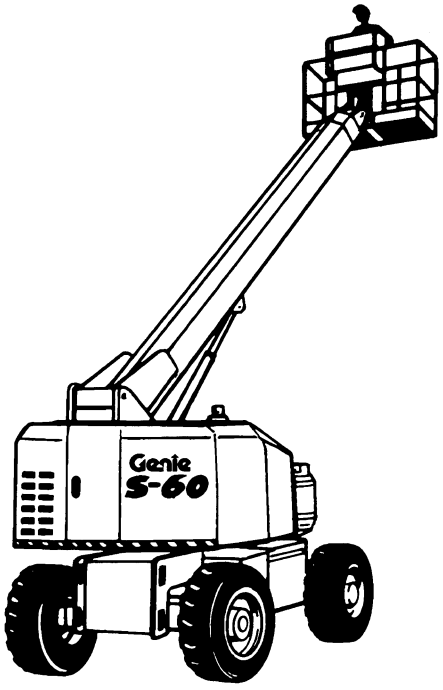
Genie Industries

Technical Publications

Genie® S-60

Service Manual



First Edition
Part No. 29751

Genie® S-60

Important

Read, understand and obey the safety rules and operating instructions in the Genie S-60 Operator's Manual before attempting any maintenance or repair procedure.

This service manual covers the Genie S-60 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 97030, Redmond WA 98073-9730 USA.

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Safety Rules



Danger

Failure to obey the instructions and safety rules in this manual, and the Genie S-60 Operator's 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 dimensions	2WD	4WD
Length	26 ft 8 in 8.13m	26 ft 8 in 8.13m
Width	7 ft 6 in 2.29m	7 ft 6 in 2.29m
Height	8 ft 4 in 2.54m	8 ft 4 in 2.54m
Weight	25700 lbs 11660kg	25700 lbs 11660kg
Ground clearance	12 in 30.5cm	12 in 30.5cm
Operational dimensions		
Maximum platform height	60 ft 18.3m	60 ft 18.3m
Maximum horizontal reach	51 ft 9 in 15.8m	51 ft 9 in 15.8m
Maximum turntable tailswing	36 in 91cm	36 in 91cm
Wheelbase	8 ft 2.44m	8 ft 2.44m
Minimum turning circle, outside		40 ft 9 in 12.4m
Minimum turning circle, inside		22 ft 5 in 6.8m
Turntable rotation	continuous	continuous
Platform rotation	160°	160°
Platform dimensions	**6 ft**	**8 ft**
Length	6 ft 1.83m	8 ft 2.44m
Width	30 in 76.2cm	36 in 91.4cm
Maximum capacity	660 lbs 300kg	550 lbs 250kg

Tires and wheels - All models		
Tire size		15-19.5NHS
Tire ply rating		12
Tire contact area	71 sq in	458 sq cm
Overall tire diameter	40 in	102cm
Tire pressure	60 psi	4.14 bar
Wheel diameter	19.5 in	49.5cm
Wheel width	12.2 in	31cm
Wheel lugs		9 @ 5/8-18
Lug nut torque	125 ft-lbs	169.5 Nm
Fluid capacities		
Fuel tank	50 gallons	189 liters
LPG tanks (each)	33.5 pounds	15.2 kg
Hydraulic tank	50 gallons	189 liters
Hydraulic system (including tank)	60 gallons	227 liters
Drive torque hub	40 fl oz	1.2 liters
Turntable rotation torque hub	17 fl oz	0.5 liters

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

PERFORMANCE & HYDRAULIC SPECIFICATIONS

Performance Specifications

Drive speeds, maximum	2WD	4WD
Boom stowed, high range gasoline/LPG models	4.5 mph 7.2km/h 40 ft/6 sec 12.2m/6 sec	4.5 mph 7.2km/h 40 ft/6 sec 12.2m/6 sec
Boom stowed, high range Deutz diesel models	3.9 mph 6.3km/h 40 ft/7 sec 12.2m/7 sec	3.9 mph 6.3km/h 40 ft/7 sec 12.2m/7 sec
Boom stowed, low range gasoline/LPG models	1.4 mph 2.2km/h 40 ft/20 sec 12.2m/20 sec	1.2 mph 1.9km/h 40 ft/23 sec 12.2m/23 sec
Boom stowed, low range Deutz diesel	1.4 mph 2.2km/h 40 ft/20 sec 12.2m/20 sec	1.4 mph 2.2km/h 40 ft/20 sec 12.2m/20 sec
Boom raised or extended all models	0.68 mph 1.1km/h 40 ft/40 sec 12.2m/40 sec	0.68 mph 1.1km/h 40 ft/40 sec 12.2m/40 sec
Gradeability (boom stowed)	20%	35%

Boom function speeds, maximum from platform controls	
Boom extend	60 seconds
Boom retract	60 seconds
Boom raise	60 seconds
Boom lower	90 seconds
Turntable rotate - 360°	86 seconds
Platform rotate - 160°	6.5 seconds
Platform level up	13 seconds
Platform level down	8 seconds
Multiple function, stowed to full raised	65 seconds
Multiple function, full raised to stowed	95 seconds

Hydraulic Specifications

Hydraulic fluid	Dexron II equivalent	
Drive pump		
Type: bi-directional variable displacement piston pump		
Displacement	0 to 25 gallons per minute 0 to 96 liters per minute	
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	3.4 bar
Drive manifold		
Motor shift/brake relief pressure	320 psi	22 bar
4WD front motor flow regulators	4.5 gallons per minute 17 liters per minute	
4WD rear motor flow regulators	7.0 gallons per minute 26.5 liters per minute	
2WD rear motor flow regulators	8.0 gallons per minute 30.3 liters per minute	
Front drive motors		**4WD models**
Displacement per revolution	21.4 cu in	35.1cc
Rear drive motors		
Displacement per revolution low range high range	 2.8 cu in 0.15 cu in	 45.9cc 2.5cc

HYDRAULIC SPECIFICATIONS

Function pump		
Type: variable displacement piston pump with flow and pressure compensators		
Displacement - static	2.3 cu in	37.7cc
Displacement - 2600 rpm	0 to 25.8 gallons per minute	0 to 97.8 liters per minute
Compensator setting		
pressure	2800 psi	193 bar
flow	200 psi	14 bar
Hydraulic tank circuit return line filters (two): 10 micron with 25 psi / 1.7 bar bypass		

Function manifold	
Function relief valve pressure	3000 psi 207 bar
Boom down relief valve pressure	1200 psi 83 bar
Boom extend	1000 psi 69 bar
Steer/oscillate flow regulator	3.5 gallons per minute 13.3 liters per minute

Auxiliary pump		
Type: fixed displacement gear pump		
Displacement - static	0.152 cu in	2.5cc
Displacement - 2600 rpm	1.4 gallons per minute	5.3 liters per minute
Auxiliary pump relief pressure	3100 psi	214 bar

BOLT TORQUE 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
No. 10	24	43		5	60		7
	32	49		6	68		8
1/4 inch	20	96		11	144		16
	28	120		14	168		19
5/16 inch	18		17	23		25	34
	24		19	28		25	34
3/8 inch	16		30	41		45	61
	24		35	48		50	68
7/16 inch	14		50	68		70	95
	20		55	75		80	109
1/2 inch	13		75	102		110	149
	20		90	122		120	163
9/16 inch	12		110	149		150	204
	18		120	163		170	231
5/8 inch	11		150	204		220	298
	18		170	231		240	326
3/4 inch	10		260	353		380	515
	16		300	407		420	570
7/8 inch	9		430	583		600	814
	14		470	637		660	895
1 inch	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.

Ford Engine LSG-423

Displacement	140 cu in	2.3 liters
Number of cylinders		4
Bore & stroke		3.780 x 3.126 inches 96 x 79.4mm
Horsepower		63 @ 4000 rpm
Firing order		1 - 3 - 4 - 2
Low idle		1500 rpm
High idle		2600 rpm
Governor		electronic
Compression ratio		9.5:1
Compression pressure (approx.)		150 to 175 psi 10 to 12 bar
Pressure (psi) of lowest cylinder must be at least 75% of highest cylinder		
Valve clearances		0.040 to 0.050 inches 1.0 to 1.3mm
Lubrication system		
Oil pressure (operating temp. @ 2600 rpm)		40 to 60 psi 2.75 to 4.1 bar
Oil capacity (including filter)		5 quarts 4.7 liters
Oil viscosity requirements		
Temperature below 60°F / 15.5°C		5W-30
-10°F to 90°F / -23°C to 32°C		10W-30
Temperature above -10°F / -23°C		10W-40 to 10W-50
Temperature 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 while starting (normal temperature)		0.5V DC
Brush length, new	0.50 in	12.7mm
Brush length wear limit	0.25 in	6.35mm
Brush spring tension	40 ounces	11 Newtons
Bolt torque through brush		55 to 75 inch-pounds 6 to 8.5Nm
Brush mounting bolt torque		15 to 20 foot-pounds 20 to 27Nm
Maximum commutator run-out		0.005 inches 0.127mm
Battery		
Type		12V, Group 24
Quantity		2
Ampere hour		75AH
Cold cranking ampere		875A
Reserve capacity @ 25A rate		125 minutes
Fuel pump		
Static pressure		5 to 7 psi 0.34 to 0.48 bar
Minimum volume flow (in 25 seconds)		1 pint 473cc

FORD ENGINE LSG-423 SPECIFICATIONS

Ignition System	
Ignition spark advance	10° BTDC
Ignition coil primary resistance	1.13 to 1.25Ω @ 75°F / 24°C
Ignition coil secondary resistance	7700 to 9300Ω @ 75°F / 24°C
Spark plug type	Motorcraft AWSF-52
Spark plug gap	0.042 to 0.046 inches 1.07 to 1.18mm

Engine coolant		
Capacity	11.5 quarts	10.9 liters

Alternator	
Output	35A, 14.5V

Fan belt deflection	3/8 to 1/2 inch	9 to 12mm

Bolt torque specifications

Bolt description (size)	torque ft-lbs	torque Nm
Auxiliary shaft gear bolt (M-10)	28 to 40	38 to 54
Auxiliary shaft thrust plate bolt (M-6)	6 to 9	8 to 12
Timing belt tensioner pivot bolt (M-10)	28 to 40	38 to 54
Timing belt tensioner adjusting bolt (M-8)	14 to 21	19 to 28
Camshaft gear bolt (M-12)	50 to 71	68 to 96
Camshaft thrust plate bolt (M-6)	6 to 9	8 to 12
Carburetor to spacer stud (M-8)	7.5 to 15	10 to 20
Carburetor spacer to manifold bolt (M-8)	10 to 14	14 to 19
Crankshaft damper bolt (M-14)	103 to 133	140 to 180
Cylinder head bolt (M-12): torque in sequence		
first step	50 to 60	68 to 81
second step	80 to 90	108 to 122
Distributor clamp bolt (M-10)	14 to 21	19 to 28
Distributor vacuum tube to manifold adaptor	5 to 8	7 to 11
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first step	14 to 19	19 to 26
second step	20 to 30	27 to 41
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Cylinder front cover bolt (M-6)	6 to 9	8 to 12
Inner timing belt cover stud (M-8)	14 to 21	19 to 28
Outer timing belt cover bolt (M-6)	6 to 9	8 to 12

DEUTZ ENGINE F4L 1011 SPECIFICATIONS

Deutz Engine F4L 1011

Displacement	166.7 cu in	2.732 liters
Number of cylinders		4
Bore and stroke		3.58 x 4.13 inches 91 x 105mm
Horsepower		56 @ 3000 rpm
Firing order		1 - 3 - 4 - 2
Compression ratio		18.5:1
Compression pressure		362 to 435 psi 25 to 30 bar
Low idle		1200 rpm
High idle		2200 rpm
Governor		centrifugal mechanical
Valve clearance, cold		
Intake	0.012 in	0.3mm
Exhaust	0.020 in	0.5mm
Lubrication system		
Oil pressure	26 to 87 psi	1.8 to 6.0 bar
Oil capacity (including filter)		11 quarts 10.5 liters
Oil viscosity requirements		
Temperature below 60°F / 15.5°C (synthetic)		5W-30
-10°F to 90°F / -23°C to 32°C		10W-40
Temperature above -4°F / -34°C		15W-40
Engine oil should have properties of API classification CC/SE, CD/SE, CC/SF or CD/SF grades.		
Injection system		
Injection pump make		OMAP
Injection pump pressure	4351 psi	300 bar
Injector opening pressure	3626 psi	250 bar
Fuel requirement		diesel number 2-D
Alternator output		55A, 14V
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
Quantity		2
Ampere hour		75AH
Cold cranking ampere		875A
Reserve capacity @ 25A rate		125 minutes
Fan belt deflection	3/8 to 1/2 inch	9 to 12mm

Bolt tightening specifications

Bolt description (size, grade)	torque ft-lbs	torque Nm
Camshaft/Thrust bearing bolt (M-8 x 35, 8.8)	15 to 18	20 to 24
Rocker arm bolts (M-8 x 45, 8.8)	15 to 18	20 to 24
Rocker arm set screw nut	15 to 18	20 to 24
Cylinder head cover	6 to 7	8 to 10
Blower rotor nut (M-17 Valeo or M-18 Bosch)	33 to 41	45 to 55
Blower carrier bolts (M-8 x 50 Torx, 8.8)	15 to 18	20 to 24
V-belt pulley bolts (M-10 x 16, 8.8)	28 to 34	38 to 46
Idler pulley/V-belt pulley bolt (M-10 x 25, 8.8)	27 to 32	36 to 44
Idler pulley for toothed belt (M-10 x 50, 8.8)	30 to 36	41 to 49
Oil pump bolts (M-8 x 35 Torx)	15 to 18	20 to 24

DEUTZ ENGINE F4L 1011 SPECIFICATIONS

Bolt tightening specifications, continued

Bolt description (size, grade)	torque ft-lbs	torque Nm
Oil filter bracket bolts (M-8 x 20 Torx, 8.8)	7 to 8	9 to 11
Oil intake housing bolts (M-8 x 75 Torx)	15 to 18	20 to 24
Fuel pump bolts	15 to 18	20 to 24
Injection pump bolts	15 to 18	20 to 24
Injector cap nut	30 to 37	40 to 50
Injector fastening bolt	15 to 18	20 to 24
Injection line	10 to 12	13.5 to 16.5
Air intake manifold bolts (M-8 x 30, 8.8)	15 to 18	20 to 24
Air intake manifold, 3-hole flange bolts (M-8 x 35 Torx, 8.8)	15 to 18	20 to 24
Exhaust manifold bolts (M-10 x 30 Torx, 10.9)	27 to 32	36 to 44
Starter fastening bolts (M-10 x 28, 8.8)	28 to 34	38 to 46
Starter carrier bolts (M-12 x 28, 8.8)	50 to 60	68 to 82
Oil pan bolts (M-8 x 16 Torx, 8.8)	15 to 18	20 to 24
Oil drain bolts	37 to 44	50 to 60

	torque ft-lbs	**torque Nm**
Oil thermostat housing screw plug (M-38 x 1.5)	37 to 44	50 to 60
Oil thermostat housing bolts (M-6 x 35 Torx, 8.8)	5.5 to 7	7.5 to 9
Oil thermostat housing bolts (M-6 x 80 Torx, 8.8)	5.5 to 7	7.5 to 9
Oil thermostat housing bolts (M-6 x 105 Torx, 8.8)	14 to 16	19 to 22
Valve plunger housing bolts (M-8 x 30 Torx, 8.8)	14 to 16	19 to 22
Alternator nuts (M-5)	3	4
Fuel bracket bolts (M-8 x 20, 8.8)	15	20
Adapter housing bolts (M-12 x 35, 10.9 or M-12 x 75, 10.9)	70 to 77	95 to 105

		first step tightening torque		second step tightening angles	
		ft-lbs	Nm	1st	2nd
Main bearing bolts		37	50	60°	45°
Big end bolts		22	30	60°	60°
Flywheel bolts		22	30	60°	30°
Cylinder head studs	step 1	22	30		
	step 2	59	80		
	step 3	118	160	120°	NA
Camshaft/central bolt		22	30	150°	NA
Crankshaft/central bolt		96	130	210°	NA

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, quarterly, 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

Schedule

There are four types of maintenance inspections that must be performed according to a schedule—daily, quarterly, annual, two year. To account for repeated procedures, the Maintenance Tables and the Maintenance Inspection Report have been divided into four subsections—A, B, C, D. Use the following chart to determine which group(s) of procedures are required to perform a scheduled inspection.

Inspection	Table or Checklist
Daily	A
Quarterly	A + B
Annual	A + B + C
Two year	A + B + C + D

Maintenance Tables

The maintenance tables contained in this section provide summary information on the specific physical requirements for each inspection.

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

Maintenance Inspection Report

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

Make copies of the Maintenance Inspection Report to use for each inspection. Store completed forms for three years.

Maintenance Tables

Table A		Tools are required	New parts required	Warm engine required	Cold engine required	Dealer service suggested
A-1	Inspect the Operator's 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 - Gasoline/LPG Models					
A-6	Check for Fuel Leaks					
A-7	Check the Hydraulic Oil Level					
A-8	Check for Hydraulic Leaks					
A-9	Check the Tire Pressure					
A-10	Test the Platform and Ground Controls					
A-11	Test the Auxiliary Power Operation					
A-12	Test the Tilt Sensor					
A-13	Test the Limit Switches					
A-14	Check the Air Filter Condition Indicator - Deutz Diesel Models					
Every 100 hours, perform the following two engine maintenance procedures.						
A-15	Replace the Engine Oil and Filter - Gasoline/LPG Models					
A-16	Replace the Engine Air Filter					

MAINTENANCE TABLES

Table B

		Tools are required	New parts required	Warm engine required	Cold engine required	Dealer service suggested
B-1	Check the Engine Belt(s)					
B-2	Check the Radiator - Gasoline/LPG Models					
B-3	Check the Oil Cooler and Cooling Fins - Deutz Diesel Models					
B-4	Check the Exhaust System					
B-5	Check the Batteries					
B-6	Check the Hydraulic Tank Filter Condition Indicators					
B-7	Inspect the Electrical Wiring					
B-8	Inspect the Tires and Wheels (including lug nut torque)					
B-9	Confirm the Proper Brake Configuration					
B-10	Check the Oil Level in the Torque Hubs					
B-11	Check and Adjust the Engine Idle Mixture - Gasoline/LPG Models					
B-12	Check and Adjust the Engine RPM					
B-13	Test the Key Switch					
B-14	Test the Emergency Stop Buttons					
B-15	Test the Ground Control Override					
B-16	Test the Oscillate Lock-out (oscillating axle equipped models)					
B-17	Test the Platform Self-leveling					

MAINTENANCE TABLES

Table B, continued		Tools are required	New parts required	Warm engine required	Cold engine required	Dealer service suggested
B-18	Test the Service Horn					
B-19	Test the Foot Switch					
B-20	Test the Engine Speed Select					
B-21	Test the Fuel Select Operation - Gasoline/LPG Models					
B-22	Test the Drive Enable System					
B-23	Test the Drive Brakes					
B-24	Test the Drive Speed - Boom Stowed Position					
B-25	Test the Alarm Package (travel alarms, descent alarms, flashing beacons)					
B-26	Inspect the Extend and Retract Cables					
Every 500 hours, perform the following engine maintenance procedure.						
B-27	Replace the Engine Oil and Filter - Deutz Diesel Models					
Table C						
C-1	Check the Boom Wear Pads					
C-2	Check the Turntable Rotation Bearing Bolts					
C-3	Check the Free-wheel Configuration					
C-4	Grease the Turntable Rotation Bearing and Rotate Gear					
C-5	Replace the Torque Hub Oil					

MAINTENANCE TABLES

Table C, continued		Tools are required	New parts required	Warm engine required	Cold engine required	Dealer service suggested
C-6	Replace the Hydraulic Tank Filters					
C-7	Replace the Drive Loop Hydraulic Filter					
C-8	Replace the Diesel Fuel Filter - Deutz Diesel Models					
C-9	Replace the Gasoline Fuel Filter - Gasoline/LPG Models					
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/LPG Mixture - Gasoline/LPG Models					
C-14	Check and Adjust the Ignition Timing - Gasoline/LPG Models					
C-15	Check the Engine Valve Clearances - Deutz Diesel Models					

Table D

D-1	Change the Hydraulic Oil					
D-2	Change or Recondition the Engine Coolant - Gasoline/LPG Models					
D-3	Change the Fuel Lines					
D-4	Check the Engine Valve Clearances - Gasoline/LPG Models					
D-5	Check the Engine Cylinder Compression - Gasoline/LPG Models					
D-6	Clean the PCV Hoses and Fittings - Gasoline/LPG Models					

MAINTENANCE TABLES

Table D, continued

		Tools are required	New parts required	Warm engine required	Cold engine required	Dealer service suggested
D-7	Check the Engine Injection Pumps and Injectors - Deutz Diesel Models					
D-8	Check the Toothed Belt - Deutz Diesel Models					
D-9	Replace the Timing Belt - Ford Models					

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**
☐	**Quarterly 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 Operator's and Safety manuals			
A-2 Decals and placards			
A-3 Damage, loose or missing parts			
A-4 Engine oil level			
A-5 Engine coolant-gasoline			
A-6 Fuel leaks			
A-7 Hydraulic oil level			
A-8 Hydraulic leaks			
A-9 Tire pressure			
A-10 Platform and ground controls			
A-11 Auxiliary power			
A-12 Tilt sensor			
A-13 Limit switches			
A-14 Air filter indicator-Deutz			
Perform every 100 hours:			
A-15 Replace engine oil and filter-gasoline			
A-16 Replace air filter			

Checklist B	**Y**	**N**	**R**
Refer to Table B			
B-1 Engine belts(s)			
B-2 Engine radiator-gasoline			
B-3 Oil cooler and fins-Deutz			
B-4 Exhaust system			
B-5 Batteries			
B-6 Hydraulic tank filters			
B-7 Electrical wiring			
B-8 Tires and wheels			
B-9 Brake configuration			
B-10 Torque hub oil level			
B-11 Idle mixture-gasoline			
B-12 Engine RPM			
B-13 Key Switch			
B-14 Emergency Stop			
B-15 Ground control override			
B-16 Oscillate lock-out			
B-17 Platform leveling			
B-18 Service horn			
B-19 Foot Switch			
B-20 Engine speed select			
B-21 Fuel select-gasoline			
B-22 Drive enable system			
B-23 Drive brakes			
B-24 Drive speed-stowed			
B-25 Alarm package			
B-26 Extend/retract cables			
Perform every 500 hours:			
B-27 Replace engine oil and filter-Deutz			

Checklist C	**Y**	**N**	**R**
Refer to Table C			
C-1 Boom wear pads			
C-2 Turntable bearing bolts			
C-3 Free-wheel configuration			
C-4 Grease rotation bearing			
C-5 Torque hub oil			
C-6 Hydraulic tank filters			
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-gasoline			
C-13 Air/LPG mixture			
C-14 Ignition timing-gasoline			
C-15 Valves-Deutz			

Checklist D	**Y**	**N**	**R**
Refer to Table D			
D-1 Change hydraulic oil			
D-2 Engine coolant-gasoline			
D-3 Change fuel lines			
D-4 Valves-gasoline			
D-5 Compression-gasoline			
D-6 PCV hoses-gasoline			
D-7 Fuel injection -Deutz			
D-8 Toothed belt-Deutz			
D-9 Timing belt-Ford			

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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, quarterly, annually and every 2 years as specified on the maintenance report.

⚠WARNING Failure to perform each procedure as presented and scheduled may result in death, serious injury or substantial 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 Operator's and Safety Manuals

Maintaining the operator's 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 operator's 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 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 *Genie S-60 Operator's Manual* 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 and hydraulic tanks
- drive and rotation motors and torque hubs
- boom components and wear pads
- tires and wheels
- engine and related components
- limit switches, alarms, horn and beacons
- nuts, bolts and other fasteners
- cracks in welds or structural components

TABLE A PROCEDURES

A-4
Check the Engine Oil Level

Maintaining the 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.

Ford Engine LSG 423		
Oil capacity (including filter)	5 quarts	4.7 liters

Ford Engine LSG 423 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

Use oils meeting API classsification SF (labeled SF/CC or SF/CD) as they offer improved wear protection.

Deutz Engine F4L 1011		
Oil capacity (including filter)	11 quarts	10.5 liters

Deutz Engine F4L 1011 Oil viscosity requirements	
below 60°F / 15.5°C (synthetic)	5W-30
-10°F to 90°F / -23°C to 32°C	10W-40
above -4°F / -34°C	15W-40

Engine oil should have properties of API classification CC/SE, CD/SE, CC/SF or CD/SF grades.

A-5
Check the Engine Coolant Level - Gasoline/LPG Models

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

1 Check the fluid level in the coolant recovery tank. Add fluid 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 petroleum gas (LPG) tank by turning it counterclockwise.

TABLE A PROCEDURES

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

Deutz Diesel models:

- fuel tank, shutoff valve, hoses and fittings, fuel pump, fuel filter, fuel injection pumps, and 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.

A-7
Check the Hydraulic Oil Level

Maintaining the 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 boom is in the stowed position, then visually inspect the sight gauge located on the side of the hydraulic oil tank.

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

Hydraulic Oil Specifications

Hydraulic oil type	Dexron II equivalent	
Tank capacity	50 gallons	189 liters
Hydraulic system (including tank)	60 gallons	227 liters

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 tank—filters, fittings, hoses and turntable surface
- engine compartment—fittings, hoses, auxiliary power unit, main pump and turntable surface
- all cylinders
- all hydraulic manifolds
- boom
- the underside of the chassis
- ground area under the machine

A-9
Check the 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.

Tire Specifications		
Tire size		15-19.5NHS
Tire pressure	60 psi	4.14 bar

A-10
Test the Platform and Ground Controls

Testing the 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 operate smoothly.

2 Push in the Emergency Stop button to the OFF position.

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

NOTICE **Deutz Diesel models:** All functions should stop immediately. The engine will shut off after 2 to 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 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 the 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 component damage.

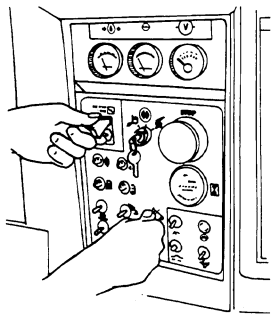
NOTICE Oscillating axle equipped machines only: From the stowed position, auxiliary power can not raise the boom above the lift interlock limit switch. Auxiliary power can raise the boom if it is already raised above the lift interlock limit switch.

TABLE A PROCEDURES

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

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

- boom up/down
- boom extend and retract
- turntable rotate right/left



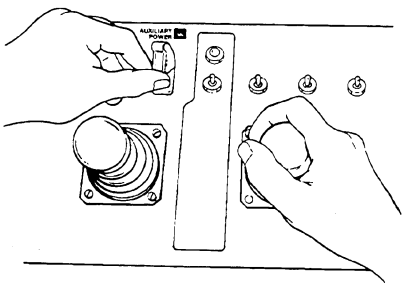
⊙ Result: Each function should operate smoothly.

3 Turn the key switch to platform control.

4 At the platform controls, pull out the Emergency Stop button to the ON position, then press down the foot switch.

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

- boom up/down
- boom extend and retract
- turntable rotate right/left
- steer right/left



A-12
Test the Tilt Sensor

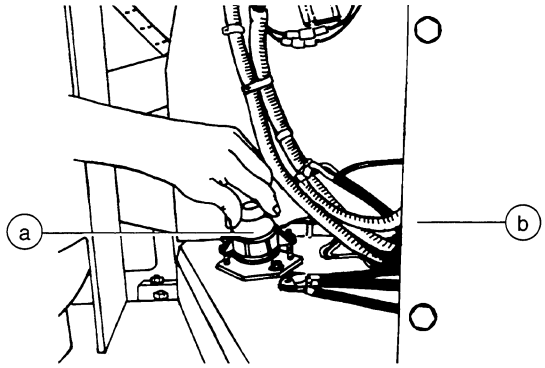
The tilt sensor sounds an alarm in the platform when the incline of the chassis exceeds 3 degrees.

NOTICE Select a level test area. The tilt alarm should not be sounding prior to test.

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 tilt sensor
b ground control box

TABLE A PROCEDURES

A-13
Test the Limit Switches

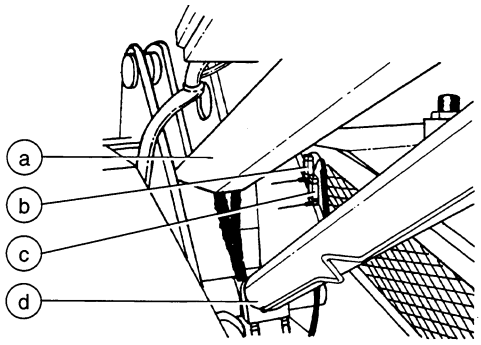
Detecting limit switch malfunctions is essential to safe machine operation.

Drive Limit Switches

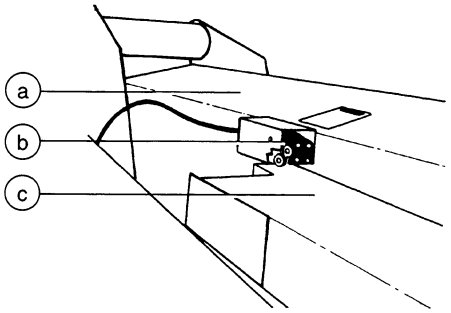
The drive limit switches are used to restrict drive speed when the boom is raised or extended, and to signal the oscillate cylinder to extend the lock-out wedges (oscillating axle equipped machines). An improperly functioning drive limit switch will allow the machine to operate in an unsafe position.

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

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



a boom assembly
b lift interlock switch
c drive limit switch
d lift cylinder



a boom assembly
b drive limit switch
c cable track assembly

2 Start the engine from the platform controls.

3 Slowly move the drive control handle off center.

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

4 Raise the boom above the drive limit switch.

5 Slowly move the drive control handle off center.

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

6 Lower the boom to the stowed position, then extend the boom past the extension drive limit switch.

7 Slowly move the drive control handle off center.

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

Drive Speed, maximum	
Boom raised or extended all models	1 foot per second 0.3 meter per second

TABLE A PROCEDURES

Drive Enable Limit Switch

The drive enable limit switch is located in the electrical rotary coupler. The switch activates a signal light to inform the operator that the boom is past either of the non-steering wheels and stops drive movement unless the drive enable override switch is used. An improperly functioning drive enable limit switch will allow the machine to operate in an unsafe position.

1 Start the engine from the platform controls then rotate the turntable to the left until the boom is past the left non-steering wheel.

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

2 Rotate the turntable to the right until the boom is past the right non-steering wheel.

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

Rotation Oscillate Lock-out Switch (oscillating axle equipped machines)

The rotation oscillate lock-out switch is located in the electrical rotary coupler. The switch signals the oscillate cylinder to extend the lock-out wedges when the boom is rotated past either of the non-steering wheels. An improperly functioning rotation oscillate lock-out switch will allow the machine to operate in an unsafe position.

1 Start the engine from the platform controls and then rotate the turntable to the left until the boom is past the left non-steering wheel.

⊙ Result: The oscillate cylinder should fully extend the lock-out wedges against the wedge stops.

2 Rotate the turntable to the right until the boom is past the right non-steering wheel.

⊙ Result: The oscillate cylinder should fully extend the lock-out wedges against the wedge stops.

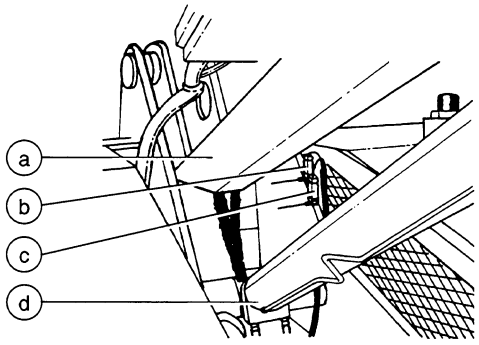
TABLE A PROCEDURES

Lift Interlock Limit Switch

On oscillating axle equipped machines, the lift interlock switch stops the boom from being raised if the oscillate lock-out wedges are not fully extended. An improperly functioning lift interlock switch will allow the machine to operate in an unsafe position.

1 With the engine off and the boom in the stowed position, visually inspect the lift interlock limit switch for the following:

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



a boom assembly
b lift interlock switch
c drive limit switch
d lift cylinder

2 Using auxiliary power, raise the boom past the lift interlock limit switch.

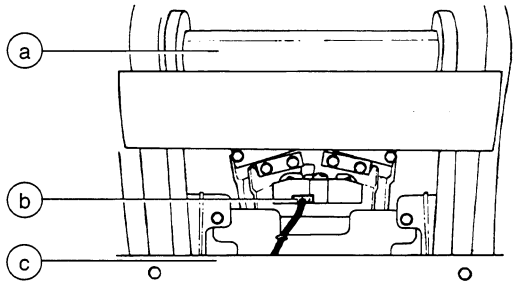
⊙ Result: When the boom passes the interlock limit switch, the boom should stop and not be able to continue to raise because the auxiliary power will not extend the oscillating lock-out wedges.

Cable Tension Safety Switch

The cable tension safety switch is located in the boom. The switch will shut off the engine when it detects a loose or broken cable. An improperly functioning cable tension safety switch will allow the machine to operate in an unsafe position.

1 With the engine off and the boom in the stowed position, visually inspect the cable tension safety switch for the following:

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



a boom assembly
b cable tension safety switch
c rear cover

2 Start the engine from the ground controls.

3 Manually depress the roller on the cable tension safety switch.

⊙ Result: The engine should shut off.

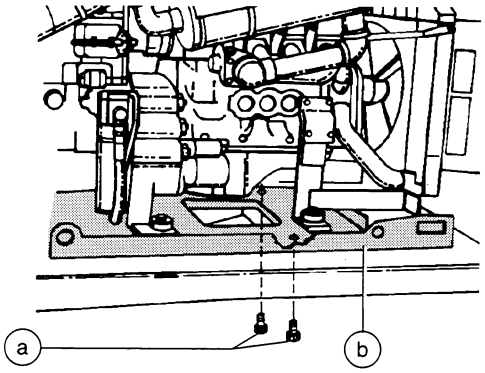
NOTICE **Deutz Diesel models:** The engine will shut off after 2 to 3 seconds.

TABLE A PROCEDURES

A-14
Check the Air Filter Condition Indicator - Deutz Diesel Models

Maintaining the engine air filter in good condition is essential to good engine performance and service life. The filter condition indicator will show when there is not enough air flowing through the filter.

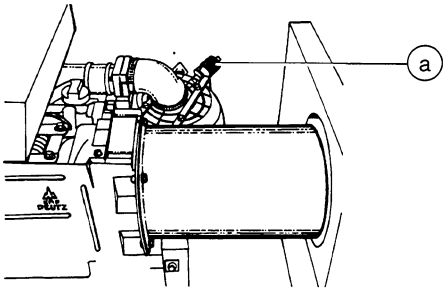
1 Remove the 2 bolts from the engine pivot plate. Swing the engine pivot plate away from the machine to access the air filter.



a pivot plate retaining bolts
b engine pivot plate

2 Visually inspect the condition indicator located on the side of the air filter canister.

⊙ Result: If the clear window of the indicator is showing the red plunger, the air filter is dirty or clogged and should be replaced. See A-16, Change the Engine Air Filter.



a air filter condition indicator

NOTICE When swinging the engine pivot plate back to its original position, align the air intake hoses.

A-15
Replace the Engine Oil and Filter - Gasoline/LPG Models

NOTICE Ford 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.

TABLE A PROCEDURES

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

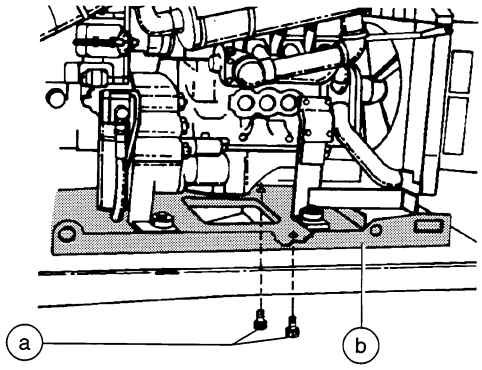
⚠CAUTION Beware of hot engine parts and oil. Contact with hot engine oil and/or engine parts may cause severe burns.

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

2 Remove the plug from the oil pan and allow all of the oil from the engine to drain into a suitable container.

3 Install the plug into the oil pan.

4 Remove the 2 bolts from the engine pivot plate. Swing the engine pivot plate away from the machine to access the oil filter.



a pivot plate retaining bolts
b engine pivot plate

5 Use an oil filter wrench and remove the filter.

6 Apply a thin layer of oil to the new oil filter gasket (filter part no. 28656). Then install the filter and tighten it securely by hand.

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

8 Fill the engine with new oil per specifications and install the filler cap.

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

10 Check the oil filter and the oil pan for leaks.

11 Swing the engine pivot plate back to its original position and replace the two retaining bolts.

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

Ford Engine LSG 423		
Oil capacity (including filter)	5 quarts	4.7 liters

Ford Engine LSG 423 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

Use oils meeting API classsification SF (labeled SF/CC or SF/CD) as they offer improved wear protection.

TABLE A PROCEDURES

A-16
Replace 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.

Gasoline/LPG Models

1 Remove the end cap from the air cleaner canister.

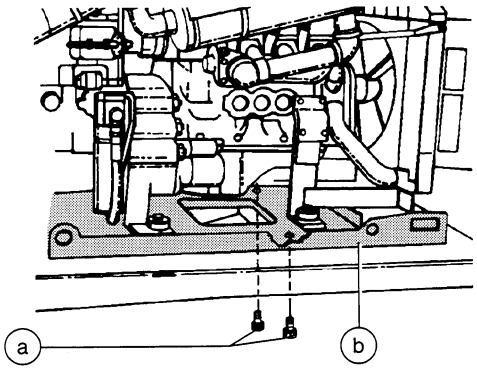
2 Remove the mounting fastener from the air filter, then remove the filter.

3 Insert the new filter (part no. 27916) and replace the mounting fastener.

4 Replace the end cap on the canister.

Deutz Diesel Models

1 Remove the 2 bolts from the engine pivot plate. Swing the engine pivot plate away from the machine to access the air filter.



a pivot plate retaining bolts
b engine pivot plate

2 Remove the end cap from the air cleaner canister, then remove the air filter.

3 Insert the new filter (part no. 29553) and replace the end cap on the canister.

NOTICE When swinging the engine pivot plate back to its original position, align the air intake hoses.

NOTICE Reset the filter condition indicator by pressing the tab located on the end of the indicator.

Table B Procedures

B-1
Check the Engine Belt(s)

Maintaining the engine belt(s) 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.

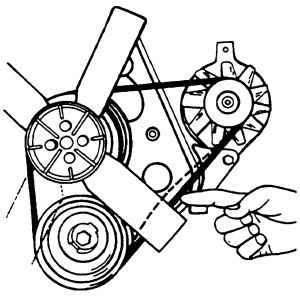
⚠CAUTION Beware of hot engine components. Contact with hot engine components may cause severe burns.

1 **Deutz Diesel models:** Remove front engine cover to access belt.

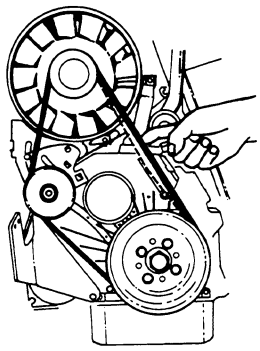
2 **All models:** Inspect the engine belt(s) for:

- cracking
- glazing
- separation
- breaks

3 Check the engine belt(s) for proper tension.



Ford engine



Deutz engine

Belt deflection - All models	3/8 inch to 1/2 inch 9mm to 12mm

B-2
Check the Radiator - Gasoline/LPG Models

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 Oil Cooler and Cooling Fins - Deutz Diesel Models

Maintaining the oil cooler in good condition is essential for good engine performance. Operating a machine with a damaged oil cooler may result in engine damage. Also, restricting air flow through the oil cooler will affect the performance of the cooling system.

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

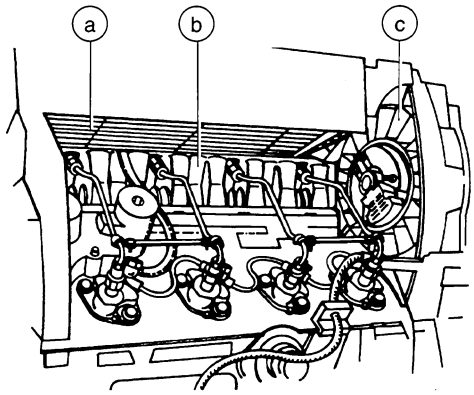
⚠CAUTION Beware of hot engine components. Contact with hot engine components may cause severe burns.

TABLE B PROCEDURES

Oil Cooler

1 Remove the engine side cover, then remove the oil cooler top cover.

2 Inspect the oil cooler for leaks and physical damage.

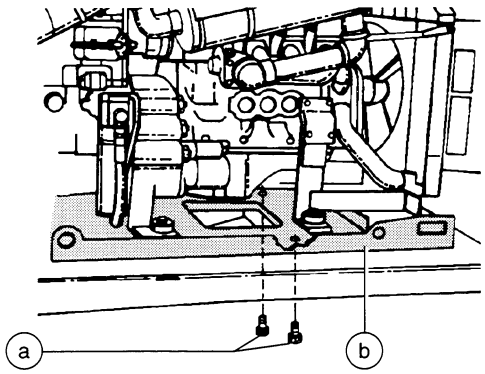


a oil cooler
b cylinder head cooling fins
c blower fins

3 Clean the oil cooler of debris and foreign material.

Cooling and Blower Fins

4 Remove the 2 bolts from the engine pivot plate. Swing the engine pivot plate away from the machine to inspect the blower fins.



a pivot plate retaining bolts
b engine pivot plate

5 Inspect the blower fins for physical damage.

6 Clean the blower fins of debris and foreign material.

7 Inspect the head cooling passages and fins for physical damage or foreign material, using a flashlight.

8 Clean the cylinder head cooling passages of debris and foreign material.

NOTICE When swinging the engine pivot plate back to its original position, align the air intake hoses.

B-4
Check the Exhaust System

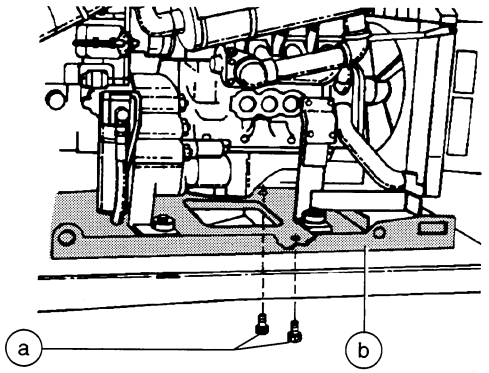
Maintaining the exhaust system is essential to good engine performance and service life. Operating the machine with a damaged or leaking exhaust system can cause component damage and unsafe operating conditions.

⚠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.

TABLE B PROCEDURES

1 **Deutz Diesel models:** Remove the 2 bolts from the engine pivot plate. Swing the engine pivot plate away from the machine to inspect the exhaust system.



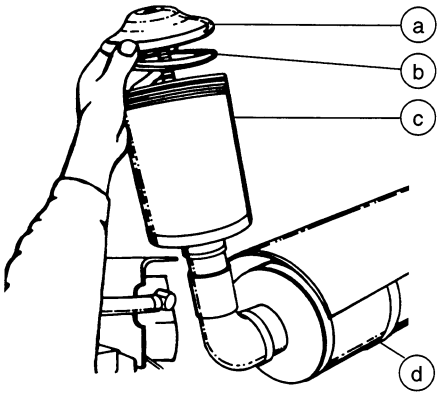
a pivot plate retaining bolts
b engine pivot plate

2 Be sure that all nuts and bolts are tight.

3 Inspect all welds for cracks.

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

5 Remove the top cover from the spark arrestor, then remove and clean the baffle plates.



a top cover
b baffle plate
c spark arrestor
d muffler

B-5
Check the Batteries

NOTICE The factory ships each machine with two sealed batteries; 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 downs and cable connections are tight.

TABLE B PROCEDURES

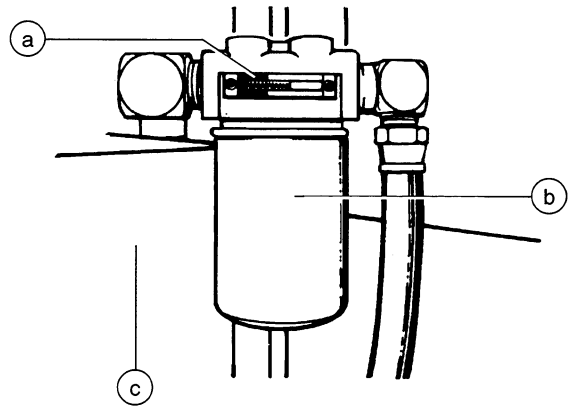
B-6
Check the Hydraulic Tank Filter Condition Indicators

Maintaining the hydraulic tank filters in good condition is essential to good system performance and safe machine operation. The filter condition indicators will show when the hydraulic flow is bypassing a clogged filter. If the filters are 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 Move the engine speed control switch to high idle (rabbit symbol).

3 Inspect the filter condition indicators.



a filter condition indicator
b filter
c hydraulic tank

⊙ Result: The filters should be operating in the GREEN area. If the display shows RED, this indicates that the hydraulic filter is being bypassed and the filter(s) should be replaced. See C-6, *Replace the Hydraulic Tank Filter.*

B-7
Inspect the 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, then raise the boom above the turntable covers.

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

4 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 boom
- boom to platform cable harness
- inside of the platform control box

TABLE B PROCEDURES

B-8
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 each lug nut for proper torque.

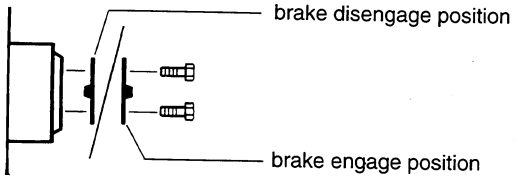
4 Check the pressure in each air-filled tire.

Tires and wheels		
Tire size		15-19.5NHS
Tire ply rating		12
Overall tire diameter	40 in	102cm
Tire pressure	60 psi	4.14 bar
Wheel diameter	19.5 in	49.5cm
Wheel width	12.2 in	31cm
Wheel lugs		9 @ 5/8-18
Lug nut torque	125 ft-lbs	169.5 Nm

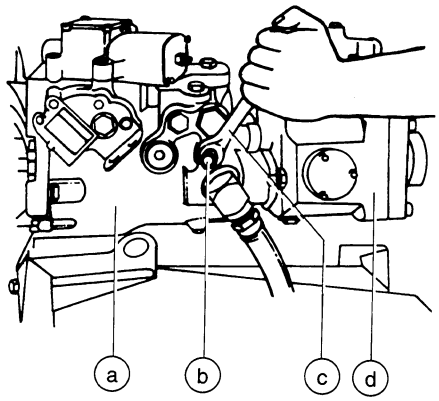
B-9
Confirm the Proper Brake Configuration

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 free-wheel valve
c screwdriver or wrench
d lift pump

NOTICE On 2WD models, the free wheel valve should always remain closed.

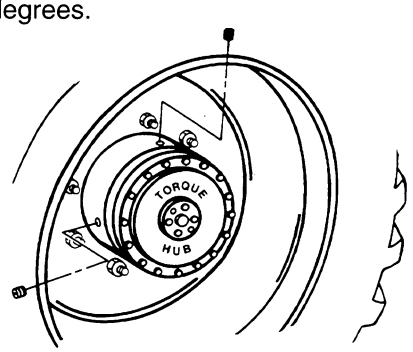
TABLE B PROCEDURES

B-10
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 component damage.

Drive Torque Hubs

1 Drive the machine to rotate the hub until the 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.

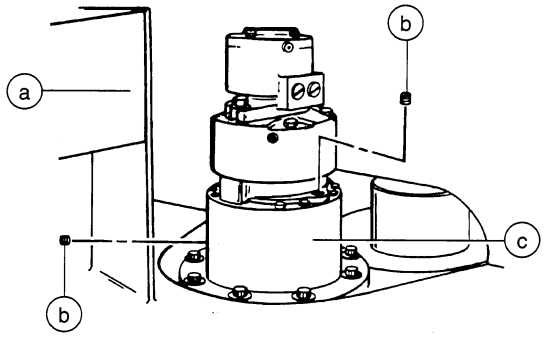
Drive Torque Hub Oil		
Capacity	40 fluid ounces	1.2 liters

Type: SAE 90 multipurpose hypoid gear oil - API service classification GL5

Turntable Rotate Torque Hub

1 Remove the plug located on the side of the hub and check the oil level.

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



a hydraulic function manifold
b plug
c torque hub

2 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.

Turntable Rotate Torque Hub Oil		
Capacity	17 fluid ounces	0.5 liters

Type: SAE 90 multipurpose hypoid gear oil - API service classification GL5

B-11
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 Liter Industrial Engine Service Manual* (Ford number: 194-216). Genie part number 29586.

TABLE B PROCEDURES

B-12
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.

Gasoline/LPG Models:

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

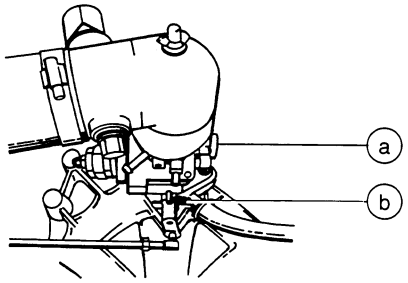
1 Disconnect the blue/black number 68 wire from the governor actuator.

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

⊙ Result: Low idle should be 900 rpm.

Skip to step 4 if the low idle rpm is correct.

3 Turn the idle adjustment screw on the carburetor clockwise to increase rpm or counterclockwise to decrease rpm.



Gasoline/LPG low idle adjustment
a carburetor
b adjustment screw

4 Turn the engine off and reconnect the blue/black number 68 wire to the governor actuator.

5 Start the engine from the ground controls.

⊙ Result: Low idle should be 1500 rpm.

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

⊙ Result: High idle should be 2600 rpm.

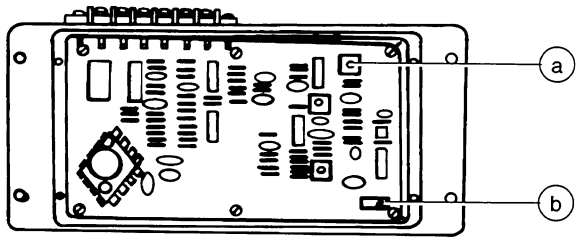
7 Turn the engine off.

If low and high idle rpm's are correct, disregard adjustment steps 8 and 9.

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

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

NOTICE Do not adjust any trim pot other than specified in this procedure.



Gasoline/LPG idle adjustment
a low idle adjustment
b high idle adjustment

10 Re-assemble the governor and recheck low and high idle.

Gasoline/LPG models	
Low idle - carburetor	900 rpm
Low idle - electronic governor	1500 rpm
High idle	2600 rpm

Deutz Diesel models:

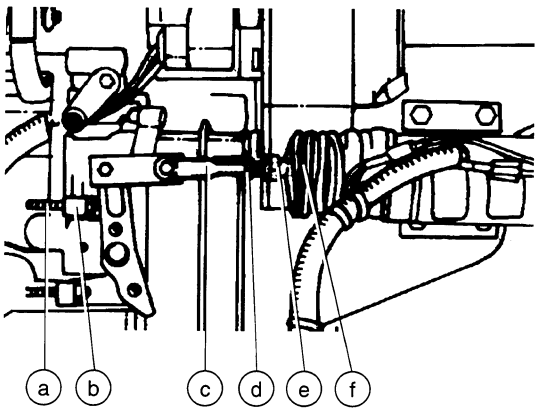
1 Connect an rpm gauge to the engine, and then start the engine from the ground controls.

⊙ Result: Low idle should be 1200 rpm.

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

TABLE B PROCEDURES

2 Loosen the lock nut, then turn the adjustment screw clockwise to increase the rpm or counterclockwise to decrease the rpm. Tighten the lock nut and recheck the rpm.



Deutz Diesel idle adjustment
a low idle adjustment screw
b lock nut
c yoke
d lock nut
e high idle adjustment nut
f solenoid boot

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

⊙ Result: High idle should be 2200 rpm.

If high idle rpm is correct, disregard adjustment step 4.

4 Loosen the yoke lock nut, then turn the adjustment nut and solenoid boot counterclockwise to increase the rpm or clockwise to decrease the rpm. Tighten the yoke lock nut and recheck the rpm.

Deutz Diesel models	
Low idle	1200 rpm
High idle	2200 rpm

B-13
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 Check the machine function from the **ground controls**.

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

4 Turn the key switch to ground control.

5 Check the 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.

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

TABLE B PROCEDURES

B-14
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 shut off and no machine functions should operate.

NOTICE **Deutz Diesel models:** All functions should stop immediately. The engine will shut off after 2 to 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 shut 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-15
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 cannot 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.

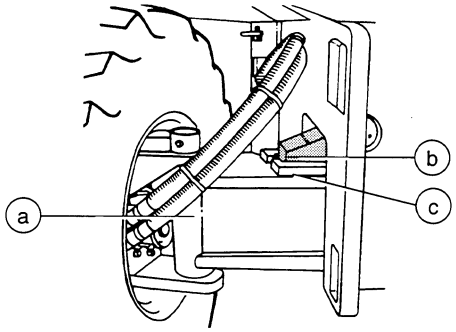
TABLE B PROCEDURES

B-16
Test the Oscillate Lock-out

NOTICE Perform this test on oscillating axle equipped machines only.

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

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



a oscillating axle
b oscillating lock-out wedge
c lock out wedge stop

⊙ Result: The oscillate cylinder should fully extend the lock-out wedges against the wedge stops.

2 Lower the boom to the stowed position.

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

B-17
Test the Platform Self-leveling

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 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 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 boom through a full cycle.

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

B-18
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 at both the ground and platform controls.

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

⊙ Result: The service horn should sound.

B-19
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, check 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.

B-20
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.

Low idle (turtle symbol) mode allows the operator to control individual boom functions only. Drive functions do not operate at low idle.

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.

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

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).

TABLE B PROCEDURES

⊙ 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.

Gasoline/LPG models	
Low idle	1500 rpm
High idle	2600 rpm
Deutz Diesel models	
Low idle	1200 rpm
High idle	2200 rpm

B-21
Test the Fuel Select Operation - Gasoline/LPG Models

The ability to select and switch between gasoline and LPG 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 LPG 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 LPG.

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-22
Test the Drive Enable System

Proper drive enable system operation is essential to safe machine operation. When the boom is past the non-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 may move in the opposite direction that the drive and steer controls are moved. An improperly functioning drive enable system may allow the machine to be moved into an unsafe position.

1 Start the engine from the platform controls.

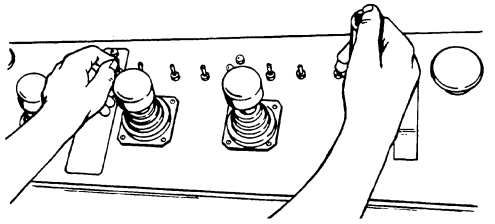
2 Rotate the turntable to the right until the boom is past the right non-steering wheel.

⊙ Result: the DRIVE ENABLE indicator light should turn on.

3 Slowly move drive control handle off center.

⊙ Result: the drive function should **not** operate.

4 Hold drive enable toggle switch to either side and slowly move the 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: the drive function should operate.

5 Rotate the turntable to the left until the boom is past the left non-steering wheel.

⊙ Result: the DRIVE ENABLE indicator light should come on.

6 Repeat steps 3 and 4.

TABLE B PROCEDURES

B-23
Test the Drive Brakes

Proper brake action is essential to safe machine operation. The drive 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.

⚠WARNING Be sure that the machine is not in free-wheel or partial free-wheel configuration. Refer to B-9 in this section, *Confirm the 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 Lower the boom into the stowed position.

4 Choose a point on the machine; i.e., contact patch of a 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.

Braking: high range, paved surface	
Stopping distance	6 to 6.5 feet 1.82 to 1.98 meters

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

B-24
Test the 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 40 feet (12.2m) apart.

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

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

4 Choose a point on the machine; i.e., contact patch of a 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.

Drive speed: stowed position, high range	
Gasoline/LPG models	6 seconds (±0.25 seconds) per 40 feet (12.2 meters)
Deutz Diesel models	7 seconds (±0.25 seconds) per 40 feet (12.2 meters)

B-25
Test the Alarm Package

The alarm package includes:

- travel alarms
- descent alarms
- flashing beacons

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

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

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 beacons should be on and flashing.

2 Move the boom switch to the DOWN position, hold for a moment and then release it.

⊙ Result: The descent alarms should sound when the boom switch is held down.

3 Turn the keyswitch to platform control.

4 At the platform controls pull out the Emergency Stop button to the ON position.

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

5 Press down the foot switch. Move the boom control handle to the DOWN position, hold for a moment and then release it.

⊙ Result: The descent alarms should sound when the control handle is held down.

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

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

B-26
Inspect the Extend and Retract Cables

Maintaining the extend and retract cables in good condition is essential to safe machine operation. Failure to find and replace damaged cables could result in unsafe operating conditions and may cause component damage.

1 Remove the turntable end cover.

2 Start the engine from the ground controls and raise the boom to a horizontal position. Extend the boom 2 feet (61cm).

3 At the pivot end of the boom, Inspect for the following:

- frayed or broken wire strands
- kinks in the cable
- corrosion
- paint or foreign materials on the cable
- cables are on the sheaves
- broken or damaged sheaves
- unusual or excessive sheave wear
- cable ends are properly secured

TABLE B PROCEDURES

4 Inspect the cables for the above items using the inspection holes on the sides of the boom tubes. Extend and retract the boom as necessary to line up the inspection holes.

5 Start the engine from the ground controls and retract the boom.

6 Remove the cotter pin and lock nut from both the extend and retract cables.

7 Check for proper torque of each extend and retract cable.

8 Re-install the lock nuts and then install new cotter pins.

Torque Specifications		
Extend and Retract Cables	20 ft-lbs	27 Nm

B-27
Replace the Engine Oil and Filter - Deutz Diesel Models

NOTICE Engine specifications require that this procedure be performed every 500 hours. Perform this procedure more often if dusty conditions exist.

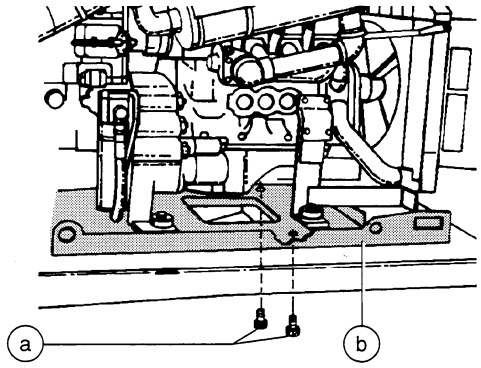
Periodic replacement of the engine oil and filter is essential to good engine performance. Operating the machine with an improper oil level or neglecting periodic oil and filter changes can damage engine components. A frequent check of elapsed machine hours against the hours noted on the oil filter will allow the inspector to anticipate and perform oil and filter changes at the 500 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 Remove the 2 bolts from the engine pivot plate. Swing the engine pivot plate away from the machine and remove the access hole cover.



a pivot plate retaining bolts
b engine pivot plate

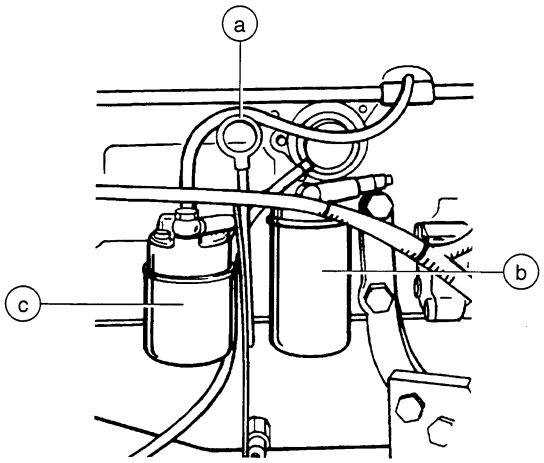
3 Swing the engine pivot plate back to its original position.

4 Remove the plug from the oil pan and allow all of the oil from the engine to drain into a suitable container.

5 Install the plug into the oil pan.

6 Use an oil wrench and remove the oil filter.

TABLE B PROCEDURES



a engine oil level dipstick
b oil filter
c fuel filter

7 Apply a thin layer of oil to the new filter gasket (filter part no. 29561). Then install the filter and tighten it securely by hand.

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

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

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

11 Check the oil filter and oil pan for leaks.

12 Install the access hole cover, then the engine pivot plate retaining bolts.

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

NOTICE When swinging the engine pivot plate back into its original position, align the air intake hoses.

Deutz Engine F4L 1011		
Oil capacity (including filter)	11 quarts	10.5 liters

Deutz Engine F4L 1011 Oil viscosity requirements	
Temperature below 60°F / 15.5°C (synthetic)	5W-30
-10°F to 90°F / -23°C to 32°C	10W-40
Temperature above -4°F / -34°C	15W-40

Engine oil should have properties of API classification CC/SE, CD/SE, CC/SF or CD/SF grades.

Table C Procedures

C-1
Check the Boom Wear Pads

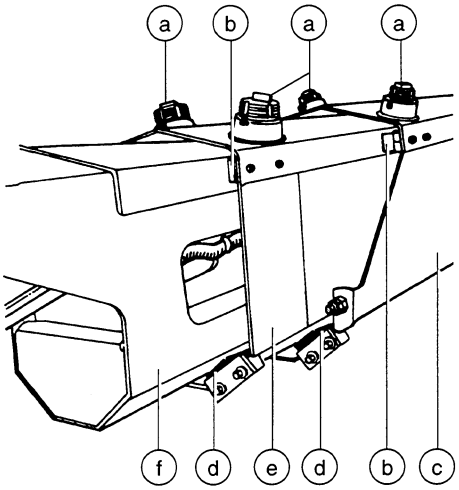
Maintaining the boom wear pads in good condition is essential to safe machine operation. Wear pads are placed on boom tubes to provide a low friction, replaceable surface between moving parts. Improperly shimmed wear pads or continued use of extremely worn wear pads may result in component damage and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

⚠CAUTION When adding shims or replacing wear pads, always maintain an equal amount of clearance between the boom tube being shimmed and the adjacent boom tube. Component damage may occur if boom tubes are not horizontally and vertically centered, with no binding or scraping through the entire extension cycle.

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

2 Extend the boom 10 inches (25cm).

3 Measure each side wear pad on the number 2 boom tube. Replace the pad if it is less than 5/16 inch (8mm) thick. If the pad is more than 5/16 inch (8mm) thick, shim as necessary to obtain zero clearance and zero drag.



a upper adjustable wear pad
b side wear pad
c number one boom tube
d lower wear pad
e number two boom tube
f number three boom tube

4 Measure each side wear pad on the number 1 boom tube. Replace the pad if it is less than 1/2 inch (14.3mm) thick. If the pad is more than 1/2 inch (14.3mm) thick, shim as necessary to obtain zero clearance and zero drag.

NOTICE When adding shims to the side wear pads, maintain equal amounts of shims on each side.

5 Measure each lower wear pad on the number 1 boom tube. Replace the pad if it is less than 3/8 inch (9.5mm) thick. If the pad is more than 3/8 inch (9.5mm) thick, shim as necessary to obtain 3/8 inch (9.5mm) clearance between the wear pad retainer and the adjacent boom tube.

6 Measure each lower wear pad on the number 2 boom tube. Replace the pad if it is less than 3/8 inch (9.5mm) thick. If the pad is more than 3/8 inch (9.5mm) thick, shim as necessary to obtain 3/16 inch (4.7mm) clearance between the wear pad retainer and the adjacent boom tube.

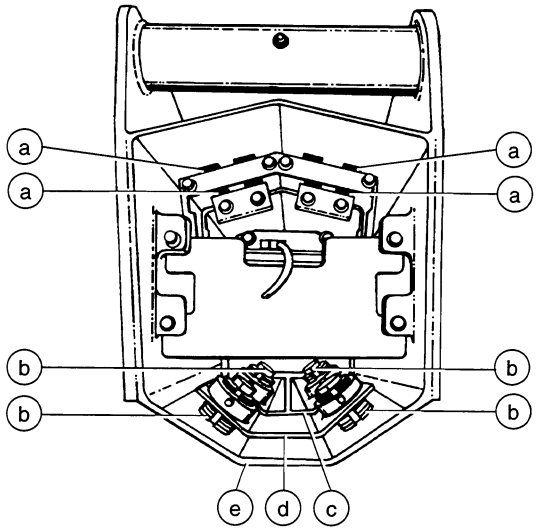
TABLE C PROCEDURES

7 Check each upper adjustable wear pad. Adjust the wear pad as necessary to obtain zero clearance and zero drag. Replace the adjustable wear pad if the threaded portion is below the top of the threaded collar.

8 Lower the boom to the stowed position.

9 Remove the turntable end cover to access the pivot end of the boom tubes.

10 Measure each upper wear pad on the number 2 and 3 boom tubes. Replace the pad if it is less than 3/8 inch (9.5mm) thick. If the pad is more than 3/8 inch (9.5mm) thick, shim as necessary to obtain 3/16 inch (4.7mm) clearance between the wear pad retainer and the adjacent boom tube.



a upper wear pad
b lower adjustable wear pad
c number three boom tube
d number two boom tube
e number one boom tube

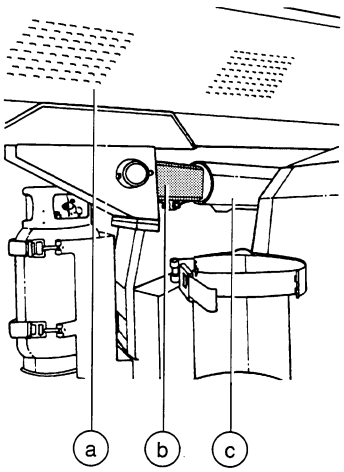
11 Check each lower adjustable wear pad. Adjust the wear pad as necessary to obtain zero clearance and zero drag. Replace the adjustable wear pad if the threaded portion is below the top of the threaded collar.

12 Extend and retract the boom through a full cycle to check for tight spots that could cause binding or scraping.

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 boom and place a safety chock on the lift cylinder. Carefully lower the boom onto the lift cylinder safety chock.



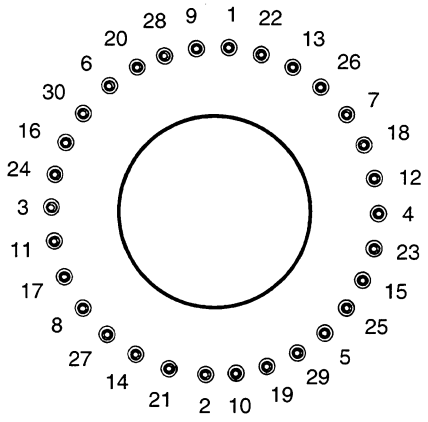
a boom
b safety chock
c lift cylinder

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

NOTICE The lift cylinder safety chock is available through Genie, (part no. 29753).

TABLE C PROCEDURES

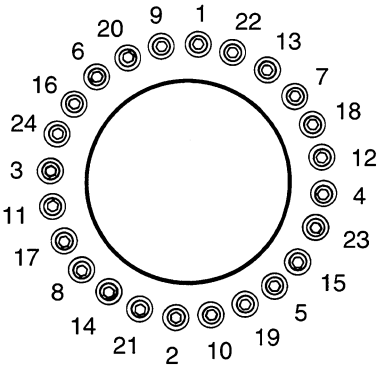
2 Be sure that each turntable mounting bolt is torqued in sequence to 110 foot-pounds (150 Newton meters).



Bolt torque sequence

3 Raise the boom slightly and remove the safety chock from the lift cylinder. Lower the boom to the stowed position.

4 Check to ensure that each bearing mounting bolt under the chassis is torqued in sequence to 110 foot-pounds (150 Newton meters).



Bolt torque sequence

C-3 Check the Free-wheel Configuration

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.

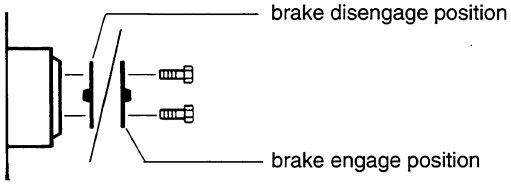
Non-steering wheels - all models:

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

2 Center a lifting jack of ample capacity (15000 lbs / 6804kg) under the chassis between the non-steering wheels.

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

4 Disengage the torque hubs by turning over the torque hub disconnect caps on each non-steering wheel hub.



5 Manually rotate each non-steering wheel.

⊙ Result: Each non-steering wheel should rotate with minimum effort.

6 Re-engage the torque hubs 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 torque hubs may result in death or serious injury and property damage.

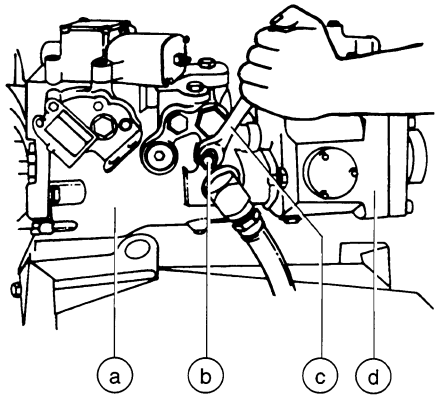
Steer wheels - 4WD models:

7 Chock the non-steering wheels to prevent the machine from rolling.

8 Position the lifting jack under the steering 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 free-wheel valve
c screwdriver or wrench
d lift pump

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.

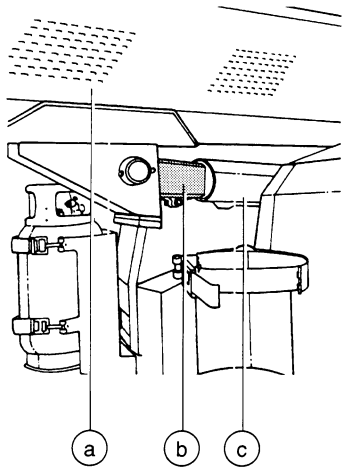
NOTICE On 2WD models, the free wheel valve should always remain closed.

C-4
Grease the Turntable Rotation Bearing and Rotate Gear

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

TABLE C PROCEDURES

1 Raise the boom and place a safety chock on the lift cylinder. Carefully lower the boom onto the lift cylinder safety chock.



a boom
b safety chock
c lift cylinder

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

NOTICE The lift cylinder safety chock is available through Genie, (part no. 29753).

2 Locate the grease fitting on the inside of the bearing.

3 Pump grease into the rotation bearing until you see it coming out of the bearing seal gap. Rotate the turntable in increments of 2 to 3 inches (5 to 7cm) at a time and repeat this step until the entire bearing has been greased.

4 Raise the boom slightly and remove the safety chock from the lift cylinder. Lower the boom to the stowed position.

5 Apply grease to each tooth of the drive gear, located under the turntable.

Oil Type	Multipurpose grease

C-5
Replace the Torque Hub Oil

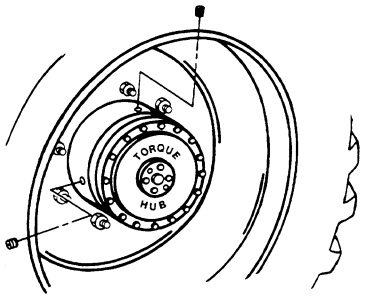
Replacing the torque hub oil is essential for good machine performance and service life. Failure to replace the torque hub oil at yearly intervals may cause the machine to perform poorly and continued use may cause component damage.

Drive torque hubs:

1 Select the drive 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.

Oil capacity per hub	40 fluid ounces	1.2 liters

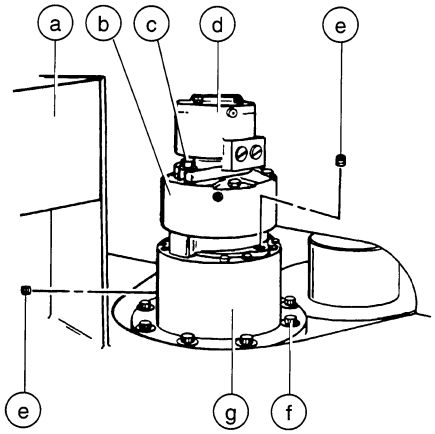
Type: SAE 90 multipurpose hypoid gear oil - API service classification GL5

TABLE C PROCEDURES

Turntable rotate torque hub

1 Secure the turntable from rotating with the turntable rotation lock.

2 Remove the motor/brake mounting bolts, and then remove the motor and brake from the torque hub and set them to the side.



a hydraulic function manifold
b brake
c motor/brake mounting bolts
d motor
e plug
f torque hub mounting bolts
g torque hub

3 Remove the torque hub mounting bolts, and then remove the torque hub from the machine.

4 Remove the plug from the top and one of the plugs from the side of the torque hub. Then drain the oil from the hub.

5 Install the torque hub. Torque the hub mounting bolts to 110 foot-pounds (150 Newton meters).

6 Install the brake and motor onto the torque hub.

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

Oil capacity per hub	17 fluid ounces	0.5 liters

Type: SAE 90 multipurpose hypoid gear oil - API service classification GL5

C-6
Replace the Hydraulic Tank Filters

Replacement of the hydraulic tank filters 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 filters 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 filters with an oil filter wrench.

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

3 Install the new filters (part no. 20293) and tighten them 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 filters and related components to be sure that there are no leaks.

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.

TABLE C PROCEDURES

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

NOTICE Perform this procedure with the engine off.

1 Open the engine side turntable cover and locate the drive loop hydraulic filter mounted on the engine near the ground controls.

2 Rotate the filter housing counterclockwise and remove the housing.

3 Remove the filter element from the housing.

4 Inspect the housing seal and replace it if necessary.

5 Install the new filter (part no. 20880) and hand tighten the housing onto the filter head. Clean up any oil that may have spilled during the installation procedure.

6 Start the engine from the ground controls.

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

C-8
Replace the Diesel Fuel Filter - Deutz Diesel Models

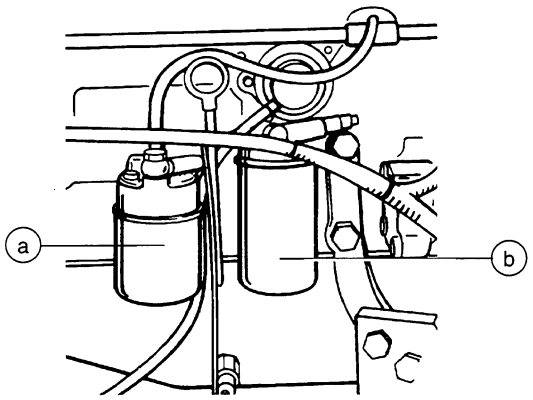
Replacing the diesel fuel filter is essential to good engine performance and service life. A dirty or clogged filter may cause the engine to perform poorly and continued use may cause component damage. Extremely dirty conditions may require that the filter be replaced more frequently.

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

NOTICE Perform this procedure with the engine off.

1 Turn the manual fuel shutoff valve, located at the fuel tank, to the closed position.

2 Remove the fuel filter with a filter wrench.



a fuel filter
b oil filter

3 Apply a thin layer of oil or diesel fuel to the new fuel filter gasket.

4 Install the new filter (part no. 29560) and tighten it securely by hand. Clean up any diesel fuel that might have spilled during the procedure.

5 Turn the manual fuel shutoff valve, located at the fuel tank, to the open position.

6 Start the engine from the ground controls, then inspect the fuel filter 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

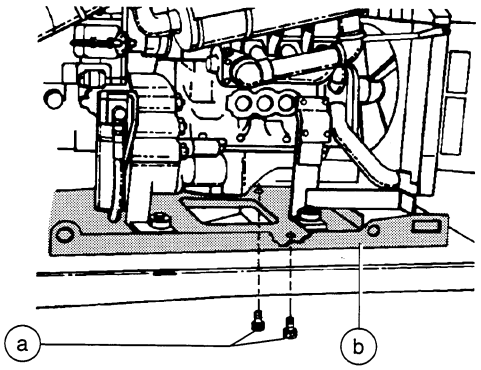
C-9
Replace the Gasoline Fuel Filter - Gasoline/LPG Models

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 2 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 retaining bolts
b engine pivot plate

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 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.

6 Swing the engine pivot plate back to its original position and replace the two retaining bolts.

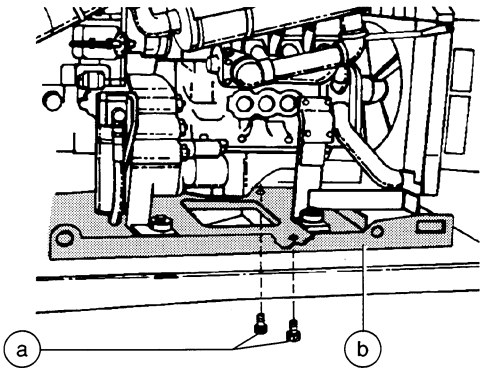
C-10
Replace the PCV Valve - Gasoline/LPG Models

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.

TABLE C PROCEDURES

1 Remove the 2 bolts from the engine pivot plate. Swing the engine pivot plate away from the machine to access the PCV valve.

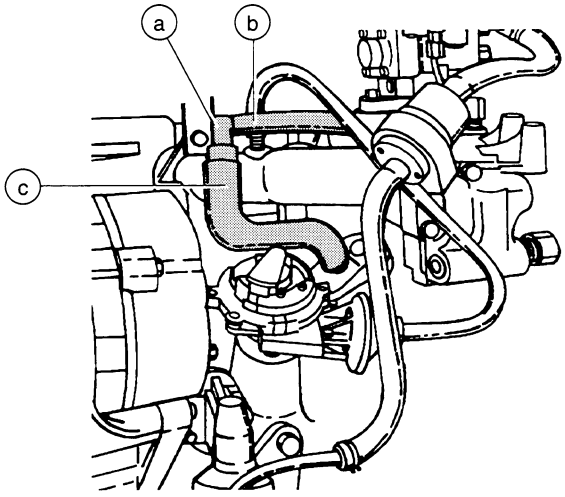


a pivot plate retaining bolts
b engine pivot plate

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

3 Install the new valve.

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



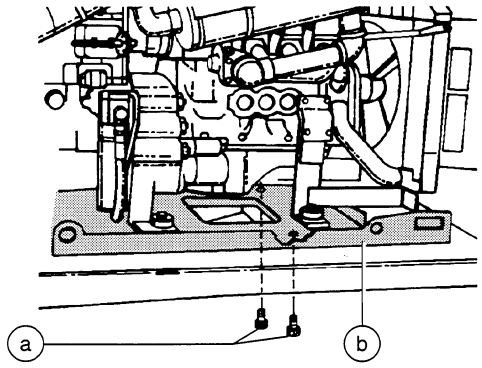
a PCV valve
b hose, PCV valve to carburetor
c hose, PCV valve to crankcase

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

A distributor cap and rotor 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.

1 Remove the 2 bolts from the engine pivot plate. Swing the engine pivot plate away from the machine to access the distributor.



a pivot plate retaining bolts
b engine pivot plate

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 the engine pivot plate back to its original position and replace the two retaining bolts.

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 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, then reconnect the plug wires. Be sure that each spark plug wire is attached to the correct spark plug.

Spark plug specifications	
Spark plug type	Motorcraft AWSF-42
Spark plug gap	0.042 to 0.046 inches 1.07 to 1.18mm
Spark plug torque	5 to 10 foot-pounds 7 to 14Nm

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

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

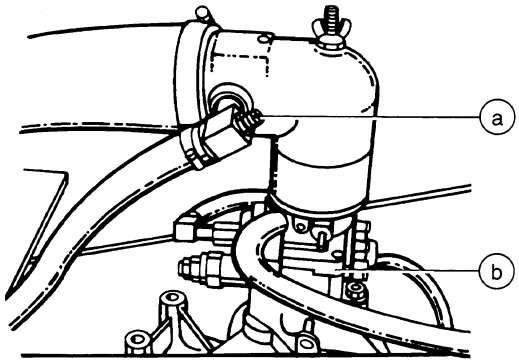
⚠ DANGER Engine fuels are combustible. Perform this procedure in an open, well-ventilated area away from heaters, sparks, flames and lighted tobacco. Always have an approved fire extinguisher within easy reach.

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

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

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

2 Loosen the high idle mixture adjustment lock nut.



a high idle mixture adjustment screw
b carburetor

TABLE C PROCEDURES

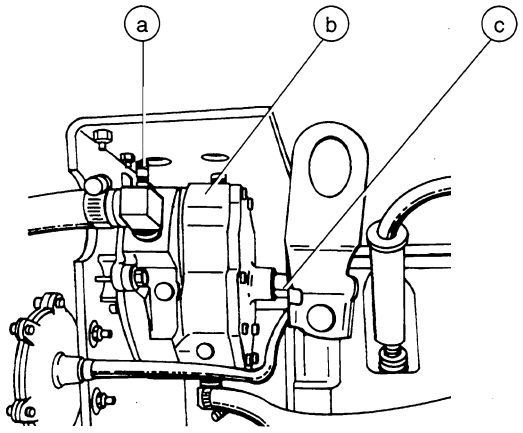
3 Load the system by pressing the boom retract switch, then move the engine speed control switch to high idle (rabbit symbol).

4 Adjust the high idle adjustment screw 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.



a low idle mixture adjustment screw
b LPG regulator
c pressure adjustment

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 Liter Industrial Engine Service Manual* (Ford number: 194-216). Genie part number 29586.

C-15
Check the Engine Valve Clearances - Deutz Diesel Models

Complete information to perform this procedure is available in the *Deutz FL 1011 Workshop Manual* (Deutz Number 02611642). Genie part number 29789.

Table D Procedures

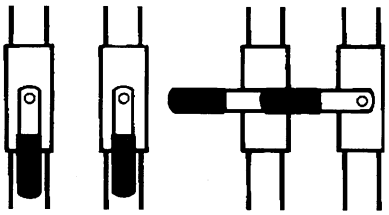
D-1
Change the Hydraulic Oil

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 boom in the stowed position.

1 Remove the fuel tank to access the suction line strainers. See Repair section, *How to Remove the Fuel Tank.*

2 Close the two hydraulic shutoff valves located at the hydraulic tank.



open closed

3 Remove the drain plug from the hydraulic tank.

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

4 Completely drain the tank into a container. See capacity specifications listed below.

5 Disconnect and cap the two suction hoses that are attached to the tank.

6 Remove the strainer assemblies from the tank.

7 Carefully clean any foreign material from the strainers.

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

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

10 Re-install the two suction hoses.

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

12 Clean up any oil that may have spilled and open the hydraulic tank valves.

13 Re-install the fuel tank.

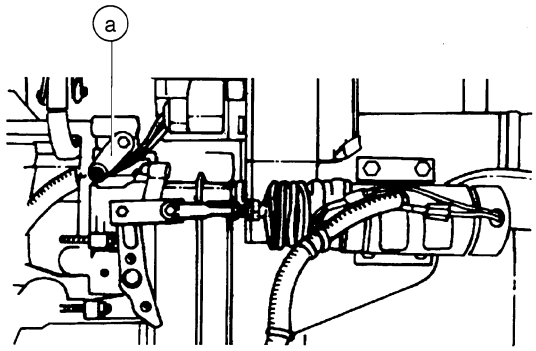
14 Prime the pump by doing the following:

Gasoline/LPG models:

Disconnect the ignition coil wire and isolate it from ground.

Deutz Diesel models:

Hold the manual fuel shutoff valve counterclockwise to the closed position.



a manual fuel shutoff valve

All models:

Crank the engine with the starter motor for 15 seconds.

15 Reconnect the wiring and start the engine from the ground controls. Check the hydraulic tank for leaks.

Hydraulic system		
Hydraulic tank capacity	50 gallons	189 liters
Hydraulic system capacity (including tank)	60 gallons	227 liters
Hydraulic fluid		Dexron II equivalent

TABLE D PROCEDURES

D-2
Change or Recondition the Engine Coolant - Gasoline/LPG Models

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.

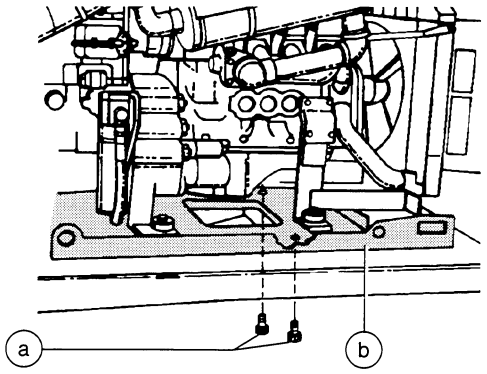
NOTICE Perform this procedure with the engine off.

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.

4 Remove the 2 bolts from the engine pivot plate. Swing the engine pivot plate away from the machine to access the radiator petcock.



a pivot plate retaining bolts
b engine pivot plate

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

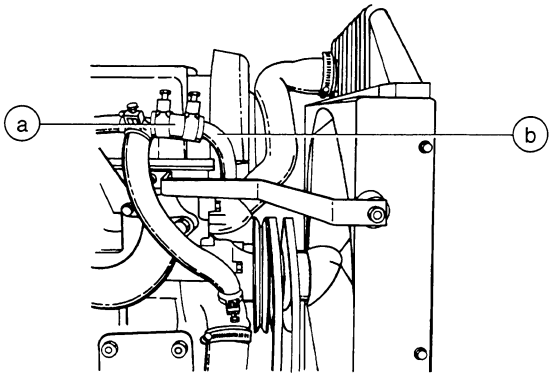
6 After all the coolant has drained, close the petcock. Reconnect the coolant return hose to the radiator.

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

8 Replace all coolant hoses and clamps.

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

10 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

11 Re-fill the radiator and then fill the coolant recovery tank to the NORMAL range.

12 Clean up any coolant spilled during this procedure.

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

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

Ford Engine LSG-423		
Coolant capacity	11.5 quarts	10.9 liters

TABLE D PROCEDURES

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.

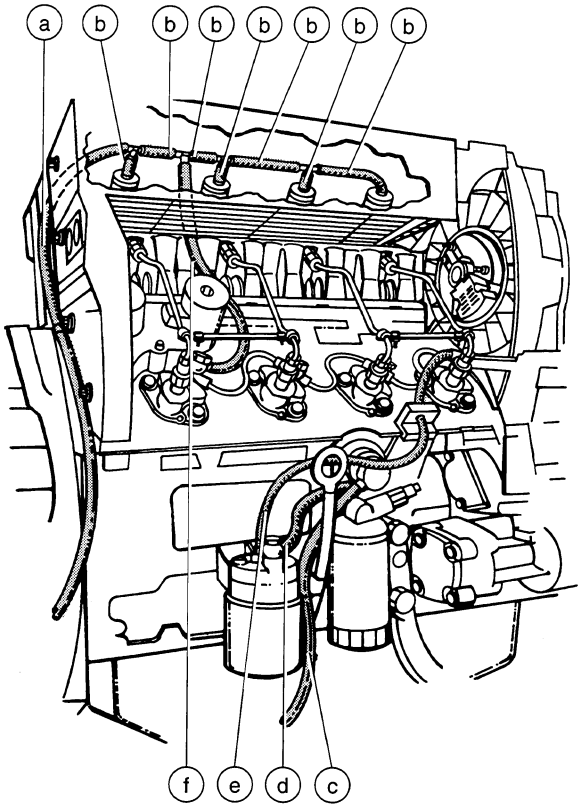
⚠ DANGER Engine fuels are combustible. Replace the fuel lines in an open, well-ventilated area away from heaters, sparks, flames and lighted tobacco. Always have an approved fire extinguisher within easy reach.

NOTICE Perform this procedure with the engine off.

1 Close the manual fuel shutoff valve, located next to the fuel tank.

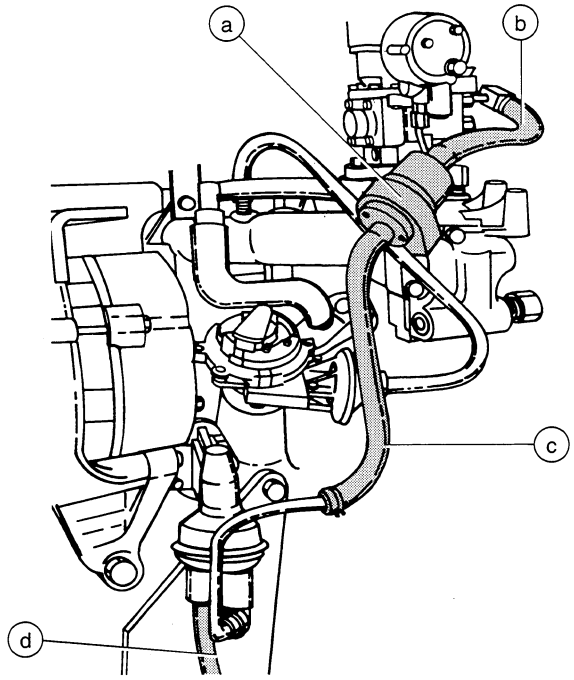
2 Remove and replace the fuel line hoses and clamps according to the following illustrations:

⚠ 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.



Deutz Diesel models
- a hose from the injector to the fuel tank
- b hoses connecting injectors
- c hose from the fuel shutoff valve to the fuel pump
- d hose from the fuel pump to the fuel filter
- e hose from the fuel filter to the injection pump
- f hose from the injection pump to the injectors

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

3 Clean up any fuel that may have spilled during this procedure.

4 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 Liter 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 Liter Industrial Engine Service Manual* (Ford number: 194-216). Genie part number 29586.

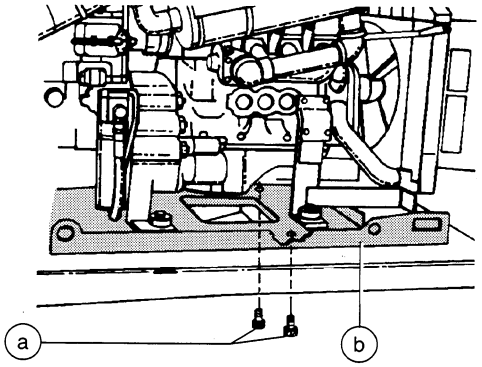
TABLE D PROCEDURES

D-6
Clean the 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.

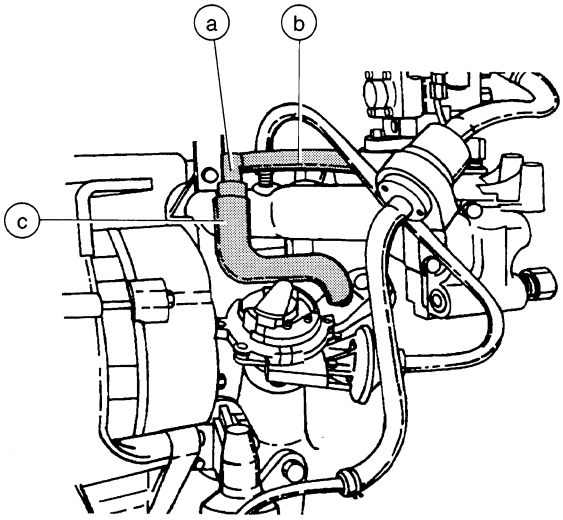
NOTICE Perform this procedure with the engine off.

1 Remove the 2 bolts from the engine pivot plate. Swing the engine pivot plate away from the machine to access the PCV hoses.



a pivot plate retaining bolts
b engine pivot plate

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



(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 Injection Pumps and Injectors - Deutz Diesel Models

Complete information to perform this procedure is available in the *Deutz FL 1011 Workshop Manual* (Deutz number: 0291 1942). Genie part number 29789.

D-8
Check the Toothed Belt - Deutz Diesel Models

Complete information to perform this procedure is available in the *Deutz FL 1011 Operation Manual* (Deutz number: 0297 4706 EN). Genie part number 29790.

D-9
Replace the Timing Belt - Gasoline/LPG Models

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

Troubleshooting Flow Charts



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 S-60 Operator's Manual.*
- ☑ Be sure that all necessary tools and test equipment are available and ready for use.
- ☑ Read each appropiate flow chart thoroughly. Attempting shortcuts may produce hazardous conditions.
- ☑ Be aware of the following hazards and follow generally accepted safe workshop practices.

⚠DANGER Crushing hazard. When testing or replacing any hydraulic component, always support the structure and secure it from movement.

⚠DANGER Electrocution hazard. Contact with electrically charged circuits may result in death or serious injury. Remove all rings, watches and other jewelry.

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

NOTICE Perform all troubleshooting on a firm level surface.

NOTICE Two persons will be required to safely perform some troubleshooting procedures.

TROUBLESHOOTING FLOW CHARTS

About This Section

When a malfunction is discovered, the flow charts in this section will help a service professional pinpoint the cause of the problem. To use this section, basic hand tools and certain pieces of test equipment are required—voltmeter, ohmmeter, pressure gauges.

The location of terminals mentioned in this section can be found on the appropriate electrical or hydraulic schematics provided in section 6, *Schematics*.

Since various degrees of a particular function loss may occur, selecting the appropriate flow chart may be troublesome. When a function will not operate with the same speed or power as a machine in good working condition, refer to the flow chart which most closely describes the problem.

General Repair Process

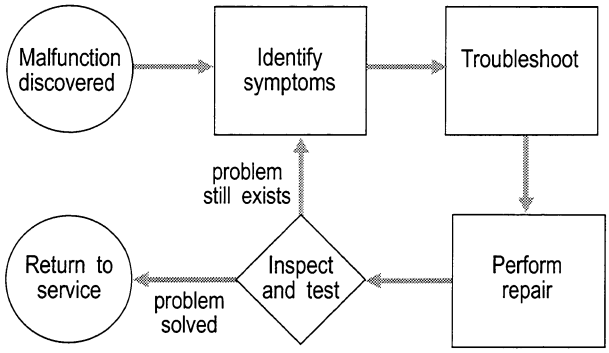


Chart 1

Engine Will Not Crank Over

Be sure the key switch is in the appropriate position.

Be sure the emergency stop buttons are pulled up into the on position.

Be sure the circuit breaker(s) is not tripped.

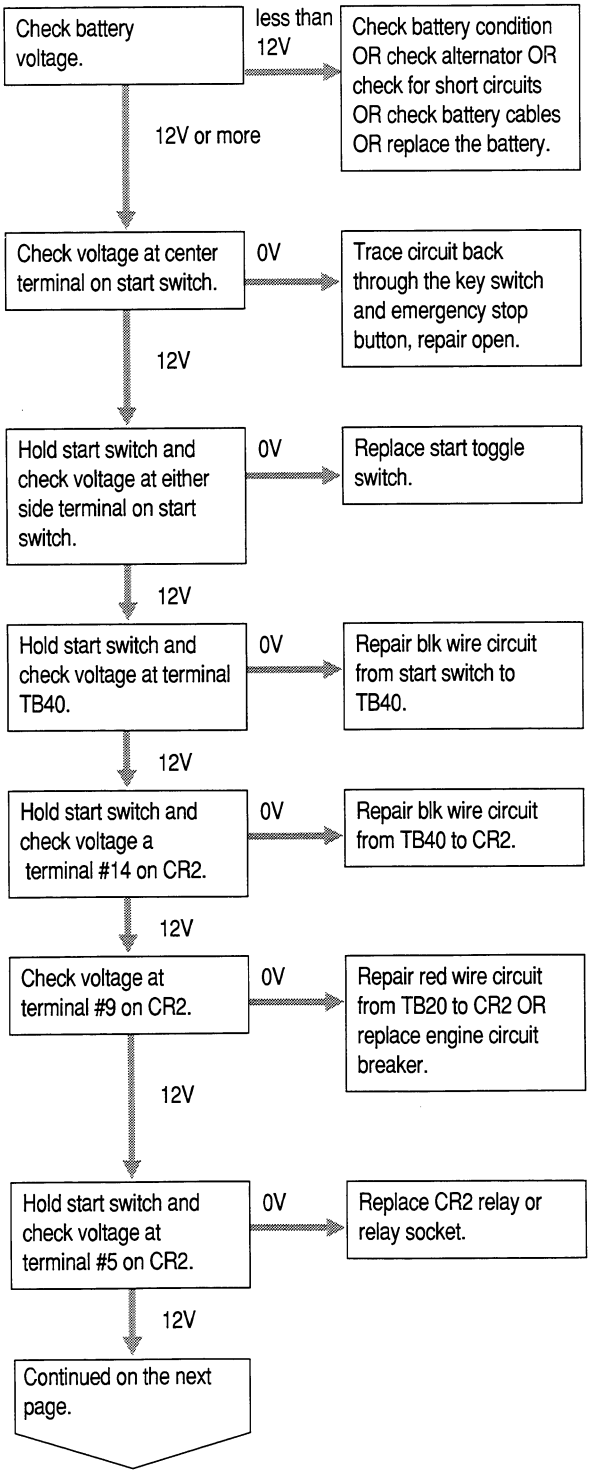


CHART 1

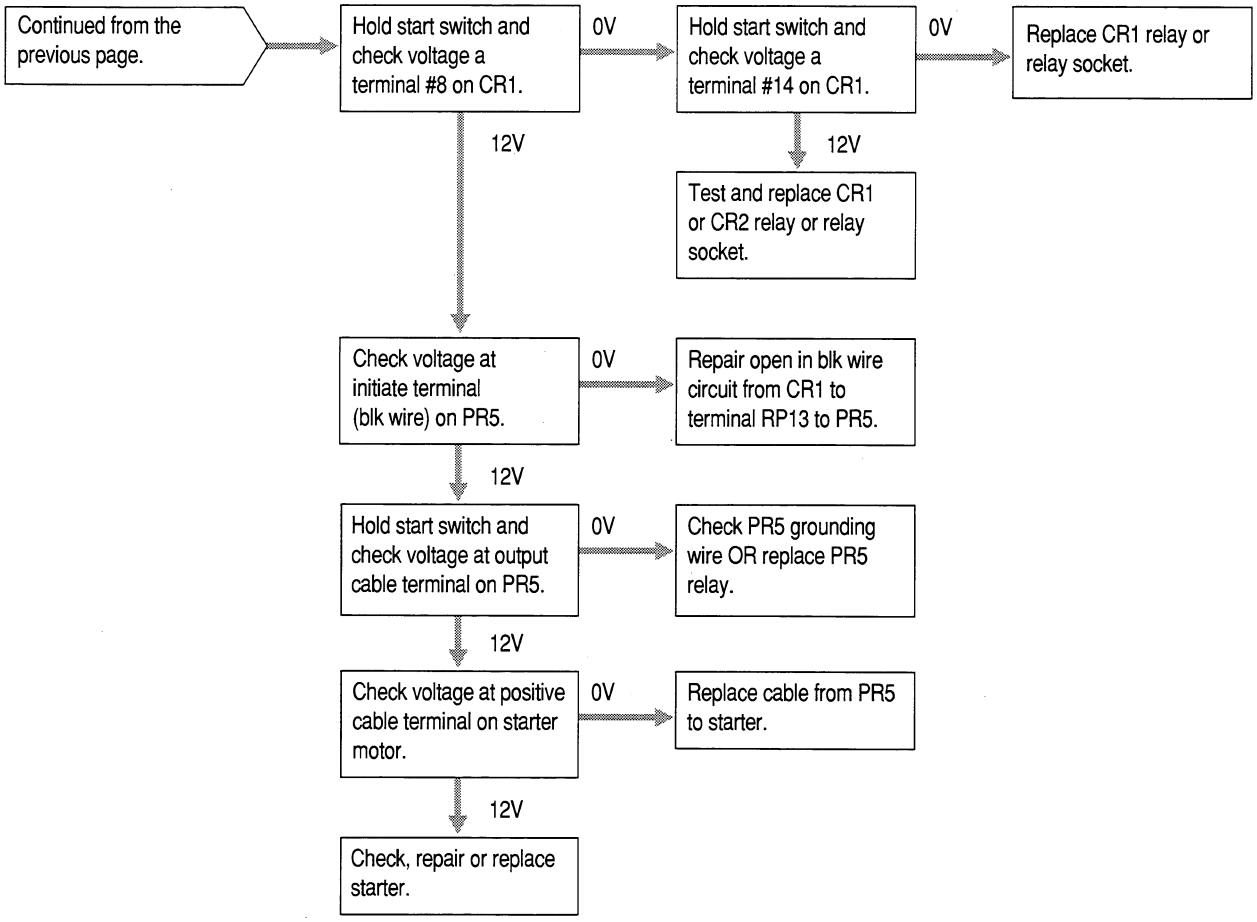

Continued from the previous page.
Hold start switch and check voltage a terminal #8 on CR1.
0V
Hold start switch and check voltage a terminal #14 on CR1.
0V
Replace CR1 relay or relay socket.
12V
12V
Test and replace CR1 or CR2 relay or relay socket.
Check voltage at initiate terminal (blk wire) on PR5.
0V
Repair open in blk wire circuit from CR1 to terminal RP13 to PR5.
12V
Hold start switch and check voltage at output cable terminal on PR5.
0V
Check PR5 grounding wire OR replace PR5 relay.
12V
Check voltage at positive cable terminal on starter motor.
0V
Replace cable from PR5 to starter.
12V
Check, repair or replace starter.

Chart 2A

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.

Be sure that automatic choke is not sticking closed.

Perform following tests in gasoline mode only.

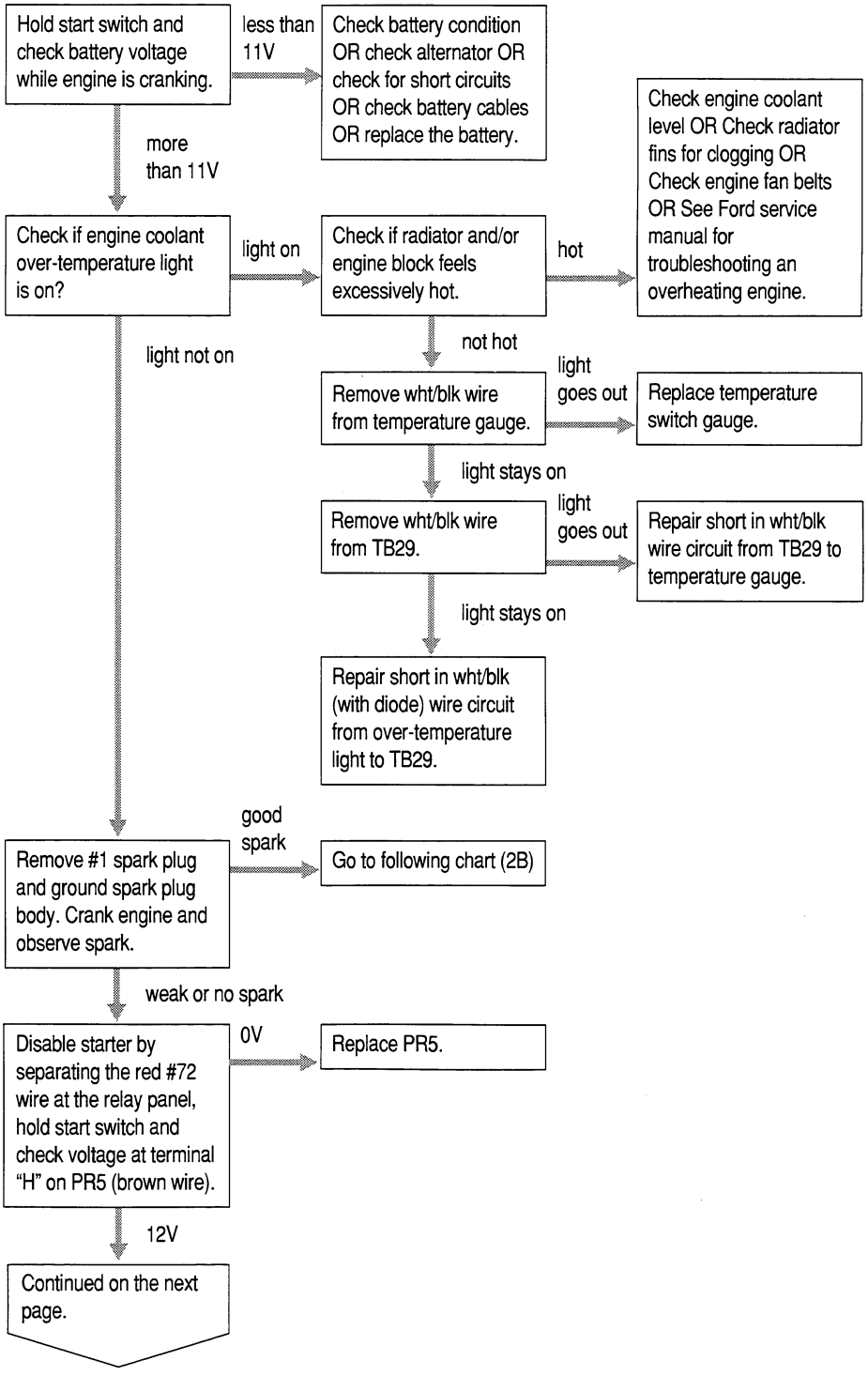


CHART 2A

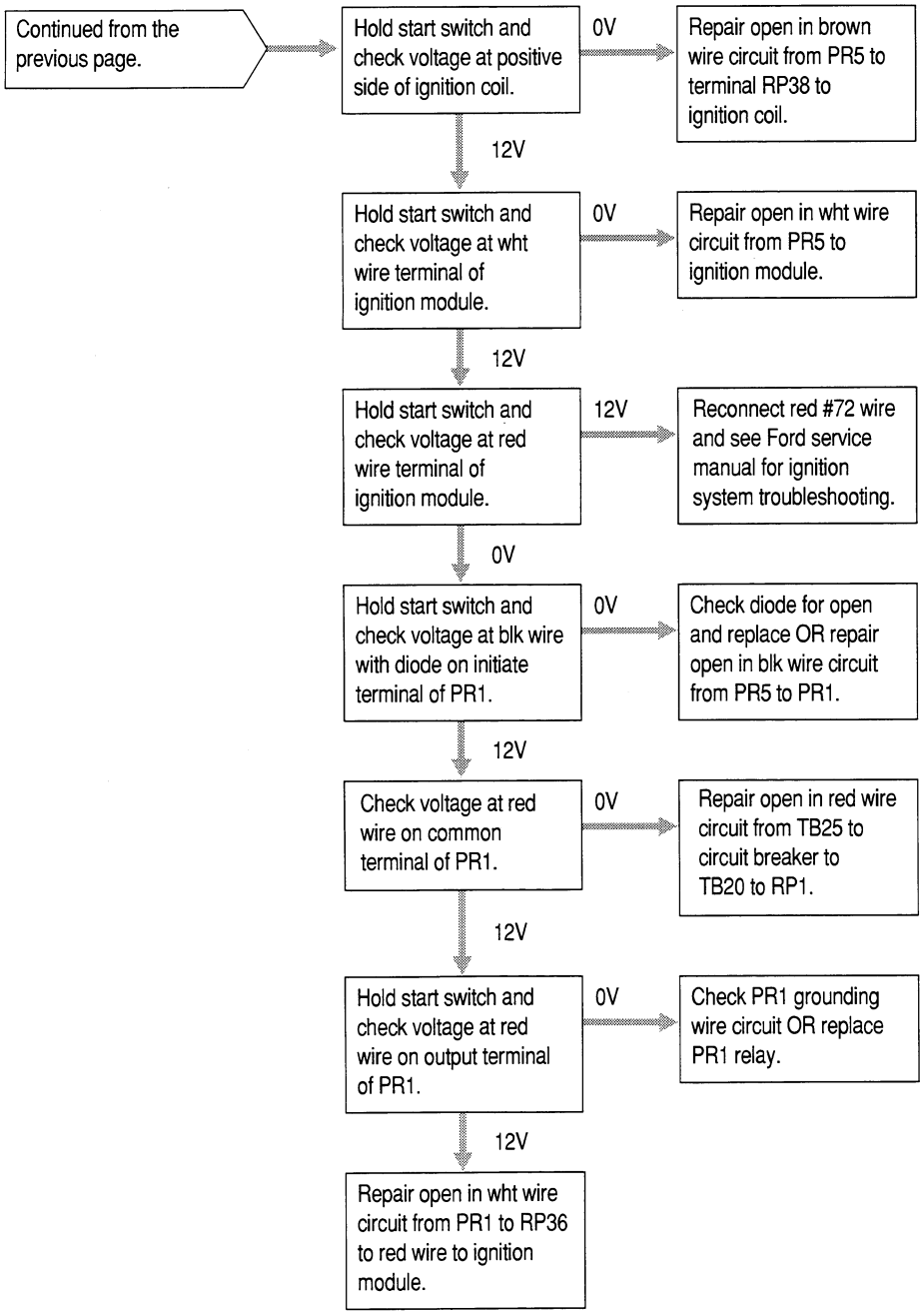

Continued from the previous page.
Hold start switch and check voltage at positive side of ignition coil.
0V
Repair open in brown wire circuit from PR5 to terminal RP38 to ignition coil.
12V
Hold start switch and check voltage at wht wire terminal of ignition module.
0V
Repair open in wht wire circuit from PR5 to ignition module.
12V
Hold start switch and check voltage at red wire terminal of ignition module.
12V
Reconnect red #72 wire and see Ford service manual for ignition system troubleshooting.
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
Check voltage at red wire on common terminal of PR1.
0V
Repair open in red wire circuit from TB25 to circuit breaker to TB20 to RP1.
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
Repair open in wht wire circuit from PR1 to RP36 to red wire to ignition module.

Chart 2B

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

Continuation of "good spark" fault path.

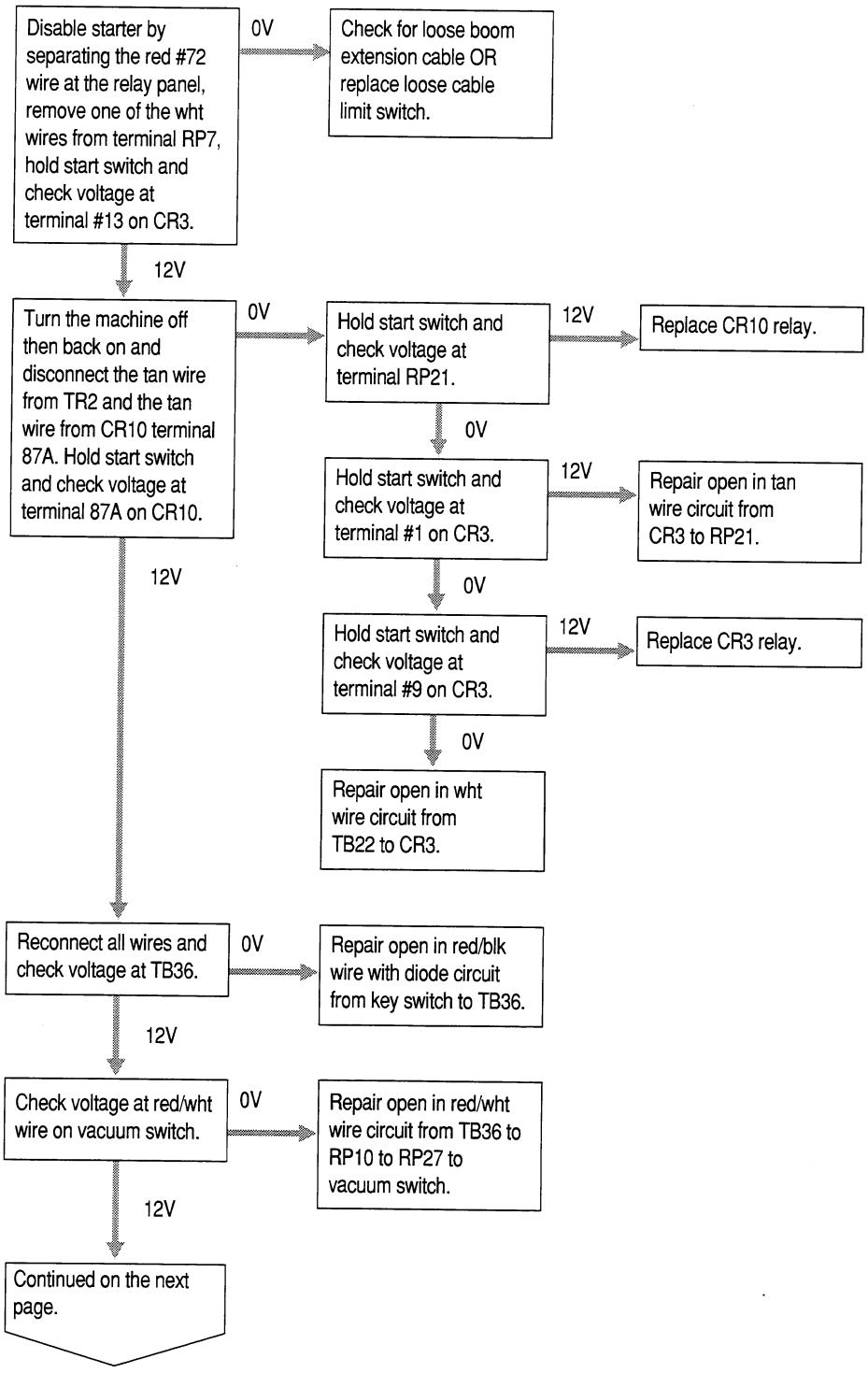


CHART 2B

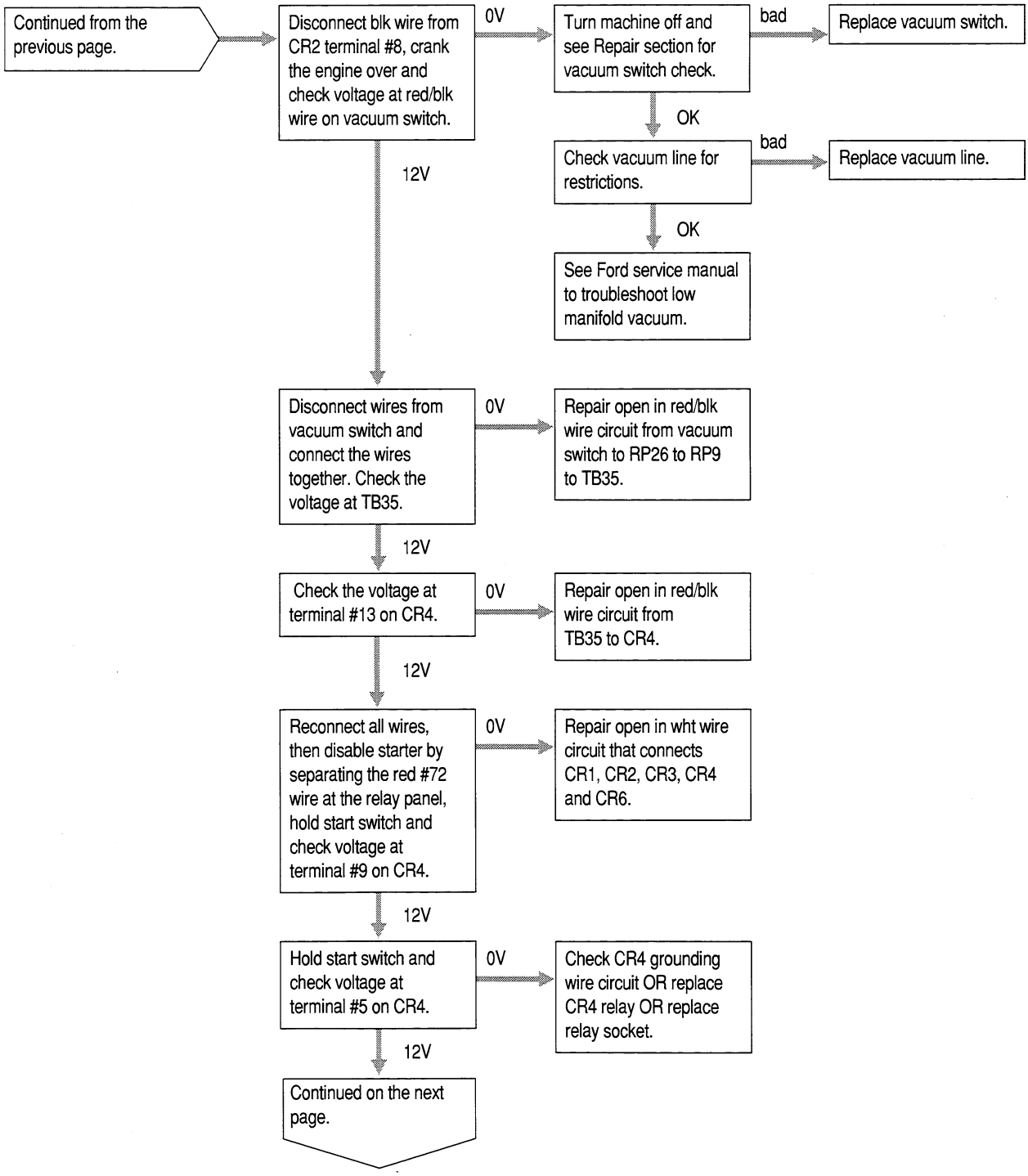

Continued from the previous page.
Disconnect blk wire from CR2 terminal #8, crank the engine over and check voltage at red/blk wire on vacuum switch.
0V
Turn machine off and see Repair section for vacuum switch check.
bad
Replace vacuum switch.
OK
Check vacuum line for restrictions.
bad
Replace vacuum line.
OK
See Ford service manual to troubleshoot low manifold vacuum.
12V
Disconnect wires from vacuum switch and connect the wires together. Check the voltage at TB35.
0V
Repair open in red/blk wire circuit from vacuum switch to RP26 to RP9 to TB35.
12V
Check the voltage at terminal #13 on CR4.
0V
Repair open in red/blk wire circuit from TB35 to CR4.
12V
Reconnect all wires, then disable starter by separating the red #72 wire at the relay panel, hold start switch and check voltage at terminal #9 on CR4.
0V
Repair open in wht wire circuit that connects CR1, CR2, CR3, CR4 and CR6.
12V
Hold start switch and check voltage at terminal #5 on CR4.
0V
Check CR4 grounding wire circuit OR replace CR4 relay OR replace relay socket.
12V
Continued on the next page.

CHART 2B

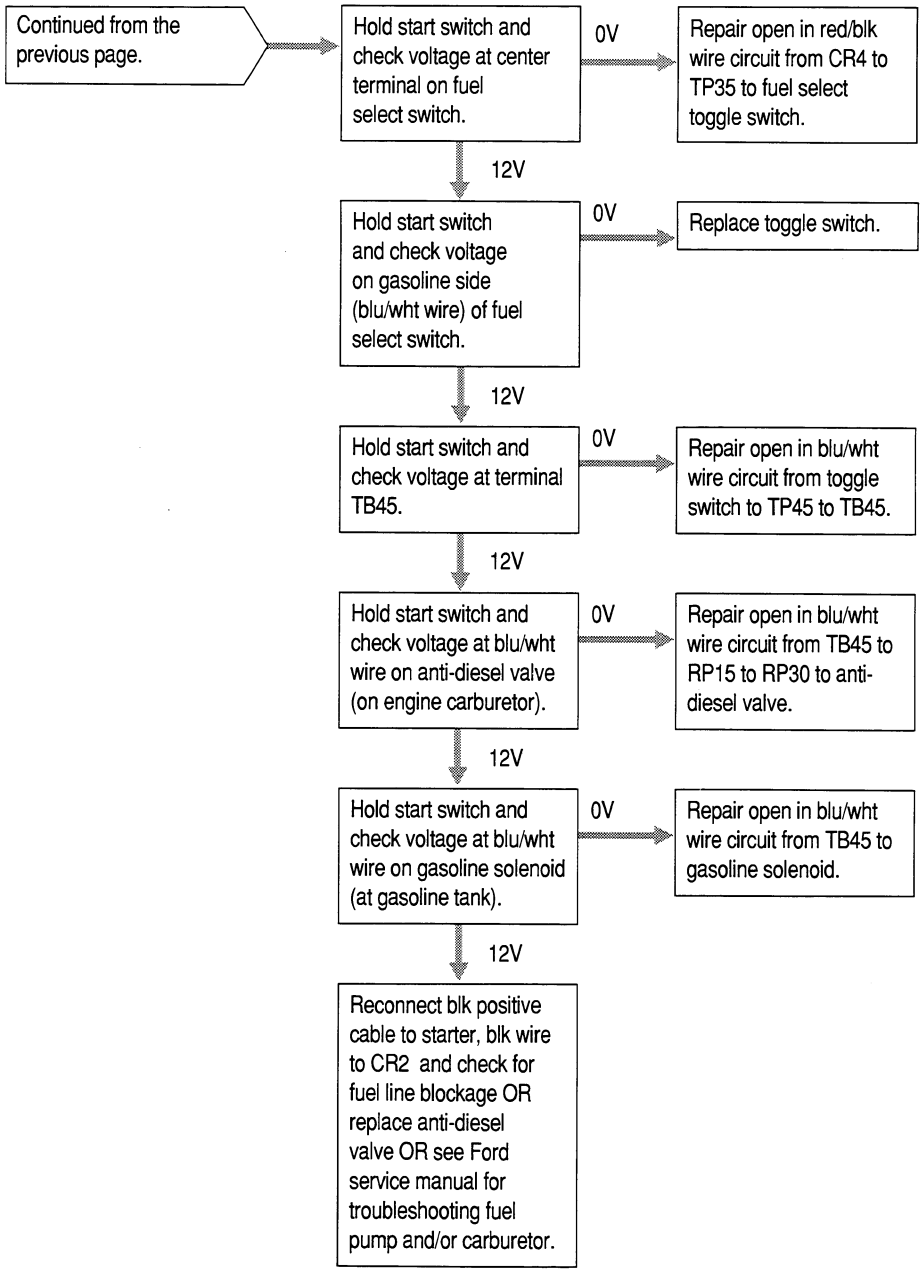

Continued from the previous page.
Hold start switch and check voltage at center terminal on fuel select switch.
0V
Repair open in red/blk wire circuit from CR4 to TP35 to fuel select toggle switch.
12V
Hold start switch and check voltage on gasoline side (blu/wht wire) of fuel select switch.
0V
Replace toggle switch.
12V
Hold start switch and check voltage at terminal TB45.
0V
Repair open in blu/wht wire circuit from toggle switch to TP45 to TB45.
12V
Hold start switch and check voltage at blu/wht wire on anti-diesel valve (on engine carburetor).
0V
Repair open in blu/wht wire circuit from TB45 to RP15 to RP30 to anti-diesel valve.
12V
Hold start switch and check voltage at blu/wht wire on gasoline solenoid (at gasoline tank).
0V
Repair open in blu/wht wire circuit from TB45 to gasoline solenoid.
12V
Reconnect blk positive cable to starter, blk wire to CR2 and check for fuel line blockage OR replace anti-diesel valve OR see Ford service manual for troubleshooting fuel pump and/or 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 level.

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

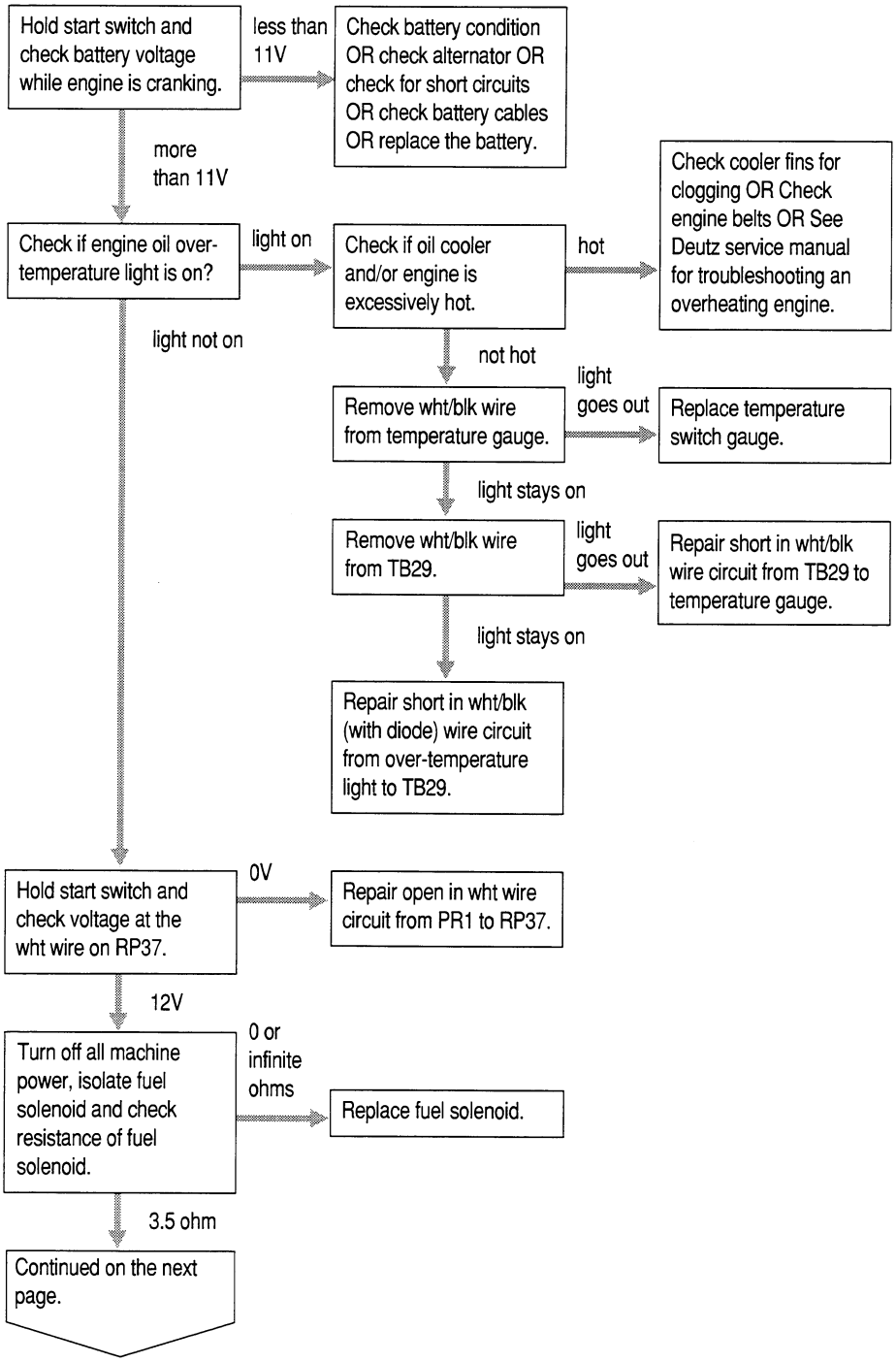


CHART 3

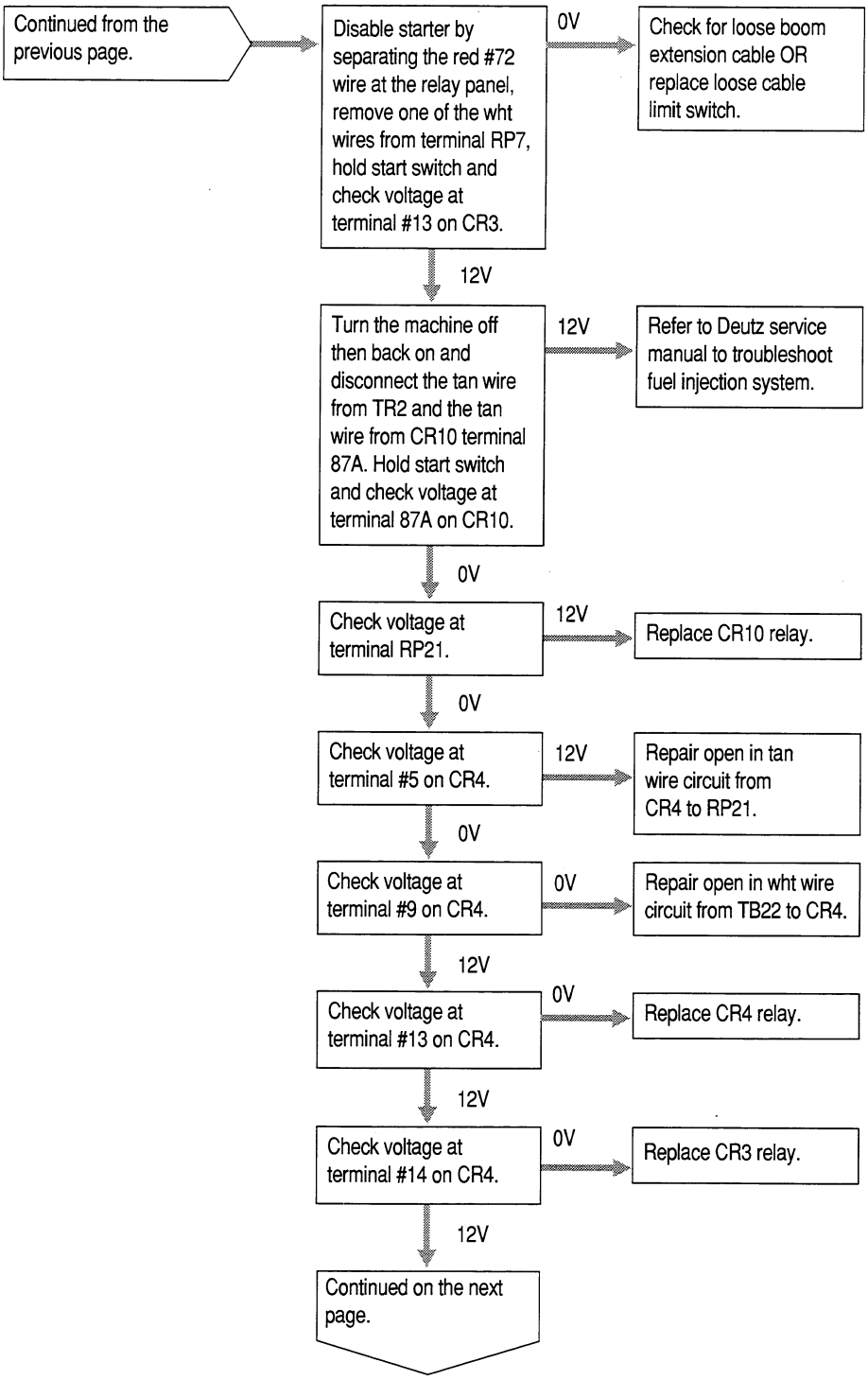

Continued from the previous page.
Disable starter by separating the red #72 wire at the relay panel, remove one of the wht wires from terminal RP7, hold start switch and check voltage at terminal #13 on CR3.
0V
Check for loose boom extension cable OR replace loose cable limit switch.
12V
Turn the machine off then back on and disconnect the tan wire from TR2 and the tan wire from CR10 terminal 87A. Hold start switch and check voltage at terminal 87A on CR10.
12V
Refer to Deutz service manual to troubleshoot fuel injection system.
0V
Check voltage at terminal RP21.
12V
Replace CR10 relay.
0V
Check voltage at terminal #5 on CR4.
12V
Repair open in tan wire circuit from CR4 to RP21.
0V
Check voltage at terminal #9 on CR4.
0V
Repair open in wht wire circuit from TB22 to CR4.
12V
Check voltage at terminal #13 on CR4.
0V
Replace CR4 relay.
12V
Check voltage at terminal #14 on CR4.
0V
Replace CR3 relay.
12V
Continued on the next page.

CHART 3

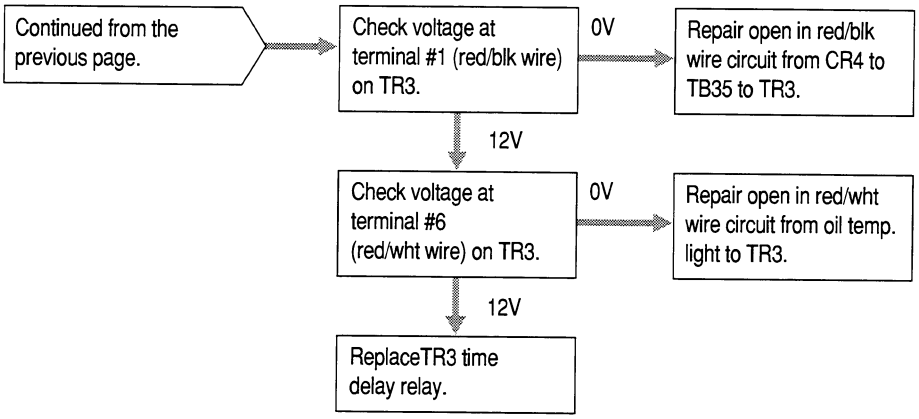

Continued from the previous page.
Check voltage at terminal #1 (red/blk wire) on TR3.
0V
Repair open in red/blk wire circuit from CR4 to TB35 to TR3.
12V
Check voltage at terminal #6 (red/wht wire) on TR3.
0V
Repair open in red/wht wire circuit from oil temp. light to TR3.
12V
ReplaceTR3 time delay relay.

Chart 4

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.

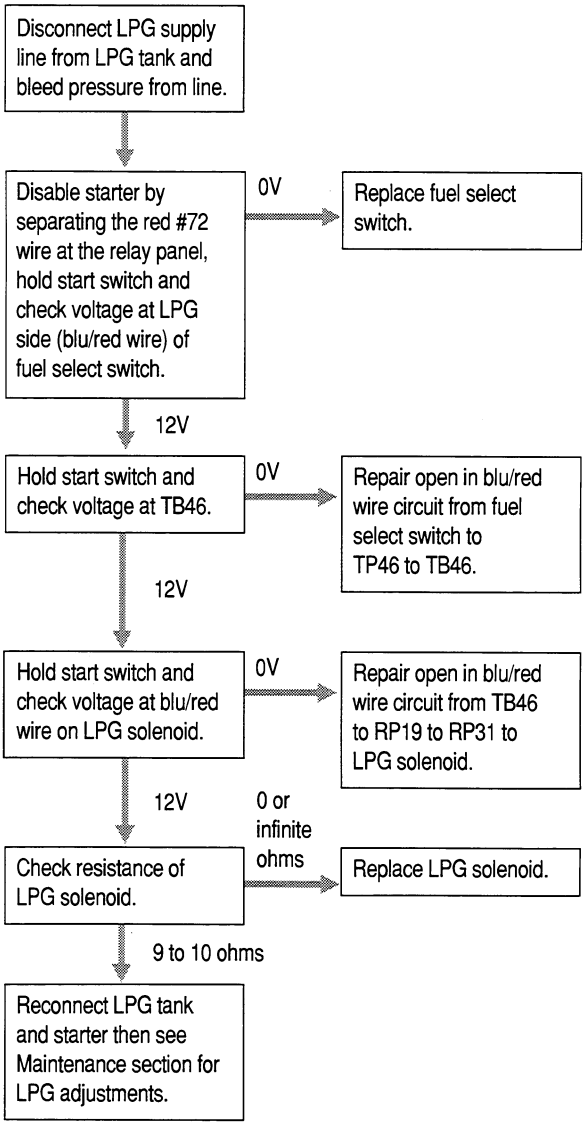


Chart 5

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.

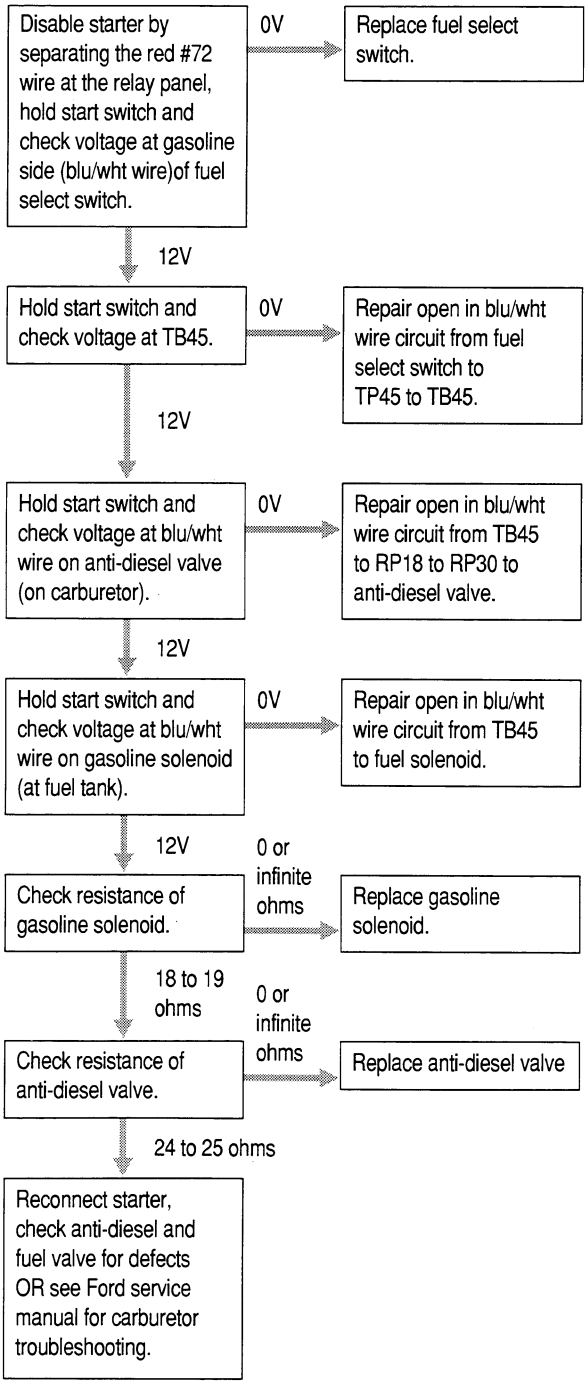


Chart 6

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.

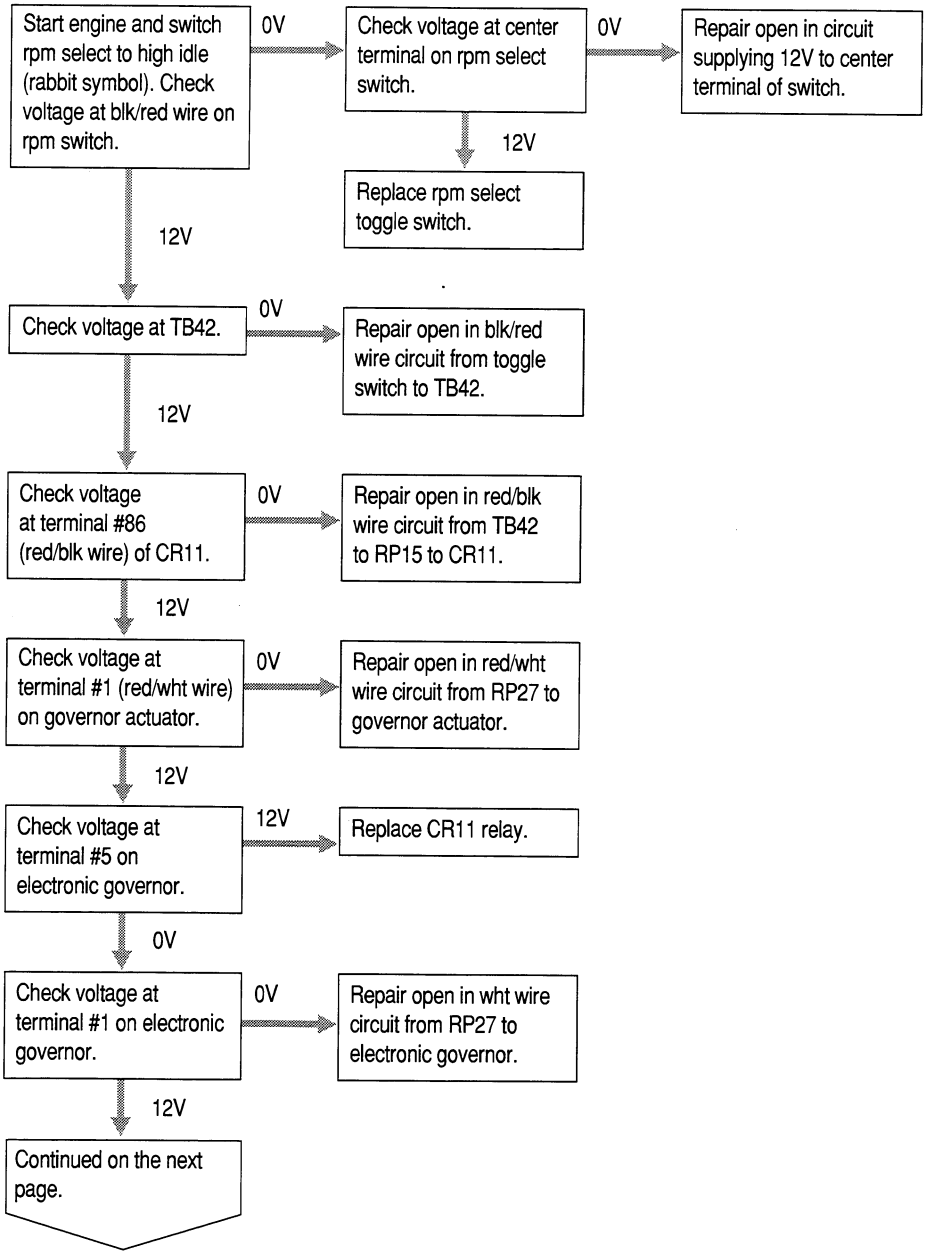


CHART 6

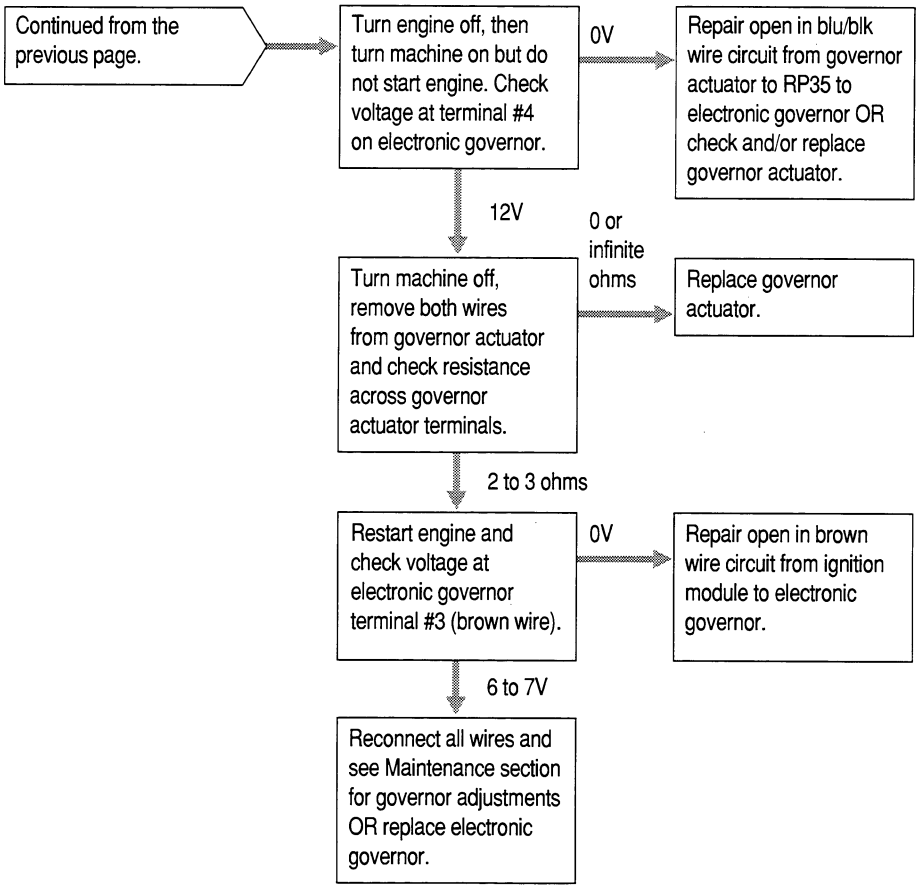

Continued from the previous page.
Turn engine off, then turn machine on but do not start engine. Check voltage at terminal #4 on electronic governor.
0V
Repair open in blu/blk wire circuit from governor actuator to RP35 to electronic governor OR check and/or replace governor actuator.
12V
0 or infinite ohms
Turn machine off, remove both wires from governor actuator and check resistance across governor actuator terminals.
Replace governor actuator.
2 to 3 ohms
Restart engine and check voltage at electronic governor terminal #3 (brown wire).
0V
Repair open in brown 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 7

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.

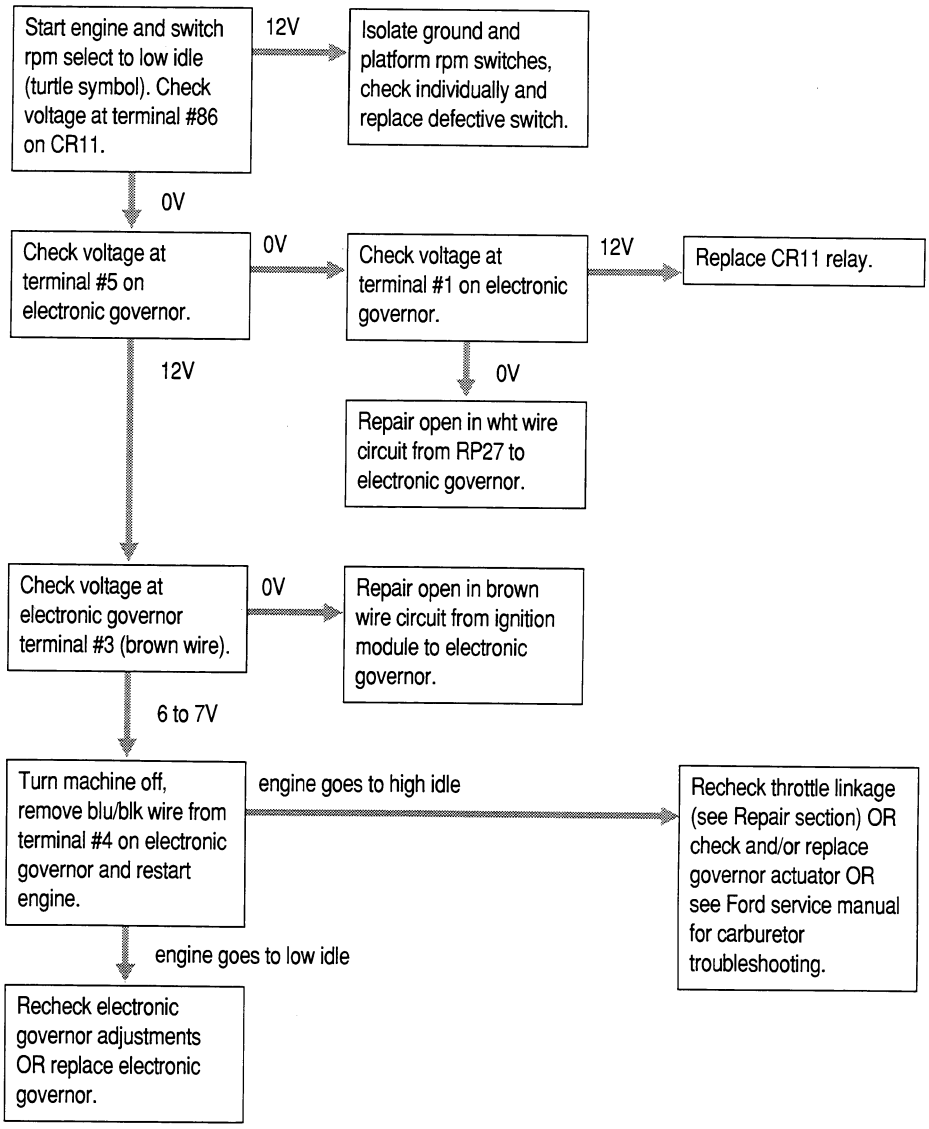


Chart 8

Engine High Idle Inoperative - Deutz Diesel Models

Be sure mechanical linkage 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.

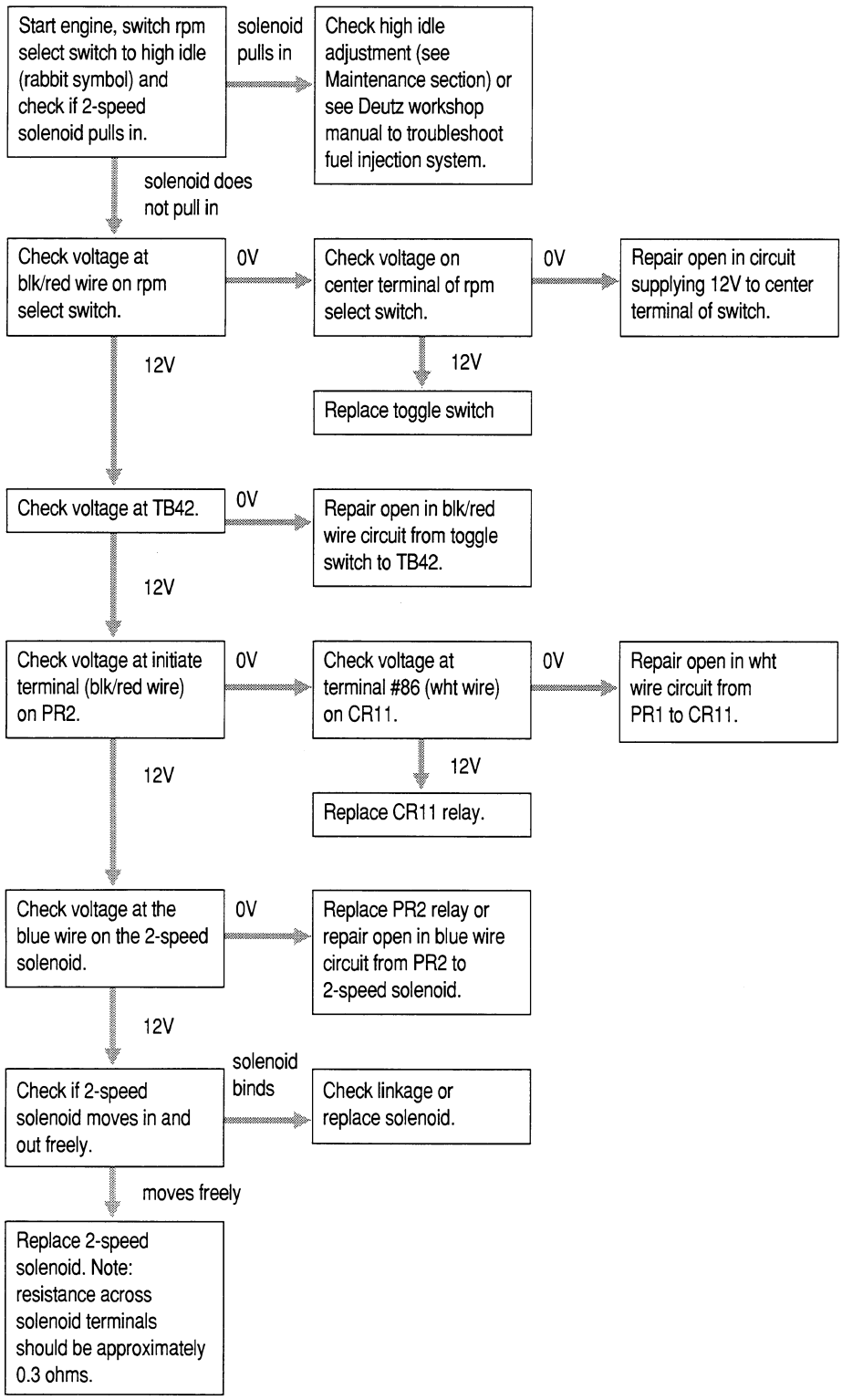


Chart 9

Engine Low Idle Inoperative - Deutz Diesel Models

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

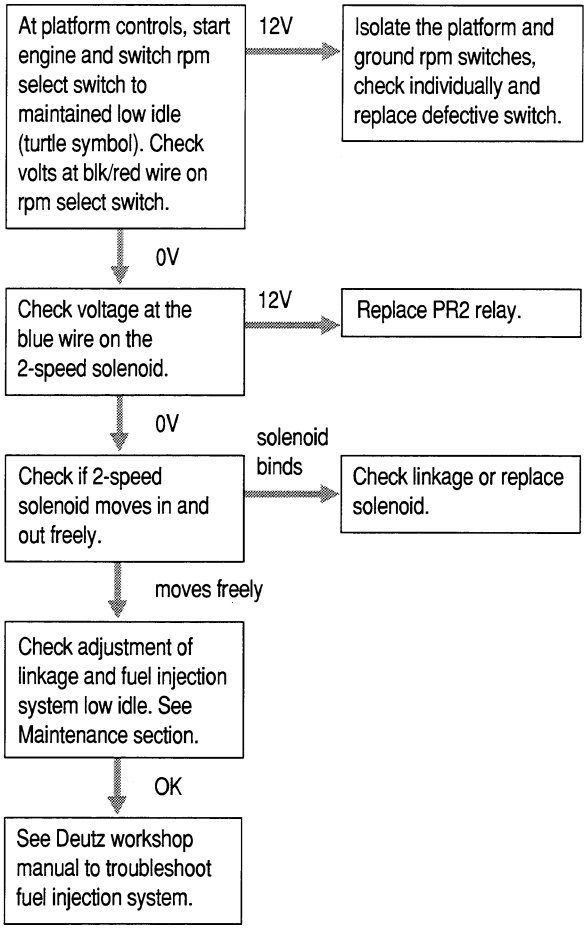


Chart 10

All Functions Inoperative, Engine Starts and Runs

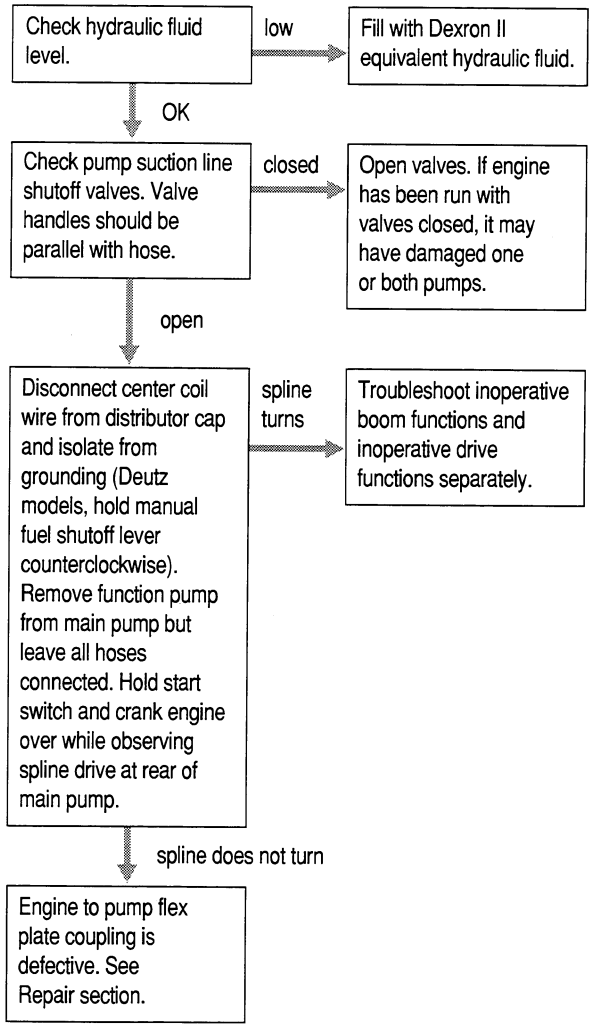


Chart 11

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.

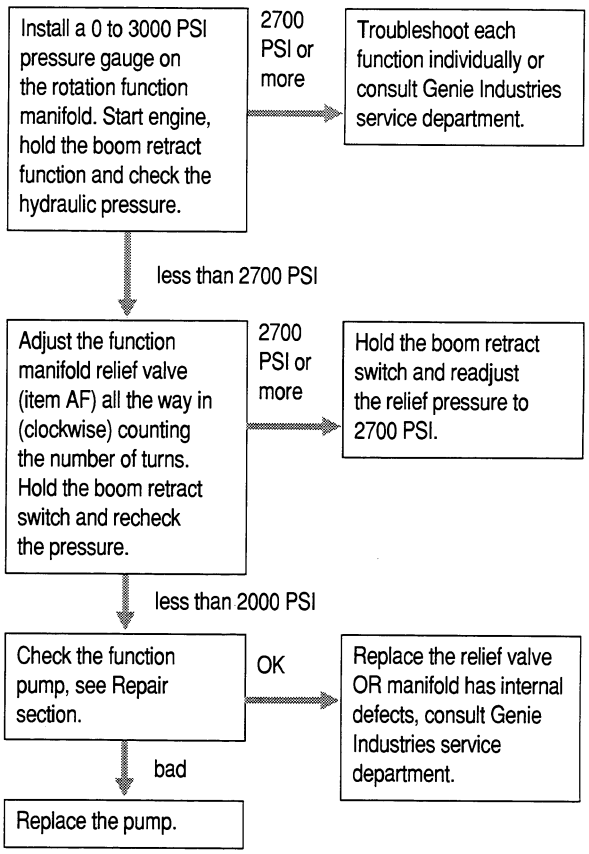


Chart 12

Ground Controls Inoperative, Platform Controls Operate Normally

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

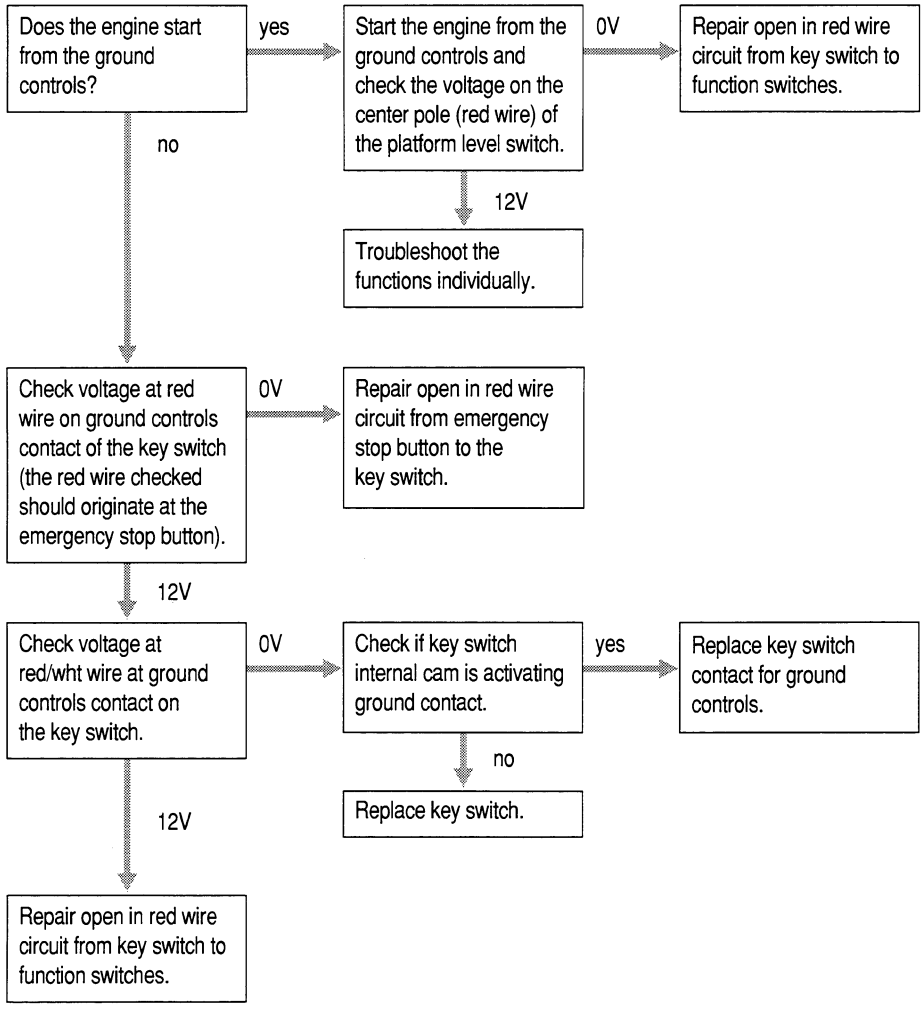


Chart 13

Platform Controls Inoperative, Ground Controls Operate Normally

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

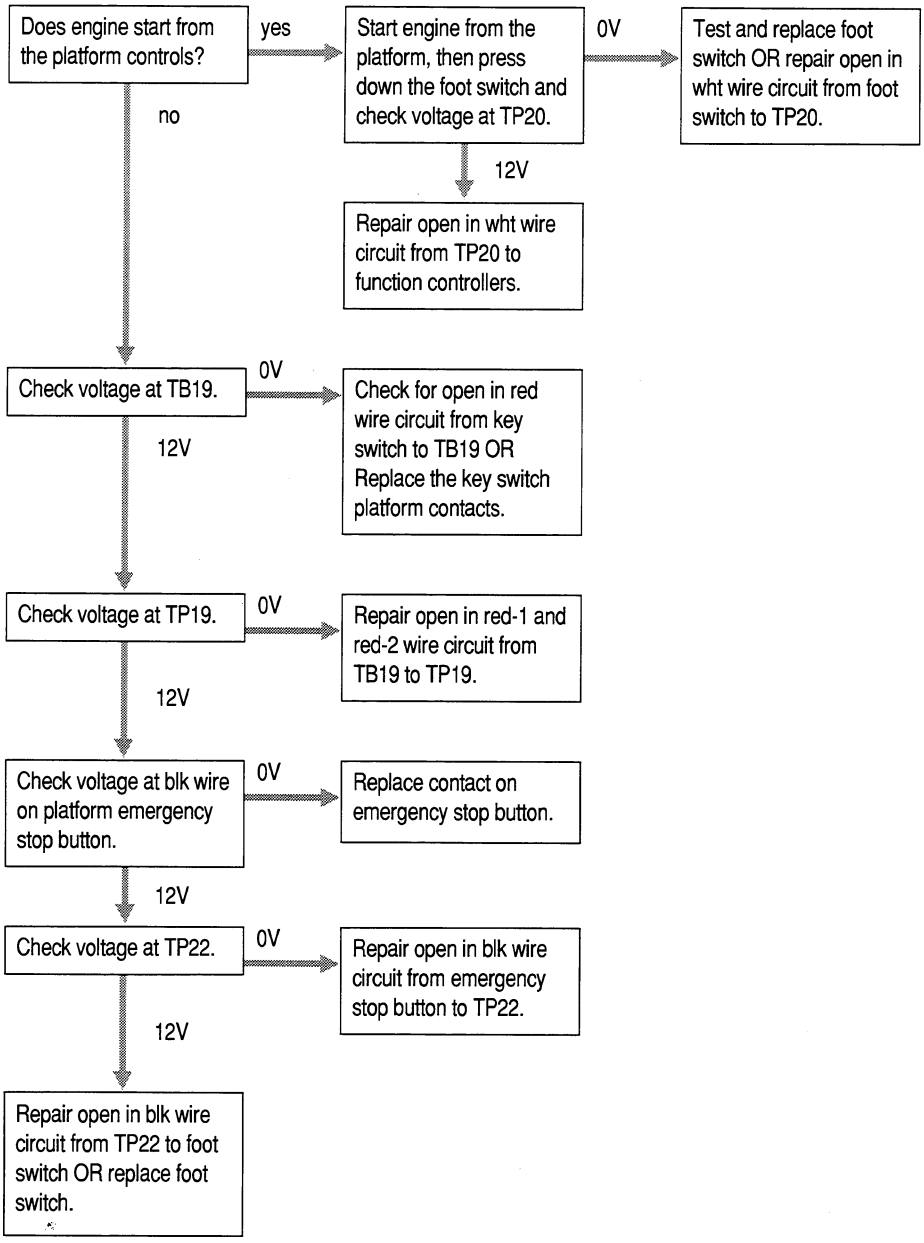


Chart 14

Boom Up Function Inoperative

Be sure all other functions operate normally.

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

If 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 lift interlock limit switch. Auxiliary power can raise the boom if it is already raised above the lift interlock limit switch.

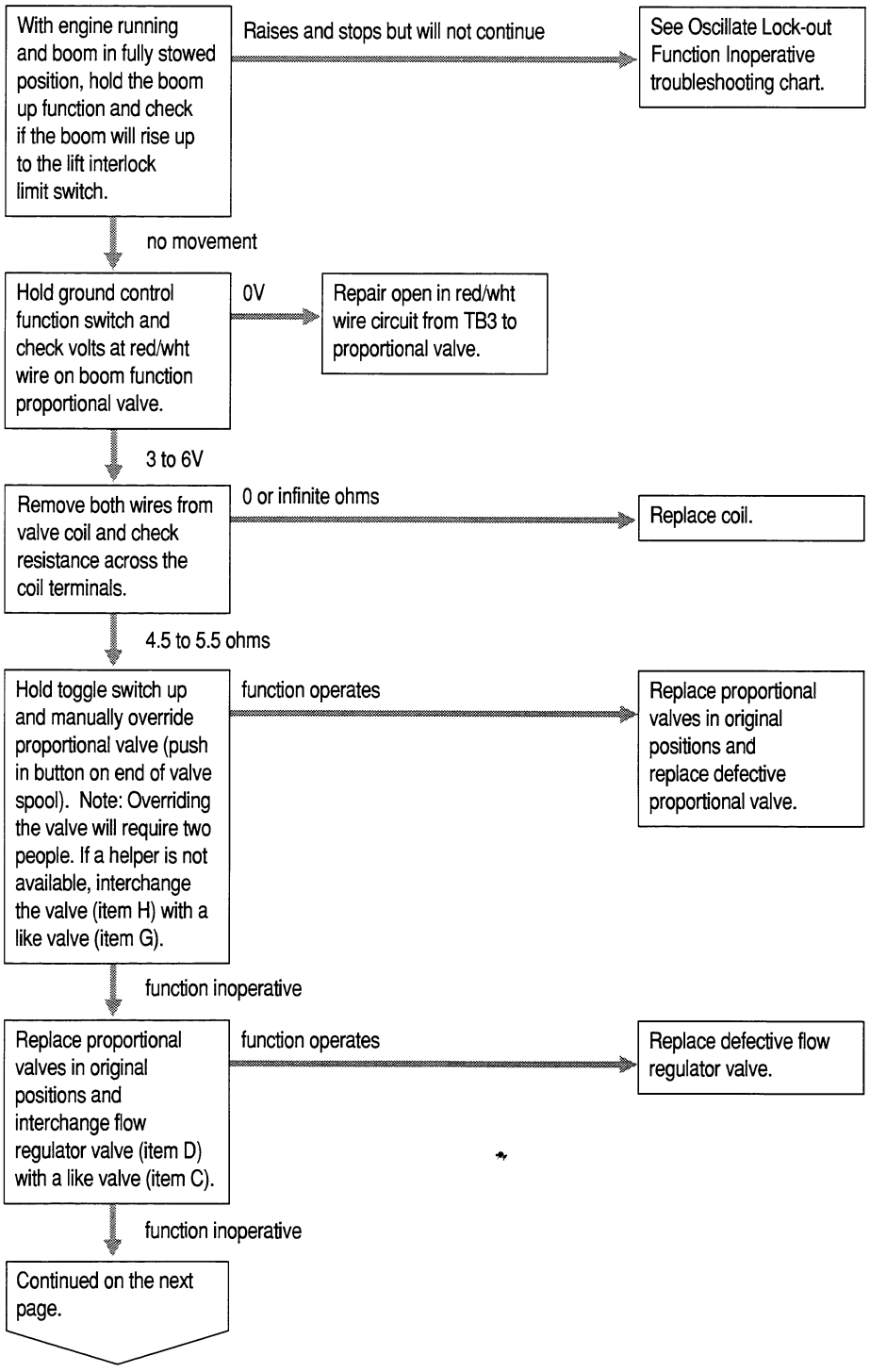


CHART 14

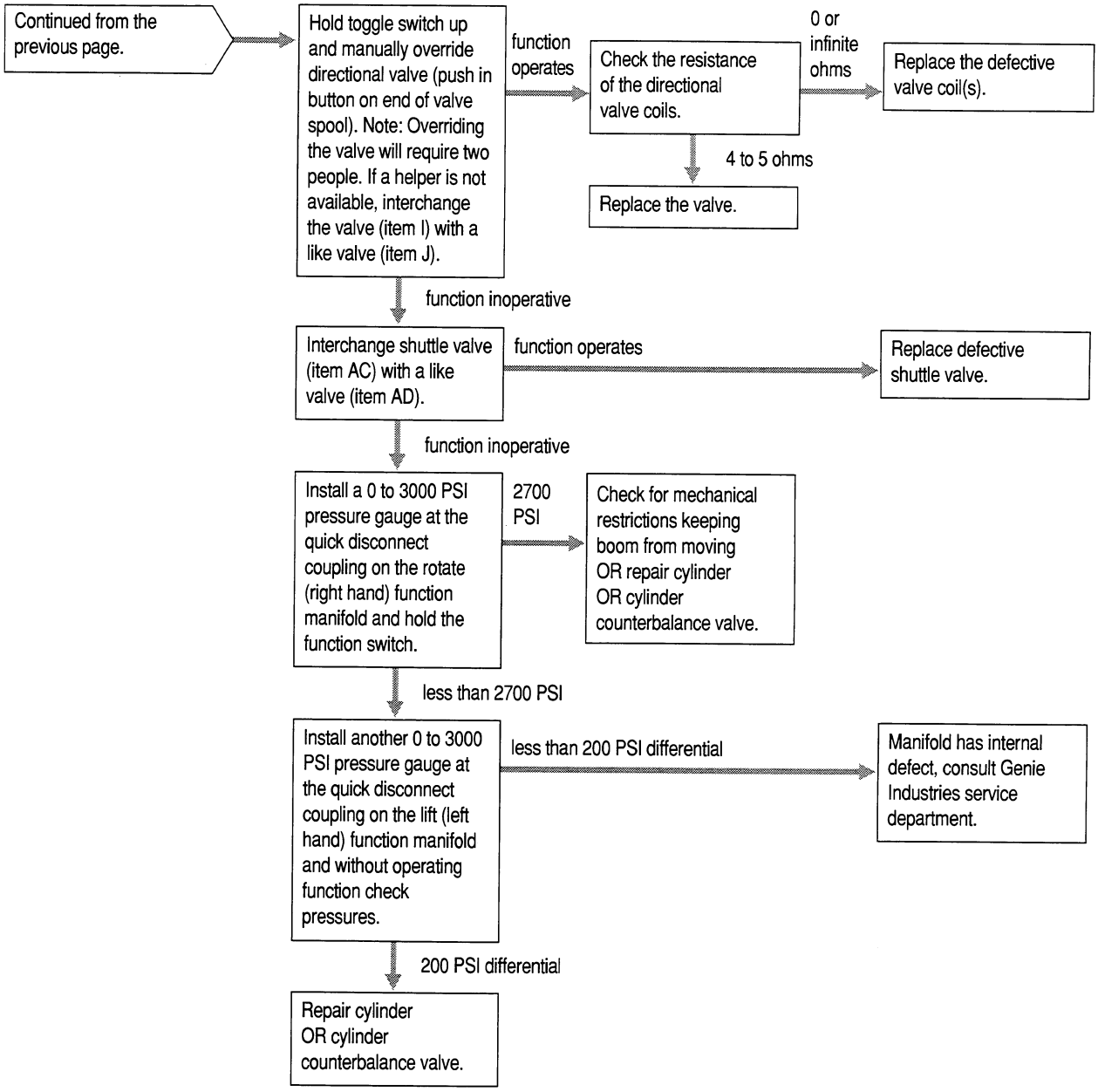

Continued from the previous page.
Hold toggle switch up and manually override directional valve (push in button on end of valve spool). Note: Overriding the valve will require two people. If a helper is not available, interchange the valve (item I) with a like valve (item J).
function operates
Check the resistance of the directional valve coils.
0 or infinite ohms
Replace the defective valve coil(s).
4 to 5 ohms
Replace the valve.
function inoperative
Interchange shuttle valve (item AC) with a like valve (item AD).
function operates
Replace defective shuttle valve.
function inoperative
Install a 0 to 3000 PSI pressure gauge at the quick disconnect coupling on the rotate (right hand) function manifold and hold the function switch.
2700 PSI
Check for mechanical restrictions keeping boom from moving OR repair cylinder OR cylinder counterbalance valve.
less than 2700 PSI
Install another 0 to 3000 PSI pressure gauge at the quick disconnect coupling on the lift (left hand) function manifold and without operating function check pressures.
less than 200 PSI differential
Manifold has internal defect, consult Genie Industries service department.
200 PSI differential
Repair cylinder OR cylinder counterbalance valve.

Chart 15

Boom Down Function Inoperative

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

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

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

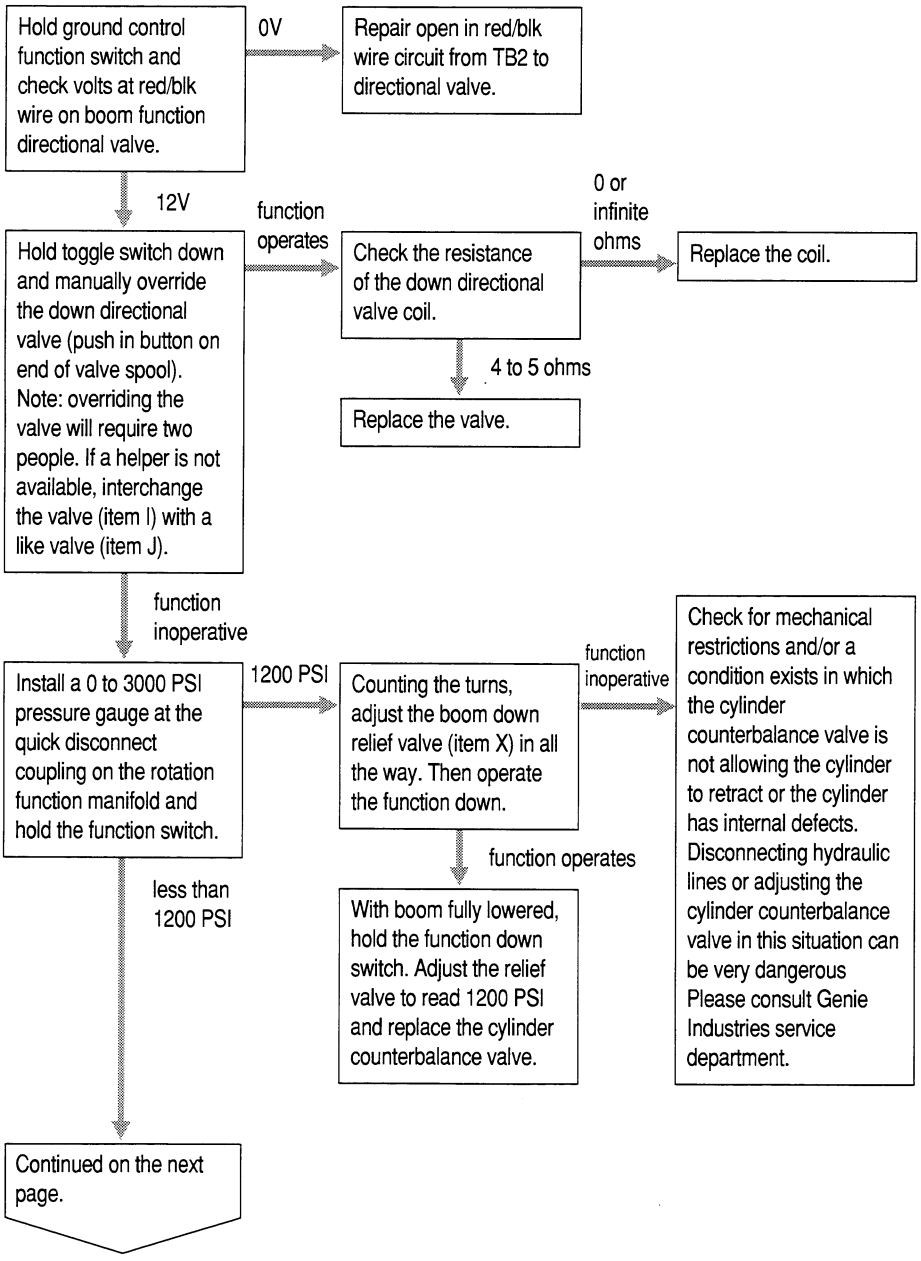


CHART 15

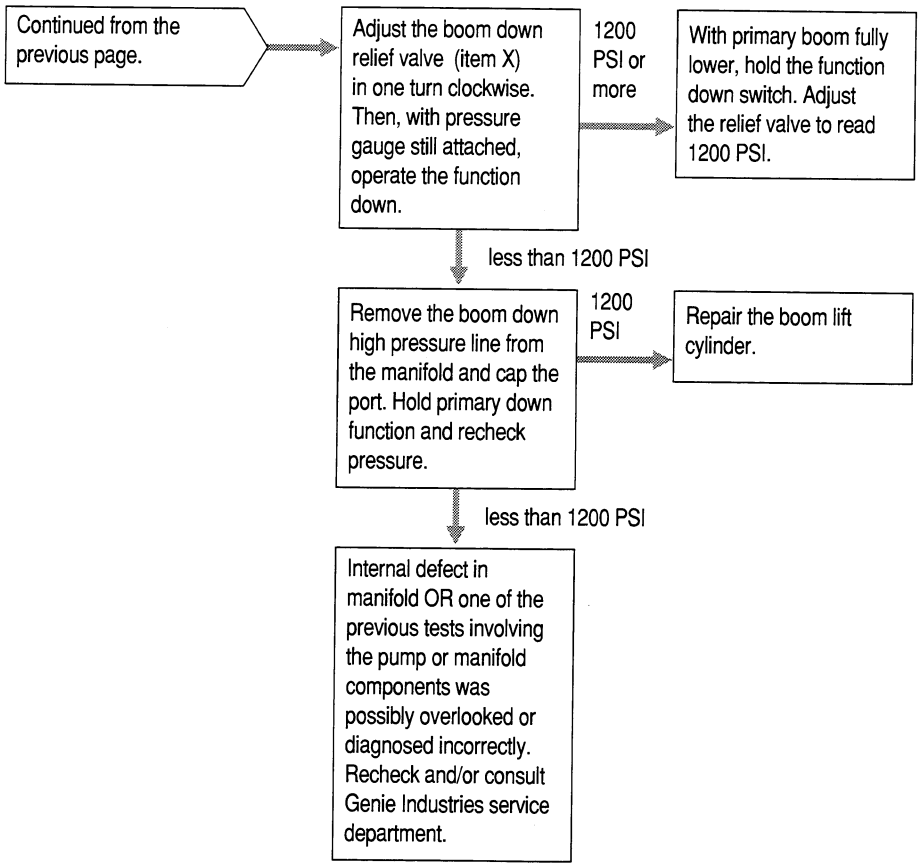

Continued from the previous page.
Adjust the boom down relief valve (item X) in one turn clockwise. Then, with pressure gauge still attached, operate the function down.
1200 PSI or more
With primary boom fully lower, hold the function down switch. Adjust the relief valve to read 1200 PSI.
less than 1200 PSI
Remove the boom down high pressure line from the manifold and cap the port. Hold primary down function and recheck pressure.
1200 PSI
Repair the boom lift 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 16

Boom Extend Function Inoperative

Be sure all other functions operate normally.

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

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

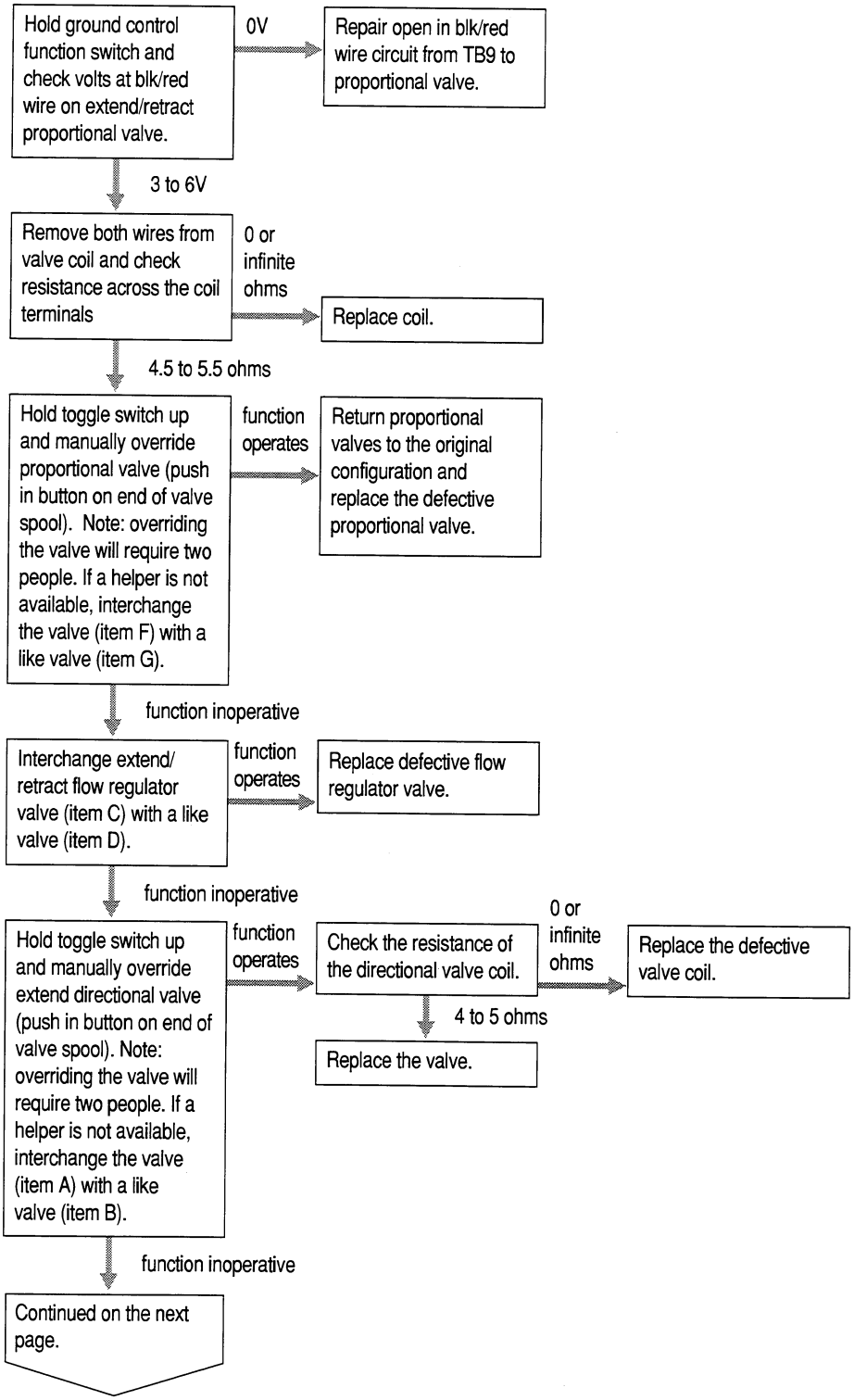


CHART 16

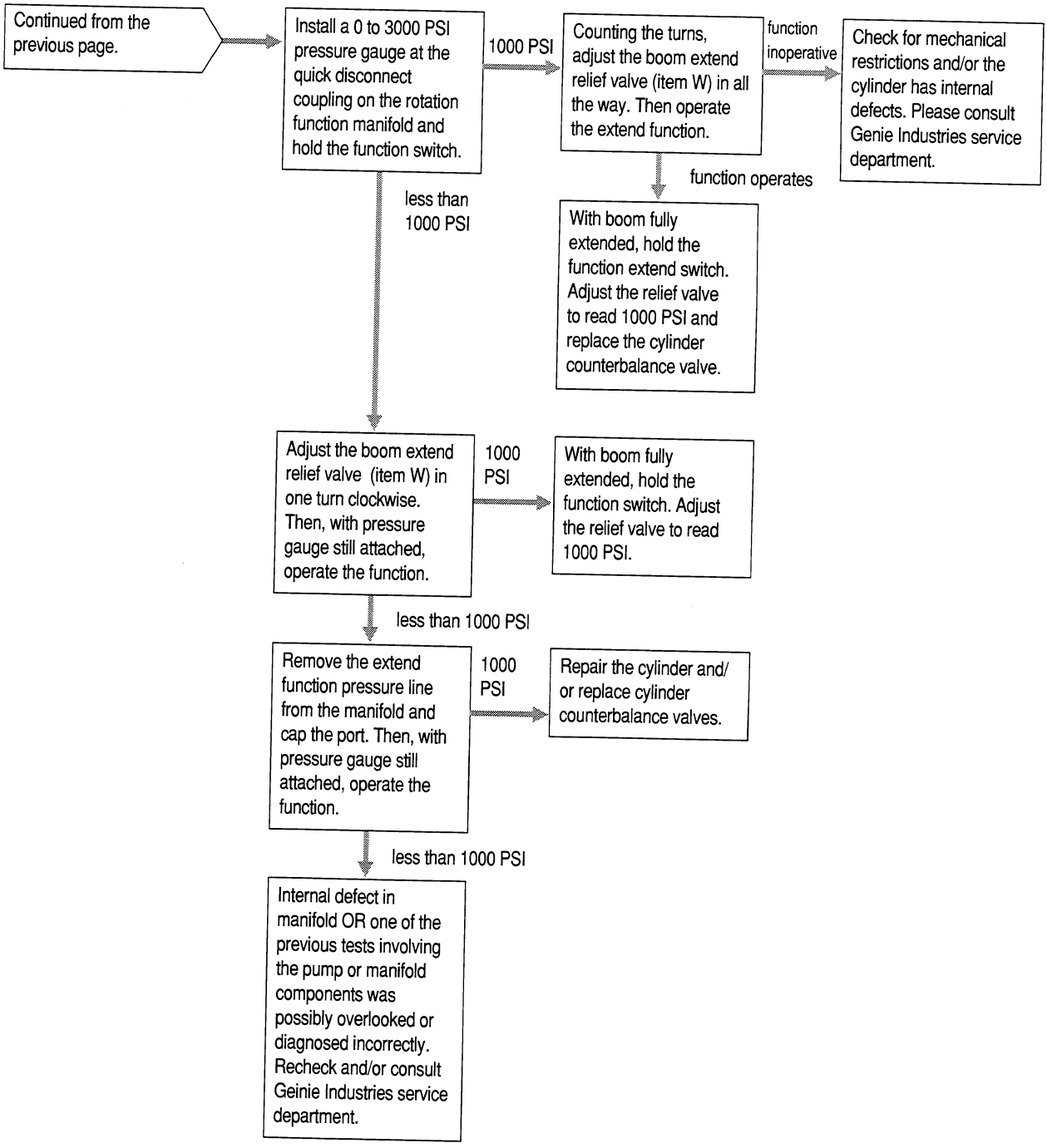

Continued from the previous page.
Install a 0 to 3000 PSI pressure gauge at the quick disconnect coupling on the rotation function manifold and hold the function switch.
1000 PSI
Counting the turns, adjust the boom extend relief valve (item W) in all the way. Then operate the extend function.
function inoperative
Check for mechanical restrictions and/or the cylinder has internal defects. Please consult Genie Industries service department.
function operates
With boom fully extended, hold the function extend switch. Adjust the relief valve to read 1000 PSI and replace the cylinder counterbalance valve.
less than 1000 PSI
Adjust the boom extend relief valve (item W) in one turn clockwise. Then, with pressure gauge still attached, operate the function.
1000 PSI
With boom fully extended, hold the function switch. Adjust the relief valve to read 1000 PSI.
less than 1000 PSI
Remove the extend function pressure line from the manifold and cap the port. Then, with pressure gauge still attached, operate the function.
1000 PSI
Repair the cylinder and/ or replace cylinder counterbalance valves.
less than 1000 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 17

Boom Retract Function Inoperative

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

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

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

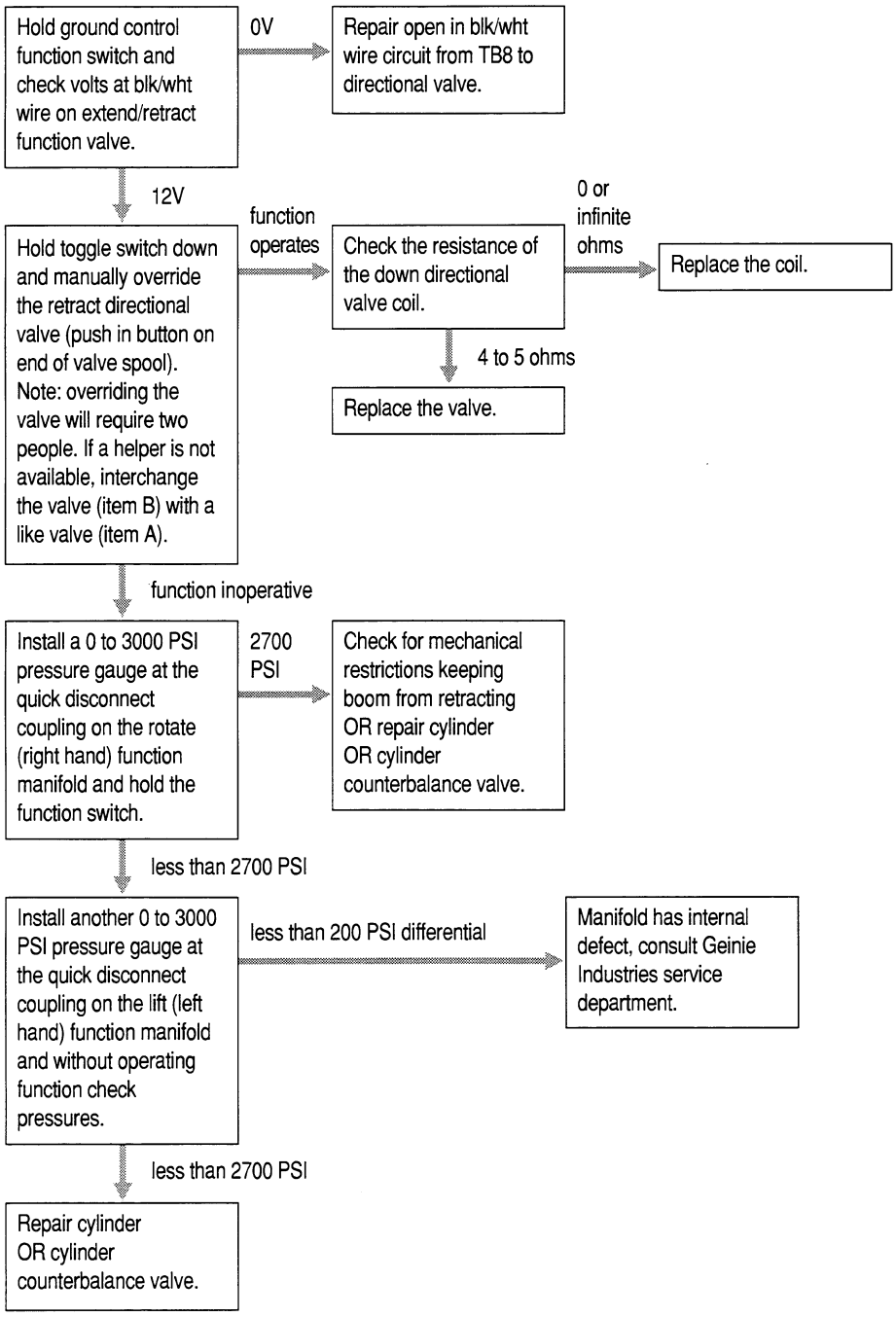


Chart 18

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.

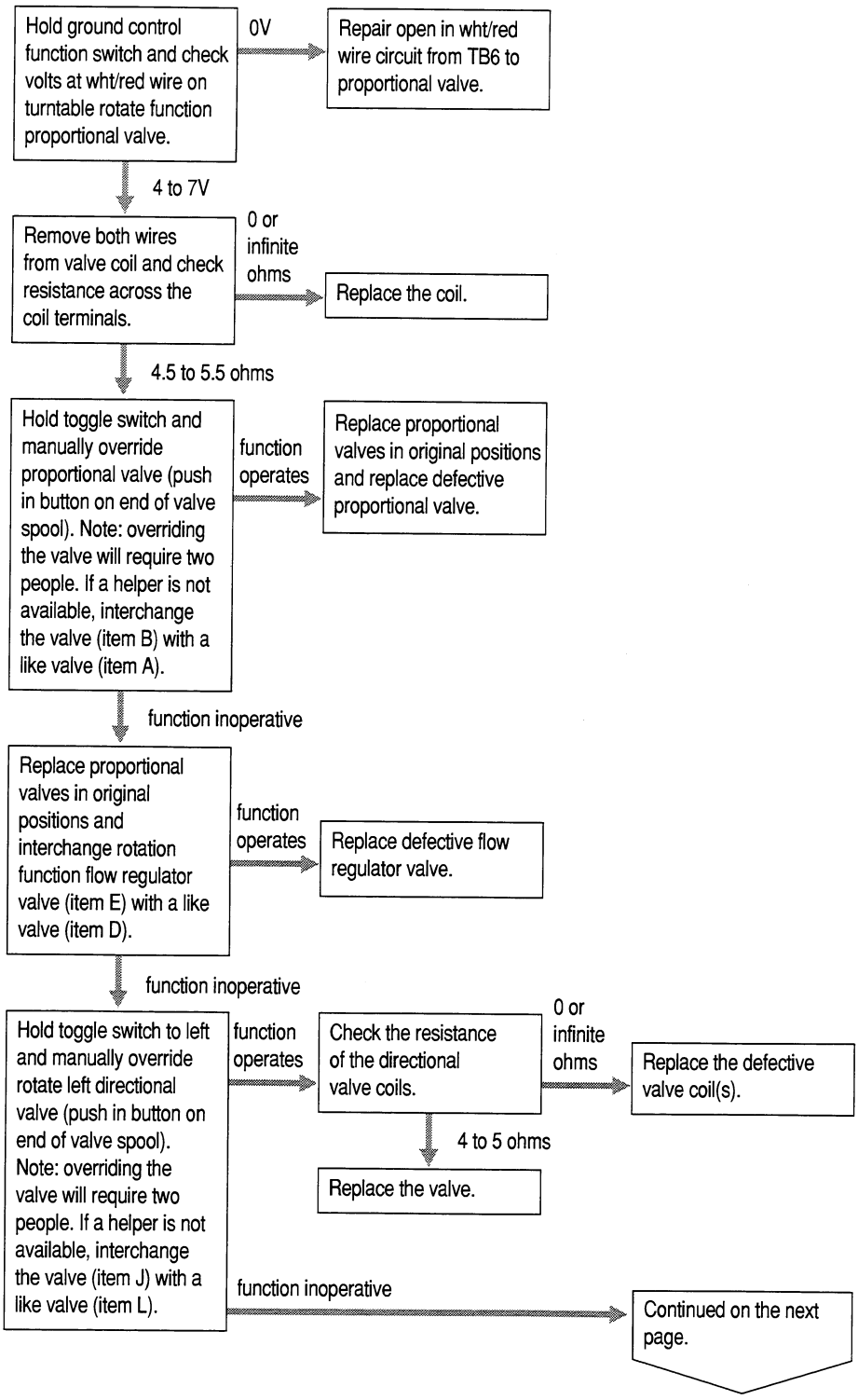


CHART 18

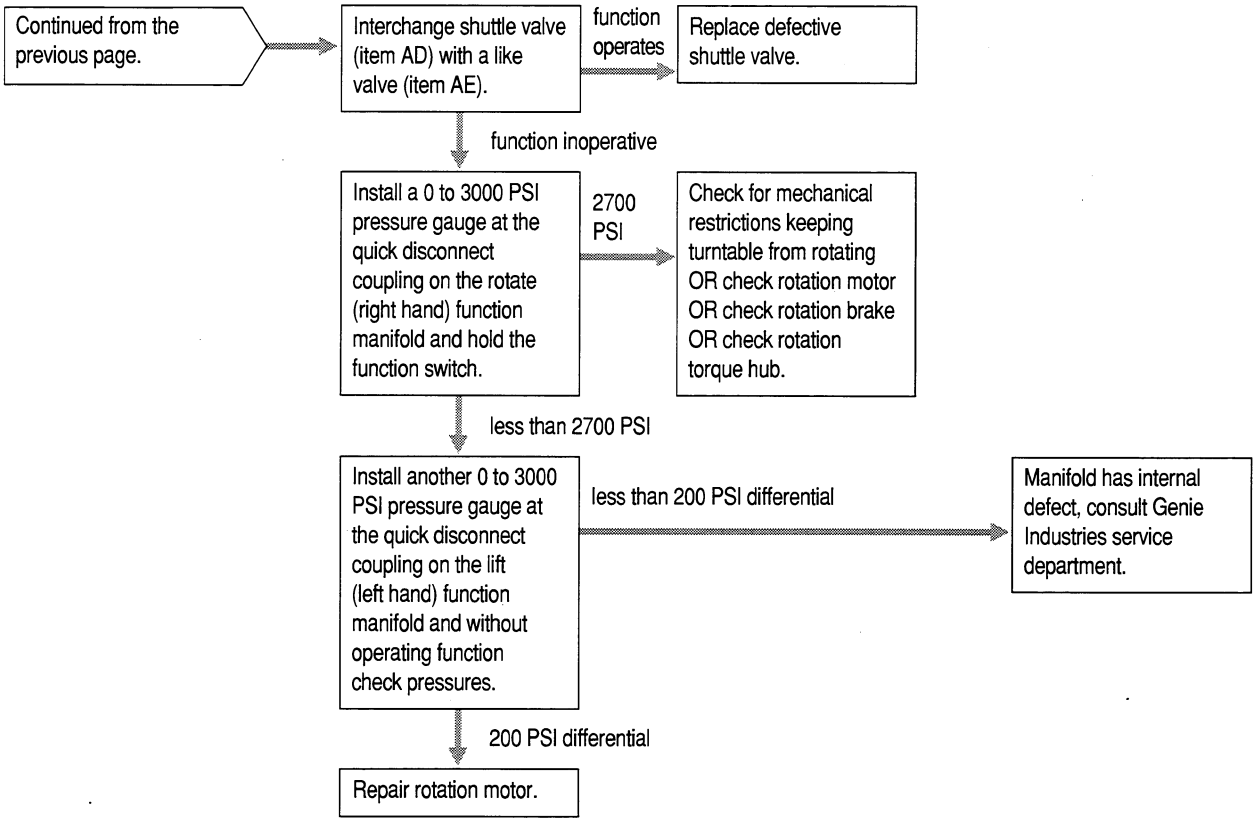

Continued from the previous page.
Interchange shuttle valve (item AD) with a like valve (item AE).
function operates
Replace defective shuttle valve.
function inoperative
Install a 0 to 3000 PSI pressure gauge at the quick disconnect coupling on the rotate (right hand) function manifold and hold the function switch.
2700 PSI
Check for mechanical restrictions keeping turntable from rotating OR check rotation motor OR check rotation brake OR check rotation torque hub.
less than 2700 PSI
Install another 0 to 3000 PSI pressure gauge at the quick disconnect coupling on the lift (left hand) function manifold and without operating function check pressures.
less than 200 PSI differential
Manifold has internal defect, consult Genie Industries service department.
200 PSI differential
Repair rotation motor.

Chart 19

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.

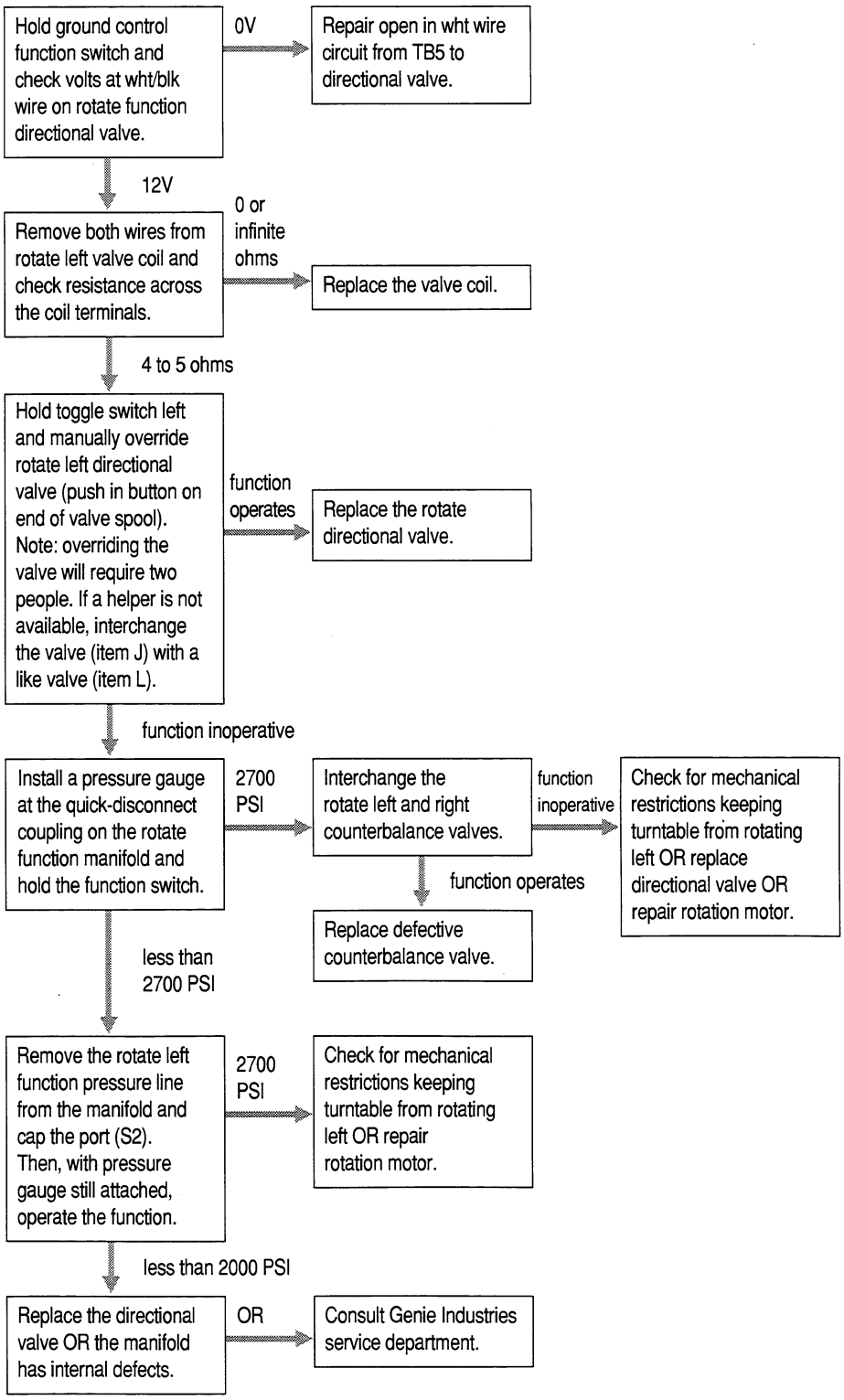


Chart 20

Turntable Rotate Right Function Inoperative

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

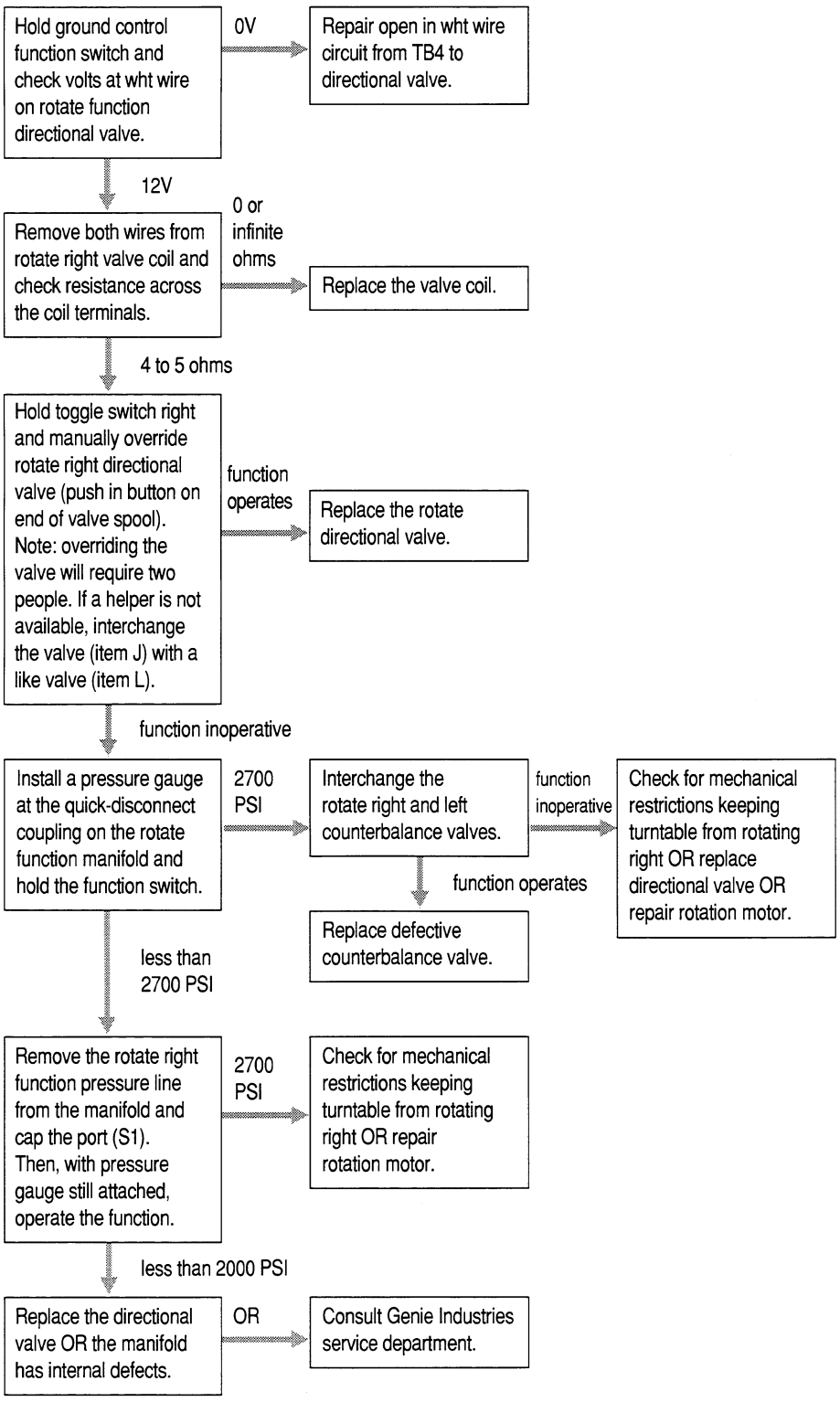


Chart 21

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*.

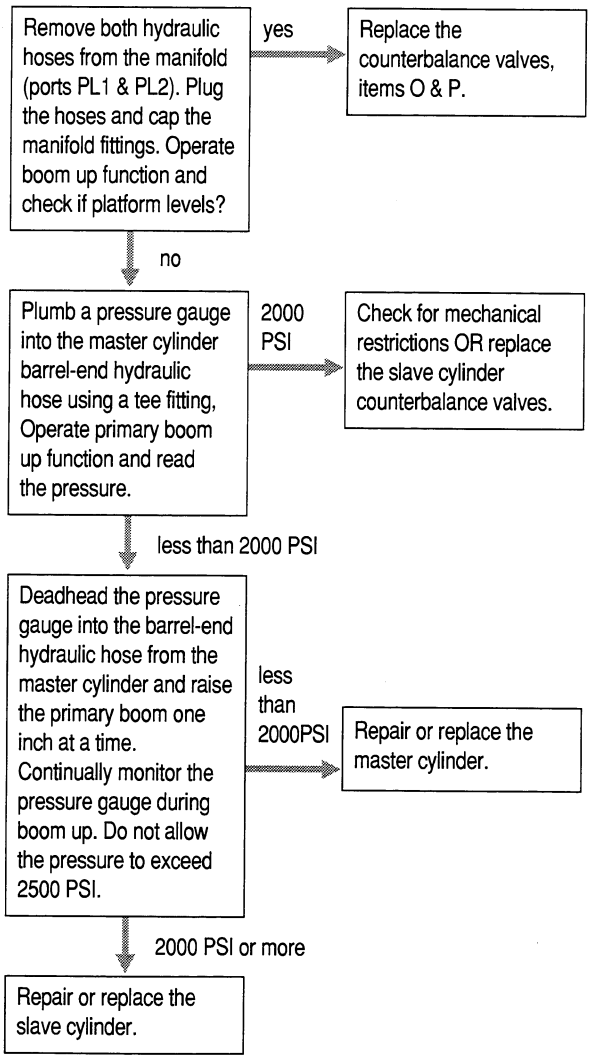


Chart 22

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.

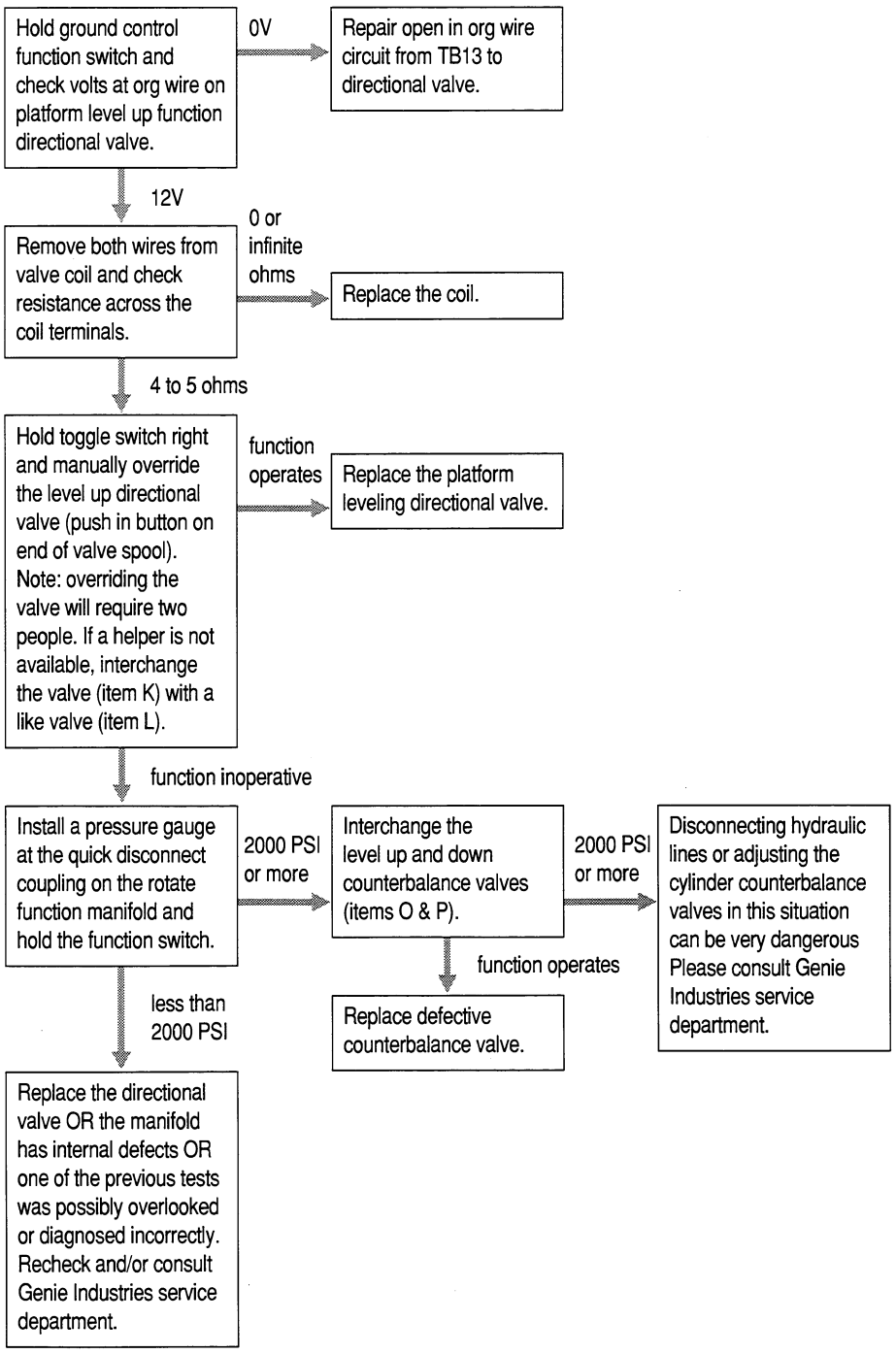


Chart 23

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.

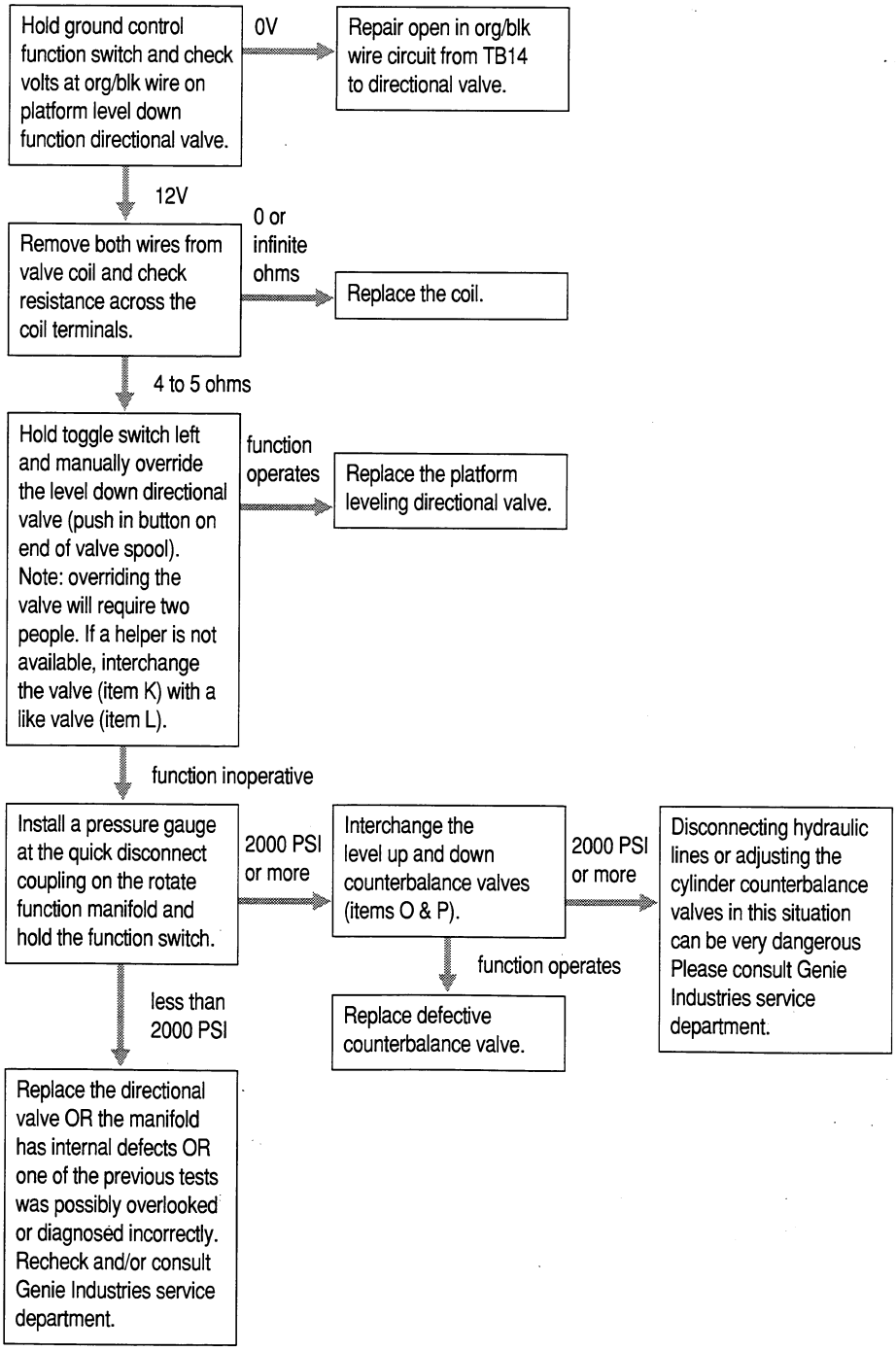


Chart 24

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.

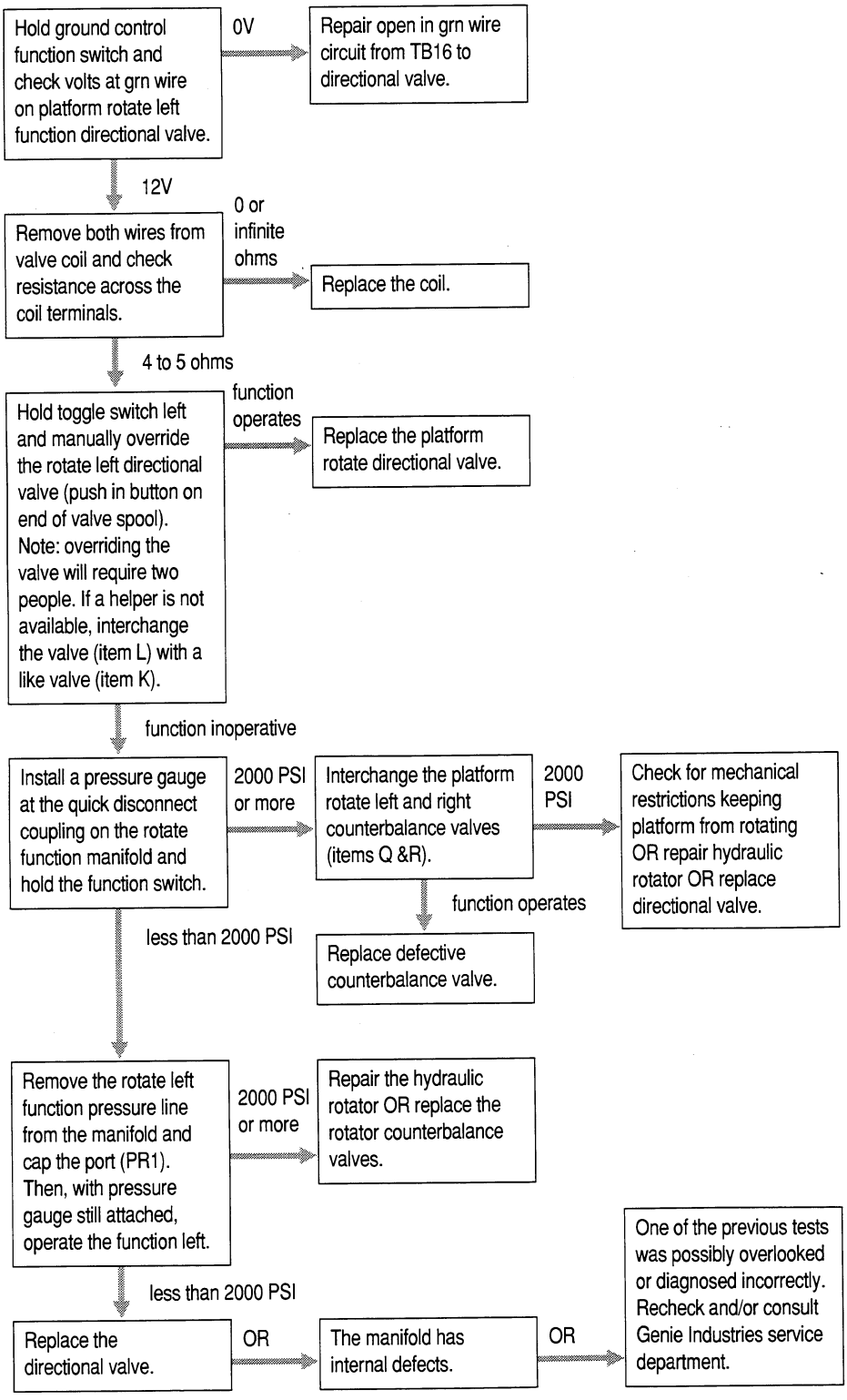


Chart 25

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.

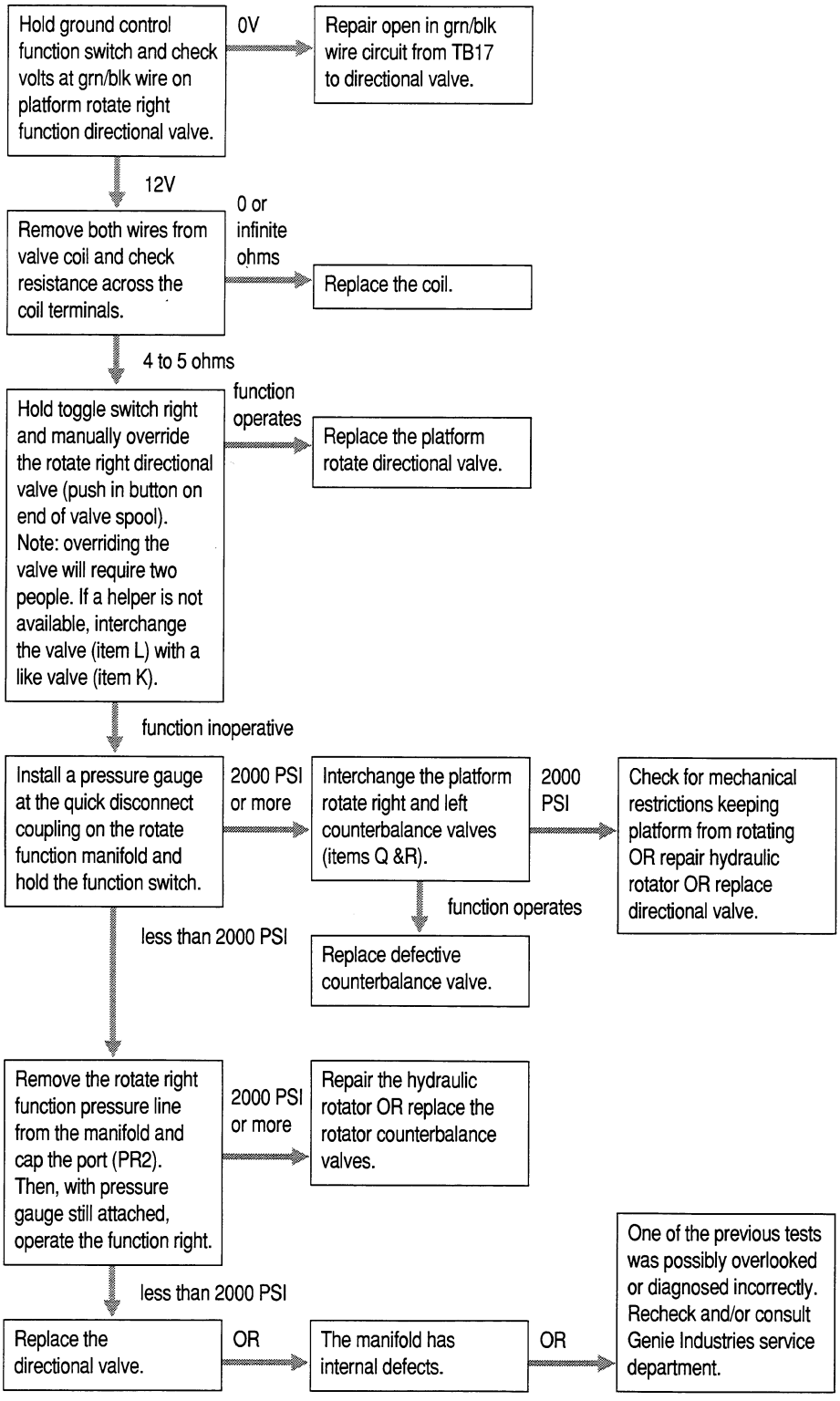


Chart 26

Oscillate Lock-out Function Inoperative

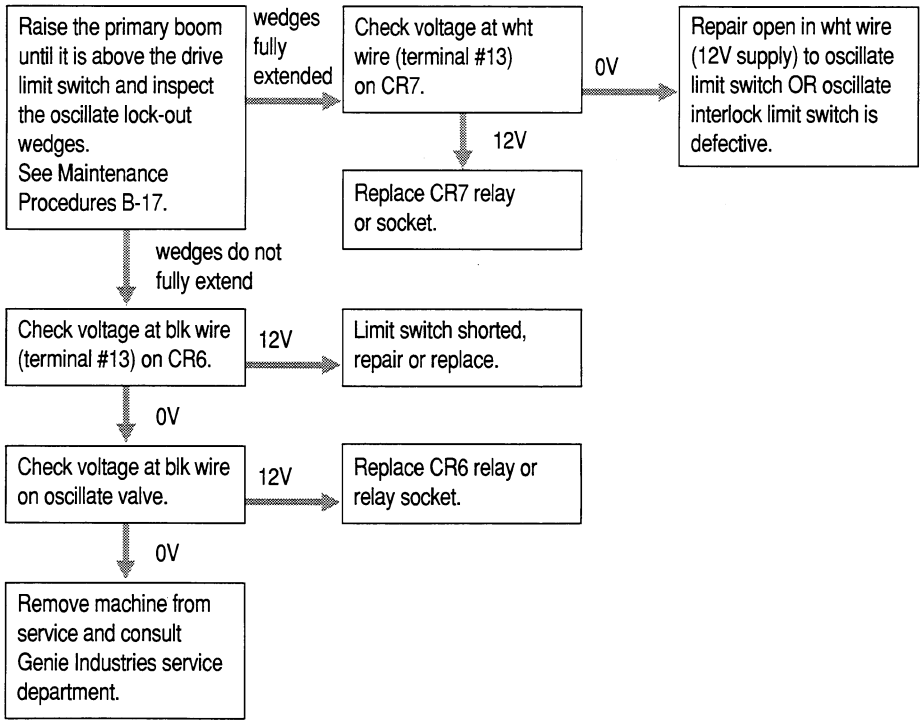


Chart 27

Steer Left Function Inoperative

Be sure all other functions operate normally.

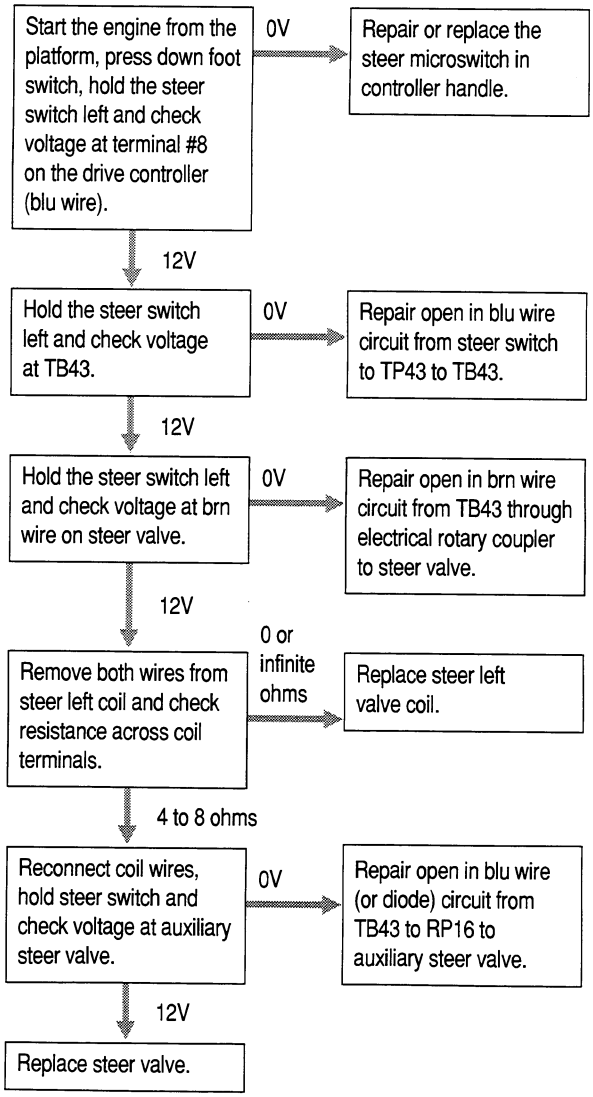


Chart 28

Steer Right Function Inoperative

Be sure all other functions operate normally.

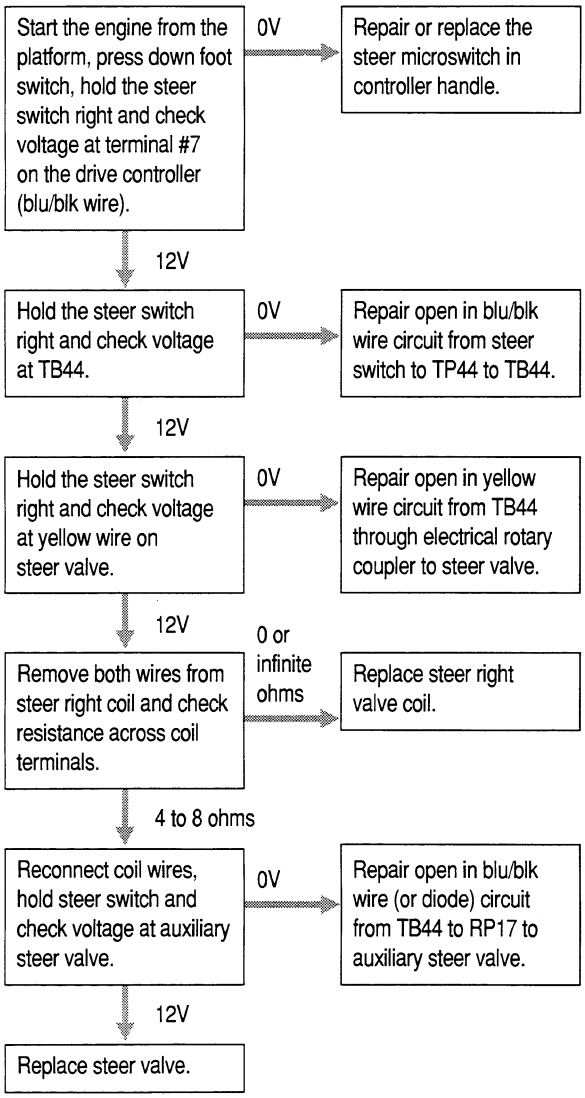


Chart 29

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.

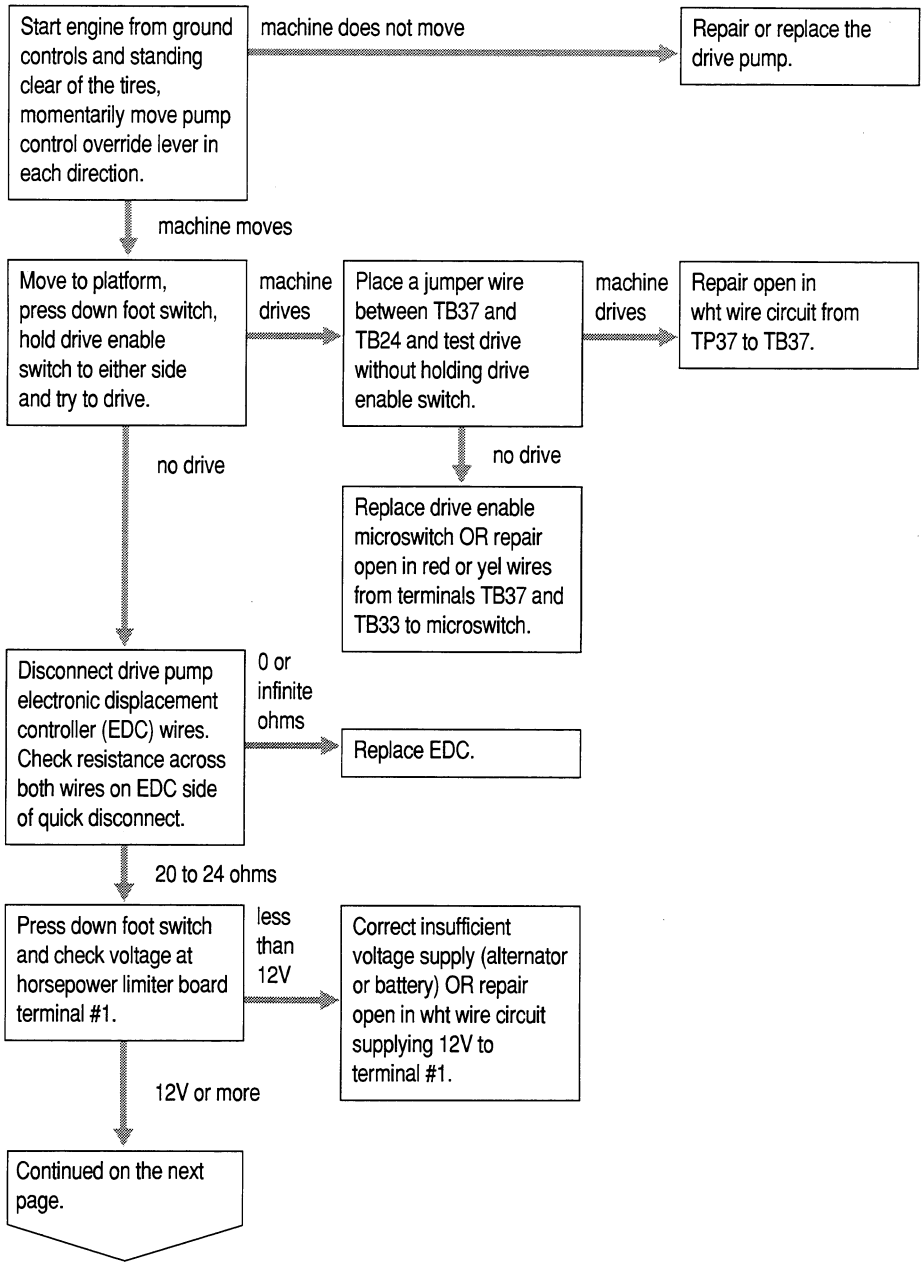


CHART 29

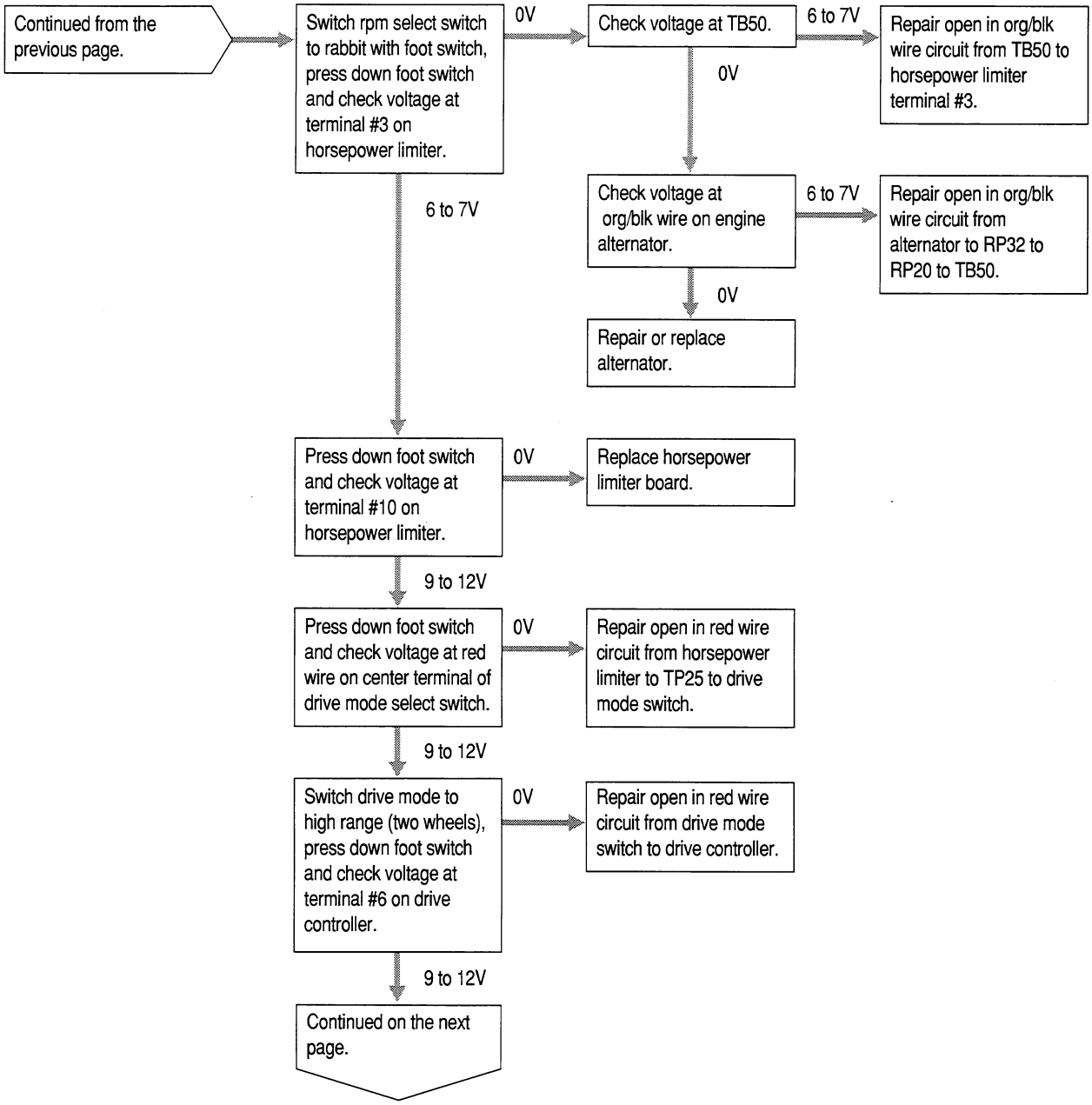

Continued from the previous page.
Switch rpm select switch to rabbit with foot switch, press down foot switch and check voltage at terminal #3 on horsepower limiter.
0V
Check voltage at TB50.
6 to 7V
Repair open in org/blk wire circuit from TB50 to horsepower limiter terminal #3.
0V
Check voltage at org/blk wire on engine alternator.
6 to 7V
Repair open in org/blk wire circuit from alternator to RP32 to RP20 to TB50.
0V
Repair or replace alternator.
6 to 7V
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 to TP25 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
Continued on the next page.

CHART 29

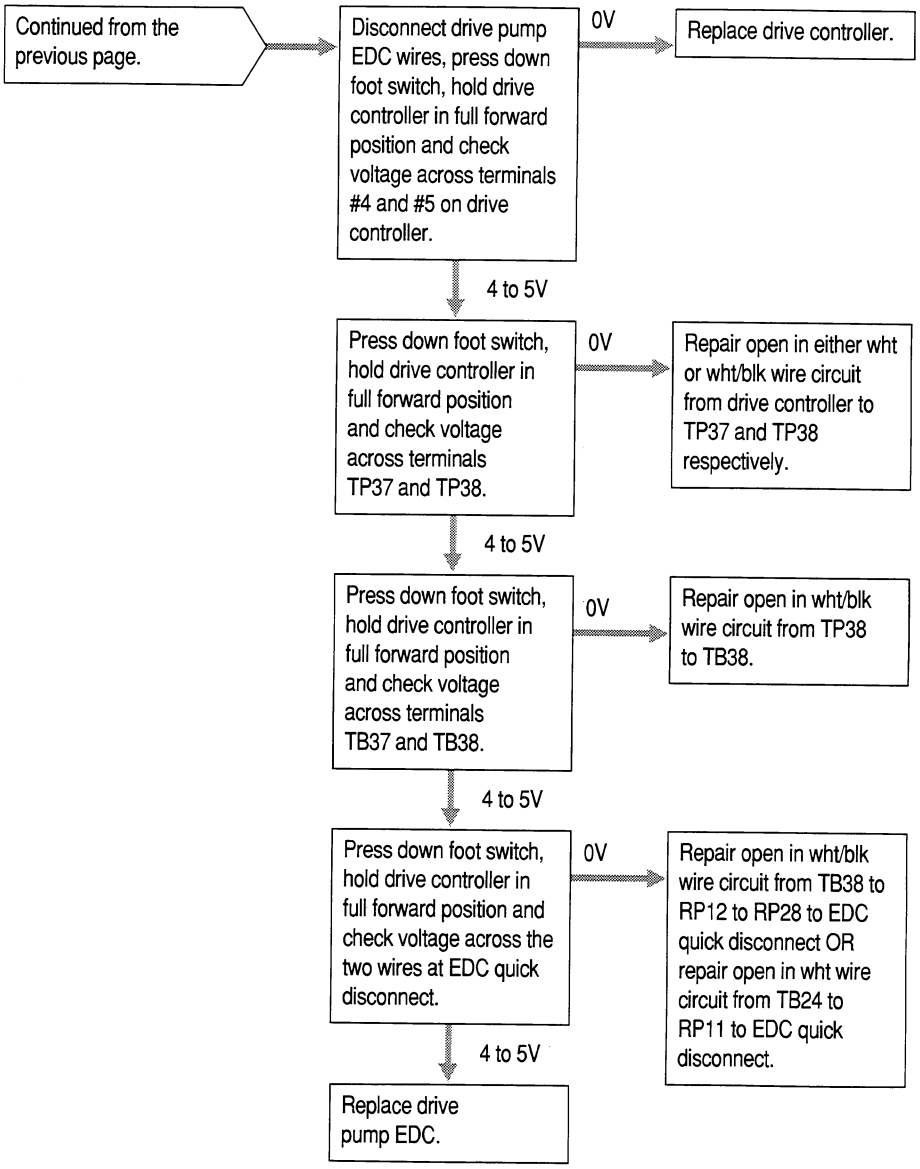

Continued from the previous page.
Disconnect drive pump EDC wires, press down foot switch, hold drive controller in full forward position and check voltage across terminals #4 and #5 on drive controller.
0V
Replace drive controller.
4 to 5V
Press down foot switch, hold drive controller in full forward position and check voltage across terminals TP37 and TP38.
0V
Repair open in either wht or wht/blk wire circuit from drive controller to TP37 and TP38 respectively.
4 to 5V
Press down foot switch, hold drive controller in full forward position and check voltage across terminals TB37 and TB38.
0V
Repair open in wht/blk wire circuit from TP38 to TB38.
4 to 5V
Press down foot switch, hold drive controller in full forward position and check voltage across the two wires at EDC quick disconnect.
0V
Repair open in wht/blk wire circuit from TB38 to RP12 to RP28 to EDC quick disconnect OR repair open in wht wire circuit from TB24 to RP11 to EDC quick disconnect.
4 to 5V
Replace drive pump EDC.

Chart 30

Drive Forward Or Reverse Function Inoperative

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

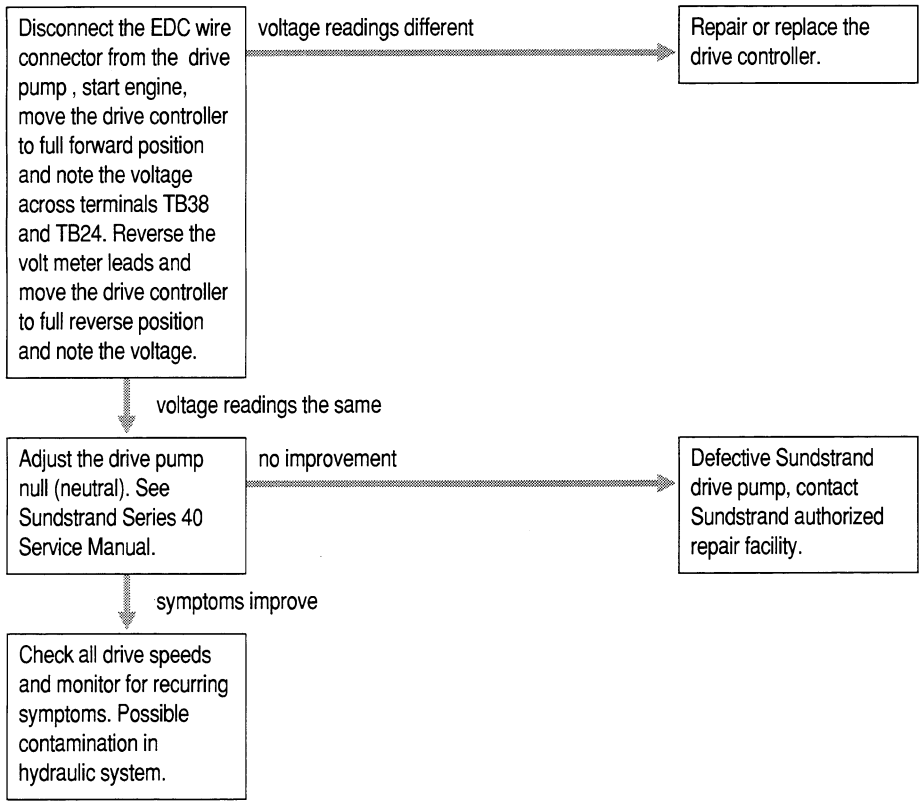


Chart 31

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.

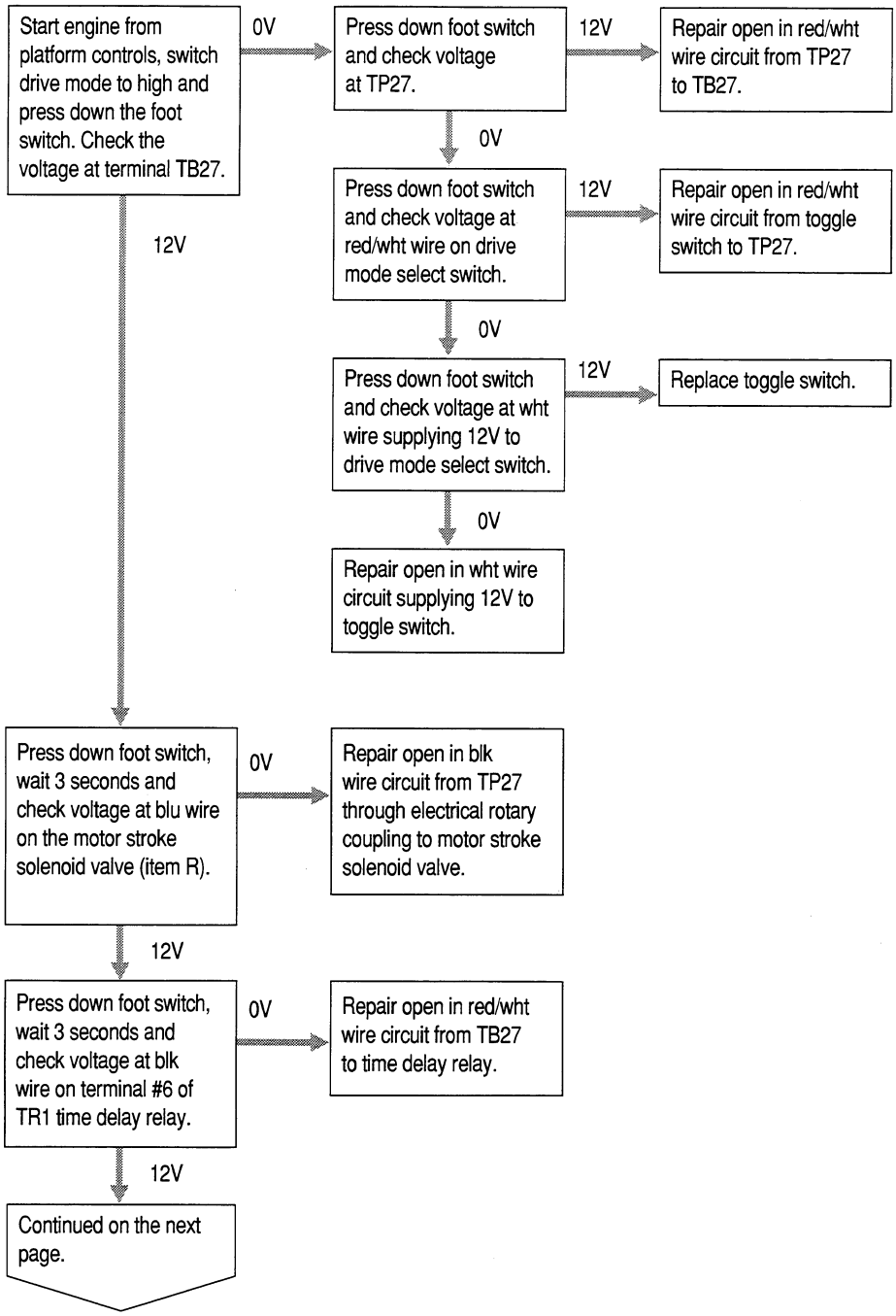


CHART 31

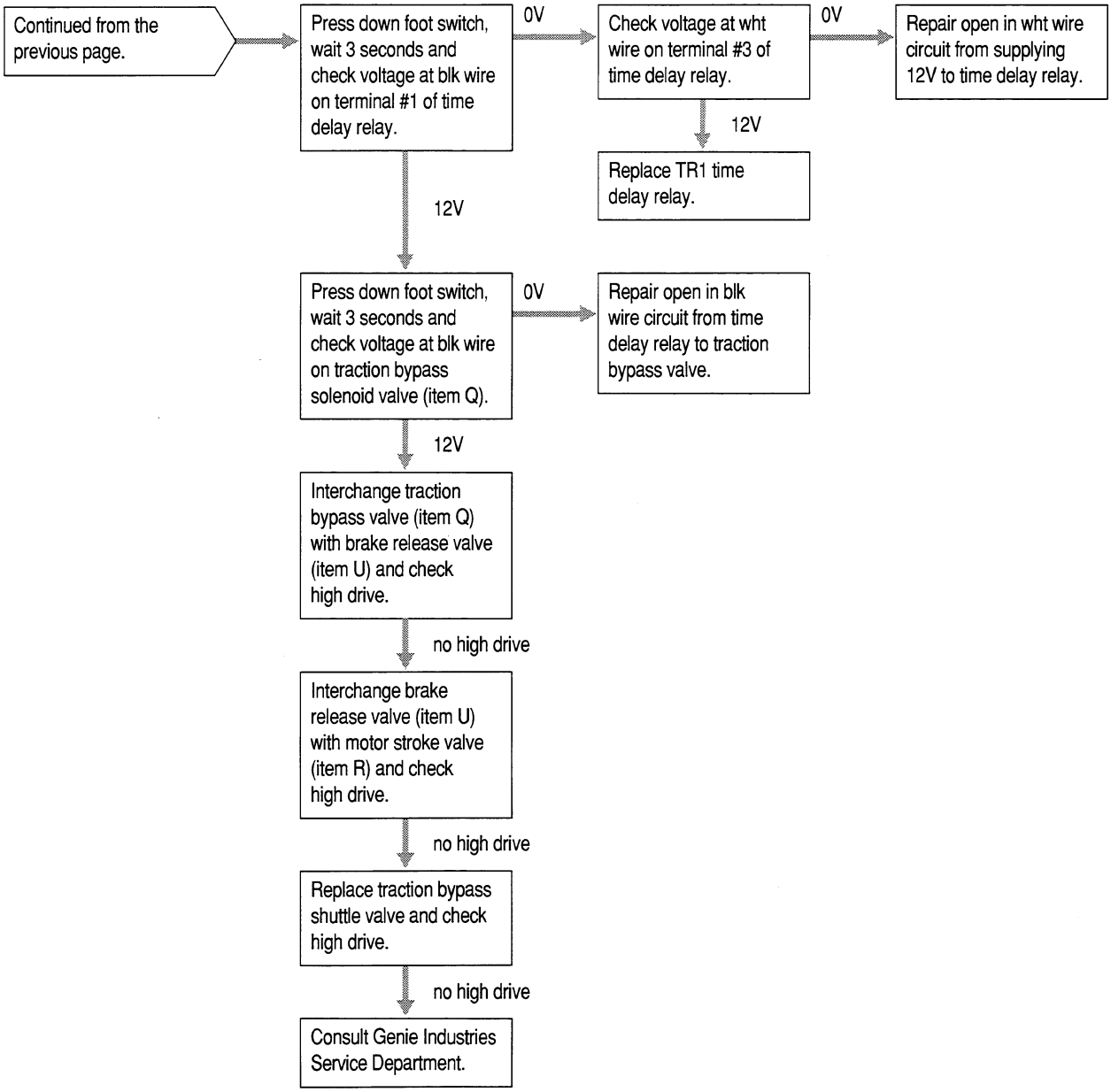

Continued from the previous page.
Press down foot switch, wait 3 seconds and check voltage at blk wire on terminal #1 of time delay relay.
0V
Check voltage at wht wire on terminal #3 of time delay relay.
0V
Repair open in wht wire circuit from supplying 12V to time delay relay.
12V
Replace TR1 time delay relay.
12V
Press down foot switch, wait 3 seconds and check voltage at blk wire on traction bypass solenoid valve (item Q).
0V
Repair open in blk wire circuit from time delay relay to traction bypass valve.
12V
Interchange traction bypass valve (item Q) with brake release valve (item U) and check high drive.
no high drive
Interchange brake release valve (item U) with motor stroke valve (item R) and check high drive.
no high drive
Replace traction bypass shuttle valve and check high drive.
no high drive
Consult Genie Industries Service Department.

Chart 32

Low Range Drive Function Inoperative

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

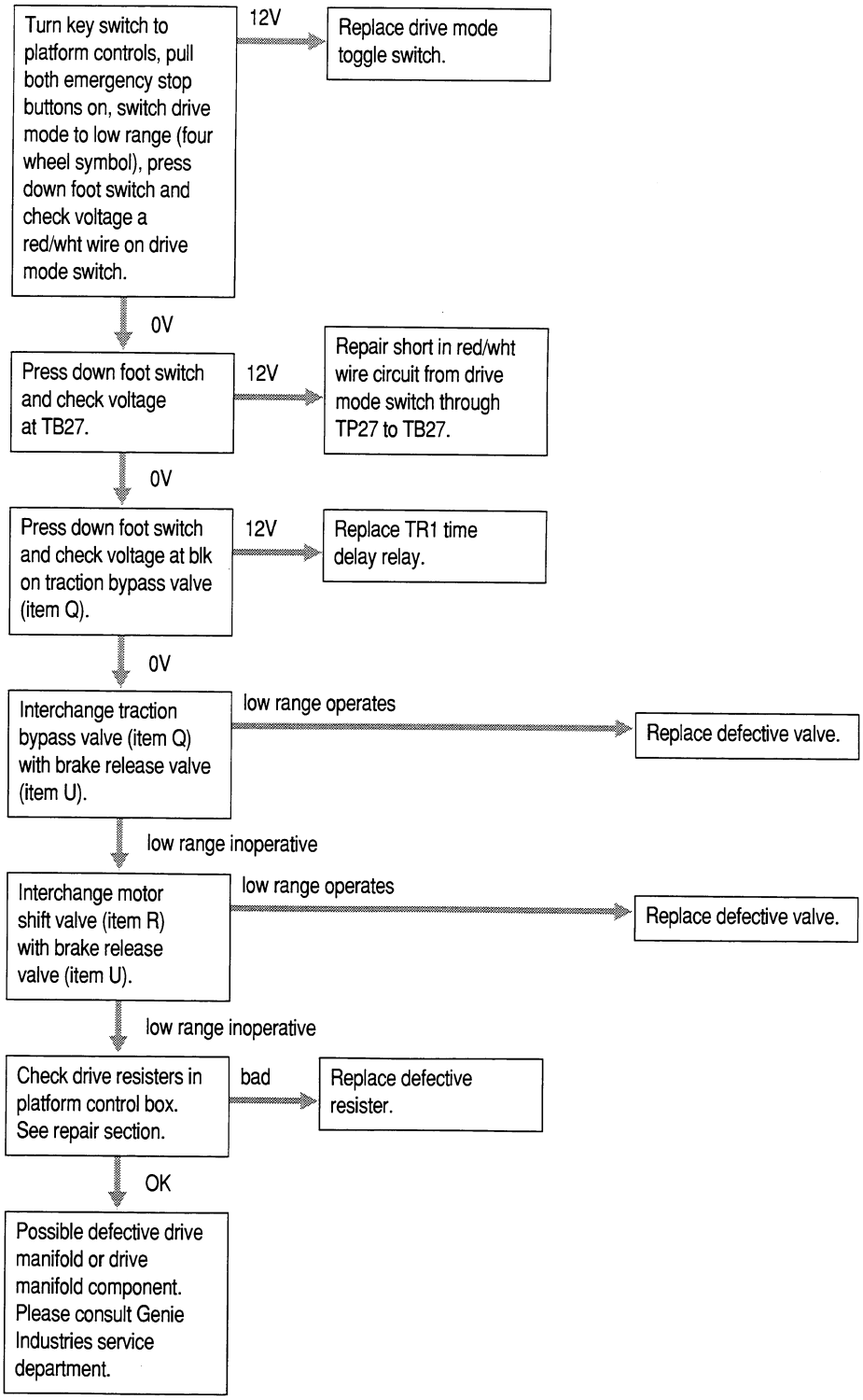


Chart 33

Machine Will Not Drive At Full Speed

Be sure all other functions operate normally.

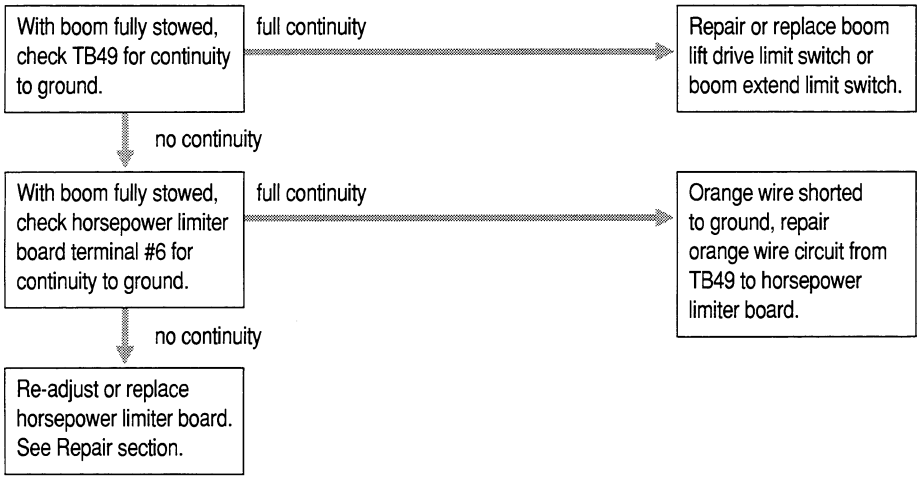


Chart 34

Machine Drives At Full Speed With Platform Elevated

Remove machine from service immediately.

Be sure boom lift drive limit switch or boom extend drive limit switch is not being held down or up.

Be sure wiring to limit switches is intact and shows no sign of tampering.

Be sure orange wire (cable 1) is properly attached to horsepower limiter.

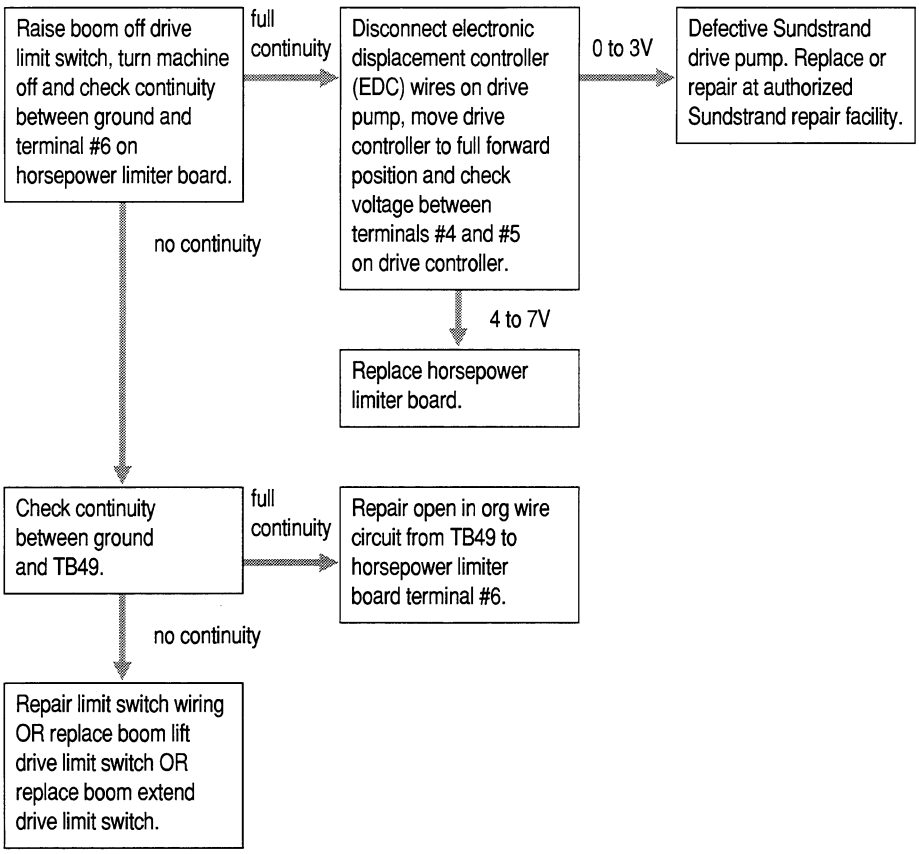


Chart 35

Drive Enable System Is Malfunctioning

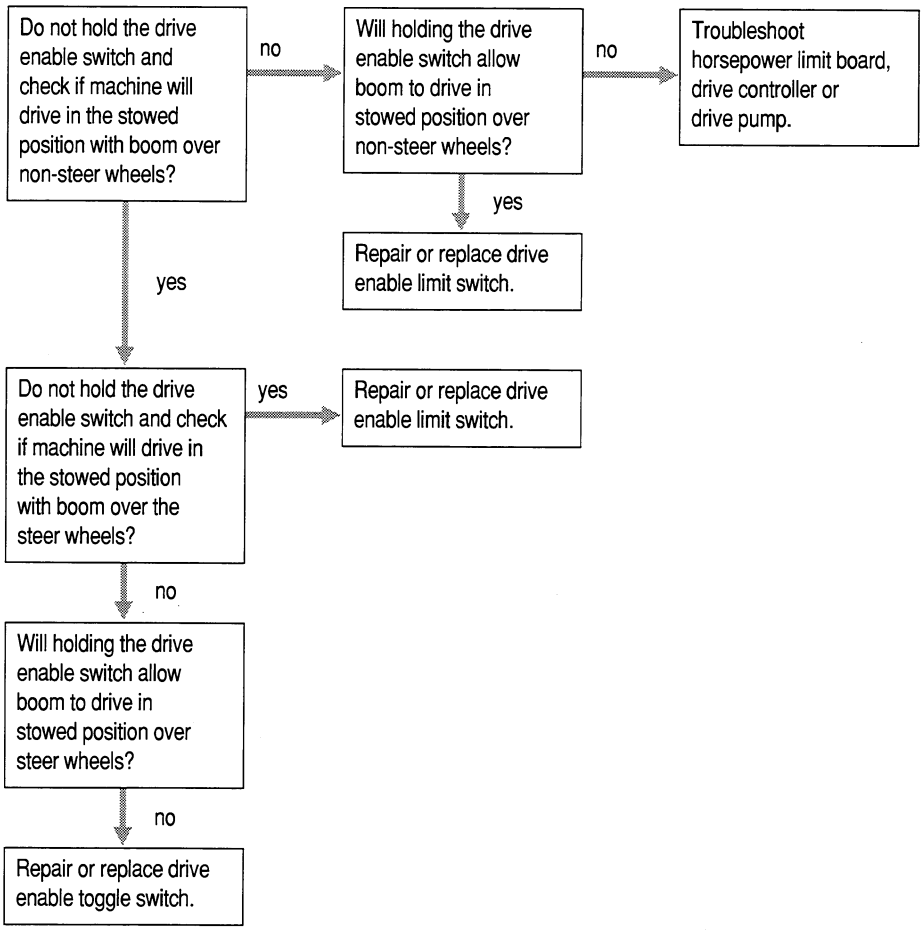


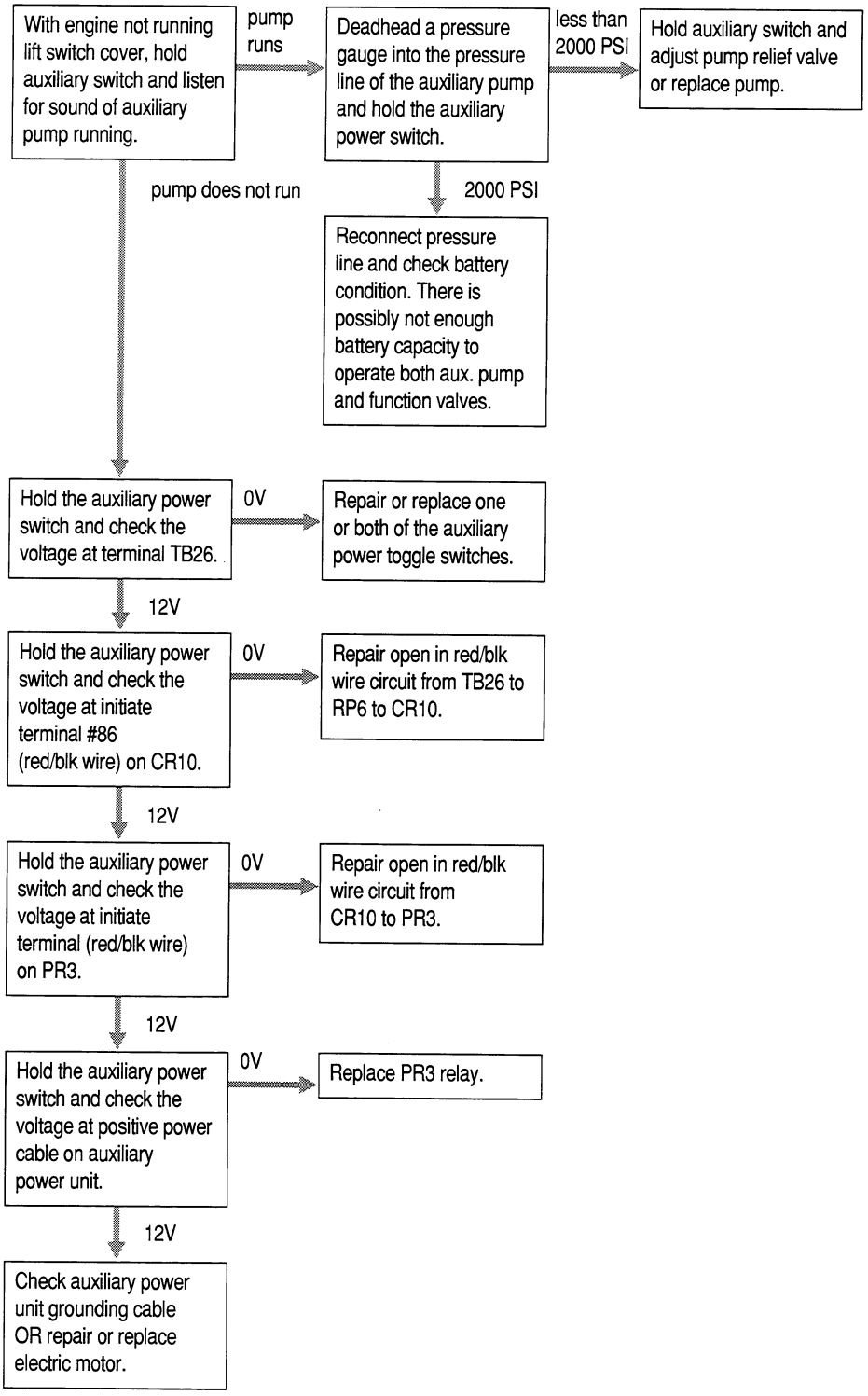
Chart 36

Auxiliary Functions Inoperative

Be sure all other functions operate normally.

Be sure key switch is in the appropriate position and the emergency stop buttons are pulled up into the on position.

Be sure engine is not running when using auxiliary power.



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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 in the *Genie S-60 Operator's 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.

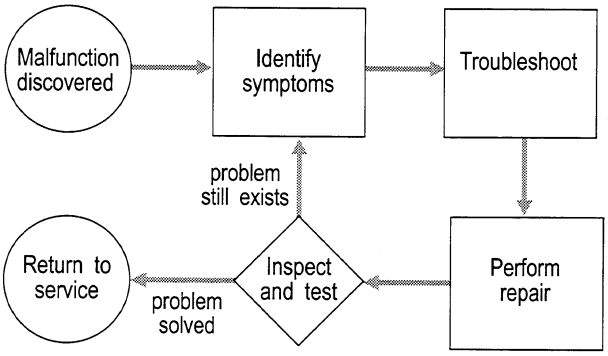
Electrical Schematics

⚠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.

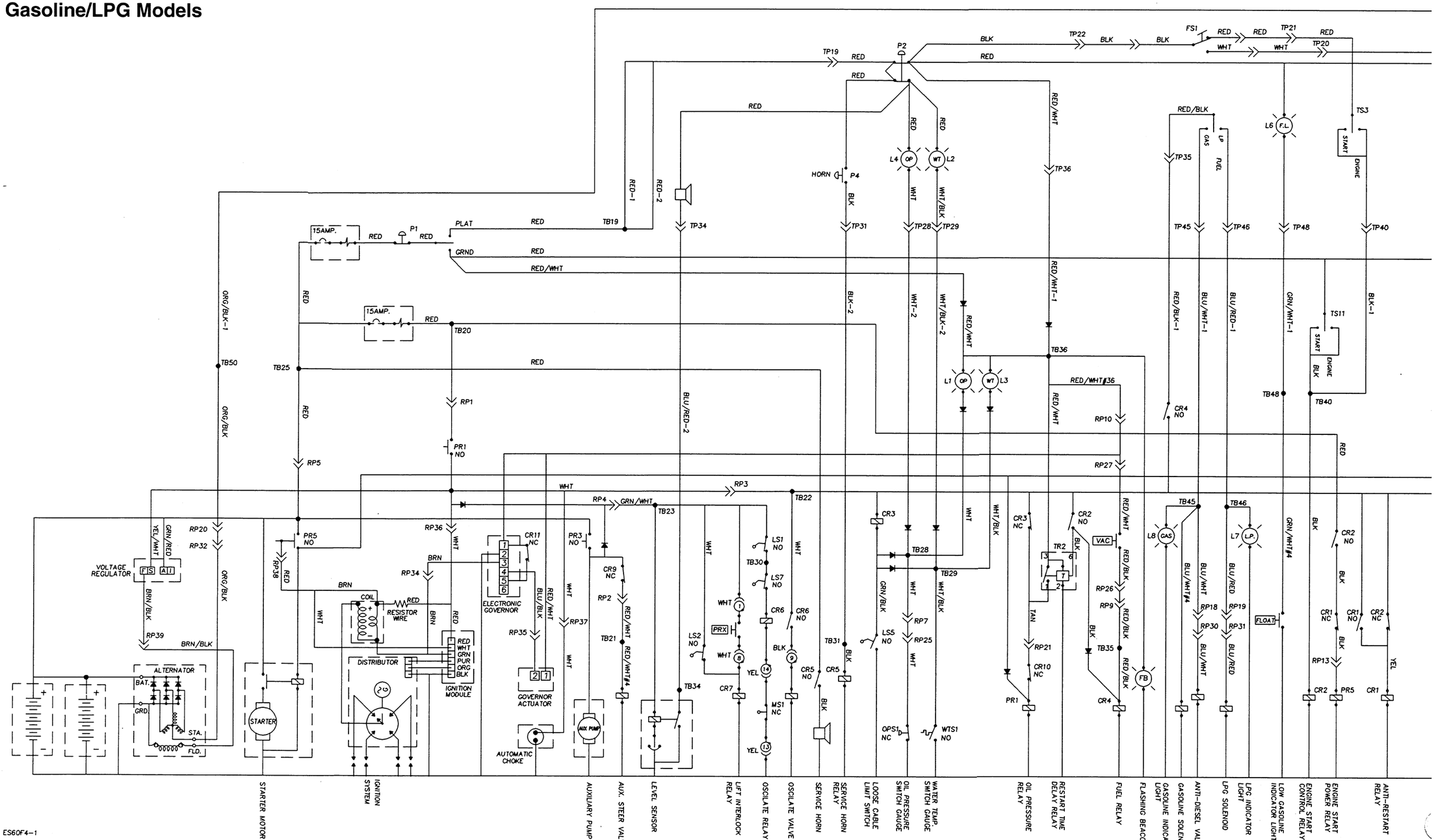
General Repair Process





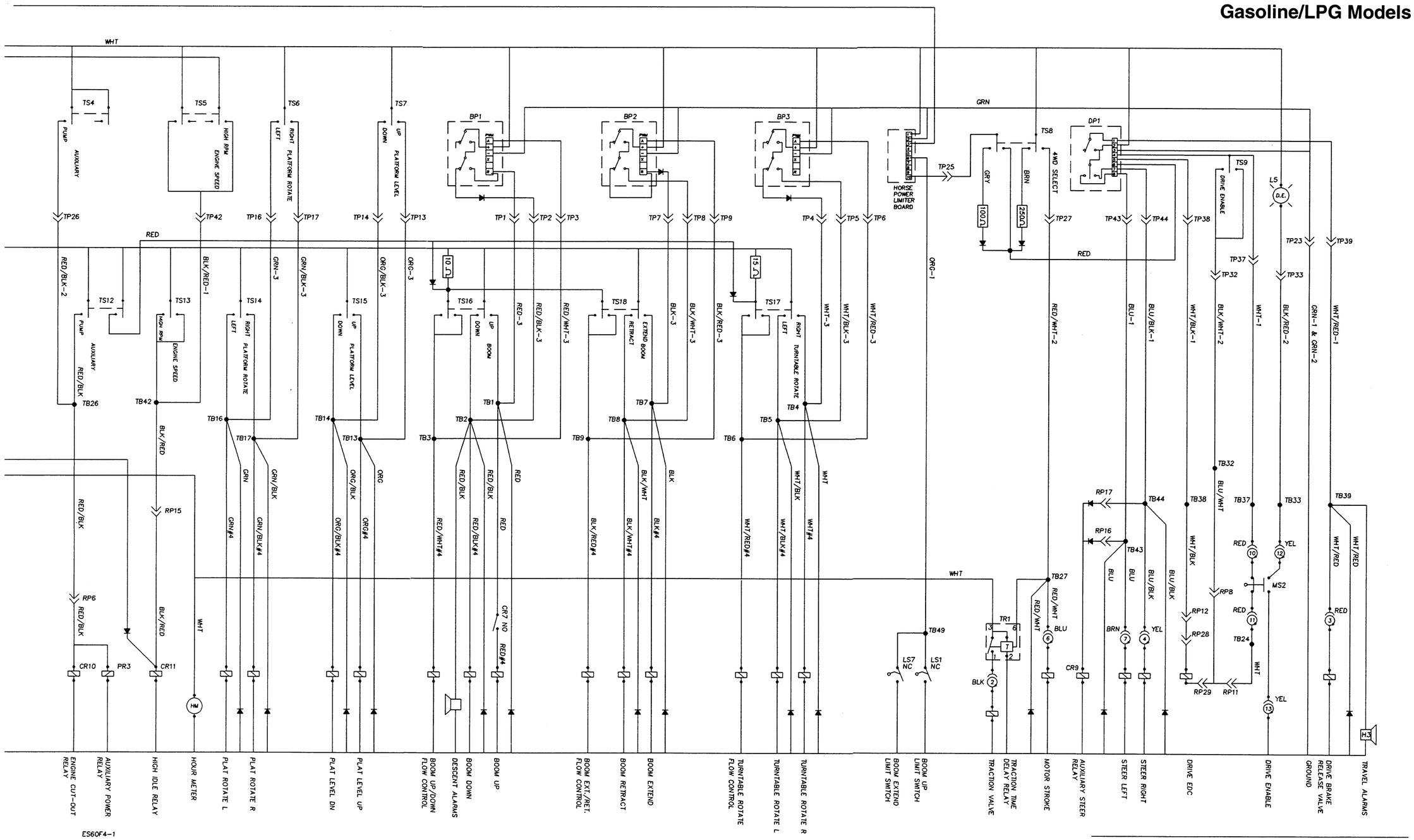


Electrical Schematic - Gasoline/LPG Models

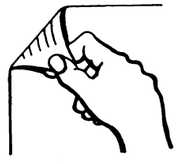


ES60F4-1

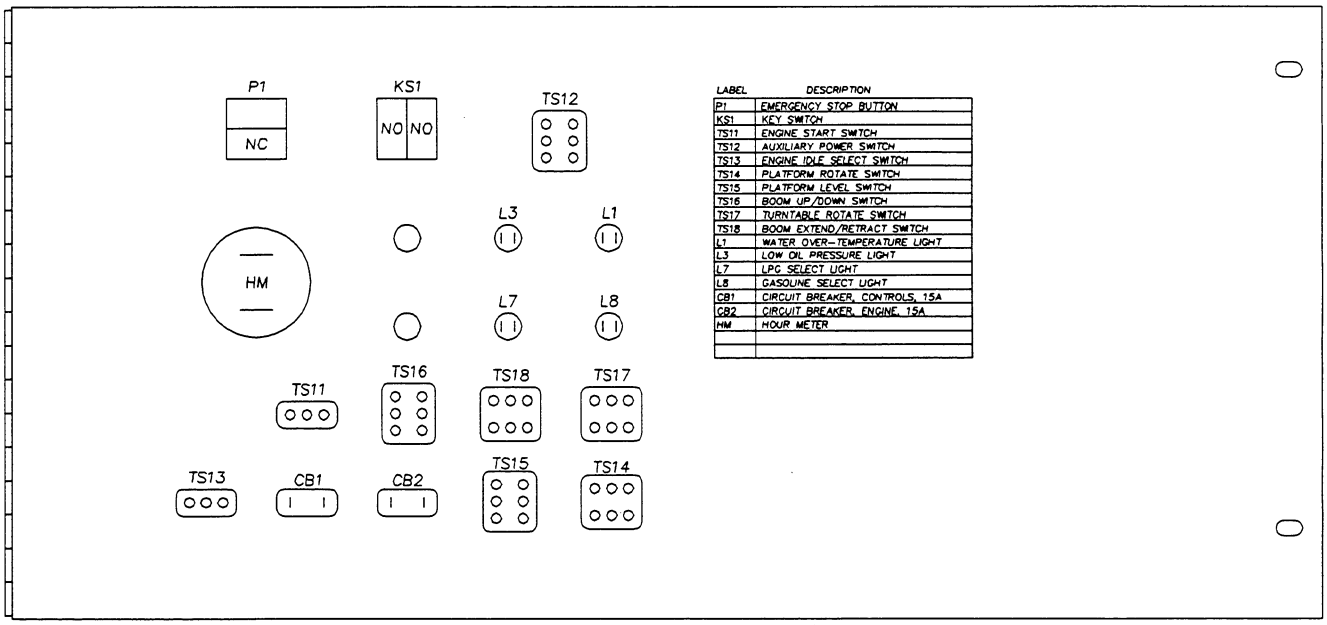
Electrical Schematic - Gasoline/LPG Models



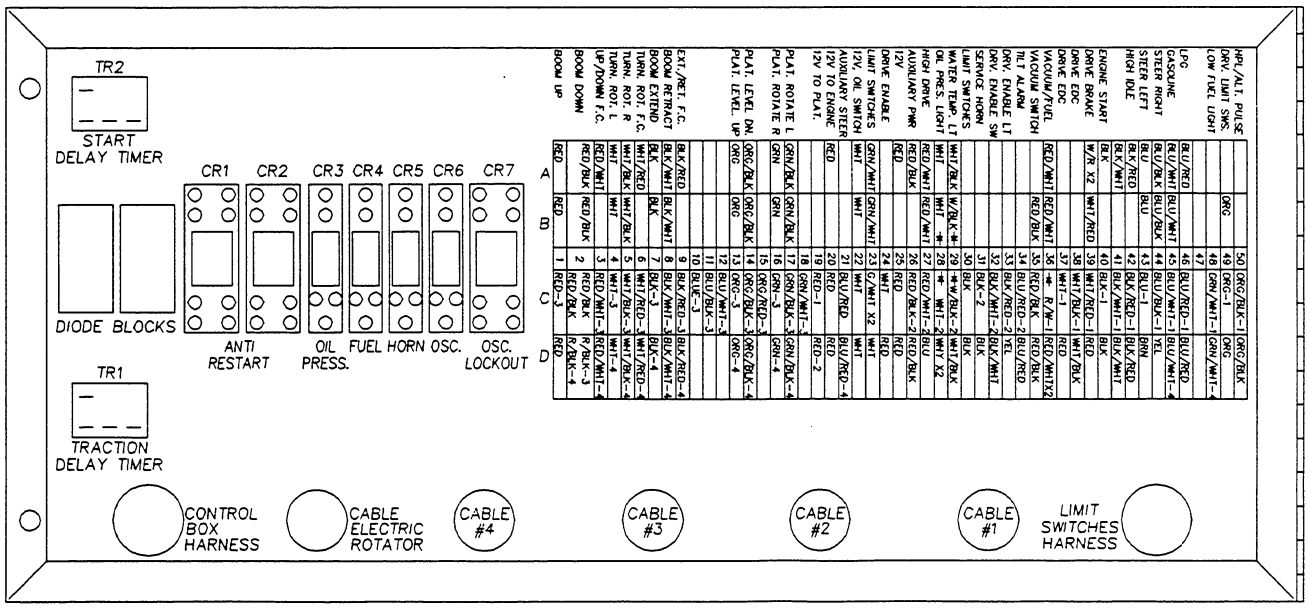
Electrical Schematic - Gasoline/LPG Models



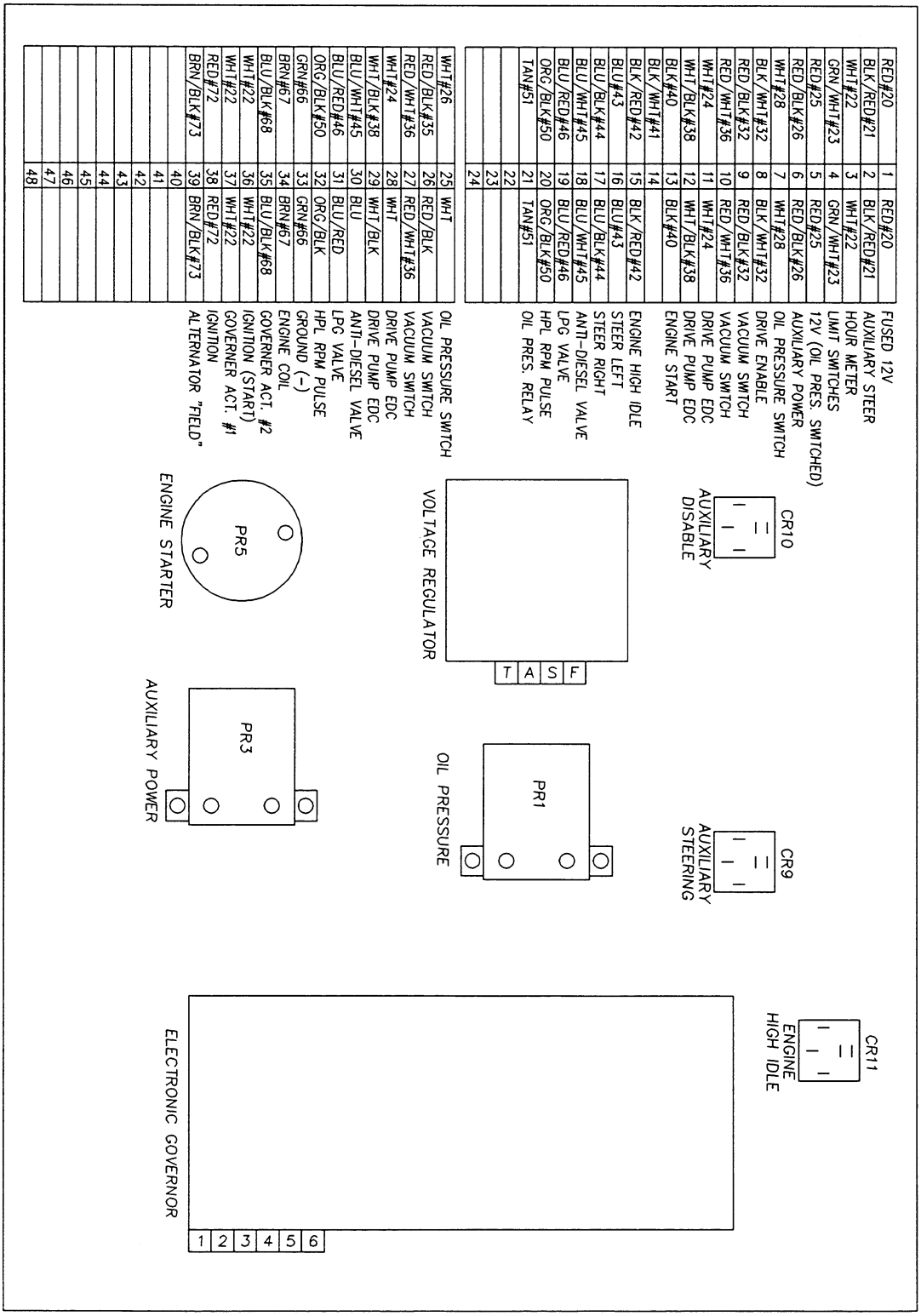
Ground Control Box Legend - Gasoline/LPG Models



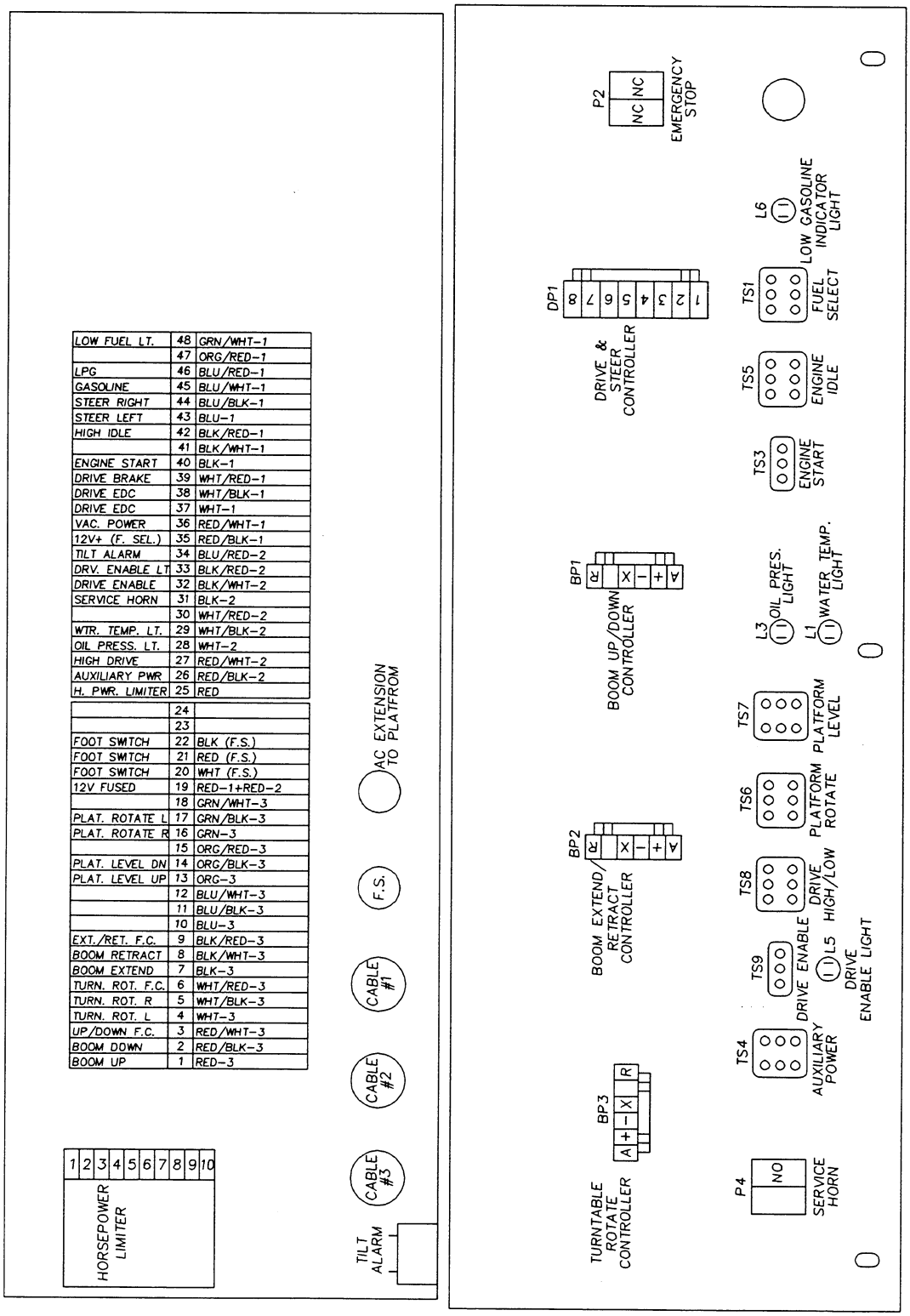
LABEL	DESCRIPTION
P1	EMERGENCY STOP BUTTON
KS1	KEY SWITCH
TS11	ENGINE START SWITCH
TS12	AUXILIARY POWER SWITCH
TS13	ENGINE IDLE SELECT SWITCH
TS14	PLATFORM ROTATE SWITCH
TS15	PLATFORM LEVEL SWITCH
TS16	BOOM UP/DOWN SWITCH
TS17	TURNTABLE ROTATE SWITCH
TS18	BOOM EXTEND/RETRACT SWITCH
L1	WATER OVER-TEMPERATURE LIGHT
L3	LOW OIL PRESSURE LIGHT
L7	LPG SELECT LIGHT
L8	GASOLINE SELECT LIGHT
CB1	CIRCUIT BREAKER, CONTROLS, 15A
CB2	CIRCUIT BREAKER, ENGINE, 15A
HM	HOUR METER



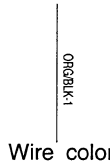
Relay Panel Legend - Gasoline/LPG Models



Platform Control Box Legend - Gasoline/LPG Models



Electrical Symbols Legend



Wire color with cable number



Terminal



Quick disconnect terminal



T-circuits connect at terminal



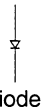
T-circuits connect



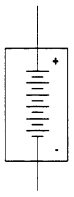
Connection no terminal



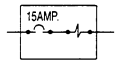
Circuits crossing no connection



Diode



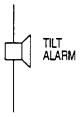
Battery



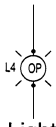
Circuit breaker



Solenoid or relay coil



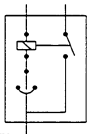
Horn



Light



Resistor



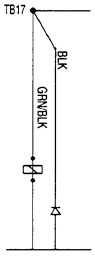
Tilt sensor



Spark plug



Glow plug



Ground supression circuit



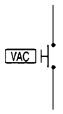
Limit switch



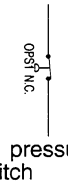
Limit switch normally open held closed



Limit switch normally closed held open



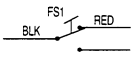
Vacuum switch



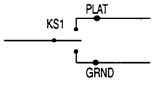
Oil pressure switch normally closed



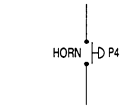
Water temperature switch normally closed



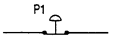
Foot switch



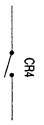
Key switch



Horn button normally open



Emergency Stop button normally closed



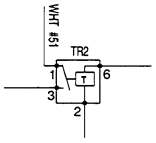
Relay contact normally open



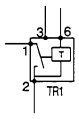
Relay panel contactor



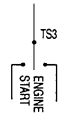
Starter motor relay



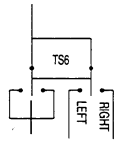
Time delay relay



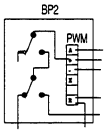
Time delay relay



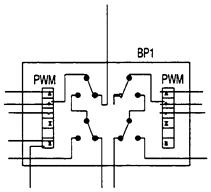
Toggle switch SPDI



Toggle switch DPDT



Single axis proportional controller

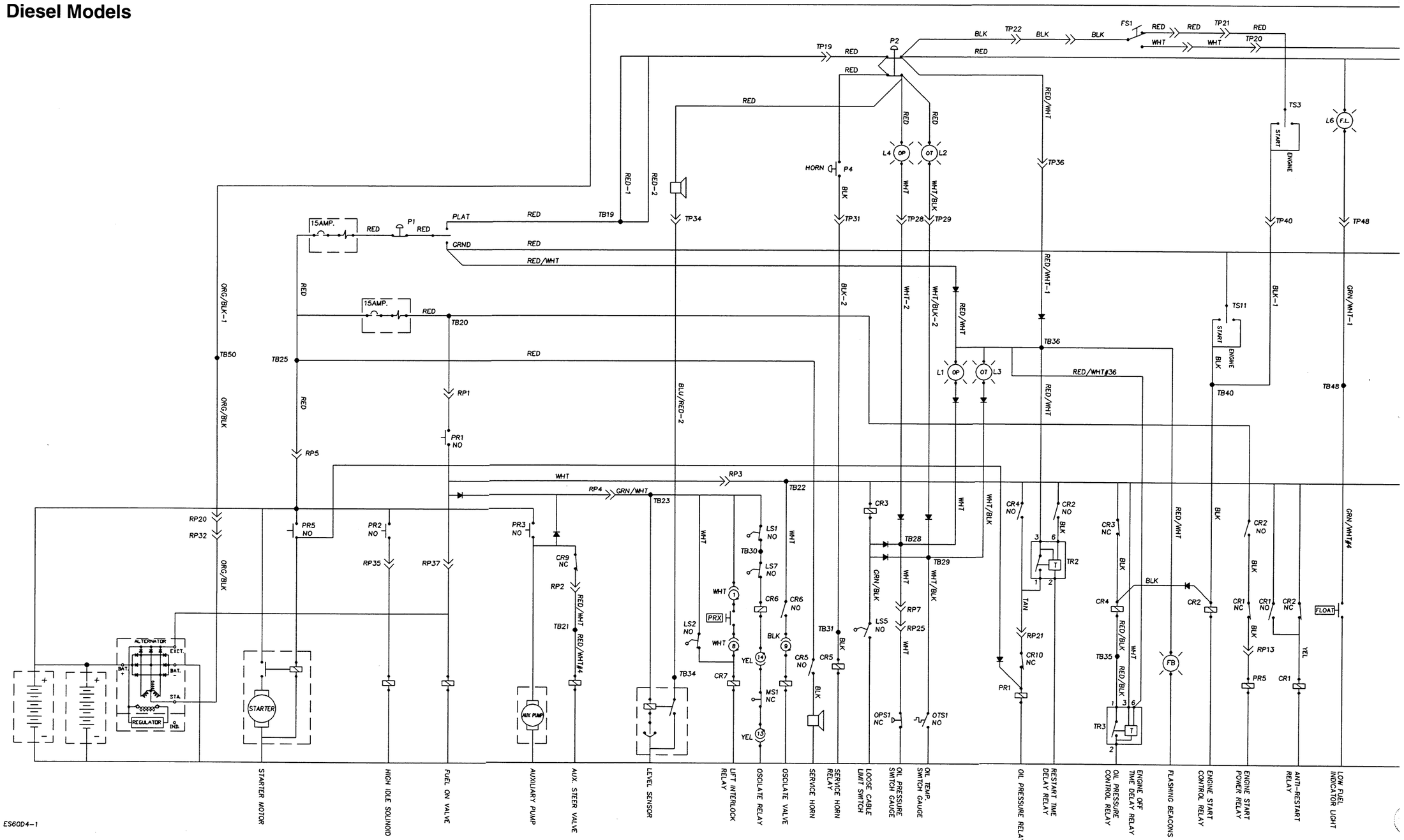


Dual axis proportional controller



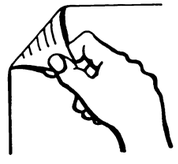


Electrical Schematic - Diesel Models

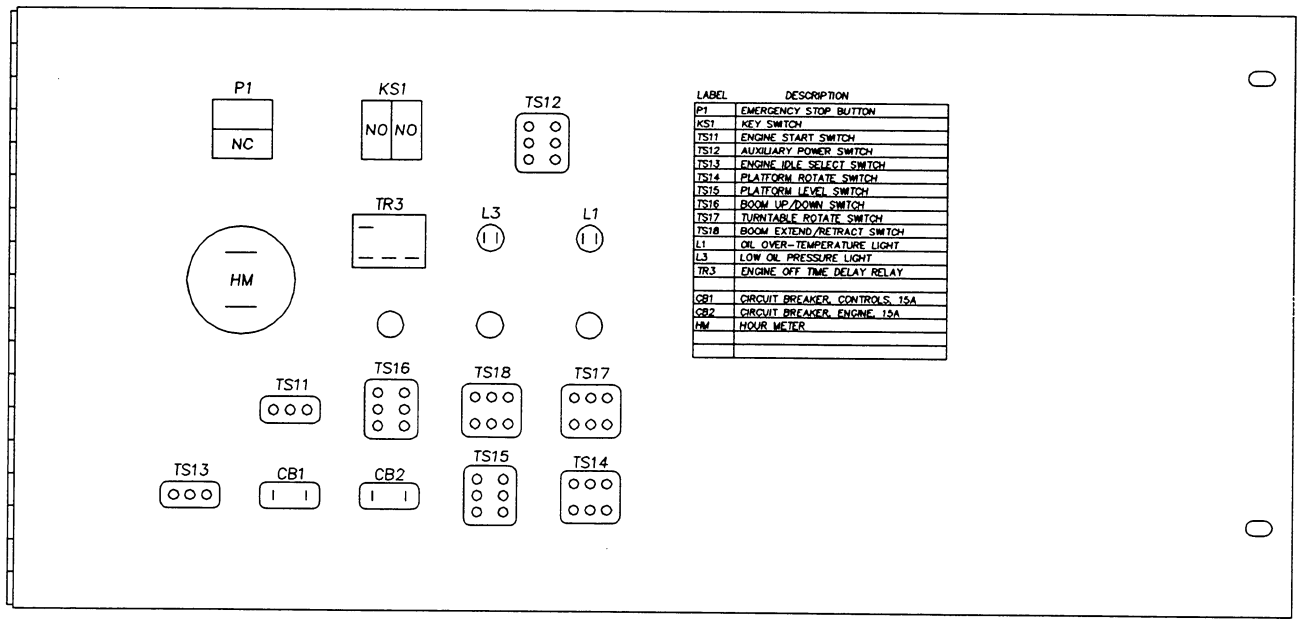


Electrical Schematic - Diesel Models

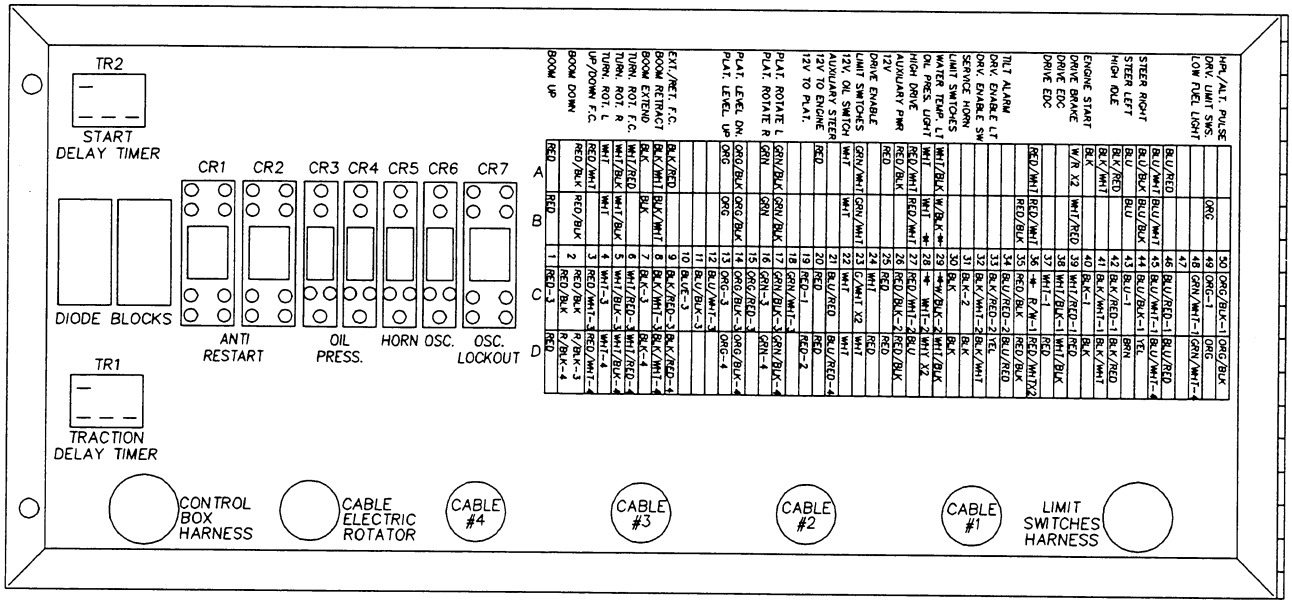
Electrical Schematic - Diesel Models



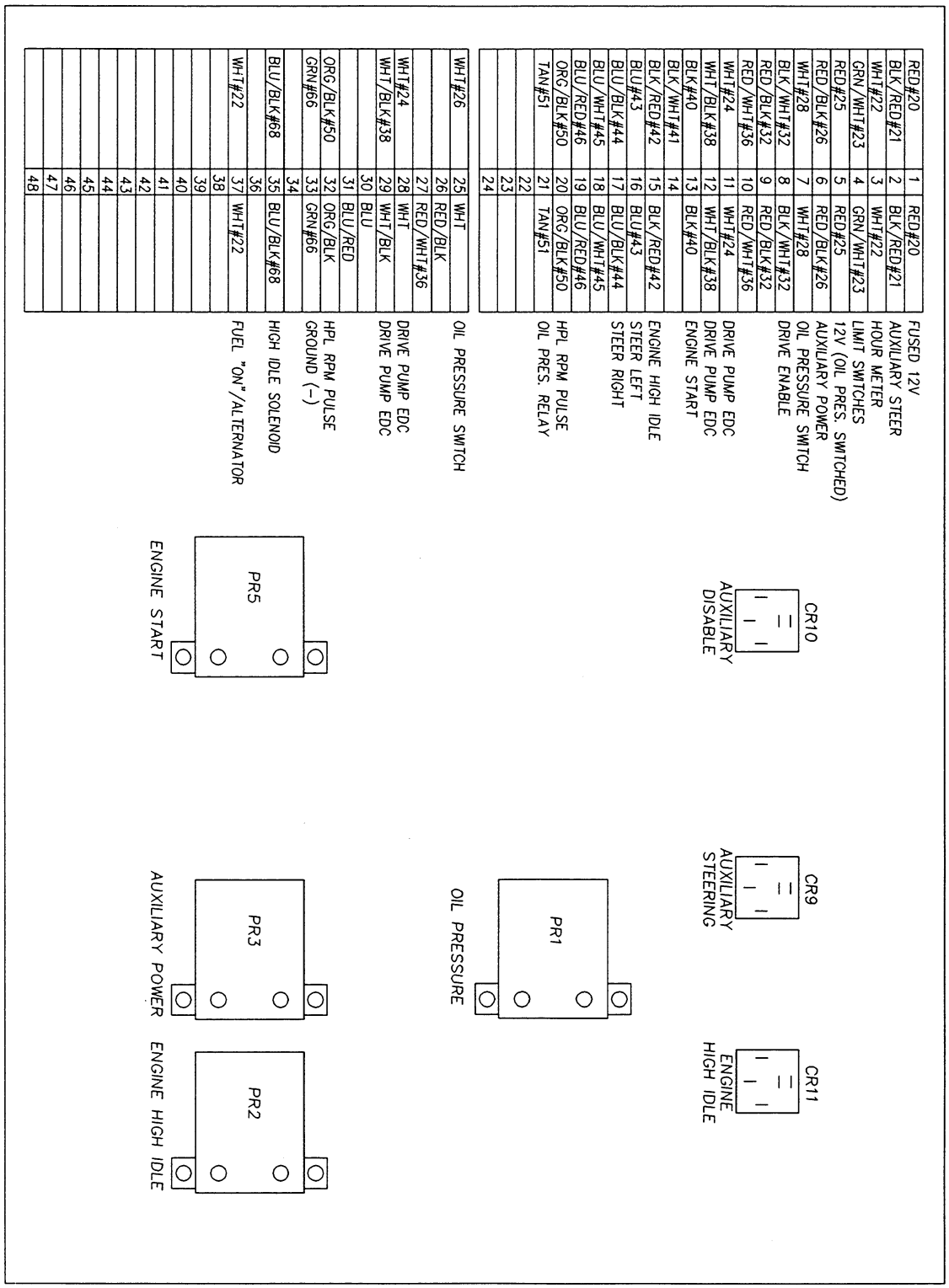
Ground Control Box Legend - Diesel Models



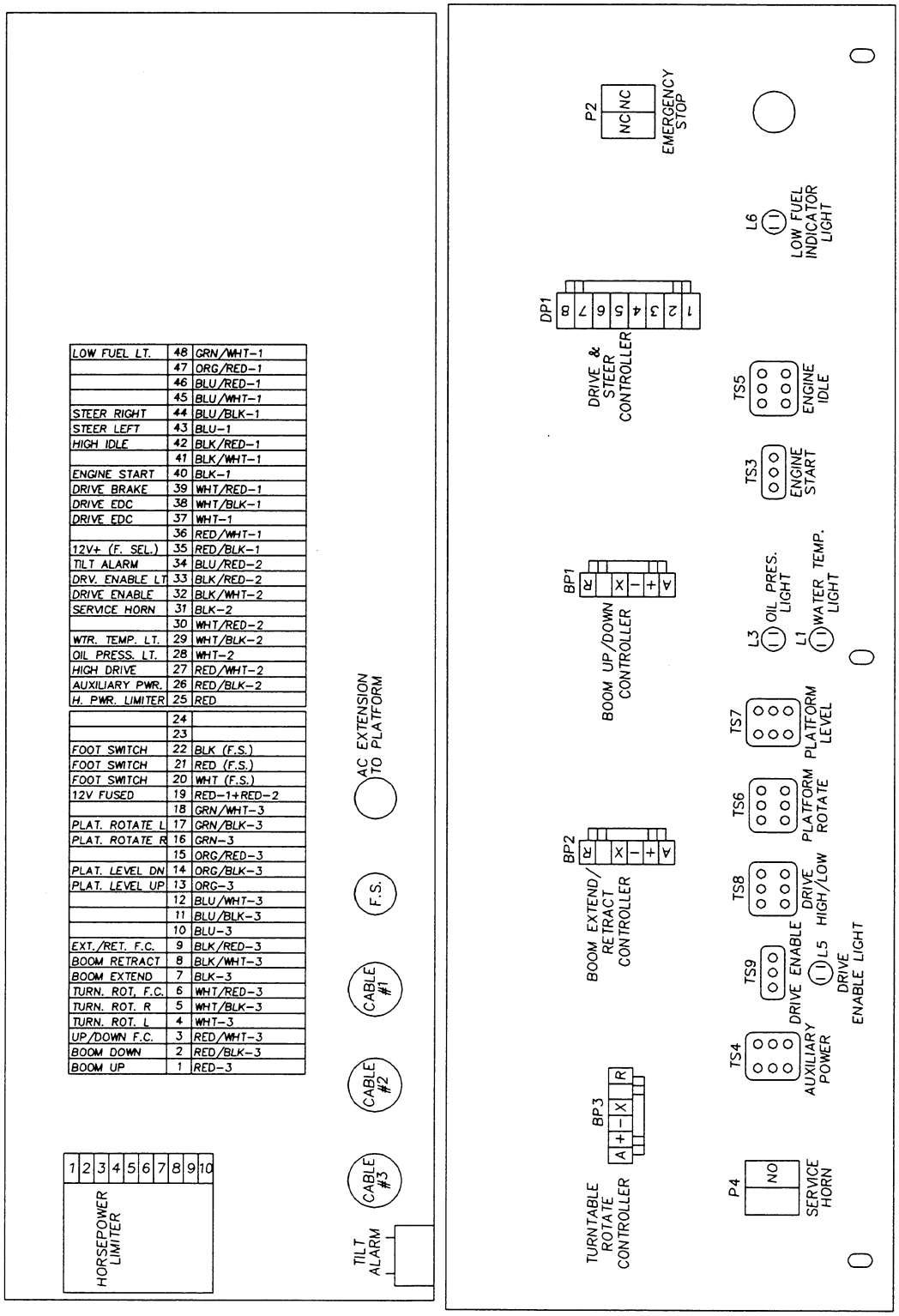
LABEL	DESCRIPTION
P1	EMERGENCY STOP BUTTON
KS1	KEY SWITCH
TS11	ENGINE START SWITCH
TS12	AUXILIARY POWER SWITCH
TS13	ENGINE IDLE SELECT SWITCH
TS14	PLATFORM ROTATE SWITCH
TS15	PLATFORM LEVEL SWITCH
TS16	BOOM UP/DOWN SWITCH
TS17	TURNTABLE ROTATE SWITCH
TS18	BOOM EXTEND/RETRACT SWITCH
L1	OIL OVER-TEMPERATURE LIGHT
L3	LOW OIL PRESSURE LIGHT
TR3	ENGINE OFF TIME DELAY RELAY
CB1	CIRCUIT BREAKER, CONTROLS, 15A
CB2	CIRCUIT BREAKER, ENGINE, 15A
HM	HOUR METER



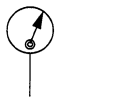
Relay Panel Legend - Diesel Models

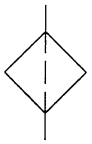


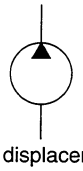
Platform Control Box Legend - Diesel Models

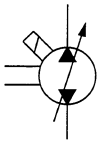


Hydraulic Symbols Legend

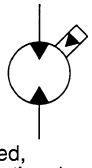

Pressure gauge

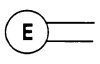

Filter


Fixed displacement pump

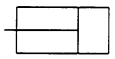

Bi-directional, variable displacement pump

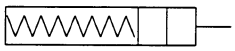

Bi-directional motor


2-speed, bi-directional motor



Pump prime mover (engine or motor)


Cylinder

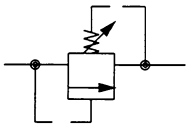

Accumulator

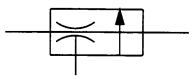


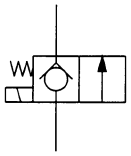
Orifice with size

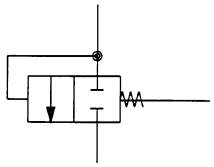

Variable orifice or shut-off valve

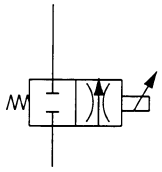

Check valve

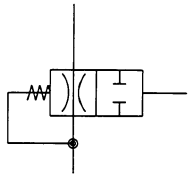

Relief valve

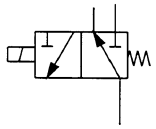

Priority flow divider

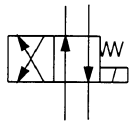

Solenoid operated dump valve

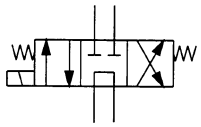

Differential sensing valve

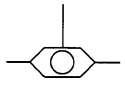

Solenoid operated proportional valve

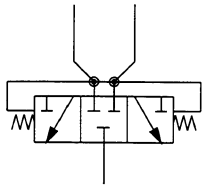

Flow regulator valve

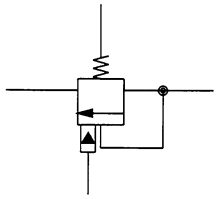

Solenoid operated 2 pos., 3 way, directional valve

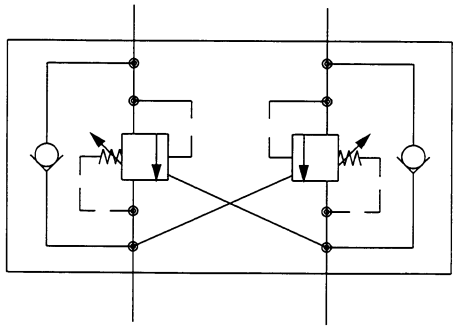

Solenoid operated 2 pos., 4 way, directional valve


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

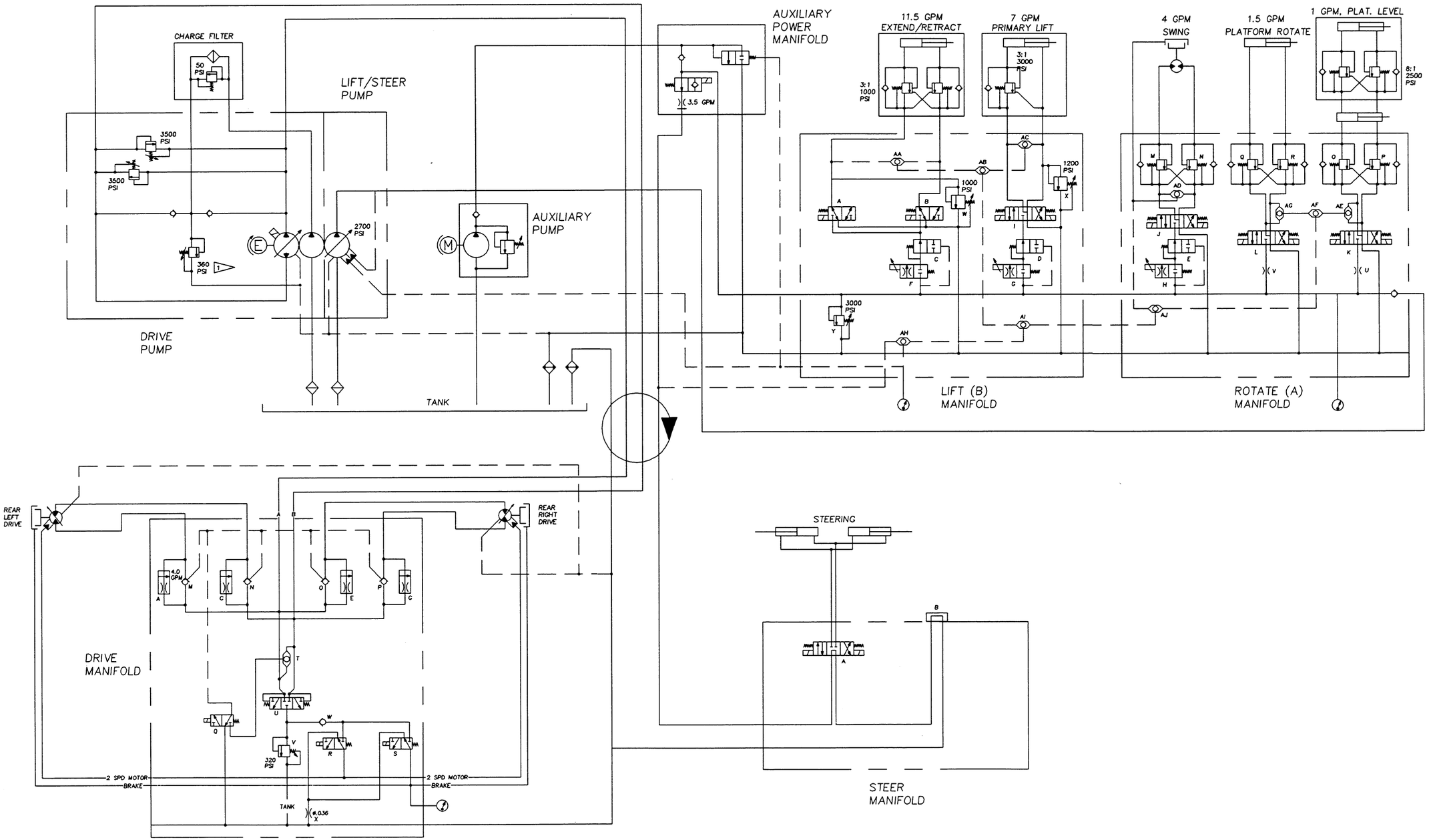

2 pos., 3 way, shuttle valve


3 pos., 4 way, directional valve

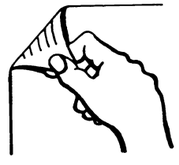

Sequencing valve


Counterbalance valve

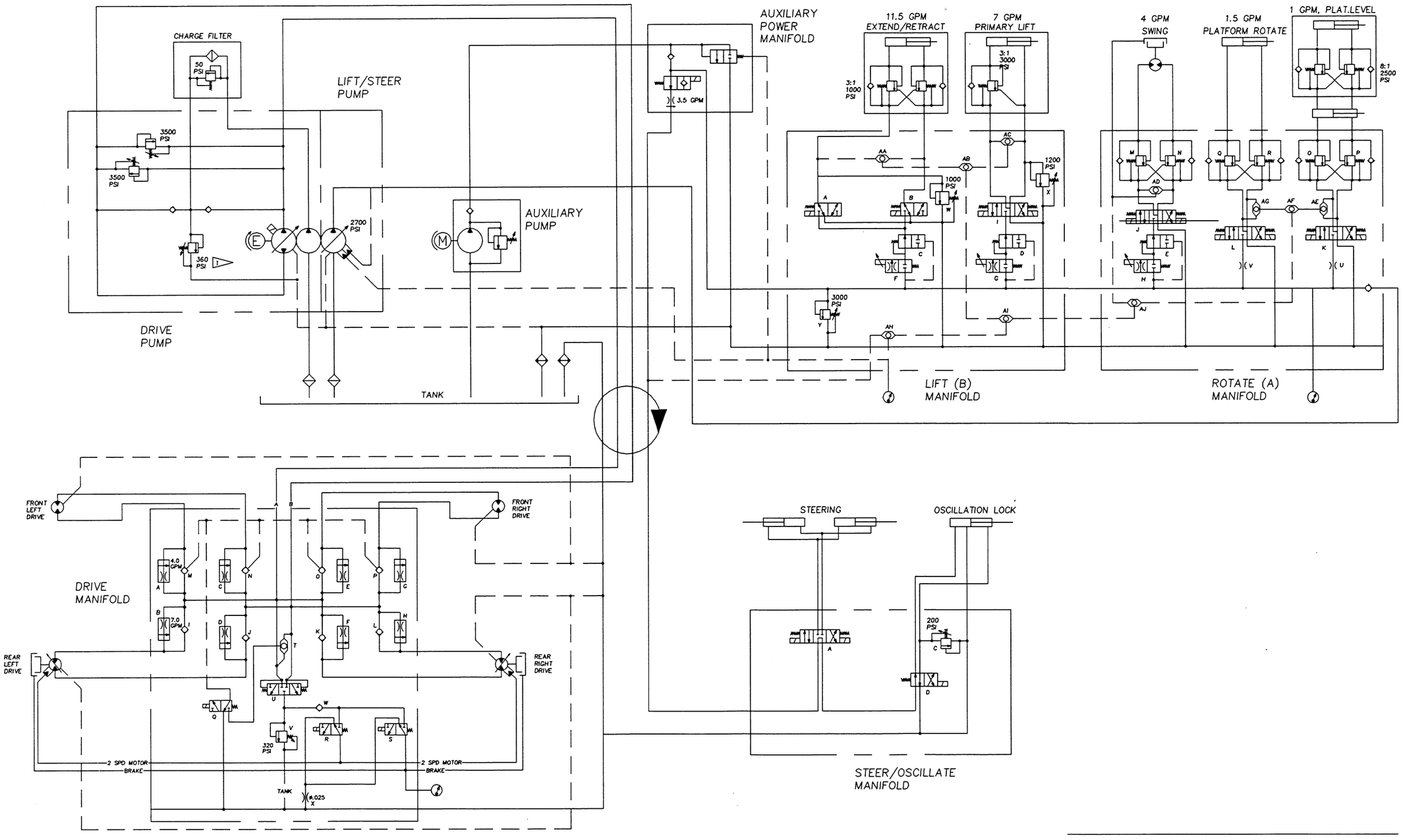
2WD Hydraulic Schematic



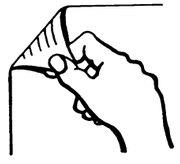
2WD Hydraulic Schematic



4WD Hydraulic Schematic



4WD Hydraulic Schematic



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:

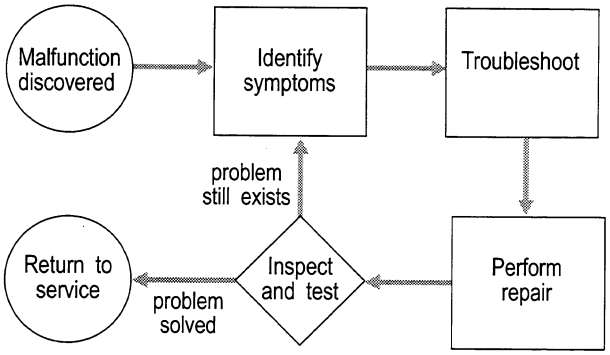
- ☑ Read, understand and obey the safety rules and operating instructions in the *Genie S-60 Operator's Manual.*
- ☑ Be sure that all necessary tools and parts are available and ready for use.
- ☑ Read each procedure completely and adhere to the instructions. Attempting shortcuts may produce hazardous 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.

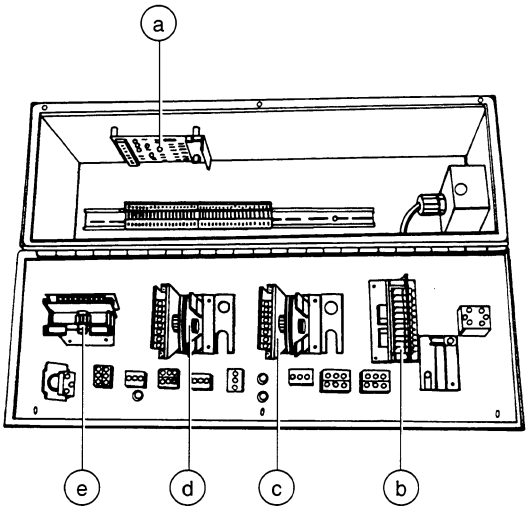
NOTICE Indicates special operation or maintenance information.

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

Platform Controls

1-1
Joystick Controllers

Maintaining joystick controllers 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.



Platform control box
- a horsepower limiter board
- b drive proportional controller
- c boom up/down proportional controller
- d boom extend/retract proportional controller
- e turntable rotate proportional controller

Boom Up/Down Controller Adjustments

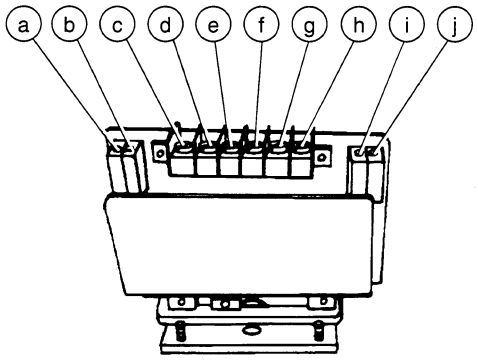
NOTICE Do not adjust the joystick controllers unless the static battery voltage is above 12V DC and the alternator is operating properly with 13V DC output or more.

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

1 Check each 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 out 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 boom up/down controller.



- a dual (lo) range 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 preliminary ramp rate: Turn the trimpot adjustment screw clockwise 15 turns or until you hear a click.

5 Connect the red(+) lead from a volt meter to the "A" terminal on the controller printed circuit 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 2.87V 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 7.38V 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 4.80V DC. Turn the dual range trimpot adjustment screw clockwise to increase the voltage or counterclockwise to decrease the voltage.

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

NOTICE Engine should be at normal operating temperature.

10 Start a timer and record how long it takes for the boom to reach the FULL UP position. Adjust the max-out trimpot to achieve a 55 to 65 second cycle time.

11 Start a timer and record how long it takes for the boom to lower into the FULL DOWN position. Adjust the dual range trimpot to achieve an 80 to 100 second cycle time.

12 Turn the engine off and re-connect the volt meter.

13 Pull out the Emergency Stop button to the ON position.

14 Press down the foot switch and then move the control handle all the way to the up position. Record the maximum voltage reading.

15 Start the engine.

16 Start a timer and simultaneously move the control handle to the full UP position. Note how long it takes to reach the maximum voltage recorded in step 14. This is the ramp speed.

17 Set the ramp rate: turn the trimpot to obtain a 3 to 5 second ramp speed. Turn the trimpot clockwise to increase the time or counterclockwise to decrease the time.

Boom up/down specifications	
Threshold	2.87V DC
Boom up - Max-out	7.38V DC
Cycle time	55 to 65 seconds
Primary boom down - Dual (lo) range	4.80V DC
Cycle time	80 to 100 seconds
Ramp rate	3 to 5 seconds

Boom Extend/Retract Controller Adjustments

NOTICE Do not adjust the joystick controllers unless the static battery voltage is above 12V DC and the alternator is operating properly with 13V DC output or more.

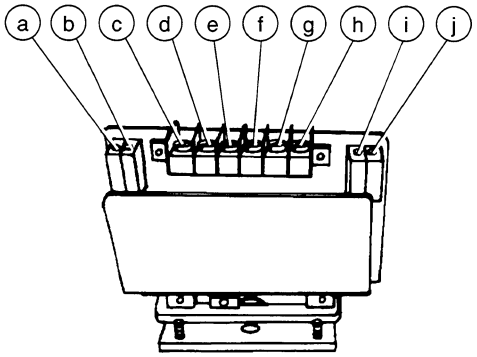
⚠WARNING Electrocution hazard. Contact with electrically charged circuits may result in death or serious injury. Remove all rings, watches and other jewelry.

1 Check each 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 out 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 boom extend/retract controller.

PLATFORM CONTROLS



a dual (lo) range 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 preliminary ramp rate: Turn the trimpot adjustment screw clockwise 15 turns or until you hear a click.

5 Connect the red(+) lead from a volt meter to the "A" terminal on the controller printed circuit 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 4.12V 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 8.55V 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 6.25V DC. Turn the dual range trimpot adjustment screw clockwise to increase the voltage or counterclockwise to decrease the voltage.

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

NOTICE Engine should be at normal operating temperature.

10 Start a timer and record how long it takes for the boom to reach full extension. Adjust the max-out trimpot to achieve a 55 to 65 second cycle time.

11 Start a timer and record how long it takes for the boom to fully retract. Adjust the dual range trimpot to achieve a 55 to 65 second cycle time.

12 Turn the engine off and re-connect the volt meter.

13 Pull out the Emergency Stop button to the ON position.

14 Press down the foot switch and then move the control handle all the way to the EXTEND position. Record the maximum voltage reading.

15 Start the engine.

16 Start a timer and simultaneously move the control handle to the full EXTEND position. Note how long it takes to reach the maximum voltage recorded in step 14. This is the ramp speed.

17 Set the ramp rate: turn the trimpot to obtain a 3 second ramp speed. Turn the trimpot clockwise to increase the time or counterclockwise to decrease the time.

Boom extend/retract specifications	
Threshold	4.12V DC
Boom extend - Max-out Cycle time	8.55V DC 55 to 65 seconds
Boom retract - Dual (lo) range Cycle time	6.25V DC 55 to 65 seconds
Ramp rate	3 seconds

Turntable Rotation Controller Adjustments

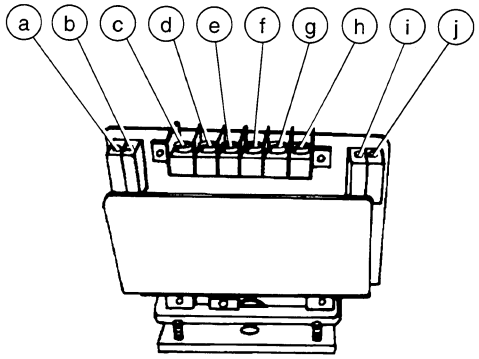
NOTICE Do not adjust the joystick controllers unless the static battery voltage is above 12V DC and the alternator is operating properly with 13V DC output or more.

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

1 Check each 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 out 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 turntable rotation controller.



a dual (lo) range 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 preliminary ramp rate: Turn the trimpot adjustment screw clockwise 15 turns or until you hear a click.

5 Connect the red(+) lead from a volt meter to the "A" terminal on the controller printed circuit 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 2.84V 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 to either full right or full left. Adjust the voltage to 5.50V 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.

PLATFORM CONTROLS

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

NOTICE Engine should be at normal operating temperature.

10 Start a timer and record how long it takes the turntable to rotate through a complete circle. Adjust the max-out trimpot to achieve an 80 to 100 second cycle time.

11 Turn the engine off and re-connect the volt meter.

12 Pull out the Emergency Stop button to the ON position.

13 Press down the foot switch and then move the control handle to either full left or full right. Record the maximum voltage reading.

14 Start the engine.

15 Start a timer and simultaneously move the control handle to either full right or full left. Note how long it takes to reach the maximum voltage recorded in step 13. This is the ramp rate.

16 Set the ramp rate: turn the trimpot to obtain a 5 second ramp speed. Turn the trimpot clockwise to increase the time or counterclockwise to decrease the time.

Turntable rotation specifications	
Threshold	2.84V DC
Turntable rotation - Max-out	5.50V DC
Cycle time	80 to 100 seconds
Ramp rate	5 seconds

1-2 Horsepower Limiter Board

The horsepower limiter board is responsible for governing drive pump output. It senses 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 maintain optimum engine rpm and horsepower. Three adjustments are required for optimum performance.

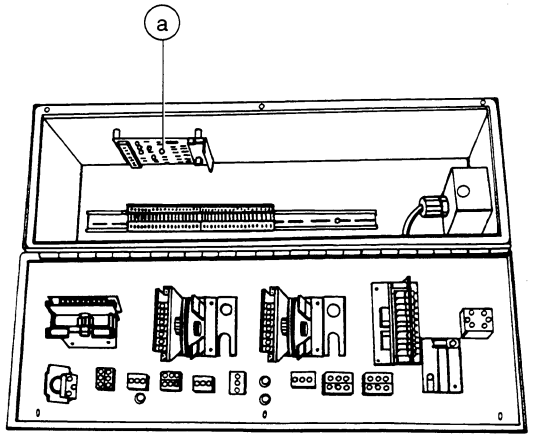
How to Adjust the Horsepower Limiter Board

NOTICE **Gasoline LPG models:** Perform this procedure in gasoline mode.

1 Remove the fasteners from the platform control box lid.

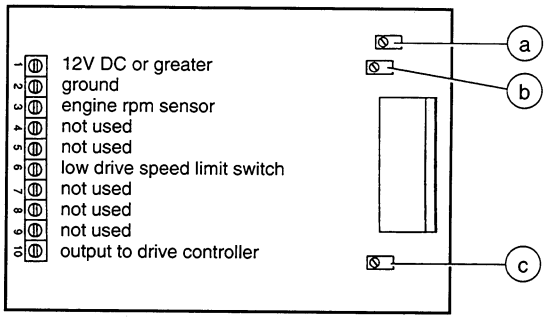
2 Open the control box lid and locate the horsepower limiter board.

AWARNING Electrocution hazard. Contact with electrically charged circuits may result in death or serious injury. Remove all rings, watches and other jewelry.



Platform control box
a horsepower limiter board

3 Connect the black(-) lead from a DC volt meter to the no. 2 terminal, and the red(+) lead to the no. 10 terminal.



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

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.

"A" potentiometer specifications - all models	
Voltage setting	9.50V 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).

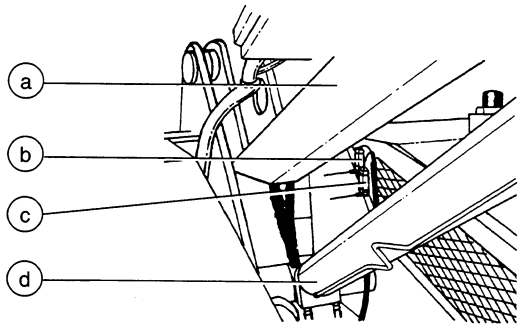
10 Press down the foot switch and re-adjust the "A" potentiometer to the previous voltage setting in step 6.

11 Be sure that the boom is in the stowed position, then drive the machine and observe how the engine rpm reacts to drive control handle movement. If the engine 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 rpm droop.

12 Disconnect the volt meter.

13 Raise the boom above the drive limit switch.



- a boom assembly
- b lift interlock switch
- c drive limit switch
- d lift cylinder

14 Drive the machine for 40 feet (12m) and record the elapsed time. Repeat this step in the opposite drive direction.

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 install the fasteners.

PLATFORM CONTROLS

Drive speed specifications	
Stowed position, high range	distance: 40 ft / 12m
Gasoline/LPG Models	6.0 seconds
Deutz Diesel Models	7.0 seconds
Boom raised or extended, high range	distance: 40 ft / 12m
	1 foot per second
All models	30.5cm per second

1-3 Foot Switch

How to Test the Foot Switch

1 Turn the key switch 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 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 connector to use for testing.

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

Test	Desired result
red to black	no continuity (infinite W)
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 key switch 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

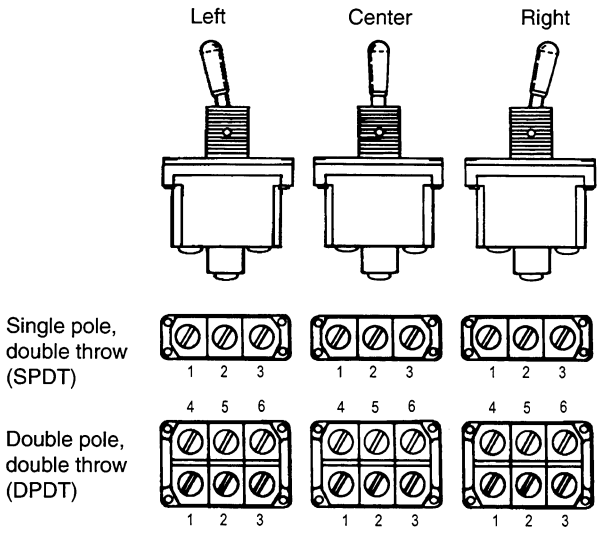
Toggle switches used for single function switching are single pole double throw (SPDT) switches. Dual function switching requires a double pole double throw (DPDT) switch.

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 key switch 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 on the platform mounting bracket and separate the foot switch quick disconnect plug.

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

3 Remove the platform mounting bolts and lift the platform off the mount.

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

2 Extend the boom until the slave cylinder barrel-end pin is accessible.

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

4 Disconnect the hydraulic hoses from the slave cylinder and connect them together with a connector.

⚠CAUTION Bodily injury hazard. Spraying hydraulic oil can penetrate 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 fastener from both the barrel and rod-end pins.

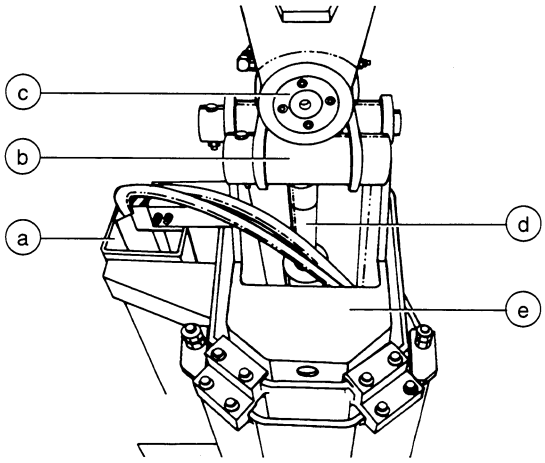
6 Drive the rod-end pin out using a soft metal drift.

7 Manually pivot the rotator up and secure it to the boom.

8 Use a soft metal drift and drive the barrel-end pin out.

9 Carefully pull the cylinder out of the boom.

NOTICE When installing the slave cylinder rod-end pin into the platform rotator, rotate the rod-end lug so the narrow side of the lug is towards the cable track.



a cable track
b slave cylinder lug narrow side
c platform rotator
d platform leveling slave cylinder
e number 3 boom tube

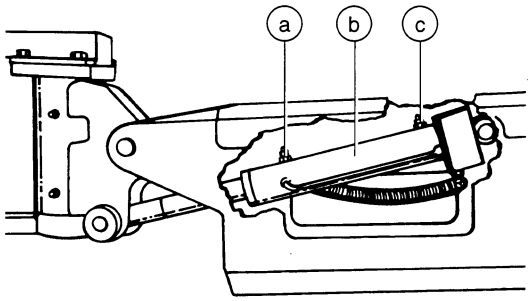
How to Bleed the Slave Cylinder

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

1 Raise the boom 5 feet (1.5m) off the ground, then extend the boom until the slave cylinder is accessible.

2 Move the manual platform level switch UP and DOWN through two platform leveling cycles, then hold the switch in the UP position until the slave cylinder is fully extended.

3 Open the top bleed valve on the slave cylinder, but do not remove it.



a top bleed valve
b slave cylinder
c bottom bleed valve

4 Hold the platform level switch in the DOWN position until the slave cylinder is fully retracted. Continue to hold the switch down for an additional 3 seconds.

5 Close the bleed valve. Then open the bottom bleed valve on the slave cylinder, but do not remove it.

6 Hold the platform level switch in the UP position until the slave cylinder is fully extended. Continue to hold the switch up for an additional 3 seconds.

7 Close the bottom bleed valve. Clean up any hydraulic oil that spilled.

8 Move the manual platform level switch up and down through two platform leveling cycles and inspect the bleed valves for leaks.

2-3 Platform Rotator

The platform rotator is a hydraulically activated helical gear assembly used to rotate the platform 160 degrees. It is equipped with an internal gear ratio that will prevent platform movement in the event of a hydraulic line failure.

How to Remove the Platform Rotator

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

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

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

⚠CAUTION Bodily injury hazard. Spraying hydraulic oil can penetrate 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 pin retainer from the slave cylinder rod-end pivot pin and the rotator pivot pin.

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

PLATFORM COMPONENTS

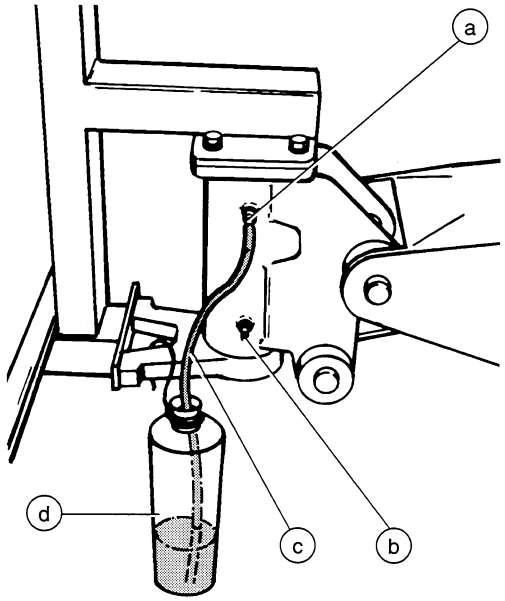
How to Bleed the Platform Rotator

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

1 Move the platform rotate switch to the right then the left through two platform rotation cycles, then hold the switch to the RIGHT position until the platform is fully rotated to the right.

2 Connect a clear hose to the top bleed valve. Place the other end of the hose in a container to collect any drainage. Secure the container to the boom.

3 Open the top bleed valve on the rotator, but do not remove it.



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

4 Hold the platform rotate switch to the LEFT position until the platform is fully rotated. Continue holding the switch until air stops coming out of the bleed valve. Then close the bleed valve.

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

5 Connect the clear hose to the bottom bleed valve and open the valve. Do not remove the bleed valve.

6 Hold the platform rotate switch to the RIGHT position until the platform is fully rotated. Continue holding the switch until air stops coming out of the bleed valve. Then close the bleed valve.

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

7 Remove the hose from the bleed valve and clean up any hydraulic oil that may have spilled.

8 Rotate the platform full right then left and inspect the bleed valves for leaks.

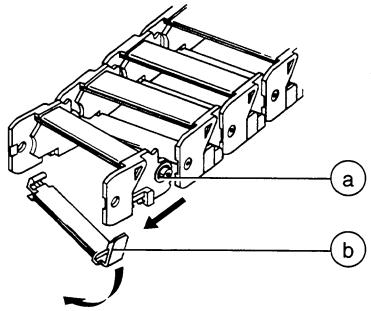
Boom Components

3-1
Plastic Cable Track

The 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 boom cable track is only necessary when performing major repairs that involve removing the boom.

How to Repair the Plastic Cable Track

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



a link separation point
b lower clip

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

2 Repeat step 1 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
Boom

How to Shim the Boom Wear Pads - Platform End

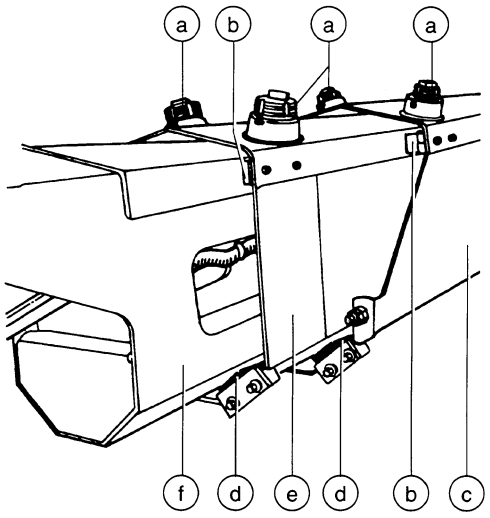
⚠CAUTION Component damage hazard. When adding shims or replacing wear pads, always maintain an equal amount of clearance between the boom tube being shimmed and the adjacent boom tube. Component damage may occur if boom tubes are not horizontally and vertically centered, with no binding or scraping through the entire extend/retract cycle.

NOTICE Refer to Maintenance Procedures, C-1, *Check the Boom Wear Pads*, for wear pad measurements before shimming.

BOOM COMPONENTS

Side Wear Pads

1 Loosen the side wear pad mounting fasteners.



a upper adjustable wear pad
b side wear pad
c no. 1 boom tube
d lower wear pad
e no. 2 boom tube
f no. 3 boom tube

2 Install the new shims on the outside of the wear pad to obtain minimum clearance while maintaining zero drag.

NOTICE When adding shims to the side wear pads, maintain an equal amount of shims on each side.

3 Extend and retract the boom through an entire cycle to check for tight spots that could cause binding or scraping.

Lower Wear Pads

NOTICE Use a lifting device to relieve the weight on the lower wear pads when installing new shims.

1 Loosen the lock nut, then remove the lock bolt from the upper adjustable wear pads. Loosen the adjustable wear pad.

2 Remove the lower wear pad retainer.

3 Install the new shims on the bottom side of the wear pad. Shim the no. 1 boom tube lower wear pad to obtain a 3/8 inch (9.5mm) clearance between the wear pad retainer and the adjacent boom tube.

4 Install the new shims on the bottom side of the wear pad. Shim the no. 2 lower wear pad to obtain a 3/16 inch (4.7mm) clearance between the wear pad retainer and the adjacent boom tube.

5 Replace the wear pad retainer and then adjust the upper adjustable wear pads.

Upper Adjustable Wear Pads

1 Loosen the lock nut and then remove the lock bolt from the upper adjustable wear pads.

2 Adjust the wear pad to obtain minimum clearance while maintaining zero drag.

3 Install the lock bolt and then tighten the lock nut.

4 Extend and retract the boom through an entire cycle to check for tight spots that could cause binding or scraping.

How to Shim the Boom Wear Pads - Pivot End

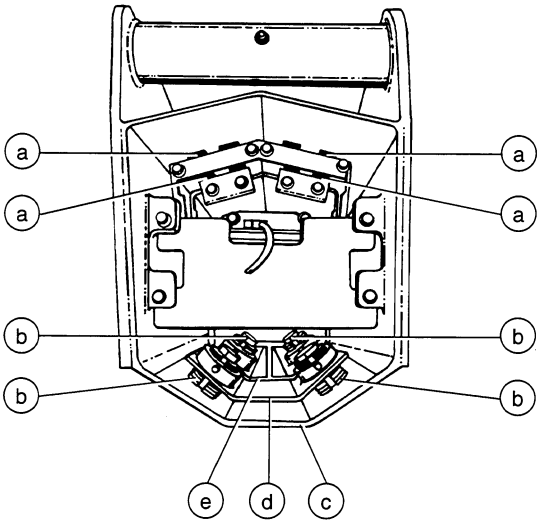
⚠CAUTION Component damage hazard. When adding shims or replacing wear pads, always maintain an equal amount of clearance between the boom tube being shimmed and the adjacent boom tube. Component damage may occur if boom tubes are not horizontally and vertically centered, with no binding or scraping through the entire extend/retract cycle.

NOTICE Refer to Maintenance Procedures, C-1, *Check the Boom Wear Pads*, for wear pad measurements before shimming.

Upper Wear Pads

1 Remove the turntable end cover to access the wear pads.

2 Loosen the lock nut, then remove the lock bolt from the lower adjustable wear pads. Loosen the adjustable wear pad.



a upper wear pad
b lower adjustable wear pad
c no. 1 boom tube
d no. 2 boom tube
e no. 3 boom tube

3 Remove the upper wear pad retainer.

4 Install the new shims on the bottom side of the wear pad. Shim the upper wear pads to obtain an $^{3}/_{16}$ inch (4.7mm) clearance between the wear pad retainer and the adjacent boom tube.

5 Replace the wear pad retainer and then adjust the adjustable wear pad.

Lower Adjustable Wear Pads

1 Loosen the lock nut, then remove the lock bolt from the lower adjustable wear pads.

2 Adjust the wear pad to obtain minimum clearance while maintaining zero drag.

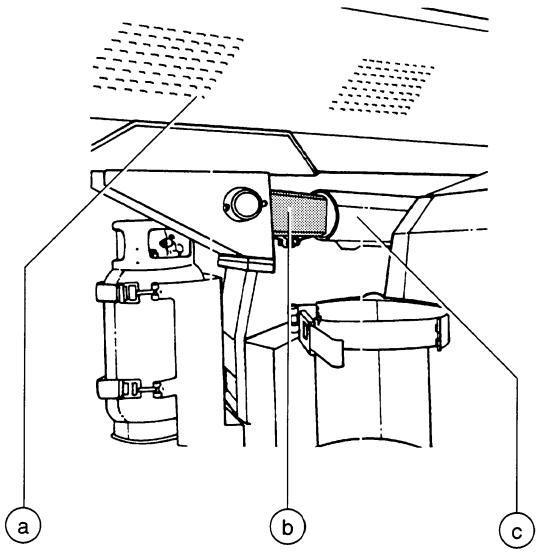
3 Install the lock bolt and then tighten the lock nut.

4 Extend and retract the boom through an entire cycle to check for tight spots that could cause binding or scraping.

How to Remove the 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 Raise the boom and place a safety chock on the lift cylinder rod. Carefully lower the boom onto the lift cylinder safety chock.



a boom assembly
b safety chock
c lift cylinder

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

NOTICE The lift cylinder safety chock, part number 29753, is available from your local Genie dealer.

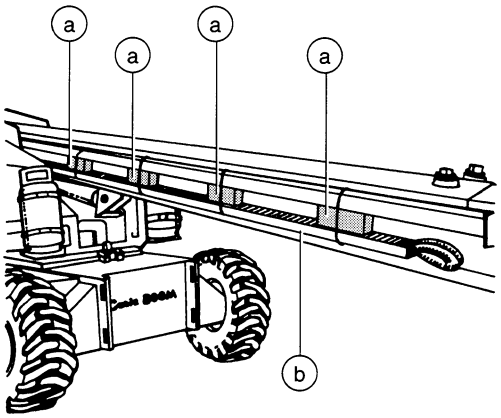
BOOM COMPONENTS

2 **Gasoline/LPG Models:** Remove both of the LPG tank mounting brackets.

3 Remove the turntable end cover.

4 Remove the cable tension safety switch from the switch mounting bracket. Do not remove the switch mounting bracket from the extension cylinder mounting bracket.

5 Place blocks between the upper and lower cable tracks and then tie them together with cable ties.



a wood block
b cable track

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

6 Remove the clamps securing the cable track hoses and cables to the turntable boom storage area.

7 Remove three of the cable track mounting fasteners at the pivot end of the boom.

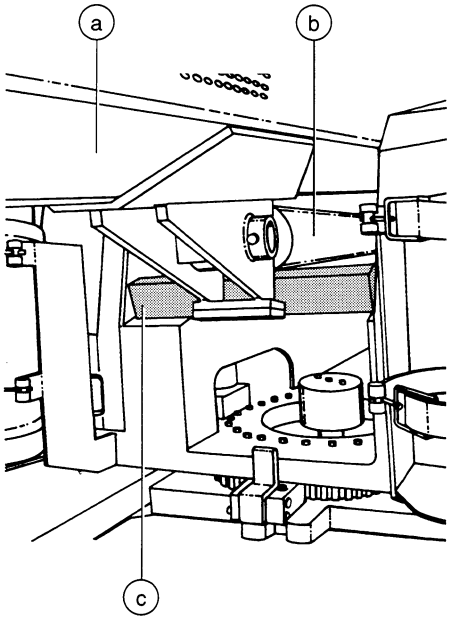
8 Raise the boom slightly and remove the safety chock from the lift cylinder. Lower the boom to the stowed position.

9 Remove the cable harness clamp from the platform mounting bracket and then disconnect the foot switch wiring plug. Remove all cable ties securing the cable and hose harnesses together.

10 Remove the platform mounting bolts and lift the platform off the mounting bracket.

11 Raise the boom and place a 4x4x25.5 inch (10x10x65cm) block under the lift cylinder. Lower the boom, so the lift cylinder is 1/4 inch (6.4mm) above the block. Do not rest the lift cylinder on the block.

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



a boom assembly
b lift cylinder
c wood block

12 Disconnect the platform leveling slave cylinder hydraulic hoses and connect them together with a connector, then disconnect and plug the platform rotator hydraulic hoses.

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

13 Disconnect and plug the extension cylinder hydraulic hoses. Cap the fittings on the cylinder.

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

14 Support the cable track with an overhead crane. Do not lift the cable track.

⚠WARNING Crushing hazard. If the overhead crane is not properly attached, the cable track may become unbalanced and fall when it is disconnected from the boom.

15 Remove the cable track mounting fasteners and then slide the cable track off its mounting blocks and remove it from the boom. Carefully set the cable track to the side.

16 Support the boom with an overhead crane. Do not lift the boom.

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

17 Remove the pin retainer fastener from the lift cylinder rod-end pivot pin. Use a soft metal drift to remove the pin, then allow the lift cylinder to rest on the wood block.

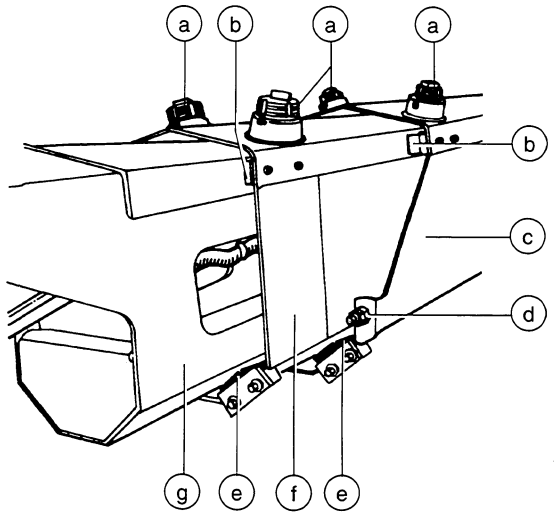
⚠CAUTION Crushing hazard. The lift cylinder will fall unless it is properly supported.

18 Remove the pin retainer fastener from the boom pivot pin. Use a soft metal drift to remove the pin, then carefully lift the boom off the machine and place it on blocks. Secure the boom assembly from tipping over.

⚠DANGER Crushing hazard. If the overhead crane is not properly attached, the boom may become unbalanced and fall when it is disconnected from the turntable pivot.

How to Disassemble the Boom

1 Loosen the retraction cables on the platform end of the no. 1 boom tube. Do not remove.



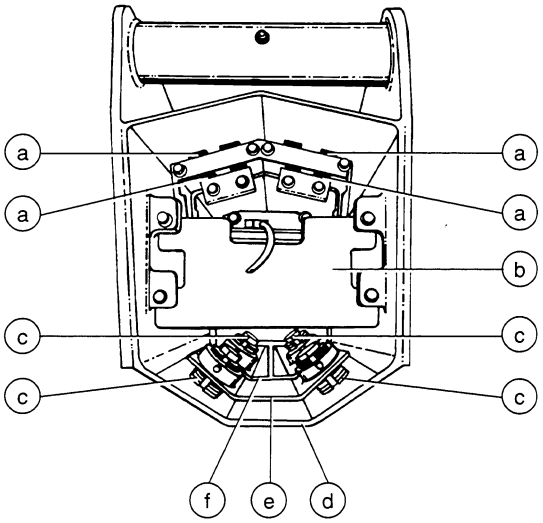
a upper adjustable wear pad
b side wear pad
c no. 1 boom tube
d retraction cable tension adjustment nut
e lower wear pad
f no. 2 boom tube
g no. 3 boom tube

2 Loosen the lock nut and then remove the lock bolt from the upper adjustable wear pads on the platform end of the no. 1 and 2 boom tubes. Remove the upper adjustable wear pads.

BOOM COMPONENTS

3 Remove the mounting fasteners from the side wear pads on the platform end of the no. 1 and 2 boom tubes and then remove the side wear pads.

4 Remove the mounting fasteners from the extension cylinder mounting bracket located at the pivot end of the boom.



a upper wear pad
b extension cylinder mounting bracket
c lower adjustable wear pad
d no. 3 boom tube
e no. 2 boom tube
f no. 1 boom tube

5 Loosen the lock nut and then remove the lock bolt from the adjustable wear pads on the pivot end of the no. 2 boom tube. Loosen the adjustable wear pads, but do not remove them.

6 Remove the upper wear pad retainer on the pivot end of the no. 2 boom tube and then remove the wear pads.

7 Pull the no. 2 and 3 tubes together from the platform end, until the tubes are half way out of the no. 1 boom tube.

8 Remove the mounting fasteners from the retraction cables. Secure the two cables together and then tie them to the platform end of the no. 2 boom tube. Do not allow the threaded rod of the retraction cables to fall into the bottom of the no. 1 boom tube.

9 Support the no. 2 boom tube with an overhead crane. Do not lift it.

⚠WARNING Crushing hazard. If the overhead crane is not properly attached, the no. 2 and 3 boom tubes may become unbalanced and fall when they are removed from the no. 1 boom tube.

10 Remove the lower wear pad retainer on the platform end of the no. 1 boom tube and then remove the wear pads.

11 Slightly lift the no. 2 and 3 tubes. Pull them out of the no. 1 boom tube until the pivot end of the no. 2 tube is 12 inches (30cm) from the platform end of the no. 1 boom tube.

12 Lift the no. 2 and 3 boom tubes enough for the adjustable wear pads on the pivot end of the no. 2 boom tube to clear the retraction cable mounting blocks on the platform end of the no. 1 boom tube. Then slide the tubes all the way out and place them on blocks. Secure the boom tubes from tipping.

13 Remove the trunnion cap mounting fasteners and then use a slide hammer to remove the trunnion caps.

NOTICE On early machines, the trunnion cap mounting bolts 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.

14 Remove the lower adjustable wear pads on the pivot end of the no. 2 boom tube.

15 Pull the extension cylinder out approximately 2 feet (61cm) towards the pivot end of the no. 2 boom tube.

16 Disconnect the retraction and extension cables from the inside of the no. 3 boom tube.

17 Support the extension cylinder with a fork lift and pull it out half way. Attach an overhead crane to the balance point of the extension cylinder. Do not lift it.

⚠WARNING Crushing hazard. If the overhead crane is not properly attached, the extension cylinder may become unbalanced and fall when it is removed from the no. 2 and no. 3 boom tubes.

18 While holding tension on the extend/retract cables, pull the extension cylinder all the way out.

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

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

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

22 Loosen the lock nut and then remove the lock bolt from the adjustable wear pads on the pivot end of the no. 3 boom tube. Loosen the adjustable wear pads, but do not remove them.

23 Remove the upper wear pad retainers on the pivot end of the no. 3 boom tube and then remove the wear pads.

24 Push the no. 3 boom tube towards the platform end, only enough to access the slave cylinder barrel-end pin.

25 Remove the pin retainer from the slave cylinder barrel-end pin. Use a soft metal drift to drive the pin out, then remove the slave cylinder from the no. 3 boom tube.

26 Pull the no. 3 boom tube towards the platform end until it is half way out.

27 Support the no. 3 boom tube with an overhead crane. Do not lift it.

⚠WARNING Crushing hazard. If the overhead crane is not properly attached, the no. 3 boom tube may become unbalanced and fall when it is removed from the no. 2 boom tube.

28 Remove the lower wear pad retainer on the platform end of the no. 2 boom tube and then remove the wear pads.

29 Slightly lift the no. 3 boom tube. Pull it out of the no. 2 boom tube until the pivot end of the no. 3 tube is 12 inches (30cm) from the platform end of the no. 2 boom tube.

30 Lift the no. 3 boom tube enough for the adjustable wear pads on the pivot end of the no. 3 boom tube to clear the lower wear pad on the platform end of the no. 2 boom tube. Then slide the no. 3 boom tube all the way out and place it on blocks. Secure the boom tube from tipping.

BOOM COMPONENTS

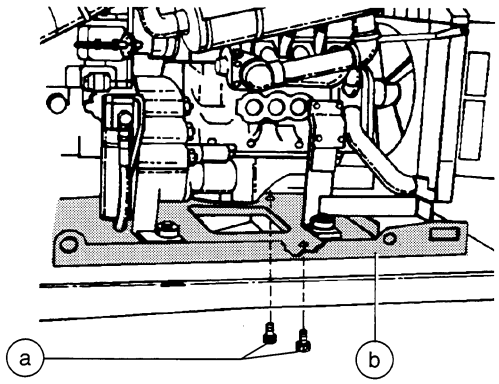
3-3
Boom Lift Cylinder

How to Remove the 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 Remove the engine side turntable cover. See 4-1, *How to Remove a Turntable Cover.*

2 Remove the two retaining bolts from the engine pivot plate. Swing the engine pivot plate away from the machine to access the lift cylinder barrel-end pin.

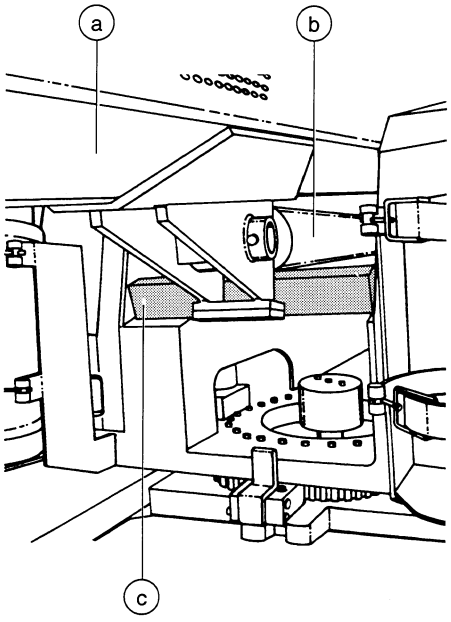


a pivot plate retaining bolts
b engine pivot plate

3 **Gasoline/LPG models:** Remove both of the LPG tank mounting brackets.

4 Raise the boom and place a 4x4x25.5 inch (10x10x65cm) block under the lift cylinder. Lower the boom, so the lift cylinder is 1/4 inch (6.4mm) above the block. Do not rest the lift cylinder on the block.

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



a boom assembly
b lift cylinder
c wood block

5 Support the boom with an overhead crane. Do not lift the boom.

6 Remove the pin retainer fastener from the lift cylinder rod-end pivot pin. Use a soft metal drift to remove the pin, then allow the lift cylinder to rest on the block.

⚠CAUTION Crushing hazard. The lift cylinder will fall unless it is properly supported.

7 Use the crane to lift the boom to a horizontal position.

8 Remove the turntable end cover to access the master cylinder.

9 Disconnect and plug the platform leveling master cylinder hydraulic hoses. Cap the fittings on the cylinder.

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

10 Remove the retainer plate on the master cylinder barrel-end pin. Lift the master cylinder barrel-end pin out of the mounting slots.

NOTICE The master cylinder can be removed with the lift cylinder.

11 Remove the fuel tank. See 11-2, *How to Remove the Fuel Tank.*

12 Remove the hydraulic tank. See 11-1, *How to Remove the Hydraulic Tank.*

13 From the engine side of the turntable, support the balance point of the boom lift cylinder with an overhead crane or similar lifting device.

⚠WARNING Crushing hazard. If the overhead crane is not properly attached, the lift cylinder may become unbalanced and fall when it is disconnected from the machine.

14 Remove the pin retainer fastener from the lift cylinder barrel-end pivot pin. Use a soft metal drift to remove the pin.

15 With the lift cylinder being supported by the overhead crane, pull the cylinder towards the platform until it is half way out.

⚠CAUTION Component damage hazard. The electrical rotary coupler, cables and hydraulic hoses can be damaged if the lift cylinder is pulled across them.

16 Disconnect and plug the lift cylinder hydraulic hoses. Cap the fittings on the cylinder.

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

17 Remove the lift cylinder.

BOOM COMPONENTS

3-4
Extension Cylinder

The extension cylinder extends and retracts the boom tubes. It is equipped with counterbalance valves to prevent movement in the event of a hydraulic line failure. The extension cylinder can only be removed from the pivot end of the boom.

How to Remove the Extension Cylinder

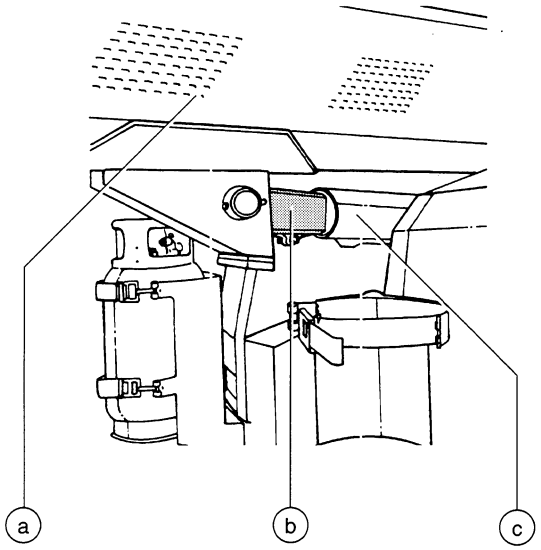
⚠WARNING This procedure requires specific repair skills, lifting equipment and a suitable workshop. Attempting this procedure without these skills and tools may result in death or serious injury and significant component damage. Dealer service is strongly recommended.

1 Remove both of the turntable covers. See 4-1, *How to Remove a Turntable Cover.*

2 Remove the turntable end cover to access the extension cylinder.

3 Retract the boom, then raise the boom and place a safety chock on the lift cylinder rod. Carefully lower the boom onto the lift cylinder safety chock.

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



a boom assembly
b safety chock
c lift cylinder

NOTICE The lift cylinder safety chock, part no. 29753, is available from your local Genie dealer.

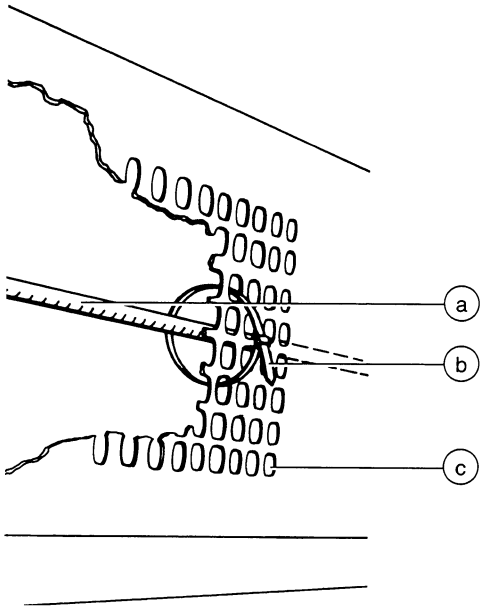
4 Remove the mounting bolts from the trunnion caps on the no. 2 boom tube. Access the mounting bolts through the no. 1 boom tube.

NOTICE On early machines, the trunnion cap mounting bolts 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.

5 Loosen, but do not remove, the tension adjustment nuts on the extend and retract cables.

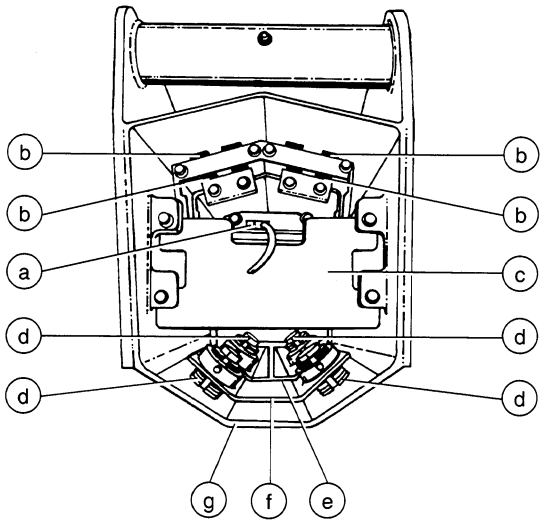
6 Remove the retract cables from the platform end of the no. 1 boom tube. Do not allow the cables to fall into the bottom of the no. 1 boom tube. Attach a guide cable to the end of each retract cable, to be used during the cylinder removal.

7 Loosely support the retract cables using cable ties through the inspection holes of the no. 1 boom tube.



a retraction cable
b cable tie
c no. 1 boom tube inspection holes

8 Remove the lower adjustable wear pads from the pivot end of the no. 2 and 3 boom tubes.



a cable tension safety switch
b upper wear pad
c extension cylinder mounting bracket
d lower adjustable wear pad
e no. 3 boom tube
f no. 2 boom tube
g no. 1 boom tube

9 Prevent the tubes from moving when the extension cylinder is removed by securing the no. 2 and 3 boom tubes to the no. 1 boom tube at the platform end of the boom.

10 Remove the cable tension safety switch from the switch mounting bracket. Do not remove the switch mounting bracket from the extension cylinder mounting bracket.

11 Disconnect and plug the extension cylinder hydraulic hoses. Cap the fittings on the cylinder.

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

BOOM COMPONENTS

12 Support the extension cylinder mounting bracket with a forklift. Do not lift it.

13 Remove the mounting fasteners from the extension cylinder mounting bracket.

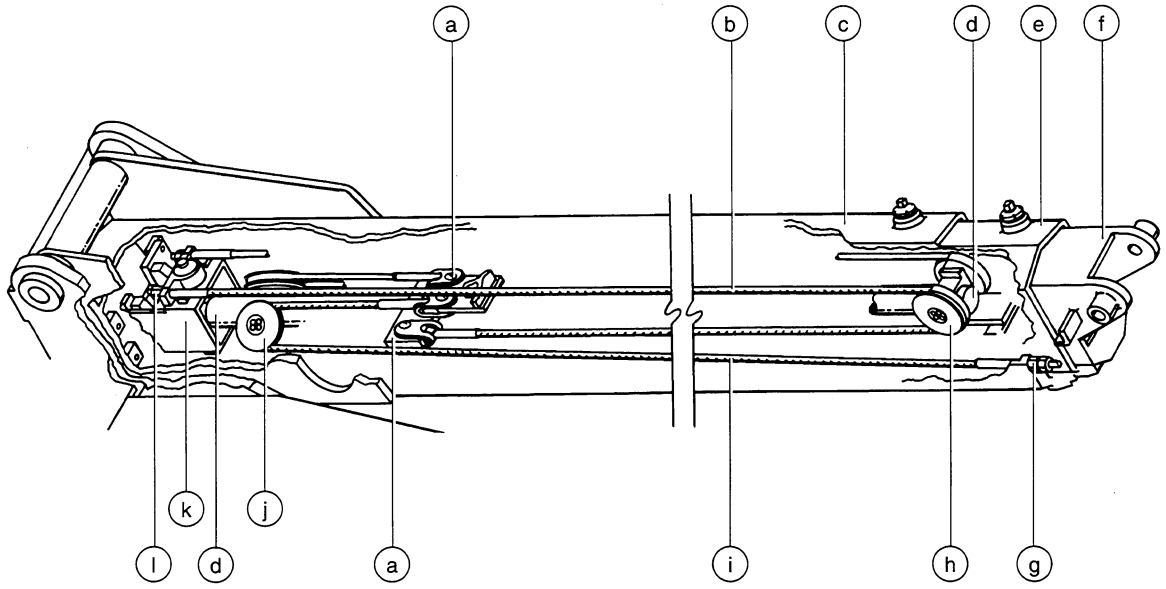
14 Lower the cylinder mounting bracket to clear the mounting tabs, then hold tension on the retract cables while carefully pulling the extension cylinder half way out. Attach an overhead crane to the cylinder for support.

15 Disconnect the retraction and extension cables from the inside of the no. 3 boom tube.

16 Remove the retraction cable sheave guards and the sheaves, then remove the retract cables from the cylinder.

17 Carefully pull the extension cylinder the rest of the way out.

NOTICE Be sure that the extend and retract cables are properly routed when the extension cylinder is installed.



a no. 3 boom tube, cable termination point
b extension cable
c no. 1 boom tube
d extension cylinder
e no. 2 boom tube
f no. 3 boom tube
g retraction cable tension adjustment nut
h extension cable sheave
i retraction cable
j retraction cable sheave
k extension cylinder mounting bracket
l extension cable tension adjustment nut

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 boom motion. The master cylinder is attached to the lift cylinder and is located at the base of the boom.

How to Remove the Platform Leveling Master Cylinder

1 Remove the turntable end cover to access the master cylinder.

2 Disconnect and plug the master cylinder hydraulic hoses. Cap the fittings on the cylinder.

⚠CAUTION Bodily injury hazard. Spraying hydraulic oil can penetrate 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 retainer plate on the master cylinder barrel-end pin. Lift the master cylinder barrel-end pin out of the mounting slots.

4 Remove the pin retainer fastener from the master cylinder rod-end pivot pin. Use a soft metal drift to remove the pin.

Turntable Covers

4-1
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 it.

⚠CAUTION Crushing hazard. Due to its heavy weight, do not attempt to support the cover by hand.

2 Disconnect the electrical connectors for the beacons and alarms.

3 Remove the upper and lower retaining clips from each gas strut.

4 Gently pry the strut pivot sockets off of the ball studs and remove both struts.

5 Raise the cover slightly to relieve the pressure on the cover hinges.

6 Remove the cover hinge bolts.

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 Alignment adjustments may be necessary when a new cover is installed.

Deutz Engine F4L 1011

5-1
RPM Adjustment

Refer to Maintenance Procedures, B-12, *Check and Adjust the Engine RPM.*

5-2
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 flat side of the spline against the flywheel. Torque the flex plate mounting bolts to 34 ft-lbs (46 Nm).

2 Install the coupler onto the pump shaft with the set screw towards the pump. Leave a 1/2 inch (12.7mm) gap between the coupler and pump end plate.

3 Apply Loctite® removable thread sealant to the coupler set screw. Torque the set screw to 37 ft-lbs (50 Nm).

⚠CAUTION Component damage hazard. Do not force the drive pump during installation or the flex plate teeth may become damaged.

5-3
Water Temperature and Oil Pressure Gauges

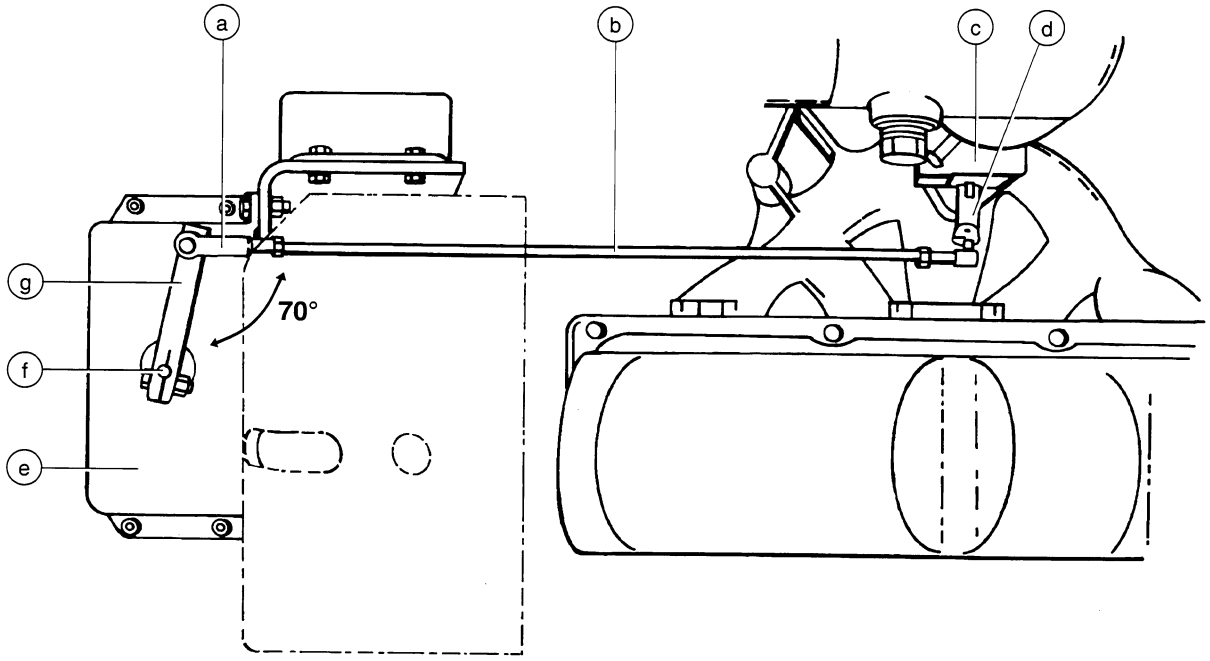
The water temperature gauge is an mechanical gauge, with adjustable limit contacts that are factory set. The contacts will close at 220° F (104° C). When the contacts close the engine will shut off to prevent damage and will not start until the temperature drops below the contact point. An over-temperature indicator light at the ground and platform controls should turn on when the contacts close.

⚠CAUTION Component damage hazard. Do not crank the engine with the over-temperature light on.

The oil pressure gauge is an mechanical gauge, with adjustable limit contacts that are factory set. The contacts will close at 19 psi (1.3 bar). When the contacts close the engine will shut off to prevent damage. A low oil pressure indicator light at the ground and platform controls should turn on when the contacts close.

⚠CAUTION Component damage hazard. Do not continue to run the engine with the low oil pressure light on.

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

6-1
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 Component damage hazard. If the throttle linkage is improperly adjusted and allowed to reach full throttle, the engine will over-rev and cause component damage.

6-2
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 LPG 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

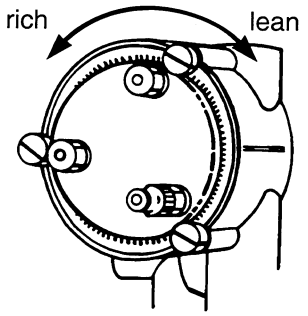
The manual choke is solenoid operated and is only operational in the gasoline mode. This choke will not operate in LPG mode.

⚠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 LPG mode.

Adjusting the choke to a rich mixture for cold climates will hamper engine performance when starting a cold engine on LPG fuel. To avoid this problem, start the engine in gasoline mode. After the engine reaches normal operating temperature, select LPG mode.



A flow path past the choke butterfly is required if the engine is to be cold started in the LPG 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 LPG 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 LPG fueled operation.

FORD LSG-423 ENGINE

6-3
Timing Adjustment

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

6-4
Carburetor Adjustment

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

6-5
RPM Adjustment

Refer to Maintenance Procedures, B-12, *Check and Adjust the Engine RPM.*

6-6
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 the linkage from the governor, then remove the governor linkage from the carburetor. Do not alter the length of the linkage.

3 Disconnect the wiring plug at the electronic displacement controller (EDC), located on the drive pump.

4 Remove the mounting fasteners from the regulator mounting bracket, then pull the bracket up past the bell housing. Secure the bracket before continuing.

5 Support the drive pump with an appropriate lifting device. Then remove all of the pump mounting plate to engine bell housing bolts.

6 Carefully pull the pump away from the engine and secure it from moving.

7 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. Torque the flex plate mounting bolts to 34 ft-lbs (46 Nm).

2 Install the coupler onto the pump shaft with the set screw towards the pump. Leave a $^{3}/_{16}$ inch (4.7mm) gap between the coupler and pump end plate.

3 Apply Loctite® removable thread sealant to the coupler set screw. Torque the set screw to 37 ft-lbs (50 Nm).

Component damage hazard. Do not force the drive pump during installation or the flex plate teeth may become damaged.

6-7
Water Temperature and Oil Pressure Gauges

The water temperature gauge is an mechanical gauge, with adjustable limit contacts that are factory set. The contacts will close at 220° F (104° C). When the contacts close the engine will shut off to prevent damage and will not start until the temperature drops below the contact point. An over-temperature indicator light at the ground and platform controls should turn on when the contacts close.

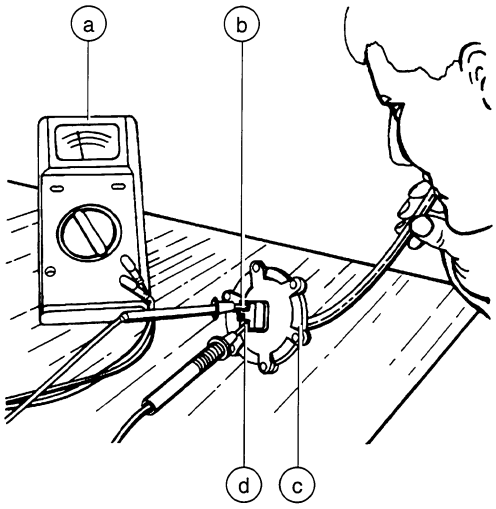
⚠CAUTION Component damage hazard. Do not crank the engine with the over-temperature light on.

The oil pressure gauge is an mechanical gauge, with adjustable limit contacts that are factory set. The contacts will close at 19 psi (1.3 bar). When the contacts close the engine will shut off to prevent damage. A low oil pressure indicator light at the ground and platform controls should turn on when the contacts close.

⚠CAUTION Component damage hazard. Do not continue to run the engine with the low oil pressure light on.

6-8
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 the vacuum switch terminals to ground.

Ground Controls

7-1
Control Relays

Relays used for single function switching are single pole double throw (SPDT) switches. Dual function switching requires a double pole double throw (DPDT) relay.

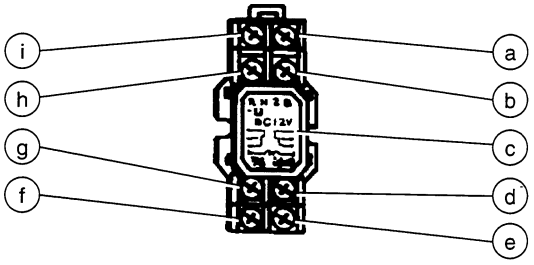
How to Test a Double Pole Double Throw Relay

This procedure covers fundamental relay testing and does not specifically apply to all varieties of relays.

1 Turn the key switch 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 4, 1, 12 & 9	no continuity
terminal 4 to 1 & 9	no continuity
terminal 1 to 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 & 12	no continuity
terminal 4 to 1, 9 & 12	no continuity
terminal 1 to 9 & 12	no continuity
terminal 8 to 12	continuity (zero Ω)
terminal 5 to 9	continuity (zero Ω)

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 key switch 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 and 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)

7-2 Toggle Switches

See 1-5, *Toggle Switches*.

7-3 Wago® Components

How to Remove a Wago® Component

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

NOTICE A small screwdriver 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.

GROUND CONTROLS

7-4
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 either end of one of the wires connected to the resistor to be tested.

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

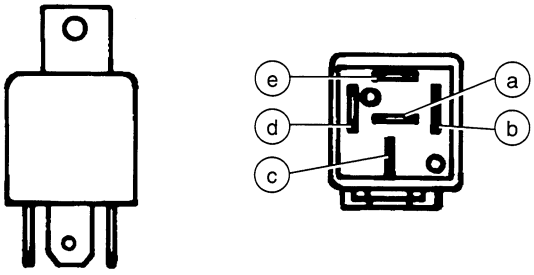
8-1
Control Relays

How to Test a Single Pole Double Throw Relay

⚠WARNING Electrocution hazard. Contact with electrically charged 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 and 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

8-2
Power Relay

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

How to Test the Power Relay

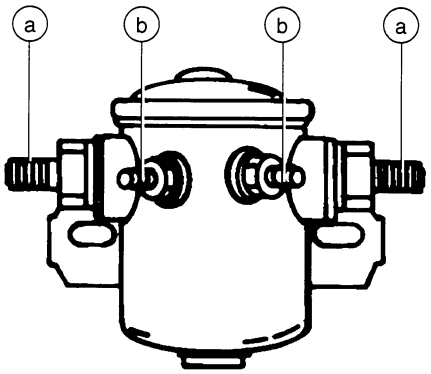
⚠WARNING Electrocution hazard. Disconnect the ground cable from the battery before performing this procedure.

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 a ground wire to the other small post, then test the following terminal combination.

Test	Desired result
2 large posts	continuity (zero Ω)

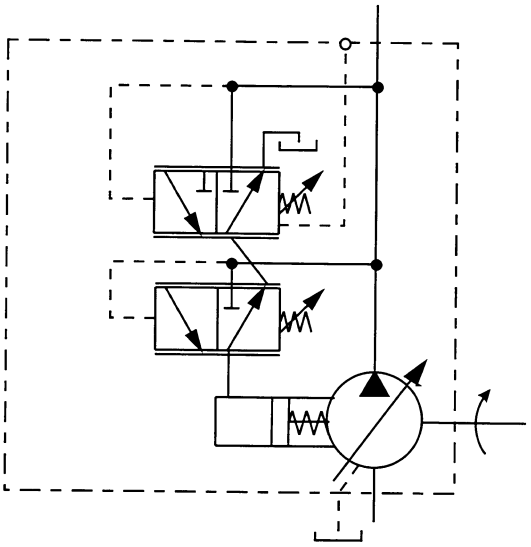


a high amp power contact terminal (large post)
b solenoid activate coil terminal (small post)

Hydraulic Pumps

9-1
Lift/Steer Pump

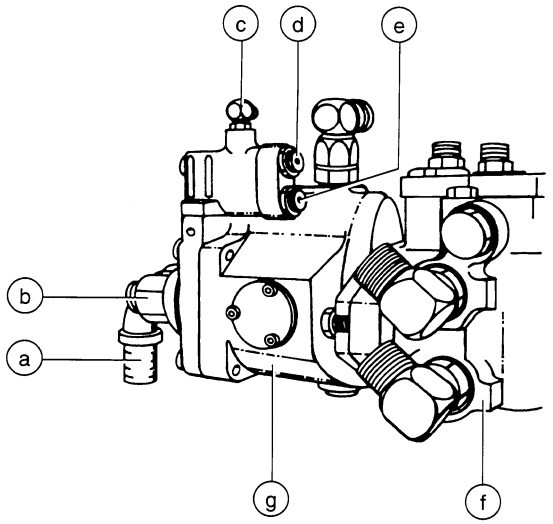
The lift/steer pump is a variable displacement piston pump. The pump output is controlled by the pressure compensator and the flow compensator. Each compensator must be adjusted separately. Any internal service to the pump should only be performed by an authorized Sundstrand-Sauer service center.



Lift/Steer Pump Hydraulic Schematic

How to Test the Lift/Steer Pump

1 Disconnect and plug the high pressure hydraulic hose from the lift/steer pump.



a suction port (IN)
b high pressure port (OUT)
c logic port
d flow compensator adjustment screw
e pressure compensator adjustment screw
f drive pump
g lift/steer pump

⚠CAUTION Bodily injury hazard. Spraying hydraulic oil can penetrate 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 Connect a 0 to 5000 psi (0 to 350 bar) pressure gauge to the high pressure port.

3 **Gasoline/LPG models:** Remove the coil wire from the distributor cap.

4 Turn the key switch to ground control and pull out the Emergency Stop button to the ON position.

HYDRAULIC PUMPS

5 **Deutz Diesel models:** Hold the manual fuel shutoff valve counterclockwise to the CLOSED position.

All models: Observe the pressure gauge while cranking the engine.

⊙ Result: If the pressure reads 200 psi (13.8 bar), proceed to step 6.

⊙ Result: If the pressure is less or more than 200 psi (13.8 bar), adjust the flow compensator before proceeding. See *How to Adjust the Flow Compensator*, in this section.

6 Disconnect and plug the logic port hydraulic hose from the lift/steer pump.

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

7 Connect the logic port and high pressure port together, then connect them to a 0 to 5000 psi (0 to 350 bar) pressure gauge.

8 **Deutz Diesel models:** Hold the manual fuel shutoff valve counterclockwise to the CLOSED position.

All models: Observe the pressure gauge while cranking the engine.

⊙ Result: If the pressure is 2800 psi (193 bar), the pump is good.

⊙ Result: If the pressure is 1000 to 2800 psi (69 to 193 bar), the pump is good, but the flow pressure should be adjusted to 2800 psi (193 bar). See *How to Adjust the Pressure Compensator*, in this section.

⊙ Result: If the pressure fails to reach 1000 psi (69 bar), the pump is bad and will need to be serviced or replaced.

9 **Gasoline/LPG models:** Reconnect the coil wire to distributor cap.

How to Adjust the Pressure Compensator

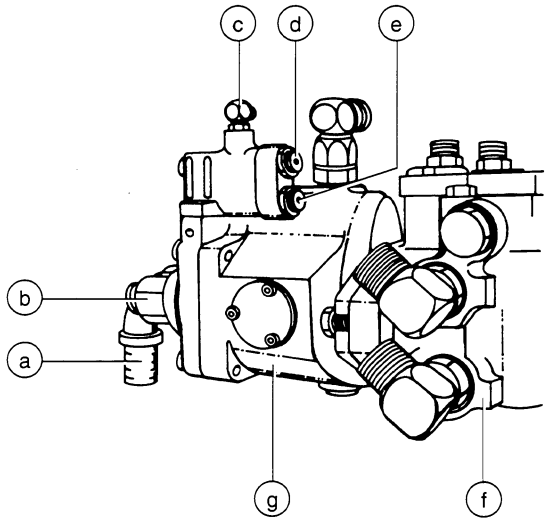
NOTICE Perform this procedure with the boom in the stowed position.

1 Connect a 0 to 5000 psi (0 to 350 bar) pressure gauge to the test port on the rotation function manifold.

2 Start the engine from the ground controls.

3 Observe the pressure gauge while retracting the boom. The hydraulic pressure should reach 2800 psi (193 bar).

4 Loosen the lock nut on the pressure compensator adjustment screw, then turn the adjustment screw clockwise to increase the pressure or counterclockwise to decrease the pressure.



a suction port (IN)
b high pressure port (OUT)
c logic port
d flow compensator adjustment screw
e pressure compensator adjustment screw
f drive pump
g lift/steer pump

5 Hold the adjustment screw, then tighten the pressure compensator adjustment lock nut. Recheck the pressure.

How to Adjust the Flow Compensator

NOTICE Perform this procedure with the boom in the stowed position.

1 Connect a 0 to 5000 psi (0 to 350 bar) pressure gauge to the test port on the rotation function manifold.

2 Connect another 0 to 5000 psi (0 to 350 bar) pressure gauge to the test port on the lift function manifold.

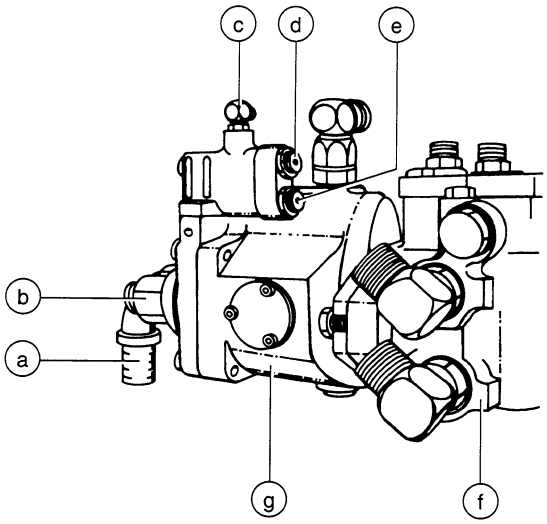
3 Start the engine from the ground controls.

4 Observe the pressure gauges while retracting the boom.

⊙ Result: The pressure gauge on the lift function manifold should read 200 psi (13.8 bar) less than the pressure gauge on the rotation manifold.

5 Loosen the lock nut on the flow compensator adjustment screw, then turn the adjustment screw clockwise to increase the pressure differential or counterclockwise to decrease the pressure differential.

6 Hold the adjustment screw, then tighten the flow compensator adjustment lock nut. Recheck the pressures.

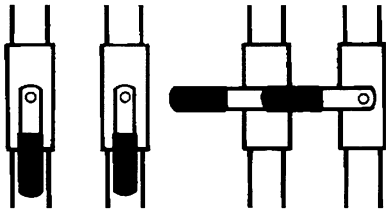


a suction port (IN)
b high pressure port (OUT)
c logic port
d flow compensator adjustment screw
e pressure compensator adjustment screw
f drive pump
g lift/steer pump

HYDRAULIC PUMPS

How to Remove the Lift/Steer Pump

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



2 Disconnect the hydraulic hoses from the lift/steer pump and cap them.

⚠CAUTION Bodily injury hazard. Spraying hydraulic oil can penetrate 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 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: Hold the manual fuel shutoff valve counterclockwise to the CLOSED position.

2 Crank the engine with the starter motor for 15 seconds.

9-2 Drive Hydraulic Pump

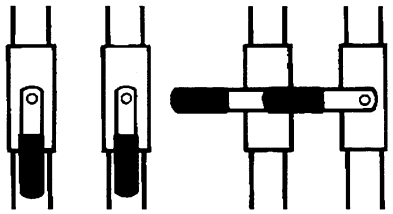
The drive hydraulic pump is a bi-directional variable displacement piston pump. The pump output is controlled by the electronic displacement controller (EDC), located on the pump. The only adjustment that can be made to the pump is the neutral or null adjustment. Any internal service to the pump should only be performed at an authorized Sundstrand-Sauer service center.

How to Remove the Drive Hydraulic Pump

⚠CAUTION Component damage hazard. 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 drive pump.

2 Close the two hydraulic tank valves located at the hydraulic tank.



3 Disconnect the hydraulic hoses from the pumps and cap them.

⚠CAUTION Bodily injury hazard. Spraying hydraulic oil can penetrate 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 drive pump mounting bolts. Carefully remove the pump.

⚠CAUTION Component damage hazard. 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: Hold the manual fuel shutoff valve counterclockwise to the CLOSED position.

2 Crank the engine with the starter motor for 15 seconds.

Function Manifolds

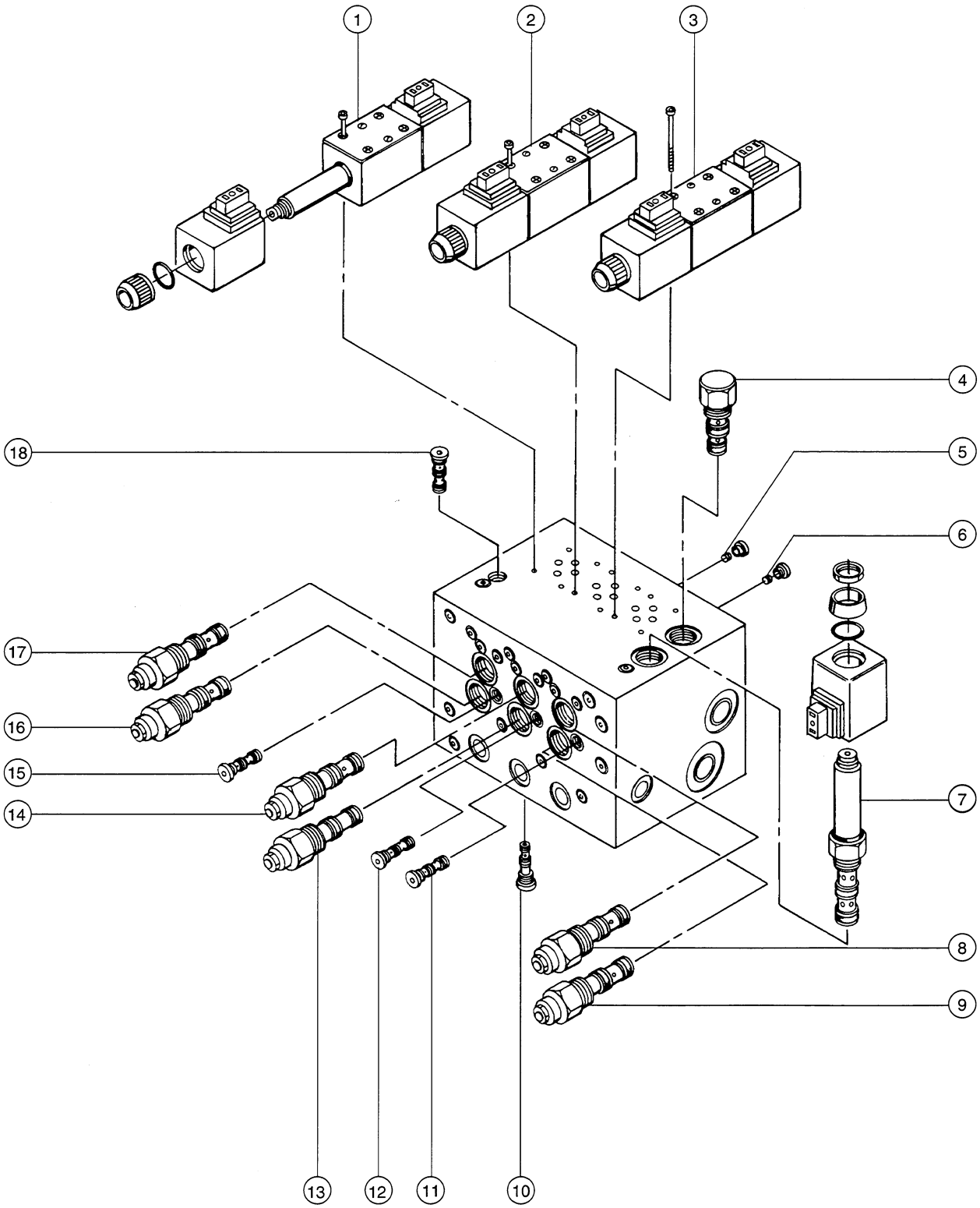
10-1
Rotation Function Manifold Components

Index No.	Description	Schematic Item	Function	Torque
1	3 position 4 way D01 valve	L	Platform rotate	30-35 in-lbs / 3-4 Nm
2	3 position 4 way D01 valve	K	Platform level	30-35 in-lbs / 3-4 Nm
3	3 position 4 way D01 valve	J	Turntable rotate	30-35 in-lbs / 3-4 Nm
4	Flow regulator valve	E	Turntable rotate	10-12 ft-lbs / 14-16 Nm
5	Orifice 0.052 in / 1.32mm	V	Platform rotate	
6	Orifice 0.052 in / 1.32mm	U	Platform level	
7	Proportional solenoid valve	H	Turntable rotate	10-12 ft-lbs / 14-16 Nm
8	Counterbalance valve	N	Turntable rotate - left	35-40 ft-lbs / 47-54 Nm
9	Counterbalance valve	M	Turntable rotate - right	35-40 ft-lbs / 47-54 Nm
10	Shuttle valve 2 position 3 way	AJ	Logic pilot-turntable rotate and brake	10-13 ft-lbs / 14-18 Nm
11	Shuttle valve 2 position 3 way	AD	Logic pilot-turntable rotate	10-13 ft-lbs / 14-18 Nm
12	Shuttle valve 2 position 3 way	AE	Logic pilot-platform level	10-13 ft-lbs / 14-18 Nm
13	Counterbalance valve	O	Platform level - up	35-40 ft-lbs / 47-54 Nm
14	Counterbalance valve	P	Platform level - down	35-40 ft-lbs / 47-54 Nm
15	Shuttle valve 2 position 3 way	AG	Logic pilot-platform rotate	10-13 ft-lbs / 14-18 Nm
16	Counterbalance valve	Q	Platform rotate - left	35-40 ft-lbs / 47-54 Nm
17	Counterbalance valve	R	Platform rotate - right	35-40 ft-lbs / 47-54 Nm
18	Shuttle valve 2 position 3 way	AF	Logic pilot	10-13 ft-lbs / 14-18 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

FUNCTION MANIFOLDS



FUNCTION MANIFOLDS

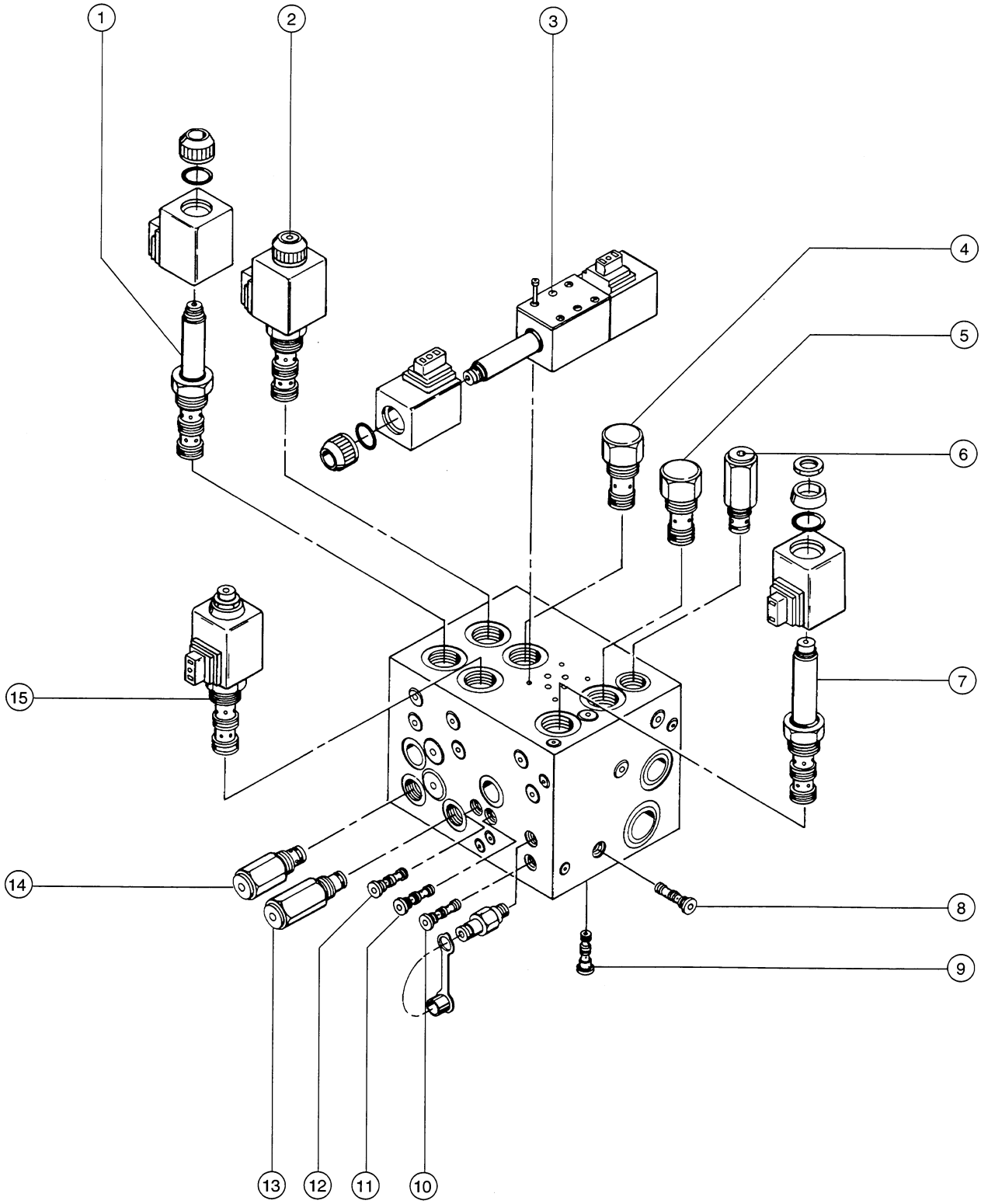
Lift Function Manifold Components

Index No.	Description	Schematic Item	Function	Torque
1	2 position 3 way valve	A	Extend	15-18 ft-lbs / 20-24 Nm
2	2 position 3 way valve	B	Retract	15-18 ft-lbs / 20-24 Nm
3	3 position 4 way D01 valve	I	Boom up/down	30-35 in-lbs / 3-4 Nm
4	Flow regulator valve	C	Extend/retract	10-12 ft-lbs / 14-16 Nm
5	Flow regulator valve	D	Boom up/down	10-12 ft-lbs / 14-16 Nm
6	Relief valve, 1200 psi (83 bar)	X	Boom down	35-40 ft-lbs / 47-54 Nm
7	Proportional solenoid valve	G	Boom up/down	10-12 ft-lbs / 14-16 Nm
8	Shuttle valve 2 position 3 way	AI	Logic pilot	10-13 ft-lbs / 14-18 Nm
9	Shuttle valve 2 position 3 way	AB	Logic pilot	10-13 ft-lbs / 14-18 Nm
10	Shuttle valve 2 position 3 way	AH	Logic pilot	10-13 ft-lbs / 14-18 Nm
11	Shuttle valve 2 position 3 way	AC	Logic pilot - up/down	10-13 ft-lbs / 14-18 Nm
12	Shuttle valve 2 position 3 way	AA	Logic pilot - extend/retract	10-13 ft-lbs / 14-18 Nm
13	Relief valve, 3000 psi (207 bar)	Y	System relief	35-40 ft-lbs / 47-54 Nm
14	Relief valve, 1000 psi (69 bar)	W	Boom extend	35-40 ft-lbs / 47-54 Nm
15	Proportional solenoid valve	F	Boom extend/retract	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

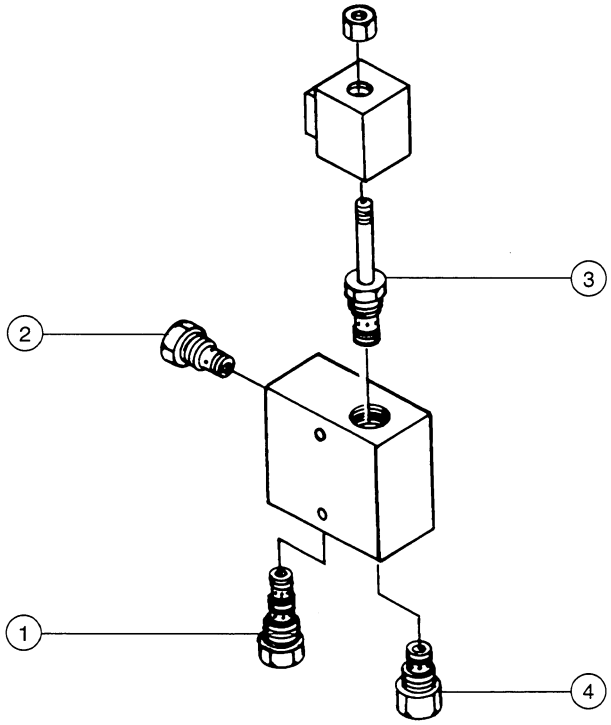
FUNCTION MANIFOLDS



FUNCTION MANIFOLDS

Auxiliary Power Manifold Components

Index No.	Description	Schematic Item	Function	Torque
1	Differential sensing valve	C	Auxiliary power	10-12 ft-lbs / 14-16 Nm
2	Check valve	D	Auxiliary power	35-40 ft-lbs / 47-54 Nm
3	Normally open poppet valve	A	Auxiliary steering	25-30 ft-lbs / 34-41 Nm
4	Flow control valve	B	Steering	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

10-2
Valve Adjustments - Function Manifold

How to Adjust the Main Relief Valve

NOTICE Perform this procedure with the boom in the stowed position.

1 Connect a 0 to 3000 psi (0 to 206 bar) pressure gauge to the test port on the rotation function manifold.

2 Start the engine from the ground controls.

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 13, lift function manifold).

5 Adjust the internal hex socket. Turn it clockwise to increase the pressure or counterclockwise to decrease the pressure. Then install the relief valve cap.

⚠WARNING Tip-over hazard. Do not adjust the relief valves higher than recommended.

6 Restart the engine. Hold the retract switch and recheck the valve pressure.

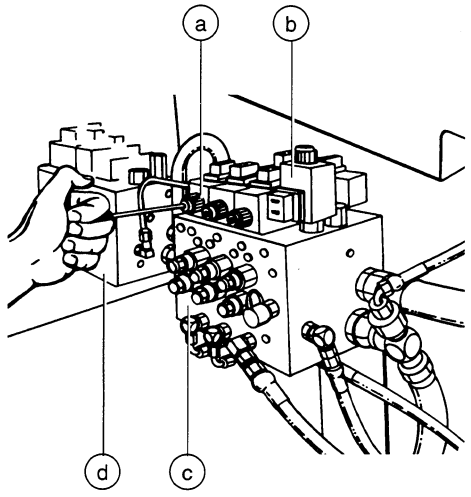
Main relief valve specifications

Pressure	2800 to 3000 psi 193 to 207 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 platform level functions each use a three position valve. The three position valves and the proportional valves can be manually overridden. To identify the manifold valves see 10-1, *Function Manifolds,* in this section.

1 Push the button on the end of the valve in ¼ inch (6mm).



a directional valve
b proportional valve
c rotation function manifold
d lift function manifold

2 Move the ground control function switch for the function being overridden to operate function.

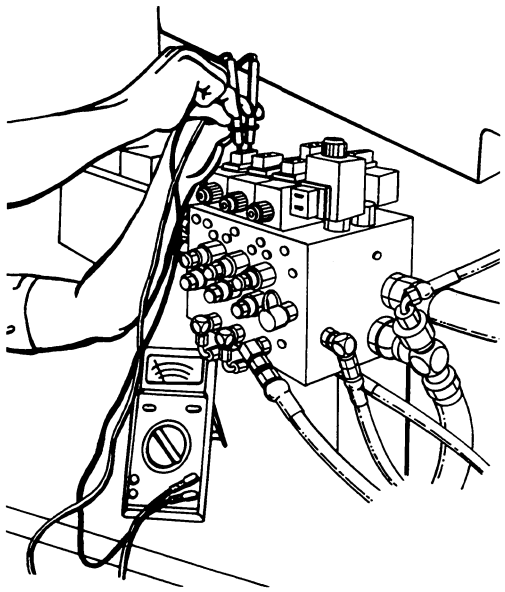
⚠WARNING Collision machine hazard. Impact with moving boom components may cause death or serious injury. Use extreme caution when overriding a machine function. Identify the direction of machine movement before overriding a valve.

FUNCTION MANIFOLDS

How to Check the Resistance of a Valve Coil

1 Turn the key switch 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.



Valve coil specifications	
Proportional solenoid valve	5Ω
2 position 3 way valve	6.5Ω
3 position 4 way directional valve	4.5Ω
Normally closed poppet valve	7Ω

Fuel and Hydraulic Tanks

11-1
Hydraulic Tank

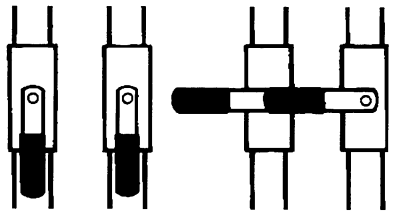
The primary functions of the hydraulic tank are to cool, clean and deaerate the hydraulic fluid during operation. This tank has a 50 gallon (189 liters) capacity and an oil level gauge with a temperature indicator. It utilizes internal suction strainers for the pump supply suction lines and has external return line filters with condition indicators.

How to Remove the Hydraulic Tank

⚠CAUTION Component damage hazard. 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.

1 Remove the fuel tank. See 11-2, *How to Remove the Fuel Tank.*

2 Close the two hydraulic tank valves located at the hydraulic tank.



3 Completely drain the oil from the tank by removing the drain plug located in the bottom of the tank.

⚠CAUTION Burn hazard. Contact with hot oil may cause severe burns.

4 Disconnect the hydraulic hoses from 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 Always use pipe thread sealant when installing the drain plug.

NOTICE Use only Dexron II equivalent hydraulic fluid.

⚠CAUTION Component damage hazard. Be sure to open the two hydraulic tank valves and prime the pump after installing the hydraulic tank.

How to Prime the Pump

1 **Gasoline/LPG models:** Disconnect the ignition coil wire and isolate it from ground.

Deutz Diesel models: Hold the manual fuel shutoff valve counterclockwise to the CLOSED position.

2 Crank the engine with the starter motor for 15 seconds.

FUEL AND HYDRAULIC TANKS

11-2
Fuel Tank

How to Remove the Fuel Tank

⚠ DANGER Explosion hazard. 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 Turn the manual fuel shutoff valve to the CLOSED position.

2 **Gasoline/LPG models:** Disconnect, drain and plug the fuel hose.

Deutz Diesel models: Disconnect, drain and plug the supply and return fuel lines. Cap the fuel return fitting on the fuel tank.

3 Remove the mounting fasteners from the bottom of the tank.

4 Use an appropriate lifting device to remove the tank from the machine.

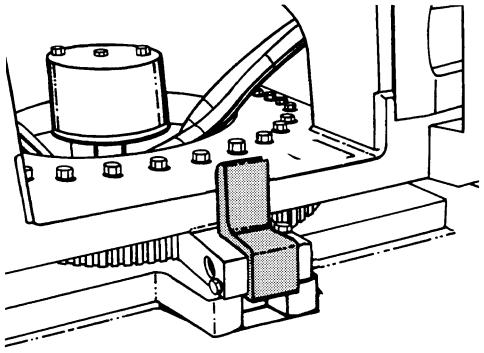
NOTICE Clean the fuel tank and inspect for rust and corrosion before installing.

Turntable Rotation Components

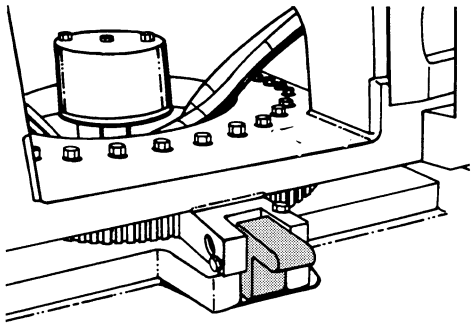
12-1
Rotation Hydraulic Motor

How to Remove the Rotation Hydraulic Motor

1 Secure the turntable from rotating with the turntable rotation lock.



Unlocked position

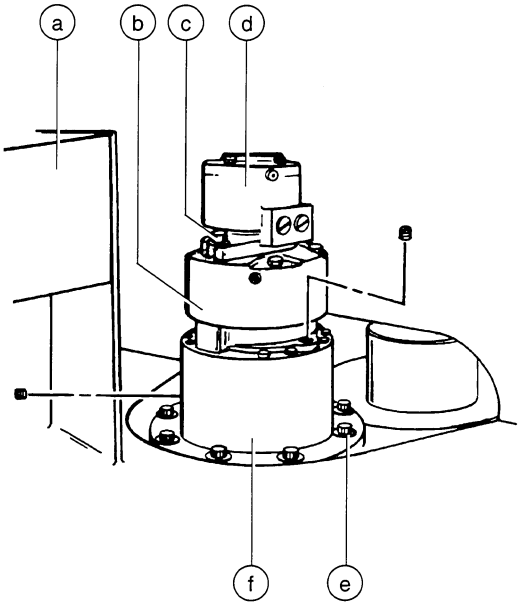


Locked position

2 Disconnect the hydraulic hoses from the motor and cap them.

⚠CAUTION Bodily injury hazard. Spraying hydraulic oil can penetrate 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 motor mounting bolts, then remove the motor from the brake.



a function manifold
b brake
c motor/brake mounting bolts
d motor
e torque hub mounting bolts
f torque hub

How to Remove the Turntable Rotation Brake or Torque Hub

Refer to Maintenance Procedures, C-5, *How to Replace the Torque Hub Oil.*

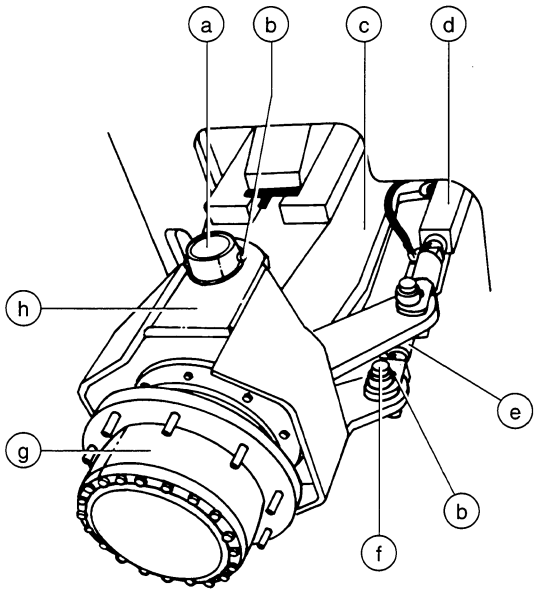
2WD & 4WD Steering Axle Components

13-1
Yoke and Hub

How to Remove the Yoke and Hub

The yoke installation utilizes bushings and a thrust washer that may require periodic replacement. The yoke must be removed before the torque hub can be removed. The wheel motor on 4WD models is an integral part of the torque hub.

1 Remove the pin retainer, then the pivot pin from both the steering cylinder and the tie rod weldment.



a king pin
b pin retainer
c oscillating axle
d tie rod
e steering cylinder
f pivot pin
g torque hub
h yoke

2 **4WD Models:** 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 penetrate 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.

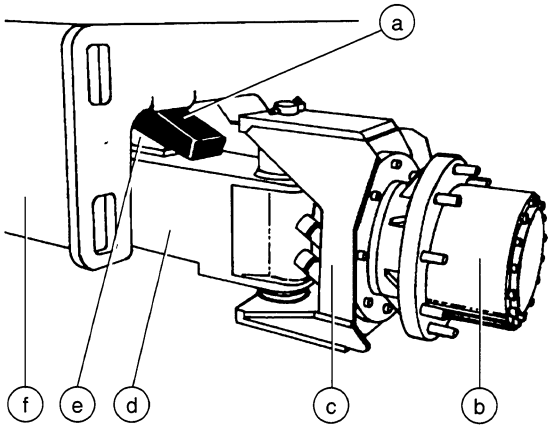
4 Block the non-steering wheels, and then center a lifting jack under the steering axle.

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 oscillating 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.

Torque specifications	
Lug nut	125 ft-lbs 169.5 Nm
Torque hub mounting bolts	120 ft-lbs 163 Nm

13-2
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 penetrate 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 installing a clevis pin.

2WD & 4WD STEERING AXLE COMPONENTS

13-3
Tie Rod

How to Remove the Tie Rod

1 Remove the cotter pin, then the clevis pin from each end of the tie rod.

2 Remove the tie rod.

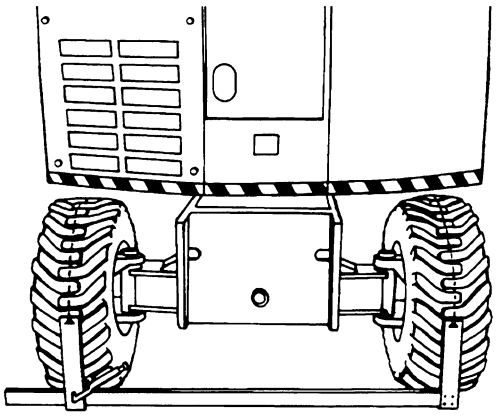
NOTICE Always use a new cotter pin when installing a clevis pin.

How to Perform the 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 stowed position.

1 Straighten the steer wheels.

2 Measure the steer tires, front to front and back to back, using a measuring fixture .



3 Center a lifting 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 turn on the adjustable end equals approximately 1/8 inch (3.2mm) change in the front and rear measurements.

7 Slide the tie rod onto the yoke. Install the clevis pin, then a new cotter pin.

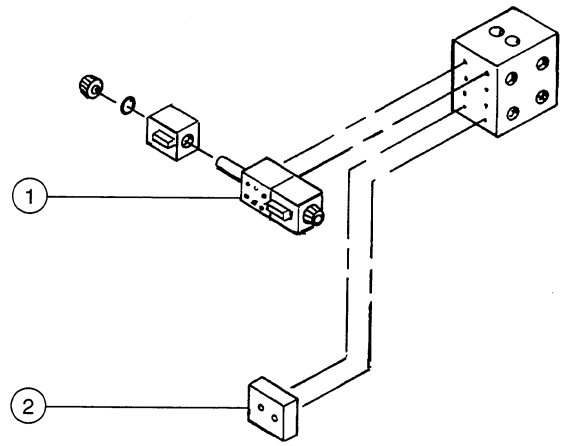
8 Tighten the jam nut against the tie rod.

9 Lower the machine and recheck the front and back measurements (step 2). If further adjustment is needed, repeat steps 3 through 8.

Toe-in specification	0 ± 1/4 inch (6.35mm)

13-4
Steer Manifold - Non-oscillating Axle

Index No.	Description	Schematic Item	Function	Torque
1	3 position 4 way D01 valve	A	Steering	30-35 in-lbs / 3-4 Nm
2	Ported cover plate	B	P port to T port	30-35 in-lbs / 3-4 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

Oscillating Axle Components

14-1
Oscillating Axle Lock-out Cylinder

The oscillating axle lock-out cylinder extends the lock-out wedges between the chassis and the oscillating axle when the boom is raised, extended or the turntable is rotated. The cylinder slides from side to side in a track on the oscillating axle and uses a proximity switch to detect when the lock-out wedges are fully extended.

How to Remove the Oscillating Axle Lock-out Cylinder

⚠WARNING This procedure requires specific repair skills 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 with the boom in the stowed position.

1 Disconnect and plug the oscillating axle lock-out cylinder hydraulic hoses, and cap the cylinder fittings.

⚠CAUTION Bodily injury hazard. Spraying hydraulic oil can penetrate 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 proximity switch from the oscillating axle lock-out cylinder.

3 Remove the mounting fastener from the wedge block on the rod end of the oscillating axle lock-out cylinder, then slide the wedge block to the right as far as possible.

4 Slide the oscillating axle lock-out cylinder to the left, then remove the cylinder.

How to Install the Oscillating Axle Lock-out Cylinder Proximity Switch

1 Install the oscillating axle lock-out cylinder, then connect the hydraulic hoses.

2 Screw the proximity switch into the cylinder exactly 4 turns. Do not over tighten.

3 Extend the boom until the oscillating axle lock-out cylinder is fully extended.

4 Screw the proximity switch into the cylinder by hand until the switch touches the cylinder piston. Do not over tighten.

5 Back out the switch counterclockwise one full turn, then tighten the seal nut and lock nut.

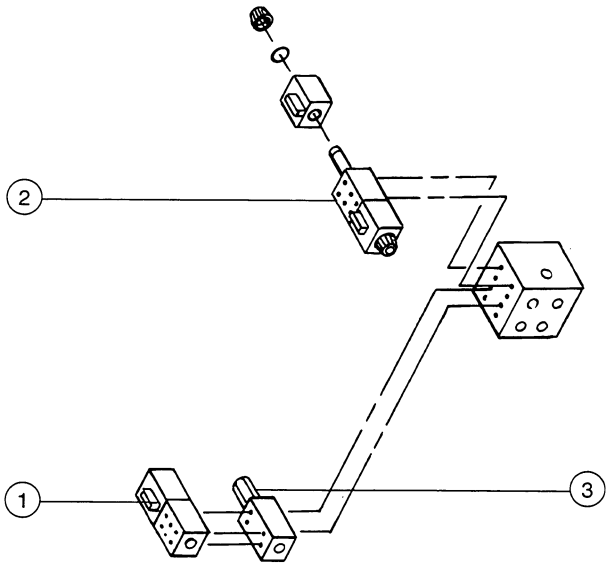
⚠CAUTION Component damage. If the proximity switch is not correctly adjusted, the switch may become damaged resulting in a hydraulic system contamination.

Steer and Oscillate Manifold

15-1

Steer and Oscillate Manifold Components

Index No.	Description	Schematic Item	Function	Torque
1	2 position 4 way valve	D	Oscillate lock-out	30-35 in-lbs / 3-4 Nm
2	3 position 4 way D01 valve	A	Steering	30-35 in-lbs / 3-4 Nm
3	Relief valve, 200 psi (14 bar)	C	Oscillate relief	35-40 ft-lbs / 47-54 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

Non-steering Axle Components

16-1
Drive Motor

⚠CAUTION Component damage hazard. 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.

⚠CAUTION Component damage hazard. 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 penetrate 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 it.

16-2
Torque Hub

How to Remove a Drive Torque Hub

The drive motor must be removed in order to access the torque hub mounting bolts.

1 Remove the drive motor. See 16-1, *How to Remove a Drive Motor.*

2 Disconnect the hydraulic hose from the brake and plug it. Then remove the hydraulic fitting and the bleed valve.

3 Loosen the wheel lug nuts. Do not remove them.

4 Center a lifting jack under the non-steering axle. Raise the machine and place blocks under the chassis to support it.

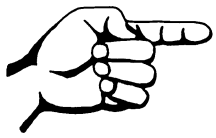
5 Remove the wheel lug nuts, then the tire and wheel assembly.

6 Place a second lifting jack under the torque hub for support.

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.

Torque specifications	
Lug nut	125 ft-lbs 169.5 Nm
Drive torque hub mounting bolts	120 ft-lbs 163 Nm



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2WD Drive Manifold

17-1

2WD Drive Manifold Components

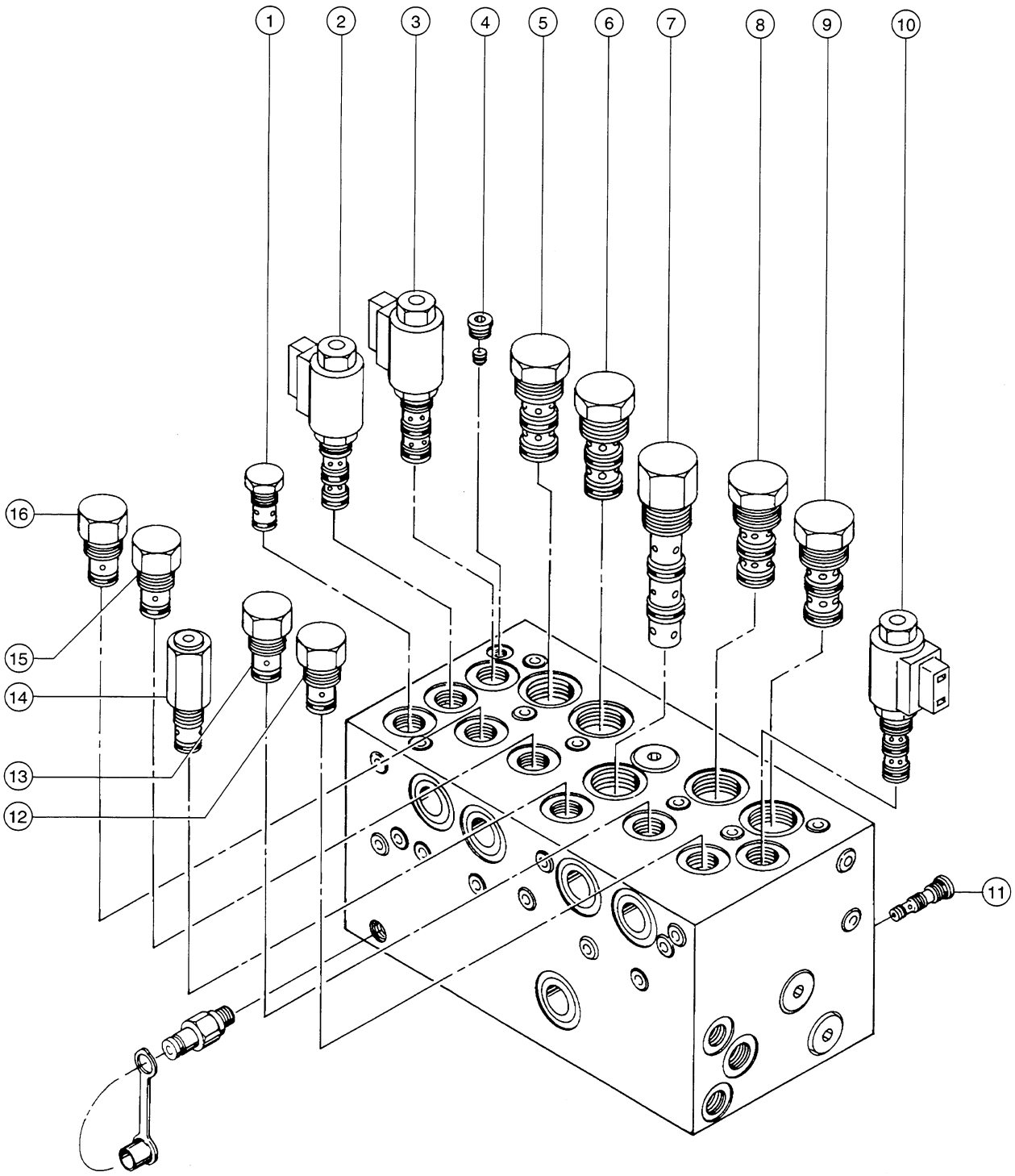
Index No.	Description	Schematic Item	Function	Torque
1	Check valve	W	Brake check	25-30 ft-lbs / 34-41 Nm
2	2 position 3 way valve	R	Brake release	8-10 ft-lbs / 11-14 Nm
3	2 position 3 way valve	S	2-Speed wheel motors (energized in high range to destroke the rear motor swash plates)	8-10 ft-lbs / 11-14 Nm
4	Orifice 0.025 in (0.635 mm)	X	Motor shift / brake release circuit	
5	Pilot to open check valve	O	Right check in forward	85-90 ft-lbs / 115-122Nm
6	Pilot to open check valve	P	Right check in reverse	85-90 ft-lbs / 115-122 Nm
7	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
8	Pilot to open check valve	N	Left check in reverse	85-90 ft-lbs / 115-122 Nm
9	Pilot to open check valve	M	Left check in forward	85-90 ft-lbs / 115-122 Nm
10	2 position 3 way valve	Q	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	T	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)	V	Charge pressure	10-12 ft-lbs / 14-16 Nm
15	Flow regulator valve	G	Right flow control in reverse	10-12 ft-lbs / 14-16 Nm
16	Flow regulator valve	E	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

Description	Torque
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

17-2
Valve Adjustments

How to Adjust the Charge Pressure Relief Valve

1 Connect a 0 to 600 psi (0 to 41 bar) pressure gauge to the test port located on the drive manifold.

⚠CAUTION Bodily injury hazard. Spraying hydraulic oil can penetrate 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 slowly 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).

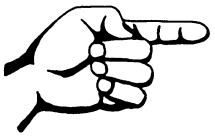
5 Adjust the internal hex socket. Turn it clockwise to increase the pressure or counterclockwise to decrease the pressure. Then install the valve cap.

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.

Relief valve specifications

Pressure	320 psi	22 bar



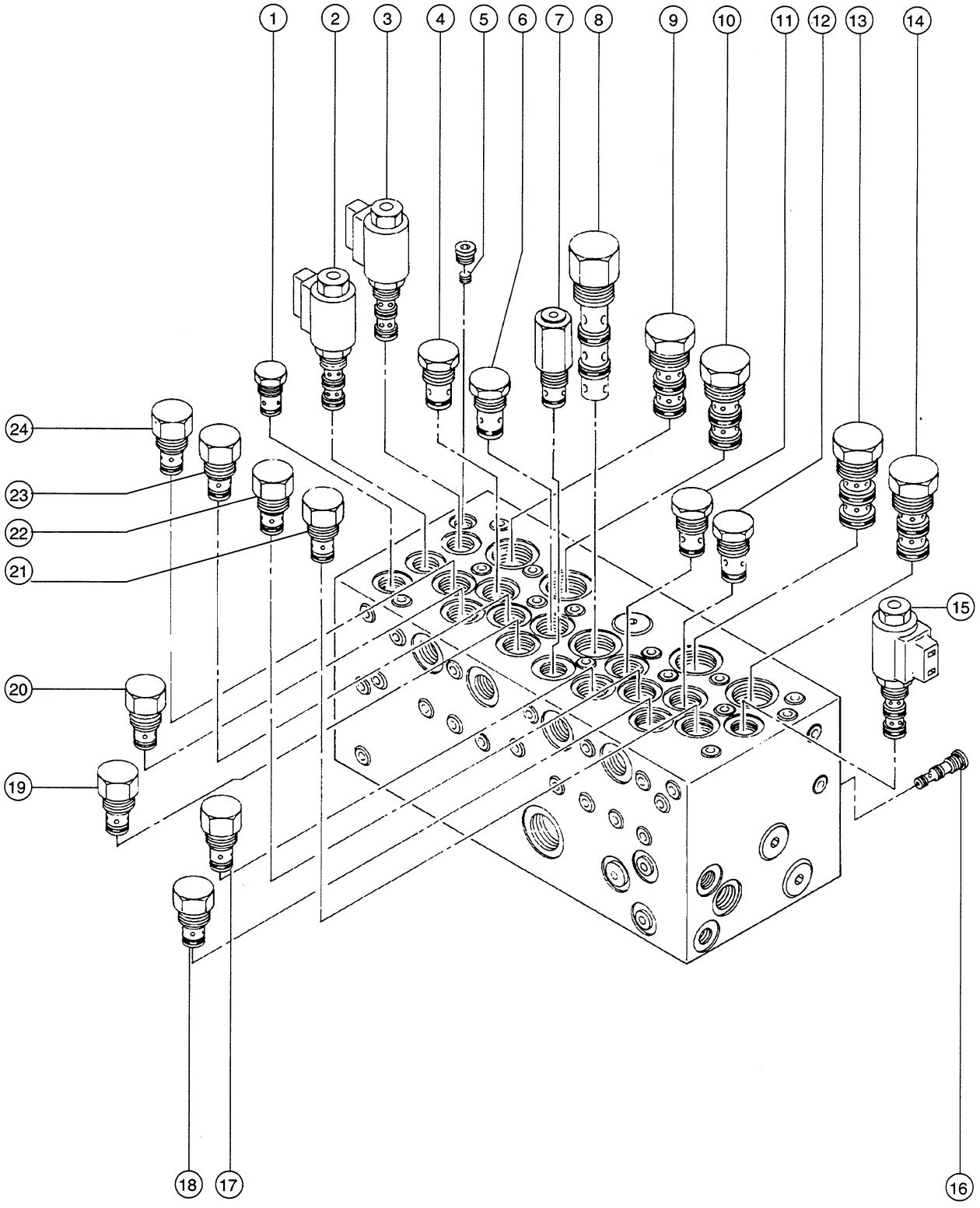
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4WD Drive Manifold

18-1
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

18-2
Valve Adjustments

How to Adjust the Charge Pressure Relief Valve

1 Connect a 0 to 600 psi (0 to 41 bar) pressure gauge to the test port located on the drive manifold.

⚠CAUTION Bodily injury hazard. Spraying hydraulic oil can penetrate 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 slowly 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 7).

5 Adjust the internal hex socket. Turn it clockwise to increase the pressure or counterclockwise to decrease the pressure. Then install 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.

Relief valve specifications		
Pressure	320 psi	22 bar



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