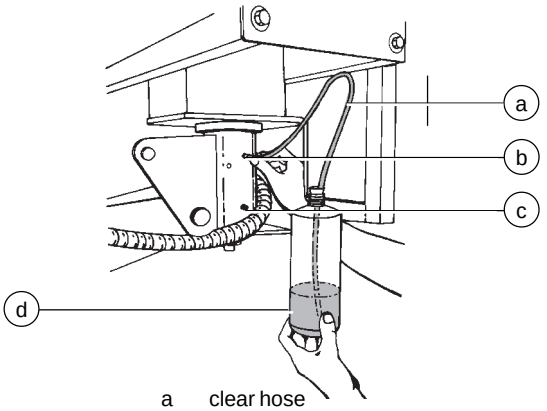
6 Remove the pin retainer from the slave cylinder rod-end pivot pin and the rotator pivot pin.

7 Use a soft metal drift to drive the pins out, then remove the platform rotator.

PLATFORM COMPONENTS

How to Bleed the Platform Rotator

1 Connect a clear hose to the top bleed valve. Place the other end of the hose in a container to collect any discharge.



a clear hose
b top bleed valve
c bottom bleed valve
d container

2 Open the top bleed valve, but do not remove it.

3 Start the engine from the ground controls.

4 Hold the platform rotate switch to the right for approximately 5 seconds, then release it. Repeat 3 times.

⚠CAUTION Crushing hazard. Keep hands clear of the platform pivot weldment during rotation.

5 Hold the platform rotate switch to the left for approximately 5 seconds, then release it.

6 Fully rotate the platform to the left and continue holding the platform rotate switch until air stops coming out of the bleed valve. Immediately release the platform rotate switch and close the bleed valve.

7 Rotate the platform to the right until it is centered.

8 Connect the clear hose to the bottom bleed valve and open the valve.

9 Rotate the platform to the right and continue holding the platform rotate switch until air stops coming out of the bleed valve.

⚠CAUTION Crushing hazard. Keep hands clear of the platform pivot weldment during rotation.

10 Close the bleed valve and remove the hose.

11 Turn off the engine and clean up any hydraulic oil that may have spilled.

12 Restart the engine from the ground controls. Then rotate the platform full left and right and inspect the bleed valves for leaks.

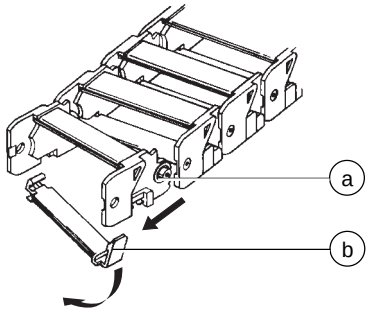
Primary Boom Components

3-1 Plastic Cable Track

The primary boom cable track guides cables and hoses running up the boom. It can be repaired link by link without removing the cables and hoses that run through it. Removing the entire primary boom cable track is only necessary when performing major repairs that involve removing the primary boom.

How to Repair the Plastic Cable Track

⚠CAUTION Component damage hazard. The primary boom cable track can be damaged if it is twisted.



a link separation point
b lower clip

1 Use a slotted screwdriver to pry down on the lower clip.

2 Repeat step 2 for each link.

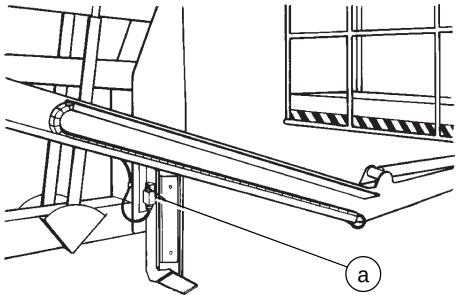
3 To remove a single link, open the lower clip and then use a screw driver to pry the link to the side.

3-2 Primary Boom

How to Shim the Primary Boom Wear Pads

NOTICE Measure each wear pad. Replace the pad if it is less than 0.41 inches (1cm) thick. If the pad is more than 0.41 inches (1cm) thick, perform the following procedure.

1 Raise the primary boom above the drive limit switch.



a drive limit switch

2 Extend the primary boom 10 inches (25.4cm).

3 Remove the wear pad mounting fasteners.

4 Install the new shims under the wear pad to obtain zero clearance and zero drag.

5 Using a round punch, align the holes in the shim to the wear pad and install the mounting fasteners.

6 Extend and retract through the entire range of motion to check for tight spots that could cause binding.

NOTICE Always maintain squareness between the primary boom outer and inner tubes.

PRIMARY BOOM COMPONENTS

How to Remove the Primary Boom

⚠WARNING This procedure requires specific repair skills, lifting equipment and a suitable workshop. Attempting this procedure without these skills and tools may result in death or serious injury and significant component damage. Dealer service is strongly recommended.

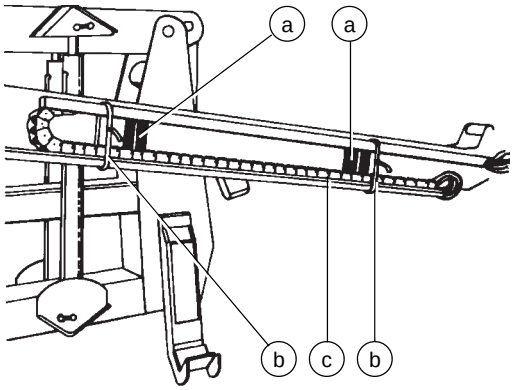
1 Remove the platform. See 2-1, *How to Remove the Platform.*

2 Disconnect and plug the hydraulic hoses at the slave cylinder and the platform rotator counterbalance valve.

⚠CAUTION Bodily injury hazard. Spraying hydraulic oil can perforate and burn skin. Loosen hydraulic connections very slowly to allow the oil pressure to dissipate gradually. Do not allow oil to squirt or spray.

3 Remove the fasteners that secure the upper cable track tray to the primary boom.

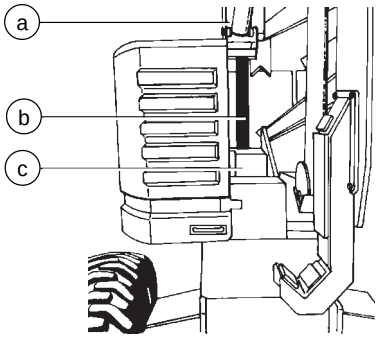
4 Loosen the fasteners that secure the lower cable track tray. Tie the upper and lower cable tracks together with wire ties. Remove the cable track assembly from the primary boom.



a wood block
b tie-wrap
c plastic cable track

⚠CAUTION Component damage hazard. The primary boom cable track can be damaged if it is twisted.

5 Raise the secondary boom and place a 4x4x31 inch (78cm) block between the chassis counterweight and upper mid-pivot. Carefully lower the secondary boom onto the block.



a upper mid-pivot
b 4x4x31 inch block
c counterweight

⚠WARNING Crushing hazard. Keep hands away from the block and all moving parts when lowering the secondary boom.

6 Raise the end of the primary boom 8 feet (2.5m) off the ground, then extend the primary boom 5 inches (12.5cm).

7 Attach an overhead crane to the primary boom. Do not lift the primary boom.

⚠WARNING Crushing hazard. If the overhead crane is not properly attached, the primary boom may become unbalanced and fall when it is disconnected from the upper mid-pivot.

8 Disconnect and plug the extension cylinder and the platform leveling master cylinder hydraulic hoses. Cap the extension cylinder fittings.

⚠CAUTION Bodily injury hazard. Spraying hydraulic oil can perforate and burn skin. Loosen hydraulic connections very slowly to allow the oil pressure to dissipate gradually. Do not allow oil to squirt or spray.

9 Remove the pin retainer from the master cylinder barrel-end pivot pin. Use a soft metal drift and remove the pin.

NOTICE Leave the master cylinder attached to the primary boom.

10 Remove the retaining fastener from the primary boom pivot pin. Do not remove the pin.

11 Remove the hose clamp bolt on the primary boom, next to the upper mid-pivot.

12 Support the lift cylinder with a lifting device.

13 Remove the pin retainer from the lift cylinder rod-end pivot pin. Use a soft metal drift to remove the pin.

⚠CAUTION The lift cylinder will fall unless it is supported.

14 Remove the hose and cable clamps from the underside of the primary boom.

15 Use a slide hammer to remove the primary boom pivot pin, then carefully lift the primary boom off the machine.

How to Disassemble the Primary Boom

NOTICE Complete disassembly of the primary boom is only necessary if the outer or inner primary boom tube must be replaced. The extension cylinder can be removed without completely disassembling the primary boom. See 3-4, *How to Remove the Extension Cylinder.*

1 Remove the primary boom. See above, *How to Remove the Primary Boom.*

2 Remove the pin retainer from the slave cylinder rod-end pivot pin. Use a soft metal drift to remove the pin.

3 Remove the pin retainer from the slave cylinder barrel-end pivot pin. Use a soft metal drift to remove the pin, then remove slave cylinder from the primary boom.

4 Support the platform rotator with a lifting device.

5 Remove the pin retainer from the platform rotator pivot pin. Use a soft metal drift to remove the pin, then remove the platform rotator from primary boom.

6 Support the master cylinder with a lifting device.

7 Remove the retaining fastener bolt from the master cylinder pivot pin. Use a soft metal drift to remove the pin, then remove the master cylinder from the primary boom.

8 Remove the fasteners from the extension cylinder pivot pin. Use a soft metal drift to remove the pin.

9 Support and slide the extension boom out of

the primary boom weldment.

⚠CAUTION Crushing hazard. The extension tube will fall when it is removed from the primary boom if it is not properly supported.

10 Remove the extension boom end cap.

11 Remove the fasteners from the extension cylinder rod-end weldment, then support and slide the extension cylinder out of the extension boom.

NOTICE The bolts that secure the cylinder rod-end weldment are installed with Loctite® removable thread sealant. It may be necessary to heat the bolts and the surrounding area to remove them. Do not reuse the bolts.

11 Remove and label the wear pads from the primary boom weldment and the extension tube.

NOTICE Pay careful attention to the location and amount of shims used with each wear pad.

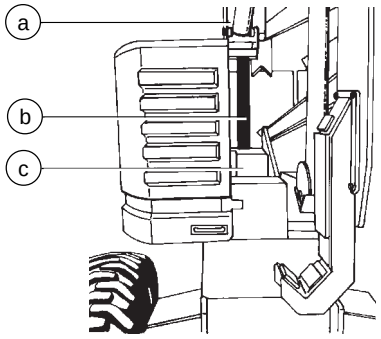
3-3
Primary Boom Lift Cylinder

The lift cylinder raises and lowers the primary boom.

How to Remove the Primary Boom Lift Cylinder

⚠WARNING This procedure requires specific repair skills, lifting equipment and a suitable workshop. Attempting this procedure without these skills and tools may result in death or serious injury and significant component damage. Dealer service is strongly recommended.

1 Raise the secondary boom and place a 4x4x31 inch (78cm) block between the chassis counterweight and the upper mid-pivot. Carefully lower the secondary boom onto the block.



a upper mid-pivot
b 4x4x31 inch block
c counterweight

⚠WARNING Crushing hazard. Keep hands away from the block and all moving parts when lowering the secondary boom.

2 Raise the primary boom until the end of the boom is 8 feet (2.5m) off the ground.

3 Support the primary boom with an overhead crane. Do not lift the primary boom.

4 Disconnect and plug the primary lift cylinder hydraulic hoses.

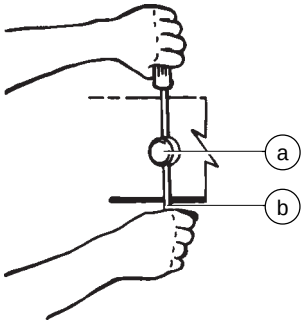
⚠CAUTION Bodily injury hazard. Spraying hydraulic oil can perforate and burn skin. Loosen hydraulic connections very slowly to allow the oil pressure to dissipate gradually. Do not allow oil to squirt or spray.

5 Remove the pin retainer from the pivot pin at the barrel-end of the primary lift cylinder.

6 Use an overhead crane to lift the primary boom 1 inch (2.5cm). This will relieve pressure on the barrel-end pivot pin.

7 Support the primary lift cylinder with straps or ropes to restrict it from swinging freely.

8 Place a rod through the barrel-end pivot pin and twist to remove the pin.



a pivot pin
b 10 to 12 inch rod

⚠CAUTION Crushing hazard. When the barrel-end pivot pin is removed, the primary lift cylinder will swing down if it is not properly supported.

9 Carefully loosen the straps and allow the primary lift cylinder to slowly swing down. Now attach the rod of the primary lift cylinder to an overhead crane or similar lifting device.

10 Remove the pin retainer from the remaining pivot pin, then use a soft metal drift to remove the pin.

⚠WARNING Crushing hazard. The primary lift cylinder will fall if it is not properly supported.

PRIMARY BOOM COMPONENTS

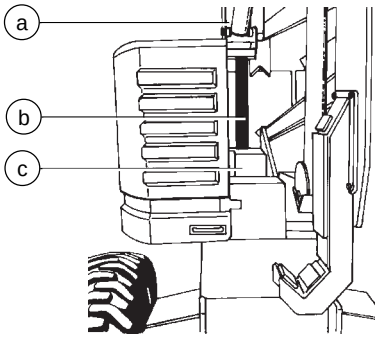
3-4
Extension Cylinder

The extension cylinder extends and retracts the primary boom steel extension tube. It can only be removed from the platform end of the primary boom. The extension cylinder is equipped with counterbalance valves to prevent movement in the event of a hydraulic line loss.

How to Remove the Extension Cylinder

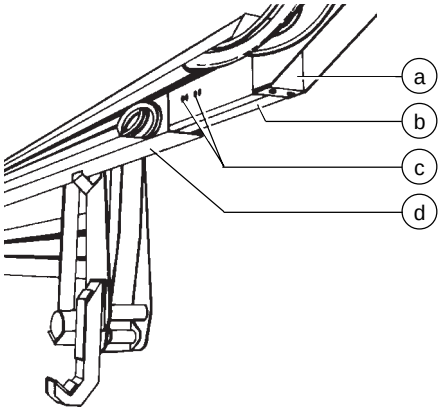
⚠WARNING This procedure requires specific repair skills, lifting equipment and a suitable workshop. Attempting this procedure without these skills and tools may result in death or serious injury and significant component damage. Dealer service is strongly recommended.

1 Raise the secondary boom and place a 4x4x31 inch (78cm) block between the chassis counterweight and the upper mid-pivot. Carefully lower the secondary boom onto the block.



a upper mid-pivot
b 4x4x31 inch block
c counterweight

⚠WARNING Crushing hazard. Keep hands away from the block and all moving parts when lowering the secondary boom.



a extension boom end cap
b extension boom
c extension cylinder rod-end weldment fasteners
d primary boom

2 Raise the primary boom until the extension boom end cap is 5 feet (1.5m) off the ground.

3 Extend the extension tube to the primary boom tube 17 inches (43cm). Then secure to prevent any additional movement

4 Remove the extension boom end cap.

5 Remove the fasteners from the cylinder rod-end weldment.

NOTICE The bolts that secure the cylinder rod-end weldment are installed with Loctite® removable thread sealant. It may be necessary to heat the bolts and the surrounding area to remove them. Do not reuse the bolts.

6 If the function is operational, extend the extension cylinder until the rod-end weldment clears the end of the extension tube.

7 Disconnect and plug the extension cylinder hydraulic hoses. Cap the fittings on the cylinder.

⚠CAUTION Bodily injury hazard. Spraying hydraulic oil can perforate and burn skin. Loosen hydraulic connections very slowly to allow the oil pressure to dissipate gradually. Do not allow oil to squirt or spray.

8 Remove the fasteners from the extension cylinder pivot pin, then use a soft metal drift to remove the pin.

9 Carefully pull out and properly support the extension cylinder from the platform end of the primary boom.

⚠CAUTION Crushing hazard. The cylinder will fall if it is not properly supported when it is pulled out of the extension tube.

NOTICE To make installation the extension cylinder easier, be sure that the cylinder rod is extended 3 to 4 feet (1m).

3-5 Platform Leveling Master Cylinder

The master cylinder acts as a pump for the slave cylinder. It's part of the closed circuit hydraulic loop that keeps the platform level through the entire range of primary boom motion. The master cylinder is located inside the upper mid-pivot at the base of the primary boom.

How to Remove the Platform Leveling Master Cylinder

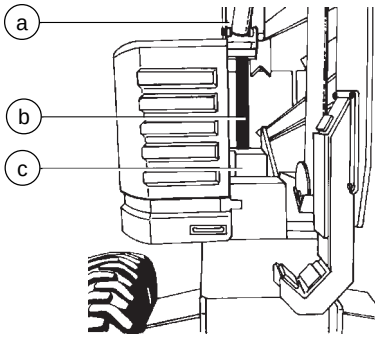
⚠WARNING This procedure requires specific repair skills, lifting equipment and a suitable workshop. Attempting this procedure without these skills and tools may result in death or serious injury and significant component damage. Dealer service is strongly recommended.

Before cylinder removal is considered, bleed the cylinder to be sure that there is no air in the closed loop. See 2-2, *How to Bleed the Slave Cylinder.*

NOTICE

1 Remove the end cover from the turntable.

2 Raise the secondary boom and place a 4x4x31 inch (78cm) block between the chassis counterweight and the upper mid-pivot. Carefully lower the secondary boom onto the block.



a upper mid-pivot
b 4x4x31 inch block
c counterweight

⚠WARNING Crushing hazard. Keep hands away from the block and all moving parts when lowering the secondary boom.

3 Extend the primary boom 6 inches (15cm), then raise the primary boom until it is level.

4 Disconnect and plug the extension cylinder hydraulic hoses. Cap the ports on the extension cylinder.

⚠CAUTION Bodily injury hazard. Spraying hydraulic oil can perforate and burn skin. Loosen hydraulic connections very slowly to allow the oil pressure to dissipate gradually. Do not allow oil to squirt or spray.

PRIMARY BOOM COMPONENTS

5 Fully lower the primary boom and support it with an overhead crane.

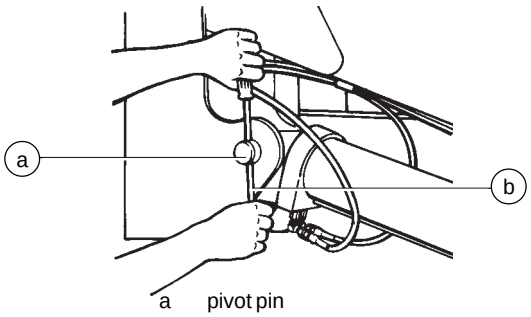
6 Disconnect and plug the primary lift cylinder hydraulic hoses. Cap the ports on the primary lift cylinder.

⚠CAUTION Bodily injury hazard. Spraying hydraulic oil can perforate and burn skin. Loosen hydraulic connections very slowly to allow the oil pressure to dissipate gradually. Do not allow oil to squirt or spray.

7 Support the barrel-end of the primary lift cylinder with a strap.

8 Remove the pin retainer from the primary lift cylinder barrel-end pivot pin.

9 Place a rod through the barrel-end pivot pin and twist to remove the pin.



a pivot pin
b 10 to 12 inch (30cm) rod

10 Carefully lower and rest the barrel-end of the primary lift cylinder on the turntable counterweight.

11 Disconnect and plug the platform leveling master cylinder hydraulic hoses. Cap the fittings on the master cylinder.

⚠CAUTION Bodily injury hazard. Spraying hydraulic oil can perforate and burn skin. Loosen hydraulic connections very slowly to allow the oil pressure to dissipate gradually. Do not allow oil to squirt or spray.

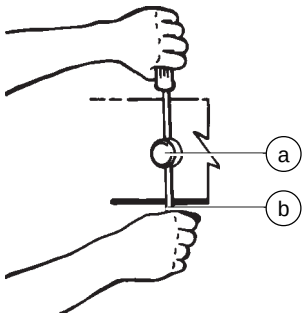
12 Remove the retaining fastener from the platform leveling master cylinder rod-end pivot pin, then use a slide hammer to remove the pin.

13 Attach a strap to the rod-end of the platform leveling master cylinder.

14 Remove the pin retainer from the platform leveling master cylinder barrel-end pivot pin. Then support the cylinder with the strap.

15 Place a rod through the barrel-end pivot pin and twist to remove the pin.

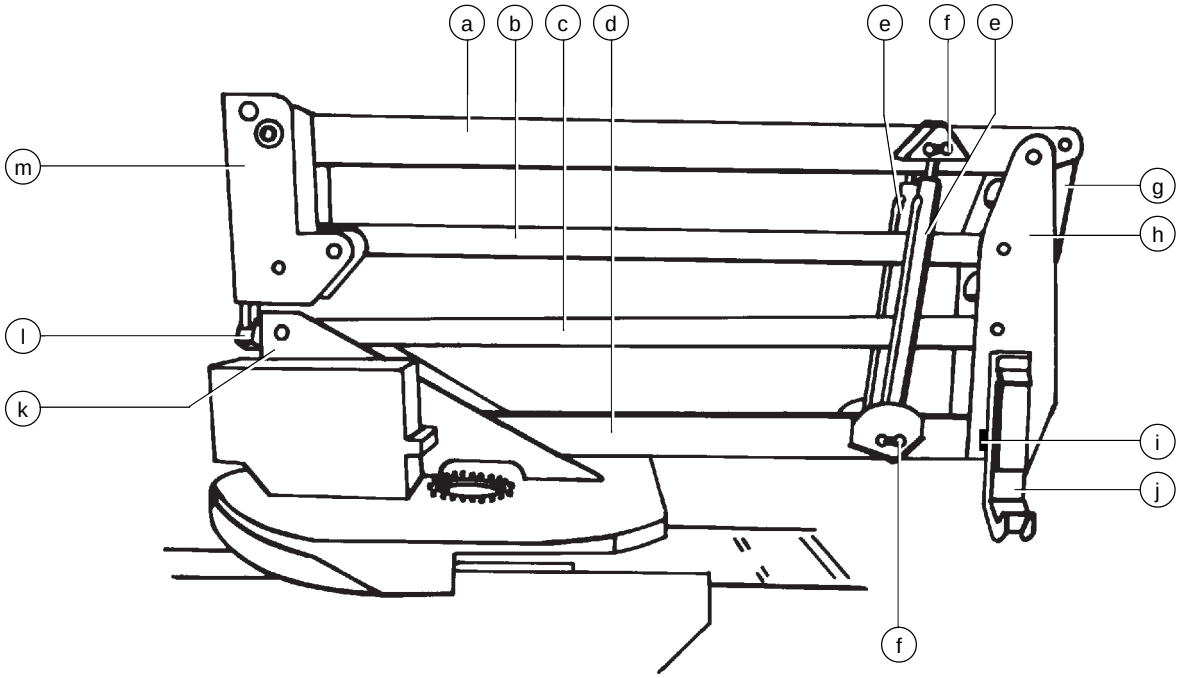
⚠CAUTION Crushing hazard. The cylinder will fall if it is not supported when the pivot pin is removed.



a pivot pin
b 10 to 12 inch (30cm) rod

16 Carefully lower the platform leveling master cylinder down and out of the upper mid-pivot.

Secondary Boom Components



4-1
Secondary Boom

How to Disassemble the Secondary Boom

⚠WARNING The procedures in this section require specific repair skills, lifting equipment and a suitable workshop. Attempting this procedure without these skills and tools may result in death or serious injury and significant component damage. Dealer service is required.

Follow the disassembly steps to the point required to complete the repair. Then re-assemble the secondary boom by following the disassembly steps in reverse order.

Secondary Boom

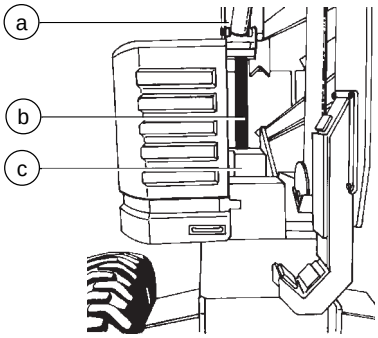
a upper secondary boom (number 1 arm)
b upper tension link (number 2 arm)
c lower tension link (number 3 arm)
d lower secondary boom (number 4 arm)
e secondary lift cylinder
f pin retainer
g compression link
h lower mid-pivot
i drive limit switch
j primary boom rest
k turntable pivot
l upper mid-pivot rest
m upper mid-pivot

SECONDARY BOOM COMPONENTS

1 Remove the platform. See 2-1, *How to Remove the Platform*.

2 Remove the primary boom. See 3-2, *How to Remove the Primary Boom*.

⚠WARNING Crushing hazard. Do not remove the 4x4x31 inch (78cm) support block installed during primary boom removal.



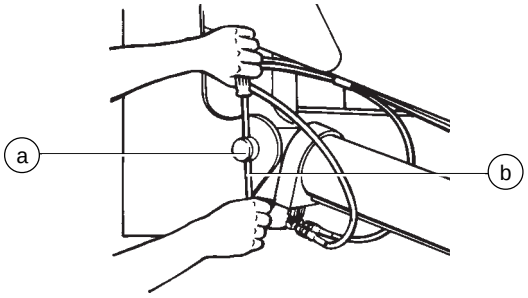
a upper mid-pivot
b 4x4x31 inch block
c counterweight

3 Use an overhead crane to attach a lifting strap to the rod-end of the primary lift cylinder. Then raise the primary lift cylinder with the crane, to a vertical position.

4 Remove the pin retainer from the pivot pin at the barrel-end of the primary lift cylinder.

5 Place a rod through the barrel-end pivot pin and twist to remove the pin. Remove the primary lift cylinder from the machine.

⚠WARNING Crushing hazard. The primary lift cylinder will fall if it is not properly supported when the barrel-end pivot pin is removed.



a pivot pin
b 10 to 12 inch (30cm) rod

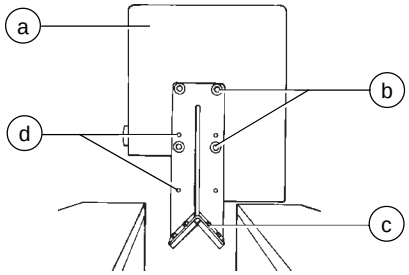
6 Remove the turntable end cover.

7 Be sure that the upper mid-pivot rest is in the industrial tire position.

Machines equipped with:

Rough terrain tires. Move the upper mid-pivot rest up into the industrial tire position on the mid-pivot.

Industrial tires. No modification is necessary.



a upper mid-pivot
b mounting position holes for rough-terrain tire models
c upper mid-pivot rest
d mounting position holes for industrial tire models

8 Attach the lifting strap from an overhead crane to the number 1 arm at the end nearest the upper mid-pivot and lift to support.

9 Remove the pin retainers from the two secondary lift cylinder rod-end pivot pins.

10 Place a rod through each rod-end pivot pin and twist to remove the pins.

11 Lift the number 1 arm until the secondary lift cylinders can swing forward to rest on the lower mid-pivot.

12 Remove the block between the counterweight and the upper mid-pivot.

13 Lower the arms enough to relieve the pressure on the compression link upper pivot pin.

Specification: to remove pressure on the compression link	
Industrial tires	The upper mid-pivot rest should be approximately 1 inch (2.5cm) above the rest block.
Rough terrain tires	The upper mid-pivot rest should be approximately 4 inches (10cm) above the rest block.

14 Remove the pin retaining fastener from the compression link to number 1 arm pivot pin. Use a soft metal drift to remove the pin.

15 Lower the arms to full rest and re-position the lifting strap to the center of the number 1 arm.

16 Remove the pin retaining fastener from the lower mid-pivot to number 1 arm pivot pin. Use a soft metal drift to remove the pin.

17 Remove the pin retaining fastener from the upper mid-pivot to number 1 arm pivot pin. Use a slide hammer to remove the pin.

⚠WARNING Crushing hazard. If the overhead crane is not properly attached, the number 1 arm may become unbalanced and fall when it is disconnected from the upper mid-pivot.

18 Carefully remove the number 1 arm from the machine.

19 Number each electrical cable and its entry location at the platform control box.

20 Open the platform control box and label each wire termination from the cables. Disconnect all control cable wiring from the platform control box.

21 Pull all of the electrical cables out of the plastic cable track. Do not pull out the hydraulic cables.

22 Disconnect and plug the platform rotator hydraulic hoses at the union, located near the upper mid-pivot. Remove the cable track assembly from the machine.

⚠CAUTION Bodily injury hazard. Spraying hydraulic oil can perforate and burn skin. Loosen hydraulic connections very slowly to allow the oil pressure to dissipate gradually. Do not allow oil to squirt or spray.

23 Remove the upper and lower cable trays from the number 2 arm. Also remove the upper cable tray from the number 3 arm.

24 Pull all of the cables and hoses down through the upper mid-pivot.

⚠CAUTION Component damage hazard. Cables and hoses can be irreparably damaged if they are kinked or pinched.

25 Attach a lifting strap from an overhead crane to the upper mid-pivot. Then place a hydraulic jack between arm numbers 2 and 3 at the end nearest the upper mid-pivot end of the arms.

26 Adjust the hydraulic jack and overhead crane to relieve the pressure on the pivot pin connecting the number 2 arm to the upper mid-pivot.

27 Remove the pin retaining fastener from the upper mid-pivot to number 2 arm pivot pin. Use a slide hammer to remove the pin.

⚠WARNING Crushing hazard. The upper mid-pivot will fall if it is not properly supported when the pivot pin is removed.

SECONDARY BOOM COMPONENTS

28 Carefully lift and remove the upper mid-pivot from the machine.

29 Position the lifting strap from an overhead crane at the center of the number 2 arm.

30 Remove the pin retaining fastener from the lower mid-pivot to number 2 arm pivot pin. Use a soft metal drift to remove the pin.

⚠WARNING Crushing hazard. If the overhead crane is not properly attached, the number 2 arm may become unbalanced and fall when it is disconnected from the mid-pivot.

31 Carefully remove the number 2 arm from the machine.

32 Remove the two cable clamps from the inside of the lower mid-pivot.

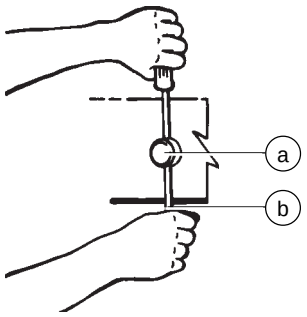
33 Disconnect and remove the drive speed limit switch from the primary boom rest.

34 Disconnect and plug the hydraulic hoses at the secondary lift cylinders.

⚠CAUTION Bodily injury hazard. Spraying hydraulic oil can perforate and burn skin. Loosen hydraulic connections very slowly to allow the oil pressure to dissipate gradually. Do not allow oil to squirt or spray.

35 Remove the pin retainers from each secondary lift cylinder barrel-end pivot pin.

36 Place a rod through each barrel-end pivot pin and twist to remove the pin. Remove each secondary lift cylinder from the machine.



a pivot pin
b 10 to 12 inch (30cm) rod

⚠WARNING Crushing hazard. The secondary lift cylinders will fall when the barrel-end pivot pins are removed if they are not properly supported.

37 Remove the lower cable tray from the number 3 arm.

38 Pull all of the cables and hoses through the lower mid-pivot and out of the turntable pivot.

⚠CAUTION Component damage hazard. Cables and hoses can be irreparably damaged if they are kinked or pinched.

39 Attach the strap from an overhead crane to the top tube of the lower mid-pivot. Then place a hydraulic jack between arm numbers 3 and 4 at the end nearest the lower mid-pivot.

40 Remove the pin retaining fastener from the lower mid-pivot to number 3 arm pivot pin. Use a soft metal drift to remove the pin.

41 Carefully lower the lower mid-pivot and compression link away from the machine to a resting position.

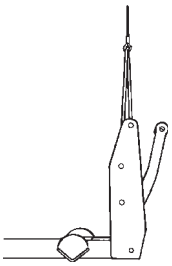
42 Position the lifting strap from an overhead crane at the center of the number 3 arm.

43 Remove the pin retaining fastener from the turntable pivot to number 3 arm pivot pin. Use a slide hammer to remove the pin.

⚠WARNING Crushing hazard. If the overhead crane is not properly attached, the number 3 arm may become unbalanced and fall when it is disconnected from the turntable pivot.

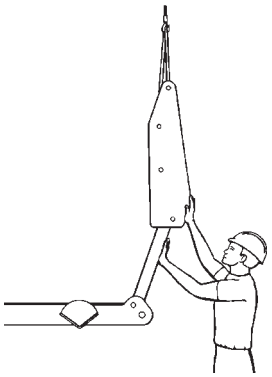
44 Carefully remove the number 3 arm from the machine.

45 Position the strap from an overhead crane around the top tube of the lower mid-pivot and then carefully lift the lower mid-pivot until it is vertical.



46 Remove the pin retaining fastener from the lower mid-pivot to number 4 arm pivot pin. Use a soft metal drift to remove the pin.

47 Support the compression link by hand, then carefully lift the lower mid-pivot up and over the compression link and off of the machine.



48 Lower the compression link to a resting position. Then attach the lifting strap from an overhead crane to the compression link and raise it to a vertical position.

49 Remove the pin retaining fastener from the compression link to number 4 arm pivot pin. Use a soft metal drift to remove the pin

50 Remove the compression link.

51 Position the lifting strap from an overhead crane at the center of the number 4 arm.

52 Remove the pin retaining fastener from the turntable pivot to number 4 arm pivot pin. Use a slide hammer to remove the pin.

⚠WARNING Crushing hazard. If the overhead crane is not properly attached, the number 4 arm may become unbalanced and fall when it is disconnected from the turntable pivot.

53 Carefully remove the number 4 arm.

SECONDARY BOOM COMPONENTS

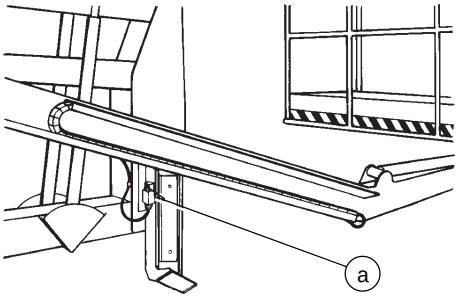
4-2
Secondary Boom Lift Cylinders

There are two boom lift cylinders incorporated in the structure of the secondary boom assembly. These cylinders operate in parallel and require hydraulic pressure to extend and retract. Each secondary boom lift cylinder is equipped with a counterbalance valves to prevent movement in the event of a hydraulic line failure. A 1200 psi (83 bar) relief valve for the down function is located on the boom function manifold.

How to Remove the Secondary Lift Cylinders

⚠WARNING This procedure requires specific repair skills, lifting equipment and a suitable workshop. Attempting this procedure without these skills and tools may result in death or serious injury and significant component damage. Dealer service is strongly recommended.

1 Lower the secondary boom to full rest, then raise the primary boom just above the drive limit switch.



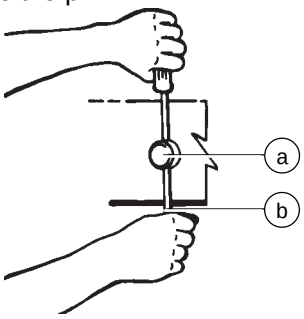
a drive limit switch

2 Disconnect and plug the hydraulic hose and steel lines for each secondary lift cylinder.

⚠CAUTION Bodily injury hazard. Spraying hydraulic oil can perforate and burn skin. Loosen hydraulic connections very slowly to allow the oil pressure to dissipate gradually. Do not allow oil to squirt or spray.

3 Remove the pin retainers from each secondary lift cylinder rod-end pivot pin.

4 Place a rod through the rod-end pivot pin and twist to remove the pin.



a pivot pin
b 10 to 12 inch (30cm) rod

5 Loosen, but do not remove, the counterbalance valve to fully retract the cylinder.

NOTICE The counterbalance valve is pre-set from the factory. Do not adjust this valve.

6 Remove the pin retainer from the pivot pins at the barrel-ends of each secondary lift cylinder.

7 Place a rod through each barrel-end pivot pin and twist to remove the pins. Remove the secondary lift cylinders from the machine.

⚠WARNING Crushing hazard. The secondary lift cylinders will fall when the barrel-end pivot pins are removed if they are not properly supported.

NOTICE Prior to removing the secondary lift cylinder, mark the location of the hydraulic fitting with a special internal orifice. Be sure to install the fitting into the same location during re-assembly.

Turntable Covers

5-1
Turntable Covers

How to Remove a Turntable Cover

1 Raise the turntable cover. Support the open cover with an overhead crane or forklift. Do not lift.

⚠CAUTION Crushing hazard. Due to its heavy weight, do not attempt to support the cover by hand.

2 Remove the upper and lower retaining clips from the gas strut.

3 Gently pry the strut pivot sockets off of the ball studs and remove the strut.

4 Remove the fasteners from the cover hinge pins.

5 Raise the cover slightly to relieve the pressure on the cover hinge pins.

6 Remove the cover hinge pins.

7 Carefully lift and remove the cover from the machine.

⚠WARNING If a turntable cover must be replaced, be sure that all appropriate safety and instructional decals are applied to the new cover.

NOTICE Some adjustment may be necessary when a new cover is installed.

Kubota V1702-B Engine

6-1
Timing Adjustment

Complete information to perform this procedure is available in the Kubota V1702-B Diesel Engine Workshop Manual (Kubota code number: 97897-00691). Genie part number 29587.

6-2
Glow Plugs

How to Check the Glow Plugs

See the scheduled maintenance procedure B-11, *Check The Glow Plugs - Diesel Models.*

6-3
RPM Adjustment

See the scheduled maintenance procedure B-13, *Check and Adjust the Engine RPM.*

6-4
Flex Plate

The flex plate acts as a coupler between the engine and the pump. It is bolted to the engine flywheel and has a splined center to drive the pump.

How to Remove the Flex Plate

1 Disconnect the wiring plug at the electronic displacement controller (EDC), located on the drive pump.

2 Support the drive pump with an appropriate lifting device. Then remove all of the pump mounting plate to engine bell housing bolts.

3 Carefully pull the pump away from the engine and secure it from moving.

4 Remove the flex plate mounting fasteners, then remove the flex plate from the engine.

How to Install the Flex Plate

1 Install the flex plate onto the flywheel with the raised spline against the flywheel.

2 Install the coupler onto the pump shaft with the set screw towards the pump. Leave a 1/4 inch (0.635mm) gap between the coupler and pump end plate.

3 Apply removable Loctite® removable thread sealant to the coupler set screw. Torque the set screw to 36 ft-lbs (49 Nm).

⚠CAUTION Component damage hazard. Do not force the drive pump during re-installation or the flex plate teeth may become damaged.

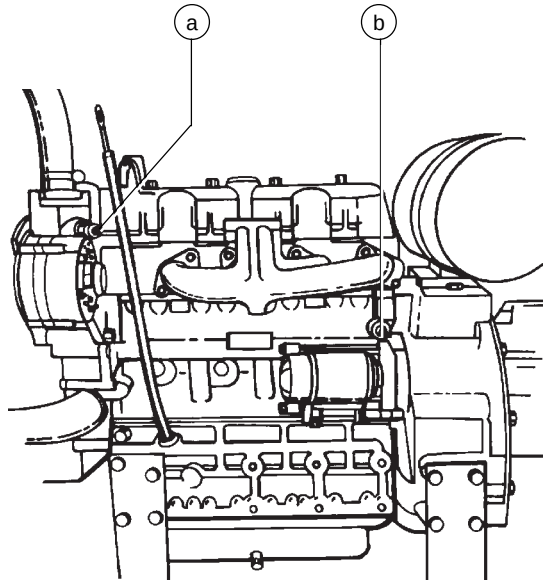
6-5
Water Temperature and Oil Pressure Switches

The water temperature switch is a normally open switch that closes at approximately 225° F (107° C). When this switch closes, the engine is shut off to prevent damage and will not restart until the temperature drops below the switch point. An over-temperature indicator light at the ground at platform controls should turn on when the switch closes.

⚠CAUTION Component damage hazard. Do not crank the engine with the over-temperature light on.

The oil pressure switch is a normally closed switch that opens at approximately 7.1 psi (0.5 bar). If the oil pressure drops below the switch point, the switch closes and shuts off the engine. A low oil pressure indicator light at the ground and platform controls should turn on when the switch closes.

⚠CAUTION Component damage hazard. Do not start or continue to run the engine with the low oil pressure light on.

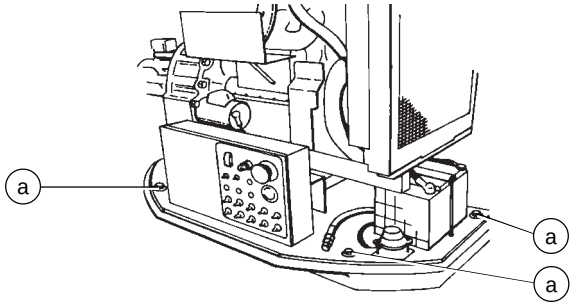


a water temperature switch
b oil pressure switch

How to Remove the Water Temperature and Oil Pressure Switches

NOTICE Perform this procedure with the engine off.

1 Remove the 3 bolts from the engine pivot plate. Swing the engine pivot plate away from the machine to access both switches.



a pivot plate bolts

2 Disconnect the wiring from the desired switch.

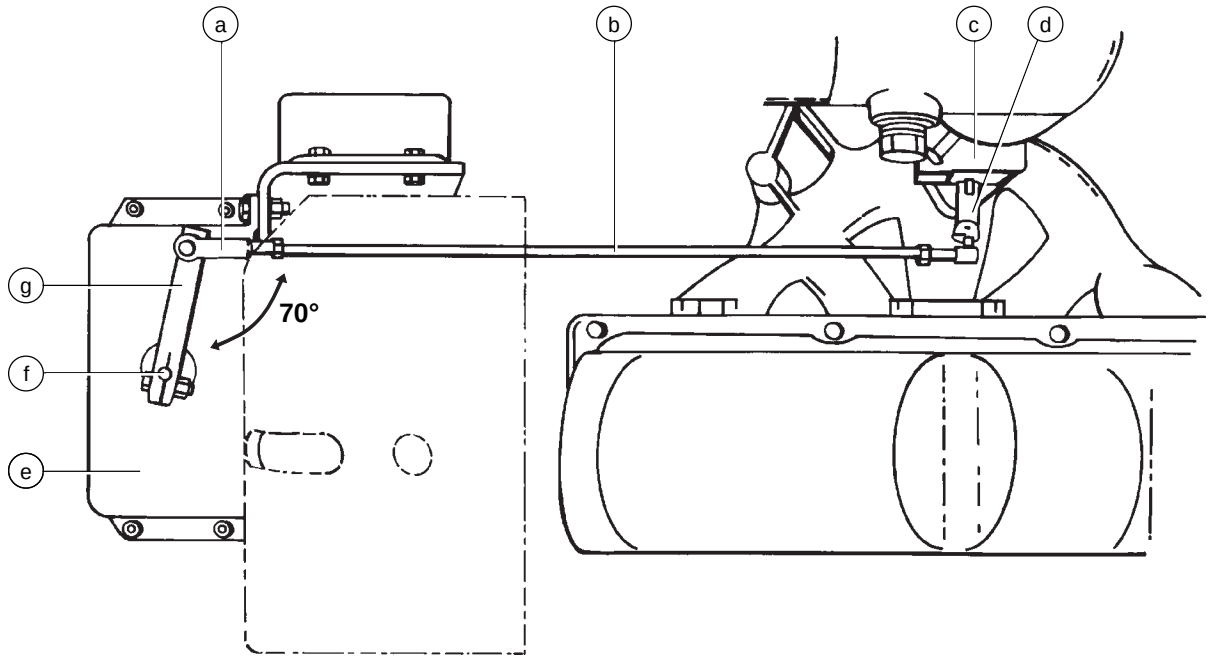
3 Remove the switch from the engine block, and then install the new switch. Do not over tighten.

⚠CAUTION Burn hazard. Contact with hot engine fluids or components may cause severe burns.

NOTICE Always use pipe thread sealant when installing a switch.

Specifications	
Water temperature switch	
Torque	8-18 foot-pounds 11-24 Newton meters
Hex size	13/16 inch
Temperature switch point	225° F (107° C) ±2%
Oil pressure switch	
Torque	8-18 foot-pounds 11-24 Newton meters
Hex size	1-1/16 inch
Oil pressure switch point	7.1 psi (0.5 bar)

Ford LSG 423 Engine



Governor Actuator and Linkage
- a clevis yoke
- b linkage rod
- c carburetor
- d throttle plate shaft
- e governor actuator
- f actuator shaft
- g actuator arm

7-1 Governor Actuator

How to Set Up the Governor Actuator and Linkage

NOTICE Adjustment of the governor actuator is only necessary when the governor actuator or the linkage has been replaced.

1 Connect the linkage rod to the throttle plate shaft, then tighten the lock nut.

2 Fasten the lock nut and clevis yoke to the linkage rod. Do not tighten the lock nut against the clevis yoke.

3 Loosen the fastener on the actuator arm. Rotate the actuator arm until it is at a 70 degree angle to the linkage rod.

4 Position the linkage rod so that the throttle is in the idle position. Then adjust the clevis yoke on the linkage rod to obtain the proper length. Install the yoke onto the actuator arm and tighten the lock nut.

5 With the throttle in the idle position and the actuator arm at a 70 degree angle to the linkage, rotate the actuator shaft slightly counterclockwise to pre-load the spring. Tighten the fastener on the actuator arm without releasing the shaft.

6 Manually pull the actuator arm through a full cycle to be sure that the linkage moves freely. Be sure that the linkage activates the throttle shaft to approximately half throttle.

NOTICE The linkage must be free of friction and obstruction. Do not let it rub against the engine, brackets or hoses.

⚠CAUTION If the throttle linkage is improperly adjusted and allowed to reach full throttle, the engine will over-rev and cause component damage.

7-2 Choke Adjustments

This engine is equipped with one of three different choke configurations. Early models were equipped with manual chokes. They were replaced with electrically heated automatic chokes. These chokes were improved with the addition of a poppet valve to enhance cold starting ability on propane fuel.

The machine is equipped with an automatic choke if there is not a choke switch on the control panel.

NOTICE Choke adjustments are affected by climate. Richer adjustment will be necessary in colder climates, leaner adjustment in warmer climates.

Manual Choke

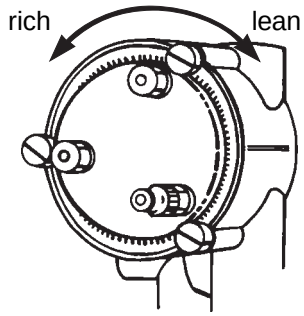
The manual choke is solenoid operated and is only operational in the gasoline mode. This choke will not operate in propane mode.

⚠CAUTION Component damage hazard. During adjustments, do not allow the choke butterfly to stop the solenoid from fully retracting. The plunger must be able to bottom-out inside the solenoid housing.

Automatic Choke Without Poppet Valve

This choke functions in both gasoline and propane mode.

Adjusting the choke to a rich mixture for cold climates will hamper engine performance when starting a cold engine on propane fuel. To avoid this problem, start the engine in gasoline mode. After the engine reaches normal operating temperature, select propane mode.



A flow path past the choke butterfly is required if the engine is to be cold started in the propane mode. A ¼ inch (6mm) flow path is recommended. Adjust the choke only when the engine and choke are cold.

Automatic Choke With Poppet Valve

This choke functions in both gasoline and propane mode. The choke butterfly may be adjusted to a fully closed (rich) position for colder climates and the poppet valve will provide a flow path during propane fueled operation.

FORD LSG 423 ENGINE

7-3 Timing Adjustment

Complete information to perform this procedure is available in the Ford LSG-423 2.3 Litre Industrial Engine Service Manual (Ford number: 194-216). Genie part number 29586.

7-4 Carburetor Adjustment

Complete information to perform this procedure is available in the Ford LSG-423 2.3 Litre Industrial Engine Service Manual (Ford number: 194-216). Genie part number 29586.

7-5 RPM Adjustment

See the scheduled maintenance procedure B-13, *Check and Adjust the Engine RPM*.

7-6 Flex Plate

The flex plate acts as a coupler between the engine and the pump. It is bolted to the engine flywheel and has a splined center to drive the pump.

Flex Plate Removal

1 Disconnect and remove the hose between the carburetor venturi and the air cleaner.

2 Disconnect and remove the muffler support bracket.

3 Disconnect the linkage from the governor, then remove the governor linkage from the carburetor. Do not alter the length of the linkage.

4 Disconnect the wiring plug at the electronic displacement controller (EDC), located on the drive pump.

5 Remove the mounting fasteners from the regulator mounting bracket, then pull the bracket up past the bell housing. Secure the bracket before continuing.

6 Support the drive pump with an appropriate lifting device. Then remove all of the pump mounting plate to engine bell housing bolts.

7 Carefully pull the pump away from the engine and secure it from moving.

8 Remove the flex plate mounting fasteners, then remove the flex plate from the engine.

How to Install the Flex Plate

1 Install the flex plate onto the flywheel with the raised spline against the flywheel.

2 Install the coupler onto the pump shaft with the set screw towards the pump. Leave a 1/4 inch (0.635mm) gap between the coupler and pump end plate.

3 Apply removable Loctite® thread sealant to the coupler set screw. Torque the set screw to 36 ft-lbs (49 Nm).

⚠ CAUTION Component damage hazard. Do not force the drive pump during re-installation or the flex plate teeth may become damaged.

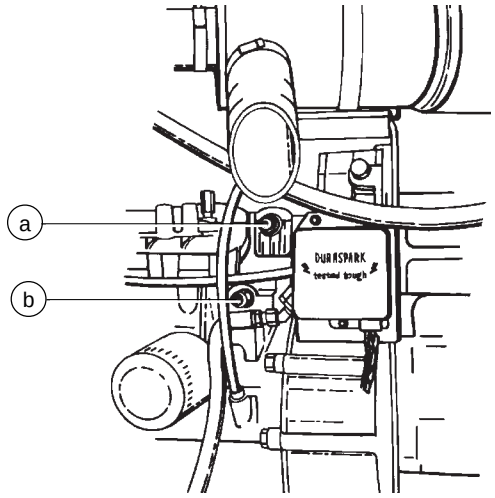
7-7 Water Temperature and Oil Pressure Switches

The water temperature switch is a normally open switch that closes at approximately 230° F (112° C). When this switch closes, the engine is shut off to prevent damage and will not restart until the temperature drops below the switch point. An over-temperature indicator light at the ground and platform controls should turn on when the switch closes.

⚠CAUTION Component damage hazard. Do not crank the engine with the over-temperature on.

The oil pressure switch is a normally closed switch that opens at approximately 3 to 5 psi (0.21 to 0.34 bar). If the oil pressure drops below the switch point, the switch closes and shuts off the engine. A low oil pressure indicator light at the ground and platform controls should turn on when the switch closes.

⚠CAUTION Component damage hazard. Do not start or continue to run the engine with the low oil pressure light on.



a oil pressure switch
b water temperature switch

How to Remove the Water Temperature and Oil Pressure Switches

NOTICE Perform this procedure with the engine off.

1 Remove the 3 bolts from the engine pivot plate. Swing the engine pivot plate away from the machine to access both switches.

2 Disconnect the wiring from the desired switch.

3 Remove the switch from the engine block, and then install the new switch. Do not over tighten.

⚠CAUTION Burn hazard. Contact with hot engine fluids or components may cause severe burns

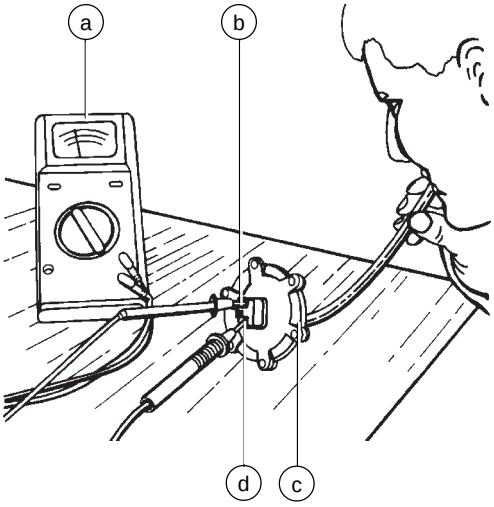
NOTICE Always use pipe thread sealant when installing a switch.

Specifications	
Water temperature switch	
Torque	8-18 foot-pounds 11-24 Newton meters
Hex size	13/16 inch
Temperature switch point	230° F (112° C)
Oil pressure switch	
Torque	8-18 foot-pounds 11-24 Newton meters
Hex size	1-1/16 inch
Oil pressure switch point	3-5 psi (0.21-0.34 bar)

FORD LSG 423 ENGINE

7-8
Vacuum Switch

How to Test the Vacuum Switch



a ohmmeter
b common terminal (SOL.)
c vacuum switch
d normally open terminal (ING.)

1 Connect the leads from an ohmmeter or continuity tester to the common and normally open terminals.

⊙ Result: There should be no continuity (infinite Ω).

2 Apply mild suction to the vacuum port.

⊙ Result: The switch should close and show full continuity (zero Ω).

⚠CAUTION Component damage hazard. Do not short vacuum switch terminals to ground.

Ground Controls

8-1 Control Relays

Relays used for single function switching are single pole double throw (SPDT) switches. Two function switching requires a double pole double throw (DPDT) relay.

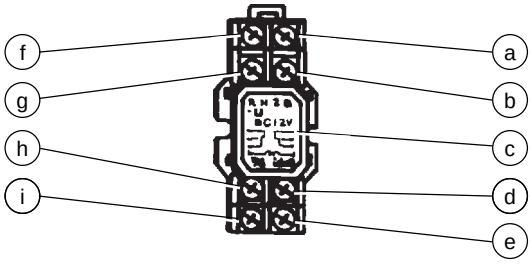
How to Test a Double Pole Double Throw Relay

This procedure covers fundamental relay testing and does not specifically apply to all varieties of relays.

1 Turn the keyswitch to the *off* position and remove the key.

2 Label and then disconnect all the wiring from the relay to be tested.

3 Connect the leads from an ohmmeter to each terminal combination and check for continuity. Terminals 13 and 14 represent the coil and should not be tested in any other combination.



a terminal no. 5
b terminal no. 1
c relay
d terminal no. 13
e terminal no. 9
f terminal no. 12
g terminal no. 14
h terminal no. 4
i terminal no. 8

Test	Desired result
terminal 13 to 14	160 to 170Ω
terminal 8 to 5,4,1,12 & 9	no continuity (infinite Ω)
terminal 5 to 8,4,1,12 & 9	no continuity
terminal 4 to 8,5,1 & 9	no continuity
terminal 1 to 8,5,4 & 12	no continuity
terminal 4 to 12	continuity (zero Ω)
terminal 1 to 9	continuity

4 Connect 12V DC to terminal 14 and a ground wire to terminal 13, then test the following terminal combinations.

Test	Desired result
terminal 8 to 1,5,9 & 4	no continuity (infinite Ω)
terminal 5 to 1,4,8 & 12	no continuity
terminal 4 to 1,5,9,8 & 12	no continuity
terminal 1 to 5,9,4,8 & 12	no continuity
terminal 8 to 12	continuity (zero Ω)
terminal 5 to 9	continuity

GROUND CONTROLS

How to Test a Single Pole Double Throw Relay

This procedure covers fundamental relay testing and does not specifically apply to all varieties of relays.

1 Turn the keyswitch to the *off* position and remove the key.

2 Label and then disconnect all the wiring from the relay to be tested.

3 Connect the leads from an ohmmeter or continuity tester to each terminal combination and check for continuity. Terminals 13 to 14 represent the coil and should not be tested in any other combination.

Test	Desired result
terminal 13 to 14	190 to 200Ω
terminal 5 to 1 & 9	no continuity (infinite Ω)
terminal 1 to 9	continuity (zero Ω)

4 Connect 12V DC to terminal 14 and a ground wire to terminal 13, then test the following terminal combinations.

Test	Desired result
terminal 1 to 5 & 9	no continuity (infinite Ω)
terminal 5 to 9	continuity (zero Ω)

8-2 Toggle Switches

See 1-4, *Toggle Switches*.

8-3 Wago® Components

How to Remove a Wago® Component

⚠WARNING Electrocution hazard. Contact with hot or live circuits may result in death or serious injury. Remove all rings, watches and other jewelry.

NOTICE A small standard screw driver is provided and should be used when removing a Wago® component. This screwdriver is located in the instruction manual storage box in the platform.

1 Label and then disconnect the wiring from the component to be removed.

2 Locate the removal tab on the bottom or top side of the component.

3 Use the provided screwdriver to gently pry up on the tab of the component and remove it.

8-4
Resistors

How to Test the Resistors

Two resistors are used to maintain proper control of boom function speeds. A 10 ohm resistor reduces voltage to all the boom function switches. A 15 ohm resistor parallels the 10 ohm resistor to reduce the voltage to the turntable rotate switch.

NOTICE Turn the key switch to the *off* position and remove the key.

1 Disconnect one of the resistor wires from the resistor or the opposite end terminal.

2 Connect the leads from an ohmmeter to each end or wiring of the resistor being tested.

3 Compare the ohmmeter reading with the resistance rating printed on the resistor.

Relay Panel

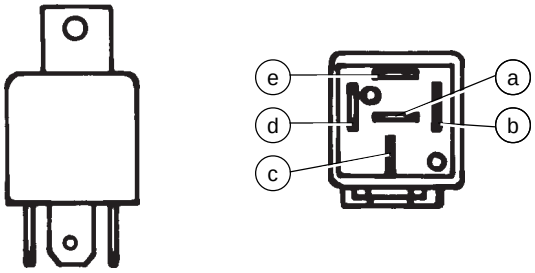
9-1
Control Relays

How to Test a Single Pole Double Throw Relay

⚠WARNING Electrocution hazard. Contact with hot or live circuits may result in death or serious injury. Remove all rings, watches and other jewelry.

1 Label and then disconnect all the wiring from the relay to be tested.

2 Connect the leads from an ohmmeter or continuity tester to each terminal combination and check for continuity. Terminals 85 to 86 represent the coil and should not be tested in any other combination.



a terminal no. 87A
b terminal no. 85
c terminal no. 30
d terminal no. 86
e terminal no. 87

Test	Desired result
terminal 85 to 86	85 to 95Ω
terminal 87 to 87a & 30	no continuity (infinite Ω)
terminal 87a to 30	continuity (zero Ω)

3 Connect 12V DC to terminal 85 and a ground wire to terminal 86, then test the following terminal combinations.

Test	Desired result
terminal 87a to 87 & 30	no continuity (infinite Ω)
terminal 87 to 30	continuity (zero Ω)

RELAY PANEL

9-2
Power Relay

⚠WARNING Electrocution hazard. Contact with hot or live circuits may result in death or serious injury. Remove all rings, watches and other jewelry.

How to Test the Power Relay

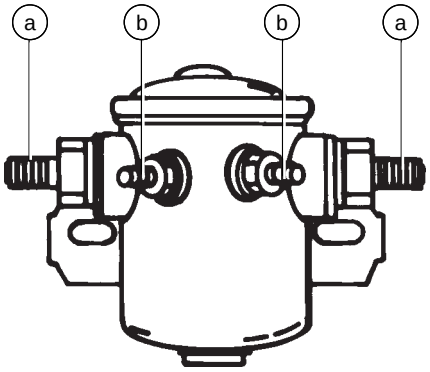
⚠WARNING Electrocution hazard. Disconnect the ground cable from the battery before performing this procedure.

1 Connect the leads from an ohmmeter to each terminal combination and check for continuity.

Test	Desired result
2 small posts	13 to 17Ω
2 large posts	no continuity (infinite Ω)
Any small post to any large post	no continuity (infinite Ω)

2 Connect 12V DC to one of the small posts and ground to the other small post, then test the following terminal combination.

Test	Desired result
2 large posts	continuity (zero Ω)



a high amp power contact terminals (large posts)

b solenoid activate coil terminals (small posts)

Hydraulic Pumps

10-1
Lift/Steer Pump

How to Test the Lift/Steer Pump

1 **Gasoline/LPG models:** Remove the coil wire from the distributor cap.

Diesel models: Disconnect the 3 wires from the fuel *on* solenoid at the fuel injector pump.

⚠WARNING Electrocution hazard. Contact with hot or live circuits may result in death or serious injury. Remove all rings, watches and other jewelry.

2 Disconnect the high pressure hydraulic hose from the pump and cap it.

⚠CAUTION Burn hazard. Contact with hot oil may cause severe burns.

3 Connect a 0 to 5000 psi (0 to 350 bar) pressure gauge to the high pressure port on the pump.

4 Turn the key switch to ground control and pull the Emergency Stop button to the *on* position.

5 Observe the pressure gauge while cranking the engine. Immediately stop cranking if the pressure reaches or exceeds 3000 psi (206 bar).

⚠CAUTION Hydraulic pressure in excess of 3000 psi (206 bar) will cause severe component damage.

⊙ Result: If the pressure gauge reads 3000 psi (206 bar), immediately stop cranking the engine. The pump is good.

⊙ Result: If pressure fails to reach 3000 psi (206 bar), the pump is bad and will need to be replaced.

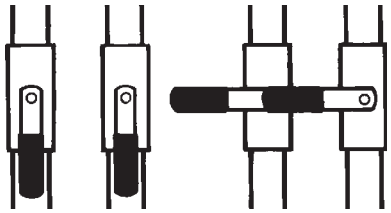
6 Remove the pressure gauge and reconnect the hydraulic hose.

7 **Gasoline/LPG models:** Reconnect the coil wire to the distributor cap.

Diesel models: Reconnect the wiring to the fuel *on* solenoid.

How to Remove the Lift/Steer Pump

1 Close the two hydraulic tank valves located at the main pump.



2 Disconnect the hydraulic hoses from the pump and cap them.

⚠CAUTION Bodily injury hazard. Spraying hydraulic oil can perforate and burn skin. Loosen hydraulic connections very slowly to allow the oil pressure to dissipate gradually. Do not allow oil to squirt or spray.

3 Remove the pump mounting bolts. Carefully remove the pump.

⚠CAUTION Component damage hazard. Be sure to open the two hydraulic tank valves after re-installing the pump.

10-2
Drive Hydraulic Pump

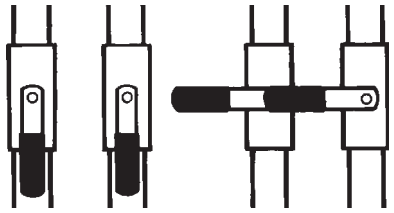
The drive hydraulic pump is a bi-directional variable displacement piston pump. The pump output is controlled by the electronic displacement controller (EDC), located on the pump. The only adjustment that can be made to the pump is the neutral or null adjustment. Any internal service to the pump should only be performed at an authorized Sundstrand-Sauer service center.

How to Remove the Drive Hydraulic Pump

⚠CAUTION The work area and surfaces where this procedure will be performed must be clean and free of debris that could get into the hydraulic system and cause severe component damage. Dealer service is recommended.

1 Disconnect the electrical connection at the electronic displacement controller (EDC) located on the main pump.

2 Close the two hydraulic tank valves located at the main pump.



open closed

3 Disconnect the hydraulic hoses from the pump and cap them.

⚠CAUTION Bodily injury hazard. Spraying hydraulic oil can perforate and burn skin. Loosen hydraulic connections very slowly to allow the oil pressure to dissipate gradually. Do not allow oil to squirt or spray.

4 Support the pump and remove the two pump mounting bolts. Carefully remove the pump.

⚠CAUTION Be sure to open the two hydraulic tank valves and prime the pump after installing the pump.

How to Prime the Pump

1 **Gasoline/LPG models:** Disconnect the ignition coil wire and isolate it from ground.

Diesel models: Disconnect the wiring to the injection pump fuel-on solenoid

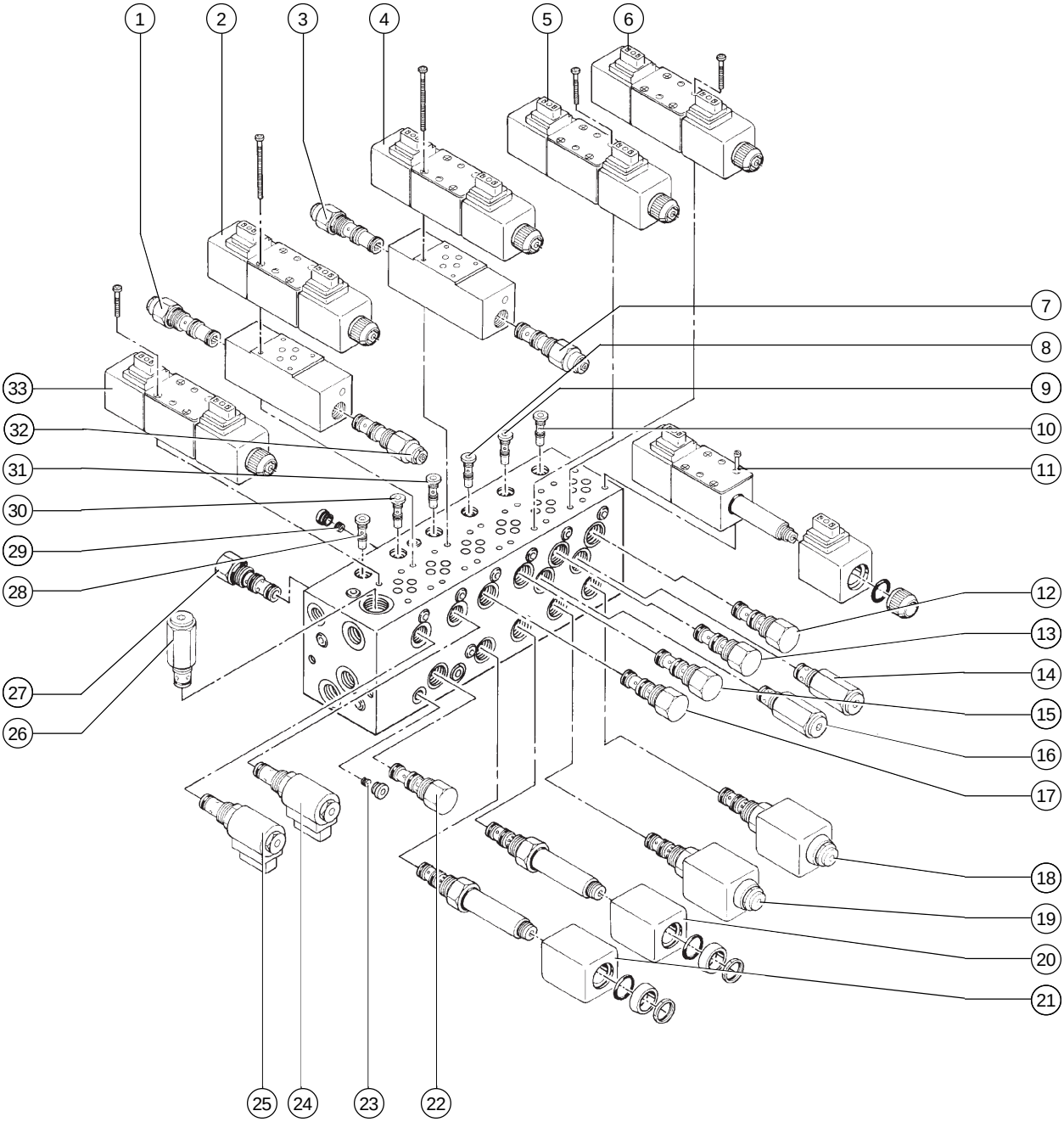
2 Crank the engine with the starter motor for 15 seconds.

Function Manifold

11-1
Function Manifold Components

Index No.	Description	Schematic Item	Function	Torque
1	Counterbalance valve	Z	Platform leveling cylinder - extend	10-12 ft-lbs / 15-18Nm
2	3 position 4 way D01 valve	D	Platform level	30-35 in-lbs / 3-4 Nm
3	Counterbalance valve	Y	Turntable rotate - right	10-12 ft-lbs / 15-18Nm
4	3 position 4 way valve	F	Turntable rotate	30-35 in-lbs / 3-4 Nm
5	3 position 4 way valve	C	Secondary up/down	30-35 in-lbs / 3-4 Nm
6	3 position 4 way valve	B	Primary up/down	30-35 in-lbs / 3-4 Nm
7	Counterbalance valve	AY	Turntable rotate - left	10-12 ft-lbs / 15-18Nm
8	Check valve	P	Secondary flow regulator	11-13 ft-lbs / 15-18 Nm
9	Check valve	AB	Primary flow regulator	11-13 ft-lbs / 15-18 Nm
10	Check valve	AA	Extend/Retract flow regulator	11-13 ft-lbs / 15-18 Nm
11	3 position 4 way valve	A	Extend/Retract	30-35 in-lbs / 3-4 Nm
12	Flow regulator valve	L	Extend/Retract	10-12 ft-lbs / 14-16 Nm
13	Flow regulator valve	M	Primary	10-12 ft-lbs / 14-16 Nm
14	Relief valve, 1200 psi (83 bar)	T	Primary down	25-30 ft-lbs / 34-41 Nm
15	Flow regulator valve	N	Secondary	10-12 ft-lbs / 14-16 Nm
16	Relief valve, 1200 psi (83 bar)	U	Secondary down	25-30 ft-lbs / 34-41 Nm
17	Flow regulator valve	O	Swing	10-12 ft-lbs / 14-16 Nm
18	Proportional solenoid valve	G	Extend/Retract	10-12 ft-lbs / 14-16 Nm
19	Proportional solenoid valve	H	Primary	10-12 ft-lbs / 14-16 Nm
20	Proportional solenoid valve	I	Secondary	10-12 ft-lbs / 14-16 Nm
21	Proportional solenoid valve	K	Swing	10-12 ft-lbs / 14-16 Nm
22	Differential sensing valve	S	All functions	10-12 ft-lbs / 14-16 Nm
23	Orifice 0.030 in / 0.76mm	AG	Platform rotate	
24	Normally closed poppet valve	R	Platform level	25-30 ft-lbs / 34-41 Nm
25	Normally closed poppet valve	Q	Platform rotate	25-30 ft-lbs / 34-41 Nm
26	Relief valve, 2200 psi (152 bar)	AF	All functions	35-40 ft-lbs / 47-54 Nm
27	Priority flow regulator valve	AE	Steering	10-12 ft-lbs / 14-16 Nm
28	Check valve	AC	Platform rotate flow regulator	11-13 ft-lbs / 15-18 Nm
29	Orifice 0.015 in / 0.38mm	V	Differential sensing	
30	Check valve	AD	Platform level flow regulator	11-13 ft-lbs / 15-18 Nm
31	Check valve	J	Swing flow regulator	11-13 ft-lbs / 15-18 Nm
32	Counterbalance valve	AZ	Platform leveling cylinder - retract	10-12 ft-lbs / 15-18 Nm
33	3 position 4 way valve	E	Platform rotate	30-35 in-lbs / 3-4 Nm

FUNCTION MANIFOLD



FUNCTION MANIFOLD

Plug Torque Specifications

Description	Torque
SAE No. 2	4.2 ft-lbs / 6 Nm
SAE No. 4	13 ft-lbs / 18 Nm
SAE No. 6	18 ft-lbs / 24 Nm
SAE No. 8	50 ft-lbs / 68 Nm
SAE No. 10	55 ft-lbs / 75 Nm
SAE No. 12	75 ft-lbs / 102 Nm

11-2 Valve Adjustments - Function Manifold

How to Adjust the Main Relief Valve

1 Connect a 0 - 3000 psi (0 to 206 bar) pressure gauge to the diagnostic nipple on the function manifold.

2 Start the engine from the ground controls and then completely retract the primary boom.

3 Hold the retract switch and observe the pressure reading on the pressure gauge.

4 Turn the engine off. Hold the relief valve and remove the cap (item 26).

5 Adjust the internal hex socket. Turn it clockwise to increase the pressure or counterclockwise to decrease the pressure. Then reinstall the relief valve cap.

⚠WARNING Tip-over hazard. Do not adjust the relief valves higher than recommended. They are set to prevent a tip-over or damage to lift linkage.

6 Restart the engine. Hold the retract switch and recheck the valve pressure.

Specifications	
Main relief valve pressure	2200 psi / 152 bar

How to Adjust the Primary or Secondary Boom Down Relief Valve

1 Connect a 0 - 3000 psi (0 to 206 bar) pressure gauge to the diagnostic nipple on the function manifold.

2 Start the engine from the ground controls and then fully lower the boom to be adjusted.

3 Hold the primary or secondary boom up/down switch in the down position and observe the pressure reading on the pressure gauge.

4 Turn the engine off. Hold the relief valve and remove the cap (item 14 for primary boom, item 16 for secondary boom).

5 Adjust the internal hex socket. Turn it clockwise to increase the pressure or counterclockwise to decrease the pressure. Then reinstall the relief valve cap.

⚠WARNING Tip-over hazard. Do not adjust the relief valves higher than recommended. They are set to prevent a tip-over or damage to lift linkage.

6 Restart the engine. Hold the primary or secondary boom up/down switch in the down position and recheck the valve pressure.

Specifications	
Relief valve pressure	1200 psi / 83 bar

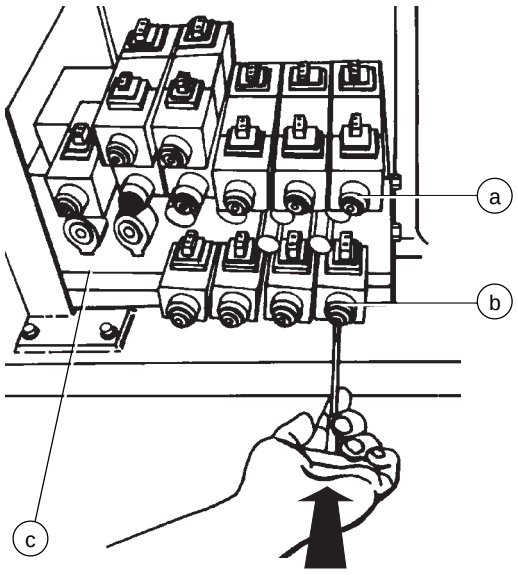
How to Override a Valve

A hydraulic valve may need to be manually overridden to troubleshoot a malfunction. Each proportional boom function uses a variable position proportional valve and a three position directional valve. Example: one position for boom up, one position for neutral and one position for boom down. The platform rotate and level functions use a three position valve and a two position poppet valve. The three position valves and the proportional valves can be manually overridden. To identify the manifold valves see 11-1 *Function Manifold Components* in this section.

1 Push the button on the end of the valve in ¼ inch (6mm).

2 Move the ground control function switch for the function being overridden to operate function.

⚠WARNING Collision Hazard. Impact with moving boom components may cause death or serious injury. Use extreme caution when overriding a boom function and know the direction of intended travel.

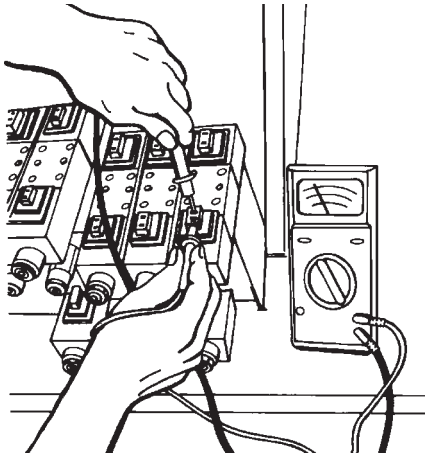


a directional valves
b proportional valves
c function manifold

How to Check the Resistance of a Valve Coil

1 Turn the keyswitch to the *off* position and disconnect the wires from the valve coil to be tested.

2 Connect the leads from an ohmmeter to the valve coil terminals.



Specifications

Valve	Resistance
Proportional solenoid valve	5Ω
3 pos 4 way directional valve	4.5Ω
Normally closed poppet valve	7Ω

Fuel and Hydraulic Tanks

12-1 Hydraulic Reservoir

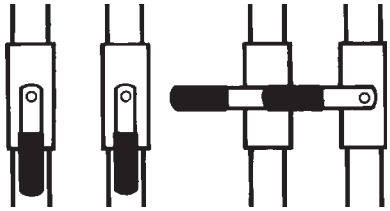
The primary functions of the hydraulic reservoir are to cool, clean and deaerate the hydraulic fluid during operation. This reservoir has a 25 gallon (94.5 liters) capacity and an oil level gauge with temperature indicator. It utilizes internal suction strainers for the pump supply suction lines and has an external return line filter.

How to Remove the Hydraulic Reservoir

⚠CAUTION The work area and surfaces where this procedure will be performed must be clean and free of debris that could get into the hydraulic system and cause severe component damage.

1 Raise the primary boom until it is horizontal to access the anchor hook.

2 Close the two hydraulic tank valves located at the main pump.



open closed

3 Completely drain the oil from the reservoir by removing the drain plug located in the bottom front of reservoir.

⚠CAUTION Burn hazard. Contact with hot oil may cause severe burns.

4 Disconnect the hydraulic hoses from the reservoir.

5 Remove the reservoir anchor hook from the back of the reservoir.

6 Remove the mounting fasteners from the bottom of the reservoir.

7 Use an appropriate lifting device to remove the reservoir from the machine.

NOTICE Always use pipe thread sealant when re-installing the drain plug.

NOTICE Use only Dexron II equivalent hydraulic fluid.

⚠CAUTION Be sure to open the two hydraulic tank valves and prime the pump after installing the pump.

How to Prime the Pump

1 **Gasoline/LPG models:** Disconnect the ignition coil wire and isolate it from ground.

Diesel models: Disconnect the wiring to the injection pump fuel-on solenoid

2 Crank the engine with the starter motor for 15 seconds.

12-2
Fuel Tank

How to Remove the Fuel Tank

⚠ DANGER Engine fuels are combustible. Remove the fuel tank in an open, well-ventilated area away from heaters, sparks, flames and lighted tobacco. Always have an approved fire extinguisher within easy reach.

⚠ DANGER Explosion hazard. When transferring fuel, connect a grounding wire between the machine and pump or container.

1 Raise the elevate assembly enough to access the back of the fuel tank.

2 Turn the manual fuel shutoff valve to the closed position.

3 **Gasoline/LPG models:** Disconnect the electrical collectors from the fuel shutoff solenoid. Disconnect, drain and plug the fuel hose.

Diesel models: Disconnect, drain and plug the supply and return fuel hoses. Cap the fuel return fitting on the fuel tank.

4 Remove the tank anchor hook from the back of the tank.

5 Remove the mounting fasteners from the bottom of the tank.

6 Use an appropriate lifting device to remove the tank from the machine.

NOTICE Clean the fuel tank and inspect for rust and corrosion before it is installed.

Turntable Rotation Components

13-1 Rotation Hydraulic Motor

The rotation hydraulic motor is the only serviceable component of the turntable rotation assembly. The worm gear may not be removed from the housing. In order to remove the housing, the turntable has to be removed.

How to Remove the Turntable Rotation Motor

1 Remove the hydraulic hoses attached to the turntable rotation motor and plug them.

⚠CAUTION Bodily injury hazard. Spraying hydraulic oil can perforate and burn skin. Loosen hydraulic connections very slowly to allow the oil pressure to dissipate gradually. Do not allow oil to squirt or spray.

2 Remove the turntable rotation motor mounting bolts, then remove the motor.

NOTICE Do not allow the turntable to rotate until the hydraulic motor is installed.

13-2 Rotation Bearing and Worm Drive

How to Remove the Rotation Bearing or Worm Drive

The turntable and all components above it must be removed prior to removing the rotation bearing or worm drive.

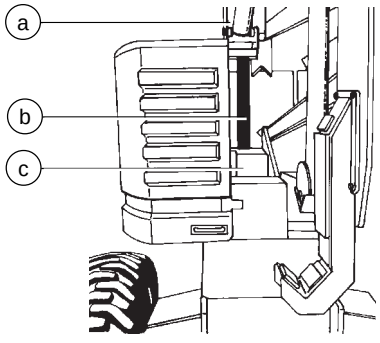
⚠WARNING This procedure requires specific repair skills, lifting equipment and a suitable workshop. Attempting this procedure without these skills and tools may result in death or serious injury and significant component damage. Dealer service is required.

NOTICE Be sure that the chassis is level.

1 Remove the platform. See 2-1, *How to Remove the Platform*.

2 Remove the primary boom. See 3-2, *How to Remove the Primary Boom*.

⚠WARNING Crushing hazard. Do not remove the 4x4x31 inch (78cm) support block installed during primary boom removal.

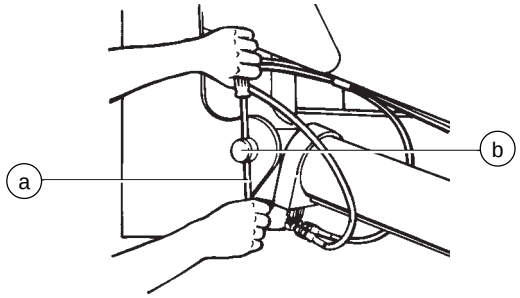


a upper mid-pivot
b 4x4x31 inch block
c counterweight

3 Use an overhead crane to attach a lifting strap to the rod-end of the primary lift cylinder. Then raise the primary lift cylinder with the crane, to a vertical position.

4 Remove the pin retainer from the pivot pin at the barrel-end of the primary lift cylinder.

5 Place a rod through the barrel-end pivot pin and twist to remove the pin. Remove the primary lift cylinder from the machine.

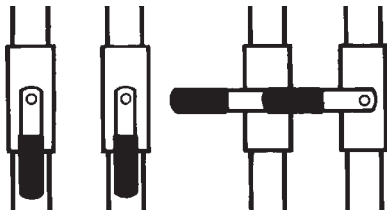


a 10 to 12 inch (30cm) rod
b pivot pin

⚠WARNING Crushing hazard. The primary lift cylinder will fall when the barrel-end pivot pin is removed if it is not properly supported.

6 Raise the elevate assembly. Remove the block from the turntable counterweight and lower the elevate assembly to the fully stowed position.

7 Close the two hydraulic tank valves located at the main pump.



open closed

8 Disconnect the three 3/4 inch hydraulic hoses from the main pump and plug them.

⚠CAUTION Bodily injury hazard. Spraying hydraulic oil can perforate and burn skin. Loosen hydraulic connections very slowly to allow the oil pressure to dissipate gradually. Do not allow oil to squirt or spray.

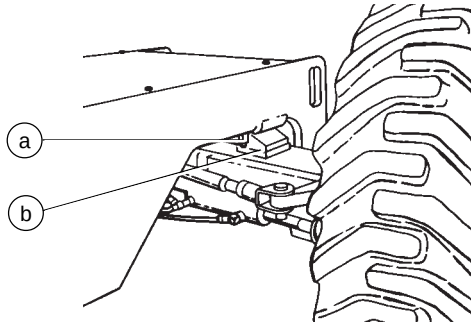
9 Disconnect the same three 3/4 inch hydraulic hoses from the drive traction manifold and plug them. Pull these hoses up through the turntable and remove them from the machine.

10 Disconnect the “in” and “return” hydraulic hoses from the steer/oscillate manifold and plug them. Pull these hoses up through the turntable.

11 Disconnect the hydraulic hoses from the turntable rotation motor and plug them. Pull these hoses up through the turntable.

12 Label and then disconnect all the wiring from the traction manifold and the steer/oscillate manifold.

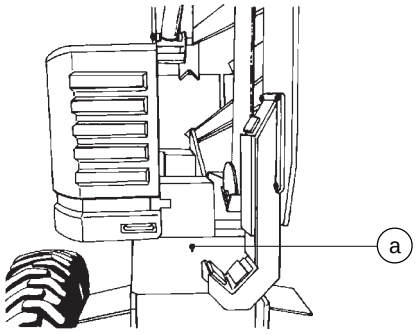
13 Disconnect and remove the oscillating axle limit switches from the oscillation cylinder.



Oscillating axle limit switch
a limit switch
b oscillate lock-out wedge

TURNTABLE ROTATION COMPONENTS

14 Disconnect and remove the drive enable limit switch.



a drive enable limit switch

15 Pull the wiring harness along with the limit switches up through the turntable.

16 Remove the turntable end cover.

17 Loosen the lug nuts on both steer tires. Do not remove them.

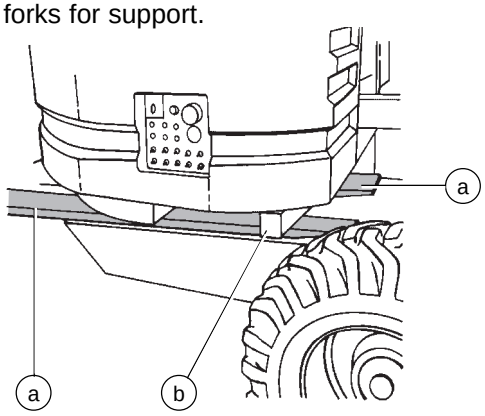
18 Center a lifting jack under the steering axle. Lift the machine until the tires are just off the ground.

19 Support the chassis on blocks, then remove both steer tires and wheel assemblies to improve access when removing the turntable.

20 Prepare a forklift with a minimum rating of 18,000 pounds (8165kg) by spreading the forks to an inside width of 3 feet (0.9m).

21 Position the forklift at the counterweight end of the turntable. Center the forks underneath the turntable and above the chassis. Do not lift.

22 Place a 5 inch (13cm) tall block near the end of the forks for support.



a forks
b block

23 Raise the forks up against the turntable. Do not lift. Be sure that the support block is still in its proper location.

24 Place a safety strap around the upper mid-pivot, then secure the strap to the forklift carriage.

25 Remove the turntable mounting bolts.

26 Carefully lift the turntable off the chassis. Set the turntable on blocks for support.

27 Place reference marks on the chassis to note the position of the worm drive housing for proper re-alignment during re-installation.

28 Remove the fasteners from the worm drive, then remove the worm drive.

29 Center the forklift forks under the chassis counterweight for support.

30 Loosen the counterweight positioning bolt.

31 Remove the fasteners from the counterweight.

32 Carefully lower the counterweight from the machine.

33 Remove the fasteners from the underside of the rotate bearing, then remove the rotate bearing.

How to Install the Rotation Bearing and Worm Drive

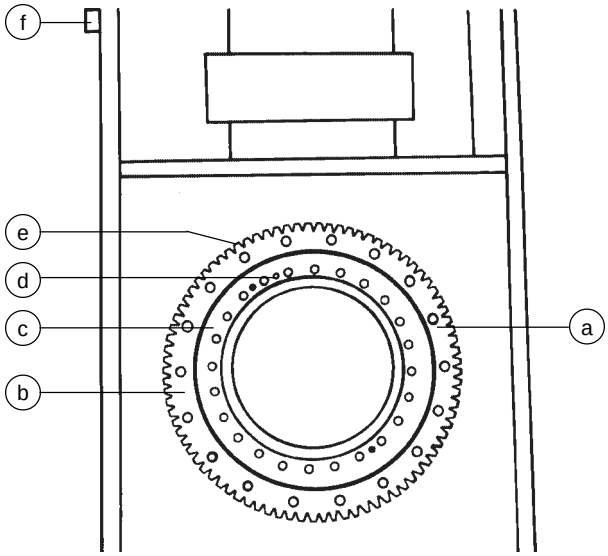
The rotation bearing is a structural component. It attaches the chassis to the turntable. The turntable is bolted to the inner race, with the worm gear housing sandwiched in-between. This housing has to be exactly positioned to provide the correct gear lash between the worm gear and the ring gear. The outside bearing race is bolted to the chassis from the underside.

⚠WARNING This procedure requires specific repair skills, lifting equipment and a suitable workshop. Attempting this procedure without these skills and tools may result in death or serious injury and significant component damage. Dealer service is required.

NOTICE If a repair requires that the turntable be removed from the chassis, installing a new rotation bearing is recommended. Consider the service life of the rotation bearing before installing a used bearing.

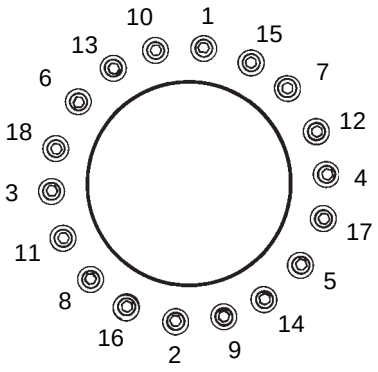
1 Position the rotation bearing on the chassis.

2 Locate the “red” mark on the outside bearing race. Align the mark with the rotation stop block on the chassis.



a "O" mark
b outer bearing
c inner bearing
d dowel
e red mark
f rotation stop block

3 Install the mounting fasteners from underneath the chassis. Use a torque wrench to tighten the fasteners in sequence to specifications.



Specifications - torque	
First rotation	95 foot pounds 129 Newton meters
Second rotation	190 foot pounds 258 Newton meters

TURNTABLE ROTATION COMPONENTS

4 Locate the “0” mark stamped in the outside bearing and the dowel on the inside bearing.

5 Position the inside bearing dowel 90 degrees counterclockwise from the “0” mark on the outside bearing.

6 Install a grease fitting on the inside bearing and apply grease until it comes out of the inner seal.

7 Apply grease to 10 gear teeth on each side of the “0” mark on the outside bearing.

8 Center the worm drive over the “0” mark on the outside bearing and install the two 5/16 inch fasteners. Hand tighten the bolts.

9 Push the worm drive towards the rotation bearing to be as close as possible.

10 Position a dial indicator to measure the worm drive in relation to the ring gear. Pull the worm drive away from the rotate bearing 0.035 inches (0.889mm) ±0.020 inches (0.508mm).

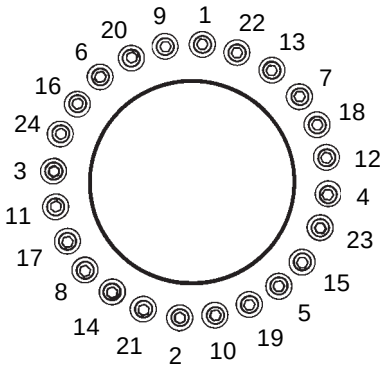
11 Tighten the two 5/16 fasteners. Observe the dial indicator to be sure that the worm drive does not move.

12 Locate the 1 inch hex head on the end of the worm gear housing. Turn the hex head to rotate the worm drive until it is positioned within the original reference marks on the chassis.

13 Position the turntable so that the flat side of the turntable is parallel with the worm drive gear.

14 While lowering the turntable onto the chassis, be sure that the milled area on the bottom surface of the turntable does not contact the top of the worm drive gear housing. If it is, remove the turntable and grind the worm drive gear housing until clearance is established.

15 Install the turntable mounting fasteners. Use a torque wrench to tighten the fasteners in sequence to specifications.



Specifications - torque	
First rotation	95 foot pounds 129 Newton meters
Second rotation	190 foot pounds 258 Newton meters

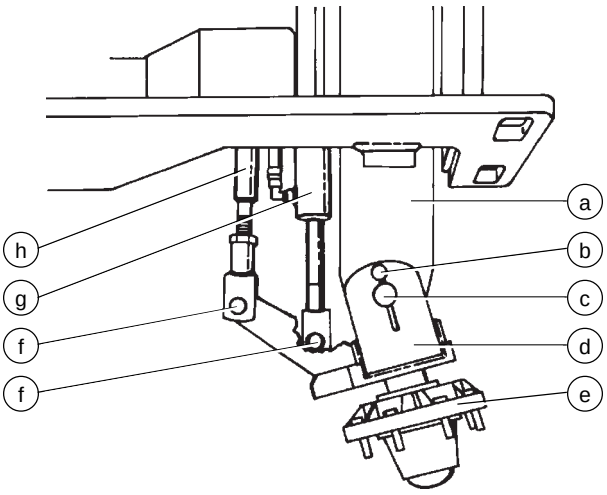
NOTICE After re-assembly, the turntable should swing smoothly without jerking or grinding.

2WD Steering Axle Components

14-1
Yoke and Hub

How to Remove the Yoke/Hub Assembly

1 Remove the cotter pin, and the clevis pin from both the steering cylinder and tie rod weldment.



a axle
b pin retainer
c king pin
d yoke
e hub
f cotter and clevis pin
g steering cylinder
h tie rod

2 Break loose the wheel lug nuts. Do not remove them.

3 Block the non-steering wheels and place a lifting jack under the steering axle.

4 Raise the machine and place blocks under the chassis.

5 Remove the lug nuts, then the tire and wheel assembly.

6 Remove the pin retainer attached to the king pin.

7 Place a second jack under the yoke/hub assembly.

8 Use a soft metal drift to drive the king pin down and out.

⚠WARNING Crushing hazard. The yoke/hub assembly will fall when the king pin is removed if it is not properly supported.

NOTICE Always use a new cotter pin when re-installing a clevis pin.

How to Remove the Hub and Bearing

1 Loosen the wheel lug nuts. Do not remove them.

2 Place a lifting jack under the steering axle.

3 Raise the machine and place blocks under the chassis.

4 Remove the lug nuts, then the tire and wheel assembly.

5 Remove the dust cap, cotter pin and slotted nut.

6 Pull the hub from the spindle. The washer and outer bearing should fall loose from the hub.

7 Place the hub on a flat surface and gently pry the bearing seal out of the hub. Remove the rear bearing.

2WD STEERING AXLE COMPONENTS

How to Install the Hub and Bearing

1 Be sure that the bearing is packed with grease.

2 Place the large inner bearing into the rear of the hub.

3 Press the bearing seal into the hub. Rest the seal on the hub, then press the seal evenly into the hub until it is flush.

4 Slide the hub onto the yoke spindle.

⚠CAUTION Component damage hazard. Do not apply excessive force or damage to the lip of the seal may result.

5 Be sure that the outer bearing is packed with grease, and place it into the hub.

6 Install the washer and slotted nut.

7 Tighten the slotted nut to 35 foot-pounds (47Nm).

8 Loosen the slotted nut and then re-tighten to 8 foot-pounds (11Nm).

9 Install a new cotter pin. Bend the pin to lock it in.

10 Install the dust cap, then the tire and wheel assembly. Torque the wheel lug nuts to 125 foot-pounds (169Nm).

14-2 Steering Cylinders

How to Remove a Steering Cylinder

There are two identical steering cylinders that work in parallel. They are part of the same hydraulic circuit, but move in opposite directions. The tie rod maintains equal movement of the tires. Bushings are used at both ends of each steering cylinder clevis.

1 Disconnect the hydraulic hoses from the steering cylinder and plug them.

⚠CAUTION Bodily injury hazard. Spraying hydraulic oil can perforate and burn skin. Loosen hydraulic connections very slowly to allow the oil pressure to dissipate gradually. Do not allow oil to squirt or spray.

2 Remove the cotter pin, then the clevis pin from each end of the steering cylinder.

3 Remove the steering cylinder.

NOTICE Always use a new cotter pin when re-installing a clevis pin.

14-3
Tie Rod

How to Remove the Tie Rod Weldment

1 Remove the cotter pins, then the clevis pins from the ends of the tie rod.

2 Remove the tie rod weldment.

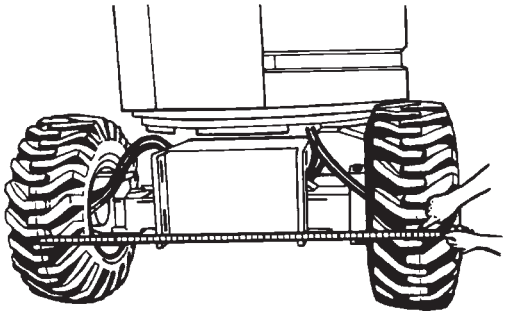
NOTICE Always use a new cotter pin when re-installing a clevis pin.

How to Perform the Tie Rod Toe-in Adjustment

NOTICE Perform this procedure on a firm level surface. Block the non-steering tires and be sure that the machine is in the fully stowed position.

1 Measure 15 inches (38cm) up from the ground on the front and rear of each steer tire and make a reference mark at the center of the tire.

2 Measure the distance from the reference points on each tire: Front to front and back to back.



3 Center a jack under the steering axle, then raise the machine.

4 Loosen the jam nut on the adjustable end of the tie rod.

5 Remove the cotter pin, then remove the clevis pin from the adjustable end of the tie rod.

6 Slide the tie rod off the yoke and adjust it by turning the end.

NOTICE One half turn on the adjustable end equals a 3/16 inch (5mm) change in the front to rear measurement.

7 Slide the tie rod onto the yoke. Install the clevis pin, then a new cotter pin.

8 Tighten the jam nut against the tie rod.

9 Lower the machine and recheck the front and back measurements (step 2). If further adjustment is needed, repeat steps 3 through 8.

Specifications	
Tie rod adjustment	1/4 inch (0.635mm) toe-in to 1/4 inch (0.635mm) toe-out

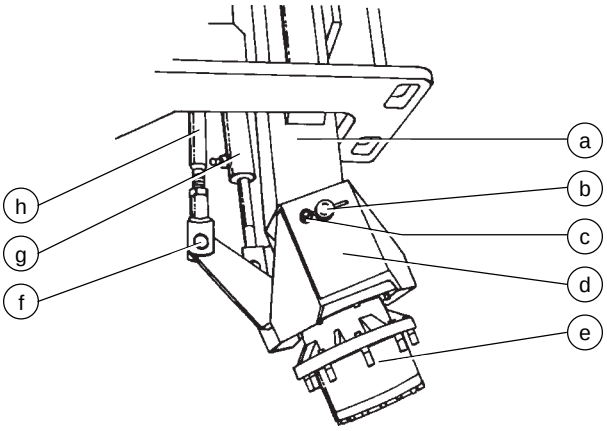
4WD Steering Axle Components

15-1
Yoke and Hub

How to Remove the Yoke and Hub

The yoke installation utilizes bushings and a thrust washer that require periodic replacement depending upon the application. The yoke must be removed before the torque hub can be removed. The wheel motor is an integral part of the torque hub.

1 Remove the cotter pin, then the clevis pin from both the steering cylinder and the tie rod weldment.



a axle
b pin retainer
c king pin
d yoke
e torque hub
f cotter and clevis pin
g steering cylinder
h tie rod

2 Disconnect the hydraulic hoses from the wheel motor and plug them. Cap the wheel motor hydraulic fittings.

⚠CAUTION Bodily injury hazard. Spraying hydraulic oil can perforate and burn skin. Loosen hydraulic connections very slowly to allow the oil pressure to dissipate gradually. Do not allow oil to squirt or spray.

3 Loosen the wheel lug nuts. Do not remove them.

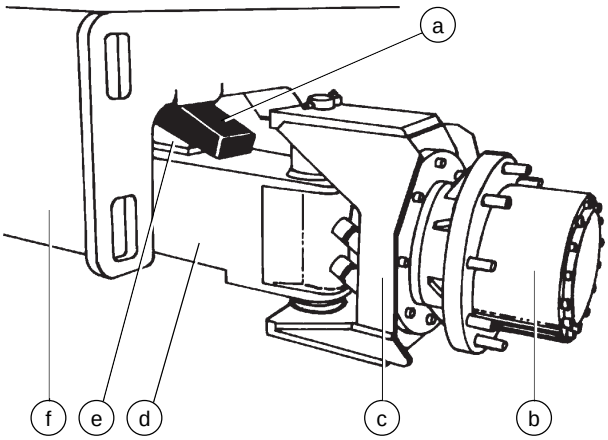
4 Block the non-steering wheels, and then center a lifting jack under the steering axle.

5 Raise the machine 6 inches (15cm) and place blocks under the chassis.

6 Remove the lug nuts, then the tire and wheel assembly.

7 Remove the pin retainer from the king pin.

8 Place a block between the oscillate cylinder lock-out wedge and the chassis on the same side as the yoke/torque hub being serviced.



a block
b torque hub
c yoke
d axle
e lock-out wedge
f chassis

9 Attach a strap from a lifting device to the yoke/torque hub assembly and support it.

10 Use a soft metal drift to drive the king pin down and out.

⚠WARNING Crushing hazard. The yoke/torque hub assembly will fall when the king pin is removed if it is not properly supported.

11 Place the yoke/torque hub assembly on a flat surface with the torque hub down. Remove the bolts that secure the yoke to the torque hub.

Specifications	
Lug nut torque	125 foot-pounds 169 Newton meters

15-2 Steering Cylinders

How to Remove the Steering Cylinder

This procedure is the same as the 2WD procedure. See repair procedure 14-2, *How to Remove the Steering Cylinder.*

15-3 Tie Rod

How to Remove the Tie Rod Weldment

This procedure is the same as the 2WD procedure. See repair procedure 14-3, *How to Remove the Tie Rod Weldment.*

How to Perform the Tie Rod Toe-in Adjustment

This procedure is the same as the 2WD procedure. See repair procedure 14-3, *How to Perform the Tie Rod Toe-in Adjustment.*

Oscillating Axle Components

16-1 Oscillating Axle Lock-out Cylinder

The oscillating axle lock-out cylinder extends the lock-out wedges between the chassis and the axle when the boom is raised above the drive limit switch. When the lock-out wedges are fully extended, the oscillation lock-out limit switches release and allow the primary boom to continue to raise above the drive limit switch.

How To Remove The Oscillating Axle Lock-out Cylinder

The oscillating axle lock-out cylinder is held in place by the same pin that retains the axle. Therefore, the axle must be removed as part of this procedure.

⚠WARNING This procedure requires specific repair skills, lifting equipment and a suitable workshop. Attempting this procedure without these skills and tools may result in death or serious injury and significant component damage. Dealer service is strongly recommended.

NOTICE Perform this procedure on a firm level surface.

1 Disconnect and plug the oscillating axle lock-out cylinder hydraulic hoses. Disconnect and plug the steer and accumulator hoses from the steer-oscillate manifold to provide clearance for pin removal.

⚠CAUTION Bodily injury hazard. Spraying hydraulic oil can perforate and burn skin. Loosen hydraulic connections very slowly to allow the oil pressure to dissipate gradually. Do not allow oil to squirt or spray.

2 Remove the oscillation lock-out limit switches from the oscillating axle lock-out cylinder.

3 Block the non-steering wheels, then center a jack under the oscillating axle and lift the machine 6 inches (15cm).

4 Support the raised machine with blocks, then carefully lower the chassis onto the blocks. Leave the jack under the axle to support it. Do not lift.

⚠CAUTION Crushing hazard. If the jack is not centered, the axle may tip when the pivot pin is removed.

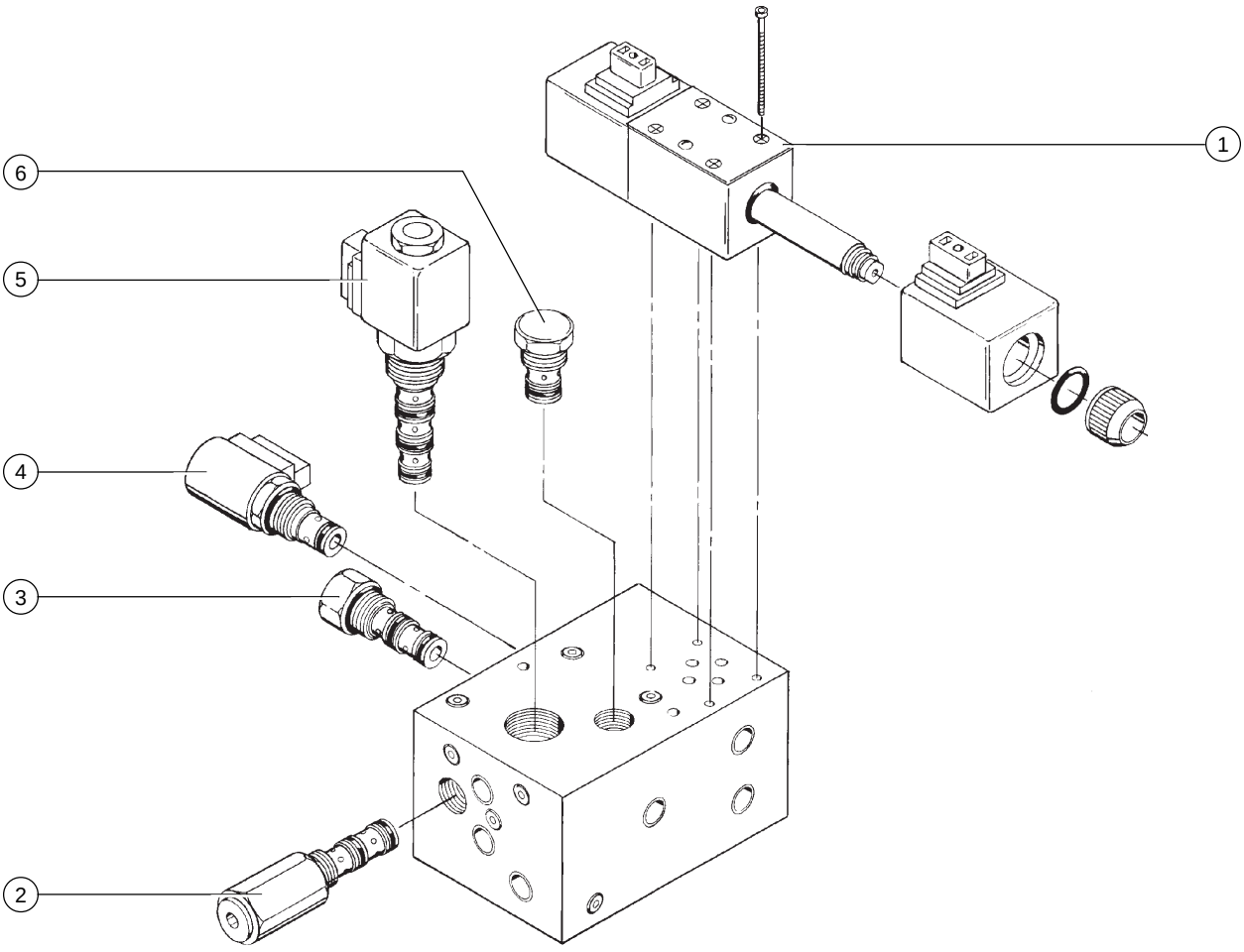
5 Remove the pin retainer from the axle pivot pin. Use a soft metal drift to remove the axle pivot pin.

6 Remove the oscillate cylinder.

Steer and Oscillate Manifold

17-1
Steer and Oscillate Manifold Components

Index No.	Description	Schematic Item	Function	Torque
1	3 position 4 way DO1 valve	F	Steering	30-35 in-lbs / 3-4 Nm
2	Pilot operated unloader valve, 1900 psi / (131 bar)	C	Sequencing	10-12 ft-lbs / 14-16 Nm
3	Sensing valve	B	Differential sensing	10-12 ft-lbs / 14-16 Nm
4	Normally closed poppet valve	A	Steering dump	25-30 ft-lbs / 34-41 Nm
5	2 position 4 way valve	D	Oscillate	10-12 ft-lbs / 14-16 Nm
6	Check valve	E	Oscillate check	35-40 ft-lbs / 47-54 Nm



STEER AND OSCILLATE MANIFOLD

Plug Torque Specifications

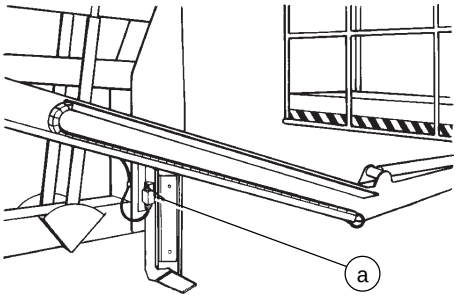
Description	Torque
SAE No. 2	50 in-lbs / 6 Nm
SAE No. 4	13 ft-lbs / 18 Nm
SAE No. 6	18 ft-lbs / 24 Nm
SAE No. 8	50 ft-lbs / 68 Nm
SAE No. 10	55 ft-lbs / 75 Nm
SAE No. 12	75 ft-lbs / 102 Nm

17-2 Valve Adjustments

How to Adjust the Sequencing Unloader Valve

⚠ CAUTION Bodily injury hazard. Spraying hydraulic oil can perforate and burn skin. Loosen hydraulic connections very slowly to allow the oil pressure to dissipate gradually. Do not allow oil to squirt or spray.

1 Start the engine and raise the primary boom above the drive limit switch. Do not lift the primary boom above the secondary boom.



a drive limit switch

2 Connect a 0 to 3000 psi (0 to 206 bar) pressure gauge to the diagnostic nipple on the function manifold.

3 Manually hold down the drive limit switch. When the oscillate cylinder fully retracts, the pressure will spike. Note the maximum pressure reading. Do not release the drive limit switch.

4 Release the drive limit switch. When the oscillate cylinder fully extends, the pressure will spike. Note the maximum pressure reading.

5 Hold the unloader valve and remove the cap (index 2).

6 Adjust the internal hex socket by turning it clockwise to increase the pressure or counterclockwise to decrease the pressure. Then reinstall the relief valve cap.

7 Manually hold down the drive limit switch and recheck the valve pressure.

Specifications	
Unloader valve	1900 psi / 131 bar

Non-steering Axle Components

18-1 Drive Motor

⚠CAUTION Repairs to the motor should only be performed by an authorized Sundstrand-Sauer dealer.

How to Remove a Drive Motor

A drive motor can only be removed from the inside of the chassis. Access on older machines is even more restricted. The brake and motor must be removed together and then separated for repair.

⚠CAUTION The work area and surfaces where this procedure will be performed must be clean and free of debris that could get into the hydraulic system and cause severe component damage. Dealer service is recommended.

1 Disconnect the hydraulic hoses from the drive motor and plug them.

⚠CAUTION Bodily injury hazard. Spraying hydraulic oil can perforate and burn skin. Loosen hydraulic connections very slowly to allow the oil pressure to dissipate gradually. Do not allow oil to squirt or spray.

2 Remove the drive motor mounting bolts.

3 Slide the drive motor shaft out of the brake and then remove.

NOTICE On older machines, the drive motor and brake must be removed together.

18-2 Torque Hub

How to Remove a Drive Torque Hub

The drive motor and brake must be removed in order to access the torque hub mounting bolts.

1 Remove the drive motor and brake. See 18-1, *How to Remove a Drive Motor*.

2 Loosen the wheel lug nuts. Do not remove them.

3 Center a jack under the non-steering axle. Raise the machine and place blocks under the chassis to support it.

4 Remove the wheel lug nuts, then the tire and wheel assembly.

5 Place a second jack under the torque hub for support.

6 Remove the bolts that attach the brake to the hub.

7 Remove the bolts that attach the torque hub to the chassis, then remove the torque hub.

⚠CAUTION Crushing hazard. The torque hub will fall if it is not properly supported when the mounting bolts are removed.

Specifications	
Lug nut torque	125 foot-pounds 169 Newton meters

2WD Drive Manifold

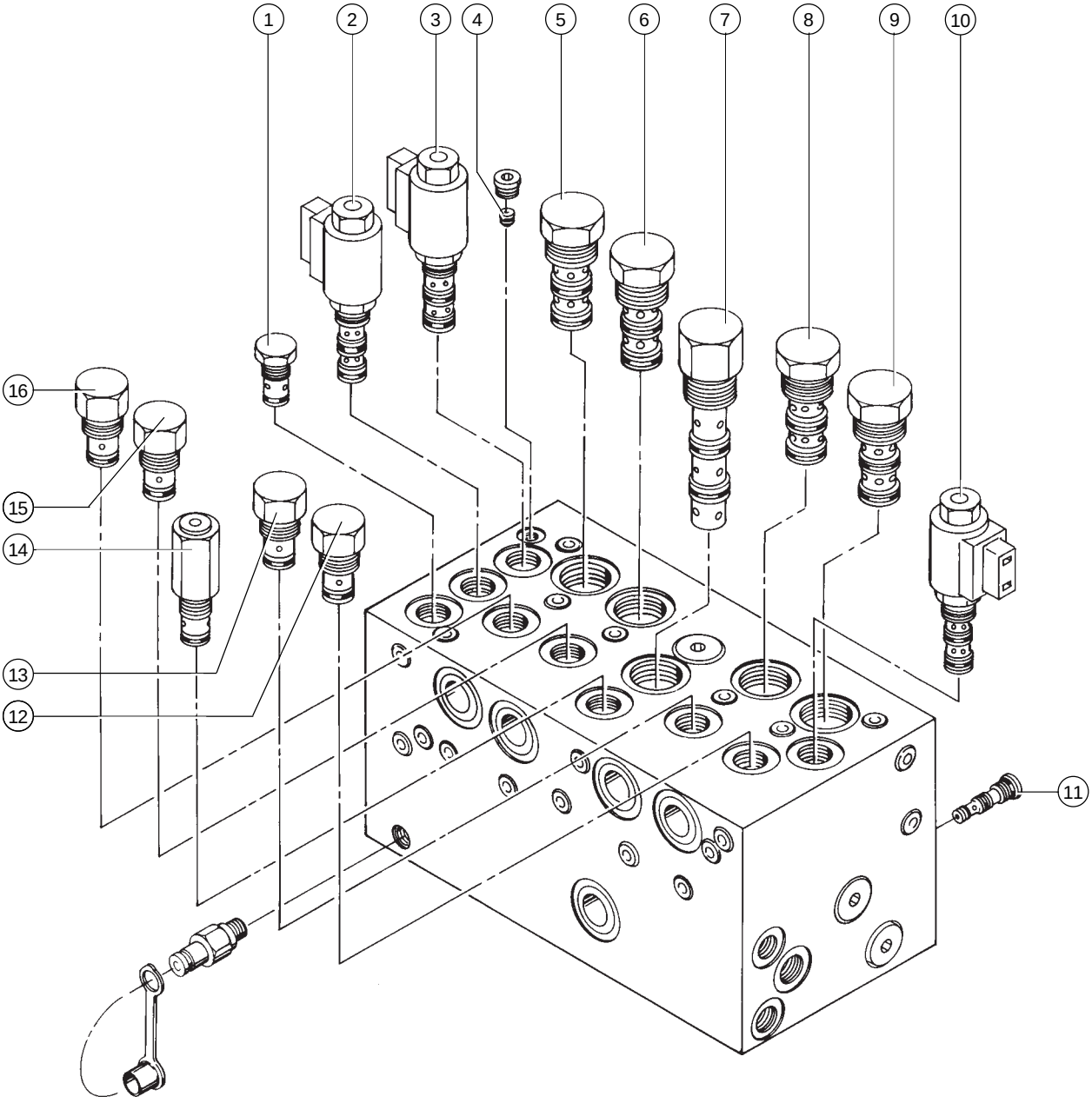
19-1
2WD Drive Manifold Components

Index No.	Description	Schematic Item	Function	Torque
1	Check valve	M	Brake check	25-30 ft-lbs / 34-41 Nm
2	2 position 3 way valve	O	Brake release	8-10 ft-lbs / 11-14 Nm
3	2 position 3 way valve	N	2-Speed wheel motors, (energized in high range to destroke the rear motor swash plates	8-10 ft-lbs / 11-14 Nm
4	Orifice 0.036 in (0.914mm)	P	Motor shift / brake release circuit	
5	Pilot to open check valve	E	Right check in forward	85-90 ft-lbs / 115-122 Nm
6	Pilot to open check valve	G	Right check in reverse	85-90 ft-lbs / 115-122 Nm
7	Shuttle valve 3 position 3 way	K	Low pressure flow path for brake release and 2-speed motor shift	15-18 ft-lbs / 20-24 Nm
8	Pilot to open check valve	D	Left check in reverse	85-90 ft-lbs / 115-122 Nm
9	Pilot to open check valve	B	Left check in forward	85-90 ft-lbs / 115-122 Nm
10	2 position 3 way valve	J	Energized in high range to pilot open check valves 5,6, 8 & 9 to bypass flow regulators and allow full flow to front wheel motors	8-10 ft-lbs / 11-14 Nm
11	Shuttle valve 2 position 3 way	I	High pressure flow path for flow regulator bypass	10-13 ft-lbs / 14-18 Nm
12	Flow regulator valve	A	Left flow control in forward	10-12 ft-lbs / 14-16 Nm
13	Flow regulator valve	C	Left flow control in reverse	10-12 ft-lbs / 14-16 Nm
14	Relief valve, 320 psi (22 bar)	L	Charge pressure	10-12 ft-lbs / 14-16 Nm
15	Flow regulator valve	H	Right flow control in reverse	10-12 ft-lbs / 14-16 Nm
16	Flow regulator valve	F	Right flow control in forward	10-12 ft-lbs / 14-16 Nm

Plug Torque Specifications

Description	Torque
SAE No. 2	50 in-lbs / 6 Nm
SAE No. 4	13 ft-lbs / 18 Nm
SAE No. 6	18 ft-lbs / 24 Nm
SAE No. 8	50 ft-lbs / 68 Nm
SAE No. 10	55 ft-lbs / 75 Nm
SAE No. 12	75 ft-lbs / 102 Nm

2WD DRIVE MANIFOLD



2WD DRIVE MANIFOLD

19-2
Valve Adjustments

How to Adjust the Charge Pressure Relief Valve

1 Connect a 0 to 600 psi (0 to 41 bar) pressure gauge in between one of the medium pressure hydraulic hoses and the medium pressure hydraulic oil filter.

⚠CAUTION Bodily injury hazard. Spraying hydraulic oil can perforate and burn skin. Loosen hydraulic connections very slowly to allow the oil pressure to dissipate gradually. Do not allow oil to squirt or spray.

2 Start the engine from the platform controls.

3 Drive the machine in either direction and observe the pressure reading on the pressure gauge.

4 Turn the engine off. Hold the relief valve and remove the cap (index 14).

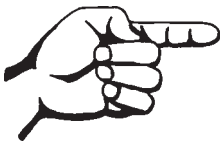
5 Adjust the internal hex socket. Turn it clockwise to increase the pressure or counterclockwise to decrease the pressure. Then reinstall the valve cap.

6 Restart the engine. Drive the machine in either direction and recheck the valve pressure.

7 Turn the engine off, then remove the pressure gauge.

Specifications	
Relief valve	320 psi / 22 bar

2WD DRIVE MANIFOLD



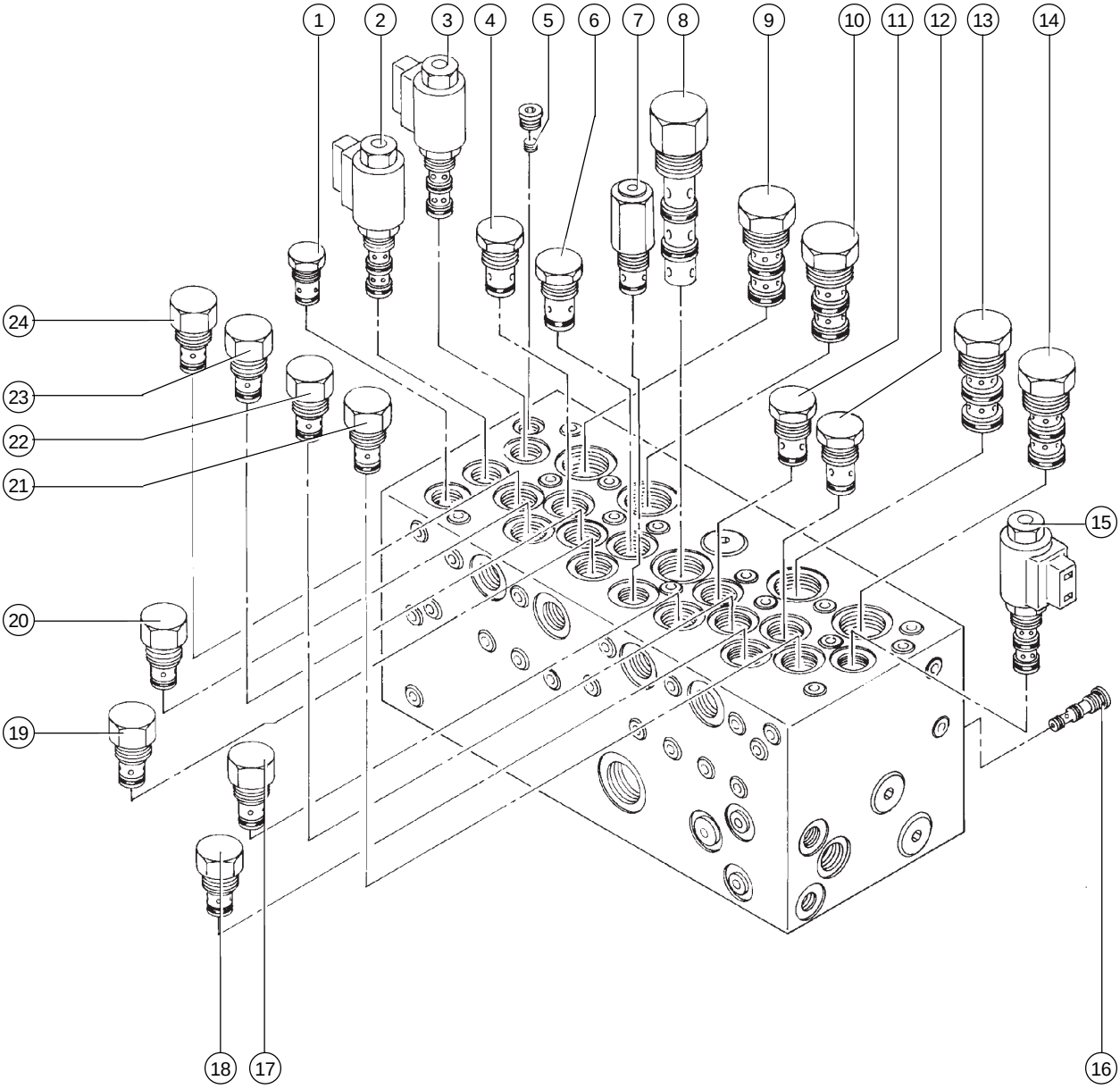
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4WD Drive Manifold

20-1
4WD Drive Manifold Components

Index No.	Description	Schematic Item	Function	Torque
1	Check valve	W	Brake check	25-30 ft-lbs / 34-41 Nm
2	2 position 3 way valve	S	Brake release	8-10 ft-lbs / 11-14 Nm
3	2 position 3 way valve	R	2-speed wheel motors (energized in high range to destroke the rear motor swash plates)	8-10 ft-lbs / 11-14 Nm
4	Check valve	K	RR check in forward	35-40 ft-lbs / 47-54 Nm
5	Orifice 0.025 in (0.635mm)	X	Motor shift / brake release circuit	
6	Check valve	L	RR check in reverse	35-40 ft-lbs / 47-54 Nm
7	Relief valve, 320 psi (22 bar)	V	Charge pressure	10-12 ft-lbs / 14-16 Nm
8	Shuttle valve 3-position 3 way	U	Low pressure flow path for brake release and 2 speed motor shift	15-18 ft-lbs / 20-24 Nm
9	Pilot to open check valve	O	RF check in forward	85-90 ft-lbs / 115-122 Nm
10	Pilot to open check valve	P	RF check in reverse	85-90 ft-lbs / 115-122 Nm
11	Check valve	J	LR check in reverse	35-40 ft-lbs / 47-54 Nm
12	Check valve	I	LR check in forward	35-40 ft-lbs / 47-54 Nm
13	Pilot to open check valve	N	LF check in reverse	85-90 ft-lbs / 115-122 Nm
14	Pilot to open check valve	M	LF check in forward	85-90 ft-lbs / 115-122 Nm
15	2 position 3 way valve	Q	Energized in high range to pilot open check valves 9, 10, 13 & 14 to bypass flow regulators and allow full flow to front wheel motors	8-10 ft-lbs / 11-14 Nm
16	Shuttle valve 2 position 3 way	T	High pressure flow path for flow regulator bypass	10-13 ft-lbs / 14-18 Nm
17	Flow regulator valve	D	LR flow control in reverse	10-12 ft-lbs / 14-16 Nm
18	Flow regulator valve	B	LR flow control in forward	10-12 ft-lbs / 14-16 Nm
19	Flow regulator valve	H	RR flow control in reverse	10-12 ft-lbs / 14-16 Nm
20	Flow regulator valve	F	RR flow control in forward	10-12 ft-lbs / 14-16 Nm
21	Flow regulator valve	A	LF flow control in forward	10-12 ft-lbs / 14-16 Nm
22	Flow regulator valve	C	LF flow control in reverse	10-12 ft-lbs / 14-16 Nm
23	Flow regulator valve	G	RF flow control in reverse	10-12 ft-lbs / 14-16 Nm
24	Flow regulator valve	E	RF flow control in forward	10-12 ft-lbs / 14-16 Nm

4WD DRIVE MANIFOLD



4WD DRIVE MANIFOLD

Plug Torque Specifications

Description	Torque
SAE No. 2	50 in-lbs / 6 Nm
SAE No. 4	13 ft-lbs / 18 Nm
SAE No. 6	18 ft-lbs / 24 Nm
SAE No. 8	50 ft-lbs / 68 Nm
SAE No. 10	55 ft-lbs / 75 Nm
SAE No. 12	75 ft-lbs / 102 Nm

20-2 Valve Adjustments

How to Adjust the Charge Pressure Relief Valve

1 Connect a 0 to 600 psi (0 to 41 bar) pressure gauge in between one of the medium pressure hydraulic hoses and the medium pressure hydraulic oil filter.

⚠CAUTION Bodily injury hazard. Spraying hydraulic oil can perforate and burn skin. Loosen hydraulic connections very slowly to allow the oil pressure to dissipate gradually. Do not allow oil to squirt or spray.

2 Start the engine from the platform controls.

3 Drive the machine in either direction and observe the pressure reading on the pressure gauge.

4 Turn the engine off. Hold the relief valve and remove the cap.

5 Adjust the internal hex socket. Turn it clockwise to increase the pressure or counterclockwise to decrease the pressure. Then reinstall the valve cap.

6 Restart the engine. Drive the machine in either direction and recheck the valve pressure.

7 Turn the engine off, then remove the pressure gauge.

Specifications	
Relief valve	320 psi / 22 bar