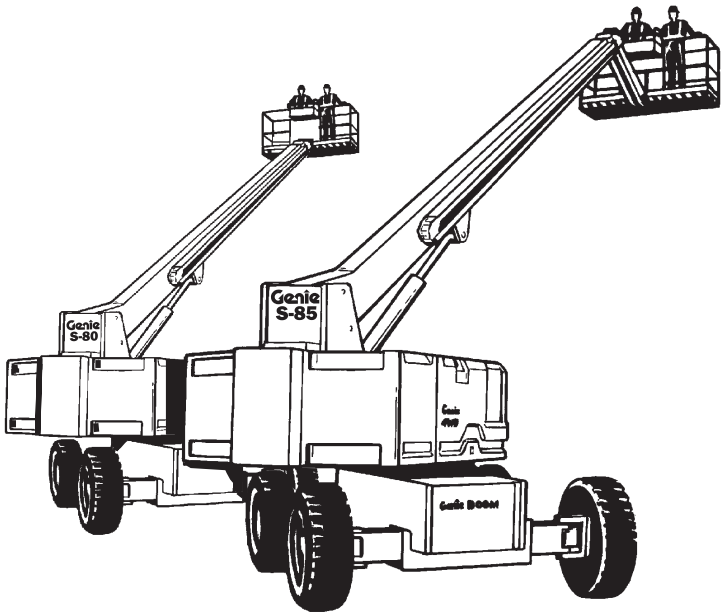
Genie Industries

Technical Publications

Genie® S-80

Genie® S-85

Service Manual



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Genie® S-80
Genie® S-85

Important

Read, understand and obey the safety rules and operating instructions in the *Genie S-80 & Genie S-85 Operator's Manual* before attempting any maintenance or repair procedure.

This service manual covers the Genie S-80 and Genie S-85 2WD and 4WD models introduced in 1994.

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

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

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

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

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Genie® Industries

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These machines comply with ANSI/SIA 92.5-1992.

Printed on recycled paper

Patents Pending

Printed in U.S.A.

Safety Rules

Danger

Failure to obey the instructions and safety rules in this manual, and the *Genie S-80 & Genie S-85 Operator's Manual* will result in death or serious injury.

Many of the hazards identified in the operator's 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 and worksite regulations
  - 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 top 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 properly ventilated and well lit.

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 environmentally safe.

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Specifications

Machine Specifications

Stowed dimensions	S-80	S-85
Length	36 ft 8 in 11.2 m	40 ft 7 in 12.4 m
Width, axles retracted	7 ft 11 1/2 in 2.43 m	7 ft 11 1/2 in 2.43 m
Width, axles extended	10 ft 3.0 m	10 ft 3.0 m
Height	9 ft 2 in 2.79 m	9 ft 2 in 2.79 m
Weight	33,380 lbs 15,141 kg	35,860 lbs 16,266 kg
Ground clearance	11 in 28 cm	11 in 28 cm
Operational dimensions		
Maximum platform height	80 ft 24.4 m	85 ft 25.9 m
Maximum horizontal reach	71 ft 11 in 21.9 m	76 ft 11 in 23.4 m
Maximum turntable tailswing	3 ft 8 1/2 in 113.0 cm	3 ft 8 1/2 in 113.0 cm
Wheelbase	9 ft 0 in 2.7 m	9 ft 0 in 2.7 m
Minimum turning circle, outside (axles extended)	23 ft 1 in 7.0 m	23 ft 1 in 7.0 m
Minimum turning circle, inside (axles extended)	10 ft 7 1/2 in 3.2 m	10 ft 7 1/2 in 3.2 m
Turntable rotation	continuous	continuous
Platform rotation	160°	160°
Maximum capacity 6 foot platform	600 lbs 272 kg	500 lbs 227 kg
Maximum capacity 8 foot platform	500 lbs 227 kg	500 lbs 227 kg

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

Platform dimensions	6 ft (Standard)	8 ft (Optional)
Length	6 ft 1.83 m	8 ft 2.44 m
Width	30 in 76.2 cm	36 in 91.4 cm

Tires and wheels	
Tire size	15-22.5 SAT
Tire ply rating	16
Tire contact area	113 sq in 729 sq cm
Overall tire diameter	43.3 in 110 cm
Tire pressure	100 psi 6.89 bar
Wheel diameter	22.5 in 57.1 cm
Wheel width	11.75 in 29.8 cm
Wheel lugs	10 @ 3/4 -16
Lug nut torque, dry bolts	420 ft-lbs 569.5 Nm
Lug nut torque, wet bolts	320 ft-lbs 433.9 Nm

Fluid capacities	
Fuel tank	30 gallons 114 liters
LPG tank	33.5 pounds 15.2 kg
Hydraulic tank	45 gallons 170 liters
Hydraulic system (including tank)	55 gallons 208 liters
Drive torque hub	50 fl oz 1.47 liters
Steer torque hub (4WD)	44 fl oz 1.30 liters
Turntable rotation torque hub	44 fl oz 1.30 liters

PERFORMANCE SPECIFICATIONS

Performance Specifications

Drive speeds, maximum	2WD	4WD
Boom stowed Gasoline/LPG models	3.8 mph 6.1 km/h 40 ft/7.2 sec 12.2 m/7.2 sec	3.1 mph 4.9 km/h 40 ft/8.8 sec 12.2 m/8.8 sec
Boom stowed Deutz diesel models	3.3 mph 5.3 km/h 40 ft/8.3 sec 12.2 m/8.3 sec	3 mph 4.8 km/h 40 ft/9.1 sec 12.2 m/9.1 sec
Boom raised or extended All models	0.68 mph 1.1 km/h 40 ft/40 sec 12.2 m/40 sec	0.68 mph 1.1 km/h 40 ft/40 sec 12.2 m/40 sec

Gradeability (boom stowed)	2WD	4WD
Rough terrain	30%	38%

Boom function speeds, minimum/maximum from platform controls	
Jib Boom up	40 to 60 seconds
Jib Boom down	50 to 80 seconds
Boom up	90 to 120 seconds
Boom down	90 to 120 seconds
Boom extend	140 to 170 seconds
Boom retract	80 to 110 seconds
Turntable rotate - 360° boom fully stowed	80 to 120 seconds
Turntable rotate - 360° boom extended	210 to 240 seconds
Platform rotate - 160°	10 to 20 seconds
Platform level up	35 to 65 seconds
Platform level down	25 to 55 seconds

Hydraulic Specifications

Hydraulic fluid	Dexron II equivalent
Drive pump	
Type: bi-directional variable displacement piston pump	
Displacement - 2500 rpm	0 to 30.3 gallons per minute 0 to 114.7 liters per minute
Maximum drive pressure	3500 psi 241.3 bar
Charge pressure neutral position drive position	 360 psi 250 psi
	 25 bar 17 bar
Medium pressure filter	3 micron
Medium pressure filter bypass pressure	50 psi 3.4 bar
Drive manifold	
Brake relief pressure	250 psi 17.2 bar
Steer end drive motors	**4WD models**
Displacement per revolution	1.52 cu in 25 cc
Non-steer end drive motors	
Displacement per revolution, variable 4WD (2 speed motor)	0.16 to 2.8 cu in 2.62 to 45.9 cc
Displacement per revolution, variable 2WD	1.12 to 2.8 cu in 18.4 to 45.9 cc

Function pump	
Type: pressure balanced gear	
Displacement - static	1.14 cu in 19 cc
Displacement - 2500 rpm	0 to 12.3 gallons per minute 0 to 46.6 liters per minute
Hydraulic tank circuit return line filter	10 micron with 25 psi (1.7 bar) bypass
Function manifold	
Function relief valve pressure	2900 psi 200 bar
Boom down relief valve pressure	2300 psi 159 bar
Boom extend	1950 psi 134 bar
Steer/axle extend flow regulator	5 gallons per minute 18.9 liters per minute
Steer regulator	3.5 gallons per minute 13.2 liters per minute
Axle and jack cylinder pressure	2500 psi 172 bar
Auxiliary pump	
Type: fixed displacement gear pump	
Displacement - static	0.152 cu in 2.5 cc
Displacement	1.4 gallons per minute 5.3 liters per minute
Auxiliary pump relief pressure	3000 psi 207 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 specifications for lubricated bolts are 25% less than dry torque specifications for each bolt size.

These bolt torque specifications are for general use only. Specification may vary depending on application of bolt.

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 79.4 mm
Horsepower	63 @ 4000 rpm
Firing order	1 - 3 - 4 - 2
Low idle - carburetor	900 rpm
Low idle - electronic governor	1600 rpm
High idle	2500 rpm
Governor	electronic
Compression ratio	9.5:1
Compression pressure (approx.) Pressure (psi) of lowest cylinder must be at least 75% of highest cylinder	150 to 175 psi 10 to 12 bar
Valve clearances	0.040 to 0.050 inches 1.0 to 1.3 mm

Lubrication system	
Oil pressure (operating temp. @ 2500 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 SG (labeled SG/CC or SG/CD) as they offer improved wear protection. (units ship with 10W-40 SG/CC)

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 12.7 mm
Brush length wear limit	0.25 in 6.35 mm
Brush spring tension	40 ounces 11 Newtons
Bolt torque through brush	55 to 75 inch-pounds 6 to 8.5 Nm
Brush mounting bolt torque	15 to 20 foot-pounds 20 to 27 Nm
Maximum commutator run-out	0.005 inches 0.127 mm

Battery	
Type	12V, Group 31
Quantity	1
Cold cranking ampere	1000A
Reserve capacity @ 25A rate	200 minutes

Fuel pump	
Static pressure	5 to 7 psi 0.34 to 0.48 bar
Minimum volume flow (in 25 seconds)	1 pint 473 cc

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 1.18 mm

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 12 mm

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

Bolt torque specifications

Bolt description (size)	torque ft-lbs	torque Nm
Distributor clamp bolt (M-10)	14 to 21	19 to 28
Distributor vacuum tube to manifold adaptor	5 to 8	7 to 11
Exhaust manifold to cylinder head bolt or nut (M-10): torque in sequence		
first step	14 to 19	19 to 26
second step	20 to 30	27 to 41
Flywheel to crankshaft bolt (M-10)	56 to 64	76 to 87
Fuel pump to cylinder block (M-8)	14 to 21	19 to 28
Intake manifold to cylinder head bolt or nut (M-8)	14 to 21	19 to 28
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Rocker arm cover to cylinder head (M-6)	5 to 8	7 to 11
Spark plug to cylinder head (M-14)	5 to 10	7 to 14
Temperature sending unit to block (M-14)	8 to 18	11 to 24
Water jacket drain plug to block	23 to 28	31 to 38
Water pump to block bolt (M-8)	14 to 21	19 to 28
Auxiliary shaft cover bolt (M-6)	6 to 9	8 to 12
Water outlet connection bolt (M-8)	14 to 21	19 to 28
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 105 mm
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	1300 rpm
High idle	2300 rpm
Governor	centrifugal mechanical
Valve clearance, cold	
Intake	0.012 in 0.3 mm
Exhaust	0.020 in 0.5 mm
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/SG or CD/SG grades. (units ship with 10W-40 SG/CC)	
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 19 mm
Brush length, minimum	0.5 in 12.7 mm
Battery	
Type	12V, Group 31
Quantity	1
Cold cranking ampere	1000A
Reserve capacity @ 25A rate	200 minutes
Fan belt deflection	3/8 to 1/2 inch 9 to 12 mm

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

DEUTZ ENGINE F4L 1011 SPECIFICATIONS

Bolt tightening specifications, continued Bolt description (size, grade)	torque ft-lbs	torque Nm
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
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
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 cause 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.
- ☑ Machines that have been out of service for a period longer than 3 months must complete the quarterly inspection.

About This Section

The 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 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 Extendable Axles					
A-11	Test the Platform and Ground Controls					
A-12	Test the Auxiliary Power Operation					
A-13	Test the Tilt Sensor					
A-14	Test the Limit Switches					

MAINTENANCE TABLES

Table A, continued		Tools are required	New parts required	Warm engine required	Cold engine required	Dealer service suggested
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					

Table B

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 Battery					
B-6	Check the Hydraulic Tank Filter Condition Indicator					
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 Drive Hub Oil Level and Fastener Torque					
B-11	Check and Adjust the Engine Idle Mixture - Gasoline/LPG Models					
B-12	Check and Adjust the Engine RPM					

MAINTENANCE TABLES

Table B, continued

		Tools are required	New parts required	Warm engine required	Cold engine required	Dealer service suggested
B-13	Test the Key Switch					
B-14	Test the Emergency Stop Buttons					
B-15	Test the Ground Control Override					
B-16	Test the Platform Self-leveling					
B-17	Test the Service Horn					
B-18	Test the Foot Switch					
B-19	Test the Engine Idle Select					
B-20	Test the Fuel Select Operation - Gasoline/LPG Models					
B-21	Test the Drive Enable System					
B-22	Test the Drive Brakes					
B-23	Test the Drive Speed - Stowed Position					
B-24	Test the Alarm Package - Optional Equipment					
B-25	Perform Hydraulic Oil Anaysis See D-1 *Test or Replace the Hydraulic Oil*					
B-26	Check the Hydraulic Limit Switch Linkage					
Every 500 hours, perform the following engine maintenance procedure.						
B-27	Replace the Engine Oil and Filter - Deutz Diesel Models					

MAINTENANCE TABLES

Table C

		Tools are required	New parts required	Warm engine required	Cold engine required	Dealer service suggested
C-1	Check the Boom Wear Pads					
C-2	Check the Extnedable Axle Wear Pads					
C-3	Check the Turntable Rotation Bearing Bolts					
C-4	Check the Free-wheel Configuration					
C-5	Grease the Turntable Rotation Bearing and Rotate Gear					
C-6	Replace the Torque Hub Oil					
C-7	Replace the Hydraulic Tank Filter					
C-8	Replace the Drive Loop Hydraulic Filter					
C-9	Replace the Diesel Fuel Filter - Deutz Diesel Models					
C-10	Replace the Gasoline Fuel Filter - Gasoline/LPG Models					
C-11	Replace the PCV Valve - Gasoline/LPG Models					
C-12	Clean or Replace the Distributor Cap and Rotor - Gasoline/LPG Models					
C-13	Replace the Spark Plugs - Gasoline/LPG Models					
C-14	Check and Adjust the Air/LPG Mixture - Gasoline/LPG Models					
C-15	Check and Adjust the Ignition Timing - Gasoline/LPG Models					
C-16	Check the Engine Valve Clearances - Deutz Diesel Models					
C-17	Adjust the Turntable Backlash					

MAINTENANCE TABLES

Table D		Tools are required	New parts required	Warm engine required	Cold engine required	Dealer service suggested
D-1	Test or Replace 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 Clearance - Gasoline/LPG Models					
D-5	Check the Engine Cylinder Compression - Gasoline/LPG Models					
D-6	Clean the PCV Hoses and Fittings - Gasoline/LPG Models					
D-7	Check the Fuel Injection Pumps and Injectors - Deutz Diesel Models					
D-8	Check the Toothed Belt - Deutz Diesel Models					
D-9	Replace the Timing Belt - Gasoline/LPG 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”, tag and remove the machine from service, repair and re-inspect it. After repair, place a check in the “R” box.

Legend

Y = yes, acceptable

N = no, remove from service

R = repaired

Comments

Checklist A	**Y**	**N**	**R**
Refer to Table A			
A-1 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 Extendable axles			
A-11 Platform and ground controls			
A-12 Auxiliary power			
A-13 Tilt sensor			
A-14 Limit switches			
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 belt(s)			
B-2 Engine radiator			
B-3 Oil cooler and fins-Deutz			
B-4 Exhaust system			
B-5 Battery			
B-6 Hydraulic tank filter			
B-7 Electrical wiring			
B-8 Tires and wheels			
B-9 Brake configuration			
B-10 Drive hub maintenance			
B-11 Idle mixture-gasoline			
B-12 Engine RPM			
B-13 Key Switch			
B-14 Emergency Stop			
B-15 Ground control override			
B-16 Platform leveling			
B-17 Service horn			
B-18 Foot switch			
B-19 Engine idle select			
B-20 Fuel select-gasoline			
B-21 Drive enable system			
B-22 Drive brakes			
B-23 Drive speed-stowed			
B-24 Alarm package			
B-25 Hydraulic oil analysis			
B-26 Hydraulic limit switch			
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 Axle Wear Pads			
C-3 Turntable bearing bolts			
C-4 Free-wheel configuration			
C-5 Grease rotation bearing			
C-6 Torque hub oil			
C-7 Hydraulic tank filter			
C-8 Drive loop hydraulic filter			
C-9 Fuel filter-diesel			
C-10 Fuel filter-gasoline			
C-11 PCV valve-gasoline			
C-12 Distibutor cap-gasoline			
C-13 Spark plugs-gasoline			
C-14 Air/LPG mixture			
C-15 Ignition timing-gasoline			
C-16 Valves-Deutz			
C-17 Turntable backlash			

Checklist D	**Y**	**N**	**R**
Refer to Table D			
D-1 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 Inspection Report.*

⚠WARNING Failure to perform each procedure as presented and scheduled may cause 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.
- ☑ Unless otherwise specified, perform each maintenance procedure with the machine in the following configuration:
  - · machine parked on a flat, level surface
  - · boom in stowed position
  - · turntable rotated with the boom between the non-steering wheels
  - · turntable secured with the turntable rotation lock pin
  - · key switch in the OFF position with the key removed
  - · wheels chocked

About This Section

This section contains detailed procedures for each scheduled maintenance inspection.

Each procedure includes a description, safety information 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 step.

Table A Procedures

A-1
Inspect the 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 container 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 be sure that the storage container is present and in good condition.

2 Check to make sure that the operator's, responsibilities and safety manual are present and complete in the storage container in the platform.

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

4 Always return the manuals to the storage container after use.

NOTICE Contact your authorized 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-80 & Genie S-85 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 legibility and damage. Replace any damaged or illegible decal immediately.

NOTICE Contact your authorized 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 turntable rotation motors and torque hubs
- axle components and wear pads
- boom components and wear pads
- dents or damage to machine
- tires and wheels
- engine and related components
- limit switches, alarms, horn and beacon
- nuts, bolts and other fasteners
- platform entry mid-rail or gate
- cracks in welds or structural components
- compartment covers and latches

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 with 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.

⊙ Result: The oil level should be in the "safe" zone.

Ford Engine LSG-423	5 quarts
Oil capacity (including filter)	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 classification SG (labeled SG/CC or SG/CD) as they offer improved wear protection.

Deutz Engine F4L 1011	11 quarts
Oil capacity (including filter)	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/SG or CD/SG 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.

⚠WARNING Fluids in the radiator are under pressure and extremely hot. Use caution when adding fluids.

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 LPG leaks.)

Gasoline/LPG models:

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

· gasoline tank, manual 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 (5 cm) of the sight gauge.

Hydraulic oil specifications

Hydraulic oil type	Dexron II equivalent
Tank capacity	45 gallons 170 liters
Hydraulic system (including tank)	55 gallons 208 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—filter, fittings, hoses, auxiliary power unit and turntable surface

· engine compartment—fittings, hoses, main pump, filter and turntable surface

· all hydraulic cylinders

· all hydraulic manifolds

· boom(s)

· the underside of the turntable

· the underside of the drive 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.

⚠WARNING An over-inflated tire can explode and may cause death or serious injury.

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	15-22.5 SAT
Pressure	100 psi 6.89 bar

A-10
Test the Extendable Axles

Proper axle extention is essential to safe machine operation. If the axle extention system is not operating correctly, the stability of the machine is compromised and it may tip over.

1 Start the engine from the ground controls.

2 Activate the steer axle drive chassis lift jack cylinder.

⊙ Result: The cylinder should extend and the drive chassis should raise smoothly, free of hesitation.

3 Continue holding the chassis jack in the extended position and extend the steer axle.

⊙ Result: The cylinder should extend and the steer axle should extend smoothly, free of hesitation.

4 Return the chassis jack control handle to the neutral position.

⊙ Result: The lift jack cylinder should fully retract when the control handle is returned to neutral.

5 Activate the non-steer axle drive chassis lift jack cylinder.

⊙ Result: The drive chassis should raise smoothly, free of hesitation.

6 Continue holding the chassis jack in the extended position and extend the non-steer axle.

⊙ Result: The non-steer axle should extend smoothly, free of hesitation.

7 Return the chassis jack control handle to the neutral position.

⊙ Result: The lift jack cylinder should fully retract when the control handle is returned to neutral.

TABLE A PROCEDURES

A-11
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 extend the axles.

2 Operate each machine function through a full cycle.

⊙ Result: All machine functions should operate smoothly.

3 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.

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

⊙ Result: All machine functions should operate smoothly.

5 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 will override the platform controls, including the Emergency Stop button.

A-12
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. When operating the machine on engine power, selecting auxiliary power will stop the engine immediately. Auxiliary power is designed for short term emergency use only, and excessive use will result in battery drain and component damage.

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

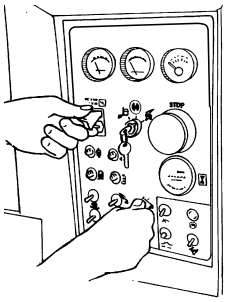
2 Simultaneously hold the auxiliary power switch ON while activating the following functions through a partial cycle:

· jib boom up/down (S-85 models)

· boom up/down

· 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:

· jib boom up/down (S-85 models)

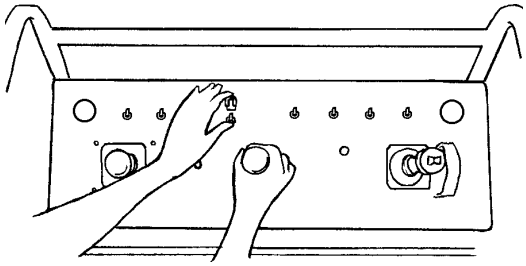
· boom up/down

· extend and retract

· turntable rotate right/left

· steer right/left

⊙ Result: Each function should operate smoothly.



NOTICE Auxiliary power will not lift the boom past the drive limit switch unless the axles are fully extended.

A-13
Test the Tilt Sensor

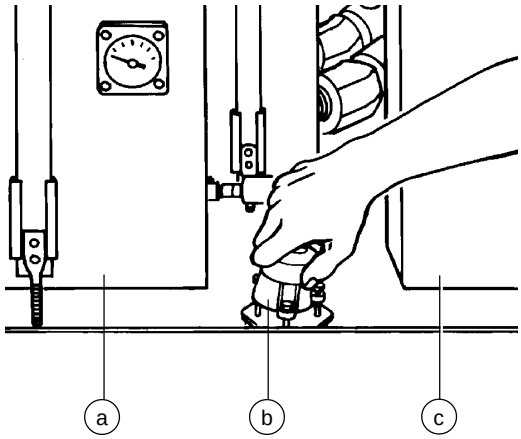
The tilt sensor sounds an alarm in the platform when the incline of the turntable exceeds 4.5 degrees.

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 tank side cover and press down on one side of the tilt sensor.

⊙ Result: After a 1.5 second delay, the alarm in the platform should sound.



a fuel tank
b tilt sensor
c ground control box

TABLE A PROCEDURES

A-14
Test the Limit Switches

Drive Limit Switches

Detecting limit switch malfunctions is essential to safe machine operation. The drive limit switches are used to restrict drive speed when the boom is raised or extended. An improperly functioning drive limit switch will allow the machine to operate in an unsafe position.

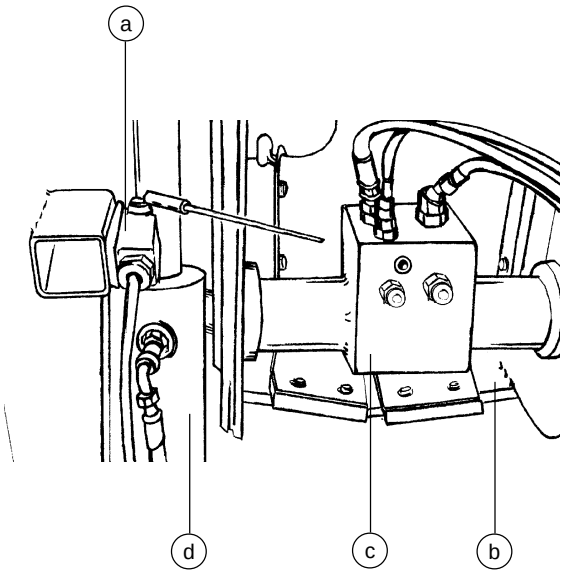
1 Remove the cover from the base of the boom to access the limit switch.

2 Visually inspect the drive limit switch located inside the pivot end of the boom. Inspect for the following:

· broken or missing actuator arm

· missing fasteners

· loose wiring



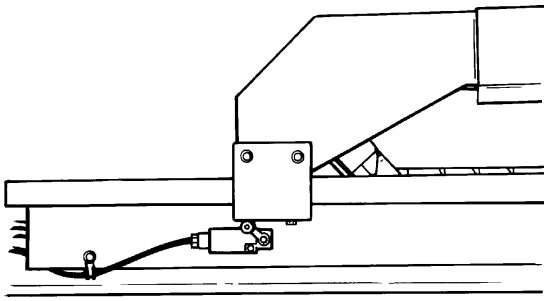
a drive limit switch
b boom
c extension cylinder
d master cylinder

3 Visually inspect the drive limit switch located on the end of the cable track on the boom. Inspect for the following:

· broken or missing roller or arm

· missing fasteners

· loose wiring



4 Start the engine from the platform controls and extend the axles.

5 Slowly move the drive control handle off center.

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

6 Raise the boom above the drive limit switch.

7 Slowly move the drive control handle off center.

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

8 Lower the boom to the stowed position, then extend the boom 1 foot (30 cm).

9 Slowly move the drive control handle off center.

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

Drive speed, maximum, raised or extended	
All models	1 foot per second 0.3 meter per second

TABLE A PROCEDURES

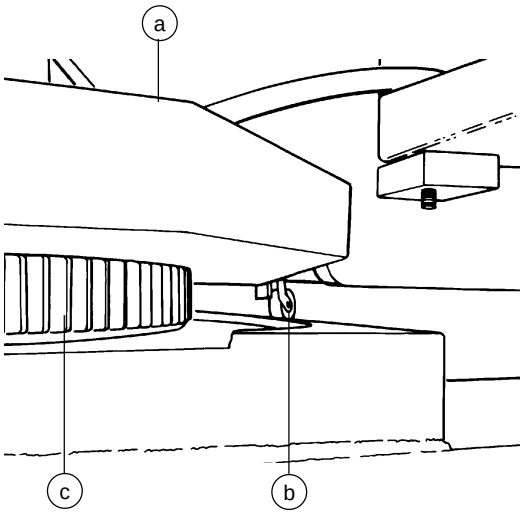
Drive Enable Limit Switch

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

· broken or missing roller or arm

· missing fasteners

· loose wiring



a turntable
b drive enable limit switch
c turntable rotation bearing

2 Manually activate the drive enable limit switch.

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

3 Start the engine from the platform controls.

4 Rotate the turntable to the left until the boom is past the left non-steer wheel.

⊙ Result: The drive enable indicator light should be on. Drive function should not operate until the drive enable switch is activated.

5 Rotate the turntable to the right until the boom is past the right non-steer wheel.

⊙ Result: The drive enable indicator light should be on. Drive function should not operate until the drive enable switch is activated.

Axle Extention Hydraulic Limit Switch

1 Start the engine from the ground controls. Lower the boom to the stowed position.

2 Extend the steer axle.

3 Raise the boom.

⊙ Result: The boom should stop raising when the drive limit switch is activated.

4 Lower the boom to the stowed position.

5 Retract the steer axle and extend the non-steer axle.

6 Raise the boom.

⊙ Result: The boom should stop raising when the drive limit switch is activated.

7 Lower the boom to the stowed position.

8 Extend the steer axle.

9 Raise the boom.

⊙ Result: The boom should continue to raise to full height after the drive limit switch is activated.

TABLE A PROCEDURES

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.

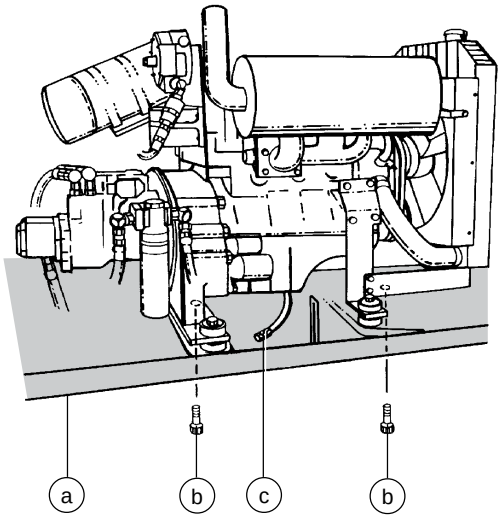
Periodic replacement of the engine oil and filter is essential to good engine performance. Operating the machine with an improper oil level or neglecting periodic oil and filter changes can damage engine components. A daily check of elapsed machine hours against the hours noted on the oil filter will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

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

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

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

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



a engine pivot plate
b pivot plate retaining bolts
c oil drain hose

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

4 Install the plug into the drain hose.

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

6 Use an oil filter wrench and remove the filter.

7 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.

8 Use a 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 install the 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 the oil drain hose for leaks.

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

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

Ford Engine LSG-423	5 quarts
Oil capacity (including filter)	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 classification SG (labeled SG/CC or SG/CD) as they offer improved wear protection.

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.

1 Remove the end cap from the air cleaner canister.

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

3 Clean the inside of the canister and the gasket with a dry cloth.

4 Insert the new filter and replace the mounting fastener.

5 Replace the end cap on the canister.

Air filters - Genie part numbers	
Ford LSG-423 Engine	27916
Deutz F4L 1011	27916

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.

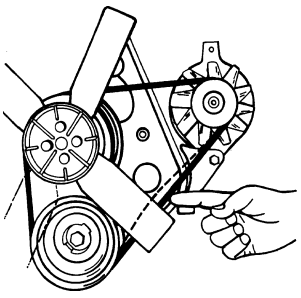
⚠CAUTION Beware of hot engine components. Contact with hot engine components may cause severe burns.

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

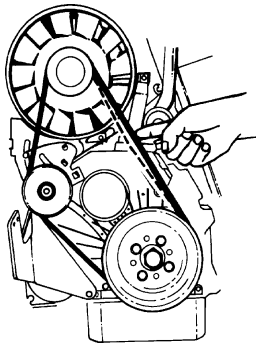
2 **All models:** Inspect the engine belt(s) for:

- cracking
- glazing
- separation
- breaks

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



Ford engine



Deutz Diesel engine

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

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.

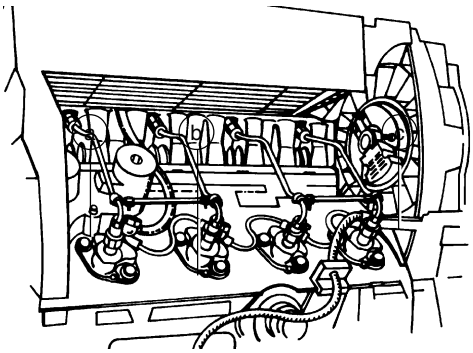
⚠WARNING Do not inspect while the engine is running. Remove the key to secure from operation.

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

Oil Cooler

1 Remove the cover from the side of the engine, 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 Inspect the blower fins for physical damage.

5 Clean the blower fins of debris and foreign material.

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

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

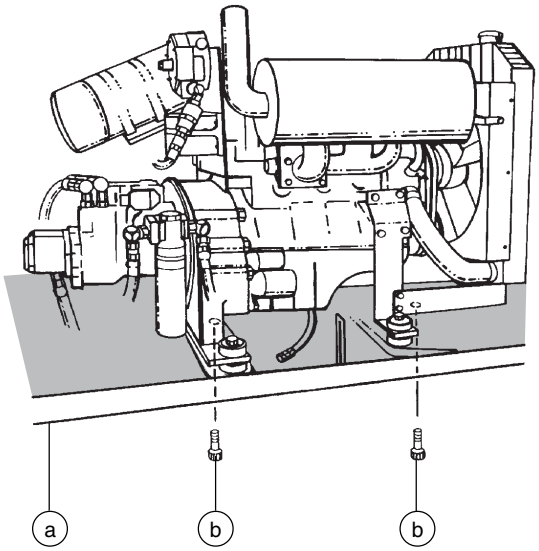
B-4
Check the Exhaust System

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

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

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

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



a engine pivot plate
b pivot plate retaining bolts

TABLE B PROCEDURES

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.

B-5
Check the Battery

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 hazardous conditions.

⚠WARNING 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.

⚠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.

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.

4 Remove the battery vent caps and check the specific gravity with a hydrometer.

5 Check the battery acid level. If needed, replenish with distilled water to the bottom of the battery fill tube. Do not overfill.

6 Install the vent caps.

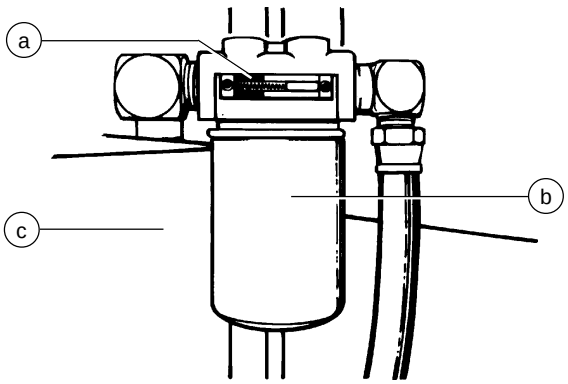
B-6
Check the Hydraulic Tank Filter Condition Indicator

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

1 Start the engine from the platform controls.

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

3 Inspect the filter condition indicator.



a filter condition indicator
b filter
c hydraulic tank

⊙ Result: The filter should be operating with the plunger in the green area. If the display shows the plunger in the red area, this indicates that the hydraulic filter is being bypassed and the filter should be replaced. See C-7, *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 electrical panel
- · engine wiring harness
- · inside of the ground control box
- · turntable manifold wiring

2 Start the engine from the ground controls, then extend the axles and 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
- · jib boom cable track (S-85 models)

B-8
Inspect the Tires and Wheels (including lug nut torque)

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.

⚠WARNING An over-inflated tire can explode and may cause death or serious injury.

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.

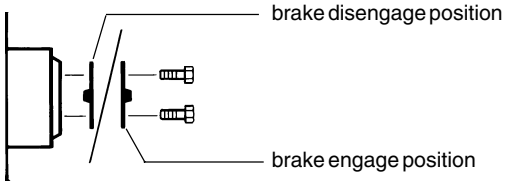
Tires and wheels	
Tire size	15-22.5 SAT
Tire ply rating	16
Tire contact area	113 sq in 729 sq cm
Overall tire diameter	44.1 in 112 cm
Tire pressure	100 psi 6.89 bar
Wheel diameter	22.5 in 57.1 cm
Wheel width	11.75 in 29.8 cm
Wheel lugs	10 @ $^{3}/_{4}$-16
Lug nut torque, dry	420 ft-lbs 569.5 Nm
Lug nut torque, wet	320 ft-lbs 433.9 Nm

TABLE B PROCEDURES

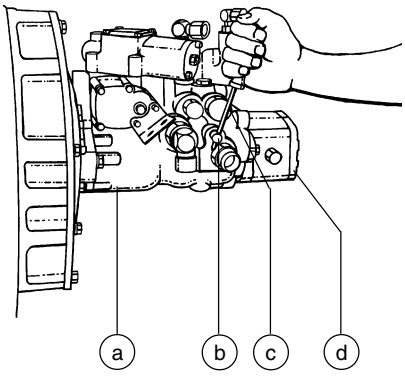
B-9
Confirm the Proper Brake Configuration

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 each torque hub disconnect cap to be sure it is in the engaged position.



2 Be sure the free-wheel valve on the drive pump is closed (clockwise).



a drive pump
b free-wheel valve
c screwdriver
d lift pump

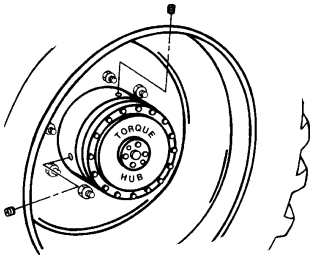
NOTICE The free-wheel valve should always remain closed.

B-10
Check the Drive Hub Oil Level and Fastener Torque

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.

4 Apply pipe thread sealant to the plug, and then install it in the torque hub.

5 Check the torque of the drive hub mounting fasteners. Torque the bolts to 160 ft-lbs / 217 Nm (lubed) or 210 ft-lbs / 284 Nm (dry).

6 Repeat this procedure for each drive torque hub.

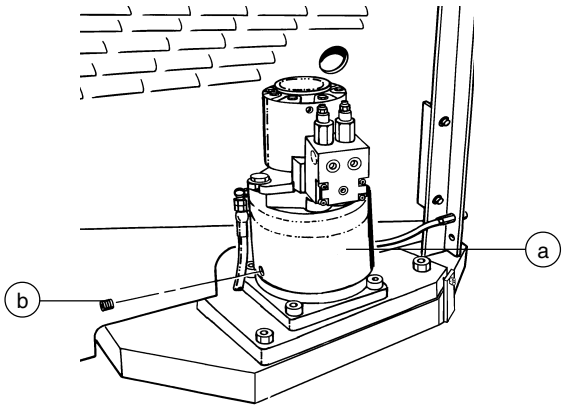
Torque hub oil	Drive	Steer
Capacity	50 fl oz 1.47 liters	44 fl oz 1.30 liters

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 torque hub
b plug

2 If necessary, add oil until the oil level is even with the bottom of the side plug hole.

3 Apply pipe thread sealant to the plug, and then install it in the torque hub.

4 Check the torque of the turntable rotate drive hub mounting fasteners. Torque the bolts to 200 ft-lbs / 271 Nm (dry) or 270 ft-lbs / 366 Nm (lubed).

Turntable rotate torque hub oil	
Capacity	44 fluid ounces 1.30 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.

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 wire from the governor actuator.

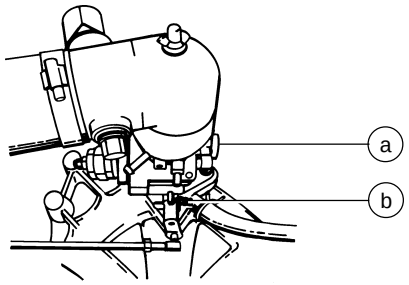
TABLE B PROCEDURES

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

⊙ Result: Carburetor 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 wire to the governor actuator.

5 Start the engine from the ground controls.

⊙ Result: Electronic governor low idle should be 1600 rpm.

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

⊙ Result: High idle should be 2500 rpm.

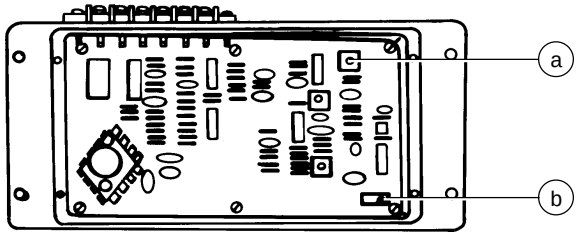
7 Turn the engine off.

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 engine side bulkhead, 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 trimpot 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	1600 rpm
High idle	2500 rpm

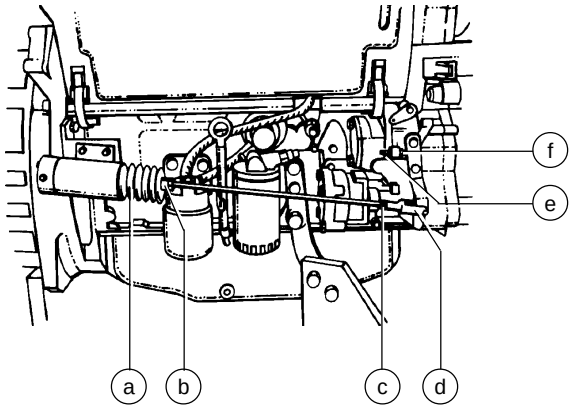
Deutz Diesel models

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

⊙ Result: Low idle should be 1300 rpm.

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

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.



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

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

⊙ Result: High idle should be 2300 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. Be sure solenoid fully retracts, when activating high idle.

Deutz Diesel models	
Low idle	1300 rpm
High idle	2300 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 any machine function from the **ground controls**.

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

4 Turn the key switch to ground control.

5 Check any 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 will 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.

B-16
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 the platform 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 extend the axles and lower the boom into the stowed position.

2 Adjust the platform to a level position using the 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-17
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-18
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 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-19
Test the Engine Idle Select

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

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

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

TABLE B PROCEDURES

Foot switch activated high idle (rabbit and foot switch symbols) 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 idle 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 idle 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 idle control switch to high idle (rabbit symbol).

⊙ Result: The engine should change to high idle.

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

⊙ Result: The engine should change to low idle.

7 Move the engine idle 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	1600 rpm
High idle	2500 rpm
Deutz Diesel models	
Low idle	1300 rpm
High idle	2300 rpm

B-20
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 start and 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 idle 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.

TABLE B PROCEDURES

B-21
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. The drive enable switch must be used to reactivate the drive function and should inform the operator that the machine will move in the opposite direction that the drive and steer controls are moved. An improperly functioning drive enable system may allow the machine to be moved into an unsafe position.

1 Start the engine from the platform controls.

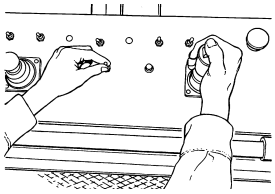
2 Rotate the turntable to the right until the boom is past the right non-steering wheel.

⊙ Result: The drive enable indicator light should turn on.

3 Slowly move the drive control handle off center.

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

4 Hold the 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.

B-22
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 they are actually 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.

3 Move the engine idle control switch to foot switch activated 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 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: paved surface	**2WD**	**4WD**
Stopping distance	3 to 5 ft 0.91 to 1.5 m	4 to 6 ft 1.22 to 1.83 m

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

TABLE B PROCEDURES

B-23
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 (12.2 m) apart.

2 Start the engine from the platform controls.

3 Move the engine idle control switch to foot switch activated 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 crosses the finish line.

Drive speed: stowed position	**2WD**	**4WD**
Gasoline/LPG models	40 ft/7.2 sec 12.2 m/7.2 sec	40 ft/8.8 sec 12.2 m/8.8 sec
Deutz Diesel models	40 ft/8.3 sec 12.2 m/8.3 sec	40 ft/9.1 sec 12.2 m/9.1 sec

B-24
Test the Alarm Package - Optional Equipment

The alarm package includes:

- travel alarm
- descent alarm
- flashing beacon

Alarms and a beacon are installed to alert operators and ground personnel of machine proximity and motion. The alarm package is installed on the turntable covers.

NOTICE The alarms and beacon 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 beacon 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 alarm should sound when the switch is held down.

3 Turn the key switch to platform control.

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

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

B-25
Perform Hydraulic Oil Analysis

See D-1, *Test or Replace the Hydraulic Oil.*

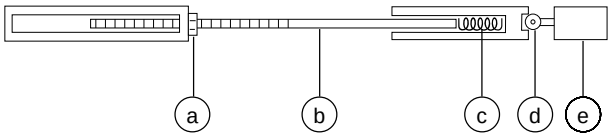
B-26
Check the Hydraulic Limit Switch Linkage

1 Remove the drive chassis steer-end cover.

2 Extend and retract the axle through 2 cycles and visually inspect the linkage for damage. Be sure the valve actuator is functioning properly.

3 Be sure the lock nut is properly tightened.

4 Repeat procedure for the non-steer end axle.



a lock nut
b linkage rod
c spring
d valve actuator
e limit switch valve

NOTICE If the linkage functioning incorrectly, See 15-3, *How to Set Up the Hydraulic Limit Switch Linkage.*

TABLE B PROCEDURES

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.

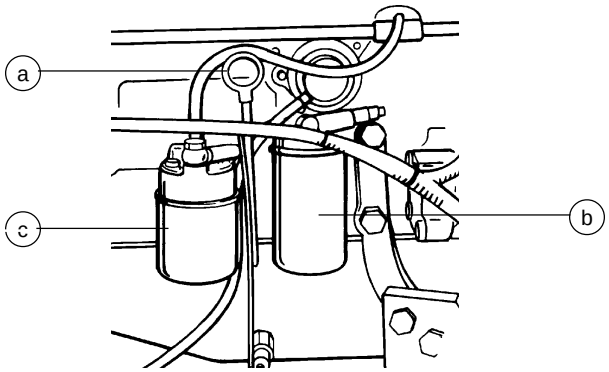
1 Remove the oil filler cap located on the valve cover.

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

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

4 Install the plug into the drain hose.

5 Use an oil wrench and remove the oil filter.



a engine oil level dipstick
b oil filter
c fuel filter

6 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.

7 Use a 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 replace the oil 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 oil pan for leaks.

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

Deutz Engine F4L 1011	11 quarts
Oil capacity (including filter)	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/SG or CD/SG 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 tube surfaces to provide a low friction, replaceable wear pad between moving parts. Improperly shimmed wear pads or continued use of worn out wear pads may result in component damage and unsafe operating conditions.

1 Start the engine from the ground controls.

2 Raise the end of the boom to a comfortable working height (chest high), then extend the boom 1 foot (30 cm).

3 Measure each wear pad. Replace the wear pad if it is less than $^{7}/_{16}$ inch (11 mm) thick. If the wear pad is more than $^{7}/_{16}$ inch (11 mm) thick, shim as necessary to obtain zero clearance and zero drag.

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

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

C-2
Check the Extendable Axle Wear Pads

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

1 Start the engine from the ground controls and extend the axles.

2 Measure each wear pad. Replace the wear pad if it is less than $^{7}/_{16}$ inch (11 mm) thick. If the wear pad is more than $^{7}/_{16}$ inch (11 mm) thick, shim as necessary to obtain zero clearance and zero drag.

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

NOTICE Always maintain squareness between the axle outer and inner tubes.

C-3
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.

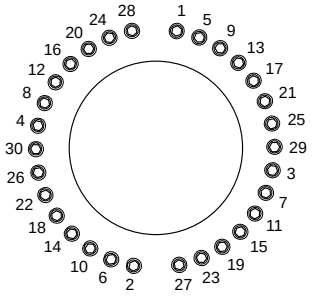
1 Raise the boom and place a safety chock on the cylinder. Carefully lower the boom onto the lift cylinder safety chock.

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

NOTICE The lift cylinder safety chock is available through Genie, (part no. 33484).

TABLE C PROCEDURES

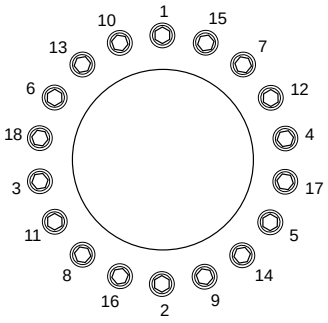
2 Be sure that each turntable mounting bolt is torqued in sequence to 210 foot-pounds (285 Newton meters).



Bolt torque sequence

3 Lower the boom to the stowed position.

4 Check to ensure that each bearing mounting bolt under the drive chassis is torqued in sequence to 210 foot-pounds (285 Newton meters).



Bolt torque sequence

C-4 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 cause death or serious injury and property damage.

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

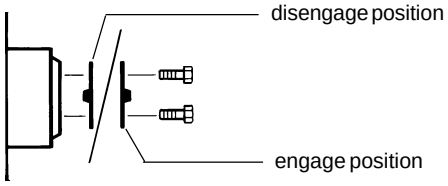
Non-steering wheels: All models

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

2 Center a lifting jack of ample capacity (20,000 lbs/9072 Kg) under the drive chassis between the non-steer tires.

3 Lift the wheels of the ground and then place jack stands under the drive 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. Rotate each wheel to check for engagement. Lift the machine and remove the jack stands.

⚠WARNING Collision hazard. Failure to re-engage the torque hubs may cause death or serious injury and property damage.

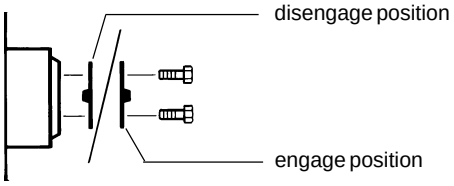
Steer wheels: 4WD models

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

8 Center a lifting jack of ample capacity (20,000 lbs/9072 Kg) under the drive chassis between the non-steer tires.

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

10 Disengage the torque hubs by turning over the torque hub disconnect caps on each steer wheel hub.



11 Manually rotate each steer wheel.

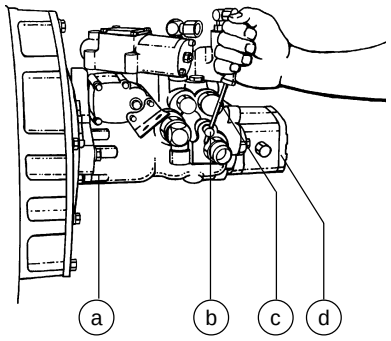
⊙ Result: Each steer wheel should rotate with minimum effort.

12 Re-engage the torque hubs by turning over the hub disconnect caps. Rotate each wheel to check for engagement. Lift the machine and remove the jack stands.

⚠WARNING Collision hazard. Failure to re-engage the torque hubs may cause death or serious injury and property damage.

All models:

13 Be sure the free-wheel valve on the drive pump is closed (clockwise).



a drive pump
b free-wheel valve
c screwdriver
d lift pump

NOTICE The free-wheel valve should always remain closed.

C-5
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.

1 Locate the grease fitting on the platform end of the tank side bulkhead.

2 Pump grease into the turntable rotation bearing. Rotate the turntable in increments of 4 to 5 inches (10 to 13 cm) at a time and repeat this step until the entire bearing has been greased.

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

Oil type	Multipurpose grease

C-6
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.

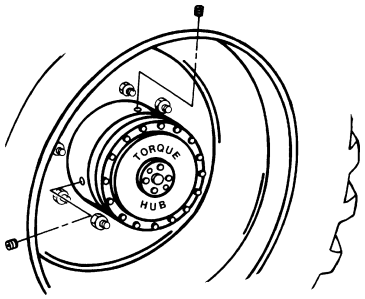
Drive Torque Hubs:

1 Select the 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.

TABLE C PROCEDURES

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. Apply pipe thread sealant to the plugs, and then install the plugs.

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

Non-steer end:

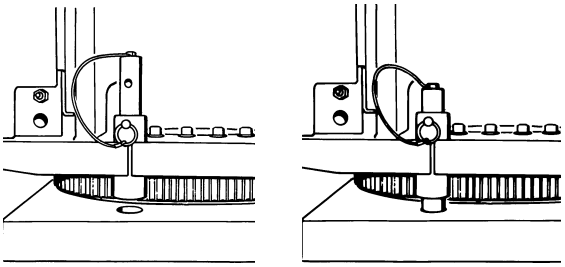
6 Remove the torque hub. See 17-2, *How to Remove a Drive Torque Hub.* After removing the torque hub, drain and replace the oil from the inside torque hub.

Oil capacity per hub		
non-steer (outside)	50 fl oz	1.47 liters
non-steer (inside)	4 fl oz	0.11 liters
steer	44 fl oz	1.30 liters

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

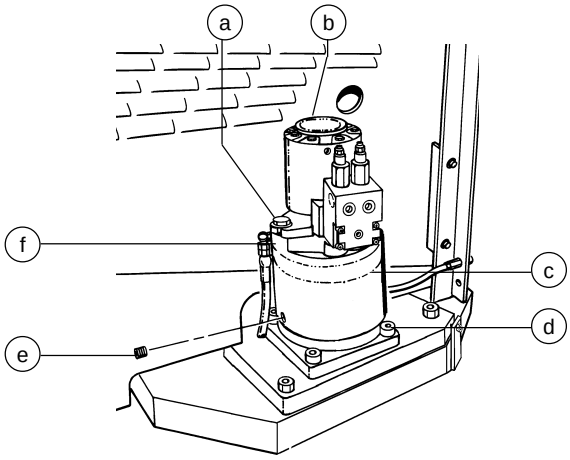
Turntable Rotate Torque Hub

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



unlocked locked

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 motor/brake mounting bolt
b motor
c torque hub
d torque hub mounting bolt
e plug
f brake

3 Remove the torque hub mounting bolts, and then use a lifting device to remove the torque hub from the machine.

4 Remove the plug 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 180 foot-pounds (244 Newton meters).

6 Install the brake and motor onto the torque hub.

7 Fill the hub with oil from the side hole until the oil level is even with the bottom of the hole. Apply pipe thread sealant to the plugs, and then install the plugs.

Capacity	44 fluid ounces 1.30 liters

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

C-7
Replace the Hydraulic Tank Filter

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

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

NOTICE Perform this procedure with the engine off.

1 Remove the filter with an oil filter wrench.

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

3 Install the new filter (part no. 20293) and tighten it securely by hand. Clean up any oil that may have spilled during the installation procedure.

4 Start the engine from the ground controls.

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

C-8
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 often.

⚠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 main pump.

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 be sure that there are no leaks.

TABLE C PROCEDURES

C-9
Replace the Diesel Fuel Filter - Deutz Diesel Models

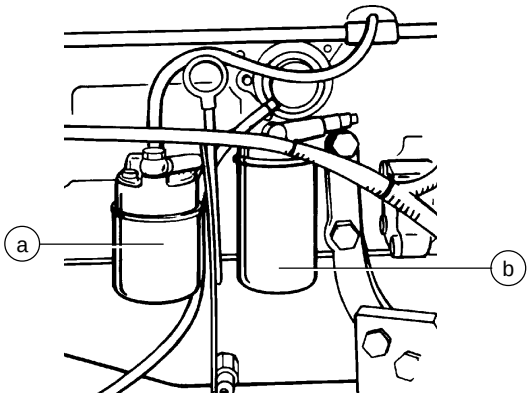
Replacing the diesel fuel filter is essential to good engine performance and service life. A dirty or clogged filter may cause the engine to perform poorly and continued use may cause component damage. Extremely dirty conditions may require that the filter be replaced more often.

⚠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.

C-10
Replace the Gasoline Fuel Filter - Gasoline/LPG Models

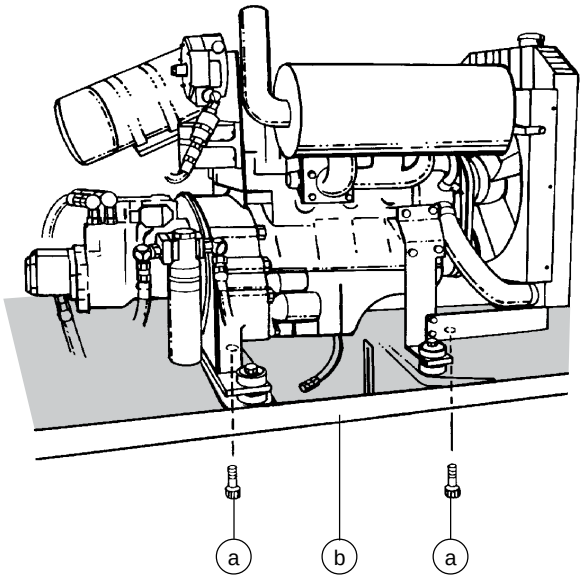
Replacing the gasoline fuel filter is essential to good engine performance and service life. A dirty or clogged filter may cause the engine to perform poorly and continued use may cause component damage. Extremely dirty conditions may require that the filter be replaced more often.

⚠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.

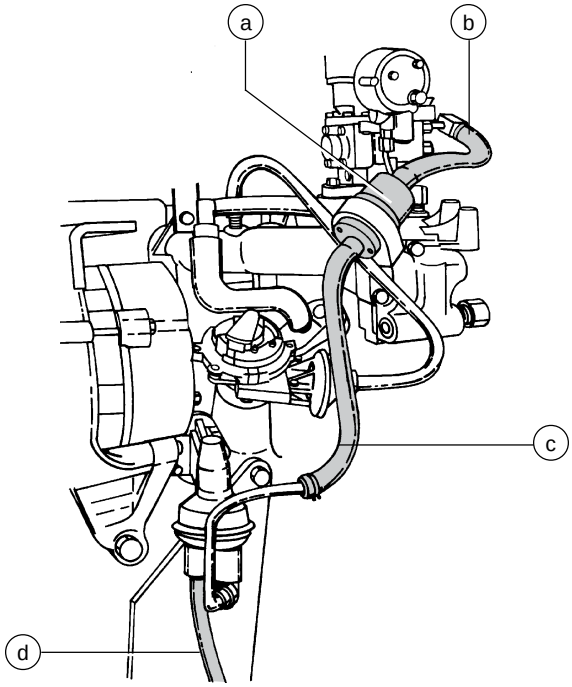
TABLE C PROCEDURES

1 Remove the 2 bolts from under 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.



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 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 connect 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.

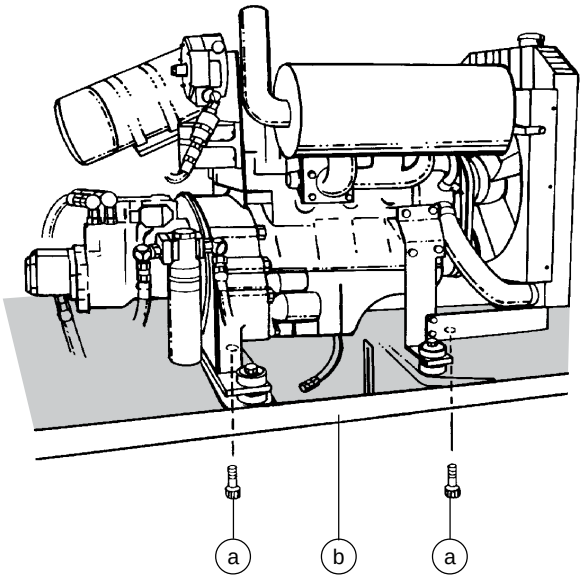
TABLE C PROCEDURES

C-11
Replace the PCV Valve - Gasoline/LPG Models

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

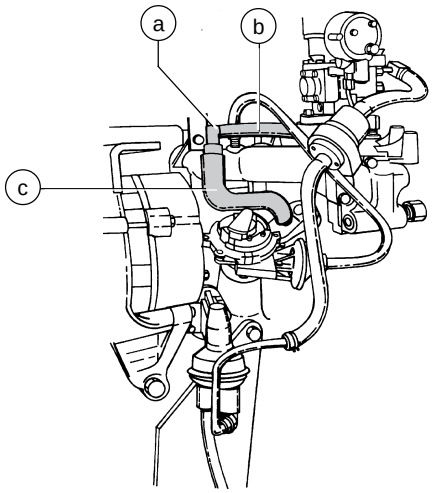
NOTICE Perform this procedure with the engine off.

1 Remove the 2 bolts from under 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 PCV valve, then remove the valve.



Shown with distributor cap removed
a PCV valve
b hose, PCV valve to carburetor
c hose, PCV valve to crankcase

3 Install the new PCV valve. Connect the hoses.

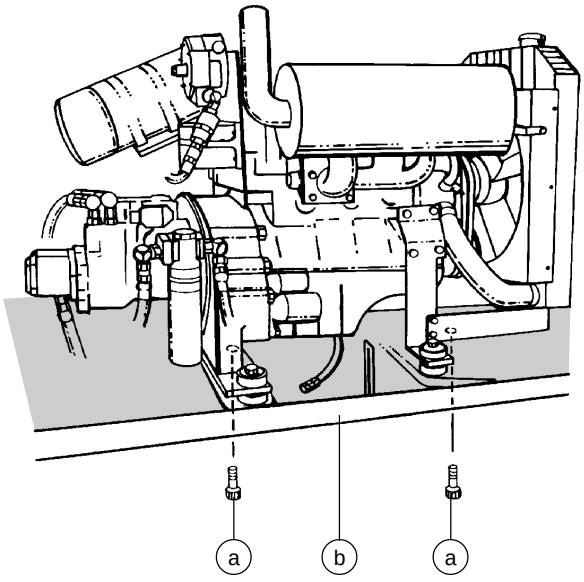
4 Swing the engine pivot plate back to its original position and replace the two retaining bolts.

C-12
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 often.

NOTICE Perform this procedure with the engine off.

1 Remove the 2 bolts from under 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 disconnect 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 connect the coil and spark plug wires.

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

9 Start the engine from the ground controls and check the engine for proper operation.

C-13
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 spark plugs, then connect the 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 1.18 mm
Spark plug torque	5 to 10 foot-pounds 7 to 14 Nm

TABLE C PROCEDURES

C-14
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.

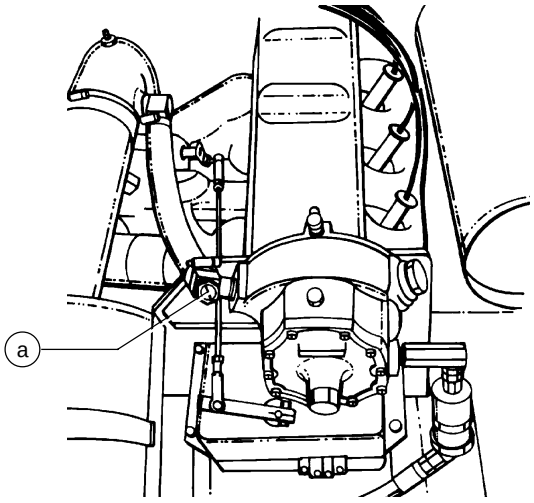
⚠DANGER Engine fuels are combustible. Perform this procedure in an open, well-ventilated area away from heaters, sparks, flames and lighted tobacco. Always have an approved fire extinguisher within easy reach.

NOTICE The engine rpm needs to be preset for gasoline fuel operation before adjusting the LPG idle mixture. Refer to B-12, *Check and Adjust the Engine RPM.*

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

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

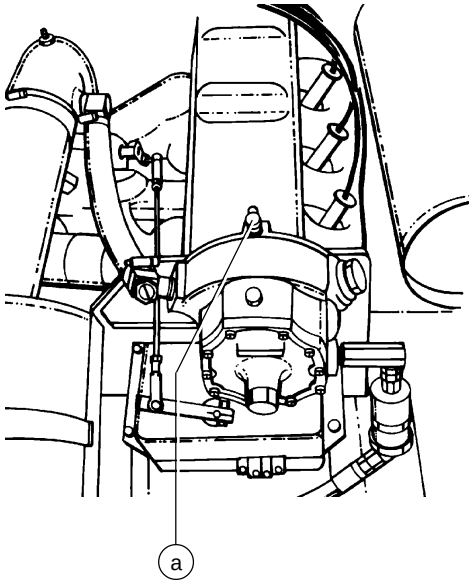
4 Adjust the high idle adjustment screw to obtain an air-to-fuel mixture ratio of 13.0:1 to 13.2:1, using an exhaust gas analyzer.

NOTICE Preliminary setting is $^{1}/_{4}$ inch of threads showing. Measure from top of lock nut to top of adjustment screw.

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 idle 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

NOTICE Preliminary setting: turn low idle adjustment screw clockwise all the way in. Turn low idle adjustment screw counterclockwise 2 $^{3}/_{4}$ turns.

C-15
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-16
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.

C-17
Adjust the Turntable Rotation Gear Backlash

The turntable rotation torque hub is mounted on an adjustable plate that controls the gap between the rotation motor gear and the turntable bearing. Maintaining proper backlash of the turntable bearing is essential to safe machine operation. Improper backlash could result in an unsafe operating condition and component damage.

NOTICE See 12-1, *How to Adjust the Turntable Rotation Gear Backlash.*

Table D Procedures

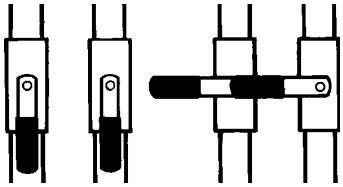
D-1
Test or Replace the Hydraulic Oil

Replacement or testing 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 often.

NOTICE The machine uses Dexron II equivalent hydraulic oil. Before replacing the hydraulic oil, the oil may be tested by an oil distributor for specific levels of contamination to verify that changing the oil is necessary. **If the hydraulic oil is not replaced at the two year inspection, quarterly testing (B-25) thereafter should be completed.**

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

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



⚠CAUTION Component damage hazard. The engine must not be started with the hydraulic tank shutoff valves in the CLOSED position or component damage will occur. If the tank valves are closed, remove the key from the key switch and tag the machine to inform personnel of the condition.

2 Remove the drain plug from the hydraulic tank.

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

4 Disconnect and cap the two suction hoses that are attached to the hydraulic tank shutoff valves.

5 Remove the strainer assemblies from the tank.

6 Carefully clean any foreign material from the strainers. Clean the strainers from the inside out.

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

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

9 Install the two suction hoses.

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

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

12 Prime the pump by doing the following:

Connect a 0 to 600 psi (0 to 41 bar) pressure gauge to the test port on the drive pump.

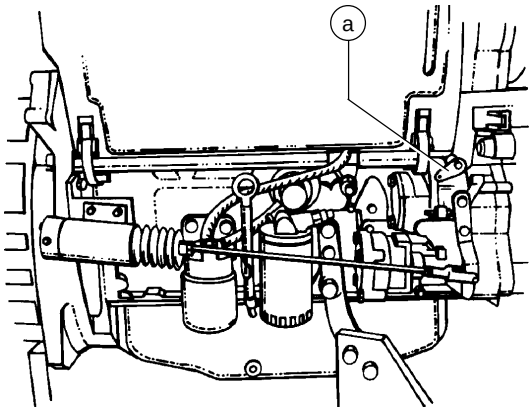
Gasoline/LPG models:

Remove the high tension lead from the center of the ignition coil.

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

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, wait 15 seconds, then crank the engine an additional 15 seconds or until the pressure reaches 320 psi (22 bar).

13 Connect the wiring and start the engine from the ground controls. Check the hydraulic tank for leaks.

Hydraulic system	
Hydraulic tank capacity	45 gallons 170 liters
Hydraulic system capacity (including tank)	55 gallons 208 liters
Hydraulic fluid	Dexron ll equivalent

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 and cooled.

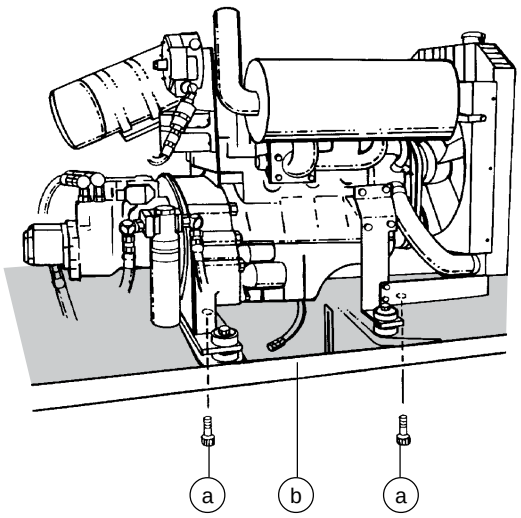
1 Put on protective clothing and eye wear.

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

3 Remove the radiator cap from the radiator.

TABLE D PROCEDURES

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



a pivot plate retaining bolts
b engine pivot plate

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

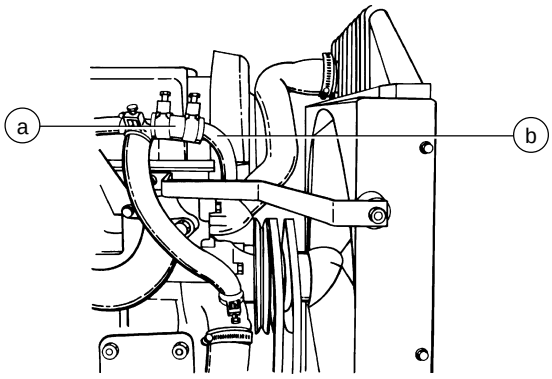
6 After all the coolant has drained, close the drain valve. Connect the coolant return hose to the radiator.

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

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 A
b hard line B

11 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.

15 Start the engine from the ground controls and run it until reaching normal operating temperature.

16 Allow engine to cool and check the fluid level in the coolant recovery tank. Add water if needed.

Ford Engine LSG-423	11.5 quarts
Coolant capacity	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 cause an unsafe operating condition.

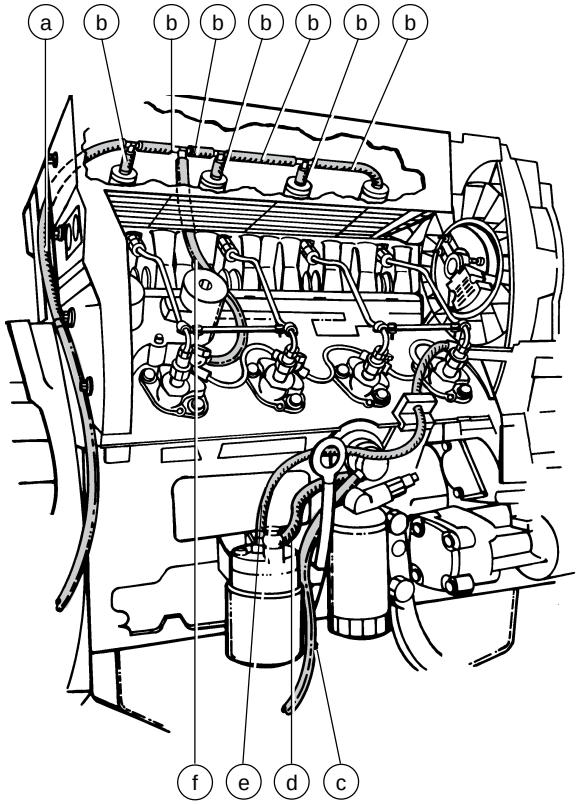
⚠DANGER Engine fuels are combustible. Replace the fuel lines in an open, well-ventilated area away from heaters, sparks, flames and lighted tobacco. Always have an approved fire extinguisher within easy reach.

NOTICE Perform this procedure with the engine off.

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

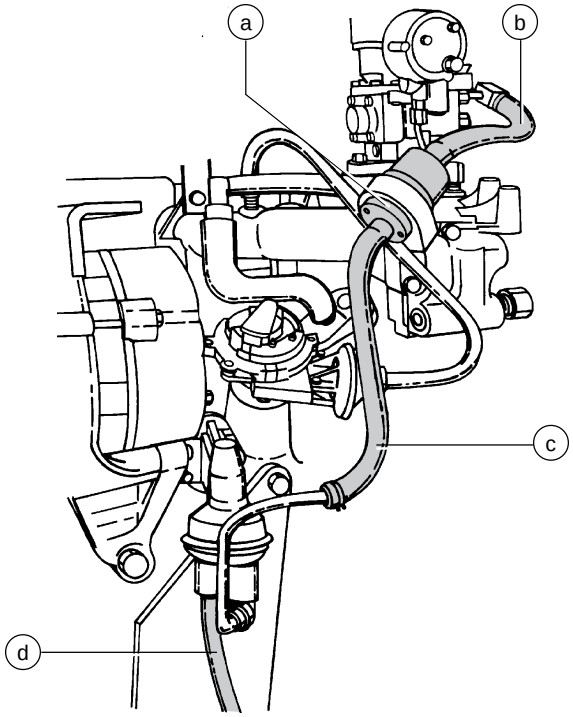
2 Remove and replace the fuel line hoses and clamps according to the following illustrations:

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



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 engine 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 the 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 the Engine Cylinder Compression - Gasoline/LPG Models

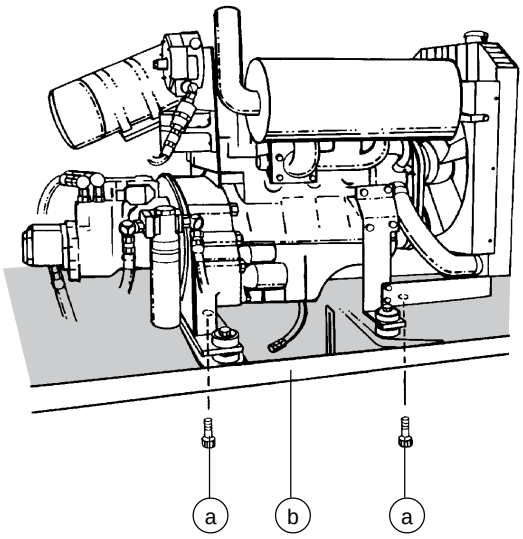
Complete information to perform this procedure is available in the *Ford LSG-423 2.3 Liter Industrial Engine Service Manual* (Ford number: 194-216). Genie part number 29586.

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.

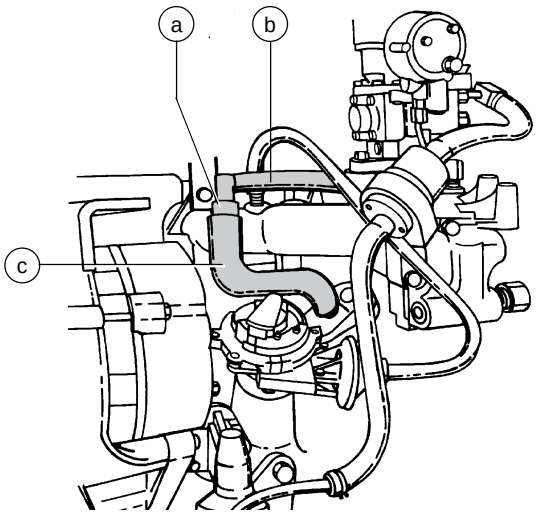
NOTICE Perform this procedure with the engine off.

1 Remove the 2 bolts from under 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 Fuel 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.
- ☑ Unless otherwise specified, perform each repair procedure with the machine in the following configuration:
  - · machine parked on a flat level surface
  - · boom in stowed position
  - · turntable rotated with the boom between the non-steering wheels
  - · turntable secured with the turntable rotation lock pin
  - · key switch in the OFF position with the key removed
  - · wheels chocked

Before Troubleshooting:

- ☑ Read, understand and obey the safety rules and operating instructions printed in the *Genie S-80 & Genie S-85 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

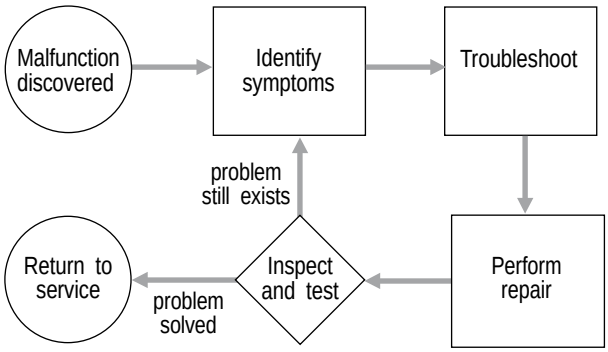


Chart 1

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) are not tripped.

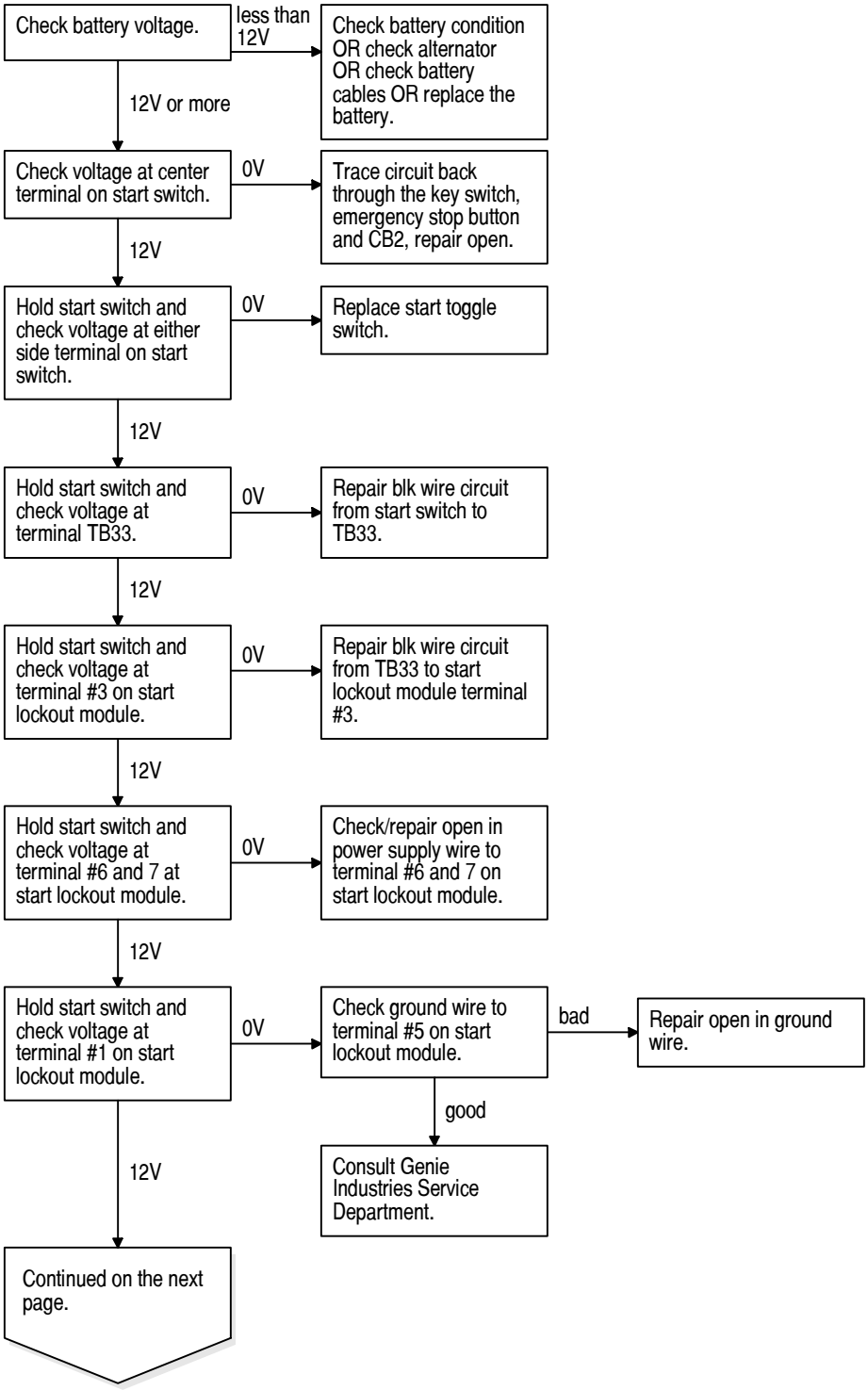


CHART 1

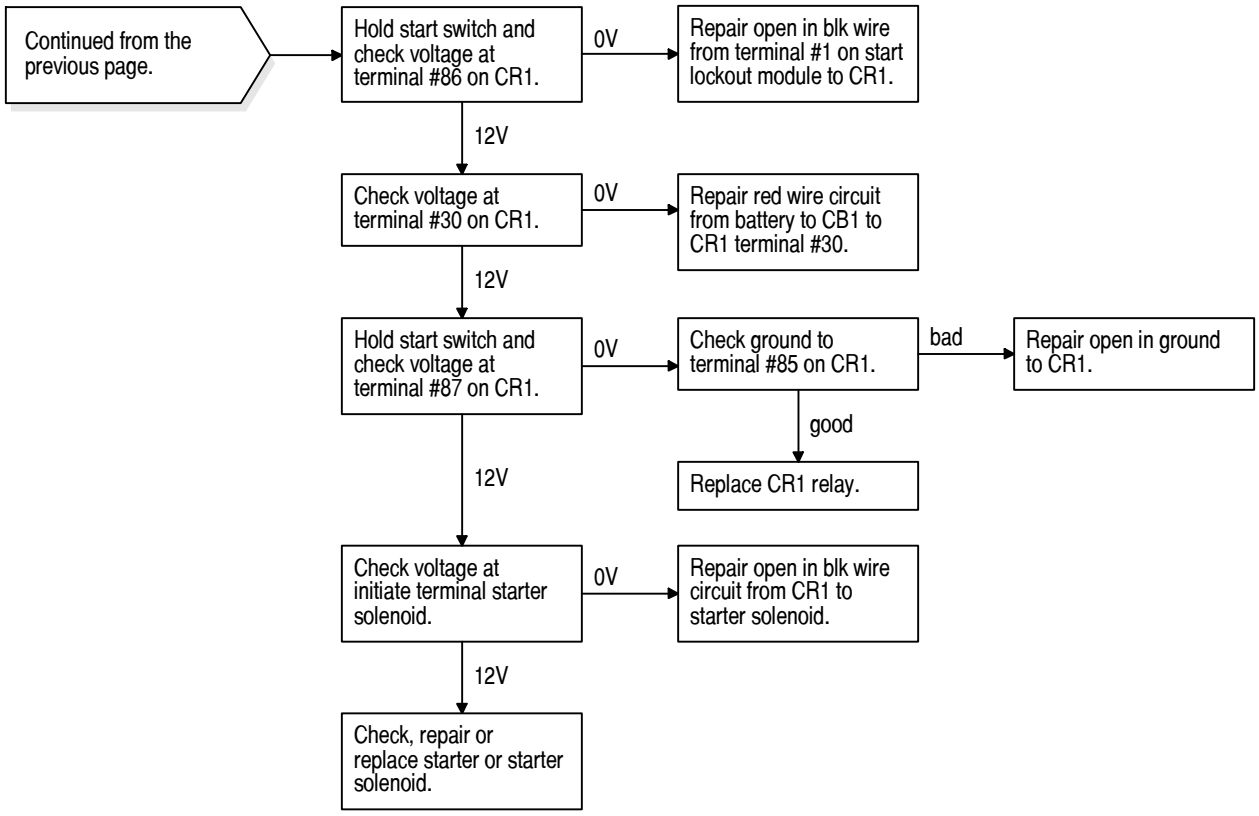

Continued from the previous page.
Hold start switch and check voltage at terminal #86 on CR1.
0V
Repair open in blk wire from terminal #1 on start lockout module to CR1.
12V
Check voltage at terminal #30 on CR1.
0V
Repair red wire circuit from battery to CB1 to CR1 terminal #30.
12V
Hold start switch and check voltage at terminal #87 on CR1.
0V
Check ground to terminal #85 on CR1.
bad
Repair open in ground to CR1.
good
Replace CR1 relay.
12V
Check voltage at initiate terminal starter solenoid.
0V
Repair open in blk wire circuit from CR1 to starter solenoid.
12V
Check, repair or replace starter or starter solenoid.

Chart 2

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

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

Be sure to check fuel levels and engine coolant level.

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

Be sure that automatic choke is not sticking closed.

Perform following tests in gasoline mode only.

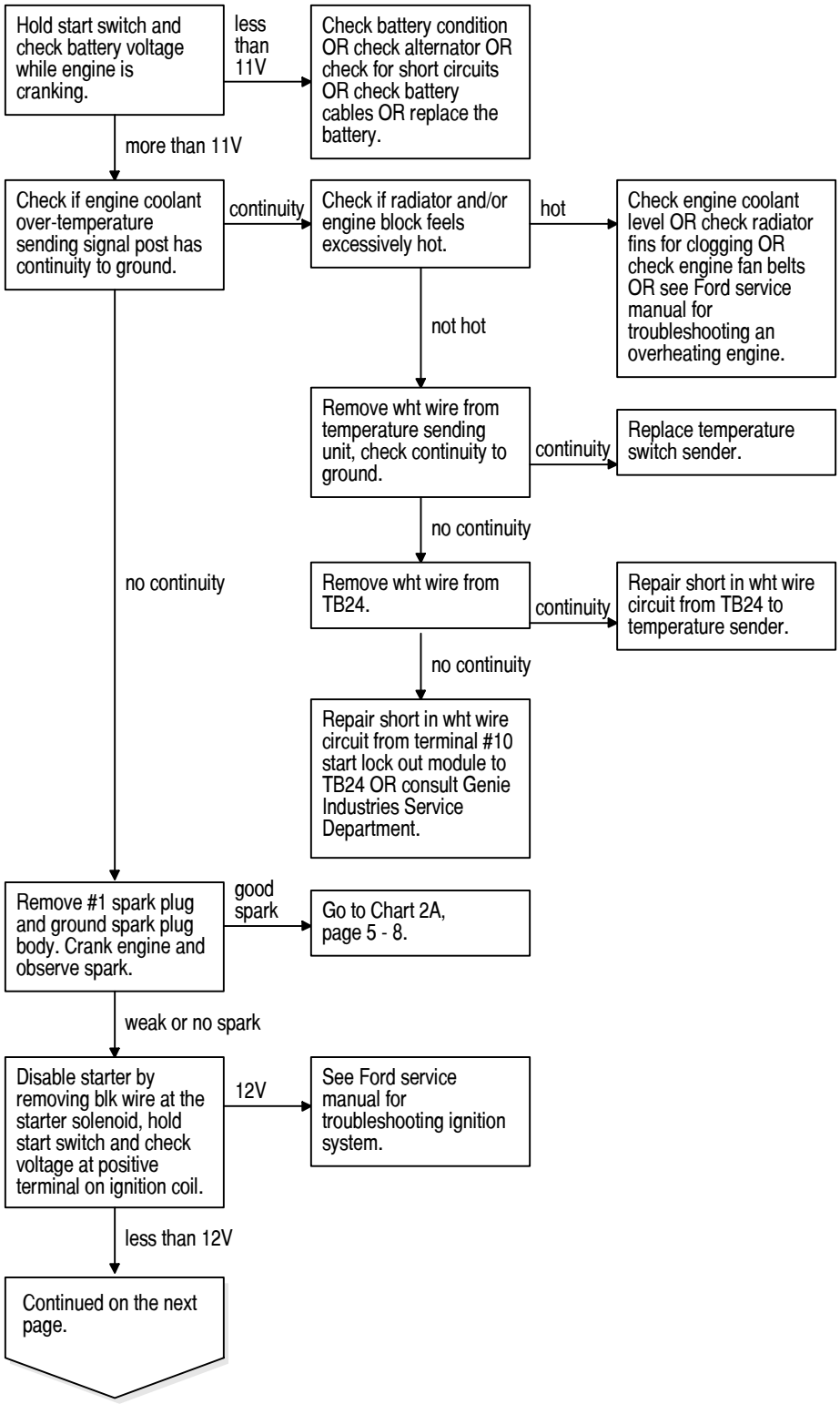


CHART 2

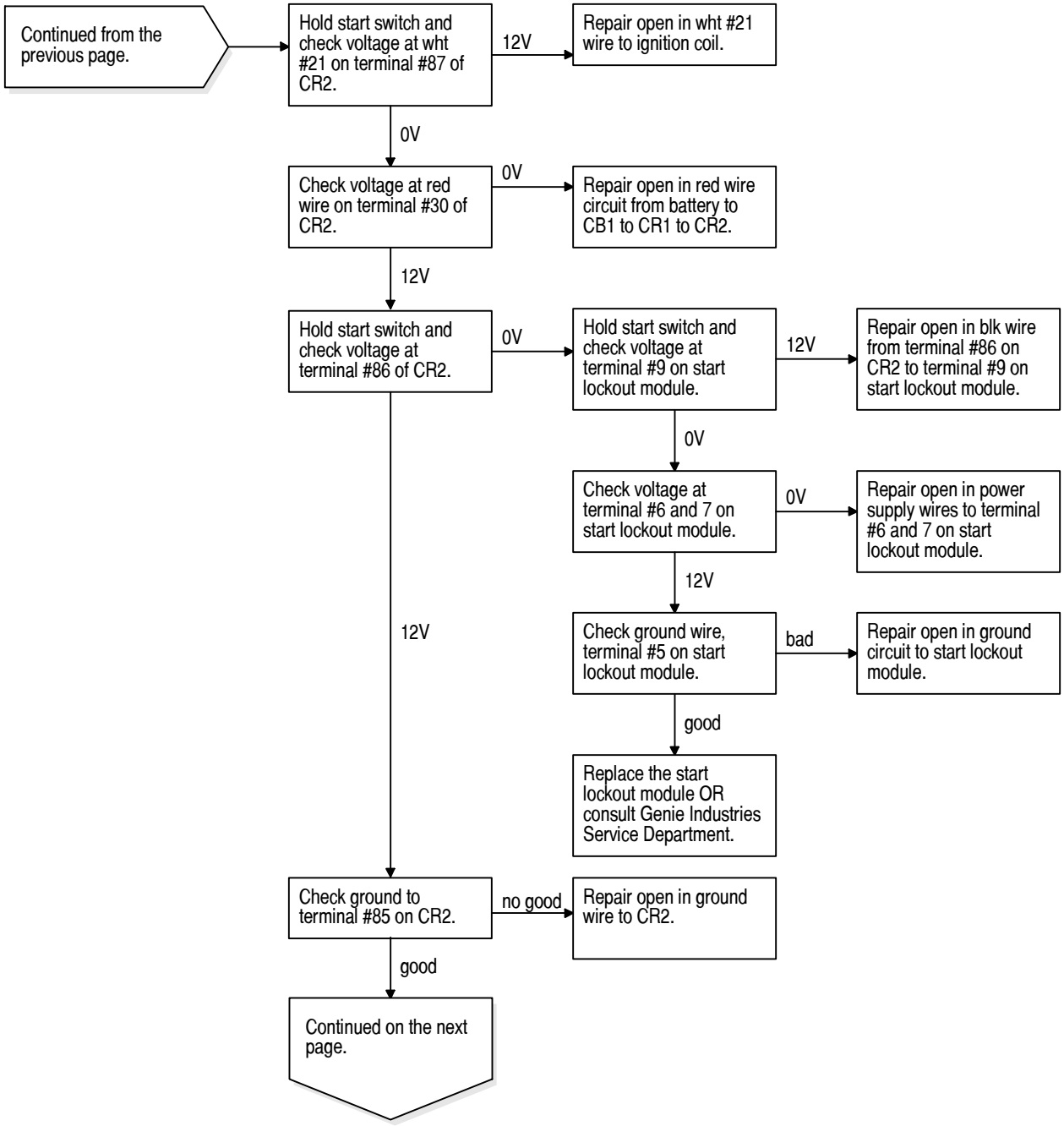

Continued from the previous page.
Hold start switch and check voltage at wht #21 on terminal #87 of CR2.
12V
Repair open in wht #21 wire to ignition coil.
0V
Check voltage at red wire on terminal #30 of CR2.
0V
Repair open in red wire circuit from battery to CB1 to CR1 to CR2.
12V
Hold start switch and check voltage at terminal #86 of CR2.
0V
Hold start switch and check voltage at terminal #9 on start lockout module.
12V
Repair open in blk wire from terminal #86 on CR2 to terminal #9 on start lockout module.
0V
Check voltage at terminal #6 and 7 on start lockout module.
0V
Repair open in power supply wires to terminal #6 and 7 on start lockout module.
12V
12V
Check ground wire, terminal #5 on start lockout module.
bad
Repair open in ground circuit to start lockout module.
good
Replace the start lockout module OR consult Genie Industries Service Department.
Check ground to terminal #85 on CR2.
no good
Repair open in ground wire to CR2.
good
Continued on the next page.

CHART 2

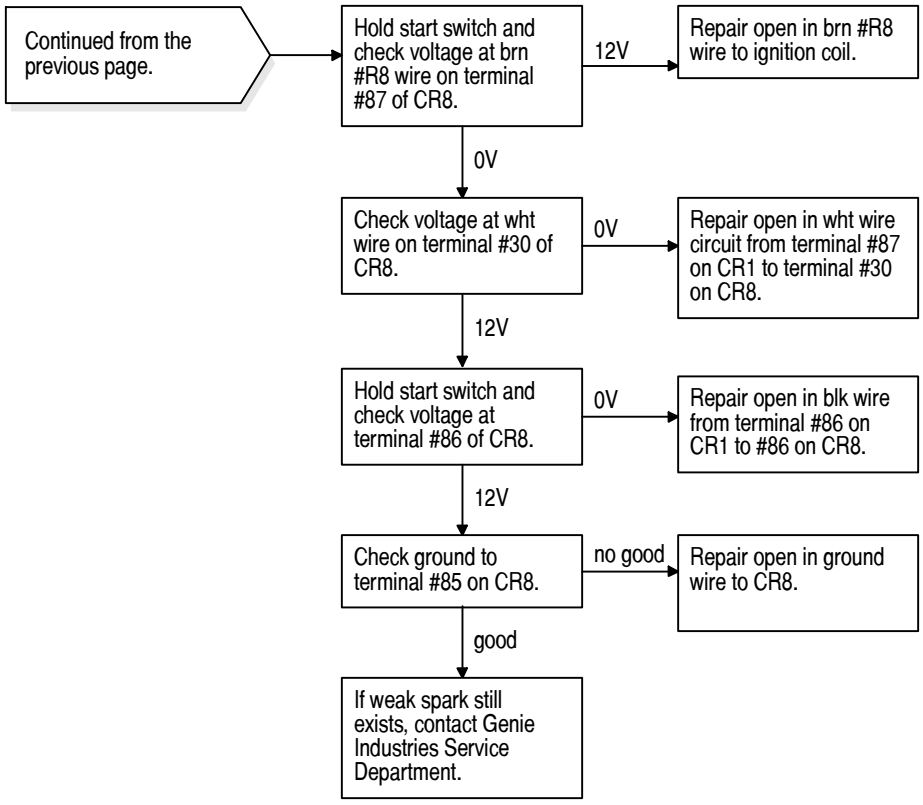

Continued from the previous page.
Hold start switch and check voltage at brn #R8 wire on terminal #87 of CR8.
12V
Repair open in brn #R8 wire to ignition coil.
0V
Check voltage at wht wire on terminal #30 of CR8.
0V
Repair open in wht wire circuit from terminal #87 on CR1 to terminal #30 on CR8.
12V
Hold start switch and check voltage at terminal #86 of CR8.
0V
Repair open in blk wire from terminal #86 on CR1 to #86 on CR8.
12V
Check ground to terminal #85 on CR8.
no good
Repair open in ground wire to CR8.
good
If weak spark still exists, contact Genie Industries Service Department.

Chart 2A

Engine Cranks Over But Will Not Start - Gasoline/LPG Models or Engine Runs While Cranking Then Dies

Continuation of “good spark” fault path.

Perform these tests in gasoline mode only.

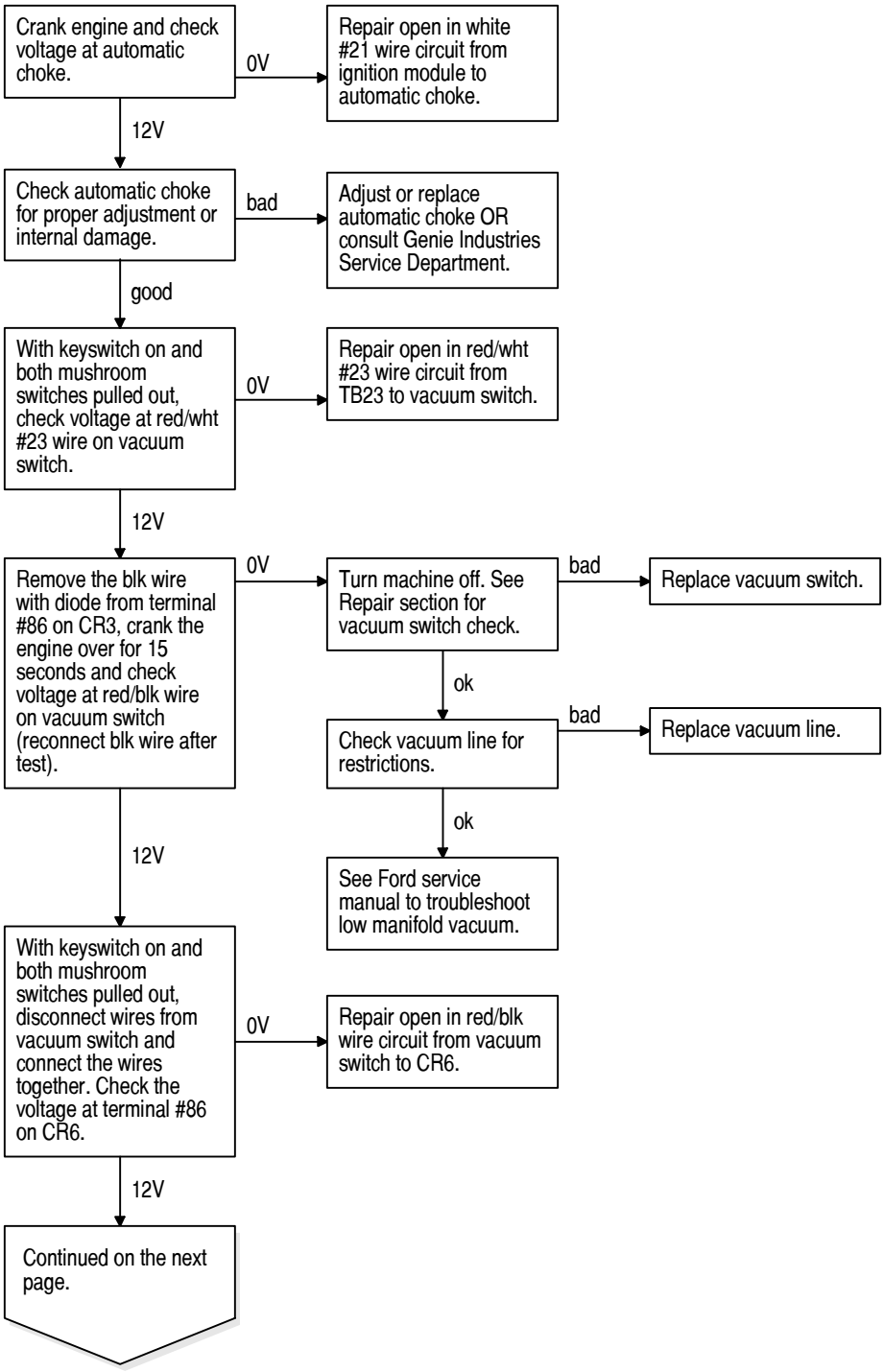


CHART 2A

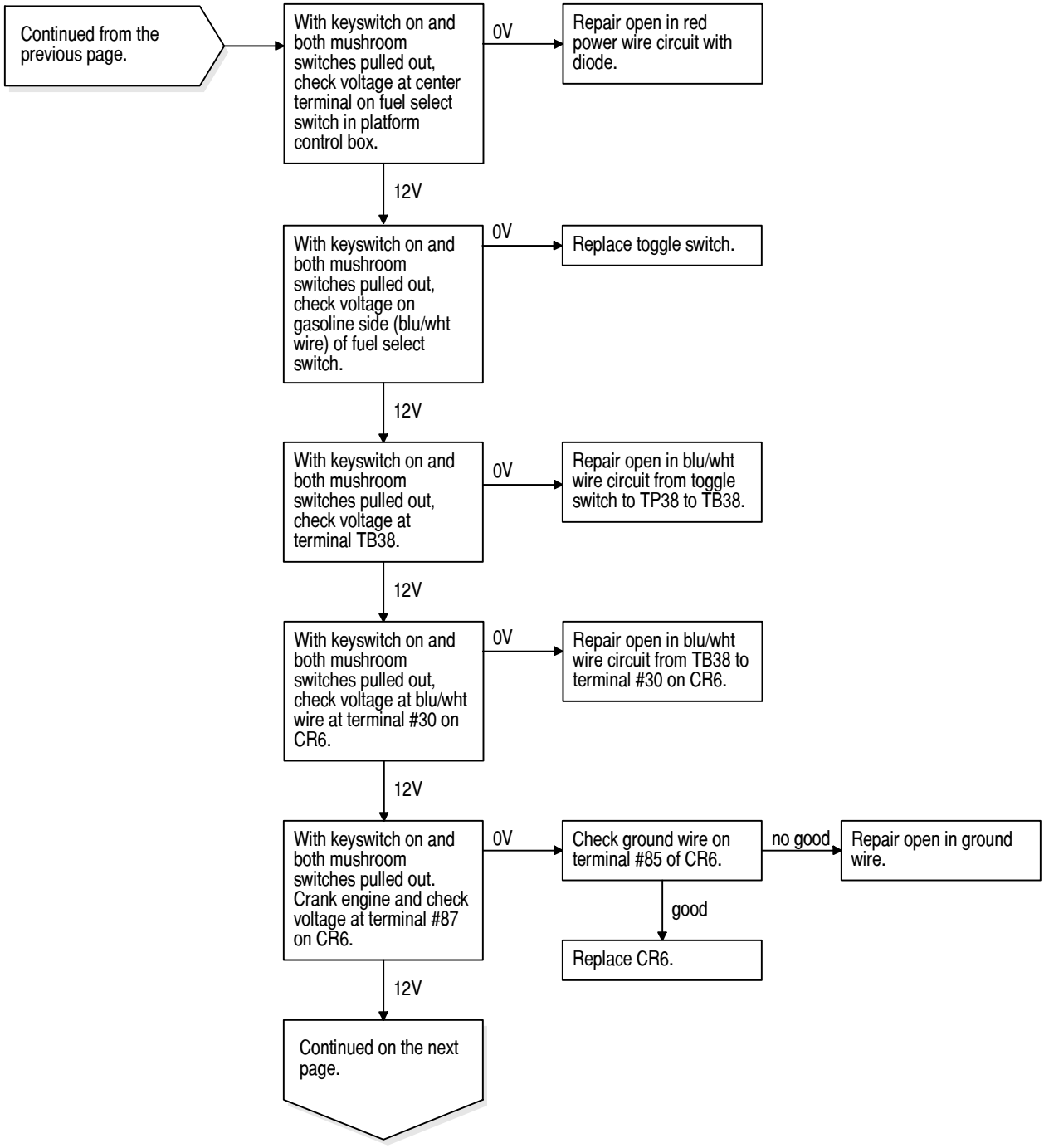

Continued from the previous page.
With keyswitch on and both mushroom switches pulled out, check voltage at center terminal on fuel select switch in platform control box.
0V
Repair open in red power wire circuit with diode.
12V
With keyswitch on and both mushroom switches pulled out, check voltage on gasoline side (blu/wht wire) of fuel select switch.
0V
Replace toggle switch.
12V
With keyswitch on and both mushroom switches pulled out, check voltage at terminal TB38.
0V
Repair open in blu/wht wire circuit from toggle switch to TP38 to TB38.
12V
With keyswitch on and both mushroom switches pulled out, check voltage at blu/wht wire at terminal #30 on CR6.
0V
Repair open in blu/wht wire circuit from TB38 to terminal #30 on CR6.
12V
With keyswitch on and both mushroom switches pulled out. Crank engine and check voltage at terminal #87 on CR6.
0V
Check ground wire on terminal #85 of CR6.
no good
Repair open in ground wire.
good
Replace CR6.
12V
Continued on the next page.

CHART 2A

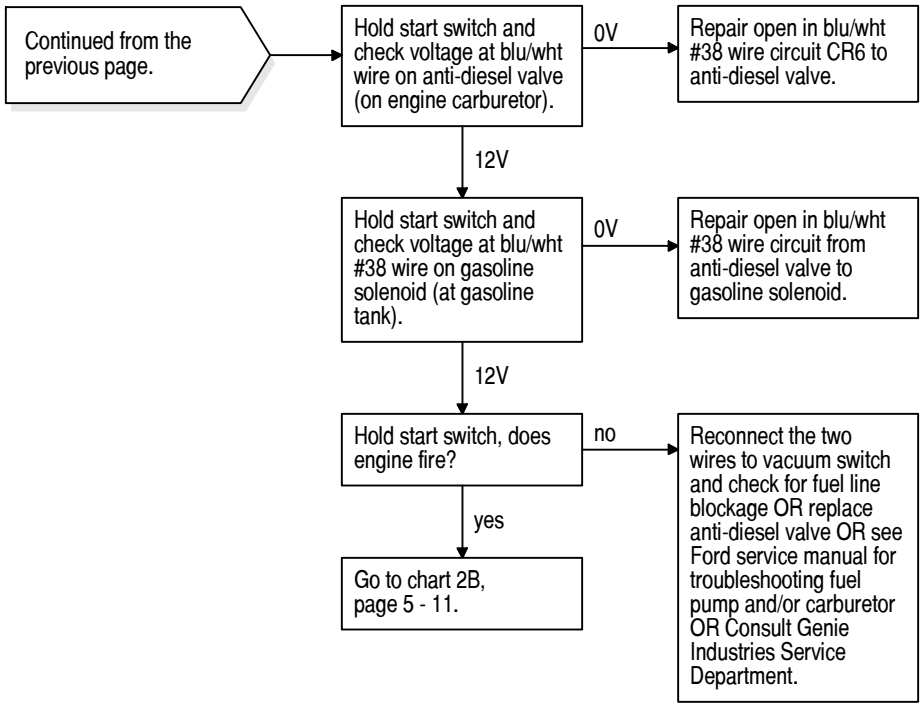

Continued from the previous page.
Hold start switch and check voltage at blu/wht wire on anti-diesel valve (on engine carburetor).
0V
Repair open in blu/wht #38 wire circuit CR6 to anti-diesel valve.
12V
Hold start switch and check voltage at blu/wht #38 wire on gasoline solenoid (at gasoline tank).
0V
Repair open in blu/wht #38 wire circuit from anti-diesel valve to gasoline solenoid.
12V
Hold start switch, does engine fire?
no
Reconnect the two wires to vacuum switch and check for fuel line blockage OR replace anti-diesel valve OR see Ford service manual for troubleshooting fuel pump and/or carburetor OR Consult Genie Industries Service Department.
yes
Go to chart 2B, page 5 - 11.

Chart 2B

Engine Runs While Cranking Then Dies

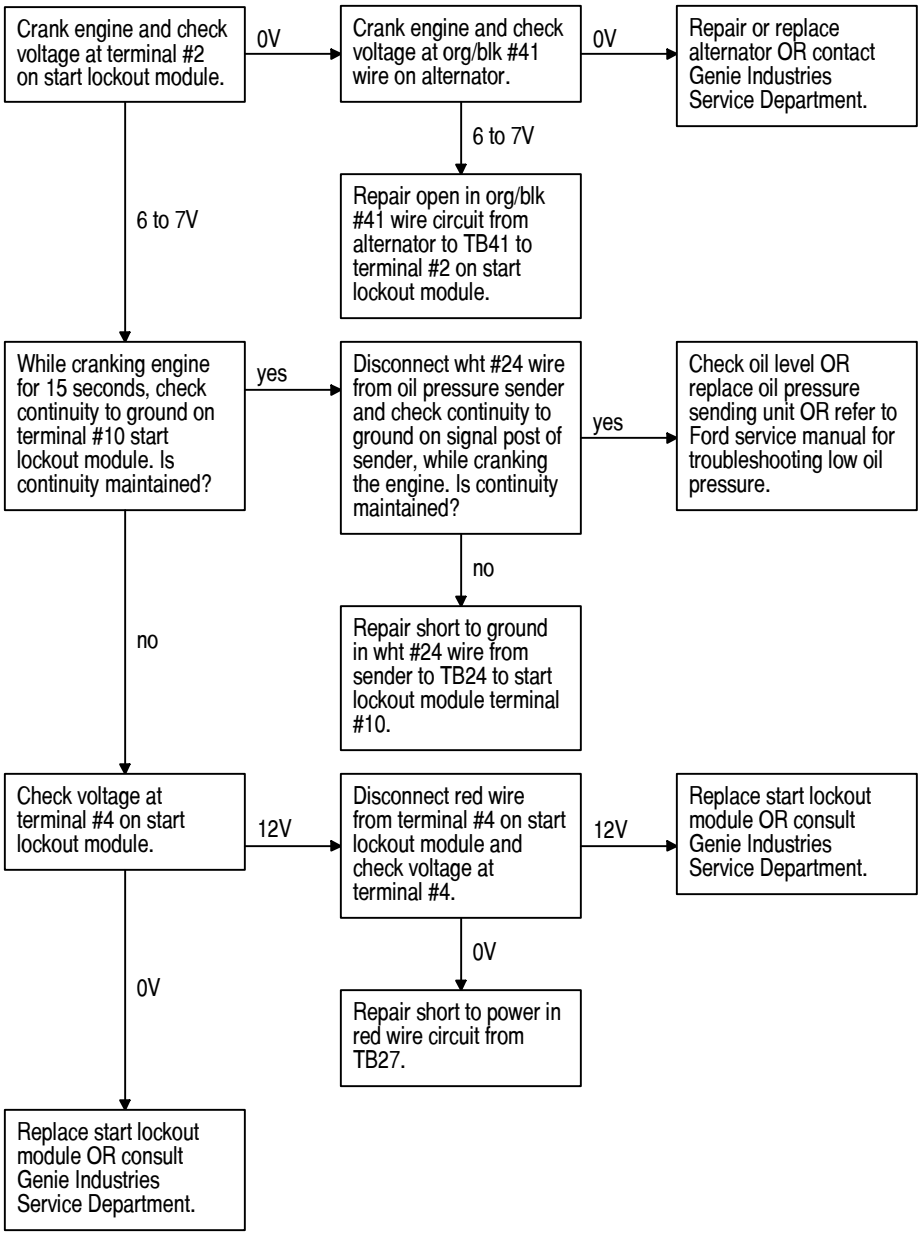


Chart 3

Engine Cranks Over But Will Not Start - Deutz 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.

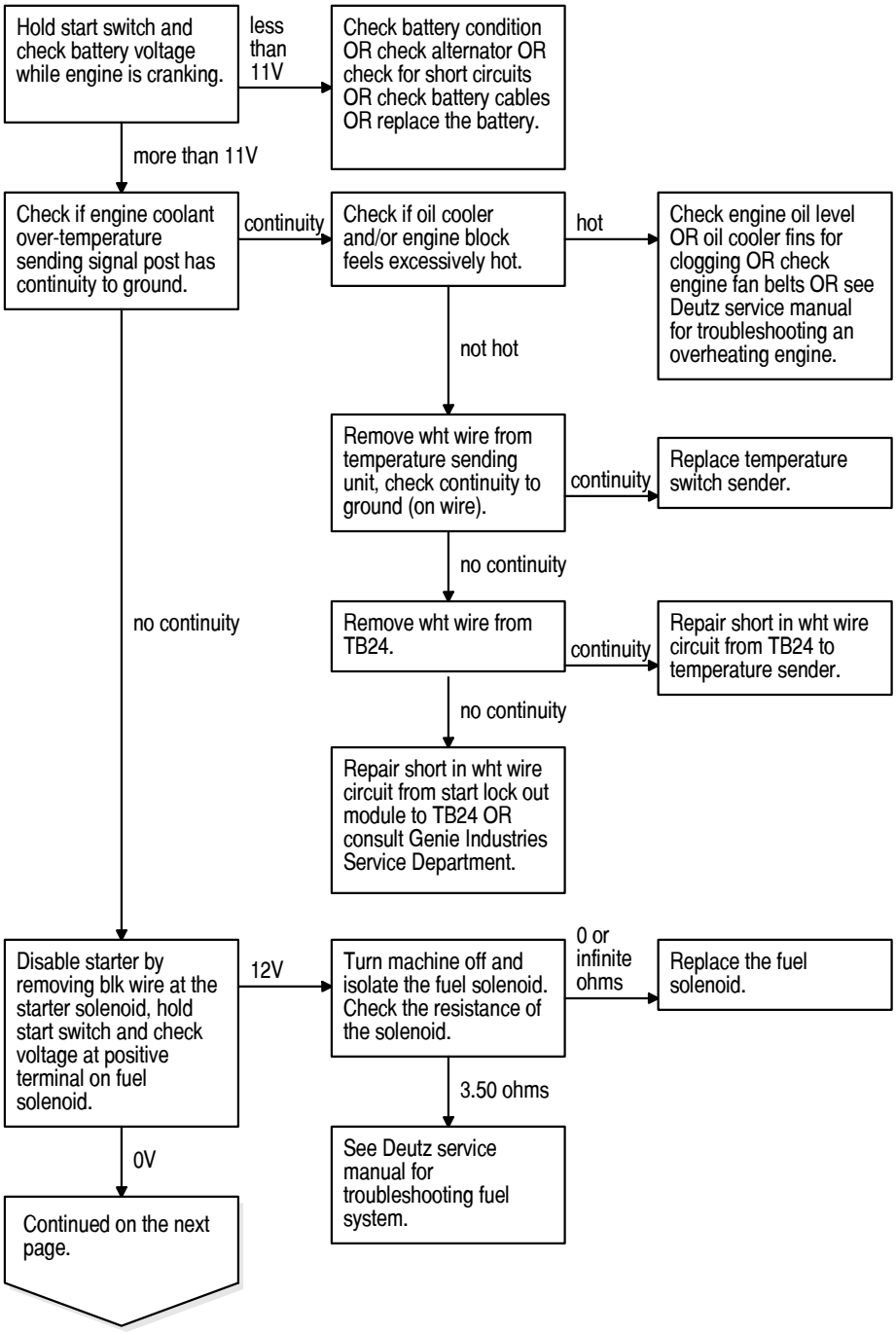


CHART 3

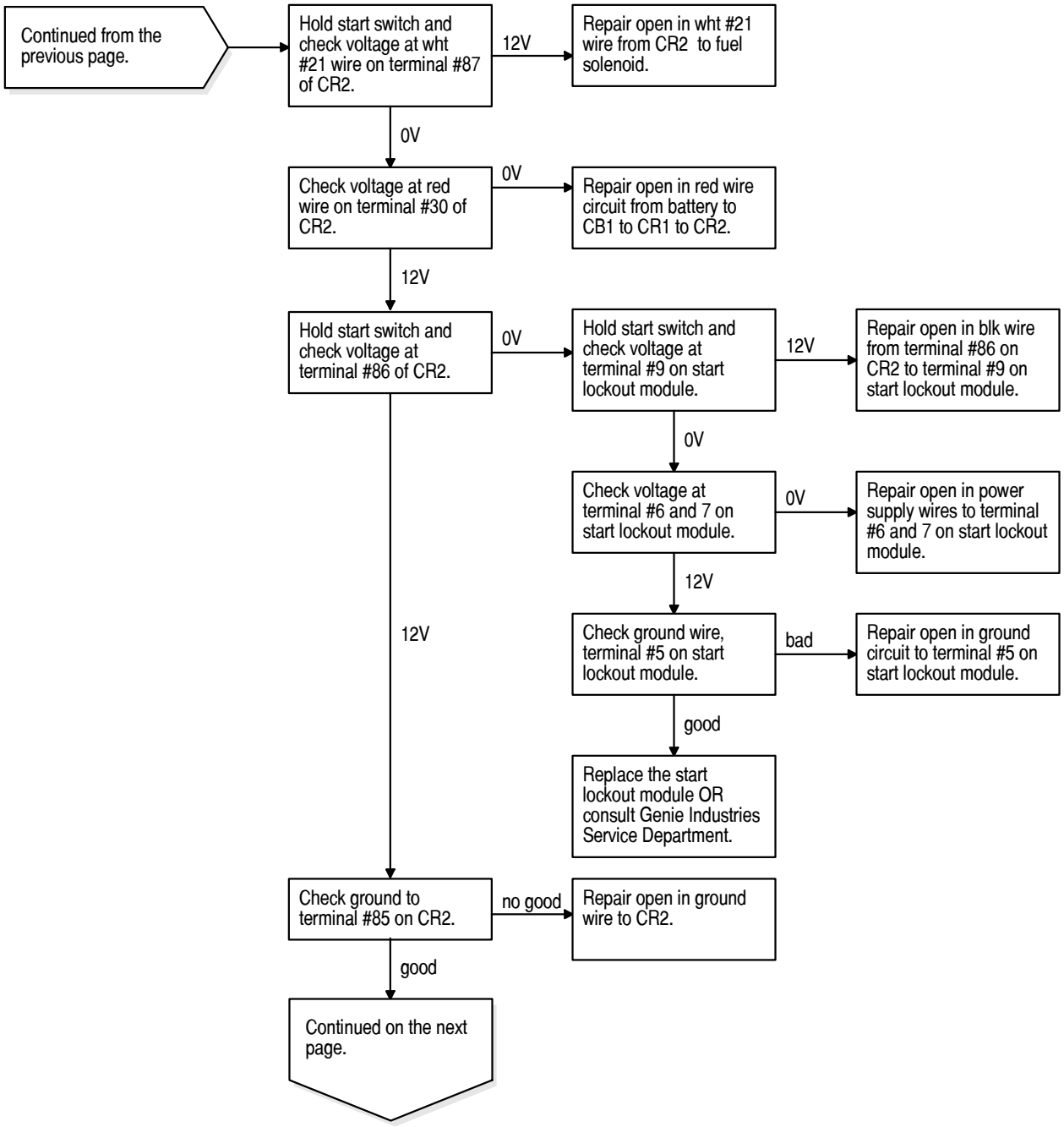

Continued from the previous page.
Hold start switch and check voltage at wht #21 wire on terminal #87 of CR2.
12V
Repair open in wht #21 wire from CR2 to fuel solenoid.
0V
Check voltage at red wire on terminal #30 of CR2.
0V
Repair open in red wire circuit from battery to CB1 to CR1 to CR2.
12V
Hold start switch and check voltage at terminal #86 of CR2.
0V
Hold start switch and check voltage at terminal #9 on start lockout module.
12V
Repair open in blk wire from terminal #86 on CR2 to terminal #9 on start lockout module.
0V
Check voltage at terminal #6 and 7 on start lockout module.
0V
Repair open in power supply wires to terminal #6 and 7 on start lockout module.
12V
12V
Check ground wire, terminal #5 on start lockout module.
bad
Repair open in ground circuit to terminal #5 on start lockout module.
good
Replace the start lockout module OR consult Genie Industries Service Department.
Check ground to terminal #85 on CR2.
no good
Repair open in ground wire to CR2.
good
Continued on the next page.

CHART 3

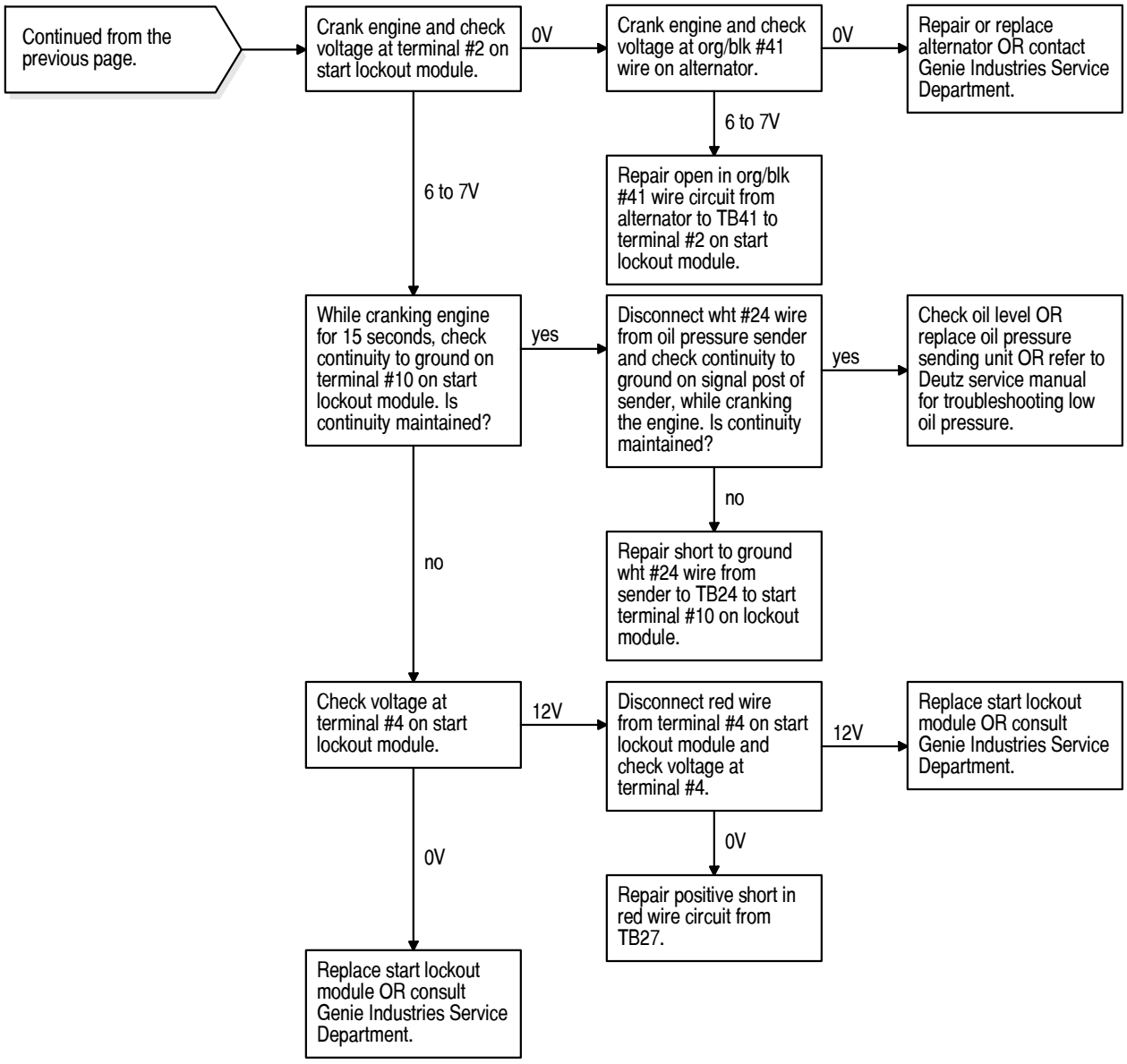

Continued from the previous page.
Crank engine and check voltage at terminal #2 on start lockout module.
0V
Crank engine and check voltage at org/blk #41 wire on alternator.
0V
Repair or replace alternator OR contact Genie Industries Service Department.
6 to 7V
Repair open in org/blk #41 wire circuit from alternator to TB41 to terminal #2 on start lockout module.
6 to 7V
While cranking engine for 15 seconds, check continuity to ground on terminal #10 on start lockout module. Is continuity maintained?
yes
Disconnect wht #24 wire from oil pressure sender and check continuity to ground on signal post of sender, while cranking the engine. Is continuity maintained?
yes
Check oil level OR replace oil pressure sending unit OR refer to Deutz service manual for troubleshooting low oil pressure.
no
Repair short to ground wht #24 wire from sender to TB24 to start terminal #10 on lockout module.
no
Check voltage at terminal #4 on start lockout module.
12V
Disconnect red wire from terminal #4 on start lockout module and check voltage at terminal #4.
12V
Replace start lockout module OR consult Genie Industries Service Department.
0V
Repair positive short in red wire circuit from TB27.
0V
Replace start lockout module OR consult Genie Industries Service Department.

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.

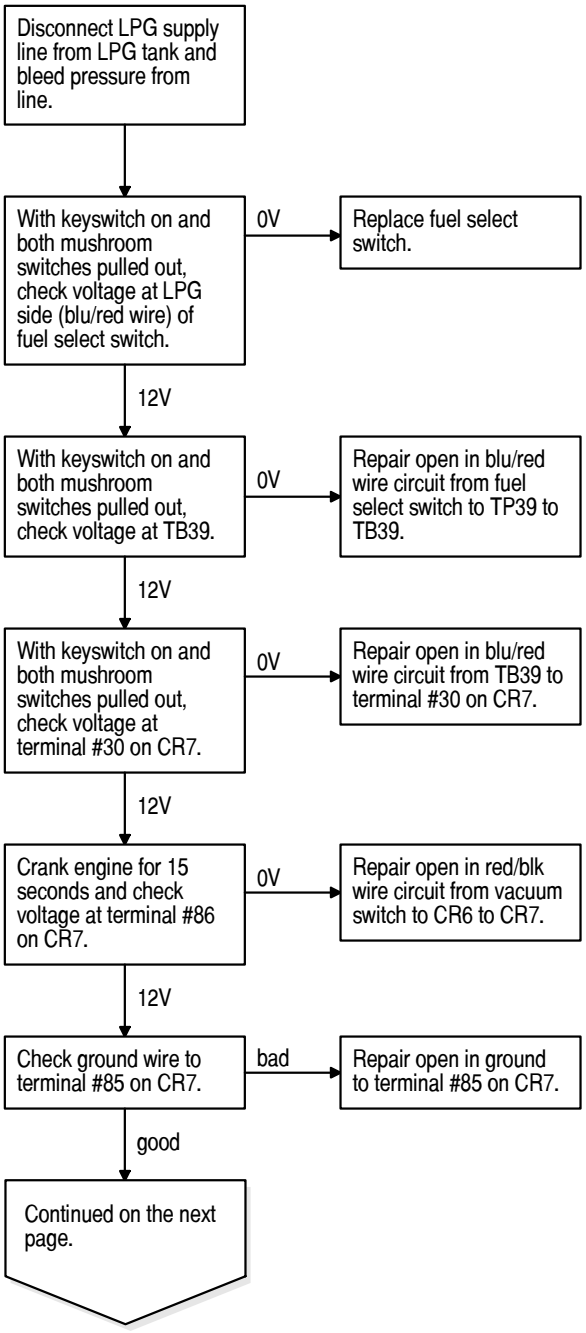
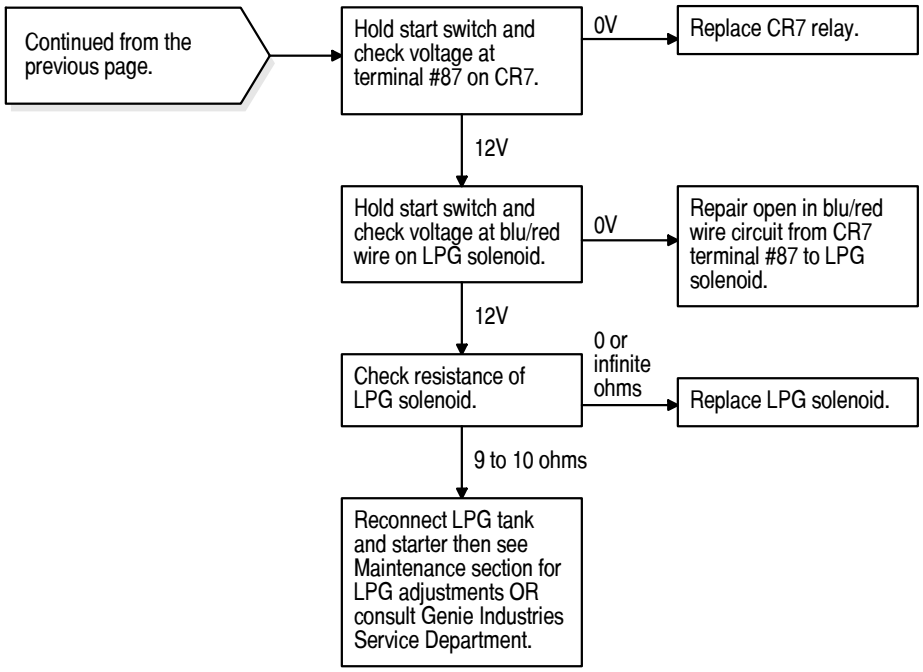


CHART 4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Hold start switch and check voltage at terminal #87 on CR7.
0V
Replace CR7 relay.
12V
Hold start switch and check voltage at blu/red wire on LPG solenoid.
0V
Repair open in blu/red wire circuit from CR7 terminal #87 to LPG solenoid.
12V
Check resistance of LPG solenoid.
0 or infinite ohms
Replace LPG solenoid.
9 to 10 ohms
Reconnect LPG tank and starter then see Maintenance section for LPG adjustments OR consult Genie Industries Service Department.

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.

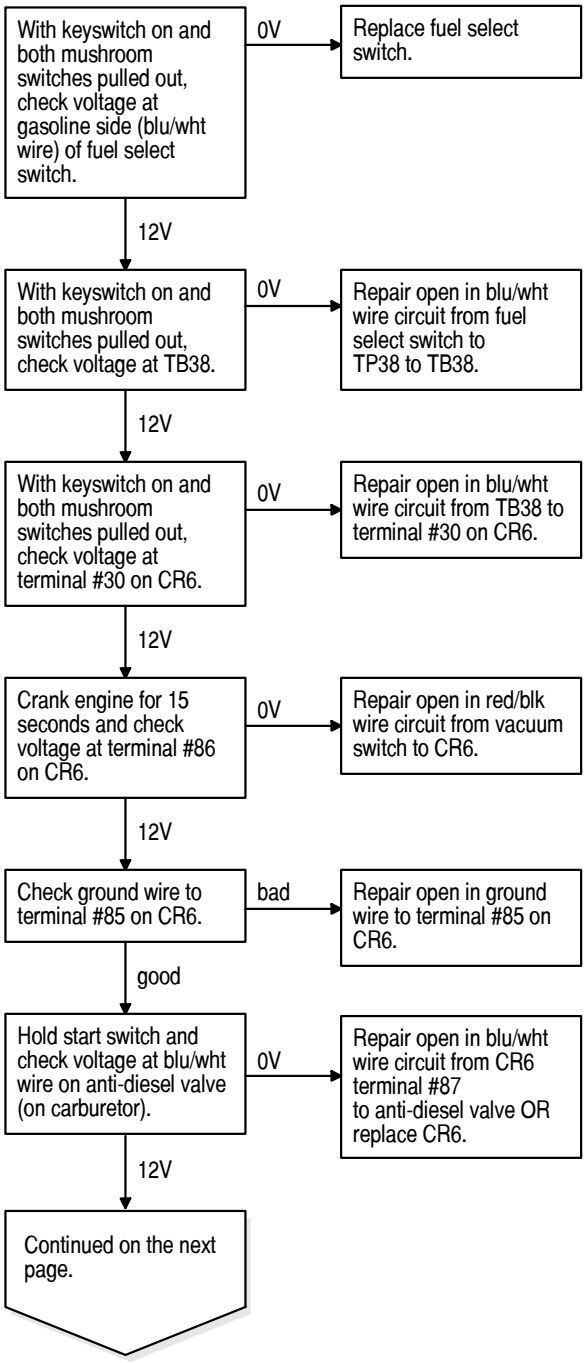
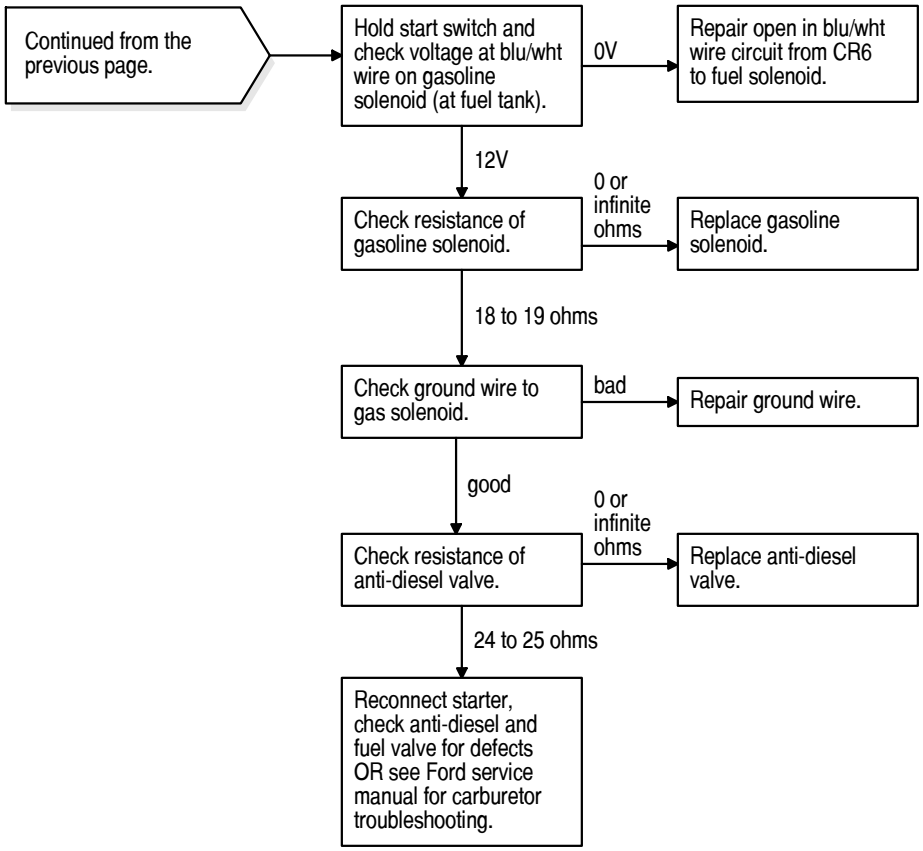


CHART 5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Hold start switch and check voltage at blu/wht wire on gasoline solenoid (at fuel tank).
0V
Repair open in blu/wht wire circuit from CR6 to fuel solenoid.
12V
Check resistance of gasoline solenoid.
0 or infinite ohms
Replace gasoline solenoid.
18 to 19 ohms
Check ground wire to gas solenoid.
bad
Repair ground wire.
good
Check resistance of anti-diesel valve.
0 or infinite ohms
Replace anti-diesel valve.
24 to 25 ohms
Reconnect starter, check anti-diesel and fuel valve for defects OR see Ford service manual for carburetor troubleshooting.

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.

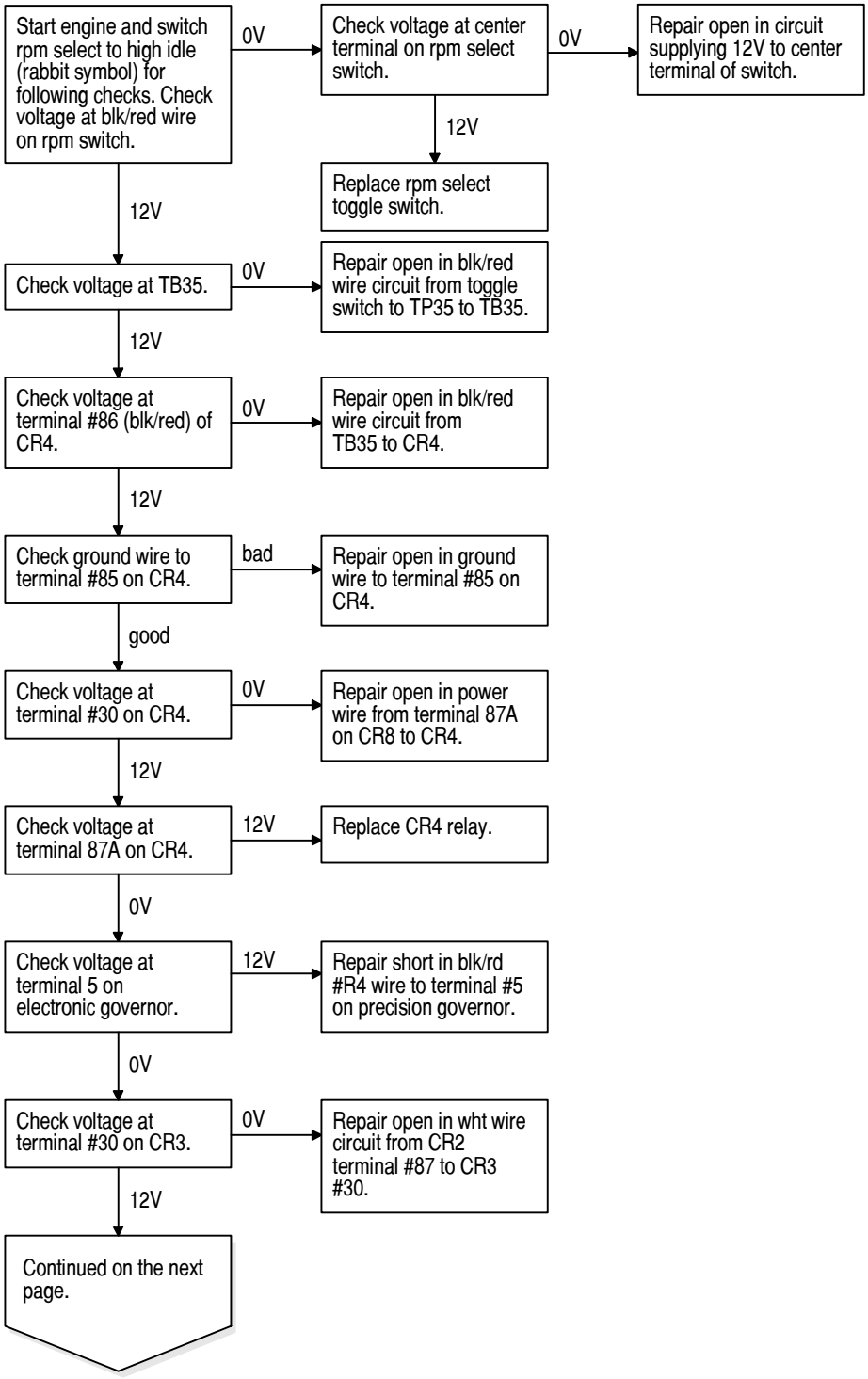


CHART 6

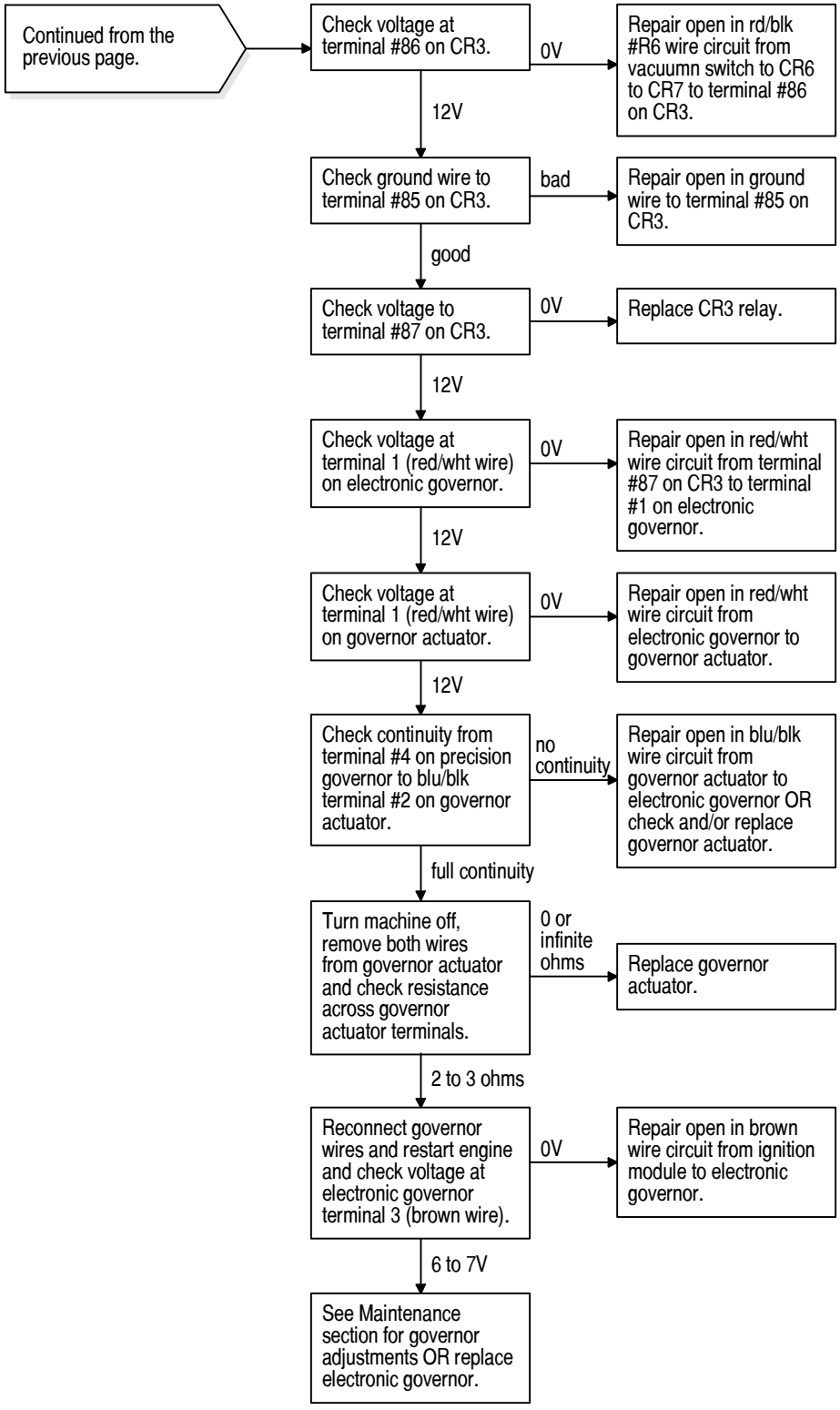

Continued from the previous page.
Check voltage at terminal #86 on CR3.
0V
Repair open in rd/blk #R6 wire circuit from vacuumn switch to CR6 to CR7 to terminal #86 on CR3.
12V
Check ground wire to terminal #85 on CR3.
bad
Repair open in ground wire to terminal #85 on CR3.
good
Check voltage to terminal #87 on CR3.
0V
Replace CR3 relay.
12V
Check voltage at terminal 1 (red/wht wire) on electronic governor.
0V
Repair open in red/wht wire circuit from terminal #87 on CR3 to terminal #1 on electronic governor.
12V
Check voltage at terminal 1 (red/wht wire) on governor actuator.
0V
Repair open in red/wht wire circuit from electronic governor to governor actuator.
12V
Check continuity from terminal #4 on precision governor to blu/blk terminal #2 on governor actuator.
no continuity
Repair open in blu/blk wire circuit from governor actuator to electronic governor OR check and/or replace governor actuator.
full continuity
Turn machine off, remove both wires from governor actuator and check resistance across governor actuator terminals.
0 or infinite ohms
Replace governor actuator.
2 to 3 ohms
Reconnect governor wires and 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
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.

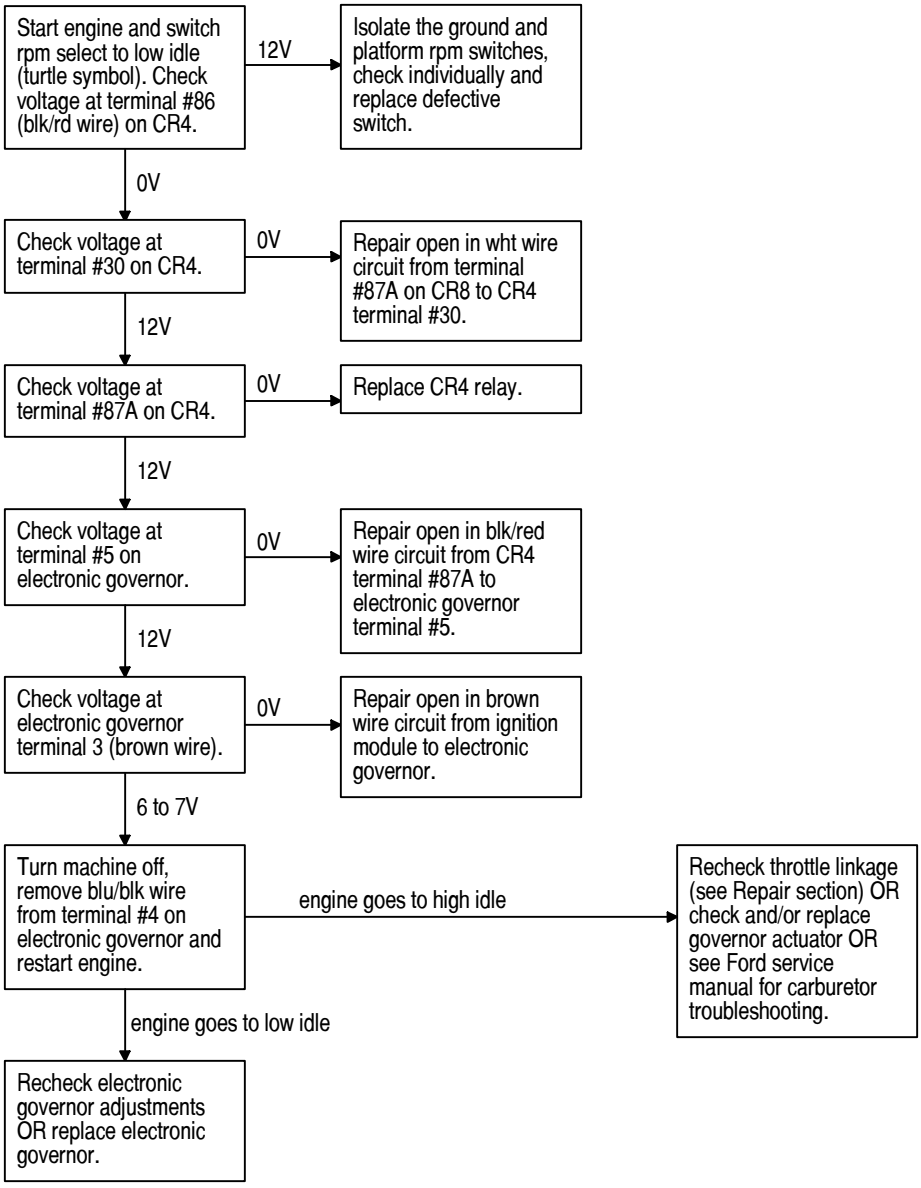


Chart 8

Engine High Idle Inoperative - Deutz Diesel Models

Be sure mechanical linkage is not binding or defective.

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

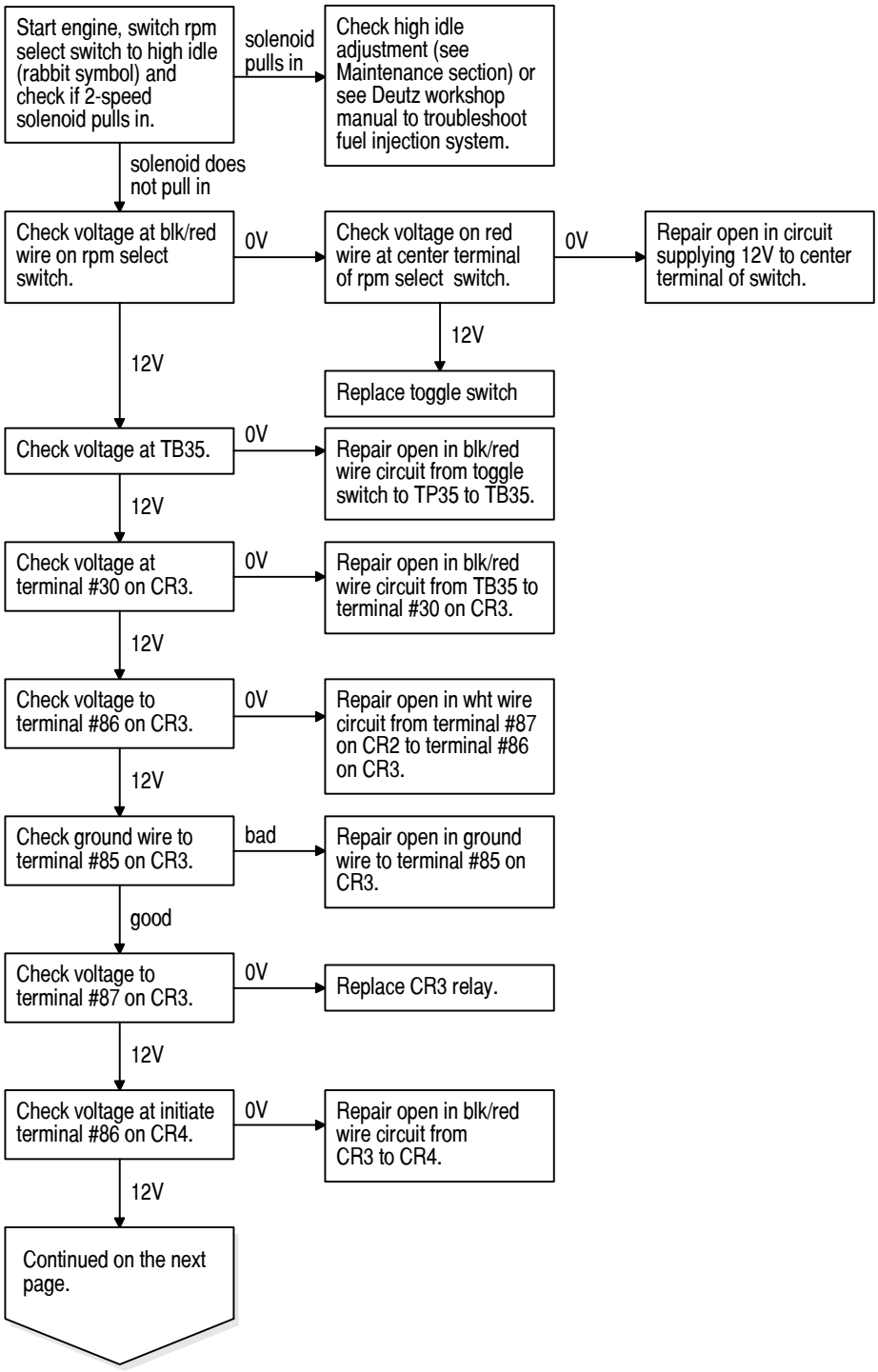


CHART 8

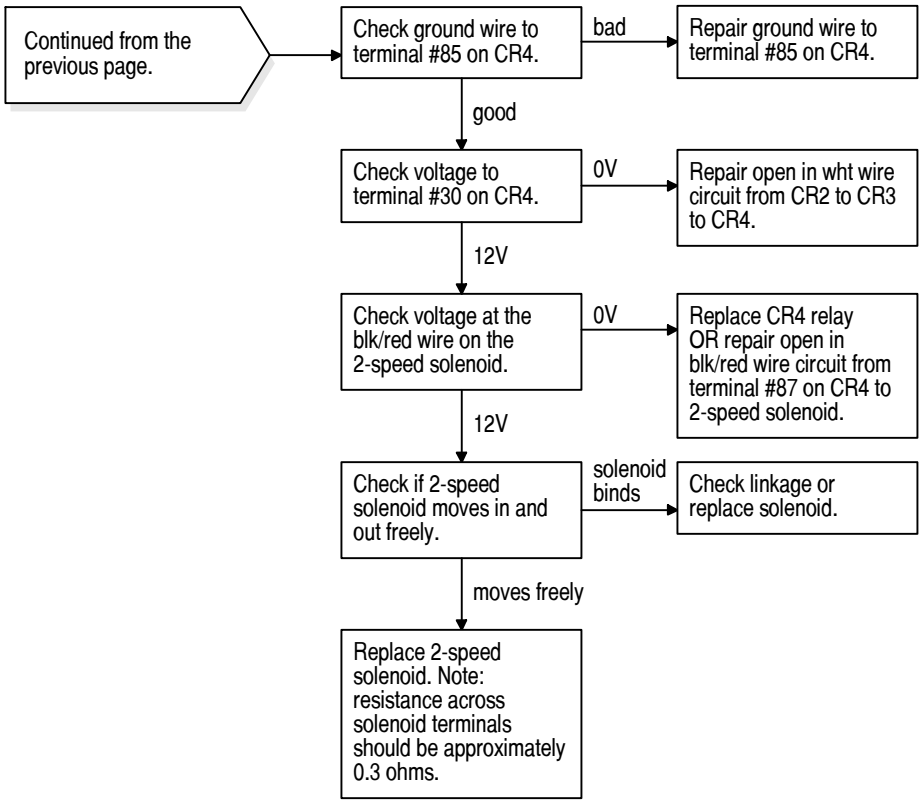

Continued from the previous page.
Check ground wire to terminal #85 on CR4.
bad
Repair ground wire to terminal #85 on CR4.
good
Check voltage to terminal #30 on CR4.
0V
Repair open in wht wire circuit from CR2 to CR3 to CR4.
12V
Check voltage at the blk/red wire on the 2-speed solenoid.
0V
Replace CR4 relay OR repair open in blk/red wire circuit from terminal #87 on CR4 to 2-speed solenoid.
12V
Check if 2-speed solenoid moves in and out freely.
solenoid binds
Check linkage or replace solenoid.
moves freely
Replace 2-speed solenoid. Note: resistance across solenoid terminals should be approximately 0.3 ohms.

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.

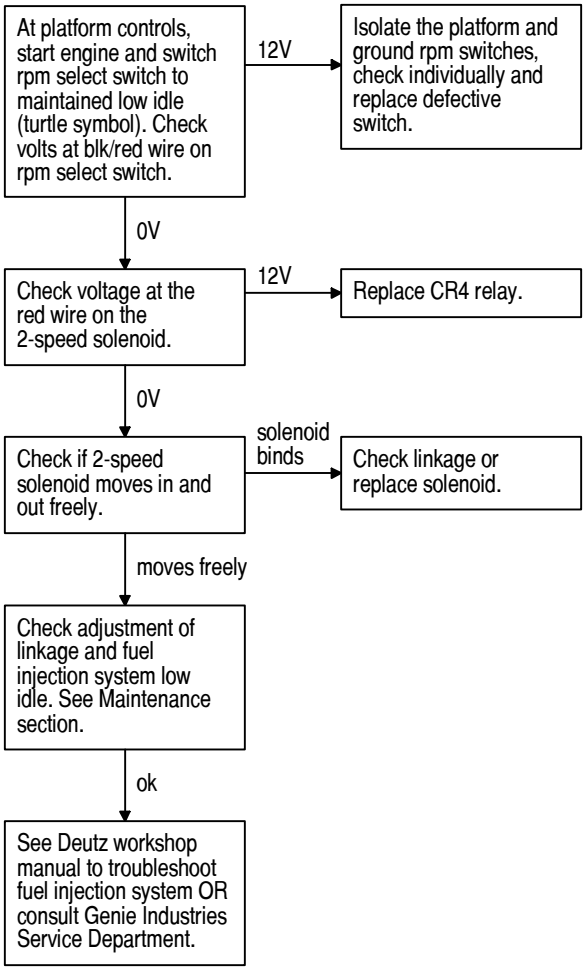


Chart 10

All Functions Inoperative, Engine Starts and Runs

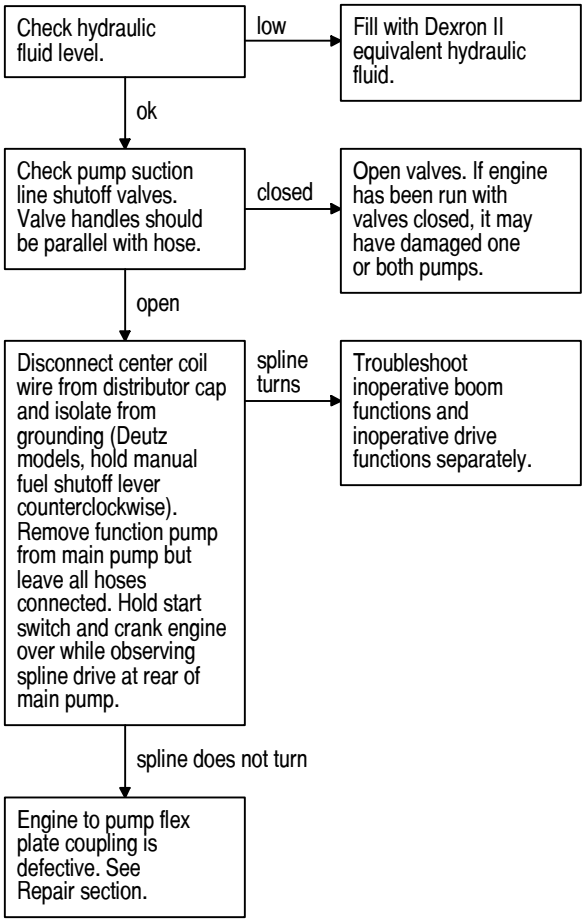


Chart 11

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.

Be sure axles are fully extended.

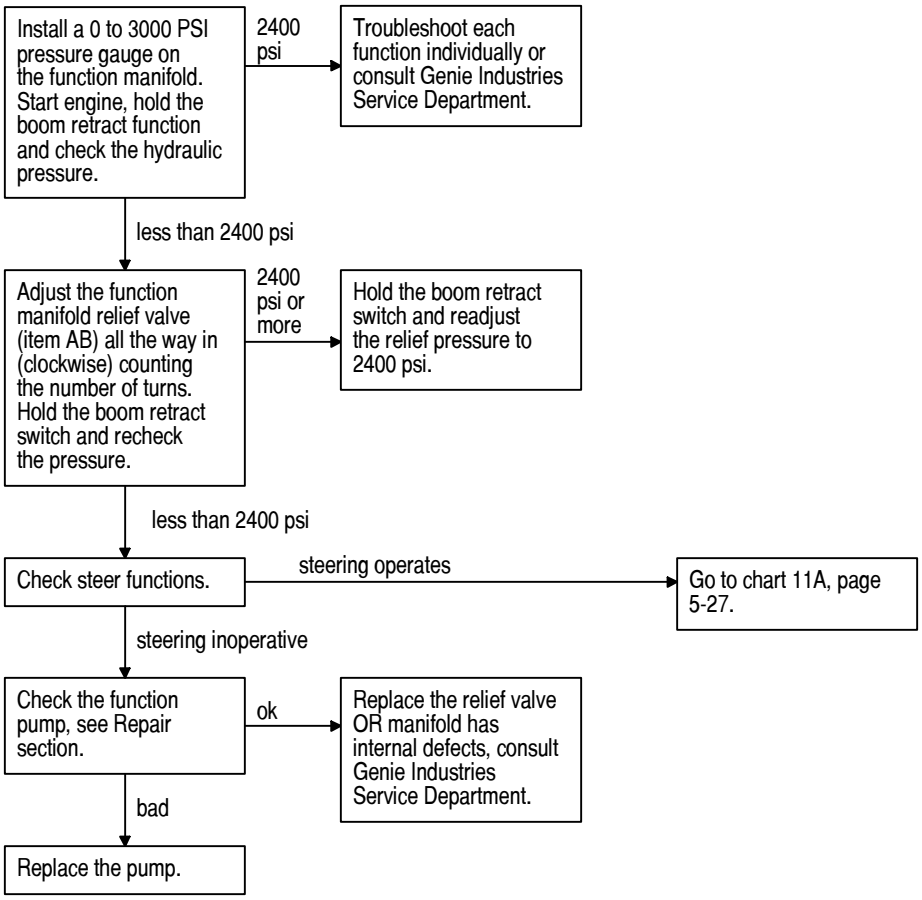


Chart 11A

All Lift Functions Inoperative, Steer and Drive Functions Operational

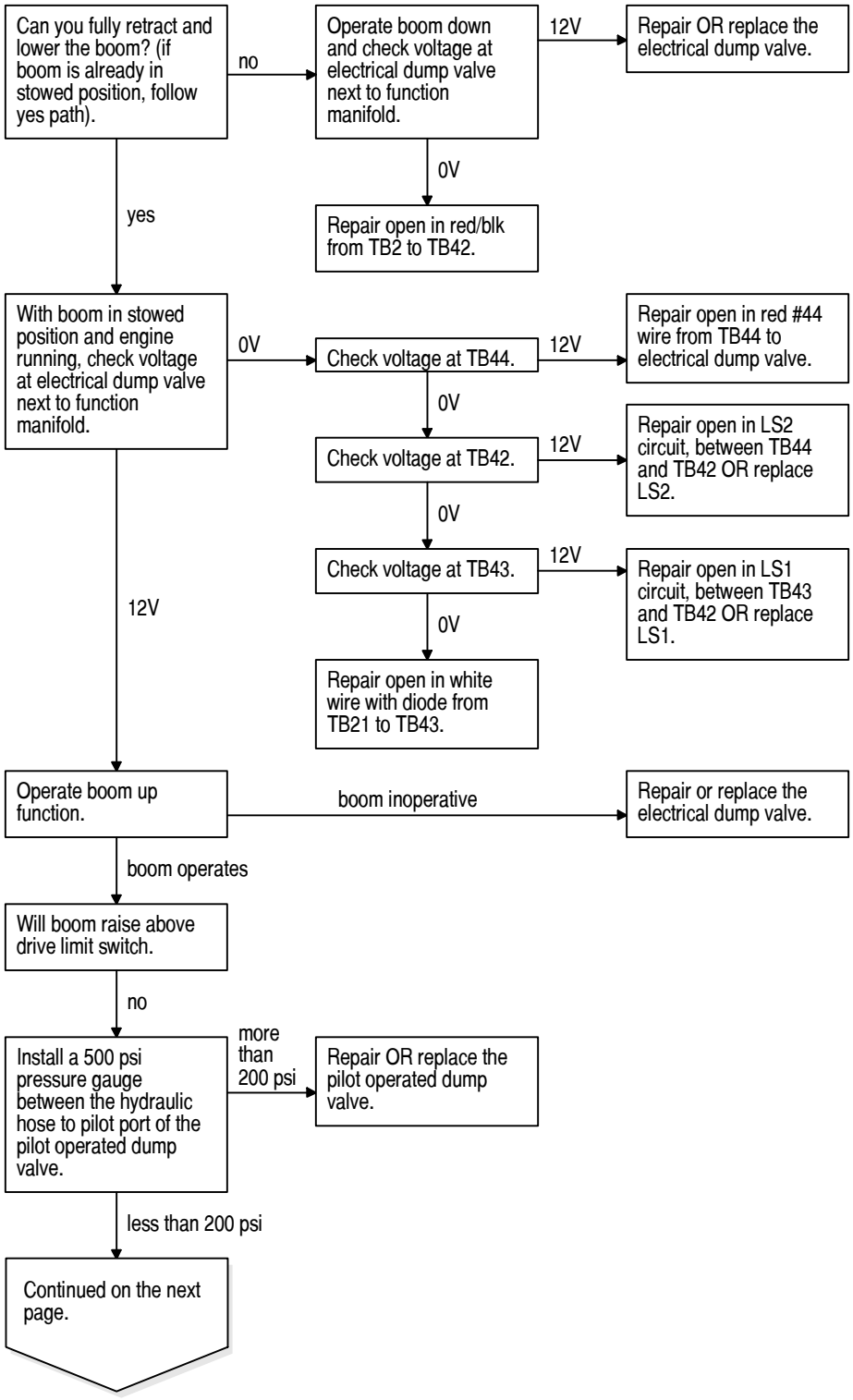


CHART 11A

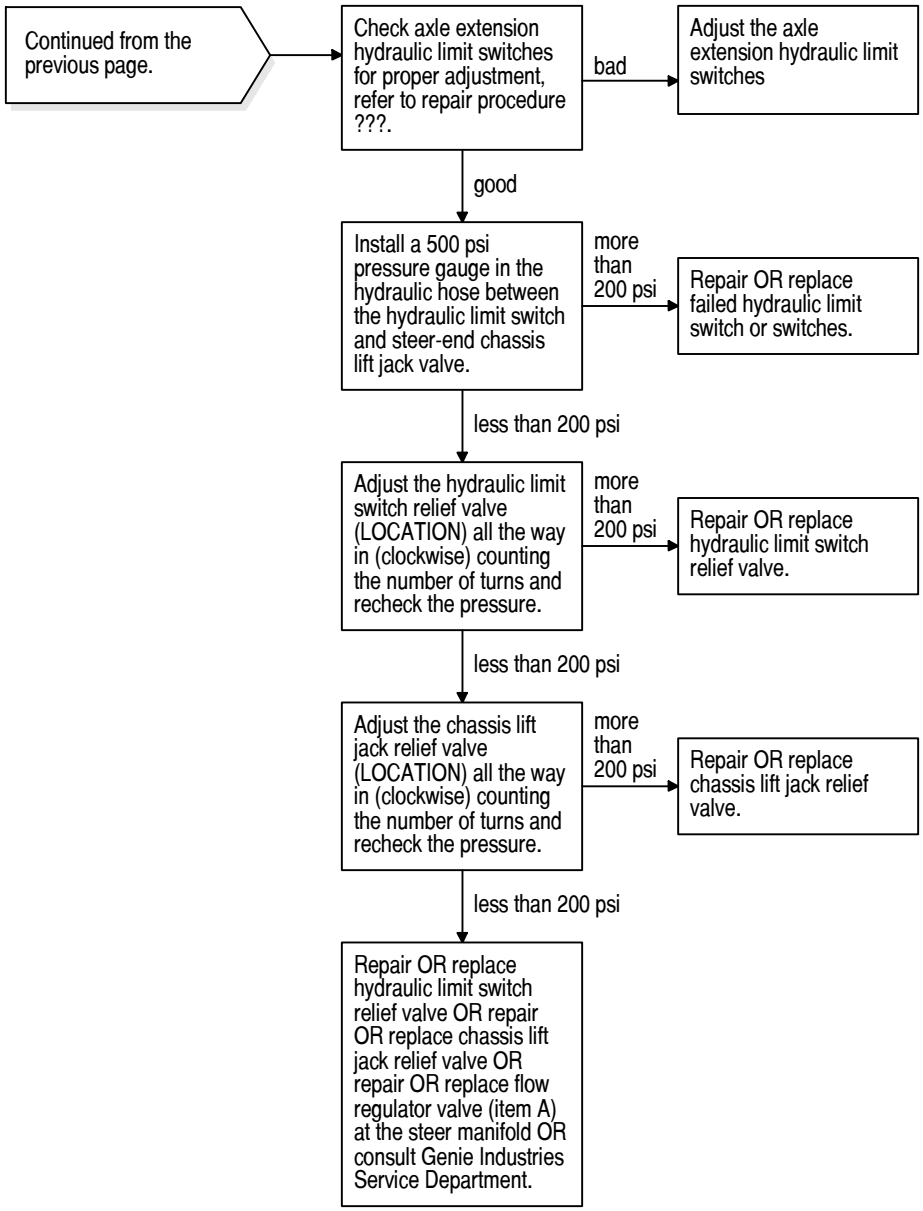

Continued from the previous page.
Check axle extension hydraulic limit switches for proper adjustment, refer to repair procedure ???.
bad
Adjust the axle extension hydraulic limit switches
good
Install a 500 psi pressure gauge in the hydraulic hose between the hydraulic limit switch and steer-end chassis lift jack valve.
more than 200 psi
Repair OR replace failed hydraulic limit switch or switches.
less than 200 psi
Adjust the hydraulic limit switch relief valve (LOCATION) all the way in (clockwise) counting the number of turns and recheck the pressure.
more than 200 psi
Repair OR replace hydraulic limit switch relief valve.
less than 200 psi
Adjust the chassis lift jack relief valve (LOCATION) all the way in (clockwise) counting the number of turns and recheck the pressure.
more than 200 psi
Repair OR replace chassis lift jack relief valve.
less than 200 psi
Repair OR replace hydraulic limit switch relief valve OR repair OR replace chassis lift jack relief valve OR repair OR replace flow regulator valve (item A) at the steer manifold OR consult Genie Industries Service Department.

Chart 12

Ground Controls Inoperative, Platform Controls Operate Normally

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

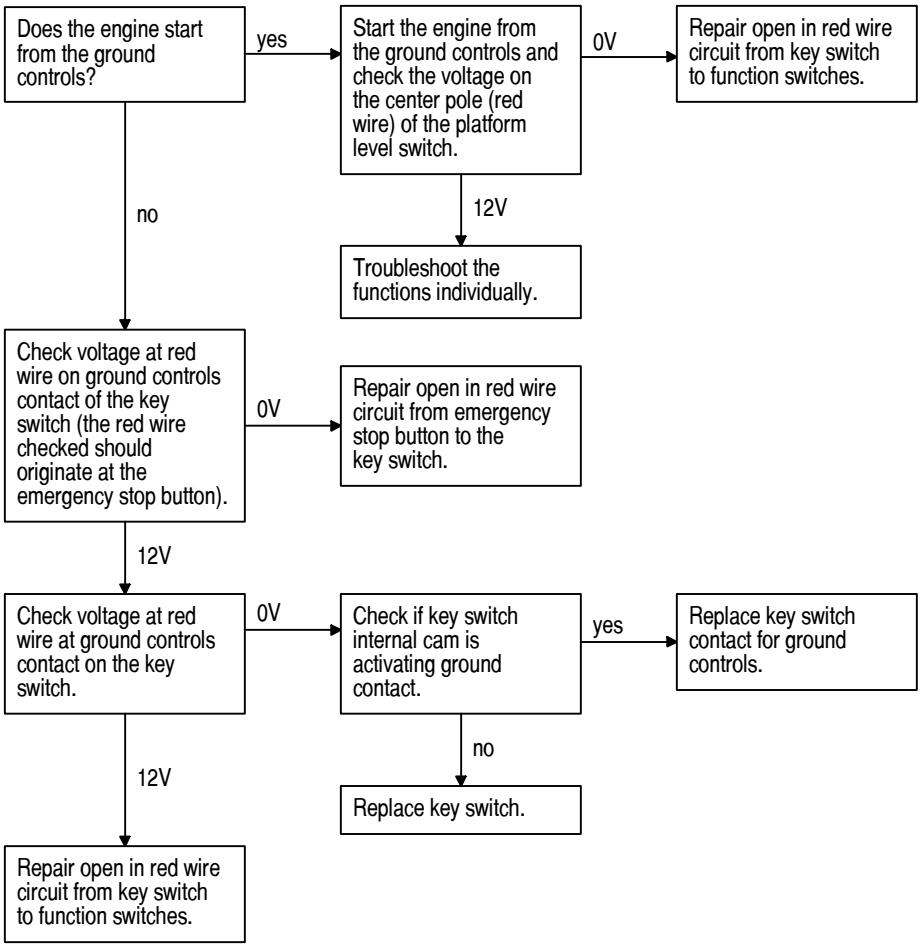


Chart 13

Platform Controls Inoperative, Ground Controls Operate Normally

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

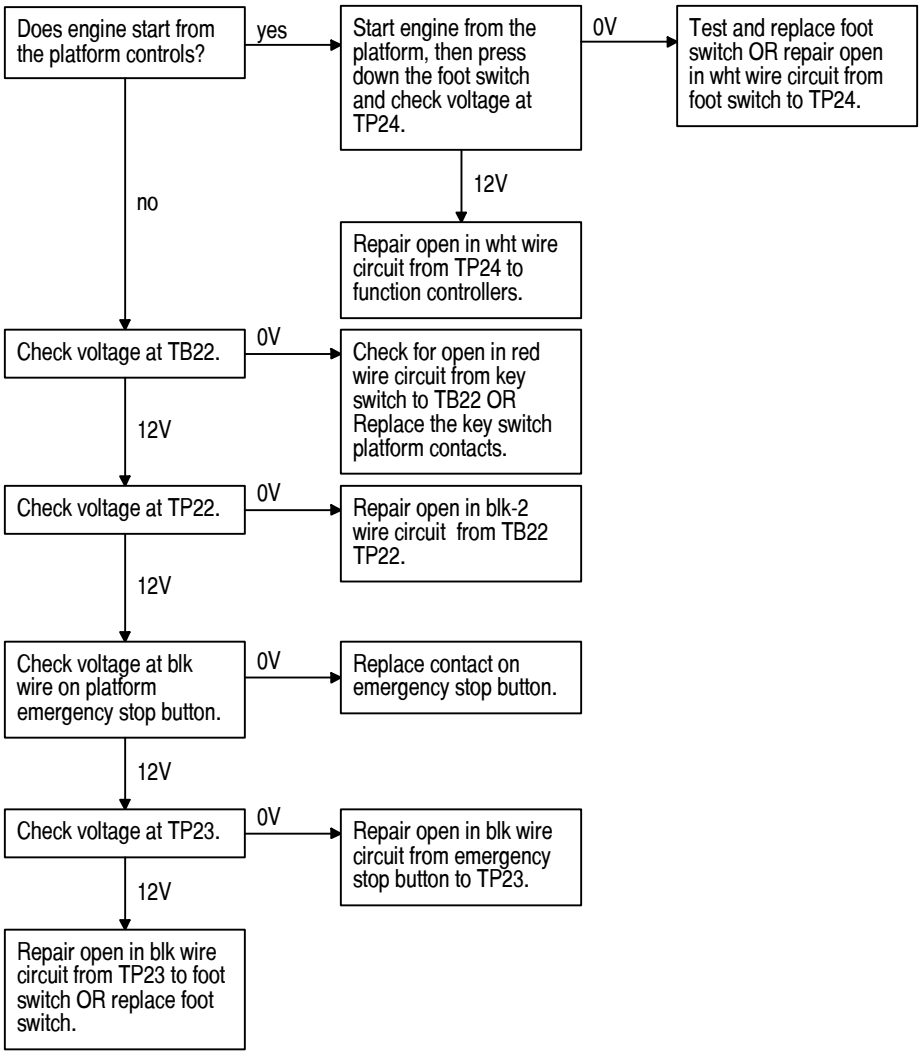


Chart 14

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 or replace resistor. See Repair section.

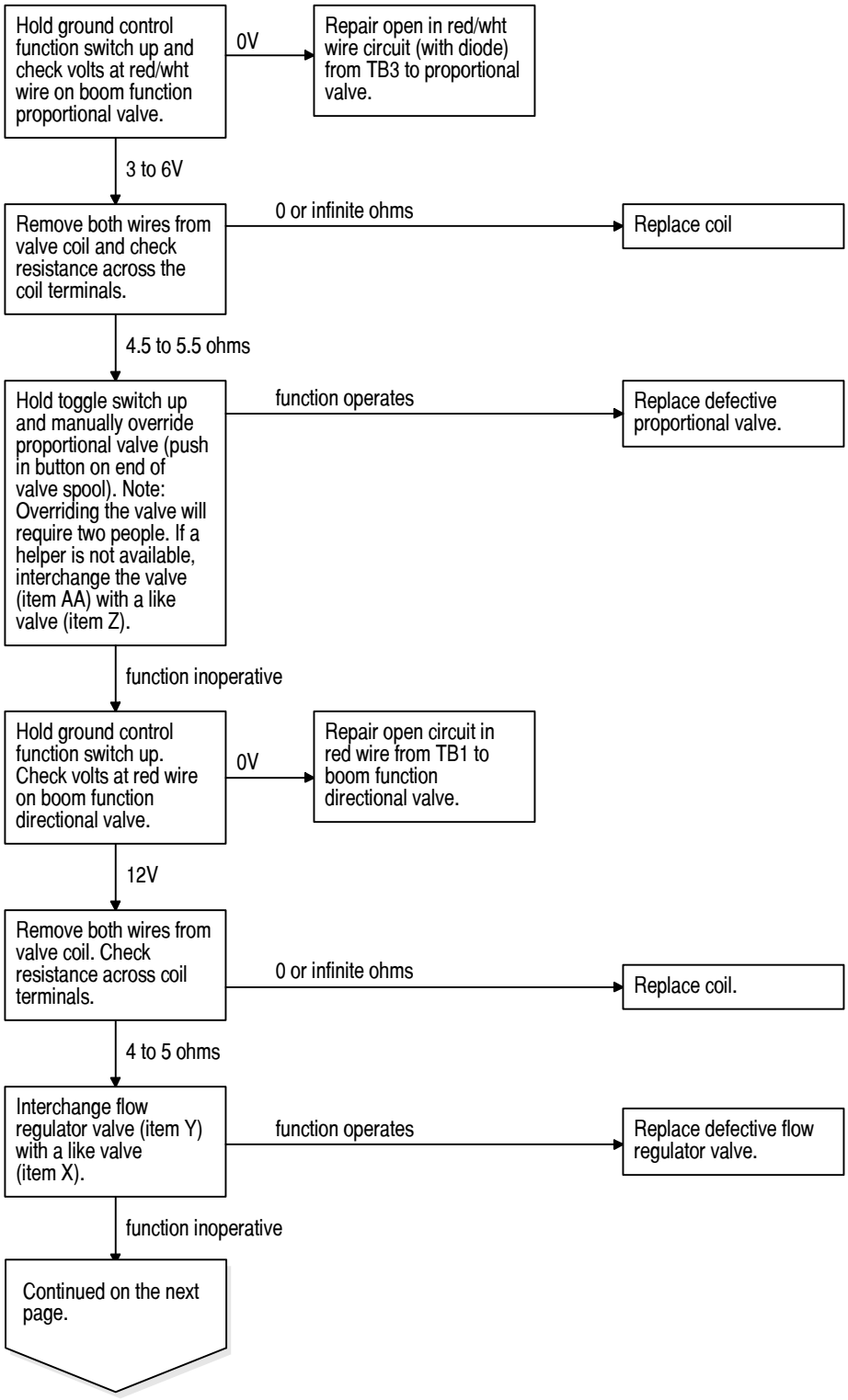


CHART 14

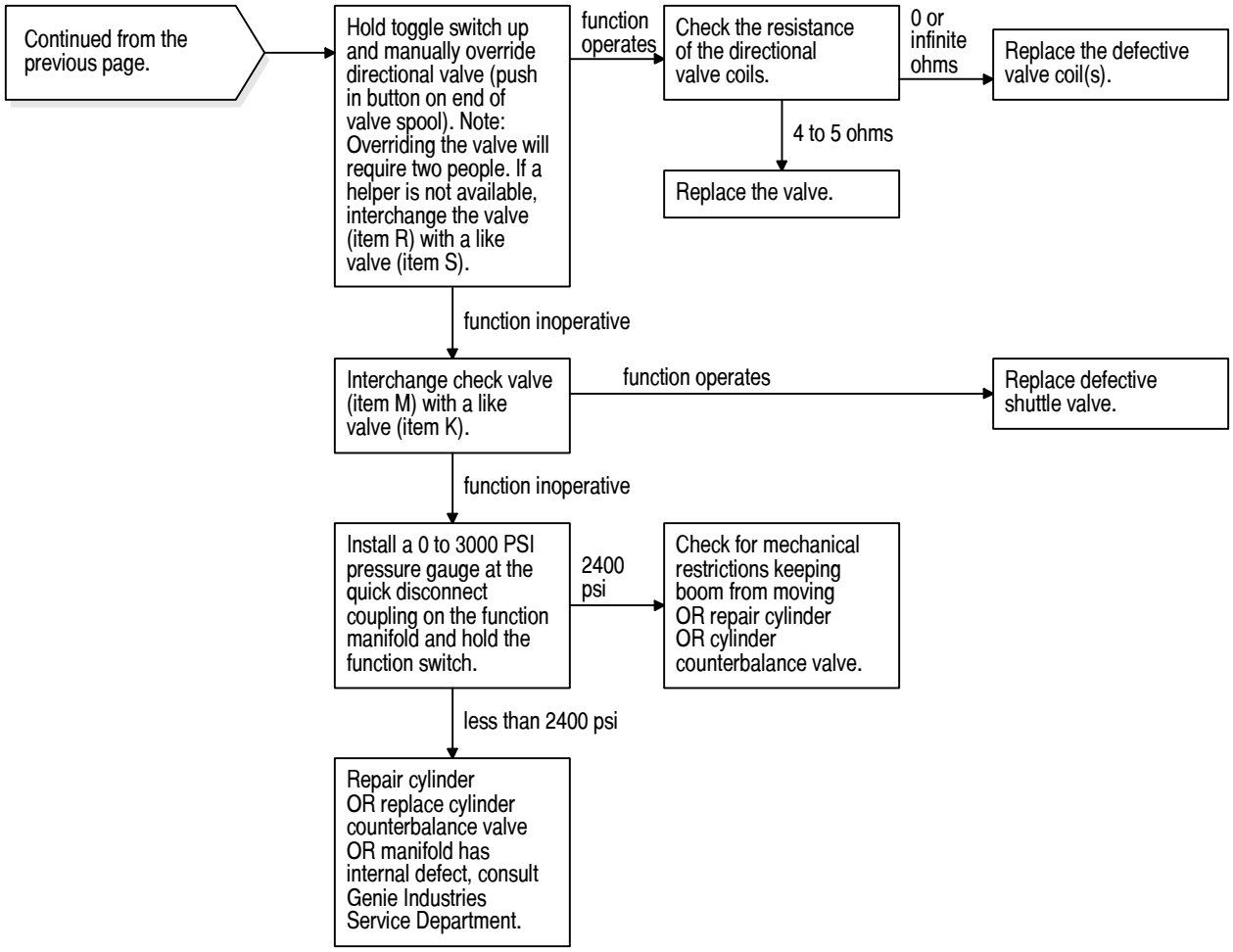

Continued from the previous page.
Hold toggle switch up and manually override directional valve (push in button on end of valve spool). Note: Overriding the valve will require two people. If a helper is not available, interchange the valve (item R) with a like valve (item S).
function operates
Check 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 check valve (item M) with a like valve (item K).
function operates
Replace defective shuttle valve.
function inoperative
Install a 0 to 3000 PSI pressure gauge at the quick disconnect coupling on the function manifold and hold the function switch.
2400 psi
Check for mechanical restrictions keeping boom from moving OR repair cylinder OR cylinder counterbalance valve.
less than 2400 psi
Repair cylinder OR replace cylinder counterbalance valve OR manifold has internal defect, consult Genie Industries Service Department.

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 or replace resistor. See Repair section.

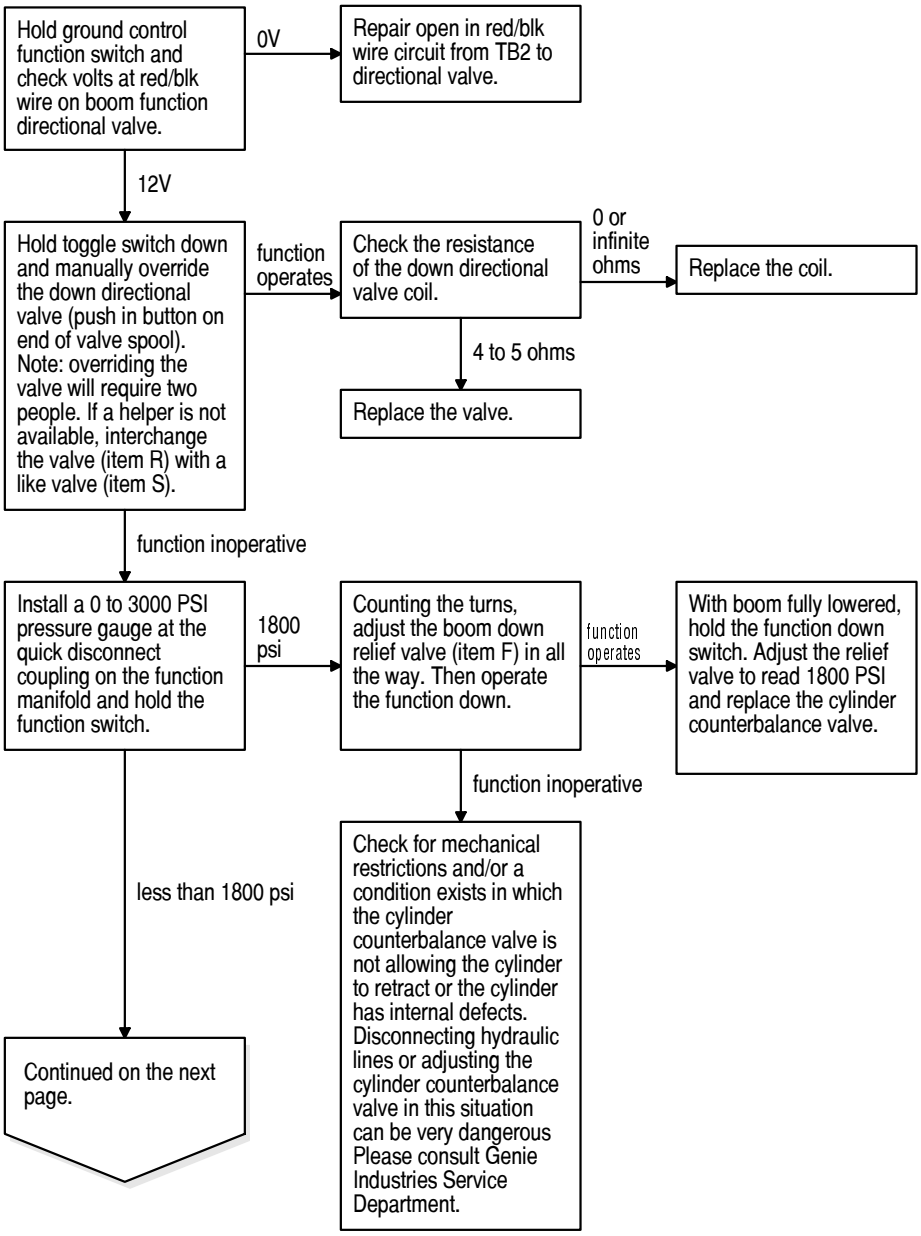


CHART 15

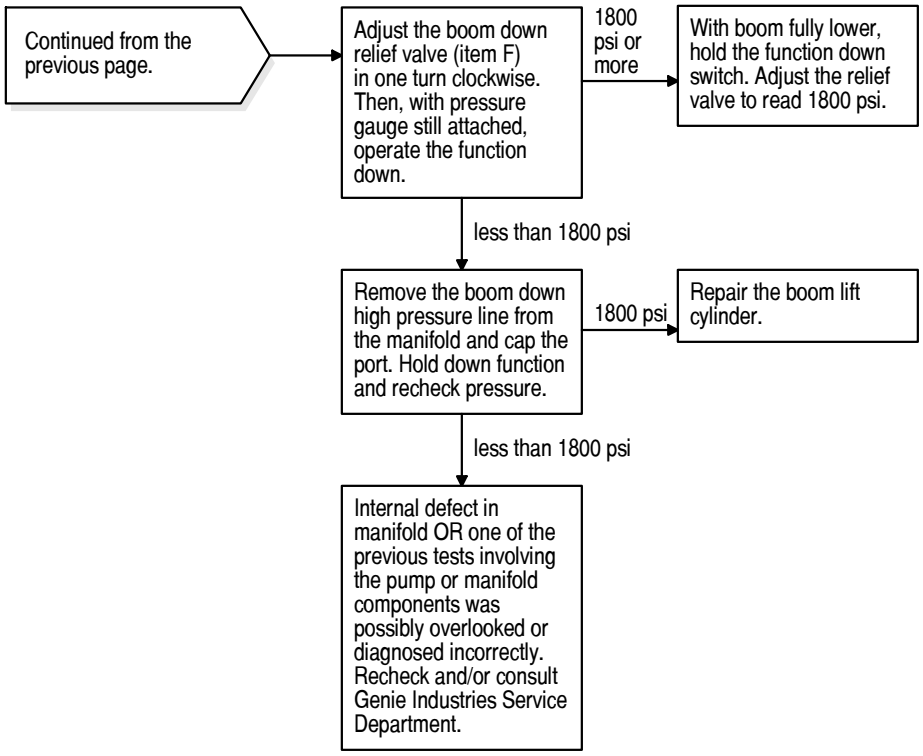

Continued from the previous page.
Adjust the boom down relief valve (item F) in one turn clockwise. Then, with pressure gauge still attached, operate the function down.
1800 psi or more
With boom fully lower, hold the function down switch. Adjust the relief valve to read 1800 psi.
less than 1800 psi
Remove the boom down high pressure line from the manifold and cap the port. Hold down function and recheck pressure.
1800 psi
Repair the boom lift cylinder.
less than 1800 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 or CR16 relay. See Repair section.

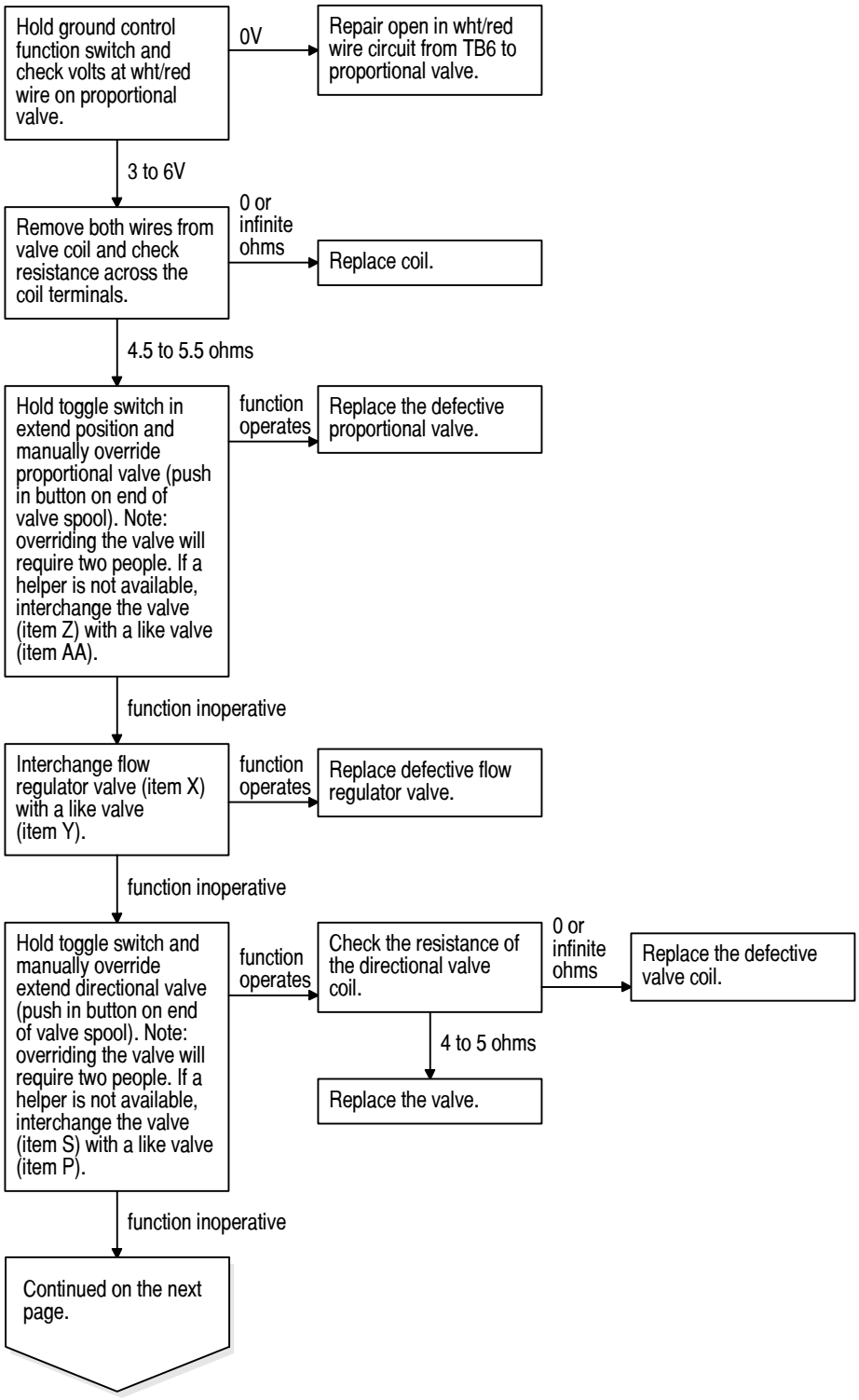


CHART 16

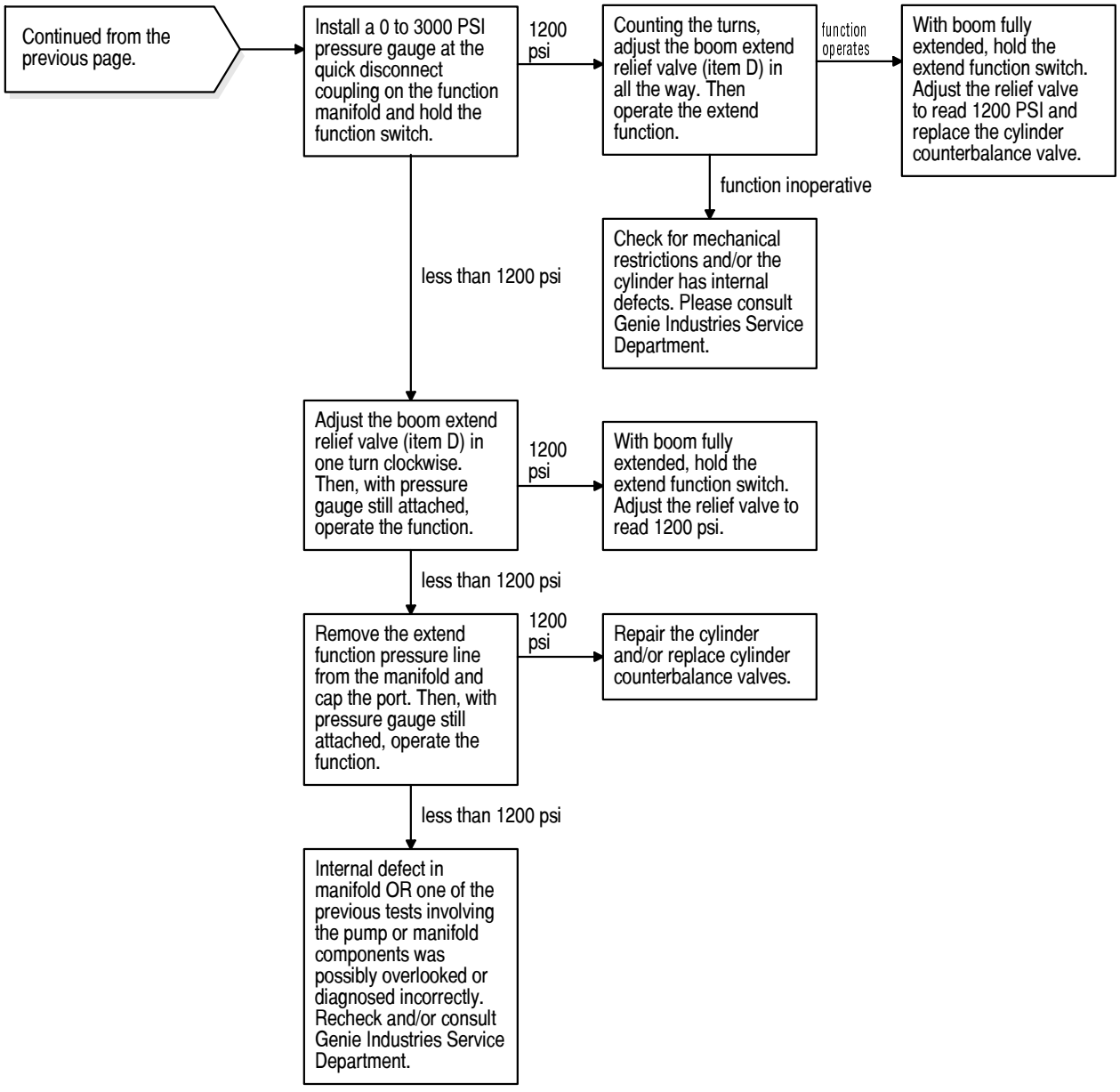

Continued from the previous page.
Install a 0 to 3000 PSI pressure gauge at the quick disconnect coupling on the function manifold and hold the function switch.
1200 psi
Counting the turns, adjust the boom extend relief valve (item D) in all the way. Then operate the extend function.
function operates
With boom fully extended, hold the extend function switch. Adjust the relief valve to read 1200 PSI and replace the cylinder counterbalance valve.
function inoperative
Check for mechanical restrictions and/or the cylinder has internal defects. Please consult Genie Industries Service Department.
less than 1200 psi
Adjust the boom extend relief valve (item D) in one turn clockwise. Then, with pressure gauge still attached, operate the function.
1200 psi
With boom fully extended, hold the extend function switch. Adjust the relief valve to read 1200 psi.
less than 1200 psi
Remove the extend function pressure line from the manifold and cap the port. Then, with pressure gauge still attached, operate the function.
1200 psi
Repair the cylinder and/or replace cylinder counterbalance valves.
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 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 or CR16 relay. See Repair section.

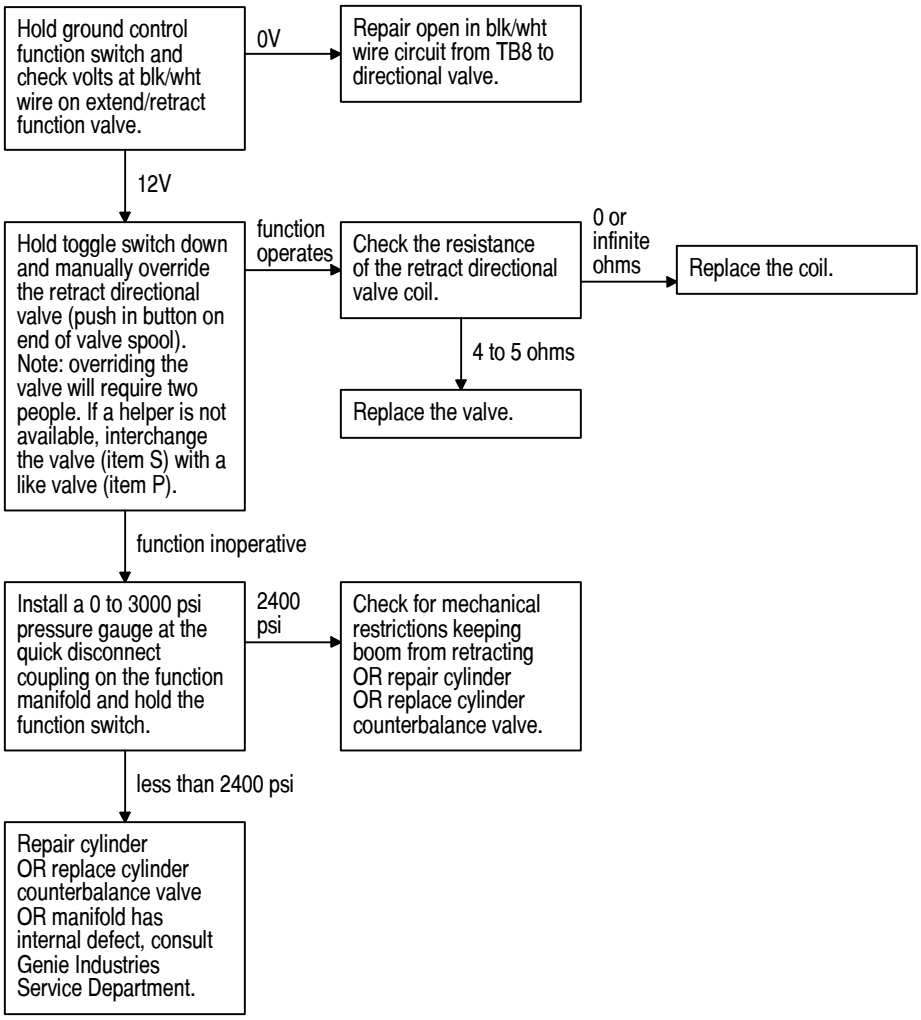


Chart 18

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 or CR16 relay. See Repair section.

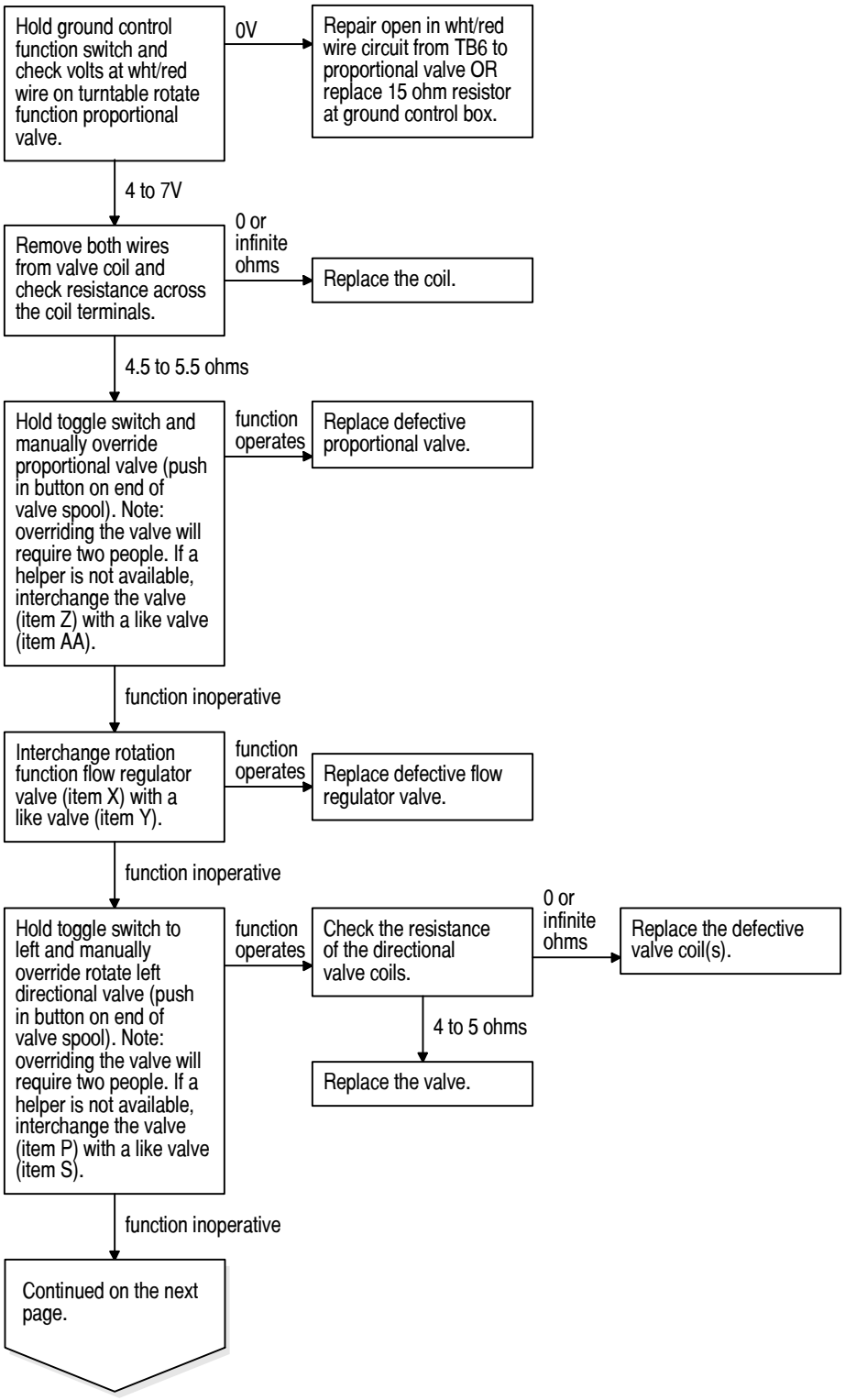


CHART 18

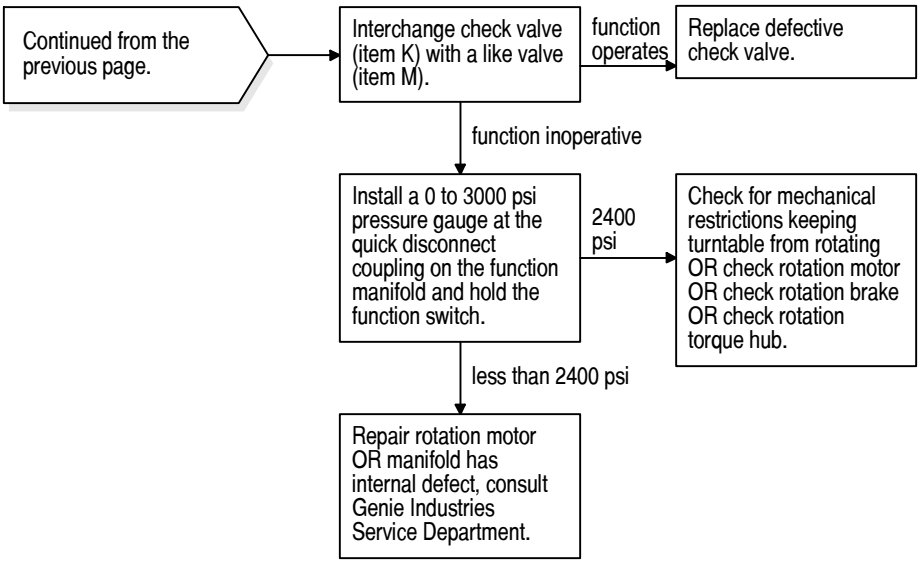

Continued from the previous page.
Interchange check valve (item K) with a like valve (item M).
function operates
Replace defective check valve.
function inoperative
Install a 0 to 3000 psi pressure gauge at the quick disconnect coupling on the function manifold and hold the function switch.
2400 psi
Check for mechanical restrictions keeping turntable from rotating OR check rotation motor OR check rotation brake OR check rotation torque hub.
less than 2400 psi
Repair rotation motor OR manifold has internal defect, consult Genie Industries Service Department.

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.

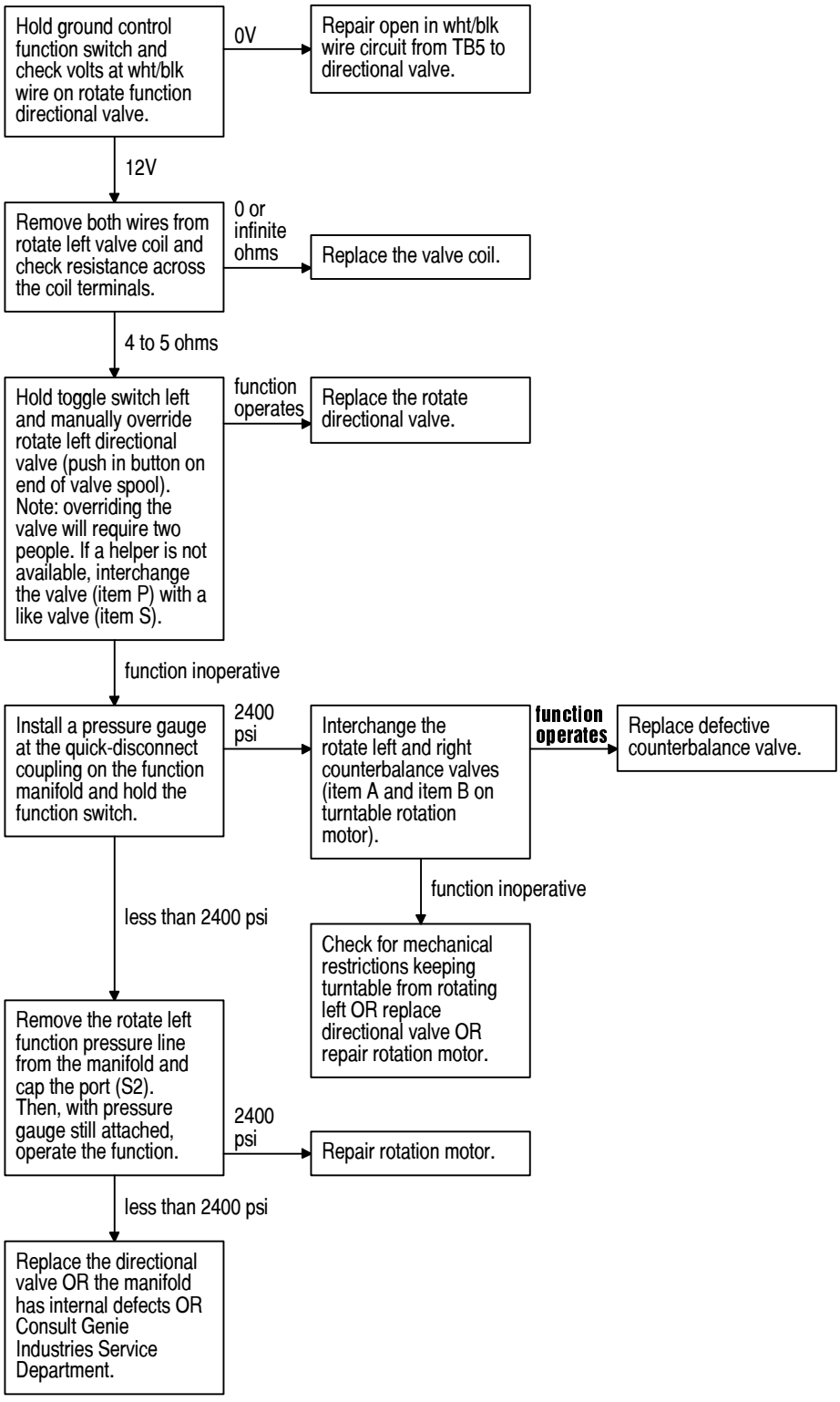


Chart 20

Turntable Rotate Right Function Inoperative

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

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

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

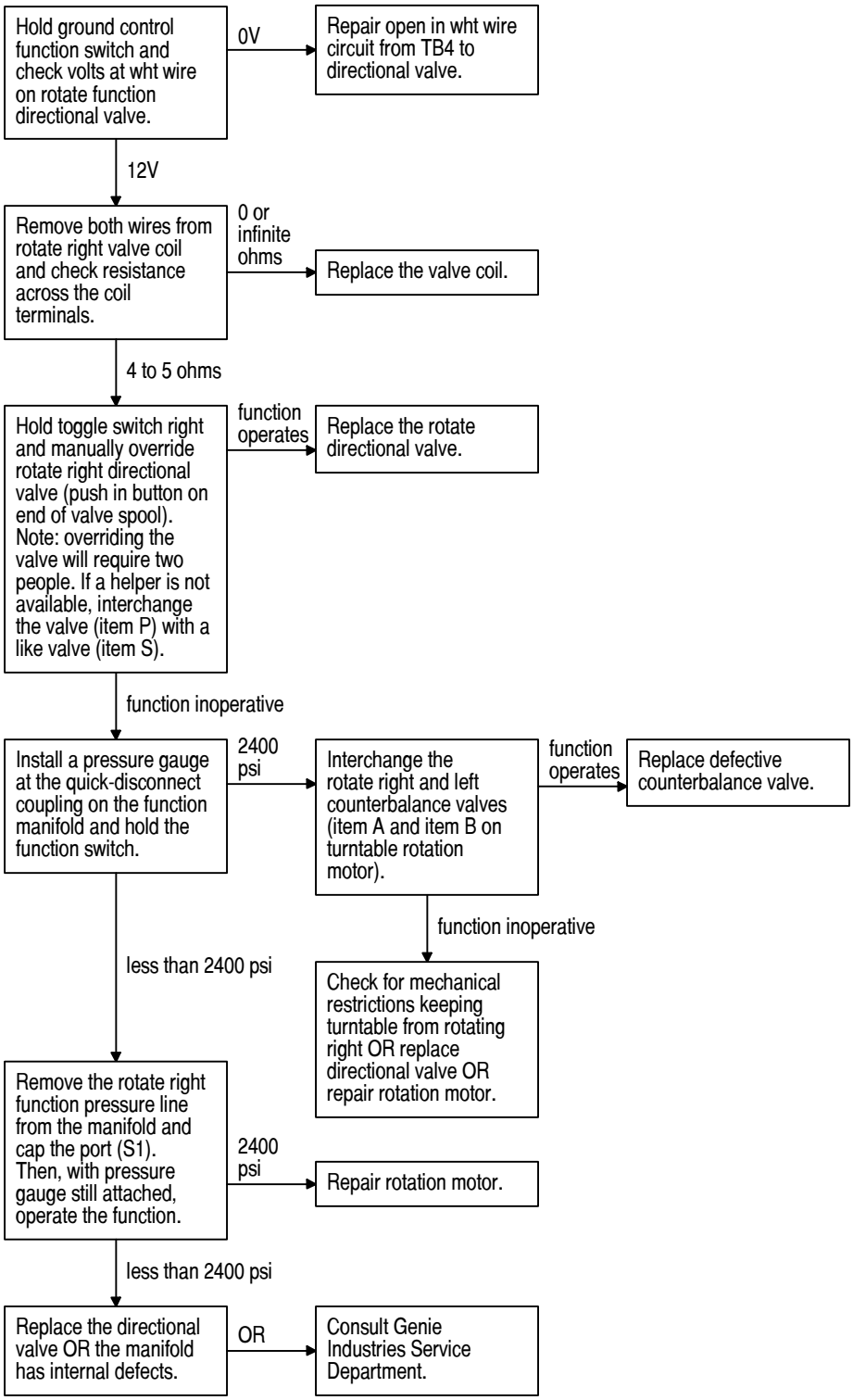


Chart 21

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*.

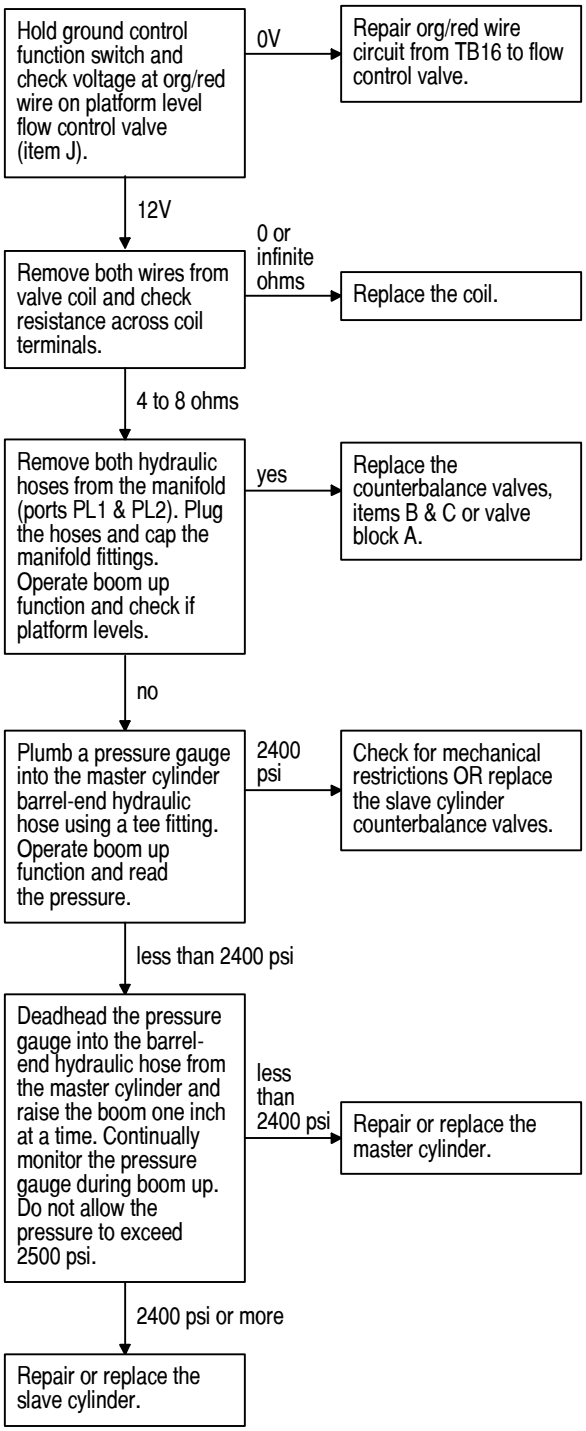


Chart 22

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.

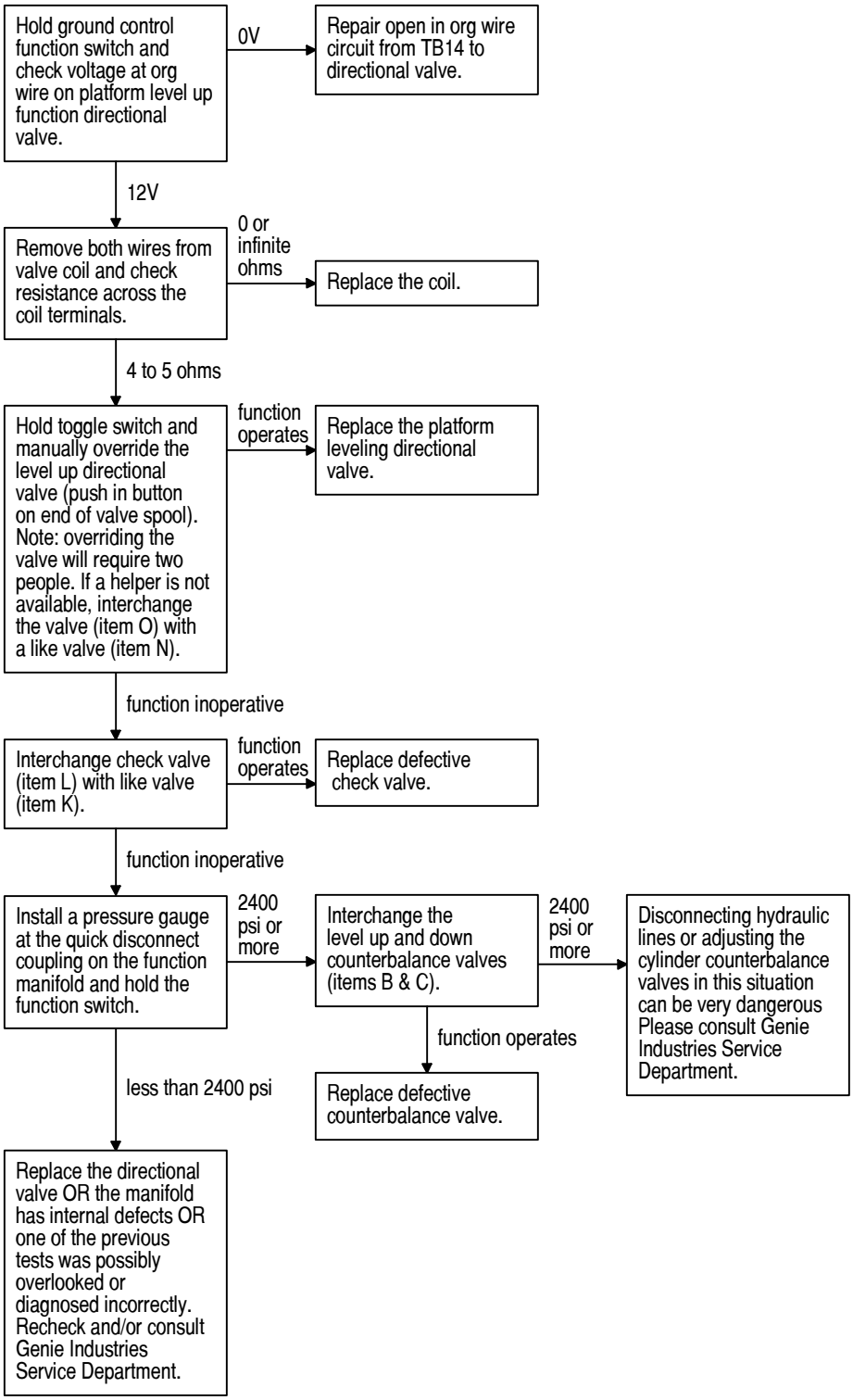


Chart 23

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.

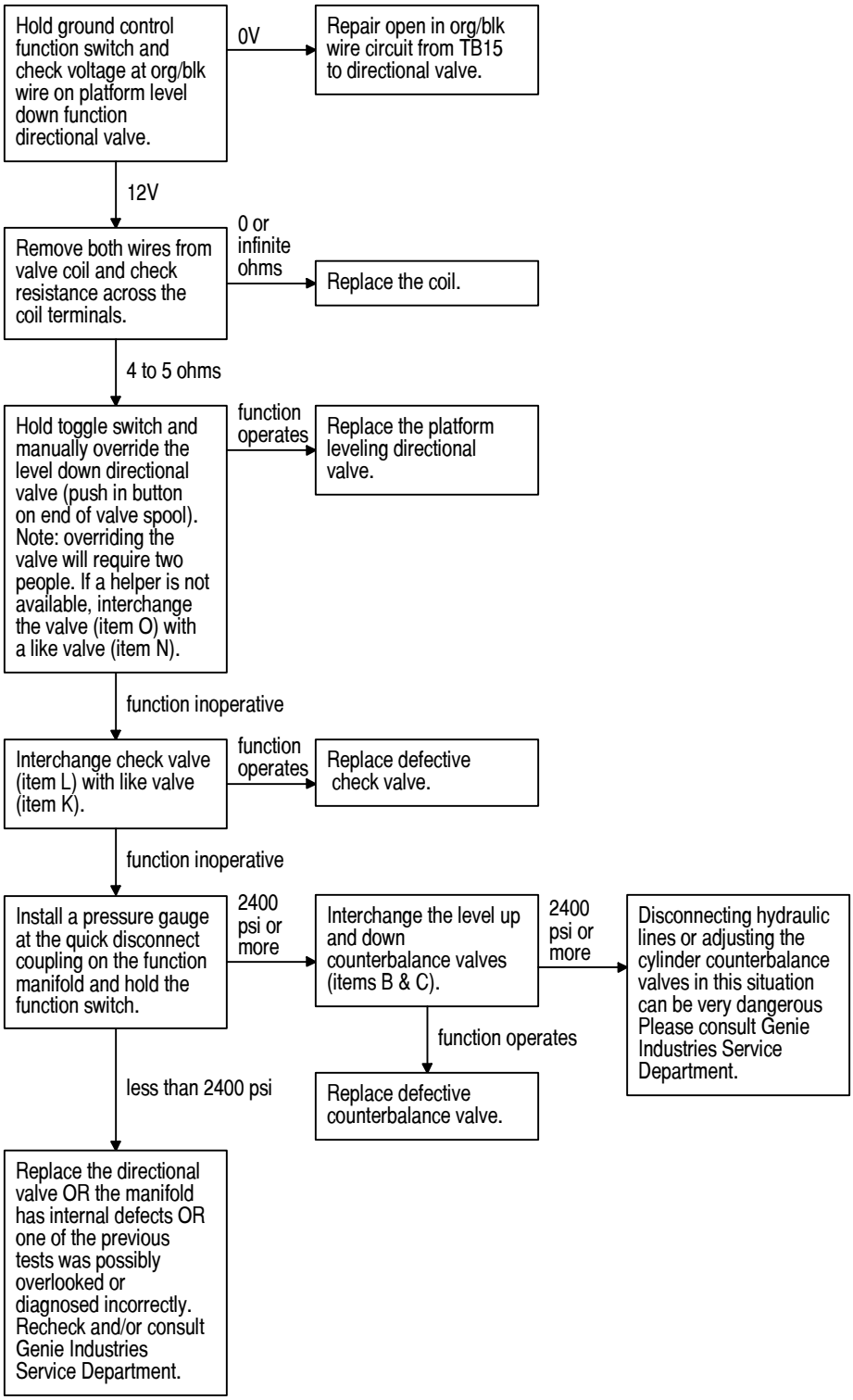


Chart 24

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.

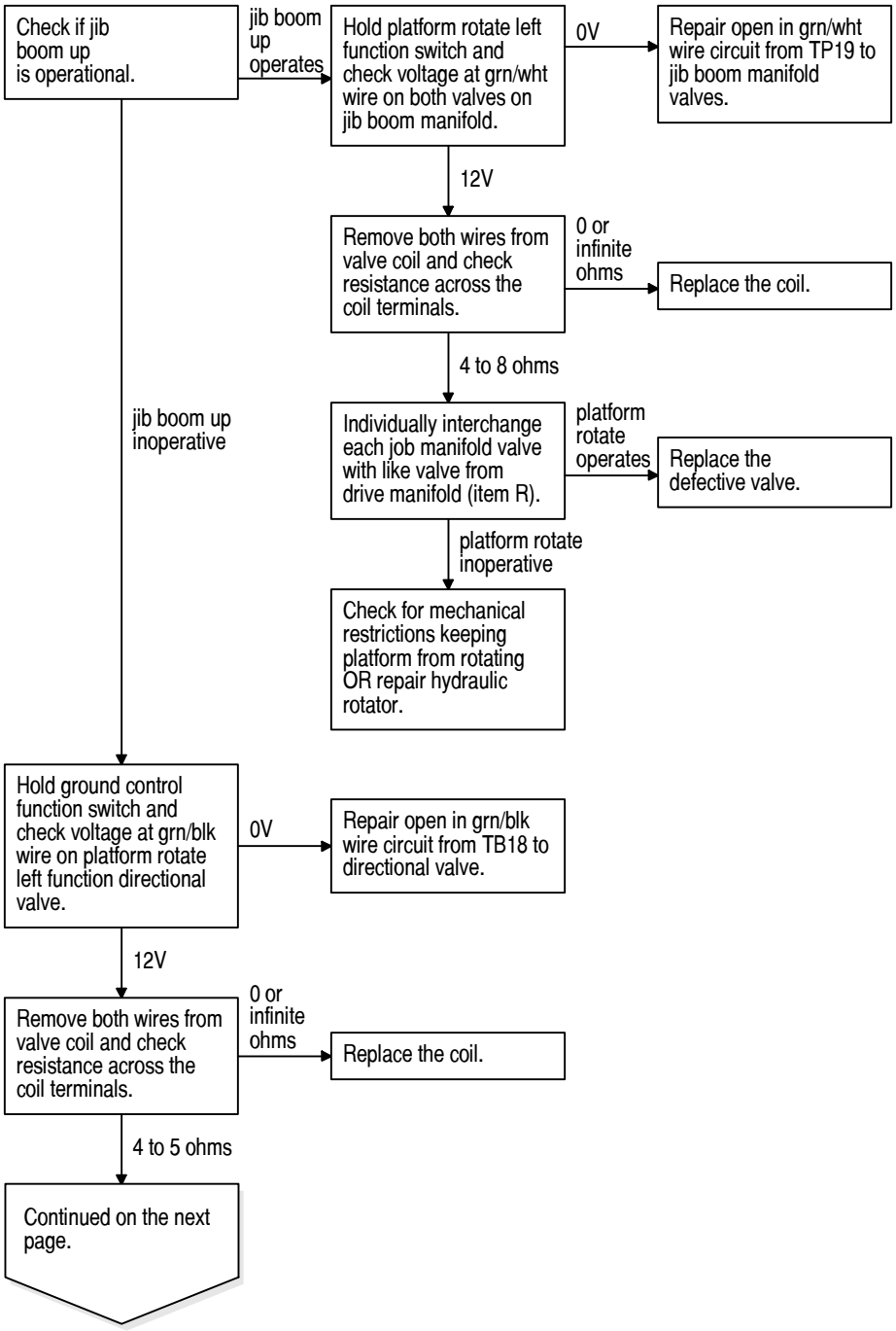


CHART 24

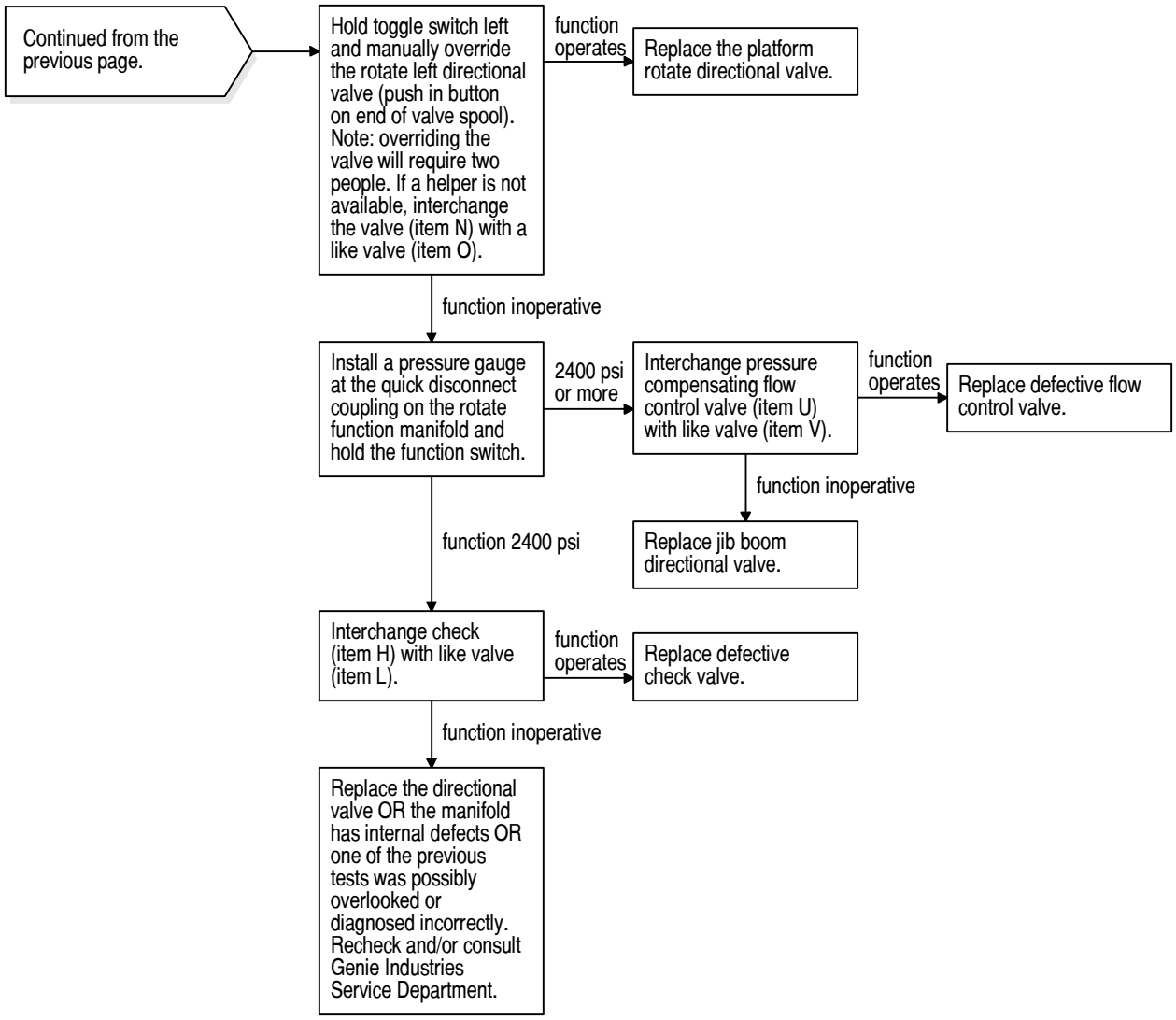

Continued from the previous page.
Hold toggle switch left and manually override the rotate left directional valve (push in button on end of valve spool). Note: overriding the valve will require two people. If a helper is not available, interchange the valve (item N) with a like valve (item O).
function operates
Replace the platform rotate directional valve.
function inoperative
Install a pressure gauge at the quick disconnect coupling on the rotate function manifold and hold the function switch.
2400 psi or more
Interchange pressure compensating flow control valve (item U) with like valve (item V).
function operates
Replace defective flow control valve.
function inoperative
Replace jib boom directional valve.
function 2400 psi
Interchange check (item H) with like valve (item L).
function operates
Replace defective check valve.
function inoperative
Replace the directional valve OR the manifold has internal defects OR one of the previous tests was possibly overlooked or diagnosed incorrectly. Recheck and/or consult Genie Industries Service Department.

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.

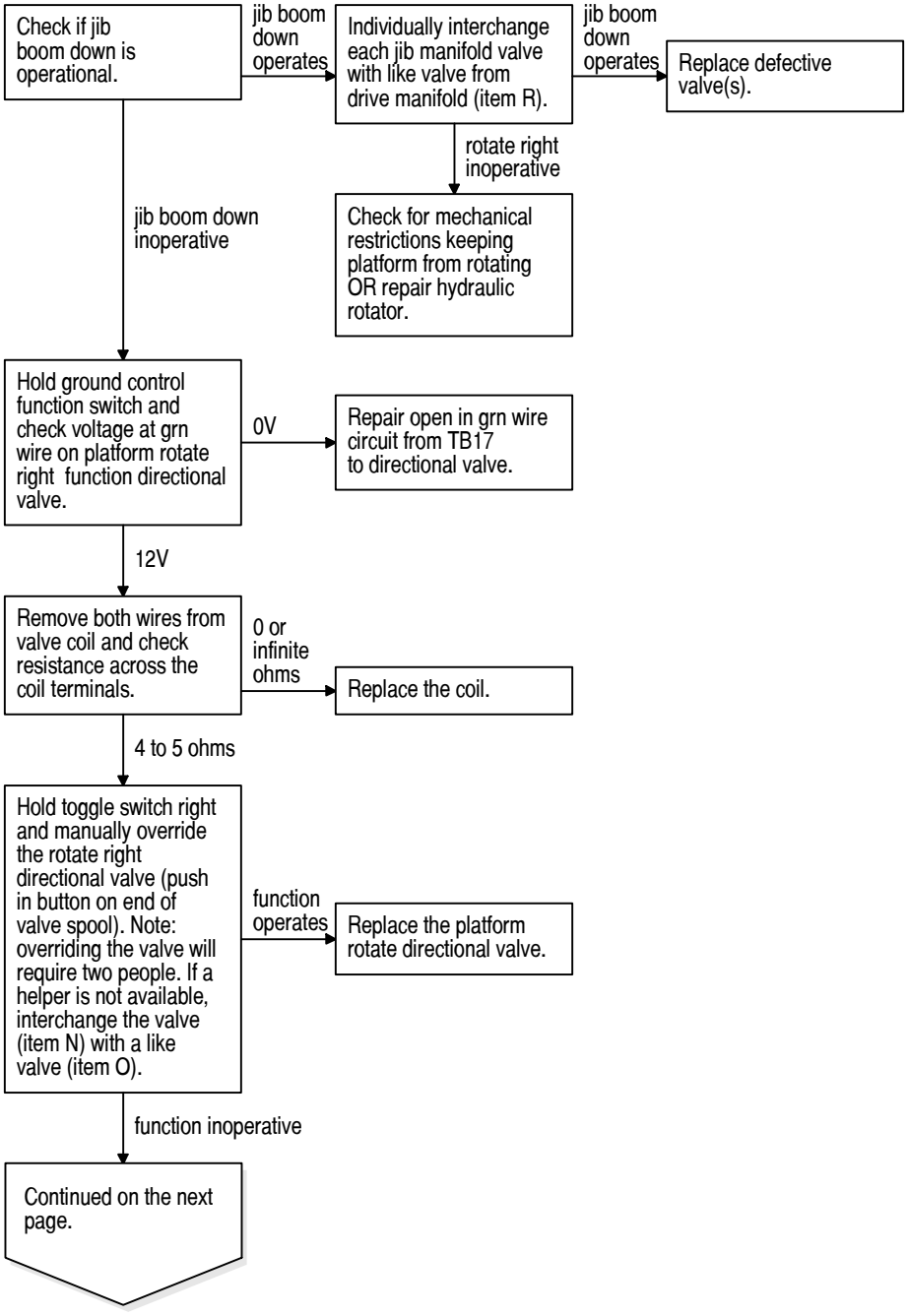


CHART 25

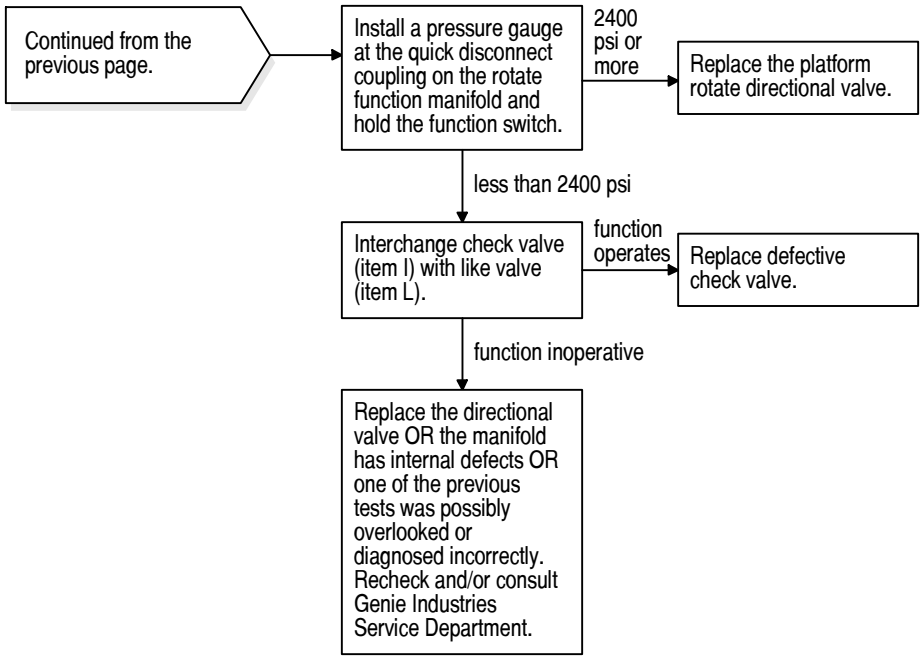

Continued from the previous page.
Install a pressure gauge at the quick disconnect coupling on the rotate function manifold and hold the function switch.
2400 psi or more
Replace the platform rotate directional valve.
less than 2400 psi
Interchange check valve (item I) with like valve (item L).
function operates
Replace defective check valve.
function inoperative
Replace the directional valve OR the manifold has internal defects OR one of the previous tests was possibly overlooked or diagnosed incorrectly. Recheck and/or consult Genie Industries Service Department.

Chart 26

Jib Boom Up Function Inoperative

Be sure all other functions operate normally.

If jib boom up function operates normally from the ground controls but not from the platform controls, troubleshoot the platform control toggle switch or CR13. See Repair section.

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

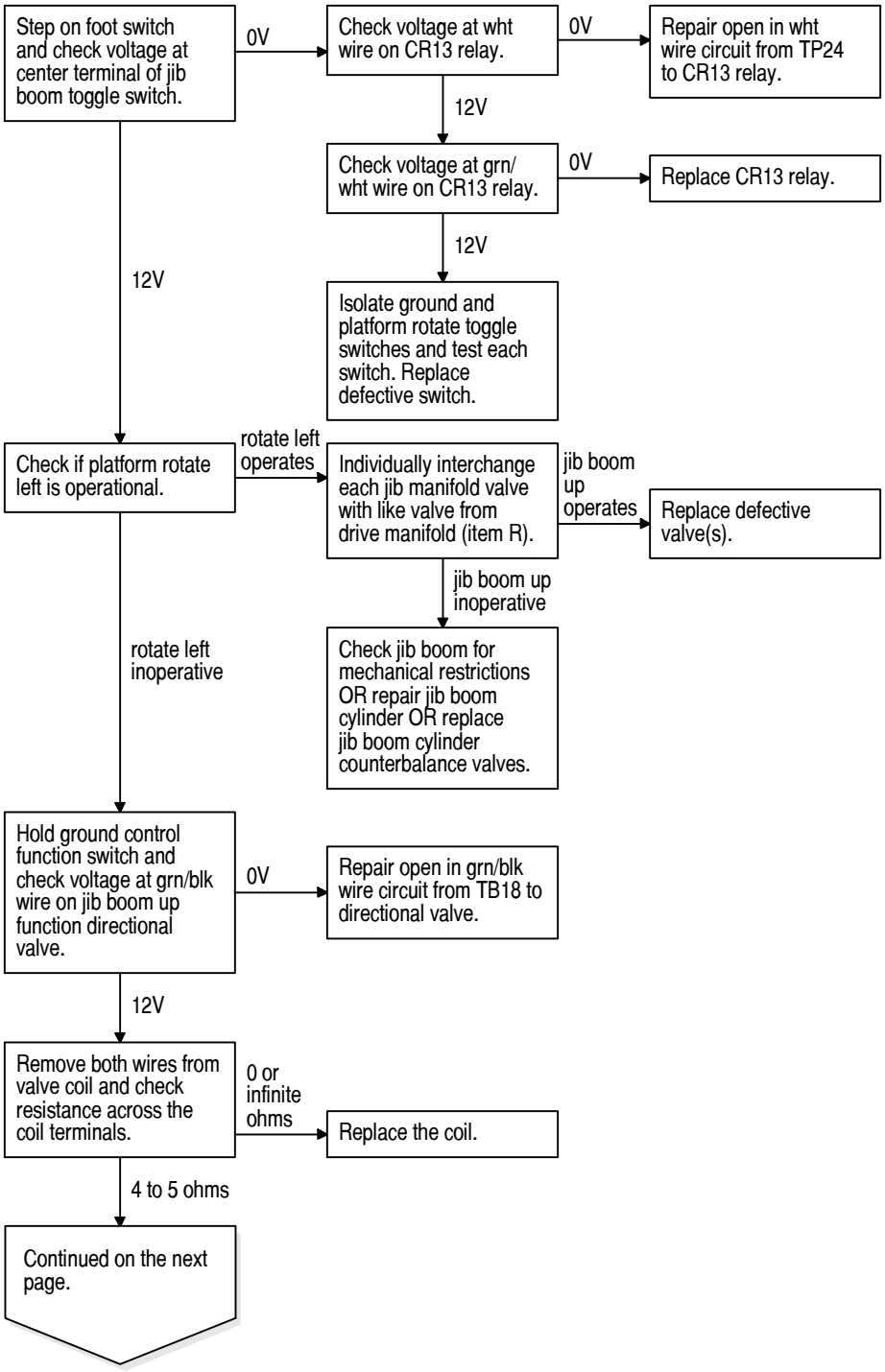


CHART 26

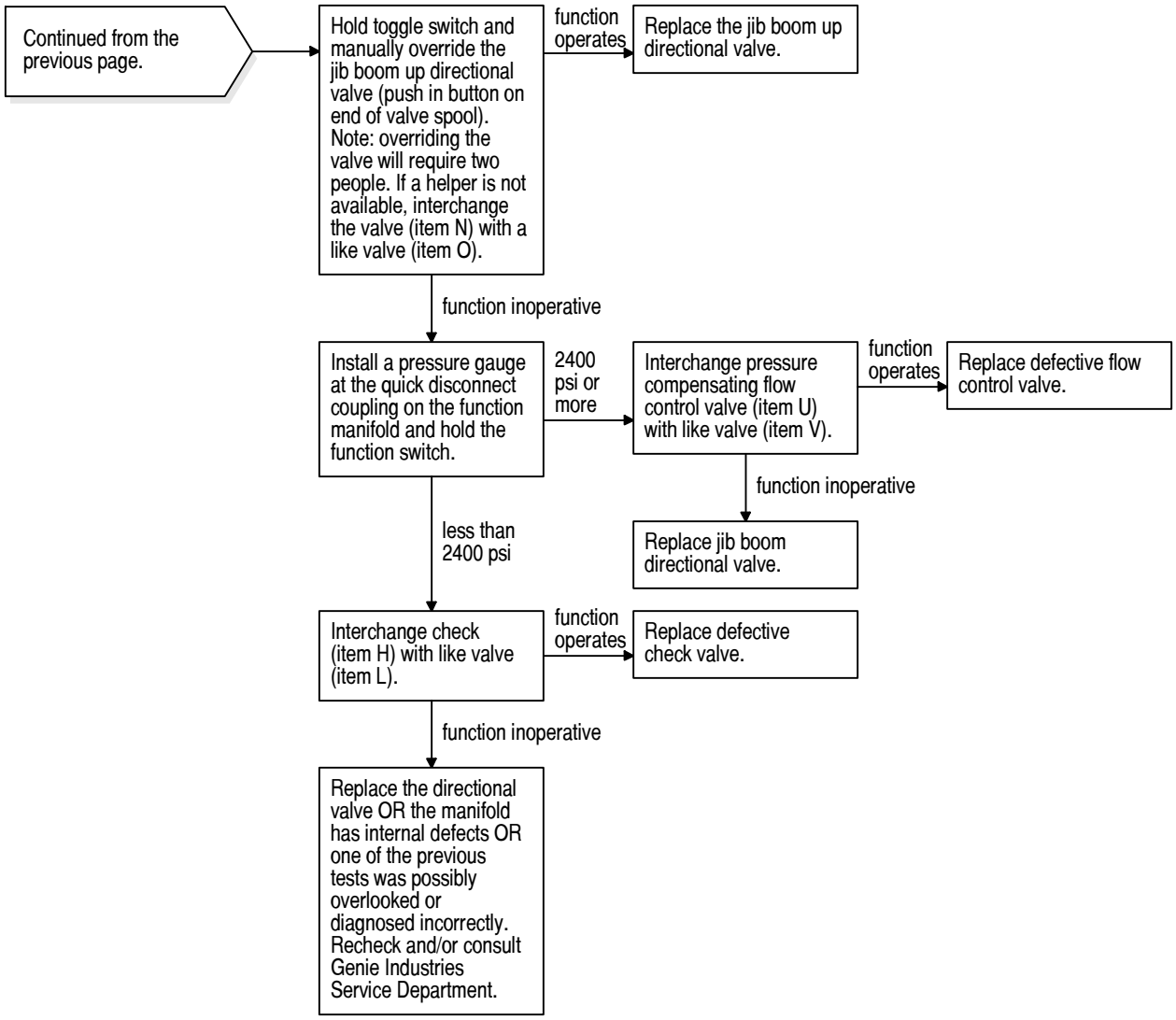

Continued from the previous page.
Hold toggle switch and manually override the jib boom up directional valve (push in button on end of valve spool). Note: overriding the valve will require two people. If a helper is not available, interchange the valve (item N) with a like valve (item O).
function operates
Replace the jib boom up directional valve.
function inoperative
Install a pressure gauge at the quick disconnect coupling on the function manifold and hold the function switch.
2400 psi or more
Interchange pressure compensating flow control valve (item U) with like valve (item V).
function operates
Replace defective flow control valve.
function inoperative
Replace jib boom directional valve.
less than 2400 psi
Interchange check (item H) with like valve (item L).
function operates
Replace defective check valve.
function inoperative
Replace the directional valve OR the manifold has internal defects OR one of the previous tests was possibly overlooked or diagnosed incorrectly. Recheck and/or consult Genie Industries Service Department.

Chart 27

Jib Boom Down Function Inoperative

Be sure all other functions operate normally.

If jib boom down function operates normally from the ground controls but not from the platform controls, troubleshoot the platform control toggle switch or CR13. See Repair section.

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

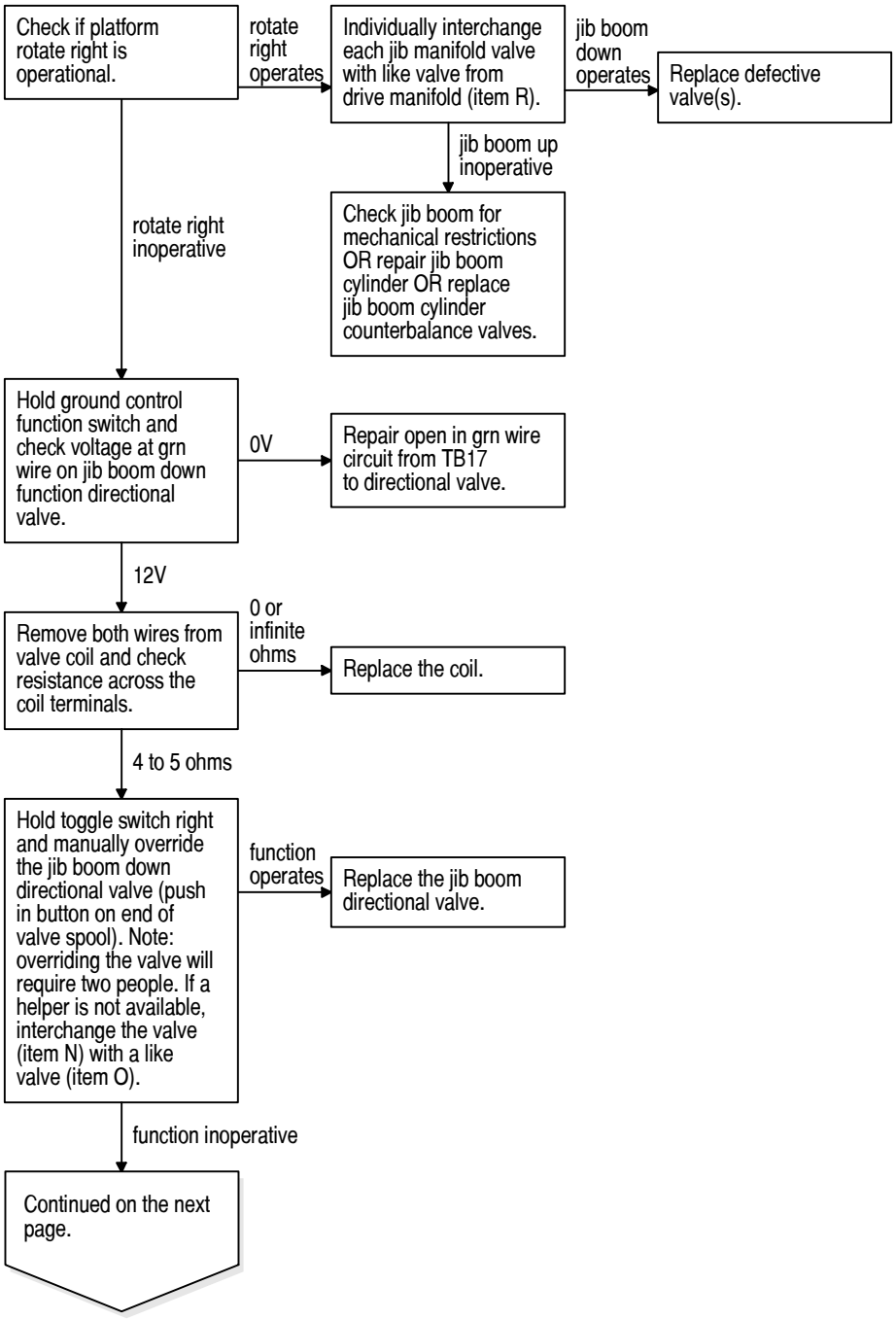


CHART 27

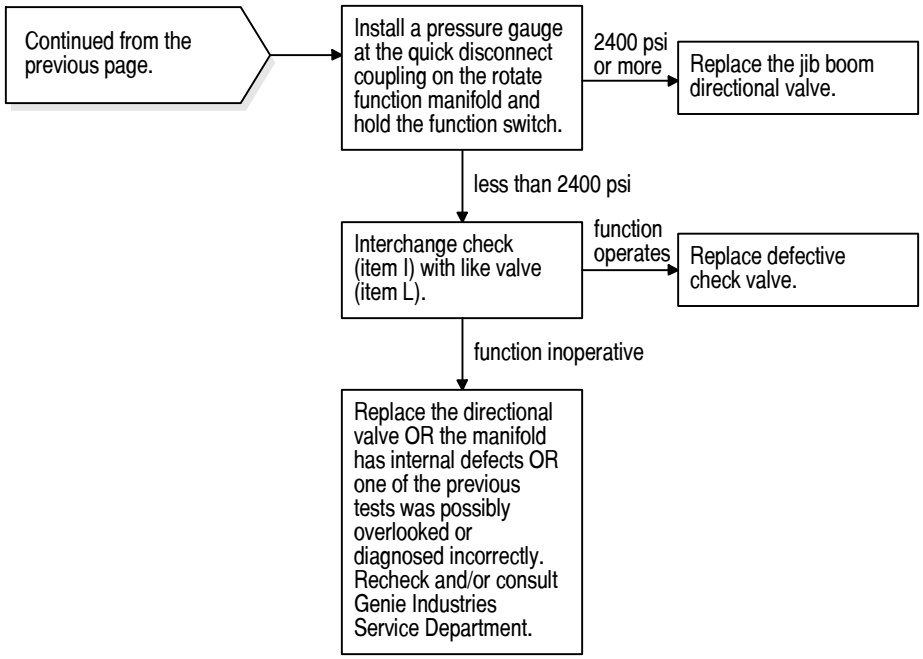

Continued from the previous page.
Install a pressure gauge at the quick disconnect coupling on the rotate function manifold and hold the function switch.
2400 psi or more
Replace the jib boom directional valve.
less than 2400 psi
Interchange check (item I) with like valve (item L).
function operates
Replace defective check valve.
function inoperative
Replace the directional valve OR the manifold has internal defects OR one of the previous tests was possibly overlooked or diagnosed incorrectly. Recheck and/or consult Genie Industries Service Department.

Chart 28

Drive Chassis Jack Function Inoperative

Be sure all other function operate normally.

Be sure unit is in stowed position.

Procedure is written for non-steer end lift jack, if steer end lift jack is inoperative repeat procedure and substitute steer for non-steer.

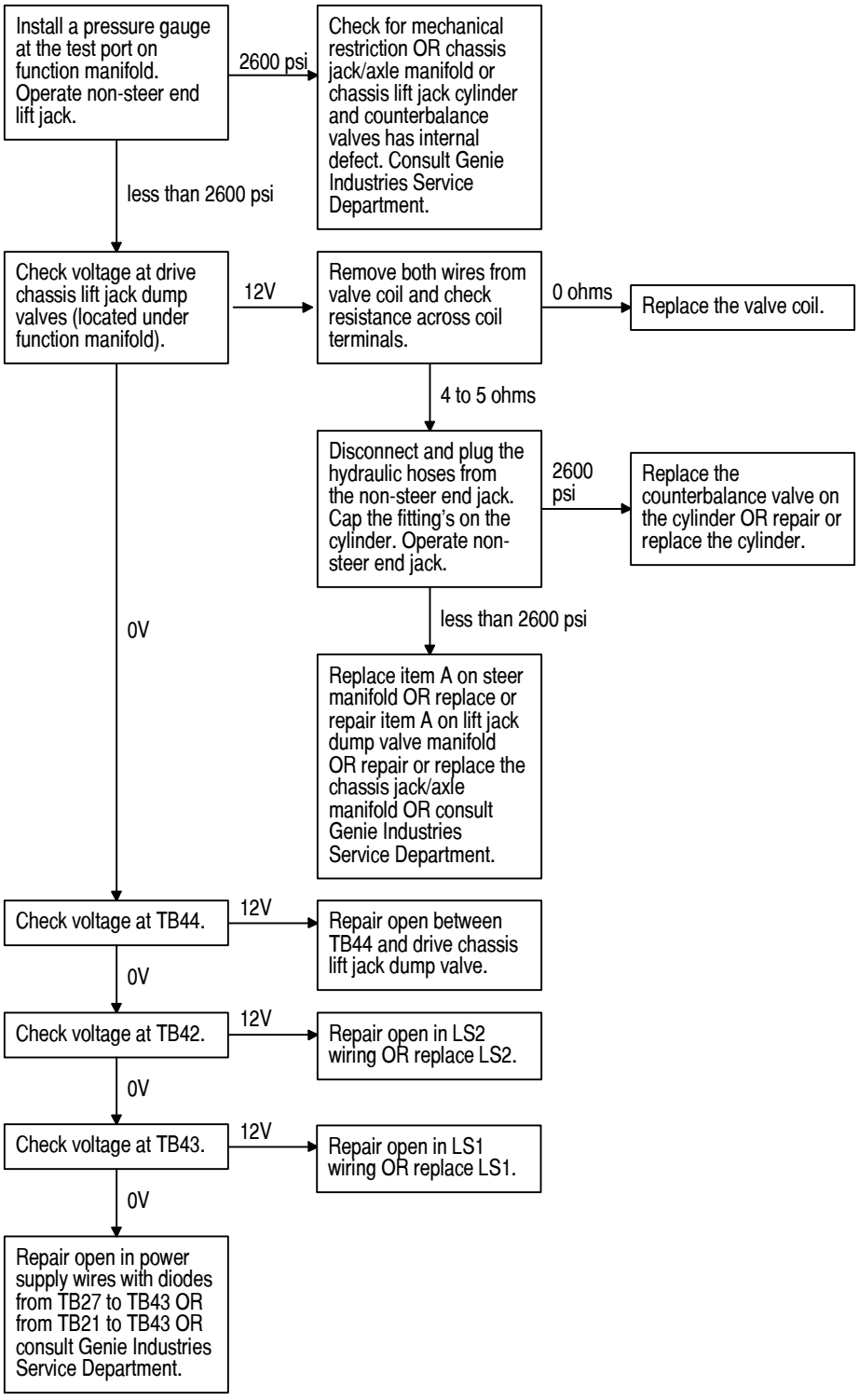


Chart 29

Axle Extend/ Retract Function Inoperative

Be sure all other function operate normally.

Be sure unit is in stowed position.

Procedure is written for non-steer end axle, if steer end axle is inoperative repeat procedure and substitute steer for non-steer.

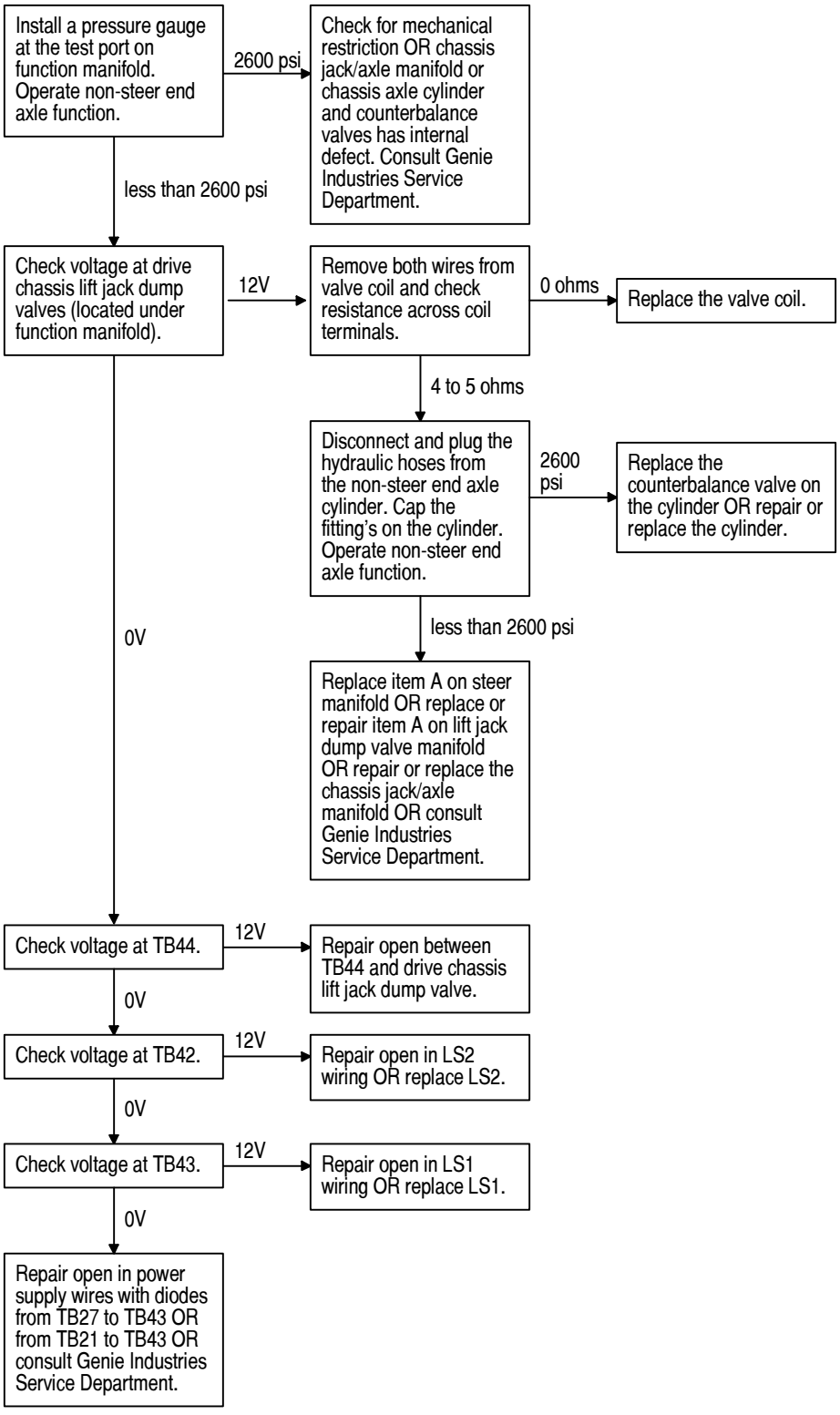


Chart 30

Steer Left Function Inoperative

Be sure all other functions operate normally.

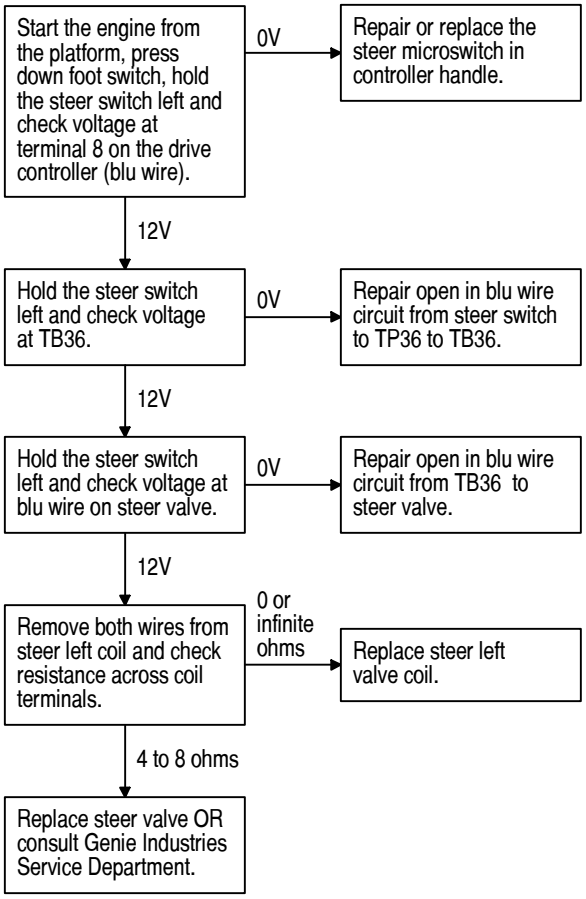


Chart 31

Steer Right Function Inoperative

Be sure all other functions operate normally.

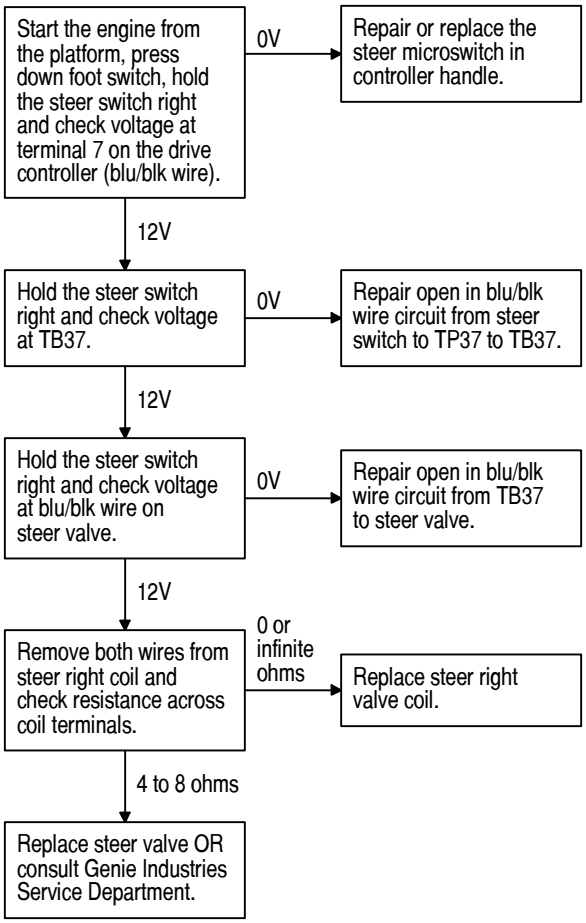


Chart 32

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.

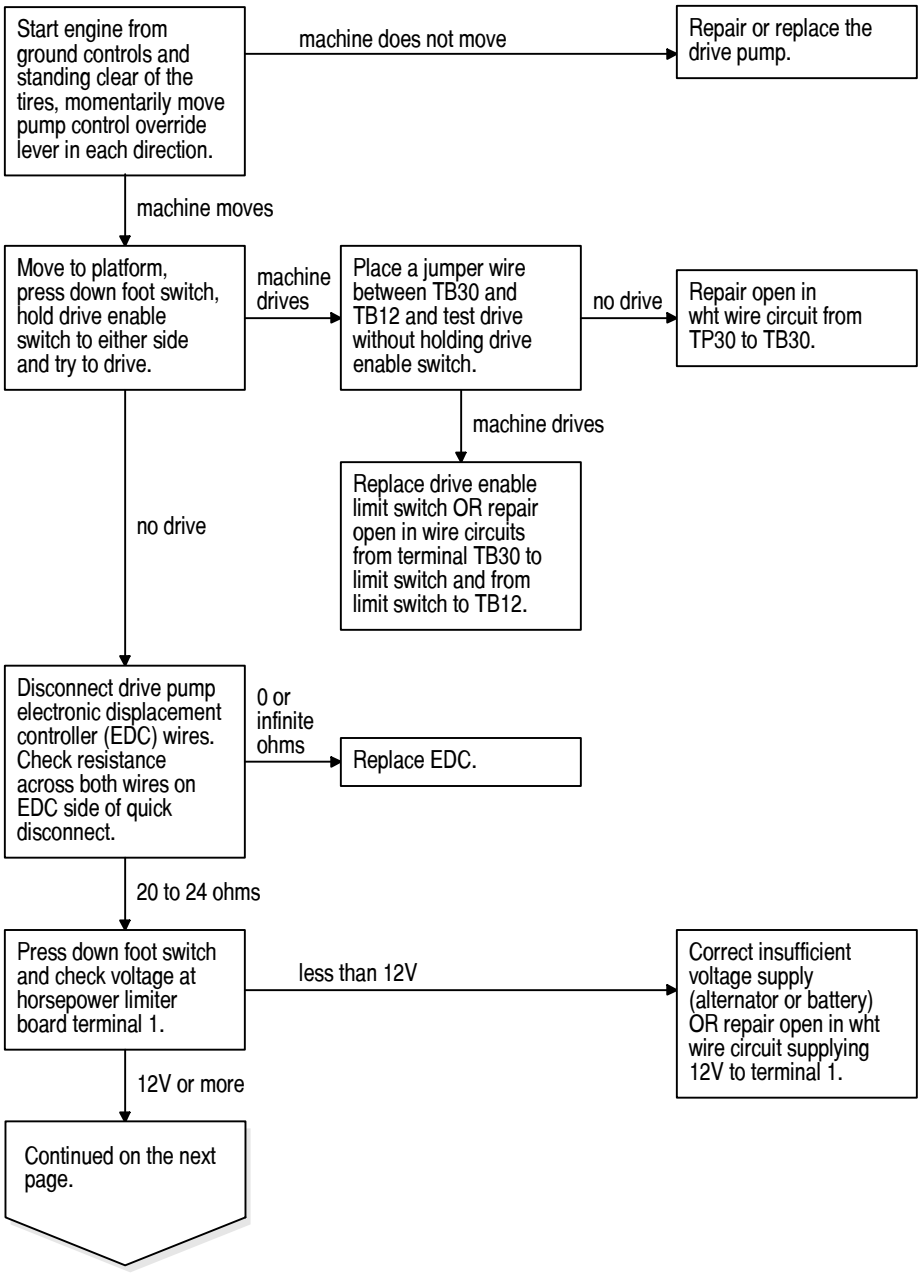


CHART 32

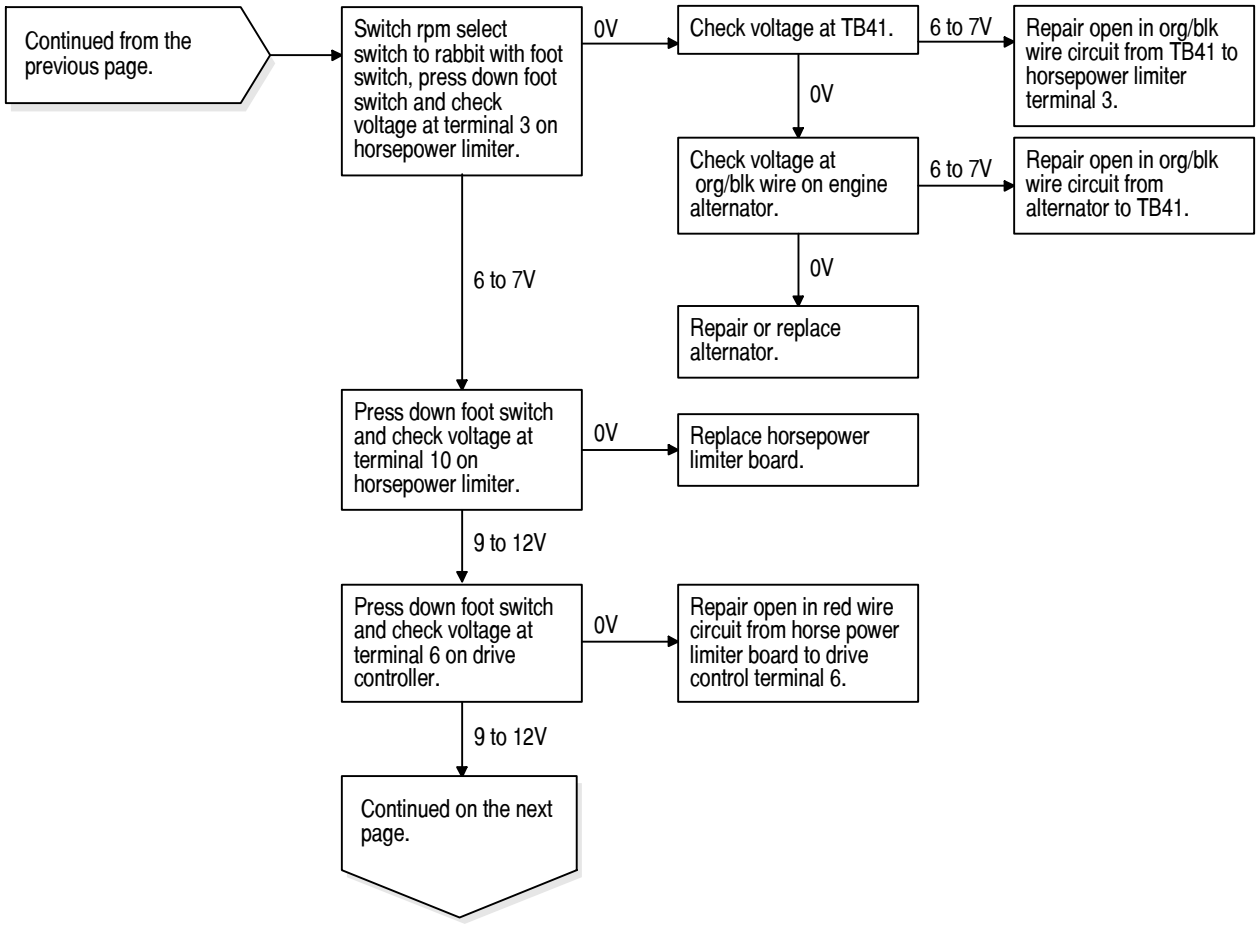

Continued from the previous page.
Switch rpm select switch to rabbit with foot switch, press down foot switch and check voltage at terminal 3 on horsepower limiter.
0V
Check voltage at TB41.
6 to 7V
Repair open in org/blk wire circuit from TB41 to horsepower limiter terminal 3.
0V
Check voltage at org/blk wire on engine alternator.
6 to 7V
Repair open in org/blk wire circuit from alternator to TB41.
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 terminal 6 on drive controller.
0V
Repair open in red wire circuit from horse power limiter board to drive control terminal 6.
9 to 12V
Continued on the next page.

CHART 32

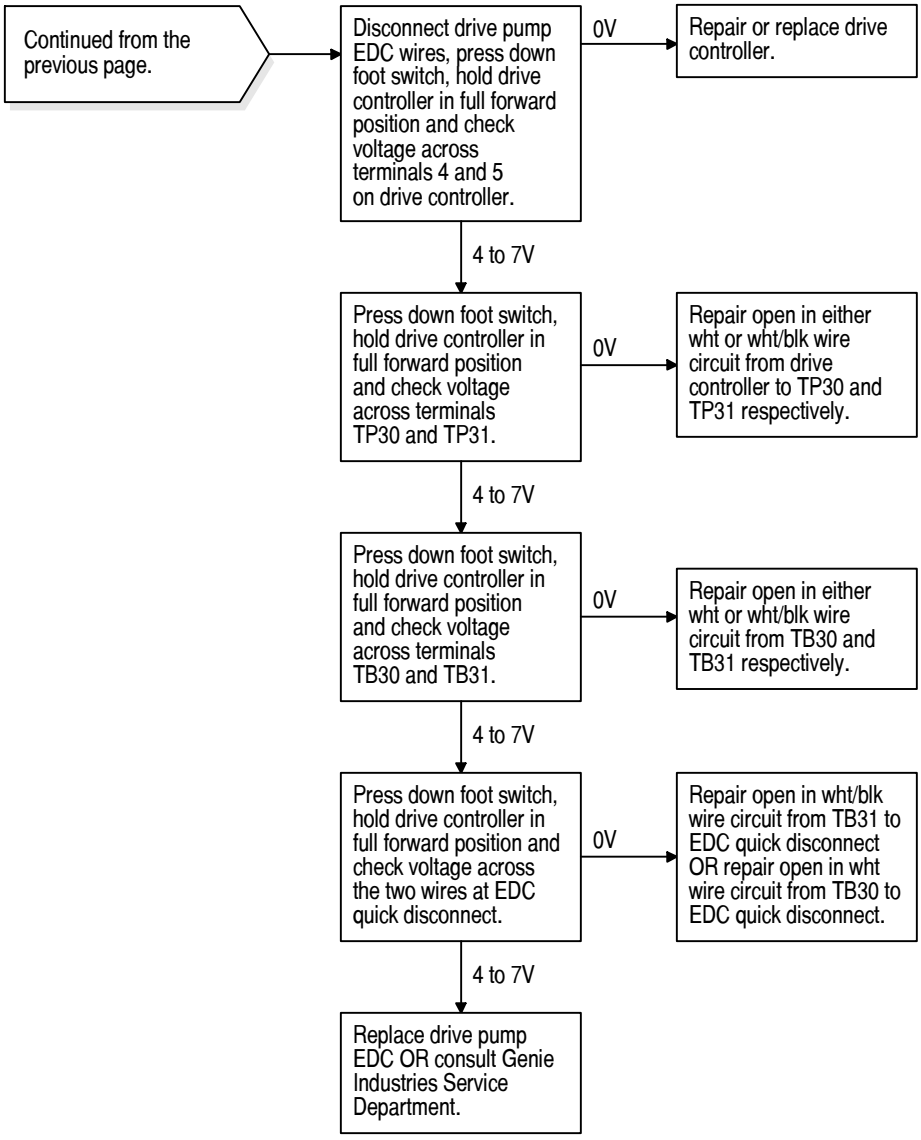

Continued from the previous page.
Disconnect drive pump EDC wires, press down foot switch, hold drive controller in full forward position and check voltage across terminals 4 and 5 on drive controller.
0V
Repair or replace drive controller.
4 to 7V
Press down foot switch, hold drive controller in full forward position and check voltage across terminals TP30 and TP31.
0V
Repair open in either wht or wht/blk wire circuit from drive controller to TP30 and TP31 respectively.
4 to 7V
Press down foot switch, hold drive controller in full forward position and check voltage across terminals TB30 and TB31.
0V
Repair open in either wht or wht/blk wire circuit from TB30 and TB31 respectively.
4 to 7V
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 TB31 to EDC quick disconnect OR repair open in wht wire circuit from TB30 to EDC quick disconnect.
4 to 7V
Replace drive pump EDC OR consult Genie Industries Service Department.

Chart 33

Drive Forward Or Reverse Function Inoperative

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

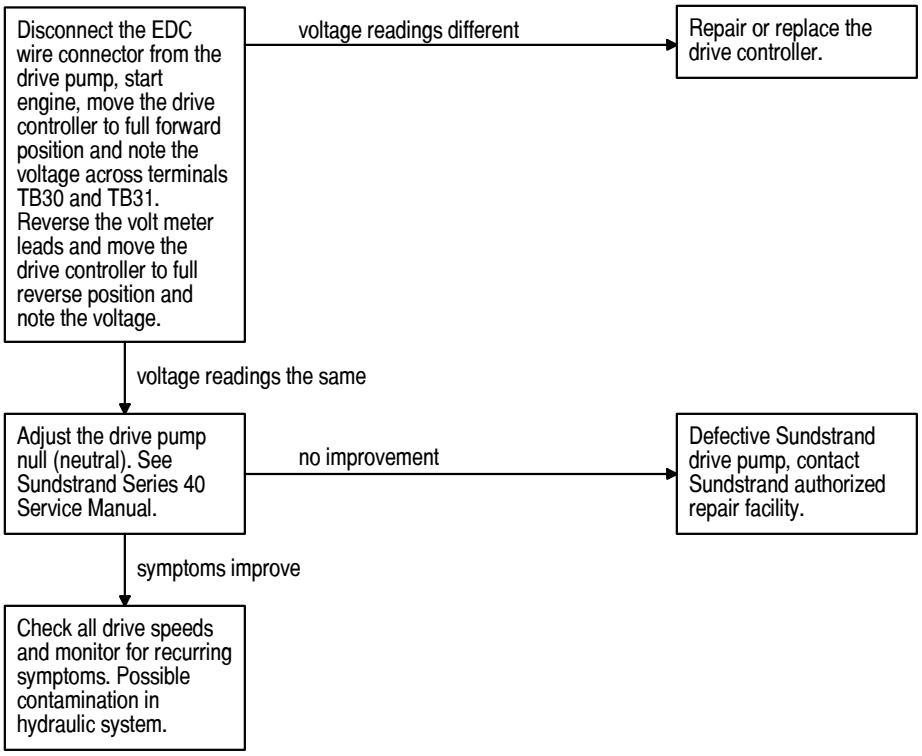


Chart 34

Traction Function Inoperative

Be sure all other functions operate normally.

Any type of traction problem, consult Genie Industries Service Department.

Chart 35

Machine Will Not Drive At Full Speed

Be sure all other functions operate normally.

Be sure the free-wheel valve is closed on the drive pump.

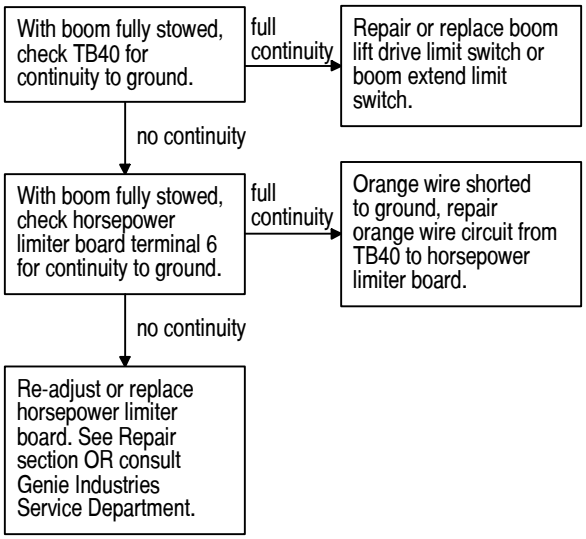


Chart 36

Machine Drives At Full Speed With Platform Raised or Extended

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.

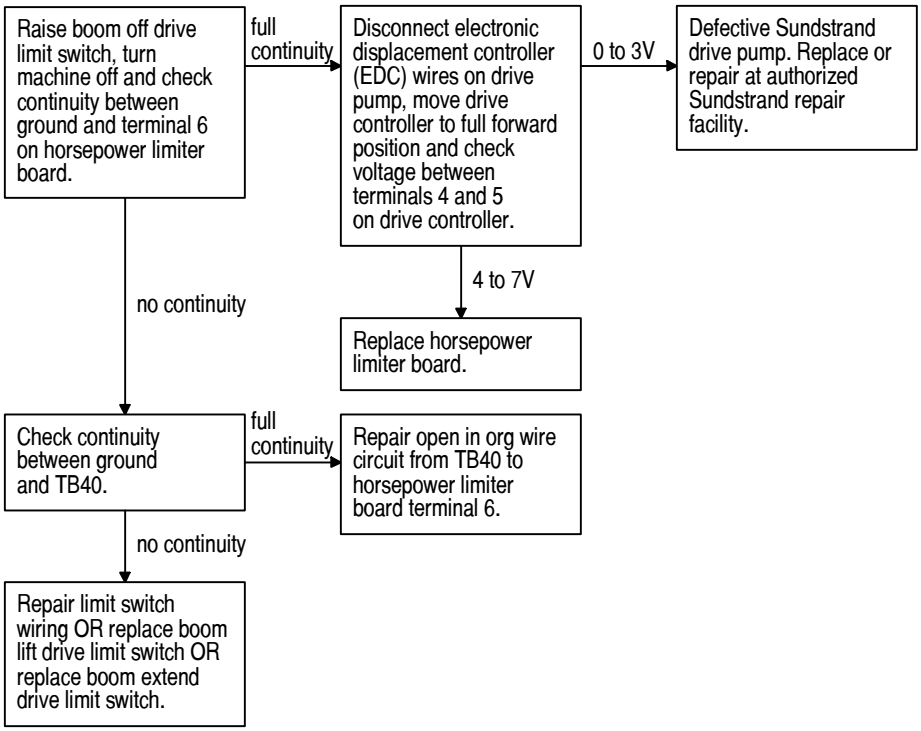


Chart 37

Drive Enable System Is Malfunctioning

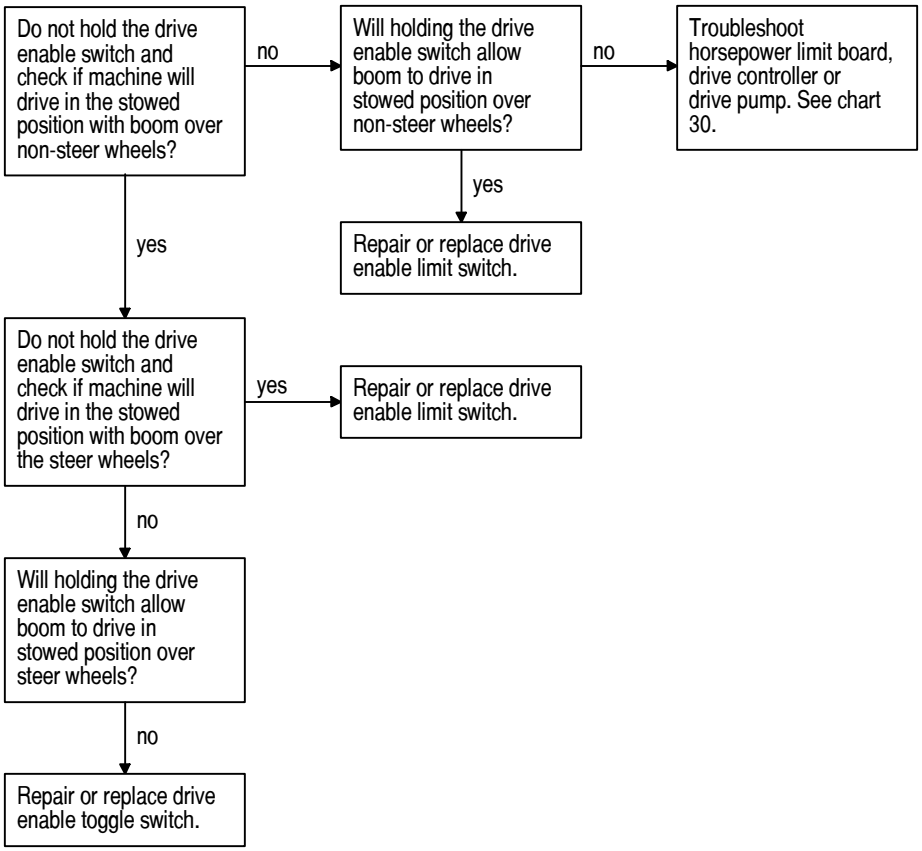


Chart 38

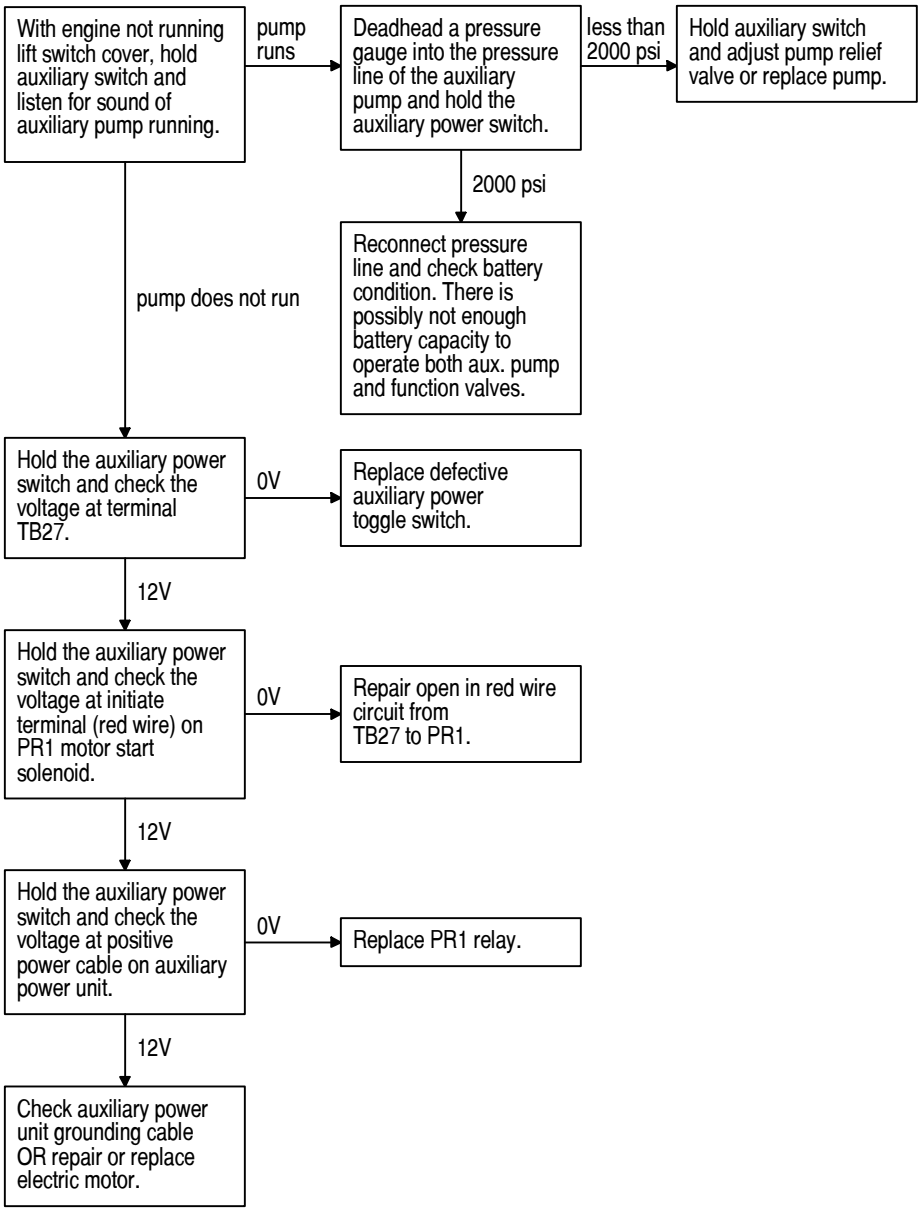
Auxiliary Functions Inoperative

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.

Note: Operating auxiliary power with the engine running should immediately kill the engine.



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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 printed in the *Genie S-80 & Genie S-85 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.

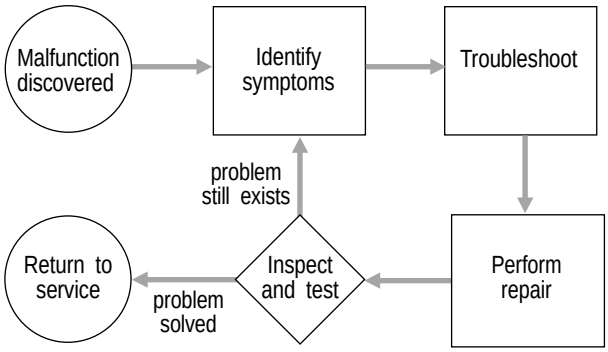
Electrical Schematics

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

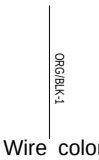
Hydraulic Schematics

⚠WARNING Bodily injury hazard. Spraying hydraulic oil can 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.

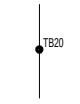
General Repair Process



Electrical Symbols Legend



Wire color with cable number



Terminal
TB=Terminal base
TP=Terminal platform

Quick disconnect terminal

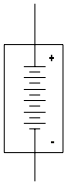
T-circuits connect at terminal

T-circuits connect

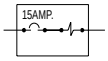
Connection no terminal

Circuits crossing no connection

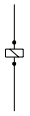
Diode



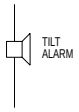
Battery



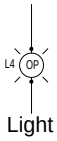
Circuit breaker



Solenoid or relay coil

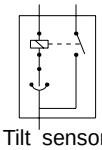


Horn



Light

Resistor

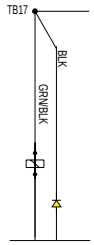


Tilt sensor

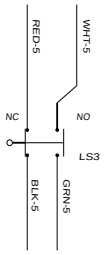
Spark plug

Glow plug

Limit switch normally open held closed

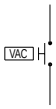


Ground supression circuit



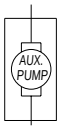
Limit switch

Limit switch normally closed held open



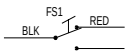
Vacuum switch

Oil pressure switch normally closed

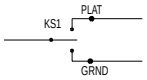


Auxiliary pump

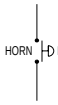
Water temperature switch normally open



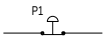
Foot switch



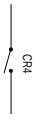
Key switch



Horn button normally open

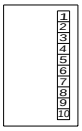


Emergency Stop button normally closed

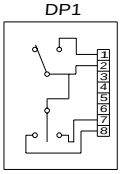


Relay contact normally open

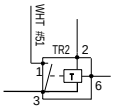
Relay panel contactor



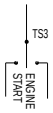
Horsepower limiter board



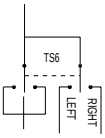
Single axis drive controller



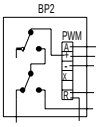
Time delay relay



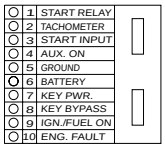
Toggle switch SPDT



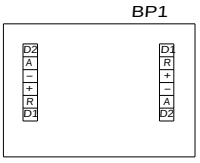
Toggle switch DPDT



Single axis proportional controller

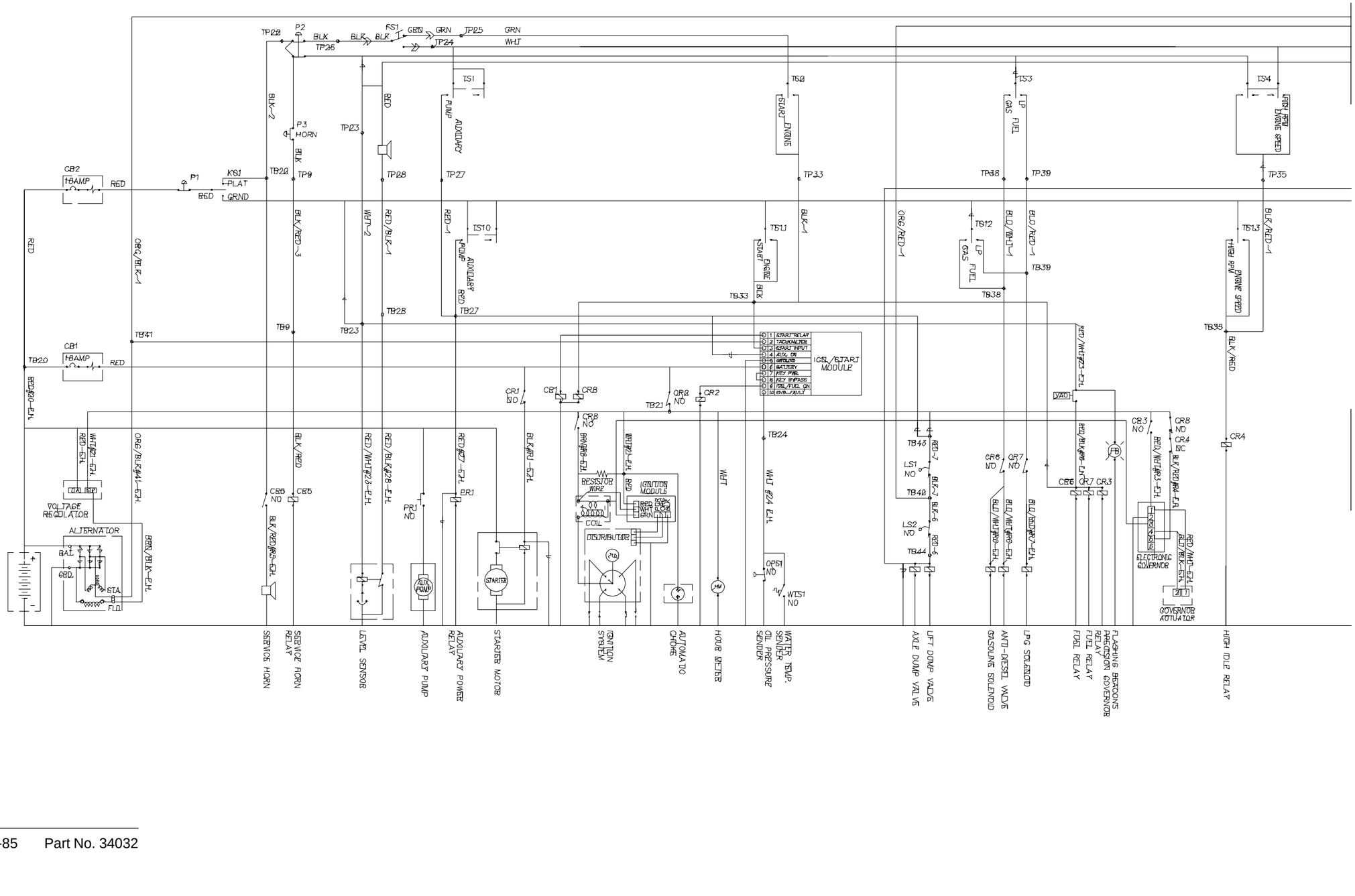


Ignition start module

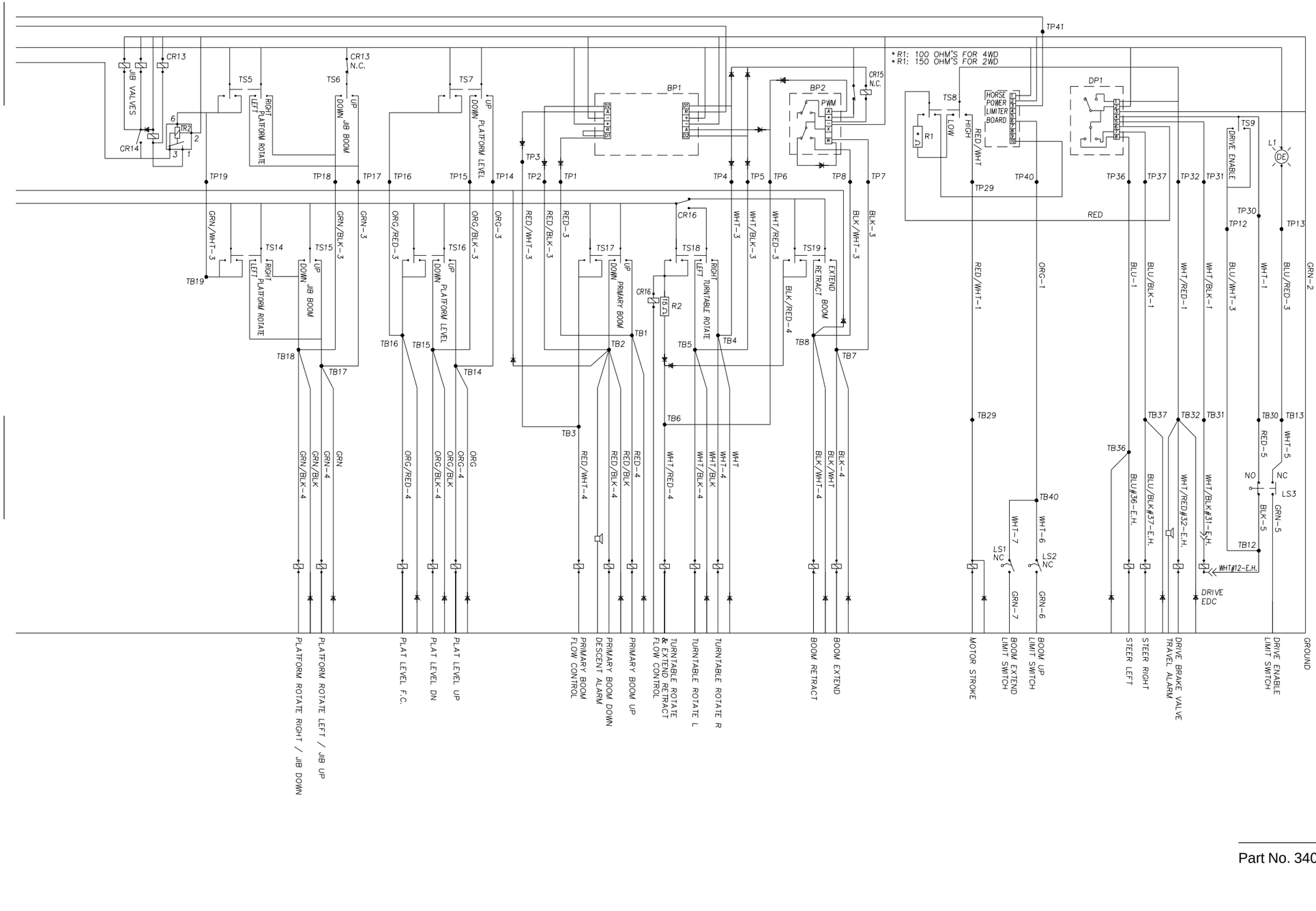


Dual axis Ramp up and down proportional controller

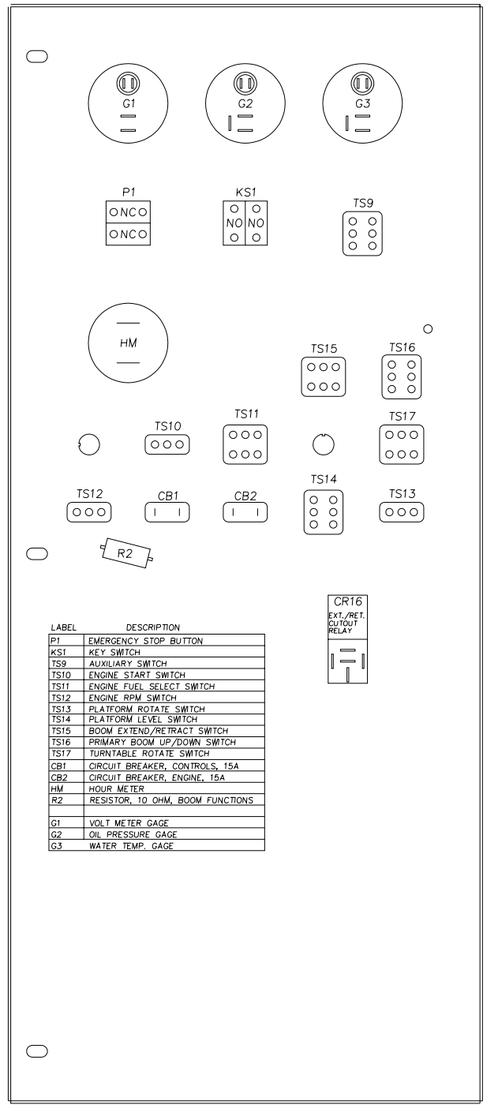
Electrical Schematic - Gasoline/LPG Models



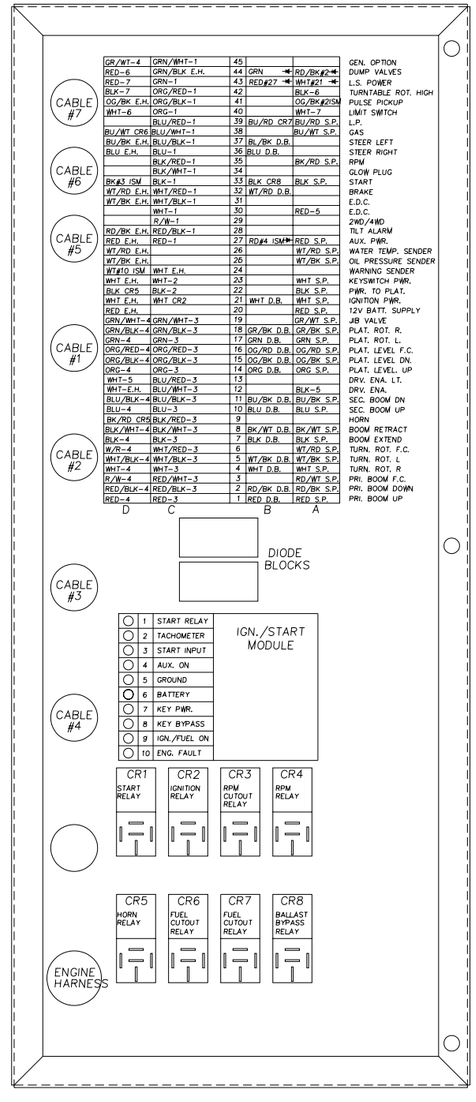
Electrical Schematic - Gasoline/LPG Models



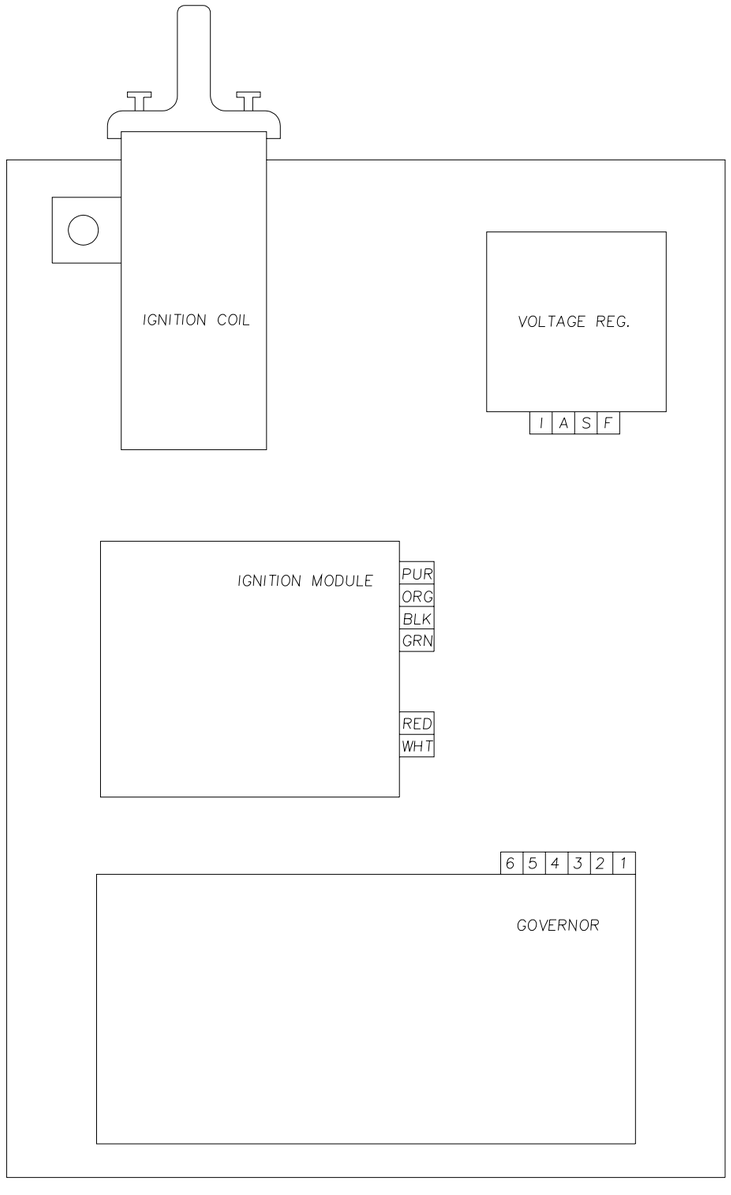
Ground Control Box Legend - Gasoline/LPG Models



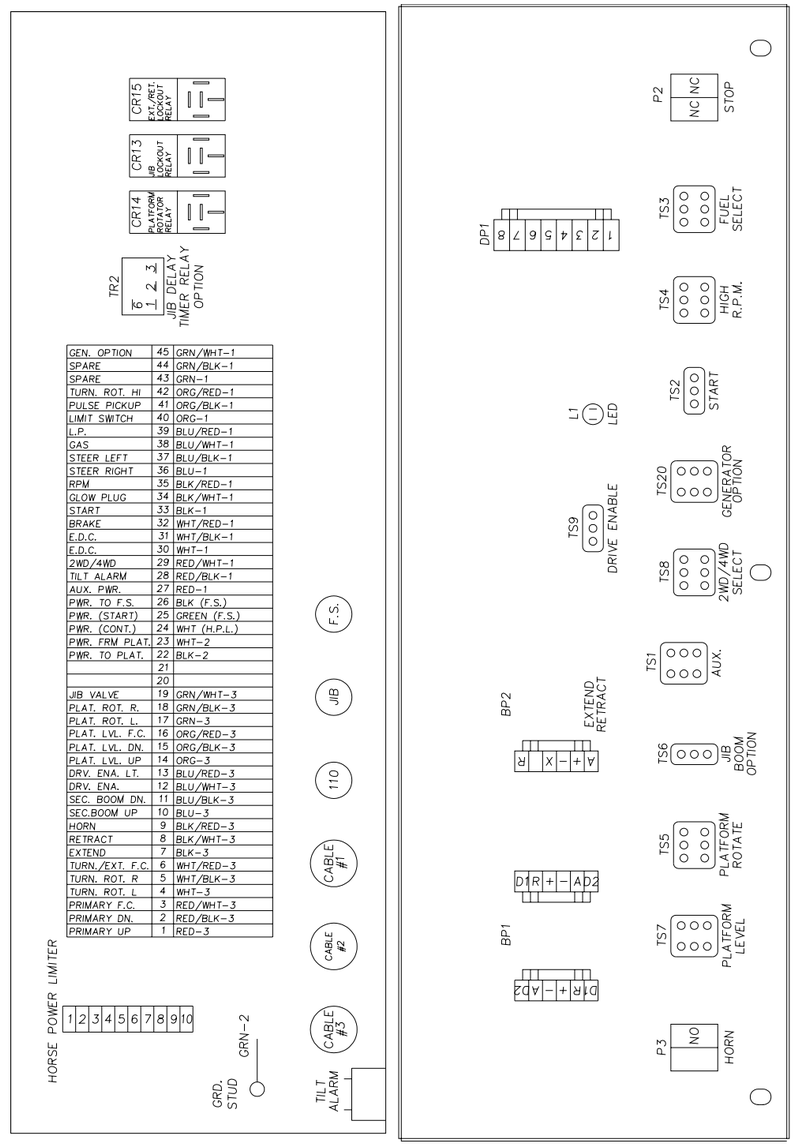
LABEL	DESCRIPTION
P1	EMERGENCY STOP BUTTON
KS1	KEY SWITCH
TS9	AUXILIARY SWITCH
TS10	ENGINE START SWITCH
TS11	ENGINE FUEL SELECT SWITCH
TS12	ENGINE RPM SWITCH
TS13	PLATFORM ROTATE SWITCH
TS14	PLATFORM LEVEL SWITCH
TS15	BOOM EXTEND/RETRACT SWITCH
TS16	PRIMARY BOOM UP/DOWN SWITCH
TS17	TURNTABLE ROTATE SWITCH
CB1	CIRCUIT BREAKER, CONTROLS, 15A
CB2	CIRCUIT BREAKER, ENGINE, 15A
HM	HOUR METER
R2	RESISTOR, 10 OHM, BOOM FUNCTIONS
G1	VOLT METER GAGE
G2	OIL PRESSURE GAGE
G3	WATER TEMP. GAGE



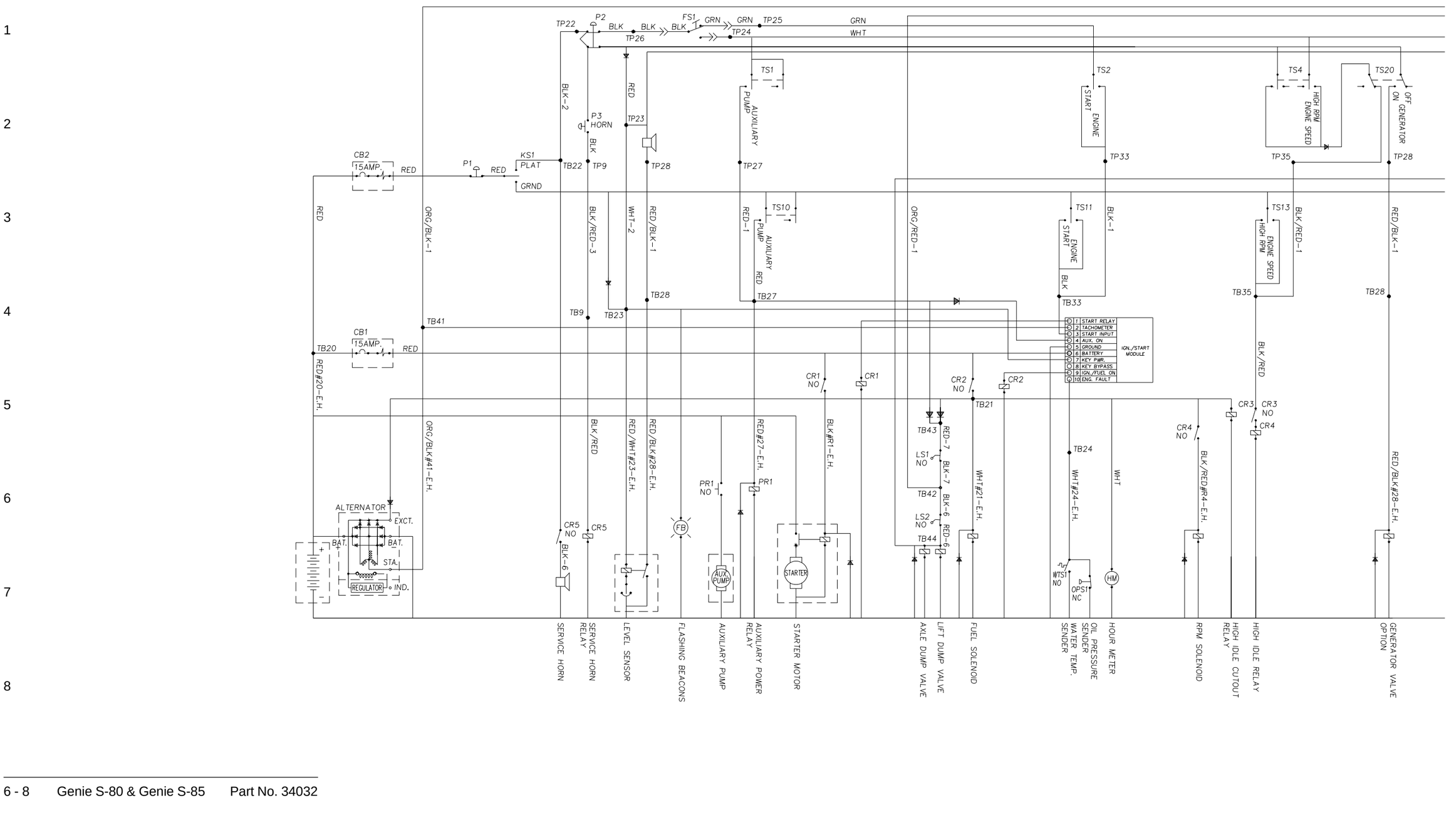
Relay Panel Legend - Gasoline/LPG Models



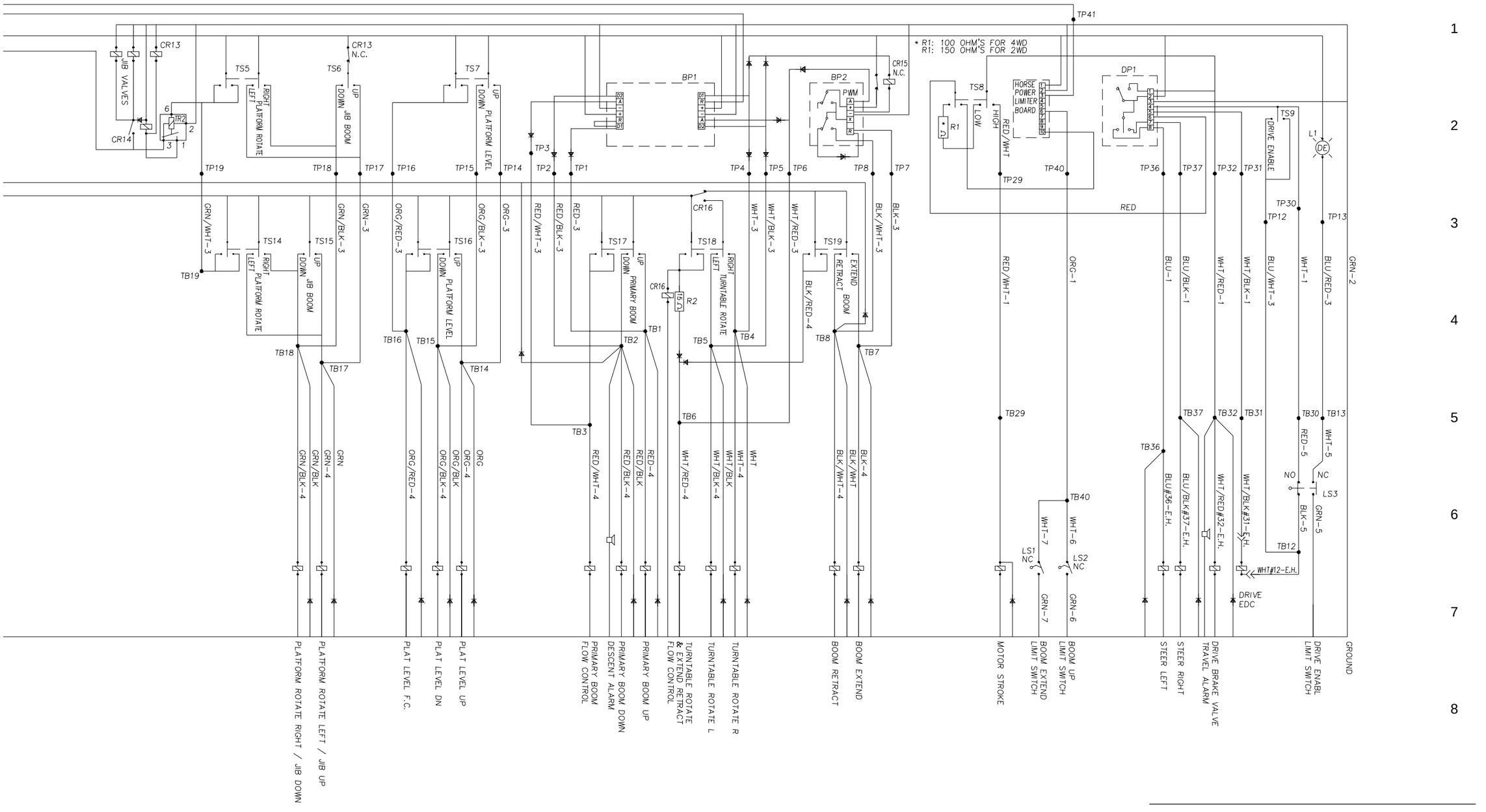
Platform Control Box Legend - Gasoline/LPG Models



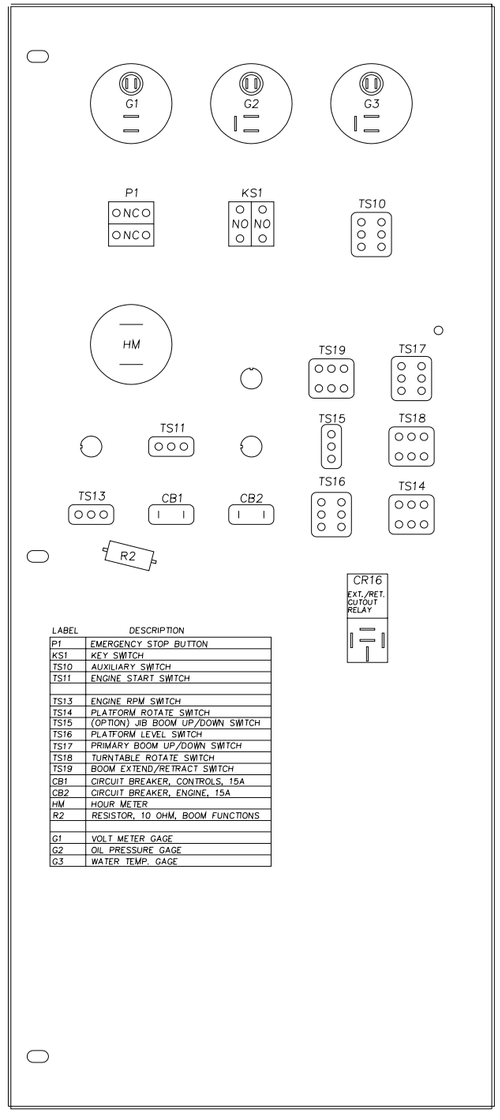
Electrical Schematic - Diesel Models



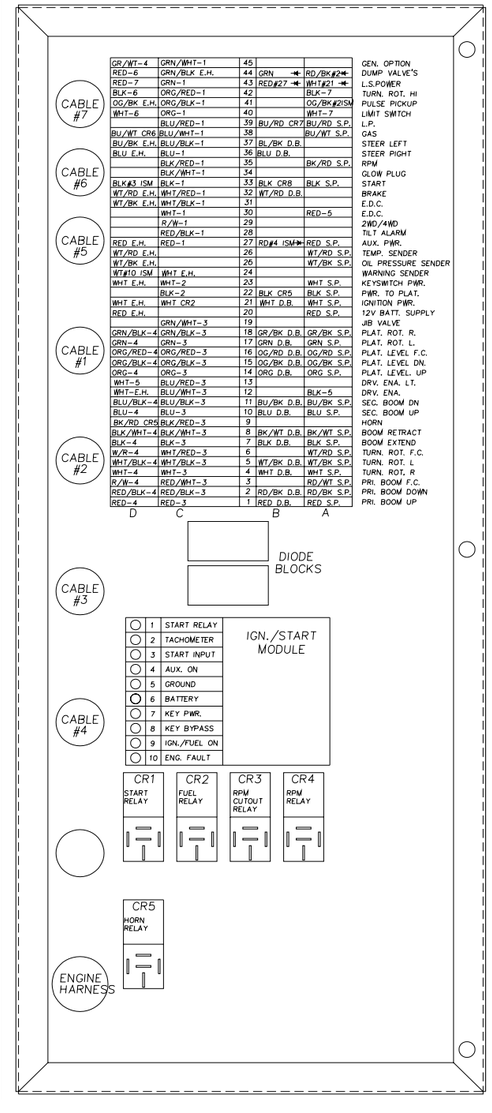
Electrical Schematic - Diesel Models



Ground Control Box Legend - Diesel Models

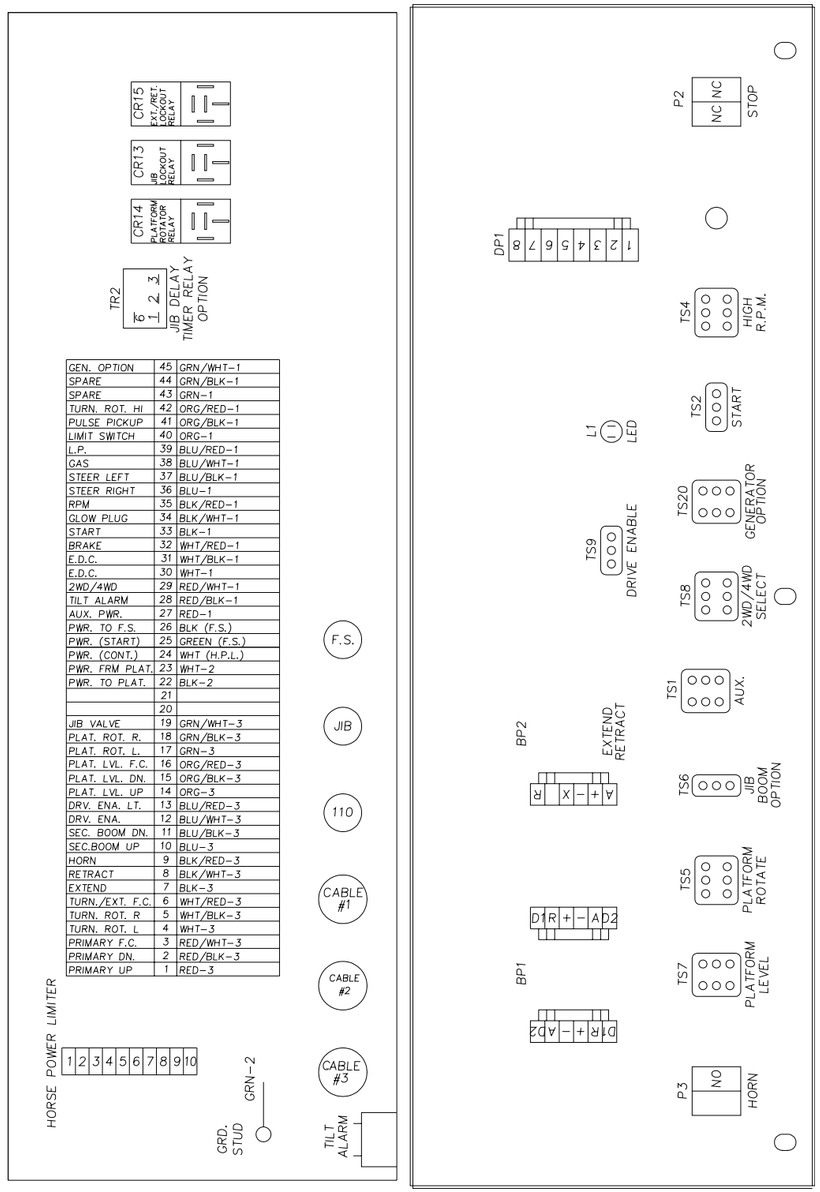


LABEL	DESCRIPTION
P1	EMERGENCY STOP BUTTON
KS1	KEY SWITCH
TS10	AUXILIARY SWITCH
TS11	ENGINE START SWITCH
TS13	ENGINE RPM SWITCH
TS14	PLATFORM ROTATE SWITCH
TS15	(OPTION) JIB BOOM UP/DOWN SWITCH
TS16	PLATFORM LEVEL SWITCH
TS17	PRIMARY BOOM UP/DOWN SWITCH
TS18	TURNTABLE ROTATE SWITCH
TS19	BOOM EXTEND/RETRACT SWITCH
CB1	CIRCUIT BREAKER, CONTROLS, 15A
CB2	CIRCUIT BREAKER, ENGINE, 15A
HM	HOUR METER
R2	RESISTOR, 10 OHM, BOOM FUNCTIONS
G1	VOLT METER GAGE
G2	OIL PRESSURE GAGE
G3	WATER TEMP. GAGE



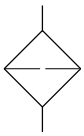
GR/WT-4	GRN/WHT-1	45			GEN. OPTION
RED-6	GRN/BLK E.H.	44	GRN	RD/BK#24	DUMP VALVE'S
RED-7	GRN-1	43	RED#27	WHT#21	L.S.POWER
BLK-6	ORG/RED-1	42		BLK-7	TURN. ROT. HI
OG/BK E.H.	ORG/BLK-1	41		OG/BK#25M	PULSE PICKUP
WHT-6	ORG-1	40		WHT-7	LIMIT SWITCH
	BLU/RED-1	39	BU/RD CR7	BU/RD S.P.	L.P.
BU/WT CR6	BLU/WHT-1	38		BU/WT S.P.	GAS
BU/BK E.H.	BLU/BLK-1	37	BL/BK D.B.		STEER LEFT
BLU E.H.	BLU-1	36	BLU D.B.		STEER PIGHT
	BLK/RED-1	35		BK/RD S.P.	RPM
	BLK/WHT-1	34			GLOW PLUG
BLK#3 ISM	BLK-1	33	BLK CR8	BLK S.P.	START
WT/RD E.H.	WHT/RED-1	32	WT/RD D.B.		BRAKE
WT/BK E.H.	WHT/BLK-1	31			E.D.C.
	WHT-1	30		RED-5	E.D.C.
	R/W-1	29			2WD/4WD
	RED/BLK-1	28			TILT ALARM
RED E.H.	RED-1	27	RD#4 ISM	RED S.P.	AUX. PWR.
WT/RD E.H.		26		WT/RD S.P.	TEMP. SENDER
WT/BK E.H.		25		WT/BK S.P.	OIL PRESSURE SENDER
WT#10 ISM	WHT E.H.	24			WARNING SENDER
WHT E.H.	WHT-2	23		WHT S.P.	KEYSWITCH PWR.
	BLK-2	22	BLK CR5	BLK S.P.	PWR. TO PLAT.
WHT E.H.	WHT CR2	21	WHT D.B.	WHT S.P.	IGNITION PWR.
RED E.H.		20		RED S.P.	12V BATT. SUPPLY
	GRN/WHT-3	19			JIB VALVE
GRN/BLK-4	GRN/BLK-3	18	GR/BK D.B.	GR/BK S.P.	PLAT. ROT. R.
GRN-4	GRN-3	17	GRN D.B.	GRN S.P.	PLAT. ROT. L.
ORG/RED-4	ORG/RED-3	16	OG/RD D.B.	OG/RD S.P.	PLAT. LEVEL F.C.
ORG/BLK-4	ORG/BLK-3	15	OG/BK D.B.	OG/BK S.P.	PLAT. LEVEL DN.
ORG-4	ORG-3	14	ORG D.B.	ORG S.P.	PLAT. LEVEL UP
WHT-5	BLU/RED-3	13			DRV. ENA. LT.
WHT-E.H.	BLU/WHT-3	12		BLK-5	DRV. ENA.
BLU/BLK-4	BLU/BLK-3	11	BU/BK D.B.	BU/BK S.P.	SEC. BOOM DN
BLU-4	BLU-3	10	BLU D.B.	BLU S.P.	SEC. BOOM UP
BK/RD CR5	BLK/RED-3	9			HORN
BLK/WHT-4	BLK/WHT-3	8	BK/WT D.B.	BK/WT S.P.	BOOM RETRACT
BLK-4	BLK-3	7	BLK D.B.	BLK S.P.	BOOM EXTEND
W/R-4	WHT/RED-3	6		WT/RD S.P.	TURN. ROT. F.C.
WHT/BLK-4	WHT/BLK-3	5	WT/BK D.B.	WT/BK S.P.	TURN. ROT. L
WHT-4	WHT-3	4	WHT D.B.	WHT S.P.	TURN. ROT. R
R/W-4	RED/WHT-3	3		RD/WT S.P.	PRI. BOOM F.C.
RED/BLK-4	RED/BLK-3	2	RD/BK D.B.	RD/BK S.P.	PRI. BOOM DOWN
RED-4	RED-3	1	RED D.B.	RED S.P.	PRI. BOOM UP
D	C		B	A	

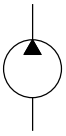
Platform Control Box Legend - Diesel Models

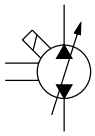


Hydraulic Symbols Legend

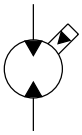

Pressure gauge


Filter


Fixed displacement pump

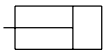

Bi-directional, variable displacement pump


Bi-directional motor


2-speed, bi-directional motor

Pump prime mover (motor)

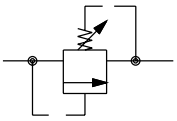
Pump prime mover (engine)

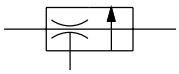

Double acting cylinder

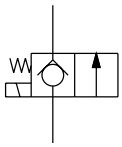
Orifice with size

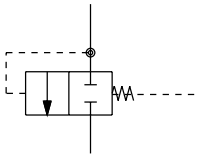

Variable orifice or shut-off valve

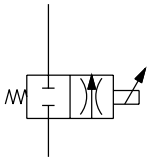

Check valve

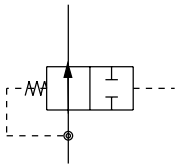

Adjustable relief valve

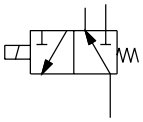

Priority flow divider

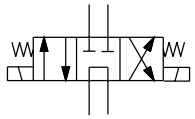

Solenoid operated dump valve

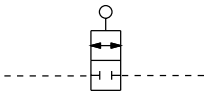

Differential sensing valve

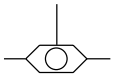

Solenoid operated proportional valve

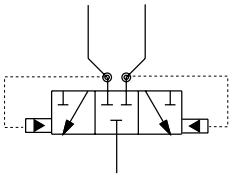

Flow regulator valve

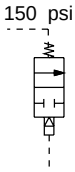

Solenoid operated 2 pos., 3 way, directional valve


Solenoid operated 3 pos., 4 way, directional valve

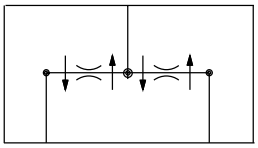

Manually operated 2 pos., 2 way valve

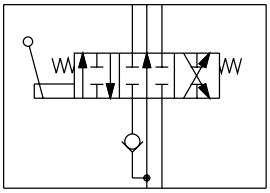

2 pos., 3 way, shuttle valve

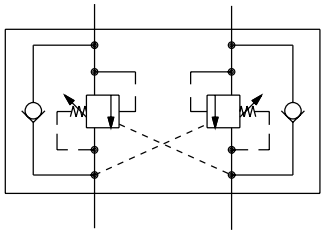

3 pos., 3 way, directional valve



Pilot operated bypass valve with psi


Flow divider/combiner

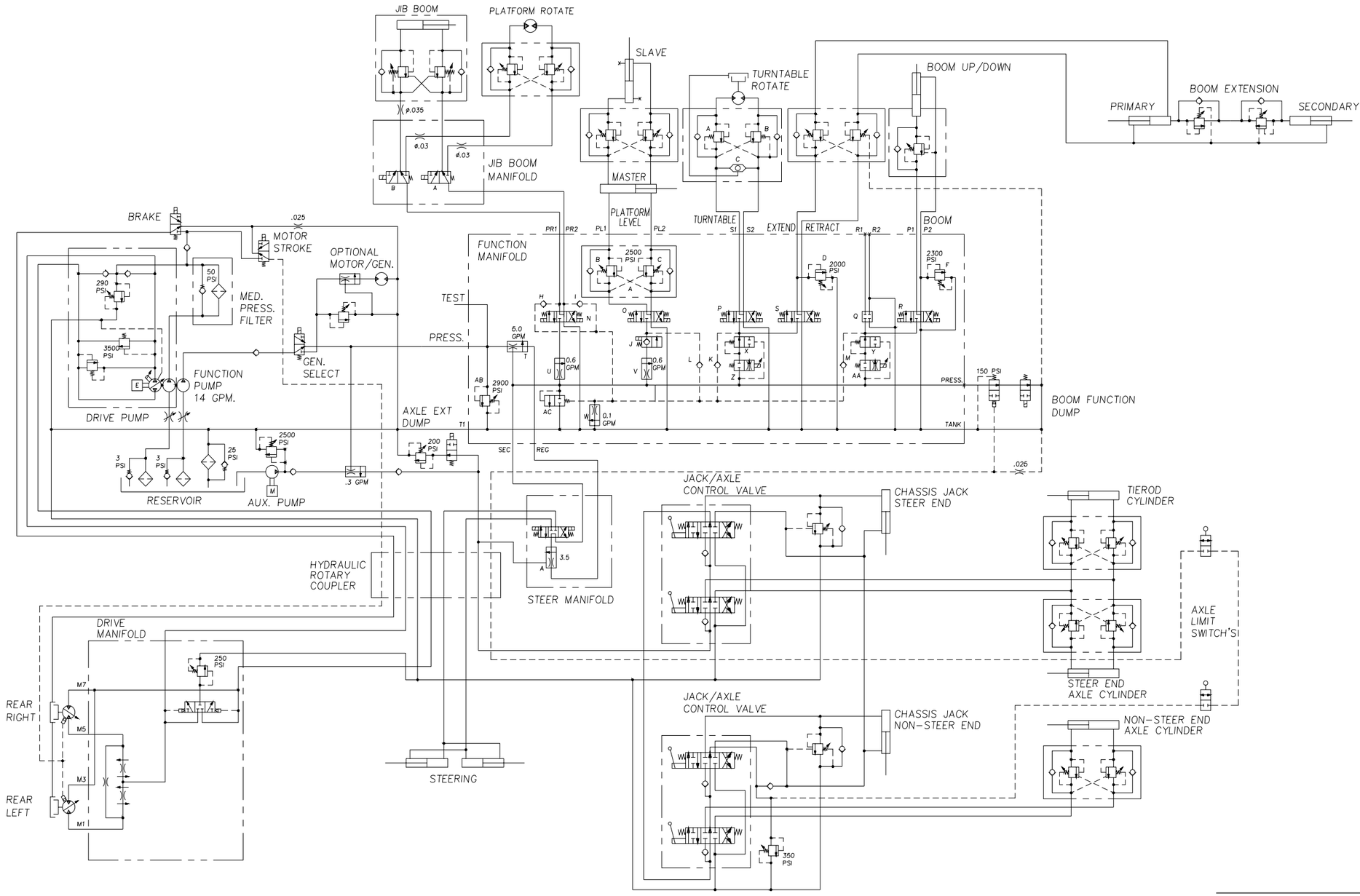

Manually operated 3 pos., 4 way valve with pilot port


Counterbalance valve

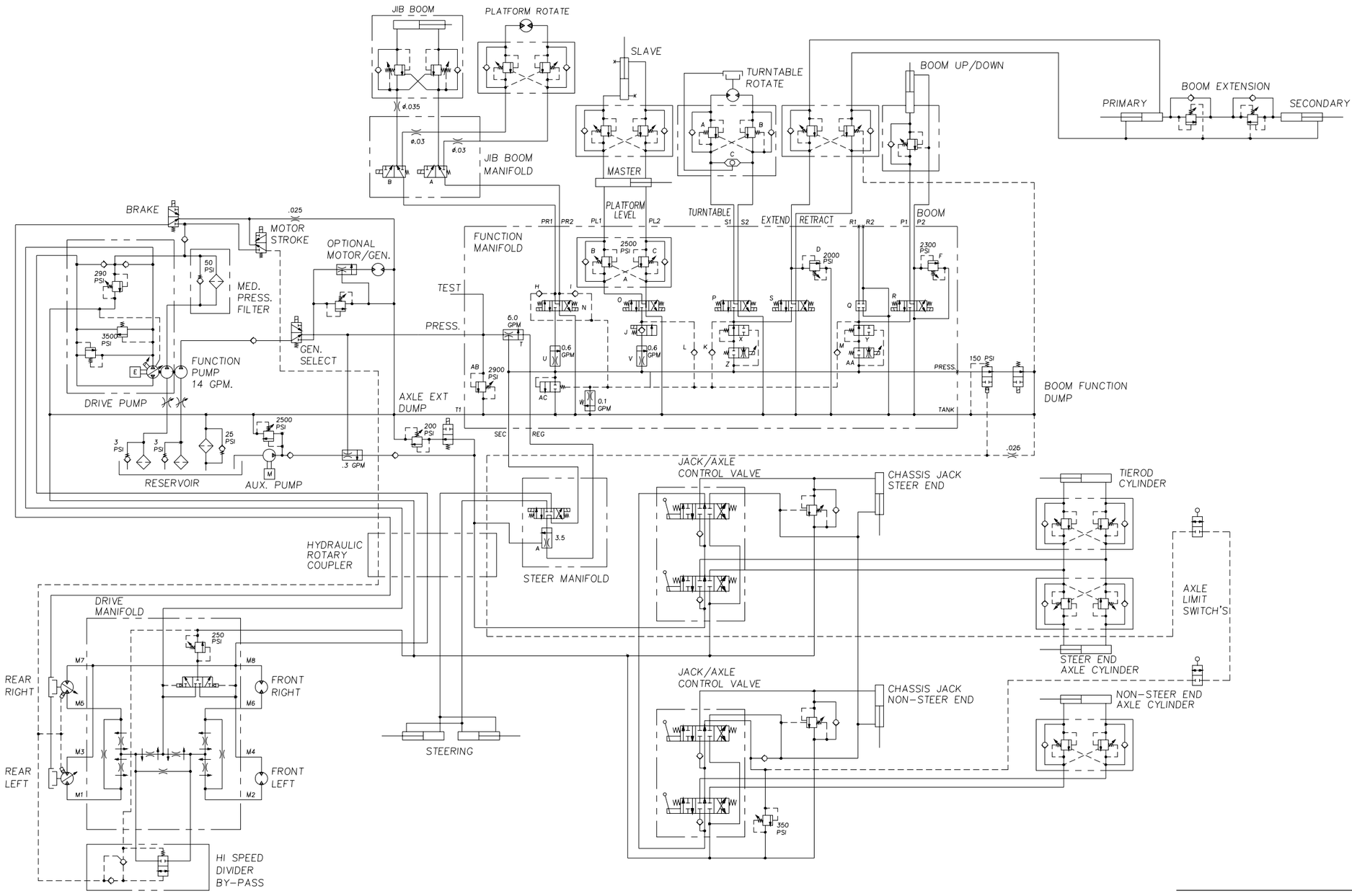
2WD Hydraulic Schematic

O N M L K J I H G F E D C B A

1 2 3 4 5 6 7 8



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:

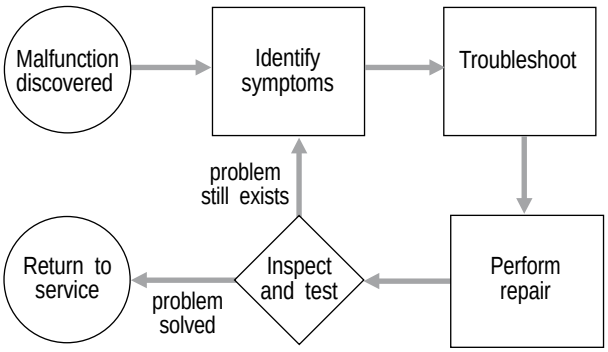
- ☑ Read, understand and obey the safety rules and operating instructions in the *Genie S-80 & Genie S-85 Operator's Manual.*
- ☑ Be sure that all necessary tools and parts are available and ready for use.
- ☑ Read each procedure completely and adhere to the instructions. Attempting shortcuts may produce hazardous conditions.
- ☑ Unless otherwise specified, perform each repair procedure with the machine in the following configuration:
  - · machine parked on a flat, level surface
  - · boom in stowed position
  - · turntable rotated with the boom between the non-steering wheels
  - · turntable secured with the turntable rotation lock pin
  - · key switch in the OFF position with the key removed
  - · wheels chocked
  - · axles retracted

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 personal injury or damage to the machine.

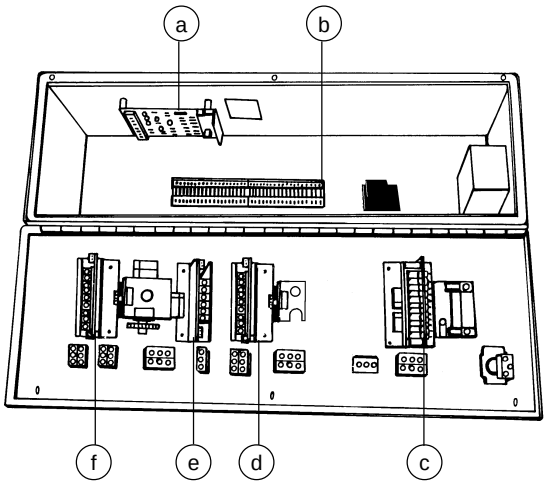
NOTICE Indicates special operation or maintenance information.

⊙ 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 terminals
- c drive proportional controller
- d extend/retract proportional controller
- e boom proportional controller
- f turntable rotate proportional controller

Boom Up/Down Controller Adjustments

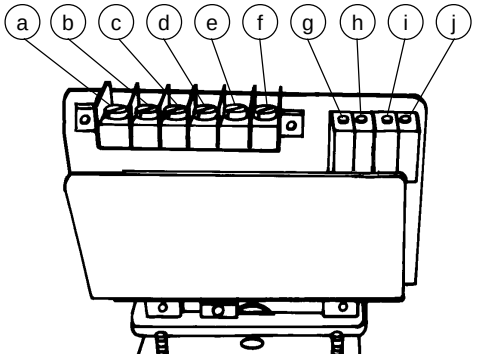
NOTICE Do not adjust the joystick controllers unless the static battery voltage is above 12V DC and the alternator is operating properly with 13.6 to 14.5V DC output.

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

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

2 Turn the key switch to platform control and pull 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 terminal "D2" directional output
- b terminal "A" proportional output
- c terminal "-" ground
- d terminal "+" positive
- e terminal "R" activates max-out range
- f terminal "D1" directional output
- g ramp rate adjustable trimpot
- h lo range adjustable trimpot
- i threshold adjustable trimpot
- j hi range adjustable trimpot

4 Set the preliminary ramp rate: Turn the trimpot adjustment screw clockwise 15 turns or until you hear a repeated 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 3.5V DC. Turn the threshold trimpot adjustment screw clockwise to increase the voltage or counterclockwise to decrease the voltage.

7 Set the hi range: Press down the foot switch, then move the control handle all the way to the UP position. Adjust the voltage to 9.1V DC. Turn the max-out trimpot adjustment screw clockwise to increase the voltage or counterclockwise to decrease the voltage.

8 Set the lo range: Press down the foot switch, then move the control handle all the way to the DOWN position. Adjust the voltage to 8.3V 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 idle control switch to foot switch activated high idle (rabbit and foot switch symbol). Lower the boom to the stowed position.

NOTICE Engine should be at normal operating temperature.

10 Start a timer and record how long it takes for the boom to fully raise. Adjust the max-out trimpot to achieve a 90 to 120 second cycle time.

11 Start a timer and record how long it takes for the boom to fully lower. Adjust the dual range trimpot to achieve a 90 to 120 second cycle time.

NOTICE If the function cycle time is not achievable, check the relief valve pressure. See 10-2, *Valve Adjustments - Function Manifold.*

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 all the way to the 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 4 second ramp speed. Turn the trimpot clockwise to increase the time or counterclockwise to decrease the time.

Boom up/down specifications	
Threshold	3.5V DC
Boom up - hi range	9.1V DC
Cycle time	90 to 120 seconds
Boom down - lo range	8.3V DC
Cycle time	90 to 120 seconds
Ramp rate	3 to 4 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 13.6 to 14.5V DC output.

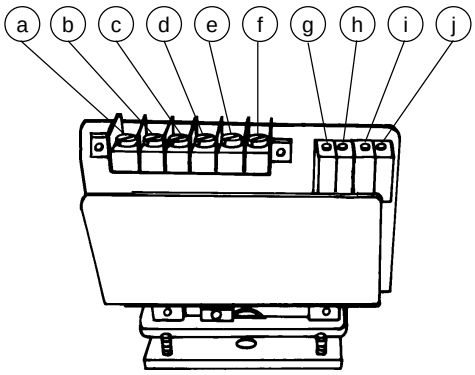
⚠WARNING Electrocution hazard. Contact with electrically charged circuits may result in death or serious injury. Remove all rings, watches and other jewelry.

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

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

PLATFORM CONTROLS

3 Open the platform control box lid and locate the turntable rotation controller. Refer to the platform control box illustration, page 7-2.



a terminal "D2" directional output
b terminal "A" proportional output
c terminal "-" ground
d terminal "+" positive
e terminal "R" activates max-out range
f terminal "D1" directional output
g ramp rate adjustable trimpot
h lo range adjustable trimpot
i threshold adjustable trimpot
j hi range adjustable trimpot

4 Set the preliminary ramp rate: Turn the trimpot adjustment screw clockwise 15 turns or until you hear a repeated 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 3.5V DC. Turn the threshold trimpot adjustment screw clockwise to increase the voltage or counterclockwise to decrease the voltage.

7 Set the hi range: Press down the foot switch, fully retract the boom, then move the control handle all the way to the left or right. Adjust the voltage to 5.5V DC. Turn the max-out trimpot adjustment screw clockwise to increase the voltage or counterclockwise to decrease the voltage.

8 Set the lo range: Press down the foot switch, extend the boom 3 feet, then move the control handle all the way to the left or right. Adjust the voltage to 4.5V DC. Turn the lo range trimpot adjustment screw clockwise to increase the voltage or counterclockwise to decrease the voltage.

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

NOTICE Engine should be at normal operating temperature.

10 Fully retract the boom, then 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 120 second cycle time.

11 Extend the boom, then start a timer and record how long it takes the turntable to rotate through a complete circle. Adjust the lo range trimpot to achieve a 210 to 240 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 left or right. Record the maximum voltage reading.

15 Start the engine.

16 Start a timer and simultaneously move the control handle all the way to the left or right. Note how long it takes to reach the maximum voltage recorded in step 14. This is the ramp rate.

17 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	3.5V DC
Turntable rotation -	
hi range (boom retracted)	5.5V DC
Cycle time	80 to 120 seconds
lo range (boom extended)	4.5V DC
Cycle time	210 to 240 seconds
Ramp rate	5 seconds

Boom Extend/Retract Controller Adjustments

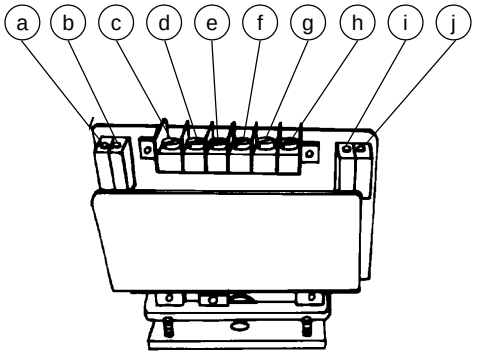
NOTICE Do not adjust the joystick controllers unless the static battery voltage is above 12V DC and the alternator is operating properly with 13.6 to 14.5V DC output.

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

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

2 Turn the key switch to platform control and pull 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. Refer to the platform control box illustration, page 7-2.



a ramp rate adjustable trimpot
b dual (lo) range 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 repeated 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 3.5V 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 9.75V DC. Turn the max-out trimpot adjustment screw clockwise to increase the voltage or counterclockwise to decrease the voltage.

PLATFORM CONTROLS

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 8.9V 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 idle control switch to foot switch activated high idle (rabbit and foot switch symbol). Lower the boom to the stowed position.

⚠WARNING Engine should be at normal operating temperature.

10 Start a timer and record how long it takes for the boom to fully extend. Adjust the max-out trimpot to achieve an 140 to 170 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 an 80 to 110 second cycle time.

⚠WARNING If the function cycle time is not achievable, check the relief valve pressure. See 10-2, *Valve Adjustments - Function Manifold.*

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 all the way to the 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 up/down specifications	
Threshold	3.5V DC
Boom extend - Max-out	9.75V DC
Cycle time	140 to 170 seconds
Boom retract - Dual (lo) range	8.9V DC
Cycle time	80 to 110 seconds
Ramp rate	3 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 The engine rpm must be correct before performing this procedure. See Maintenance Procedure B-12, *Check and Adjust the Engine RPM.*

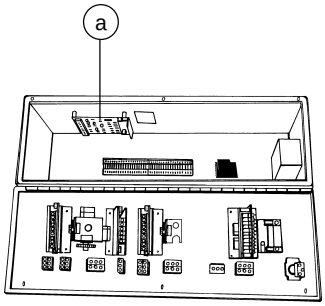
NOTICE Do not adjust the horsepower limiter board unless the static battery voltage is above 12V DC and the alternator is operating properly with 12.5 to 14.5V DC output.

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

1 Remove the fasteners from the platform control box lid.

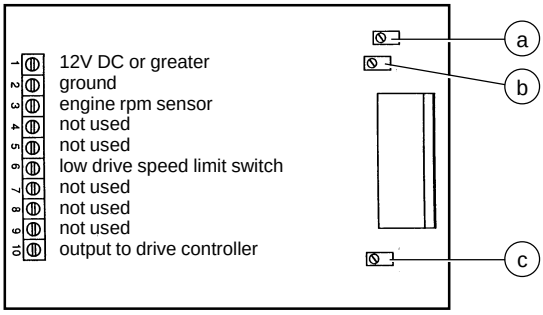
2 Open the control box lid and locate the horsepower limiter board.

⚠WARNING 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 raised 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 idle 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	10.5 to 11.5V DC

7 Move the engine idle 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 idle 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.

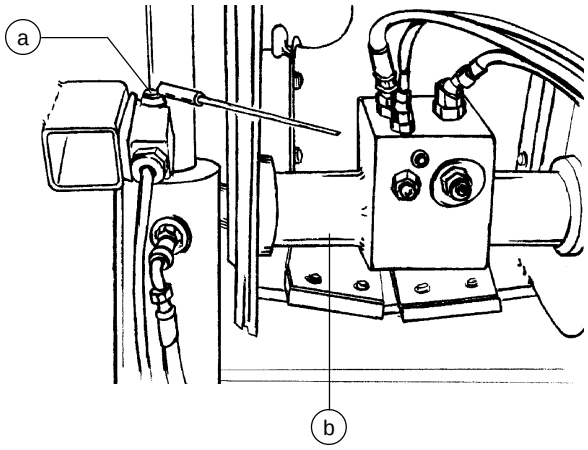
11 Be sure that the boom is in the stowed position, then drive the machine and observe how the engine rpm reacts to drive control handle movement. If the engine surges or hunts, adjust the "C" potentiometer counterclockwise until surging is minimized.

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 (surging) and engine rpm droop.

PLATFORM CONTROLS

12 Disconnect the volt meter.

13 Raise the boom above the drive limit switch.



a drive limit switch
b boom extension cylinder

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

15 Adjust the "B" potentiometer to obtain the correct raised drive speed of 1 foot per second (30.5 cm per second). Turn the "B" potentiometer counterclockwise to increase voltage or clockwise to decrease voltage.

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

Drive speed specifications		
Stowed position	distance: 40 ft / 12 m	
	2WD	**4WD**
Gasoline/LPG models	40 ft/7.2 sec 12.2 m/7.2 sec	40 ft/8.8 sec 12.2 m/8.8 sec
Deutz Diesel models	40 ft/8.3 sec 12.2 m/8.3 sec	40 ft/9.1 sec 12.2 m/9.1 sec
Boom raised or extended All models	distance: 40 ft / 12 m 1 foot per second 30.5 cm per second	

1-3
Foot Switch
How to Test the Foot Switch

1 Turn the key switch to the OFF position and separate 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**
green to black	continuity (zero Ω)
green to white	no continuity (infinite Ω)
black to white	no continuity

NOTICE Do not use the color 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**
green to black	no continuity (infinite Ω)
green to white	no continuity
black to white	continuity (zero Ω)

1-4 Resistors

The resistors is used on 4WD machines to maintian low range drive speed. The resistors are located in the platform control box.

NOTICE Refer to the schematic legends for resistor locations and values.

How to Test the Resistors

1 Turn the key switch to the OFF position.

2 Disconnect either end of one of the wires connected to the resistor to be tested.

3 Connect the leads from an ohmmeter to each end or wiring of the resistor being tested.

4 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.

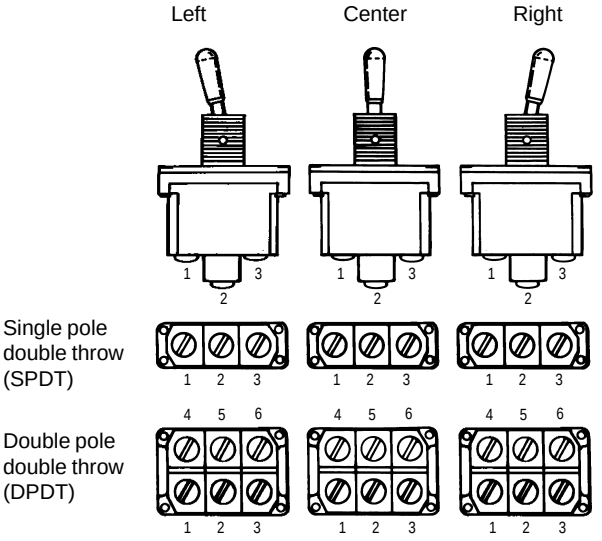
How to Test a Toggle Switch

NOTICE Continuity is the equivalent of 0 to 3 ohms. A simple continuity tester may not accurately test the 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. Tag 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 (zero Ω)
terminal 1 to 3, 4, 5 & 6	no continuity (infinite Ω)
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 CONTROLS

1-6
Control Relays

Relays used for single function switching are single pole double throw (SPDT) relays.

How to Test a Single Pole Double Throw Relay

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

Direct Connection Relay

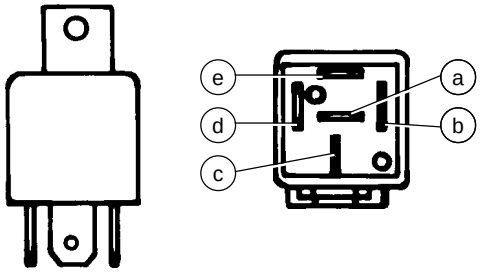
1 Label and then disconnect all the wiring from the relay to be tested.

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.

Test	Desired result
terminal 85 to 86 without resistor	85 to 95Ω
terminal 87 to 87a & 30	no continuity (infinite Ω)
terminal 87a to 30	continuity (zero Ω)

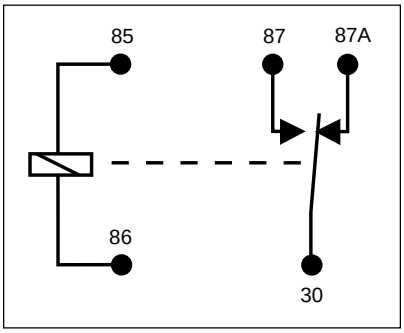
3 Connect 12V DC to terminal 85 and a ground wire to terminal 86, then test the following terminal combinations.

Test	Desired result
terminal 87 to 87a & 30	no continuity (infinite Ω)
terminal 87 to 30	continuity (zero Ω)



a terminal no. 87a - N.C.
b terminal no. 85 - coil
c terminal no. 30 - common
d terminal no. 86 - ground
e terminal no. 87 - N.O.

Control Relay Schematic - without resistor



Platform Components

2-1 Platform

How to Remove the Platform

1 Remove the cable harness from the cable clamp 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 Extend the boom until the slave cylinder barrel-end pivot pin is accessible.

2 Raise the boom slightly and place blocks under the platform. Then lower the boom until the platform is resting on the blocks.

3 Remove the pin retainer fastener from the rod-end pin.

4 Remove the external retaining ring from the barrel-end pin.

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

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

7 Carefully pull the cylinder out of the boom.

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

PLATFORM COMPONENTS

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 to a horizontal position.

2 Move the platform level switch up and down through two platform leveling cycles to remove any air that might be in the system.

2-3 Platform Rotator

The platform rotator is a hydraulically activated helical gear assembly used to rotate the platform 160 degrees.

How to Remove the Platform Rotator

⚠CAUTION Component damage hazard. Mark the platform mounting weldment and the rotator flange before removing the platform mounting weldment. The platform mounting weldment must be replaced in the exact same position on the rotator flange as it was before removal. If a new rotator is installed or the rotator is disassembled, proper alignment can be achieved by rotating the rotator all the way to the left and then installing the platform mounting weldment all the way in the left position.

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

2 Disconnect and plug the hydraulic hoses from the platform rotator 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.

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

4 Remove the six mounting bolts from the platform mounting weldment, then remove the center bolt and slide the platform mounting weldment off of the platform rotator.

5 Support the platform rotator. Do not apply any lifting pressure.

S-80 Models:

6 Support the platform leveling slave cylinder.

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

8 Use a soft metal drift to drive both pins out, then remove the platform rotator from the machine.

S-85 Models:

6 Remove the pin retainers from the jib boom and leveling links to platform rotator pivot pins. Do not remove the pins.

7 Support the jib boom and leveling links.

8 Use a soft metal drift to drive both pins out, then remove the platform rotator from the machine.

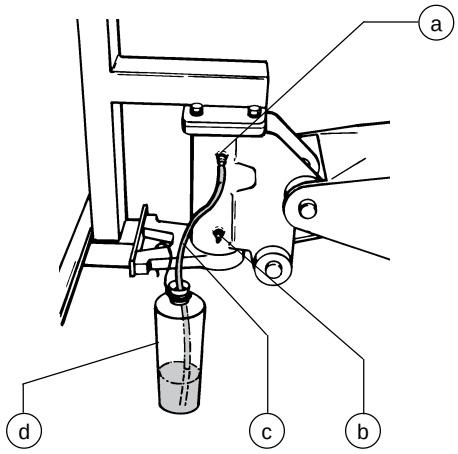
How to Bleed the Platform Rotator

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.

Jib Boom Components - S-85 Models

3-1
Jib Boom - S-85 Models

How to Remove the Jib Boom

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

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

2 Remove the platform mounting weldment and the platform rotator. See 2-3, *How to Remove the Platform Rotator*.

3 Support the platform pivot weldment with a lifting device.

4 Disconnect and plug the jib boom lift cylinder 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.

5 Remove the pin retainer from the jib boom lift cylinder barrel-end pivot pin. Use a soft metal drift to remove the pin.

6 Tag, disconnect and plug all the hydraulic hoses from the jib boom 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.

7 Remove the cable tray from the side of the jib boom.

8 Support the jib boom with an overhead crane.

9 Remove the pin retainer from the jib boom pivot pin. Use a soft metal drift to remove the pin, then remove the jib boom from the primary boom.

⚠WARNING Crushing hazard. The jib boom will fall when the pin is removed if it is not properly supported.

10 Remove the pin retainers from the jib boom lift cylinder rod-end pivot pin. Do not remove the pin.

11 Remove both of the jib boom leveling links from the primary boom.

12 Support the jib boom lift cylinder with an overhead crane.

13 Use a soft metal drift to remove the jib boom lift cylinder rod-end pivot pin, then remove the jib boom lift cylinder from the primary boom.

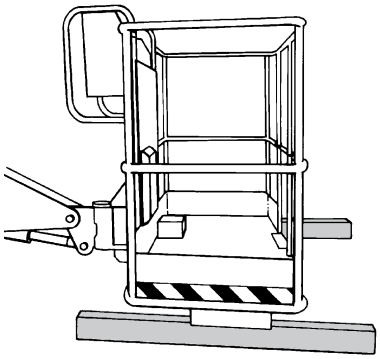
⚠WARNING Crushing hazard. The jib boom lift cylinder will fall when the pin is removed if it is not properly supported.

3-2
Jib Boom Lift Cylinder - S-85 Models

How to Remove the Jib Boom Lift Cylinder

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

1 Raise the jib boom slightly and place blocks under the platform mounting weldment. Then lower the jib boom until the platform is resting on the blocks.



2 Disconnect and plug the jib boom lift cylinder 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.

3 Remove the pin retainers from the jib boom lift cylinder rod-end pivot pin. Do not remove the pin.

4 Use a soft metal drift to tap the rod-end pivot pin half way out. Then lower the leveling link to the ground. Tap the pin the other direction and remove the opposite leveling link. Do not remove the pin.

5 Support the jib boom lift cylinder with an overhead crane.

6 Remove the pin retainer from the jib boom lift cylinder barrel-end pivot pin. Use a soft metal drift to remove the barrel-end pin.

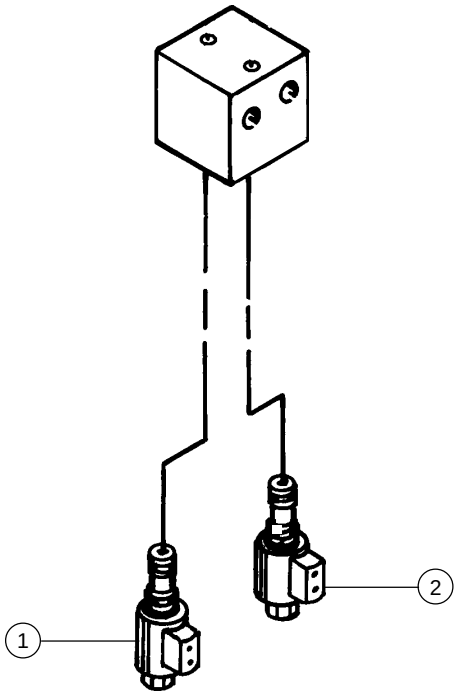
7 Use a soft metal drift to remove the jib boom lift cylinder rod-end pin. Remove the cylinder from the machine.

⚠WARNING Crushing hazard. The jib boom lift cylinder will fall when it is removed if it is not properly supported.

JIB BOOM COMPONENTS - S-85 MODELS

3-3
Jib Boom / Platform Rotate Manifold Components S-85 Models

1	2 position 3 way valve	A	Platform rotate select	8-10 ft-lbs / 11-14 Nm
2	2 position 3 way valve	B	Platform rotate select	8-10 ft-lbs / 11-14 Nm



Plug Torque Specifications

Description	Hex Size	Torque
SAE No. 2	1/8	50 in-lbs / 6 Nm
SAE No. 4	3/16	13 ft-lbs / 18 Nm
SAE No. 6	1/4	18 ft-lbs / 24 Nm
SAE No. 8	5/16	50 ft-lbs / 68 Nm
SAE No. 10	9/16	55 ft-lbs / 75 Nm
SAE No. 12	5/8	75 ft-lbs / 102 Nm

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 specification	
2 position 3 way valve	6.3Ω

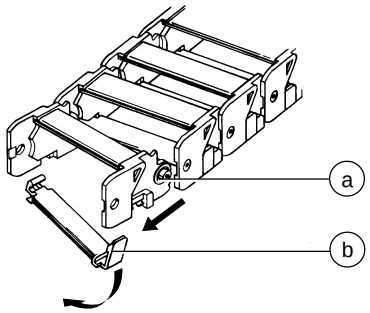
Boom Components

4-1 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 out and 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 screwdriver to pry the link to the side.

4-2 Boom

How to Shim the Boom

NOTICE Measure each wear pad. Replace the pad if it is less than $^{7}/_{16}$ inch (11 mm) thick. If the pad is more than $^{7}/_{16}$ inch (11 mm) thick, perform the following procedure.

1 Extend the boom until the wear pads are accessible.

2 Loosen the wear pad mounting fasteners.

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

4 Tighten the mounting fasteners.

5 Extend and retract the boom through an entire cycle. Check for tight spots that could cause scraping or binding.

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

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 cause death or serious injury and significant component damage. Dealer service is strongly recommended.

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

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

2 Remove the platform rotator and leveling slave cylinder. See 2-3, *How to Remove the Platform Rotator*.

BOOM COMPONENTS

S-85 Models: Remove the jib boom. See 3-1, *How to Remove the Jib Boom*.

3 Remove the mounting fasteners from the counterbalance valve manifold on the end of the boom. Then remove the manifold and set it aside.

4 Remove the drive speed limit switch mounted on the side of the cable track. Do not disconnect the wiring.

5 Support the cable track with an overhead crane.

6 Remove the hose/cable cover from the pivot end of the boom.

7 Remove the cable track mounting bolts at the platform end of the boom.

8 Remove the side panel from the cable track to access the cable track mounting bolts.

9 Remove the cable track mounting fasteners, then remove the cable track from the boom and lay it off to the side.

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

10 Remove the turntable end cover.

11 Remove the retaining bolt from the master cylinder rod-end pivot pin. Use a soft metal drift to remove the pin. Pull the cylinder back and secure it from moving.

12 Remove the drive speed limit switch mounted on the inside of the pivot end of the boom. Do not disconnect the wiring.

13 Tag, 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 Attach an overhead 5 ton (4536 kg) crane to the center point of the boom.

15 Attach a similar lifting device to the lift cylinder.

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

17 Place support blocks under the cylinder, across the turntable.

18 Remove the pin retaining fastener from the boom lift cylinder rod-end pin. Use a soft metal drift to remove the pin.

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

19 Lower the rod end of the lift cylinder onto support blocks. Protect the cylinder rod from damage.

20 Remove the pin retaining fastener from the boom pivot pin.

21 Remove the boom pivot pin with a soft metal drift, then carefully remove the boom from the machine.

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

How to Disassemble the Boom

NOTICE Complete disassembly of the boom is only necessary if the outer or inner boom tubes must be replaced. The extension cylinder can be removed without completely disassembling of the boom. See 4-4, *How to Remove the Extension Cylinder*.

1 Remove the boom. See 4-2, *How to Remove the Boom*.

2 Place blocks under the extension cylinder for support.

3 Remove the retaining rings from the extension cylinder barrel-end pivot pin at the base of the number 1 boom tube. Use a soft metal drift to remove the pin.

4 Remove and label the wear pads from the top side of the number 1 boom tube at the platform end of the boom.

NOTICE Pay careful attention to the location and amount of shims used with each wear pad.

5 Remove the two wear pad stop bolts from each side of the number 1 boom tube (located on the outside).

6 Support the number 2 and 3 boom tubes with an overhead crane at the platform end of the boom.

⚠CAUTION Crushing hazard. The boom tubes will fall when they are removed from the boom if they are not properly supported.

7 Support and slide the number 2 and 3 boom tubes out of the number 1 tube. Place the number 2 and 3 tubes on blocks for support.

NOTICE During removal, the overhead crane strap will need to be carefully adjusted for proper balancing.

8 Remove and label the wear pads from the top side of the number 2 boom tube at the platform end of the boom.

9 Remove the trunnion cap mounting fasteners at the base of the number 2 boom tube. Then use a slide hammer to remove the trunnion caps.

10 Remove the sliding wear pad assembly from the extension cylinder at the base of the number 2 boom tube.

11 Carefully rotate the base end of the extension cylinder until the pin mounting bore is in a vertical position.

12 Support the number 3 boom tube with an overhead crane at the platform end of the boom.

⚠CAUTION Crushing hazard. The boom tubes will fall when they are removed from the boom if they are not properly supported.

13 Support and slide the number 3 boom tube out of the number 2 tube. Place the number 3 tube on blocks for support.

NOTICE During removal, the overhead crane strap will need to be carefully adjusted for proper balancing.

14 Remove the retaining rings from the extension cylinder rod-end pivot pin at the platform end of the number 3 boom tube. Use a soft metal drift to remove the pin.

15 Remove the two wear pad stop bolts from each side of the number 3 boom tube (located on the outside).

16 Support and slide the extension cylinder out of the base end of the number 3 tube. Place the extension cylinder on blocks for support.

NOTICE During removal, the overhead crane strap will need to be carefully adjusted for proper balancing.

17 Remove and label the wear pads from the extension cylinder.

NOTICE Pay careful attention to the location of each wear pad.

BOOM COMPONENTS

4-3
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 Raise the boom until the boom is horizontal.

2 Place support blocks under the cylinder across the turntable.

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

4 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.

5 Tag, disconnect and plug the boom 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.

6 Remove the mounting fasteners from the lift cylinder mounting bracket.

7 Remove the pin retaining 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 blocks. Protect the cylinder rod from damage.

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

8 With the lift cylinder being supported by the overhead crane, pull the cylinder toward the platform until it is out.

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

4-4
Extension Cylinders

The extension cylinder consists of two cylinders that are fastened together. The first cylinder extends and retracts the number 2 boom tube. The second cylinder extends and retracts the number 3 boom tube. The extension cylinders are equipped with counterbalance valves to prevent movement in the event of a hydraulic line failure.

How to Remove the Extension Cylinders

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

1 Extend the boom all the way to full extension.

2 Remove the mounting fasteners from the guide pads, located on the outside of the number 3 boom tube.

3 Retract the boom until the cylinder rod-end pin is accessible in the number 3 boom tube.

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

5 Remove the platform leveling slave cylinder. See 2-2, *How to Remove the Slave Cylinder.*

S-85 Models: Remove the jib boom. See 3-1, *How to Remove the Jib Boom.*

6 Raise the boom to a horizontal position.

7 Remove the snap rings from the extension cylinder rod-end pin (at the platform end). Use a soft metal drift to remove the pin.

8 Remove the turntable end cover.

9 Tag, 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.

10 Remove the pin retaining fasteners from both sides of the extension cylinder at the base end of the boom.

11 Use a slide hammer to remove the pins.

12 Support and slide the extension cylinder out of the boom.

⚠CAUTION Crushing hazard. The extension cylinder will fall when it is removed from the extension boom if it is not properly supported.

NOTICE Note the length of the cylinder after removal. The cylinder must be at the same length for installation.

4-5 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 located at the base of the boom.

How to Remove the Platform Leveling Master Cylinder

1 Raise the boom until the rod-end pivot pin is accessible.

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

3 Tag, 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.

4 Remove the pin retaining fasteners from both master cylinder pins.

5 Use a soft metal drift to remove the pins.

Turntable Covers

5-1
Turntable Covers

How to Remove a Turntable Cover

1 Raise the turntable cover. Support the open cover with an overhead crane or forklift. Do not lift it.

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

2 Remove the upper and lower retaining clips from the gas strut.

3 Gently pry the strut pivot sockets off of the ball studs and remove the strut. Protect the strut cylinder rod from damage.

4 Remove the cover hinge bolts, that fasten the hinge support bracket to the bulkhead.

5 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

6-1
RPM Adjustment

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

6-2
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 toward the pump. Leave a $^1/_2$ inch (12.7 mm) gap between the coupler and pump end plate.

3 Apply Loctite® removable thread sealant to the coupler set screw. Torque the set screw to 45 ft-lbs (61 Nm).

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

4 Assemble the engine and torque the pump mountint plate to 34 ft-lbs (46 Nm).

6-3
Oil Temperature and Pressure Gauges

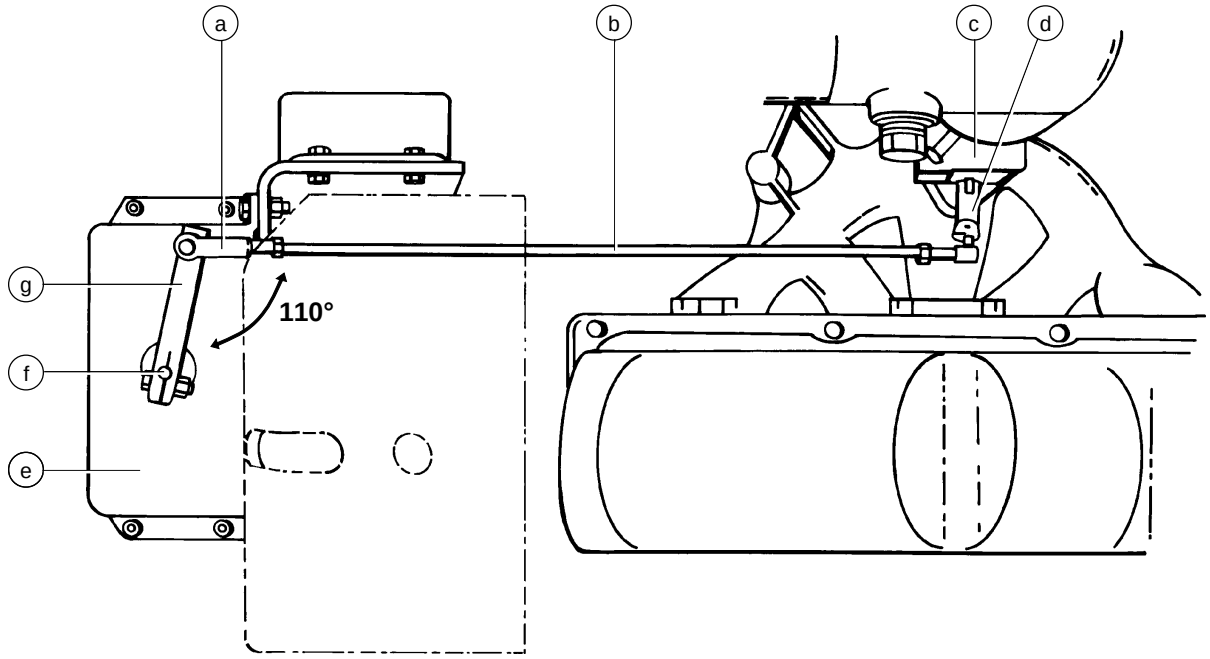
The oil temperature gauge is an electrical gauge. The sending unit has limit contacts that are factory set. The contacts will close at 300° F (147° C). When the contacts close, the engine will shut off to prevent damage and will not start until the temperature drops below the contact point. Temperature will be indicated when the key is on and the Emergency Stop Button is pulled out to the ON position.

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

The oil pressure gauge is an electrical gauge. The sending unit has limit contacts that are factory set. The contacts will close at 7 psi (0.48 bar). When the contacts close, the engine will shut off to prevent damage. Oil pressure will be indicated when the engine is running.

⚠CAUTION Component damage hazard. Do not crank 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

7-1
Governor Actuator

How to Set Up the Governor Actuator and Linkage

NOTICE Adjustment of the governor actuator is only necessary when the governor actuator or the linkage has been replaced.

1 Connect the linkage rod to the throttle plate shaft, then tighten the lock nut.

2 Fasten the lock nut and clevis yoke to the linkage rod. Do not tighten the lock nut against the clevis yoke.

3 Loosen the fastener on the actuator arm. Rotate the actuator arm until it is at a 110 degree angle to the linkage rod. Then tighten the actuator arm fastener.

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.

5 With the throttle in the idle position and the actuator arm at a 110 degree angle to the linkage, rotate the clevis yoke on the linkage rod two turns counterclockwise to pre-load the spring. Tighten the lock nut on the linkage rod.

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.

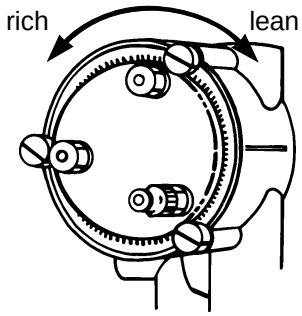
7-2 Choke Adjustments

This engine is equipped with an electrically heated automatic choke. The choke has a poppet valve to enhance cold starting ability on LPG fuel.

NOTICE Choke adjustments are affected by climate. Richer adjustment will be necessary in colder climates, leaner adjustment in warmer climates.

Automatic Choke with Poppet Valve

The 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

7-3 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.

7-4 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.

7-5 RPM Adjustment

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

7-6 Flex Plate

The flex plate acts as a coupler between the engine and the pump. It is bolted to the engine flywheel and has a splined center to drive the pump.

Flex Plate Removal

1 Disconnect and remove the hose between the carburetor venturi and the air cleaner.

2 Disconnect 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 1/4 inch (6.35 mm) gap between the coupler and pump end plate.

3 Apply Loctite® removable thread sealant to the coupler set screw. Torque the set screw to 45 ft-lbs (61 Nm).

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

4 Assemble the engine and torque the pump mounting plate to 34 ft-lbs (46 Nm).

7-7
Water Temperature and Oil Pressure Gauges

The water temperature gauge is an electrical gauge. The sending unit has limit contacts that are factory set. The contacts will close at 230° F (109° 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. Temperature will be indicated when the key is on and the Emergency Stop Button is pulled out to the ON position.

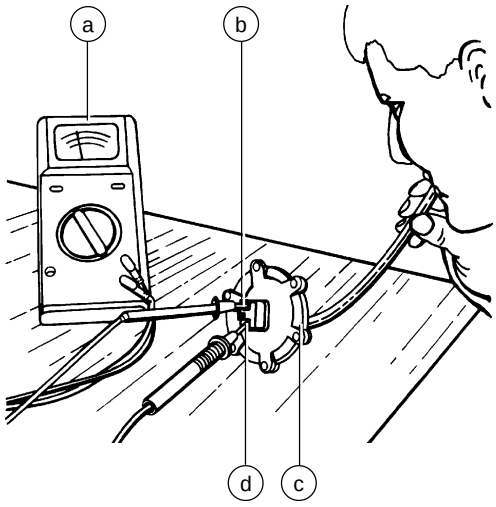
⚠CAUTION Component damage hazard. Do not crank the engine with the over-temperature light on.

The oil pressure gauge is an electrical gauge. The sending unit has limit contacts that are factory set. The contacts will close at 8 psi (0.55 bar). When the contacts close, the engine will shut off to prevent damage. Oil pressure will be indicated when the engine is running.

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

7-8
Vacuum Switch

How to Test the Vacuum Switch



a ohmmeter
b common terminal (SOL.)
c vacuum switch
d normally open terminal (ING.)

1 Connect the leads from an ohmmeter or continuity tester to the common and normally open terminals.

⊙ Result: There should be no continuity (infinite Ω).

2 Apply mild suction to the vacuum port.

⊙ Result: The switch should close and show full continuity (zero Ω).

⚠CAUTION Component damage hazard. Do not short the vacuum switch terminals to ground.

Ground Controls

8-1 Control Relays

Relays used for single function switching are single pole double throw (SPDT) relays.

How to Test a Single Pole Double Throw Relay

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

Direct Connection Relay

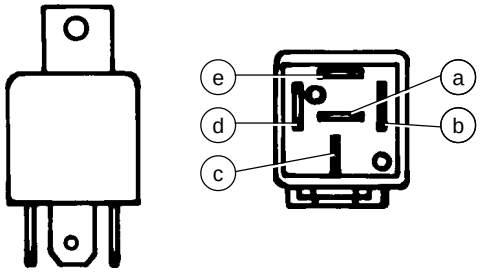
1 Label and then disconnect all the wiring from the relay to be tested.

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.

Test	Desired result
terminal 85 to 86 with resistor	75 to 85Ω
terminal 85 to 86 without resistor	85 to 95Ω
terminal 87 to 87a & 30	no continuity (infinite Ω)
terminal 87a to 30	continuity (zero Ω)

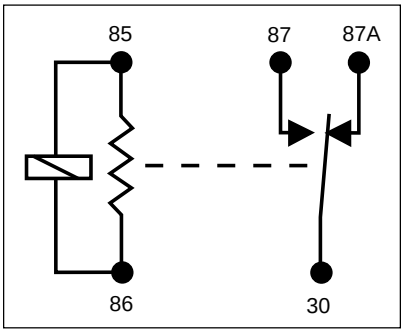
3 Connect 12V DC to terminal 85 and a ground wire to terminal 86, then test the following terminal combinations.

Test	Desired result
terminal 87 to 87a & 30	no continuity (infinite Ω)
terminal 87 to 30	continuity (zero Ω)

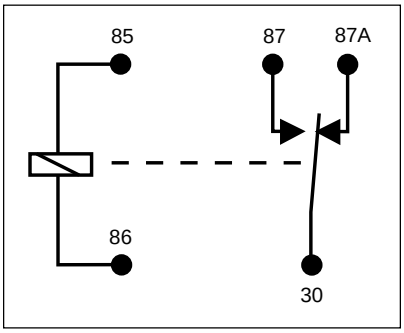


a terminal no. 87a - N.C.
b terminal no. 85 - coil
c terminal no. 30 - common
d terminal no. 86 - ground
e terminal no. 87 - N.O.

Control Relay Schematic - with resistor



Control Relay Schematic - without resistor



8-2
Toggle Switches

See 1-5, *Toggle Switches*.

8-3
Wago® Components

How to Remove a Wago® Component

⚠WARNING Electrocution hazard. Contact with electrically charged circuits may cause 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 operator's manual storage box in the platform.

1 Label the wiring from the component to be removed.

2 Use the provided screwdriver to push in and release the wire from the component.

3 Locate the removal tab on the bottom or top side of the component.

4 Use the provided screwdriver to gently pry up on the tab of the component and remove it.

8-4
Resistors

How to Test the Resistor

The resistor is used to maintain proper control of boom function speeds. A 10 ohm resistor reduces voltage to all the boom function switches.

NOTICE Refer to the schematic legends for resistor locations and values.

1 Turn the key switch to the OFF position.

2 Disconnect either end of one of the wires connected to the resistor to be tested.

3 Connect the leads from an ohmmeter to each end or wiring of the resistor being tested.

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

GROUND CONTROLS

8-5
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

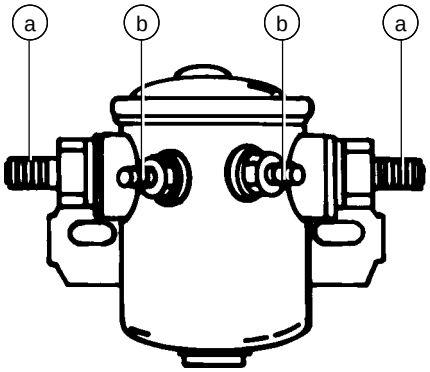
⚠WARNING Electrocution hazard. Disconnect the ground cable from the battery before performing this procedure.

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)



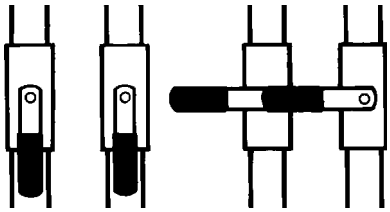
a high amp power contact terminal (large post)
b solenoid activate coil terminal (small post)

Hydraulic Pumps

9-1 Lift/Steer Pump

How to Remove the Lift/Steer Pump

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



open closed

⚠CAUTION Component damage hazard. The engine must not be started with the hydraulic tank shutoff valves in the CLOSED position or component damage will occur. If the tank valves are closed, remove the key from the key switch and tag the machine to inform personnel of the condition.

2 Disconnect and plug the lift/steer pump hydraulic hoses. Cap the 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 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.

9-2 Drive Pump

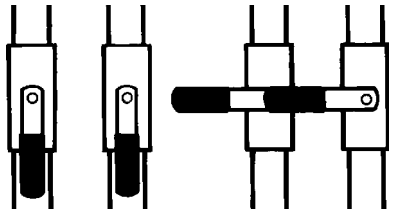
The drive pump is a bi-directional variable displacement piston pump. The pump output is controlled by the electronic displacement controller (EDC), located on the pump. The only adjustment that can be made to the pump is the neutral or null adjustment. Any internal service to the pump should only be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

How to Remove the Drive 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.



open closed

⚠CAUTION Component damage hazard. The engine must not be started with the hydraulic tank shutoff valves in the CLOSED position or component damage will occur. If the tank valves are closed, remove the key from the key switch and tag the machine to inform personnel of the condition.

3 Tag and disconnect the hydraulic hoses from the pumps 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.

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 Connect a 0 to 600 psi (0 to 41 bar) pressure gauge to the test port on the drive pump.

2 **Gasoline/LPG models:** Remove the high tension lead from the center of the ignition coil.

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

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

3 Crank the engine with the starter motor for 15 seconds, wait 15 seconds, then crank the engine an additional 15 seconds or until the pressure reaches 320 psi (22 bar).

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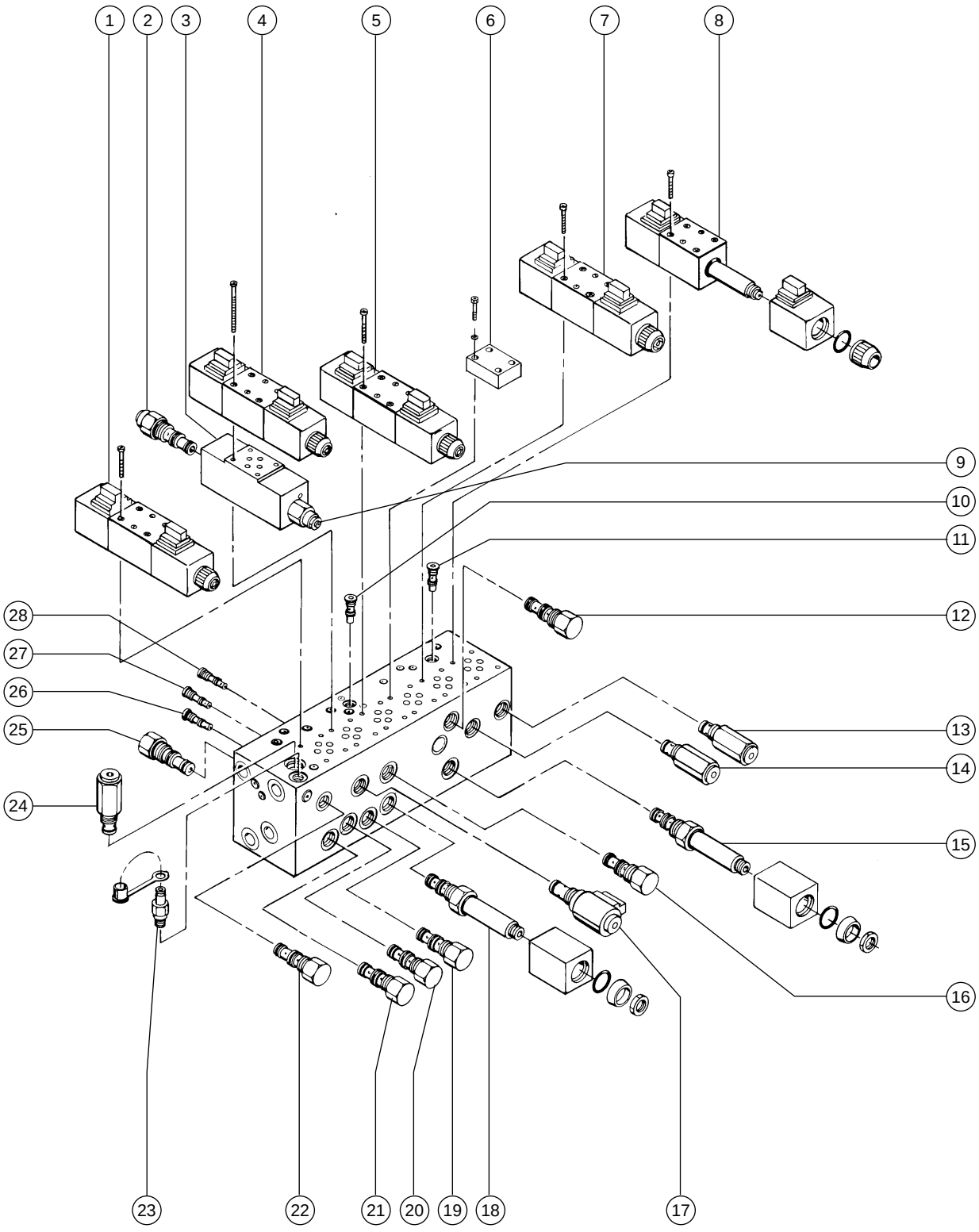
Function Manifolds

10-1
Function Manifolds

Index No.	Description	Schematic Item	Function	Torque
1	3 position 4 way D03 valve	N	Platform rotate	30-35 in-lbs / 3-4 Nm
2	Counterbalance valve	B	Platform level up	35-40 ft-lbs / 47-54 Nm
3	Sandwich valve manifold	A	Platform level	
4	3 position 4 way D03 valve	O	Platform level	30-35 in-lbs / 3-4 Nm
5	3 position 4 way D03 valve	P	Turntable rotate	30-35 in-lbs / 3-4 Nm
6	Cover plate	Q		30-35 in-lbs / 3-4 Nm
7	3 position 4 way D03 valve	R	Boom up/down	30-35 in-lbs / 3-4 Nm
8	3 position 4 way D03 valve	S	Boom extend/retract	30-35 in-lbs / 3-4 Nm
9	Counterbalance valve	C	Platform level down	35-40 ft-lbs / 47-54 Nm
10	Check valve	K	Turntable rotate differential sensing	11-13 ft-lbs / 15-18 Nm
11	Check valve	M	Boom up/down differential sensing	11-13 ft-lbs / 15-18 Nm
12	Flow regulator valve	Y	Boom up/down	10-12 ft-lbs / 14-16 Nm
13	Relief valve, 1950 psi (134 bar)	D	Boom extend	25-30 ft-lbs / 34-41 Nm
14	Relief valve, 2300 psi (159 bar)	F	Boom down	25-30 ft-lbs / 34-41 Nm
15	Proportional solenoid valve	AA	Boom	10-12 ft-lbs / 14-16 Nm
16	Flow regulator valve	X	Turntable rotate/boom extend/retract	10-12 ft-lbs / 14-16 Nm
17	Normally closed poppet valve	J	Platform level	25-30 ft-lbs / 34-41 Nm
18	Proportional solenoid valve	Z	Turntable rotate/boom extend/retract	10-12 ft-lbs / 14-16 Nm
19	Flow regulator valve	V	Platform level	10-12 ft-lbs / 14-16 Nm
20	Differential sensing valve	AC	All functions	10-12 ft-lbs / 14-16 Nm
21	Flow regulator valve	U	Platform rotate	10-12 ft-lbs / 14-16 Nm
22	Flow regulator valve	W	Differential sensing circuit	10-12 ft-lbs / 14-16 Nm
23	Diagnostic fitting		Testing	
24	Relief valve, 2900 psi (200 bar)	AB	System relief	35-40 ft-lbs / 47-54 Nm
25	Priority flow regulator valve	T	Steering	10-12 ft-lbs / 14-16 Nm
26	Check valve	I	Platform rotate right - differential sensing	11-13 ft-lbs / 15-18 Nm
27	Check valve	H	Platform rotate left - differential sensing	11-13 ft-lbs / 15-18 Nm
28	Check valve	L	Platform level - differential sensing	11-13 ft-lbs / 15-18 Nm

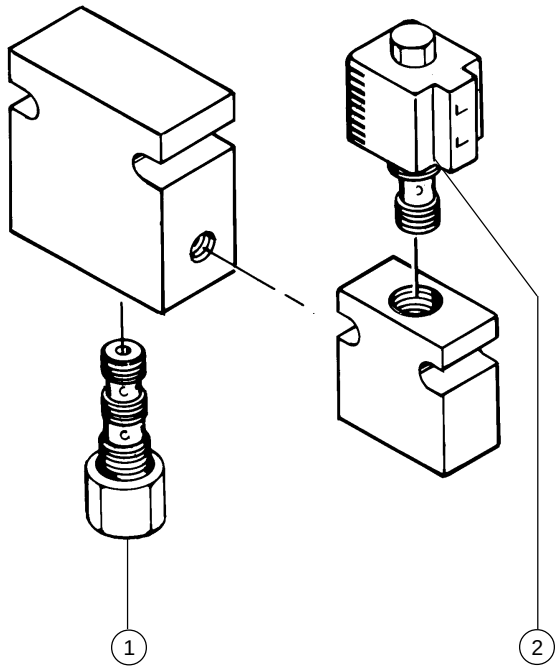
FUNCTION MANIFOLDS



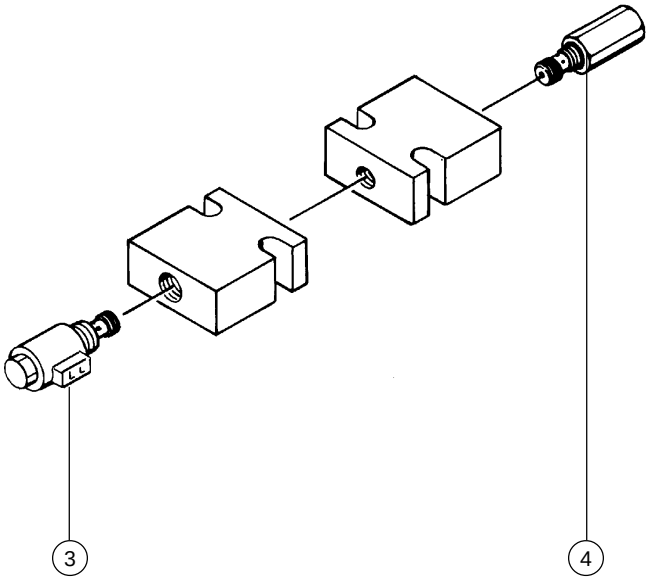
FUNCTION MANIFOLDS

Index No.	Description	Schematic Item	Function	Torque
1	Normally open pilot operated 2 position 2 way directional valve	A	Directs flow from pressure port to tank port	25-30 ft-lbs / 34-41 Nm
2	Normally open electrically operated 2 position 2 way directional valve	B	Directs flow from pressure port to tank port	10-12 ft-lbs / 14-16 Nm
3	Normally open pilot operated 2 position 2 way directional valve	A	Directs flow from index 2 on steer manifold to index 4 on lift jack dump valves	10-12 ft-lbs / 14-16 Nm
4	Relief valve, 200 psi (13.7 bar)	B	Chassis lift jacks	25-30 ft-lbs / 34-41 Nm

Boom Function Dump Valves



Drive Chassis Lift Jack Dump Valves



10-2 Valve Adjustments - Function Manifold

How to Adjust the Main Relief Valve

Perform this procedure with the boom in the stowed position.

NOTICE

1 Connect a 0 to 5000 psi (0 to 345 bar) pressure gauge to the test port (item 23) on the function manifold.

2 Start the engine from the ground controls.

3 Hold the retract switch with the boom fully retracted, and observe the pressure reading on the pressure gauge.

4 Turn the engine off. Use a wrench to hold the relief valve and remove the cap (item 24, 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.

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

⚠WARNING

6 Restart the engine. Hold the retract switch with the boom fully retracted, and recheck the valve pressure.

Main relief valve specifications

Pressure	2900 psi 200 bar

How to Adjust the Boom Down Relief Valve

Perform this procedure with the boom in the stowed position.

NOTICE

1 Connect a 0 to 5000 psi (0 to 345 bar) pressure gauge to the test port (item 23) on the function manifold.

2 Start the engine from the ground controls.

3 Hold the boom down switch with the boom fully lowered, and observe the pressure reading on the pressure gauge.

4 Turn the engine off. Use a wrench to hold the relief valve and remove the cap (item 14, 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.

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

⚠WARNING

6 Restart the engine. Hold the boom down switch with the boom fully lowered and recheck the valve pressure.

Boom down relief valve specifications

Pressure	2300 psi 159 bar

FUNCTION MANIFOLDS

How to Adjust the Boom Extend 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 (item 23) on the function manifold.

2 Start the engine from the ground controls.

3 Hold the extend switch with the boom fully extended, and observe the pressure reading on the pressure gauge.

4 Turn the engine off. Use a wrench to hold the relief valve and remove the cap (item 13, 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.

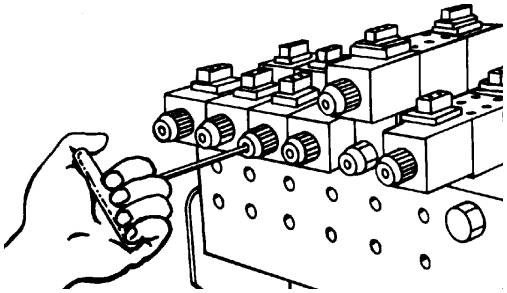
6 Restart the engine. Hold the extend switch with the boom fully extended, and recheck the valve pressure.

Boom extend relief valve specifications	
Pressure	1950 psi 134 bar

How to Override a Valve

A hydraulic valve may need to be manually overridden to troubleshoot a malfunction. The proportional boom functions (boom up/down and turntable rotate) use 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 function uses a three position valve. The platform level uses a three position and a two position valve. The three position valves and the proportional valves can be manually overridden. To identify the manifold valves see 10-1, *Function Manifold,* in this section.

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



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

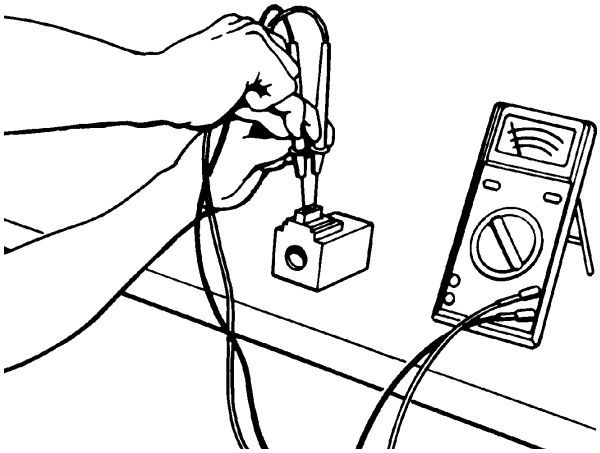
⚠WARNING

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

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
3 position 4 way directional valve	4.5Ω
Normally closed poppet valve	7Ω

Fuel and Hydraulic Tanks

11-1 Hydraulic Tank

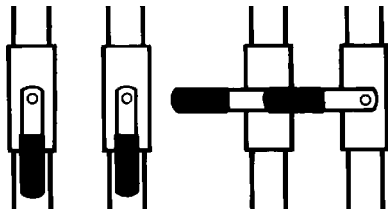
The primary functions of the hydraulic tank are to cool, clean and deaerate the hydraulic fluid during operation. This tank has a 45 gallon (170 liter) capacity and an oil level gauge with a temperature indicator. It utilizes internal suction strainers for the pump supply lines and has an external return line filter with a condition indicator.

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 Connect a 0 to 600 psi (0 to 41 bar) pressure gauge to the test port on the drive pump.

2 **Gasoline/LPG models:** Remove the high tension lead from the center of the ignition coil.

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

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

3 Crank the engine with the starter motor for 15 seconds, wait 15 seconds, then crank the engine an additional 15 seconds or until the pressure reaches 320 psi (22 bar).

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.

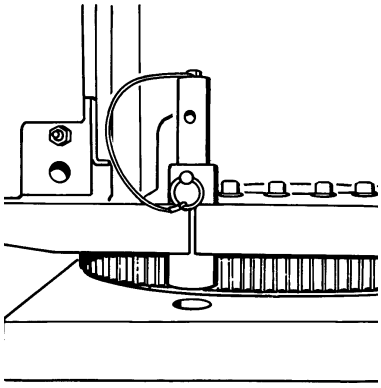
NOTICE Clean the fuel tank and inspect for rust and corrosion before installing.

Turntable Rotation Components

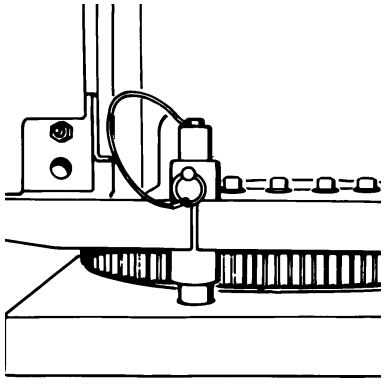
12-1
Rotation Hydraulic Motor

How to Remove the Rotation Hydraulic Motor

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



Unlocked position

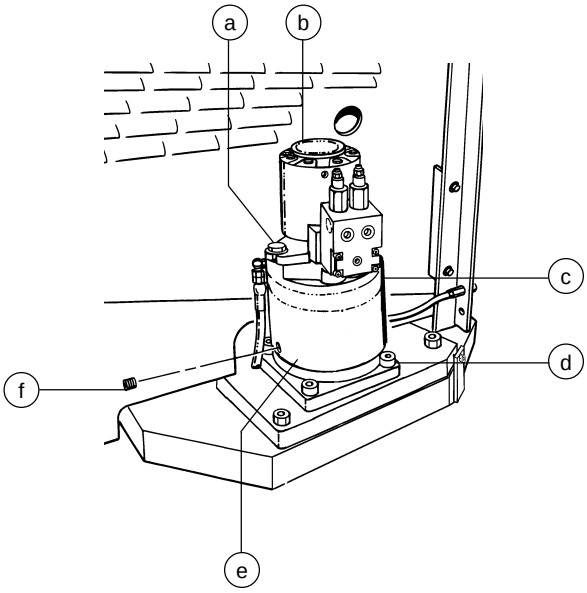


Locked position

2 Tag and disconnect the hydraulic hoses from the motor and manifold, 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.

3 Remove the motor mounting bolts, then remove the motor from the brake.



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

How to Remove the Turntable Rotation Brake or Torque Hub

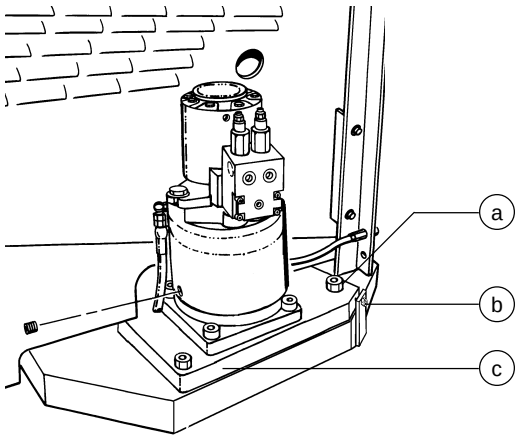
Refer to Maintenance Procedures, C-6, *How to Replace the Torque Hub Oil.*

How to Adjust the Turntable Rotation Gear Backlash

The turntable rotation torque hub is mounted on a adjustable plate that controls the gap between the rotation motor gear and the turntable bearing.

NOTICE Be sure to check the backlash with the machine on a flat level surface.

1 Loosen the mounting fasteners on the torque hub pivot plate.



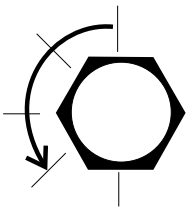
a pivot plate mounting bolts
b adjustment bolt with lock nut
c torque hub pivot plate

2 Push the torque hub pivot plate towards the turntable as far as possible (this will push the rotation gear into the rotation bearing).

3 Loosen the lock nut on the adjustment bolt.

4 Turn the adjustment bolt clockwise until it contacts the pivot plate.

5 Turn the adjustment bolt $^{3}/_{8}$ of a turn counterclockwise. Then tighten the lock nut on the adjustment bolt.



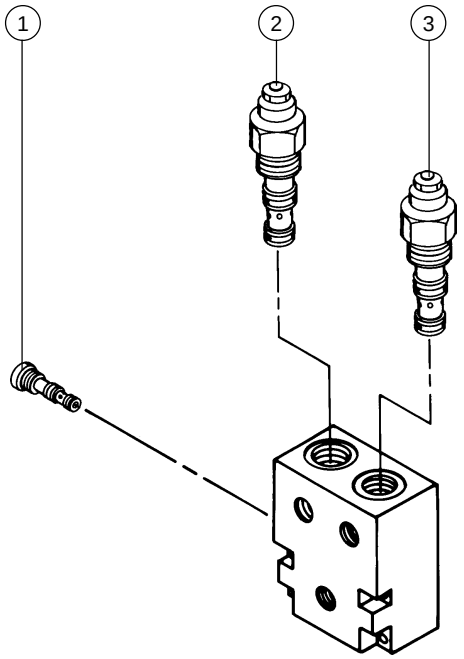
6 Rotate the torque hub pivot plate away from the turntable until it contacts the adjustment bolt. Then tighten the mounting fasteners on the torque hub pivot plate.

7 Rotate the turntable through an entire rotation. Check for tight spots that could cause binding. Readjust if necessary.

TURNTABLE ROTATION COMPONENTS

12-2
Turntable Rotation Manifold Components

Index No.	Description	Schematic Item	Function	Torque
1	Shuttle valve 2 position 3 way	C	Turntable rotation brake release	10-13 ft-lbs / 14-18 Nm
2	Counterbalance valve	A	Turntable rotate - right	35-40 ft-lbs / 47-54 Nm
3	Counterbalance valve	B	Turntable rotate - left	35-40 ft-lbs / 47-54 Nm



Plug Torque Specifications

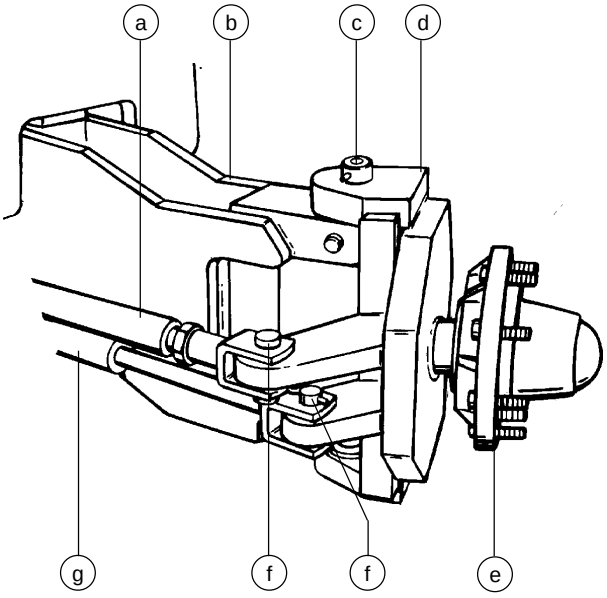
Description	Hex size	Torque
SAE No. 2	1/8	50 in-lbs / 6 Nm
SAE No. 4	3/16	13 ft-lbs / 18 Nm
SAE No. 6	1/4	18 ft-lbs / 24 Nm
SAE No. 8	5/16	50 ft-lbs / 68 Nm
SAE No. 10	9/16	55 ft-lbs / 75 Nm
SAE No. 12	5/8	75 ft-lbs / 102 Nm

2WD Steering Axle Components

13-1
Yoke and Hub

How to Remove the Yoke and Hub

1 Remove the retaining bolt, then the pivot pin from both the steering cylinder and the tie rod.



a tie rod
b axle
c king pin/retaining bolt
d yoke
e hub
f pivot pin/retaining bolt
g steering cylinder

2 Loosen the wheel lug nuts. Do not remove them.

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

4 Raise the machine 6 inches (15 cm) and place blocks under the chassis for support.

5 Remove the lug nuts, then the tire and wheel assembly.

6 Remove the retaining bolt from the king pin.

7 Attach a strap from a lifting device to the yoke/hub assembly for support.

8 Use a slide hammer to remove the upper king pin, then use a soft metal drift to drive the lower king pin down and out.

⚠WARNING Crushing hazard. The yoke/hub assembly will fall when the king pins are removed if it is not properly supported.

Torque specifications	dry	lubricated
Lug nut	420 ft-lbs 569.5 Nm	320 ft-lbs 433.9 Nm

2WD STEERING AXLE COMPONENTS

How to Remove the Hub and Bearings

1 Loosen the wheel lug nuts. Do not remove them.

2 Block the non-steering wheels and place a lifting jack under the steering axle.

3 Raise the machine and place blocks under the chassis for support.

4 Remove the lug nuts. Then remove the tire and wheel assembly.

5 Remove the dust cap, cotter pin and slotted nut.

6 Pull the hub off the spindle. The washer and outer bearing should fall loose from the hub.

7 Place the hub on a flat surface and gently pry the bearing seal out of the hub. Remove the rear bearing.

How to Install the Hub and Bearings

NOTICE When replacing a wheel bearing, both the inner and outer bearings including the pressed-in races must be replaced.

1 Be sure that both bearings are packed with grease.

2 Place the large inner bearing into the rear of the hub.

3 Press the bearing seal evenly into the hub until it is flush.

4 Slide the hub onto the yoke spindle.

⚠CAUTION Component damage. Do not apply excessive force or damage to the lip of the seal may occur.

5 Place the outer bearing into the hub.

6 Install the washer and slotted nut.

7 Tighten the slotted nut to 35 foot-pounds (47 Nm).

8 Loosen the slotted nut, then re-tighten to 8 foot-pounds (11 Nm).

9 Install a new cotter pin. Bend the cotter pin to lock it in.

10 Install the dust cap, then the tire and wheel assembly. Torque the wheel lug nuts to 420 foot-pounds (569.5 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 and plug the hydraulic hoses from the steering cylinder. Cap the 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 pin retaining fasteners. Then remove the pivot pin from each end of the steering cylinder.

3 Remove the steering cylinder.

13-3
Tie Rod Cylinder

How to Remove the Tie Rod Cylinder

1 Disconnect and plug the hydraulic hoses from the tie rod cylinder. Cap the 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 pin retaining fasteners, then remove the pivot pin from each end of the tie rod cylinder.

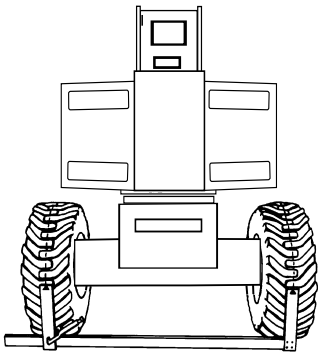
3 Remove the tie rod cylinder.

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 Loosen the jam nut on the adjustable end of the tie rod cylinder.

4 Remove the pin retaining fasteners, then remove the pivot pin from the adjustable end of the tie rod cylinder.

5 Slide the tie rod cylinder off the yoke and adjust it by turning the end.

NOTICE One turn on the adjustable end equals approximately 1/8 inch (3.2 mm) change in the front and rear measurements.

6 Slide the tie rod onto the yoke. Install the pivot pin, then install the retaining bolt.

7 Tighten the jam nut against the tie rod.

8 Recheck the front and back measurements (step 2). If further adjustment is needed, repeat steps 3 through 7.

Toe-in specification	0 ± 1/8 inch (6.35 mm)

4WD Steering Axle Components

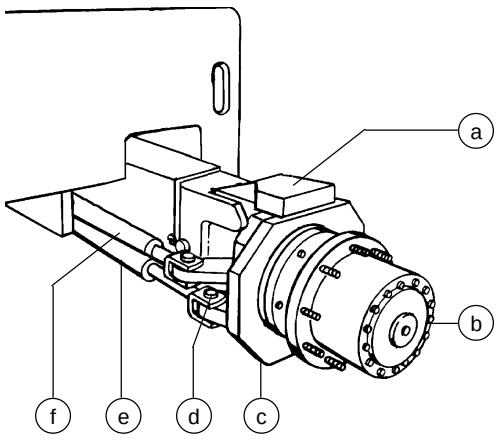
14-1
Yoke and Hub

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.

1 Start the engine from the ground controls. Rotate the turntable until the platform is between the steer tires.

2 Remove the pin retaining fasteners, then remove the pivot pin from both the steering cylinder and the tie rod cylinder.



a king pin
b torque hub
c yoke
d pivot pin
e tie rod cylinder
f steer cylinder

3 Tag, disconnect and plug the hydraulic hoses from the wheel motor. 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.

4 Loosen the wheel lug nuts. Do not remove them.

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

6 Raise the machine 15 inches (38 cm) and place blocks under the chassis for support.

7 Remove the lug nuts, then remove the tire and wheel assembly.

8 Remove the roll pin from the upper king pin.

9 Remove the retaining bolts from the upper and lower king pins.

10 Attach a strap from a lifting device to the yoke/torque hub assembly for support.

11 Use a slide hammer to remove the upper king pin, then use a soft metal drift to drive the lower king pin down and out.

⚠WARNING Crushing hazard. The yoke/torque hub assembly will fall when the lower king pin is removed if it is not properly supported.

12 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	dry	lubricated
Lug nut	420 ft-lbs 569.5 Nm	320 ft-lbs 433.9 Nm
Torque hub mounting bolts	180 ft-lbs 244 Nm	
Drive motor mounting bolts	75 ft-lbs 102 Nm	

14-2 Steering Cylinders

How to Remove a Steering Cylinder

This procedure is the same as the 2WD procedure. See repair procedure 13-2, *How to Remove a Steering Cylinder*.

14-3 Tie Rod Cylinder

How to Remove the Tie Rod Cylinder

This procedure is the same as the 2WD procedure. See Repair Procedure 13-3, *How to Remove the Tie Rod Cylinder*.

How to Perform the Toe-in Adjustment

This procedure is the same as the 2WD procedure. See Repair Procedure 13-3, *How to Perform the Toe-in Adjustment*.

Extendable Axle Components

15-1 Extendable Axles

The extendable axles are used to widen the foot print of the drive chassis for stability.

How to Shim the Extendable Axle

NOTICE Measure each wear pad. Replace the pad if it is less than $^{7}/_{16}$ inch (11 mm) thick. If the pad is more than $^{7}/_{16}$ inch (11 mm) thick, perform the following procedure.

1 Extend the axle.

2 Remove the wear pad mounting fasteners.

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

4 Use a round punch to align the shim to the wear pad. Install the mounting fasteners.

5 Extend and retract the axle through an entire cycle. Check for tight spots that could cause scraping or binding.

NOTICE Always maintain squareness between the outer and inner axle tubes.

How to Remove the Inner Axle

⚠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.

1 Extend the axle to be removed.

2 Loosen the wheel lug nuts. Do not remove them.

3 Block the wheels on the opposite end of the machine, and then center a lifting jack under the axle to be removed.

4 Raise the machine 15 inches (38 cm) and place blocks under the chassis for support.

5 Remove the lug nuts, then remove the tire and wheel assembly.

Non-steer end: proceed to step 9.

Steer End:

6 Remove the pin retaining fasteners. Then remove the pivot pins from the steer cylinder and tie rod cylinder. Pull the cylinders off of the yoke/hub assembly.

7 Remove the steer cylinder mounting lug from the inner axle.

8 Disconnect the axle extension cylinder hydraulic hoses at the tee next to the lift jack. Do not disconnect them from the cylinder.

4WD Models:

Disconnect and plug the hydraulic hoses from the wheel motor. 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.

9 Remove the drive chassis cover.

10 Remove the retaining ring from the axle extension cylinder pivot pin. Then remove the pin.

11 Disconnect and plug the hydraulic hoses from the wheel motor. 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.

12 Attach a strap from a lifting device to the inner axle for support.

13 Use a soft metal drift to remove the cylinder pivot pin.

14 Remove the lock plate from the top side of the inner axle. Then remove the lower wear pads.

15 Carefully pull the inner axle out of the axle.

How to Remove the Axle Extension Cylinder

1 Remove the yoke/hub assembly. See *13-1 or 14-1, How to Remove the Yoke and Hub*.

2 Disconnect and plug the hydraulic hoses from the cylinder. Cap the cylinder 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 Remove the retaining bolt, then the pivot pins from each end of the cylinder. Remove the cylinder from the axle.

15-2 Drive Chassis Lift Jacks

The drive chassis lift jacks are used to lift the drive chassis for axle extension. The lift jacks should not be used to support the machine during maintenance or repair procedures.

How to Remove a Chassis Lift Jack

1 Remove the drive chassis cover.

2 Disconnect and plug the hydraulic hoses from the cylinder. Cap the cylinder 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 Attach a strap from a lifting device to the cylinder for support.

4 Remove the lift jack mounting fasteners. Then remove the jack from the machine.

EXTENDABLE AXLE COMPONENTS

15-3
Hydraulic Limit Switches

The hydraulic limit switches are 2 position 2 way valves. The switches sense full axle extension and allow the boom functions to operate.

How to Set Up the Hydraulic Limit Switch Linkage

NOTICE Adjustment of the hydraulic limit switch linkage is only necessary when the switch or linkage has been replaced or the axle wear pads are worn or have been replaced.

1 Install the hydraulic switch and connect the hydraulic hoses.

2 Install the linkage rod and leave the lock nut loose.

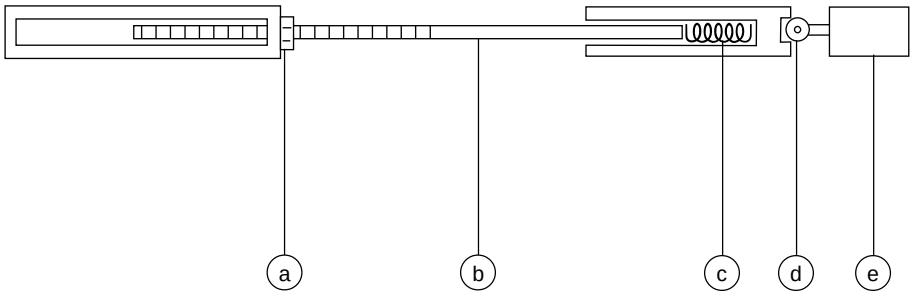
3 Use the lift jack to raise the machine.

4 Extend the axles completely.

5 Lower the machine and turn the linkage rod clockwise until it completely compresses the valve actuator. Then turn the linkage rod counterclockwise $^{1}/_{8}$ inch. Tighten the lock nut.

6 Raise the machine.

7 Extend and retract both axles through 2 cycles and check boom functions. If the boom will not raise past the drive limit switch, readjust as necessary.

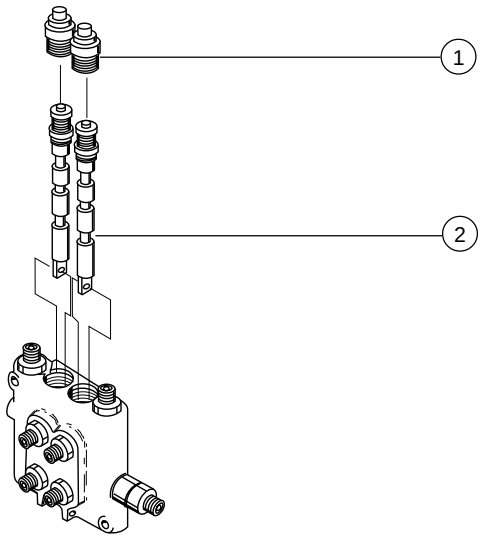


a lock nut
b linkage rod
c spring
d valve actuator
e limit switch valve

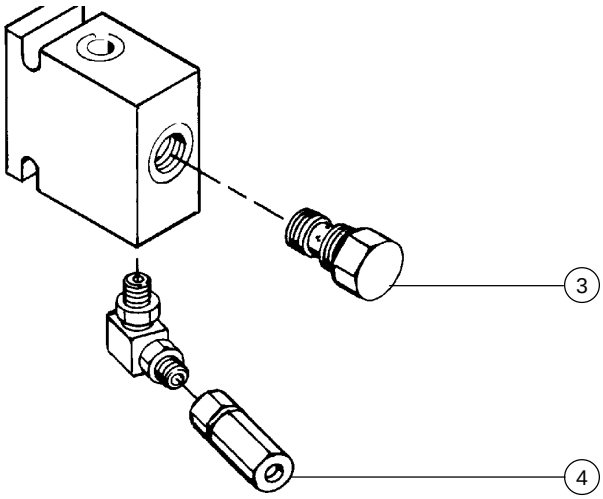
15-4
Chassis Jack/Axle Manifold Components

Index No.	Description	Schematic Item	Function	Torque
1	Cap		Breather	20-25 ft-lbs / 27-33 Nm
2	Spool valve		Directional control	
3	Priority flow regulator valve	A	Chassis lift jacks	10-12 ft-lbs / 14-16 Nm
4	Inline check valve	B	Chassis lift jacks	
5	Pilot to open check valve		Directs flow from cylinder barrel end to tank	25-30 ft-lbs / 34-41 Nm
6	Relief valve, 200 psi (13.7 bar)	A	Hydraulic limit switch	25-30 ft-lbs / 34-41 Nm

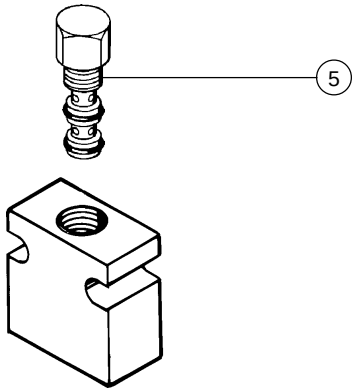
Chassis Jack/Axle Manifold



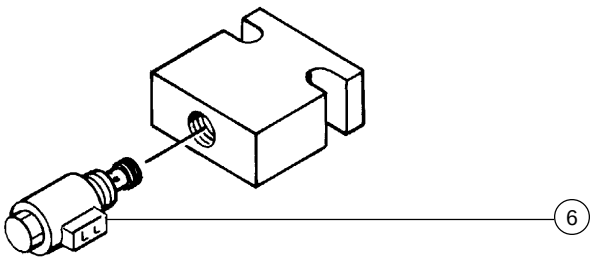
Priority Flow Regulator Valve



Hydraulic Jack Check Valve



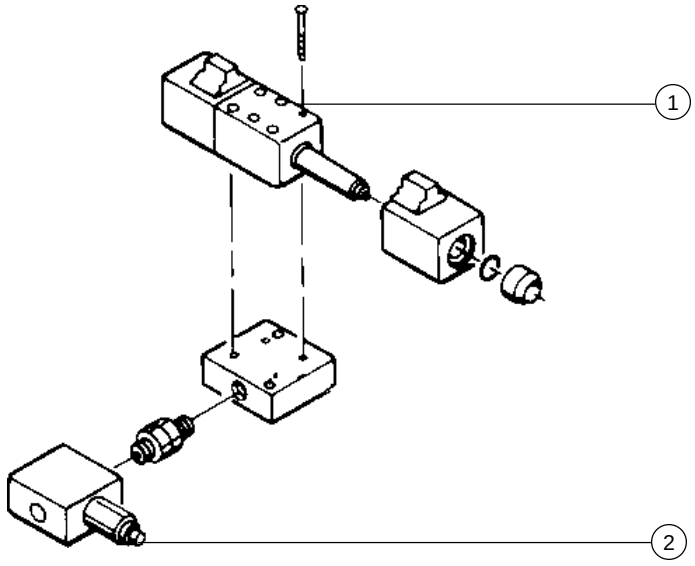
Hydraulic Limit Switch Relief Valve



Steer Manifolds

16-1
Steer Manifold Components

Index No.	Description	Schematic Item	Function	Torque
1	3 position 4 way D03 valve		Steering	30-35 in-lbs / 3-4 Nm
2	Priority flow regulator valve	A	Chassis lift jacks & extendable axles	10-12 ft-lbs / 14-16 Nm



Plug Torque Specifications

Description	Hex size	Torque
SAE No. 2	1/8	50 in-lbs / 6 Nm
SAE No. 4	3/16	13 ft-lbs / 18 Nm
SAE No. 6	1/4	18 ft-lbs / 24 Nm

Description	Hex size	Torque
SAE No. 8	5/16	50 ft-lbs / 68 Nm
SAE No. 10	9/16	55 ft-lbs / 75 Nm
SAE No. 12	5/8	75 ft-lbs / 102 Nm

Non-steering Axle Components

17-1 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.

Torque specifications	
Drive motor mounting bolts	75 ft-lbs 102 Nm

17-2 Torque Hub

How to Remove a Drive Torque Hub

1 Remove the drive motor. See 17-1, *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 drive 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.

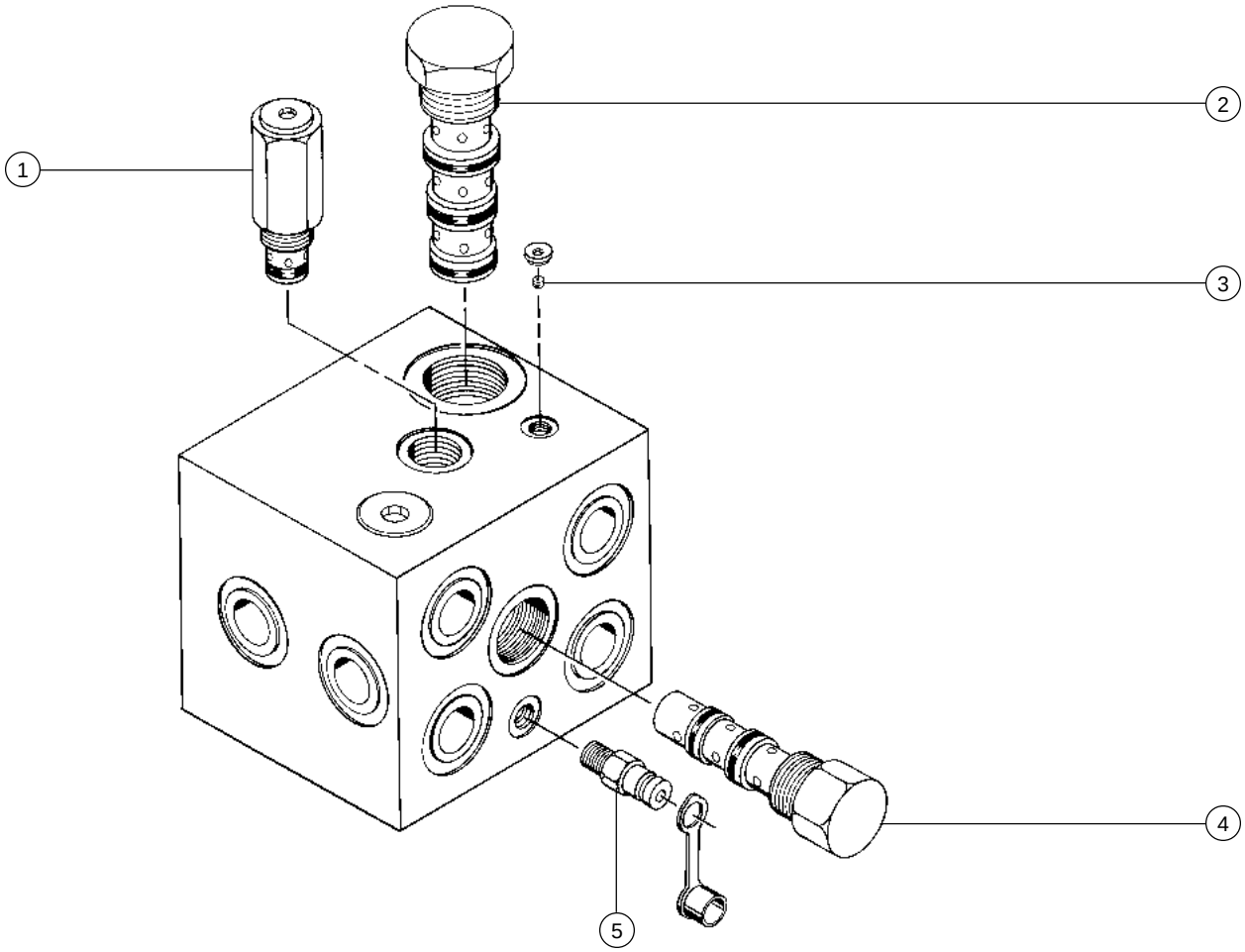
⚠CAUTION Crushing hazard. The torque hub will fall if it is not properly supported when the mounting bolts are removed.

Torque specifications	
Lug nut (dry)	420 ft-lbs 569.5 Nm
Lug nut (lubricated)	320 ft-lbs 433.9 Nm
Drive torque hub mounting bolts	120 ft-lbs 163 Nm
Drive motor mounting bolts	75 ft-lbs 102 Nm

2WD Drive Manifold

18-1
2WD Drive Manifold Components

Index No.	Description	Schematic Item	Function	Torque
1	Relief valve, 250 psi (17 bar)	B	Charge pressure circuit	15-18 ft-lbs / 20-24 Nm
2	Shuttle valve 3 position 3 way	A	Charge pressure circuit that gets hot oil out of low pressure side of drive pump and allows low pressure flow path or brake release and 2-speed motor shift	15-18 ft-lbs / 20-24 Nm
3	Orifice 0.070 in (1.78 mm)	D	Drive circuit	
4	Flow divider/combiner valve	C	Controls flow to drive motors in forward and reverse	25-30 ft-lbs / 34-41 Nm
5	Diagnostic fitting		Testing	



Plug Torque Specifications

Description	Hex size	Torque
SAE No. 2	1/8	50 in-lbs / 6 Nm
SAE No. 4	3/16	13 ft-lbs / 18 Nm
SAE No. 6	1/4	18 ft-lbs / 24 Nm
SAE No. 8	5/16	50 ft-lbs / 68 Nm
SAE No. 10	9/16	55 ft-lbs / 75 Nm
SAE No. 12	5/8	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 1).

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.

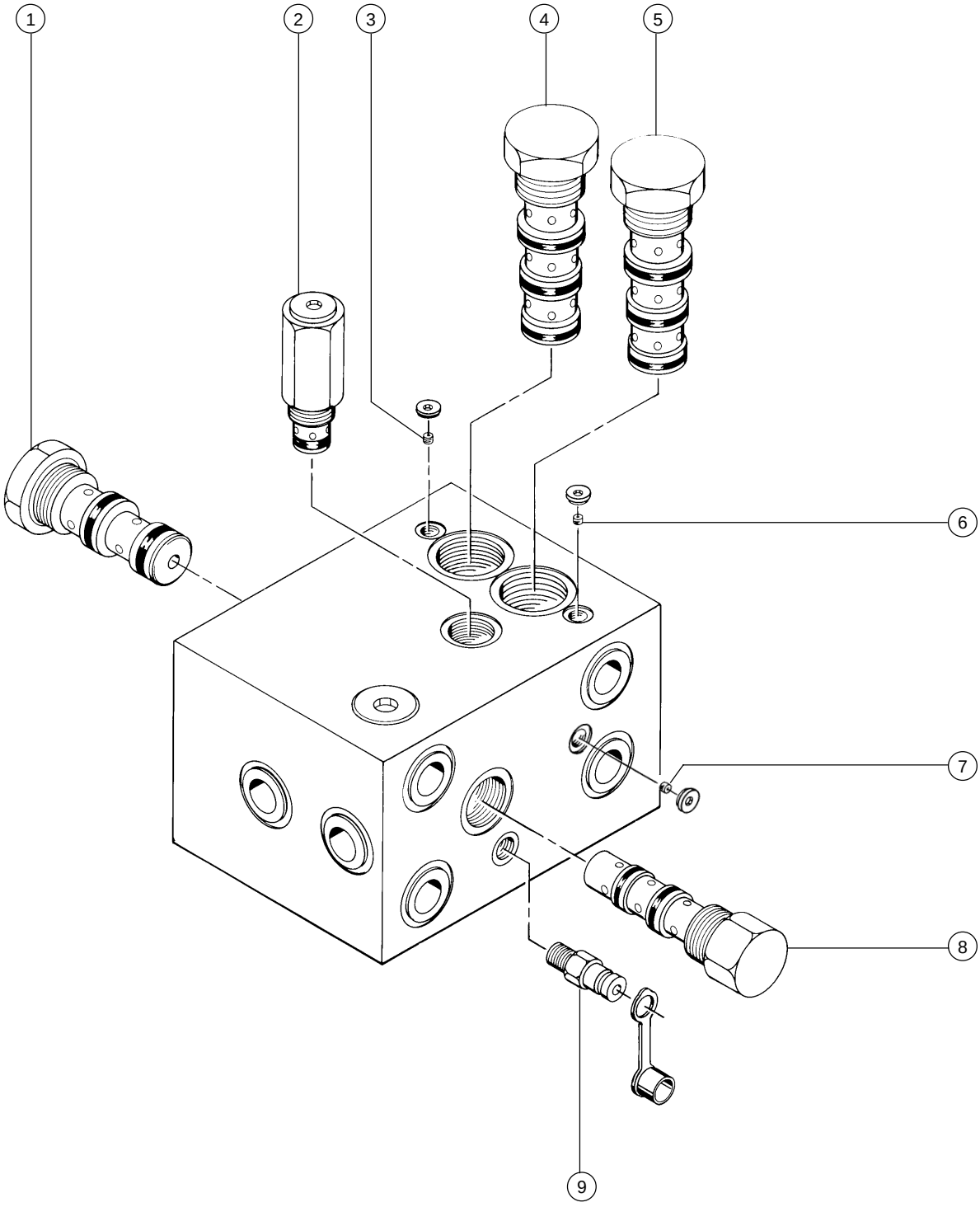
Relief valve specifications	
Pressure 17 bar	250 psi

4WD Drive Manifold

19-1
4WD Drive Manifold Components

Index No.	Description	Schematic Item	Function	Torque
1	Shuttle valve 3 position 3 way	A	Charge pressure circuit that gets hot oil out of low pressure side of drive pump and allows low pressure flow path or brake release and 2-speed motor shift	15-18 ft-lbs / 20-24 Nm
2	Relief valve, 250 psi (17 bar)	E	Charge pressure circuit	15-18 ft-lbs / 20-24 Nm
3	Orifice 0.052 in (1.32 mm)	H	Drive circuit, non-steer end	
4	Flow divider/combiner valve	C	Controls flow to steer end drive motors in forward and reverse	25-30 ft-lbs / 34-41 Nm
5	Flow divider/combiner valve	A	Controls flow to non-steer end drive motors in forward and reverse	25-30 ft-lbs / 34-41 Nm
6	Orifice 0.070 in (1.78 mm)	F	Drive circuit, steer end	
7	Orifice 0.070 in (1.78 mm)	G	Drive circuit, non-steer end	
8	Flow divider/combiner valve	B	Controls flow to flow divider/combiner valves 4 and 5	25-30 ft-lbs / 34-41 Nm
9	Diagnostic fitting		Testing	

4WD DRIVE MANIFOLD



4WD DRIVE MANIFOLD

Plug Torque Specifications

Description	Hex size	Torque
SAE No. 2	1/8	50 in-lbs / 6 Nm
SAE No. 4	3/16	13 ft-lbs / 18 Nm
SAE No. 6	1/4	18 ft-lbs / 24 Nm
SAE No. 8	5/16	50 ft-lbs / 68 Nm
SAE No. 10	9/16	55 ft-lbs / 75 Nm
SAE No. 12	5/8	75 ft-lbs / 102 Nm

19-2 Valve Adjustments

How to Adjust the Charge Pressure Relief Valve

1 Connect a 0 to 600 psi (0 to 41 bar) pressure gauge 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 2).

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 17 bar	250 psi

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