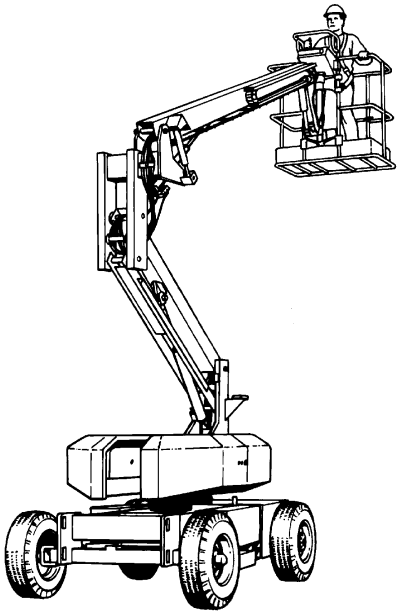
Genie Industries

Technical Publications

Genie® Z-30/20™

Service Manual



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Genie® Z-30/20

Important

Read, understand and obey the safety rules and operating instructions in the appropriate *Genie Z-30/20 Operator's Manual* before attempting any maintenance or repair procedure.

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 an authorized Genie dealer service center.

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

Readers are encouraged to notify Genie of errors and send in suggestions for improvement. All communications will be carefully considered for future printings of this and other manuals. Please write to the technical publications team in care of Genie Industries, PO Box 97030, Redmond WA 98073-9730 USA.

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Genie® Industries

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Safety Rules

Danger

Failure to obey the instructions and safety rules in this manual and the appropriate *Genie Z-30/20 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 when 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		
Length	15 ft 9 in	4.8 m
Width	5 ft 10 in	1.8 m
Height	6 ft 7 in	2 m
Machine Weight	8700 lbs	3946.3 kg
Ground clearance	7.38 in	18.7 cm
Operational dimensions		
Maximum platform height	31 ft	9.4 m
Maximum platform working height	38 ft	11.6 m
Maximum horizontal reach	20 ft	6.1 m
Maximum turntable tailswing	14 in	35.6 cm
Wheelbase	6 ft	1.8 m
Minimum turning radius, outside	13 ft 9 in	4.2 m
Minimum turning circle, inside	6 ft 4 in	1.9 m
Turntable rotation		359°
Platform rotation		130°

Tires and wheels		
Tire size		9-14.5 LT
Load range		F
Tire contact area	43.5 sq in	280 sq cm
Overall tire diameter	28 in	71 cm
Wheel diameter	14.5 in	36.8 cm
Wheel width	7 in	17.8 cm
Wheel lugs		
Front		8 @ 5/8-18
Rear		9 @ 5/8-18
Lug nut torque	125 ft-lbs	169.5 Nm
Platform dimensions		
Length	48 in	121.9 cm
Width	30 in	76.2 cm
Maximum capacity	500 lbs	227 kg
Fluid Capacities		
Hydraulic tank capacity	2.5 gallons	9.5 liters
Hydraulic system capacity (including tank)	4 gallons	15.1 liters

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

SPECIFICATIONS

Performance Specifications

Drive speeds, maximum		
Boom stowed, 35:1 torque hubs	4.3 mph 40 ft/6.1 sec	6.9 km/h 12.2 m/6.1 sec
Boom stowed, 49:1 torque hubs	3.2 mph 40 ft/8.6 sec	5.1 km/h 12.2 m/8.6 sec
Boom raised	0.6 mph 40 ft/45.5 sec	1.0 km/h 12.2 m/45.5 sec

Gradeability (boom stowed)	
35:1 torque hubs	30%
49:1 torque hubs	37%

Boom function speeds, maximum from platform controls	
Primary boom up	24 to 26 seconds
Primary boom down	19 to 21 seconds
Primary boom extend	19 to 21 seconds
Primary boom retract	12 to 14 seconds
Secondary boom up	23 to 25 seconds
Secondary boom down	25 to 27 seconds
Turntable rotate - 180°	10 to 12 seconds
Platform level up	5 to 7 seconds
Platform level down	8 to 10 seconds

Hydraulic Specifications

Hydraulic fluid	Dexron equivalent
Lift pump	
Type: gear	
Displacement per revolution	.137 cu in 2.31 cc
Displacement (2200 psi/152 bar)	1.75 gallons per minute 6.6 liters per minute
Function manifold	
Function relief valve pressure	2200 psi 152 bar
Primary Boom down relief Function relief	1250 psi 86.2 bar
Secondary boom down relief valve pressure	1000 psi 69 bar
Turntable rotate relief valve pressures	850 psi 58.6 bar

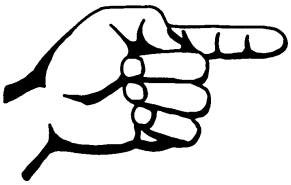
SPECIFICATIONS

Bolt Torque Specifications

Size	Threads per inch	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.



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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 machine damage.

- ☑ Immediately tag and remove from service a damaged or malfunctioning machine.
- ☑ Repair any machine damage or malfunction before operating machine.
- ☑ Keep records on all inspections for three years.
- ☑ 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 and two year. To account for repeated procedures, the *Maintenance Tables* and the *Maintenance Inspection Report* have been divided into four subsections—A, B, C, D. Use the following chart to determine which group(s) of procedures are required to perform a scheduled inspection.

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

Maintenance Tables

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

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

Maintenance Inspection Report

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

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

Maintenance Tables

Table A		Tools are required	New parts required	Warm engine required	Cold engine required	Dealer service suggested
A-1	Inspect the Operator's and Safety Manuals					
A-2	Inspect the Decals and Placards					
A-3	Inspect for Damage, Loose or Missing Parts					
A-4	Check the Hydraulic Oil Level					
A-5	Check for Hydraulic Leaks					
A-6	Test the Platform and Ground Controls					
A-7	Test the Platform Rotation					
A-8	Test the Tilt Sensor					
A-9	Test the Manual Controls					
A-10	Test the Drive Limit Switches					
A-11	Perform 30 Day Service					

Table B						
B-1	Check the Batteries					
B-2	Inspect the Electrical Wiring					
B-3	Inspect the Tires and Wheels (including lug nut torque)					
B-4	Confirm the Proper Brake Configuration					
B-5	Check the Oil Level in the Torque Hubs					

MAINTENANCE TABLES

Table B, continued

		Tools are required	New parts required	Warm engine required	Cold engine required	Dealer service suggested
B-6	Test the Key Switch					
B-7	Test the Emergency Stop Buttons					
B-8	Test the Ground Control Override					
B-9	Test the Platform Self-leveling					
B-10	Test the Service Horn					
B-11	Test the Foot Switch					
B-12	Test the Drive Brakes					
B-13	Test the Drive Speed - Stowed Position					
B-14	Test the Alarm Package - Optional Equipment					
B-15	Perform Hydraulic Oil Analysis See D-1 *Test or Replace the Hydraulic Oil*					
B-16	Test the Turntable Rotation Stop					
B-17	Check the Electrical Contactors					

MAINTENANCE TABLES

Table C		Tools are required	New parts required	Warm engine required	Cold engine required	Dealer service suggested
C-1	Check the Primary Boom Wear Pads					
C-2	Check the Turntable Rotation Bearing Bolts					
C-3	Check the Free-wheel Configuration					
C-4	Grease the Turntable Rotation Bearing and Worm Drive Gear					
C-5	Replace the Torque Hub Oil					
C-6	Replace the Hydraulic Filter					

Table D						
D-1	Test or Replace the Hydraulic Oil					

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

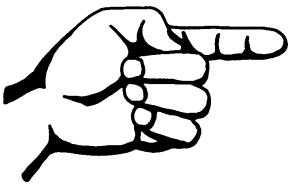
Comments

Checklist A	Y	N	R
Refer to Table A			
A-1 Operator's and Safety manuals			
A-2 Decals and placards			
A-3 Damage, loose or missing parts			
A-4 Hydraulic oil level			
A-5 Hydraulic leaks			
A-6 Platform and ground controls			
A-7 Platform rotation			
A-8 Tilt sensor			
A-9 Manual controls			
A-10Drive limit switches			
A-11 30 Day Service			

Checklist B	Y	N	R
Refer to Table B			
B-1 Batteries			
B-2 Electrical wiring			
B-3 Tires and wheels			
B-4 Brake configuration			
B-5 Torque hub oil level			
B-6 Key Switch			
B-7 Emergency Stop			
B-8 Ground control override			
B-9 Platform leveling			
B-10 Service horn			
B-11 Foot switch			
B-12 Drive brakes			
B-13 Drive speed-stowed			
B-14 Alarm package			
B-15 Hydraulic oil analysis			
B-16 Turntable stop			
B-17 Electrical contactors			

Checklist C	Y	N	R
Refer to Table C			
C-1 Boom wear pads			
C-2 Turntable bearing bolts			
C-3 Free-wheel configuration			
C-4 Grease rotation bearing			
C-5 Torque hub oil			
C-6 Hydraulic filter			

Checklist D	Y	N	R
Refer to Table D			
D-1 Hydraulic oil			



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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 properly complete each inspection when required may cause death, serious injury or substantial machine damage.

- ☑ Immediately tag and remove from service a damaged or malfunctioning machine.
- ☑ Repair any machine damage or malfunction before operating machine.
- ☑ Keep records on all inspections for three years.
- ☑ Unless otherwise specified, perform each procedure with the machine in the following configuration:
  - Machine parked on a flat level surface
  - Boom in the stowed position
  - Turntable rotated with the boom between the non-steering wheels
  - 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 warnings and step-by-step instructions.

Symbols Legend

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

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

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

NOTICE Indicates special operation or maintenance information.

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

Table A Procedures

A-1
Inspect the Operator's and Safety Manuals

Maintaining the operator's and safety manuals in good condition is essential to safe machine operation. Manuals are included with each machine and should be stored in the 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 the storage container is present and in good condition.

2 Check to make sure that the operator's, responsibilities and safety manuals 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 appropriate *Genie Z-30/20 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 power unit, hoses, fittings, cylinders and manifolds
- Turntable motor and worm gear
- Boom components and wear pads
- Dents or damage to machine
- Tires and wheels
- Limit switches
- Service horn
- Alarm and beacon package (if equipped)
- Nuts, bolts and other fasteners
- Platform entry mid-rail
- Cracks in welds or structural components
- Compartment covers and fasteners
- Battery packs and connections

A-4
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.

2 Visually inspect the sight gauge on the hydraulic power unit reservoir.

⊙ Result: The hydraulic oil level should be visible inside the sight gauge.

Hydraulic Oil Specifications

Hydraulic oil type	Dexron equivalent
Hydraulic reservoir capacity	2.5 gallons 9.5 liters
Hydraulic system (including tank)	4 gallons 15.1 liters

A-5
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 power unit—fittings, hoses and turntable surface
- Drive motor compartment—brakes, fittings, hoses, and compartment surface
- All hydraulic cylinders
- All hydraulic manifolds
- Primary and secondary booms
- The underside of the turntable
- The underside of the drive chassis
- Ground area under the machine

TABLE A PROCEDURES

A-6
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 and Emergency Stop Switch fail to stop all the machine functions. Each function should activate, operate smoothly and be free of hesitation, jerking and unusual noise.

1 Turn the key switch to ground control and lift the red Emergency Stop switch cover and move the toggle switch to the ON position.

2 Do not hold the function enable switch to either side. Attempt to activate each boom and platform function toggle switch.

⊙ Result: All boom and platform functions should **not** operate.

3 Hold the function enable switch in either direction and activate each boom and platform function toggle switch.

⊙ Result: All boom and platform functions should operate through a full cycle. Descent alarm (if equipped) should sound while boom is lowering.

4 Push in the Emergency Stop Switch to the OFF position.

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

5 Turn the key switch to platform control and lift the red Emergency Stop switch cover and move the toggle switch to the ON position. Pull out the Emergency Stop Button to the ON position at the platform controls.

6 Operate each machine function through a partial cycle.

⊙ Result: All machine functions should operate smoothly.

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

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

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

A-7
Test the Platform Rotation

Detection of platform rotation malfunctions is essential for safe machine operation. The platform rotator is operated by manually turning the hand crank in either a clockwise or counterclockwise direction.

1 Turn the hand crank at the platform in the clockwise direction.

⊙ Result: The platform should rotate to the right and operate smoothly without any hesitation or binding.

2 Turn the hand crank at the platform in the counterclockwise direction.

⊙ Result: The platform should rotate to the left and operate smoothly without any hesitation or binding.

TABLE A PROCEDURES

A-8
Test the Tilt Sensor

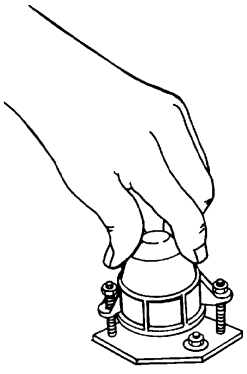
The tilt sensor sounds an alarm in the platform when the incline of the drive chassis exceeds 4.5 degrees.

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

1 Turn the key switch to platform control and lift the red Emergency Stop switch cover and move the toggle switch to the ON position at the ground controls. Pull out the Emergency Stop Button to the ON position at the platform controls.

2 Remove the function manifold side turntable 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.

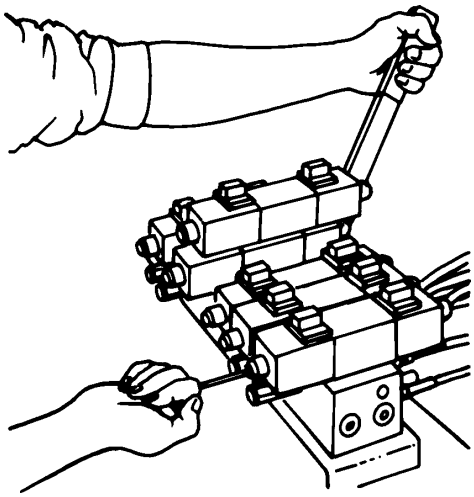


A-9
Test the Manual Controls

Detection of manual control system malfunctions is essential for safe machine operation. An unsafe working condition exists if the manual controls do not operate in the event of a main power loss.

1 Remove the function manifold side turntable cover.

2 Insert the T-handle into the end of the valve spool to be tested.



3 Push and hold the T-handle against the valve spool, operate the hand pump.

⊙ Result: Boom function should operate.

4 Repeat steps 2 and 3 to test each boom function.

NOTICE Manual controls will not operate the drive function.

TABLE A PROCEDURES

A-10
Test the Drive Limit Switch

Detecting a drive limit switch malfunction is essential to safe machine operation. The drive limit switches are used to restrict drive speed when the boom is raised. An improperly functioning limit switch will allow the boom to drive into an unsafe position.

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

· Broken or missing arms or rollers

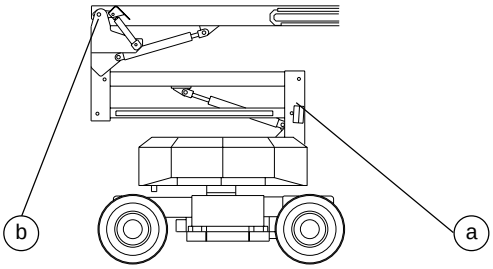
· Missing fasteners

· Loose wiring

2 Turn the key switch to ground control and lift the red Emergency Stop switch cover and move the toggle switch to the ON position.

3 Activate the function enable switch and raise the primary boom above the drive limit switch and turn the machine off.

4 Manually activate the drive limit switch.



a secondary boom drive limit switch location
b primary boom drive limit switch location

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

5 Turn the key switch to ground control and lift the red Emergency Stop switch cover and move the toggle switch to the ON position.

6 Activate the function enable switch and lower the primary boom into the stowed position.

7 Raise the secondary boom above the drive limit switch and turn the machine off.

8 Manually activate the drive limit switch.

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

9 Turn the key switch to ground control and lift the red Emergency Stop switch cover and move the toggle switch to the ON position.

10 Activate the function enable switch and lower the secondary boom into the stowed position.

11 Turn the key switch to platform control and pull out the Emergency Stop button to the ON position at the platform controls.

12 Slowly move the drive control handle off center.

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

13 Raise the primary boom above the drive limit switch.

14 Slowly move the drive control handle off center.

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

15 Lower the primary boom to the stowed position.

16 Raise the secondary boom above the drive limit switch.

17 Slowly move the drive control handle off center.

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

Drive speed, maximum, raised	40 feet/40 seconds 12.2 meters/40 seconds

A-11
Perform 30 Day Service

The 30 day maintenance procedure is a one time sequence of procedures to be performed after the first 30 days or 50 hours of usage. After this interval, refer to the maintenance tables for continued scheduled maintenance.

1 Perform the following maintenance procedures:
- B-3 Inspect Tires and Wheels
- C-2 Check the Turnable Rotation Bearing Bolts
- C-6 Replace the Hydraulic Filter

Table B Procedures

B-1
Check the Batteries

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

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

⚠WARNING Perform this procedure with the battery packs disconnected.

1 Put on protective clothing and eye wear.

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

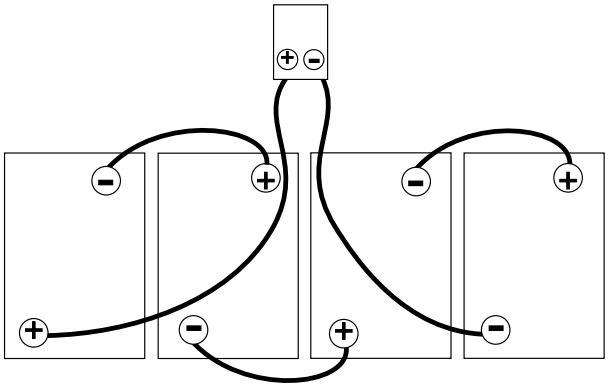
3 Be sure that the battery hold downs and cable connections are tight.

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

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

6 Install the vent caps.

7 Check each battery pack, to be sure the batteries are wired correctly.



B-2
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:

- Electrical component compartment
- Turntable circuit board wiring
- Ground control panel
- Turntable manifold wiring

2 Turn the key switch to ground control and lift the red Emergency Stop switch cover and move the toggle switch to the ON position.

3 Activate the function enable switch and raise the secondary boom until the mid-pivot is 10 feet (3 m) off the ground.

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

5 Activate the function enable switch and lower the boom to the stowed position and turn the machine off.

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

- Mid-pivot to cable track
- Cable track on the primary boom
- Primary boom to platform cable harness
- Inside of the platform control box

TABLE B PROCEDURES

B-3
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.

1 Check the tire surface and sidewalls for cuts, cracks, punctures and unusual wear.

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

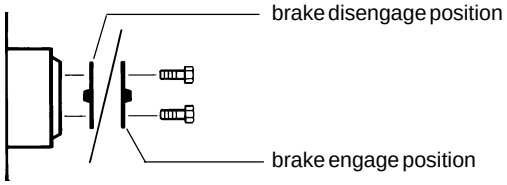
3 Check each lug nut for proper torque.

Tires and wheels		
Tire size		9-14.5 LT
Lug nut torque	**Lubricated**	**Dry**
	94 ft-lbs	125 ft-lbs
	127 Nm	169 Nm

B-4
Confirm the Proper Brake Configuration

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

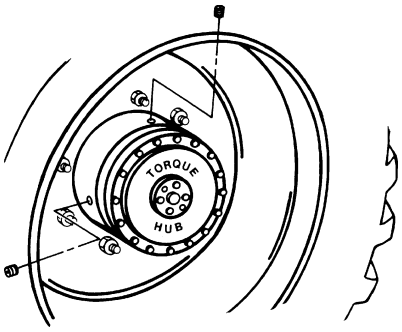
1 Check each torque hub disconnect cap to be sure it is in the engaged position.



B-5
Check the Oil Level in the Torque Hubs

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

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 plugs, then install the plugs into the hub.

5 Repeat this procedure for the other torque hub.

Drive Torque Hub Oil	
Capacity	17 fluid ounces 0.5 liters
Type: SAE 90 multipurpose hypoid gear oil - API service classification GL5	

TABLE B PROCEDURES

B-6
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 Lift the red Emergency Stop switch cover and move the toggle switch to the ON position. Pull out the Emergency Stop Button to the ON position at the platform controls.

2 Turn the key switch to **platform control**.

3 Check the machine functions from the **ground controls**.

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

4 Turn the key switch to ground control.

5 Check the machine functions from the **platform controls**.

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

6 Turn the key switch to the OFF position.

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

B-7
Test the Emergency Stop Function

A properly functioning Emergency Stop button and Emergency Stop Switch are essential for safe machine operation. An improperly operating Emergency Stop function may fail to shut off power and stop all machine functions resulting in a hazardous situation.

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

1 Turn the key switch to ground control and lift the red Emergency Stop switch cover and move the toggle switch to the ON position.

2 Push down the Emergency Stop Switch cover at the ground controls to the OFF position.

3 Attempt to activate any function at the ground or platform controls.

⊙ Result: No functions should operate.

4 Turn the key switch to platform control and lift the red Emergency Stop switch cover and move the toggle switch to the ON position at the ground controls. Pull out the Emergency Stop Button to the ON position at the platform controls.

5 Push down the Emergency Stop button to the OFF position at the platform controls.

6 Attempt to activate any function at the platform controls.

⊙ Result: No machine functions should operate.

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

B-8
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 Turn the key switch to ground control and lift the red Emergency Stop switch cover and move the toggle switch to the ON position.

3 Activate the function enable switch and operate each boom function through a partial cycle at the ground controls.

⊙ Result: All boom functions should operate.

B-9
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 primary boom. A platform self-leveling failure creates an unsafe working condition.

1 Turn the key switch to ground control and lift up the Emergency Stop Switch cover at the ground controls and move the toggle switch to the ON position. Pull out the Emergency Stop Button to the ON position at the platform controls.

2 Activate the function enable switch and lower the boom to the stowed position.

3 Activate the function enable switch and adjust the platform to a level position using the platform leveling switch.

4 Activate the function enable switch and raise and lower the primary boom through a full cycle.

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

B-10
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 lift the red Emergency Stop switch cover and move the toggle switch to the ON position at the ground controls. Pull out the Emergency Stop Button to the ON position at the platform controls.

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

⊙ Result: The service horn should sound.

TABLE B PROCEDURES

B-11
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. An improperly functioning foot switch can cause an unsafe working condition.

1 Turn the key switch to platform control and lift the red Emergency Stop switch cover and move the toggle switch to the ON position. Pull out the Emergency Stop Button to the ON position at 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-12
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. Hydraulically-released individual wheel brakes can appear to operate normally when not fully operational.

⚠WARNING Be sure that the machine is not in free-wheel or partial free-wheel configuration. Refer to B-4 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 Turn the key switch to platform control and lift the red Emergency Stop switch cover and move the toggle switch to the ON position at the ground controls. Pull out the Emergency Stop Button to the ON position at the platform controls.

3 Lower the boom into the stowed position.

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

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

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

Braking: paved surface		
Stopping distance	4-5 ft	1.2 to 1.5 m

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

B-13
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 Turn the key switch to platform control and lift the red Emergency Stop switch cover and move the toggle switch to the ON position at the ground controls. Pull out the Emergency Stop Button to the ON position at the platform controls.

3 Lower the boom into the stowed position.

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

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

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

Drive speed: stowed position		
35:1 torque hubs	40 ft/6.1 sec	12.2 m/6.1 sec
49:1 torque hubs	40 ft/8.6 sec	12.2 m/8.6 sec

B-14
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 function manifold side turntable cover.

1 Turn the key switch to ground control and lift the red Emergency Stop switch cover and move the toggle switch to the ON position at the ground controls.

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

2 Activate the function enable switch and move the primary boom switch to the DOWN position, hold for a moment and then release it. Move the secondary boom switch to the DOWN position, hold for a moment and then release it.

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

3 Turn the key switch to platform control.

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

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

TABLE B PROCEDURES

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-15
Perform Hydraulic Oil Analysis

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

B-16
Test the Turntable Rotation Stop

The turntable is capable of rotating the boom 355 degrees and is stopped midpoint between the steering wheels by the rotation stop. Detecting a rotation stop malfunction is essential to safe operation and good machine performance. If the turntable rotates past the rotation stop, component damage may result.

1 Turn the key switch to platform control and lift the red Emergency Stop switch cover and move the toggle switch to the ON position at the ground controls. Pull out the Emergency Stop Button to the ON position at the platform controls.

2 Rotate the turntable to the left full circle as far as it will go.

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

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

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

B-17
Check the Electrical Contactors

Maintaining the electrical contactors in good condition is essential to safe machine operation. Failure to locate a worn or damaged contactor could result in an unsafe working condition and component damage.

1 Remove the drive chassis cover at the non-steer end and locate the electrical component compartment.

2 Remove the cover on the electrical component compartment and locate the electrical contactors.

3 Visually inspect the contact points of each contactor for the following items:

- Excessive burns
- Excessive arcs
- Excessive pitting

NOTICE Replace the contactors if any damage is found.

Table C Procedures

C-1
Check the Primary Boom Wear Pads

Maintaining the primary boom wear pads in good condition is essential to safe machine operation. Wear pads are placed on boom 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 Turn the key switch to ground control and lift the red Emergency Stop switch cover and move the toggle switch to the ON position.

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

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

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

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

C-2
Check the Turntable Rotation Bearing Bolts

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

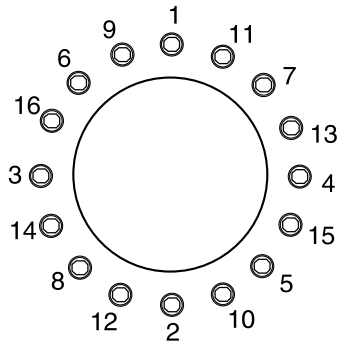
1 Raise the secondary boom and place a safety chock on the secondary boom lift cylinder.

NOTICE The lift cylinder safety chock is available through Genie (part number 36555).

2 Carefully lower the boom onto the lift cylinder safety chock.

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

2 Check to ensure that each turntable bearing bolt is torqued in specified order to 190 foot-pounds (258 Newton meters).



Bolt torque sequence

3 Remove the safety chock. Lower the boom to the stowed position.

4 Disconnect the battery packs from the machine.

5 Remove the mounting fasteners from both battery packs. Use a lifting device to remove the battery packs from the machine.

TABLE C PROCEDURES

6 Support the large counterweight under the drive chassis with a forklift at the power unit side of the machine. Lift it slightly to take the weight off of the threaded rod. Support the smaller counterweight with a floor jack from the steer-end of the machine and lift it slightly to take the weight off of the threaded rod.

7 Remove the fasteners from the cover at the non-steer end of the drive chassis. Remove the cover from the machine.

8 Remove the nut from the threaded rod that runs through the center of the counterweights at the steer-end of the machine.

9 Pull the threaded rod through the counterweights and out of the non-steer end of the machine.

⚠WARNING Crushing hazard. The counterweights may become unbalanced and fall if they are not properly supported.

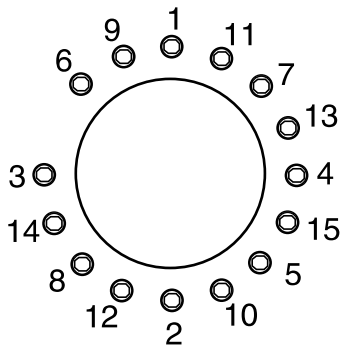
10 Pull the smaller counterweight towards the steer-end of the machine slightly and then lower the counterweight to the ground.

11 Shift the forks of the forklift to the steer-end of the machine enough for the counterweight to clear the forklift pocket tube.

12 Lower the counterweight and then remove the counterweight from the machine.

⚠WARNING Crushing hazard. The counterweight may become unbalanced and fall if it is not properly supported.

13 Check to ensure that each bearing mounting bolt under the drive chassis is torqued in specified order to 190 foot-pounds (258 Newton meters).



Bolt torque sequence

14 Install the counterweights back into the chassis.

⚠DANGER Tip over hazard. Counterweights are critical to machine stability. Failure to replace the counterweights will result in death or serious injury.

TABLE C PROCEDURES

C-3
Check the Free-wheel Configuration

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

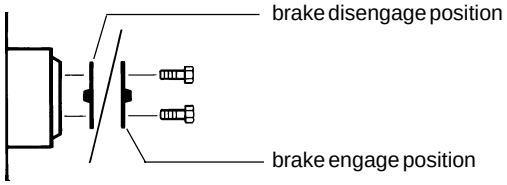
⚠WARNING Collision hazard. Select a work site that is firm and level.

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

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

3 Lift the wheels off 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 torque hub.



5 Manually rotate each non-steering wheel.

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

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

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

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

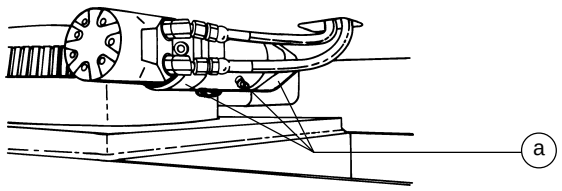
Yearly application of lubrication to the turntable bearing and worm drive gear is essential to good machine performance and service life. Continued use of an improperly greased gear will result in component damage.

1 Remove the power unit side turntable cover.

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

3 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.

4 Locate the grease fittings on the worm drive housing.



a grease fittings

5 Pump grease into each fitting until you see it coming out of the side of the gear housing.

6 Grease each tooth on the turntable rotation bearing.

Lubricant Type	Multipurpose grease

TABLE C PROCEDURES

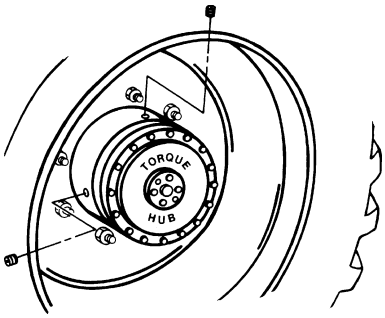
C-5
Replace the Torque Hub Oil

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

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

2 Remove both plugs and drain the oil.

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



4 Fill the hub with oil from the top hole until the oil level is even with the bottom of the side hole.

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

6 Repeat steps 1 through 5 for the other drive torque hub.

Oil capacity per hub	17 fluid ounces 0.5 liters

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

C-6
Replace the Hydraulic Filter

Replacement of the hydraulic 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 The hydraulic filter is located next to the hydraulic power unit.

1 Remove the power unit side turntable cover.

2 Clean the area around the oil filter, then remove the filter with an oil filter wrench.

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

4 Install the new filter (Genie part no. 44788) and tighten it securely by hand.

5 Clean up any oil that may have spilled during the replacement procedure.

6 Turn the key switch to ground control and lift the red Emergency Stop switch cover and move the toggle switch to the ON position. Activate function enable and hold the primary boom up toggle switch.

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

Return oil filter - Genie part number	44788

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, test the oil quarterly. Replace the oil when it fails the test.**

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

1 Place a suitable container under the hydraulic power unit reservoir.

2 Remove the power unit side turntable cover.

3 Remove the drain plug from the bottom of the hydraulic power unit reservoir.

4 Completely drain the reservoir into a suitable container.
See capacity specifications listed above.

5 Remove the reservoir mounting fasteners. Remove the reservoir and clean it using a mild solvent.

6 Remove the suction strainer and clean it using a mild solvent.

7 Install the suction strainer.

8 Install the reservoir onto the power unit.

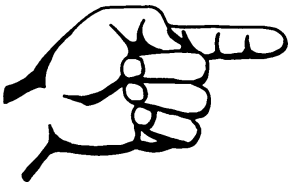
9 Install the reservoir drain plug using a thread sealant.

10 Fill the reservoir with hydraulic oil until the level is visible in the sight gauge. Do not overfill.

11 Clean up any oil that may have spilled.

Hydraulic Oil Specifications

Hydraulic oil type	Dexron equivalent
Hydraulic reservoir capacity	2.5 gallons 9.5 liters
Hydraulic system (including reservoir)	4 gallons 15.1 liters



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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
  - · 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 Z-30/20 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

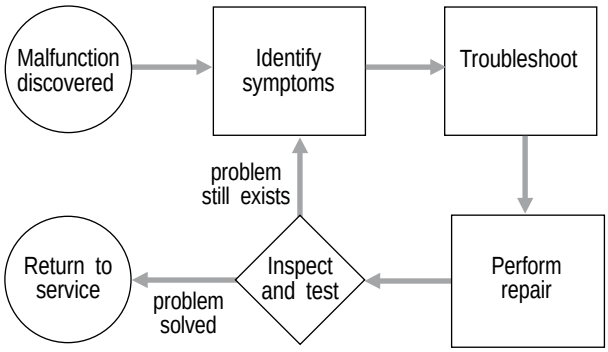


Chart 1

All Functions Will Not Operate

Be sure key switch is in the appropriate position.

Be sure the Emergency Stop switches are pulled out to the ON position.

Be sure the circuit breaker and fuses are not tripped or blown.

Be sure the battery packs are properly connected.

Be sure the batteries have been charged.

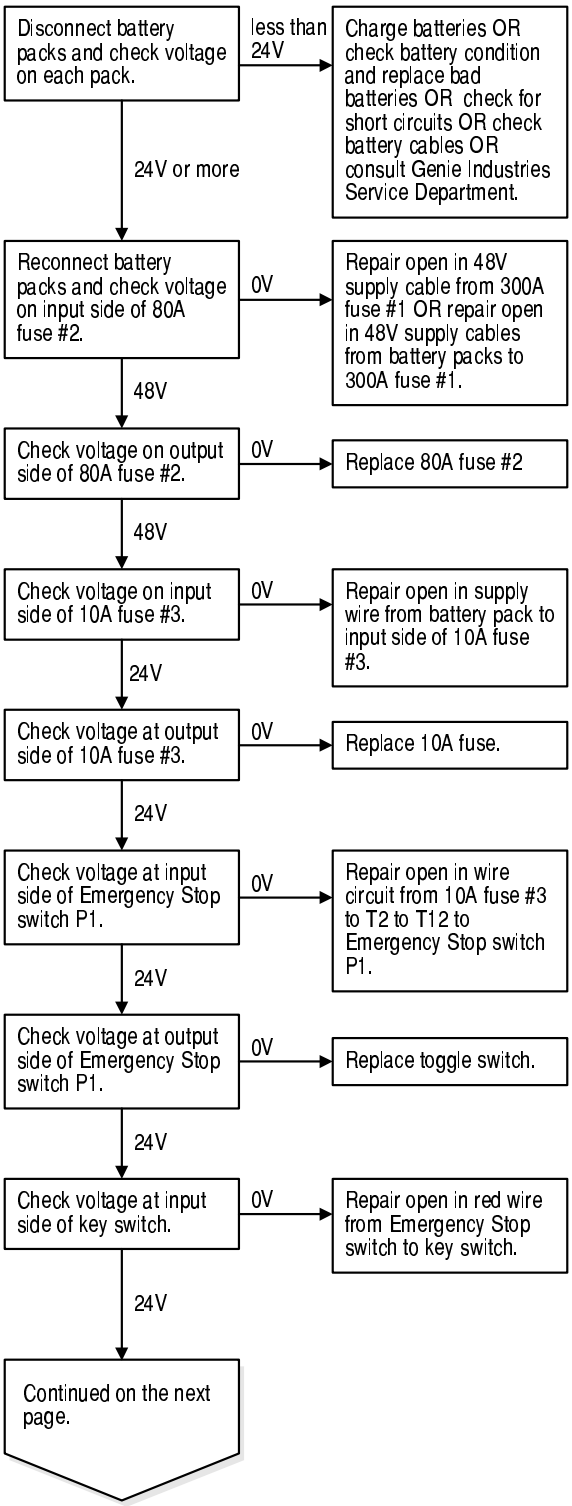


CHART 1

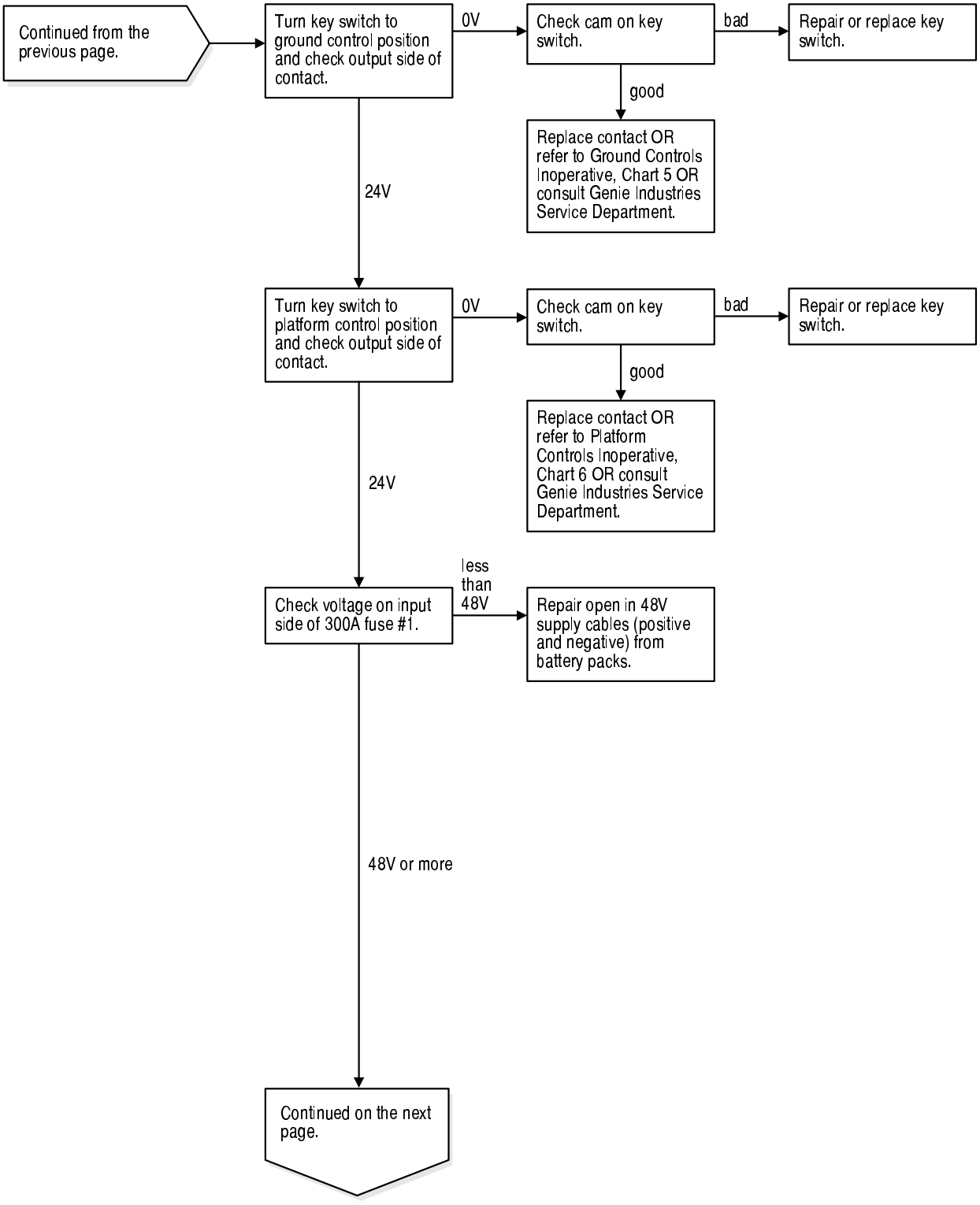

Continued from the previous page.
Turn key switch to ground control position and check output side of contact.
0V
Check cam on key switch.
bad
Repair or replace key switch.
good
Replace contact OR refer to Ground Controls Inoperative, Chart 5 OR consult Genie Industries Service Department.
24V
Turn key switch to platform control position and check output side of contact.
0V
Check cam on key switch.
bad
Repair or replace key switch.
good
Replace contact OR refer to Platform Controls Inoperative, Chart 6 OR consult Genie Industries Service Department.
24V
Check voltage on input side of 300A fuse #1.
less than 48V
Repair open in 48V supply cables (positive and negative) from battery packs.
48V or more
Continued on the next page.

CHART 1

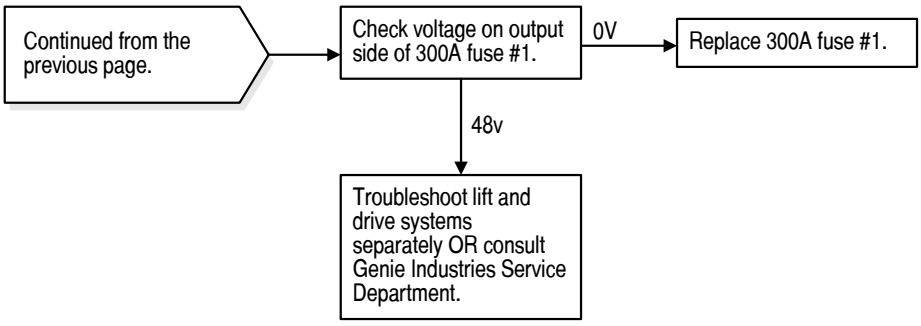

Continued from the previous page.
Check voltage on output side of 300A fuse #1.
0V
Replace 300A fuse #1.
48v
Troubleshoot lift and drive systems separately OR consult Genie Industries Service Department.

Chart 2

Lift Pump Motor Will Not Operate

Be sure key switch is in the appropriate position.

Be sure the Emergency Stop switches are pulled out to the ON position.

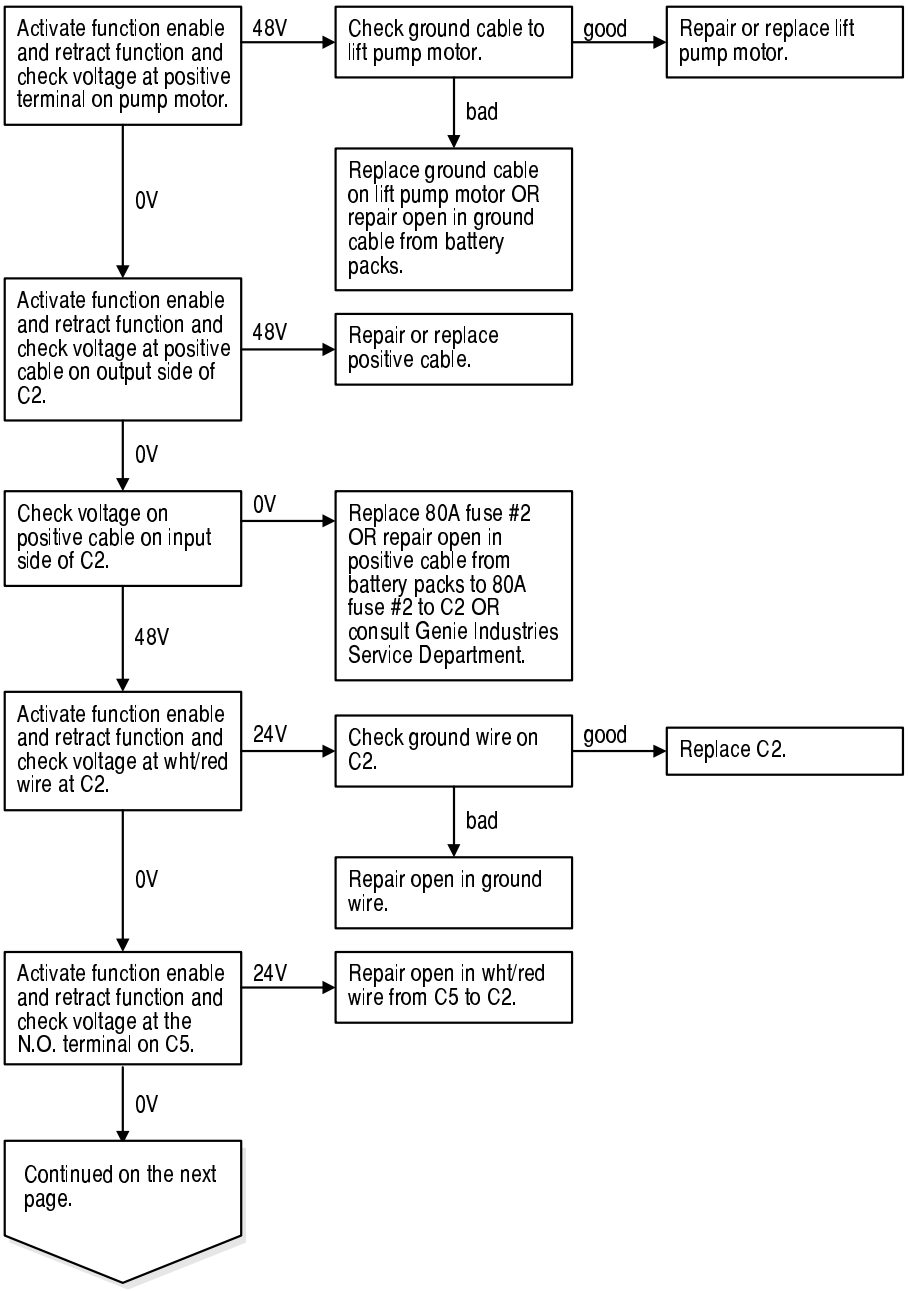


CHART 2

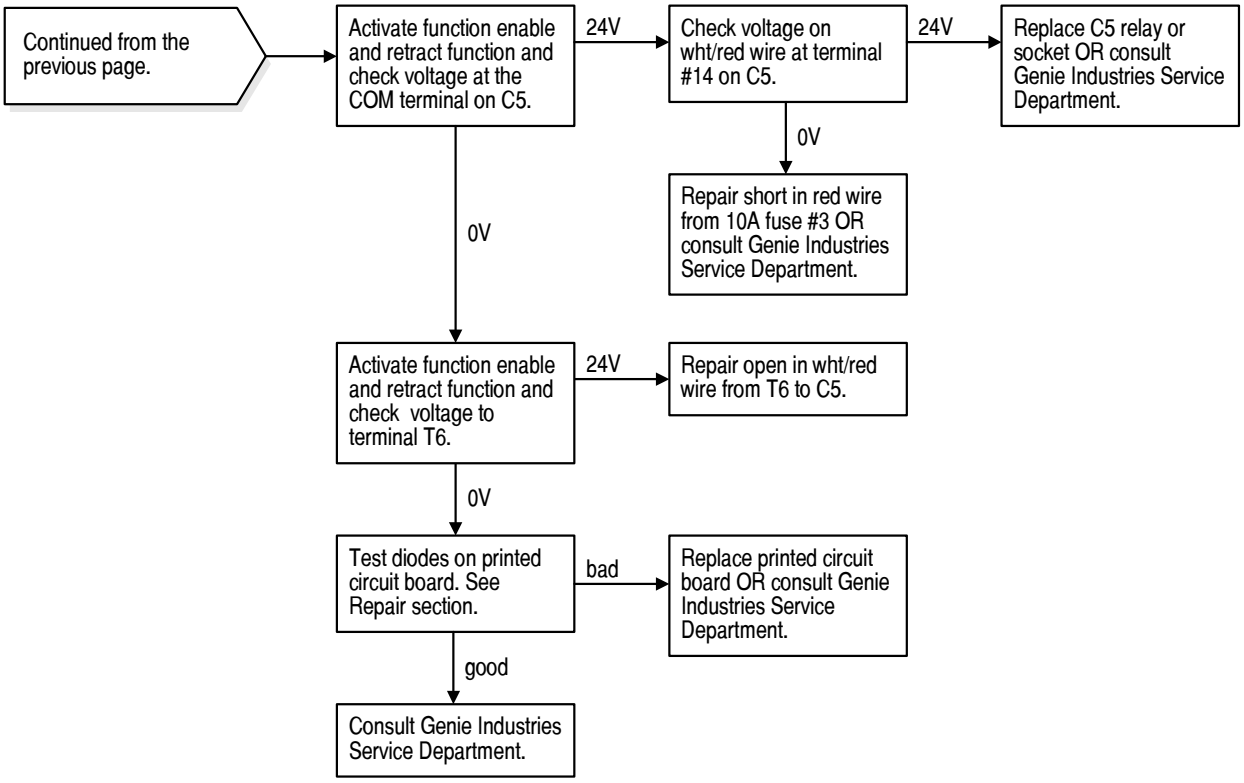

Continued from the previous page.
Activate function enable and retract function and check voltage at the COM terminal on C5.
24V
Check voltage on wht/red wire at terminal #14 on C5.
24V
Replace C5 relay or socket OR consult Genie Industries Service Department.
0V
Repair short in red wire from 10A fuse #3 OR consult Genie Industries Service Department.
0V
Activate function enable and retract function and check voltage to terminal T6.
24V
Repair open in wht/red wire from T6 to C5.
0V
Test diodes on printed circuit board. See Repair section.
bad
Replace printed circuit board OR consult Genie Industries Service Department.
good
Consult Genie Industries Service Department.

Chart 3

All Functions Inoperative, Power Unit Starts and Runs

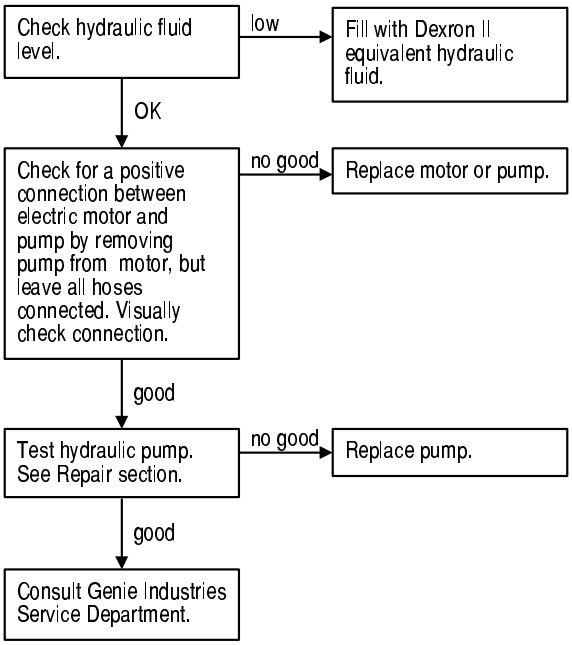


Chart 4

All Lift and Steer Functions Inoperative, Drive Function Operational

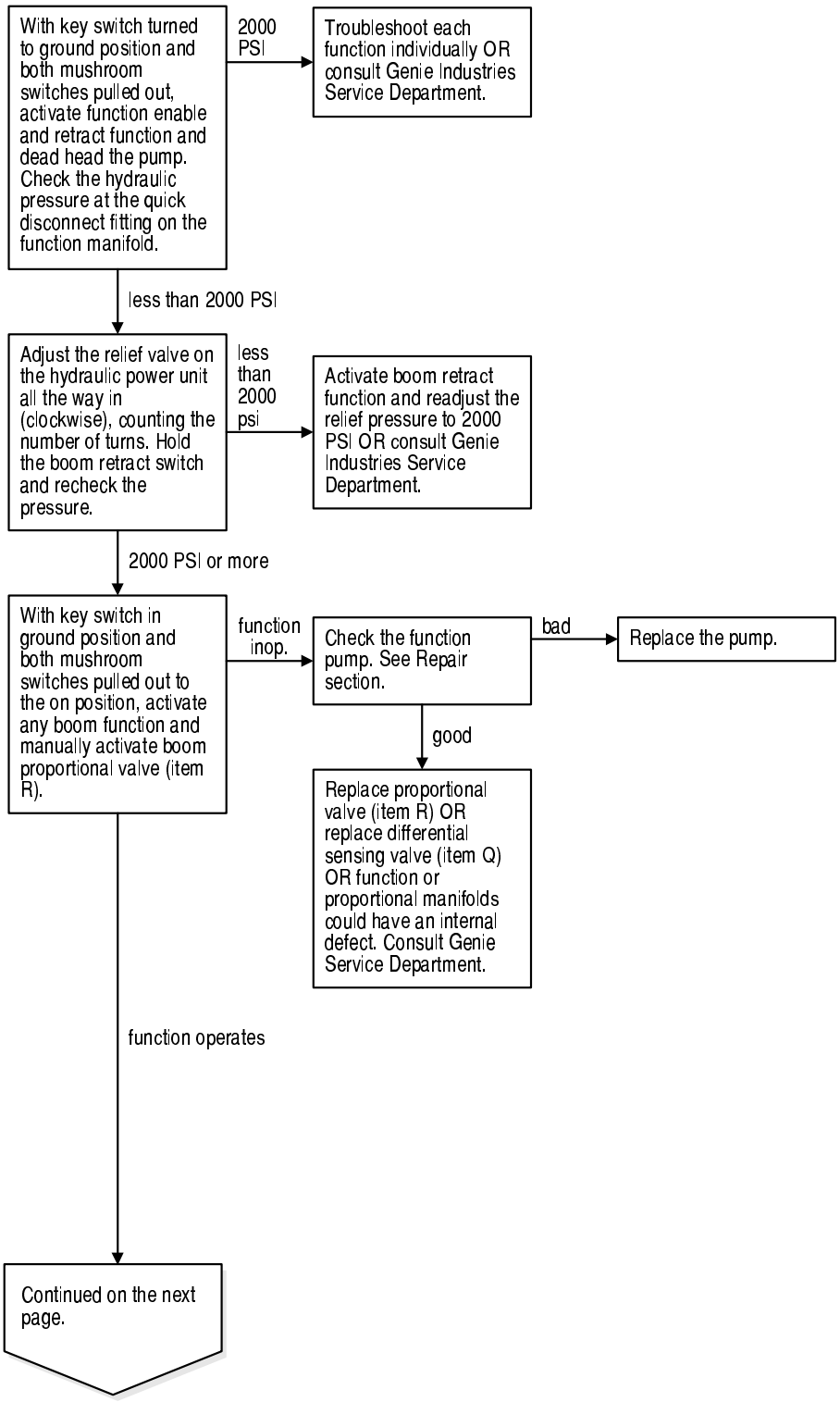


CHART 4

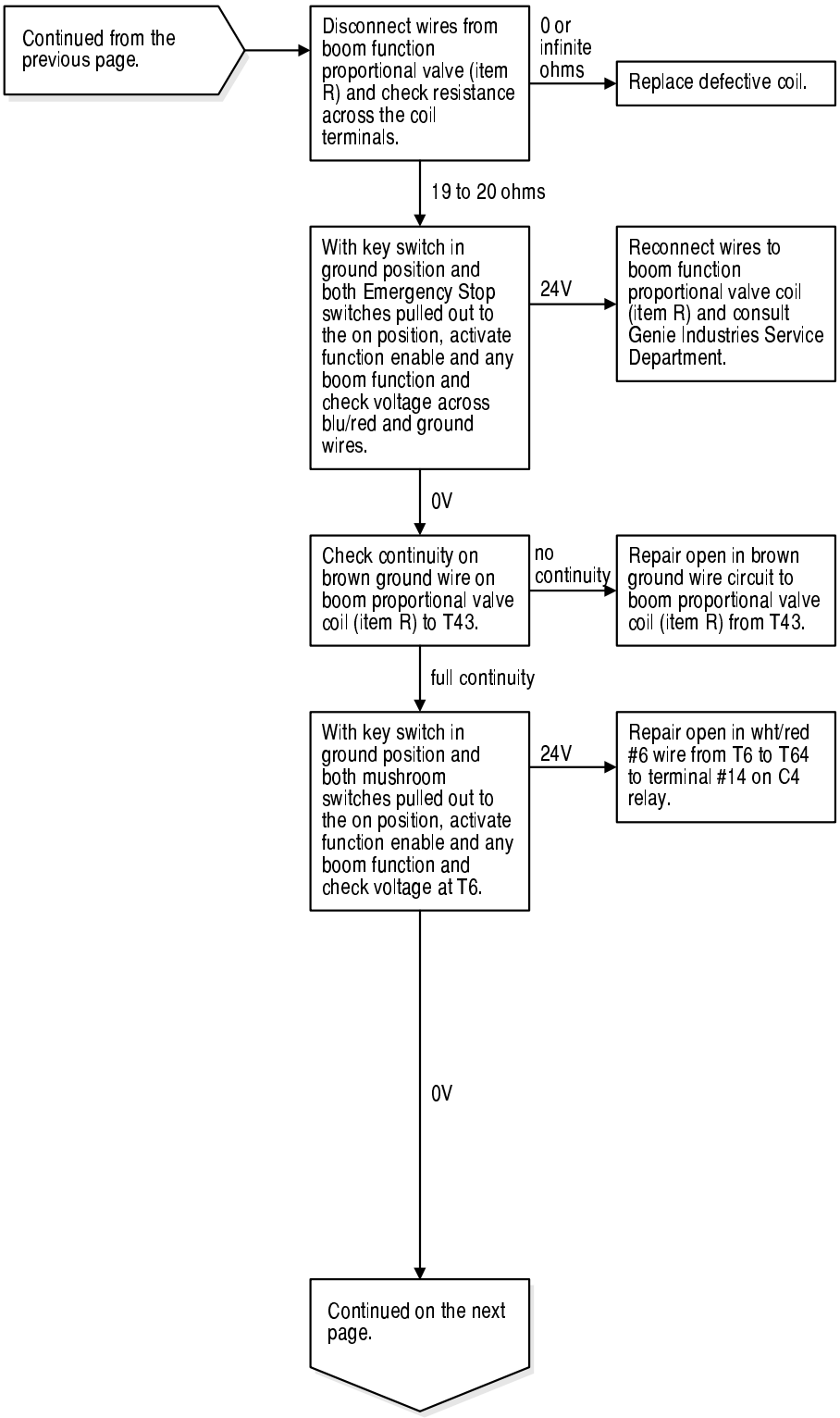

Continued from the previous page.
Disconnect wires from boom function proportional valve (item R) and check resistance across the coil terminals.
0 or infinite ohms
Replace defective coil.
19 to 20 ohms
With key switch in ground position and both Emergency Stop switches pulled out to the on position, activate function enable and any boom function and check voltage across blu/red and ground wires.
24V
Reconnect wires to boom function proportional valve coil (item R) and consult Genie Industries Service Department.
0V
Check continuity on brown ground wire on boom proportional valve coil (item R) to T43.
no continuity
Repair open in brown ground wire circuit to boom proportional valve coil (item R) from T43.
full continuity
With key switch in ground position and both mushroom switches pulled out to the on position, activate function enable and any boom function and check voltage at T6.
24V
Repair open in wht/red #6 wire from T6 to T64 to terminal #14 on C4 relay.
0V
Continued on the next page.

CHART 4

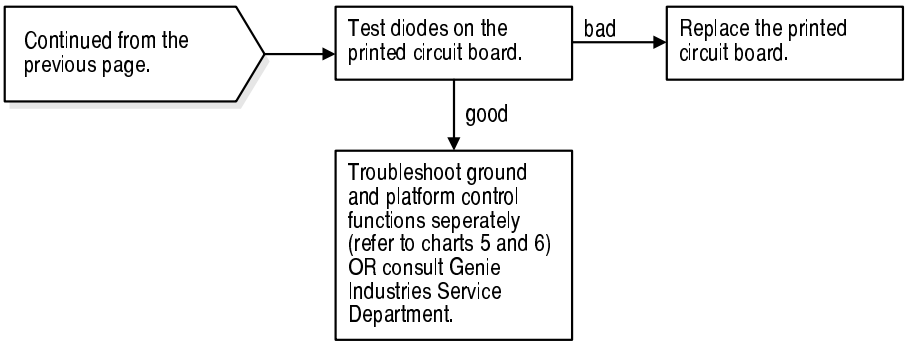

Continued from the previous page.
Test diodes on the printed circuit board.
bad
Replace the printed circuit board.
good
Troubleshoot ground and platform control functions seperately (refer to charts 5 and 6) OR consult Genie Industries Service Department.

Chart 5

Ground Controls Inoperative, Platform Controls Operate Normally

Be sure key switch is in the appropriate position.

Be sure the Emergency Stop switches are pulled out to the ON position.

Be sure the batteries are fully charged.

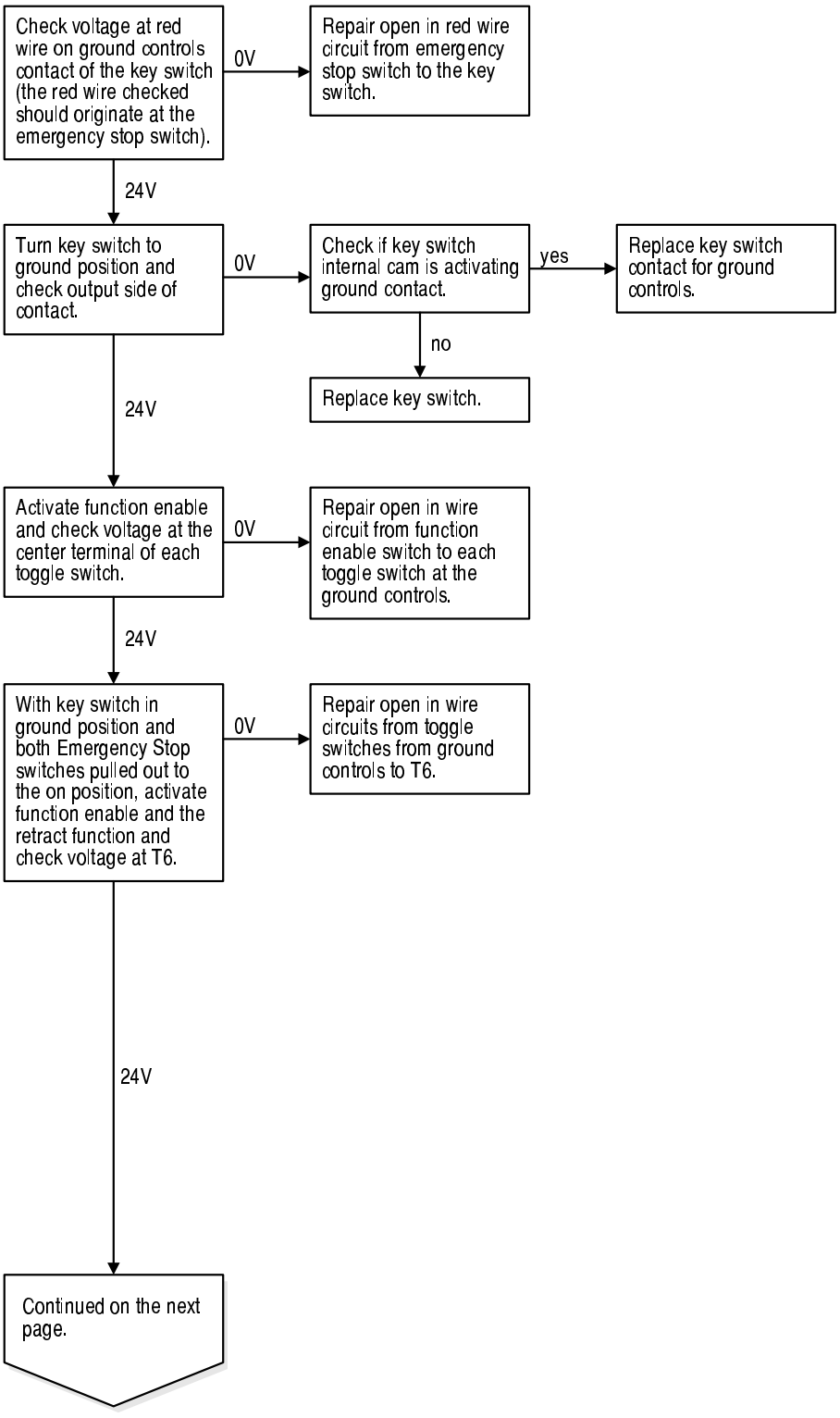


CHART 5

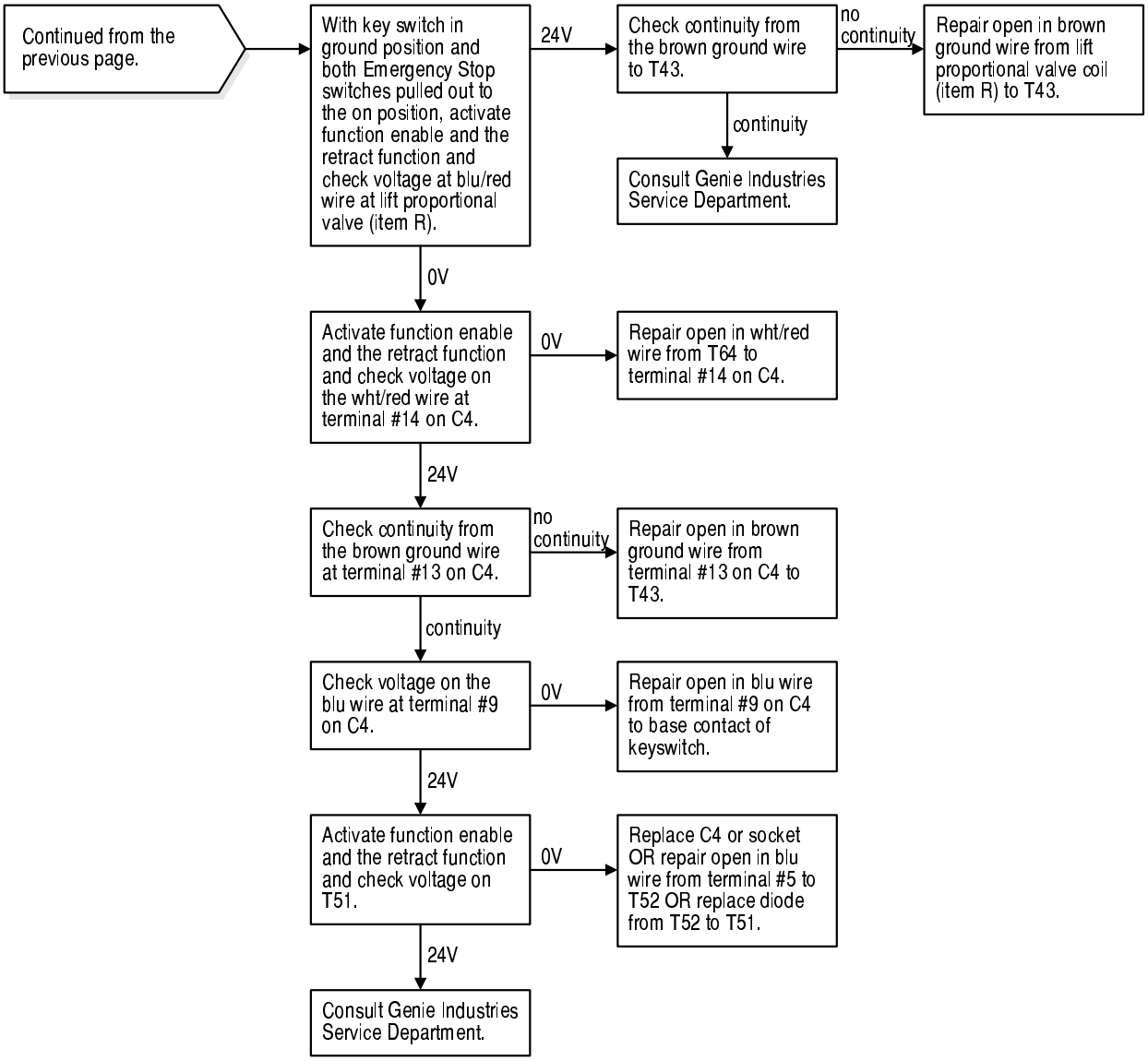

Continued from the previous page.
With key switch in ground position and both Emergency Stop switches pulled out to the on position, activate function enable and the retract function and check voltage at blu/red wire at lift proportional valve (item R).
24V
Check continuity from the brown ground wire to T43.
no continuity
Repair open in brown ground wire from lift proportional valve coil (item R) to T43.
continuity
Consult Genie Industries Service Department.
0V
Activate function enable and the retract function and check voltage on the wht/red wire at terminal #14 on C4.
0V
Repair open in wht/red wire from T64 to terminal #14 on C4.
24V
Check continuity from the brown ground wire at terminal #13 on C4.
no continuity
Repair open in brown ground wire from terminal #13 on C4 to T43.
continuity
Check voltage on the blu wire at terminal #9 on C4.
0V
Repair open in blu wire from terminal #9 on C4 to base contact of keyswitch.
24V
Activate function enable and the retract function and check voltage on T51.
0V
Replace C4 or socket OR repair open in blu wire from terminal #5 to T52 OR replace diode from T52 to T51.
24V
Consult Genie Industries Service Department.

Chart 6

Platform Controls Inoperative, Ground Controls Operate Normally

Be sure key switch is in the appropriate position.

Be sure the Emergency Stop switches are pulled out to the ON position.

Be sure the batteries are fully charged.

Be sure boom function speed controller is turned to 9.

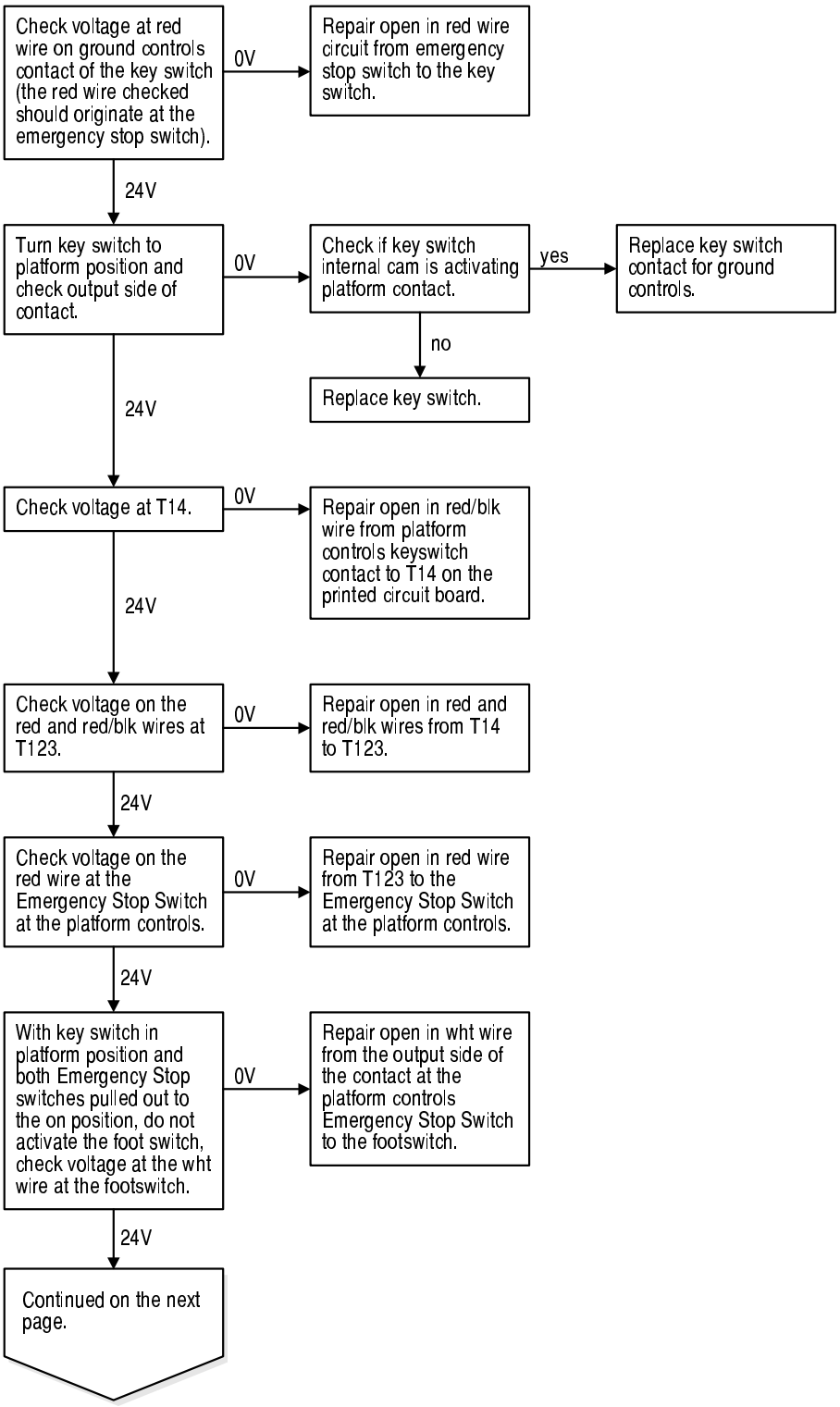


CHART 6

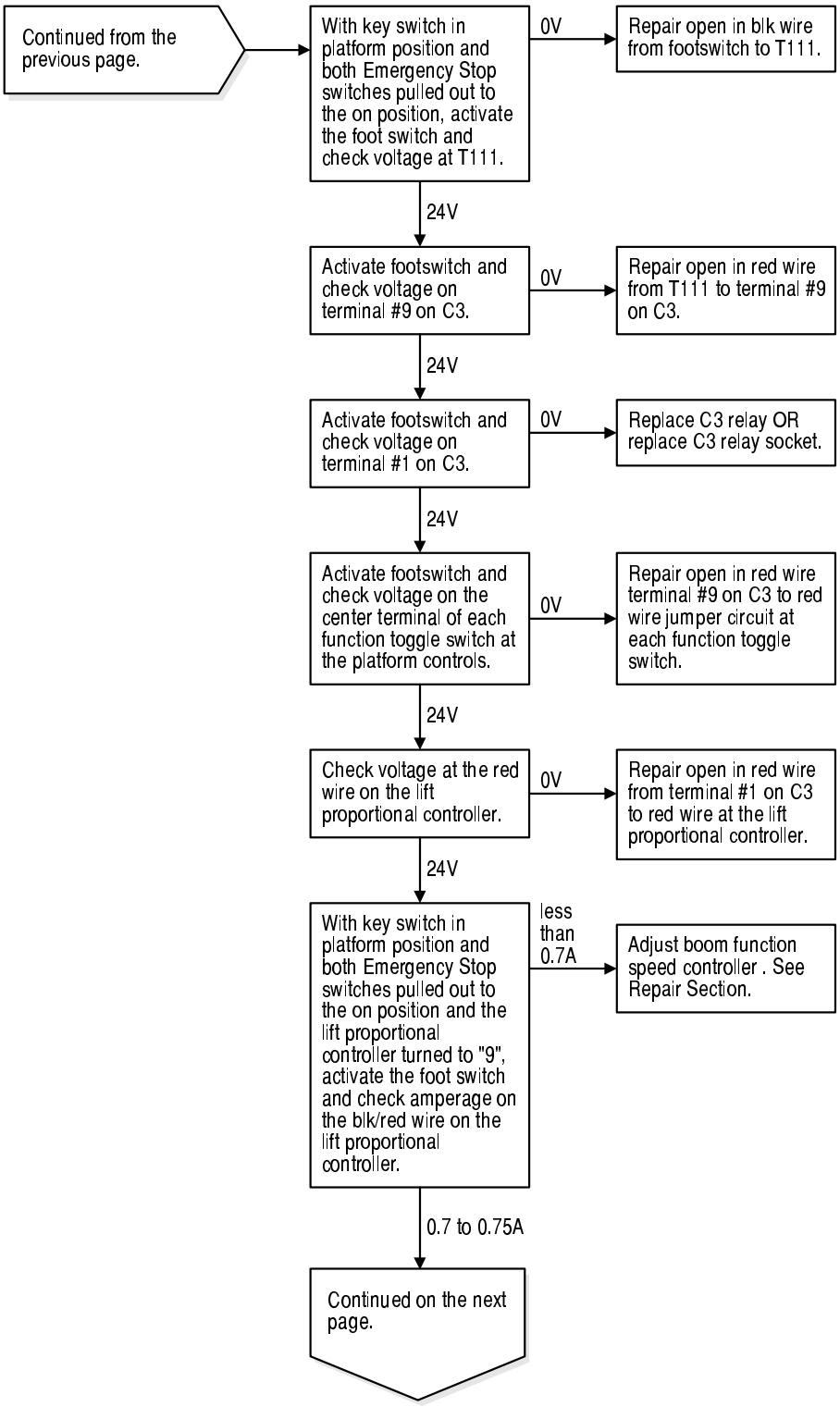

Continued from the previous page.
With key switch in platform position and both Emergency Stop switches pulled out to the on position, activate the foot switch and check voltage at T111.
0V
Repair open in blk wire from footswitch to T111.
24V
Activate footswitch and check voltage on terminal #9 on C3.
0V
Repair open in red wire from T111 to terminal #9 on C3.
24V
Activate footswitch and check voltage on terminal #1 on C3.
0V
Replace C3 relay OR replace C3 relay socket.
24V
Activate footswitch and check voltage on the center terminal of each function toggle switch at the platform controls.
0V
Repair open in red wire terminal #9 on C3 to red wire jumper circuit at each function toggle switch.
24V
Check voltage at the red wire on the lift proportional controller.
0V
Repair open in red wire from terminal #1 on C3 to red wire at the lift proportional controller.
24V
With key switch in platform position and both Emergency Stop switches pulled out to the on position and the lift proportional controller turned to "9", activate the foot switch and check amperage on the blk/red wire on the lift proportional controller.
less than 0.7A
Adjust boom function speed controller . See Repair Section.
0.7 to 0.75A
Continued on the next page.

CHART 6

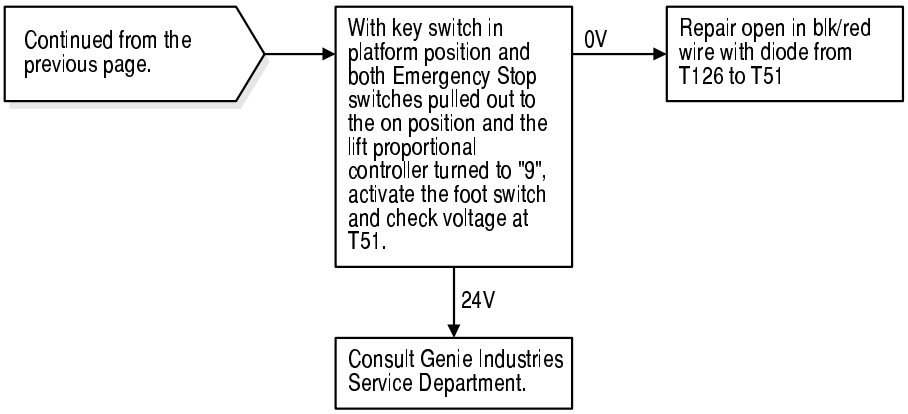

Continued from the previous page.
With key switch in platform position and both Emergency Stop switches pulled out to the on position and the lift proportional controller turned to "9", activate the foot switch and check voltage at T51.
0V
Repair open in blk/red wire with diode from T126 to T51
24V
Consult Genie Industries Service Department.

Chart 7

Primary Boom Up Function Inoperative

Be sure key switch is in the appropriate position.

Be sure the Emergency Stop switches are pulled out to the ON position.

Be sure the batteries are fully charged.

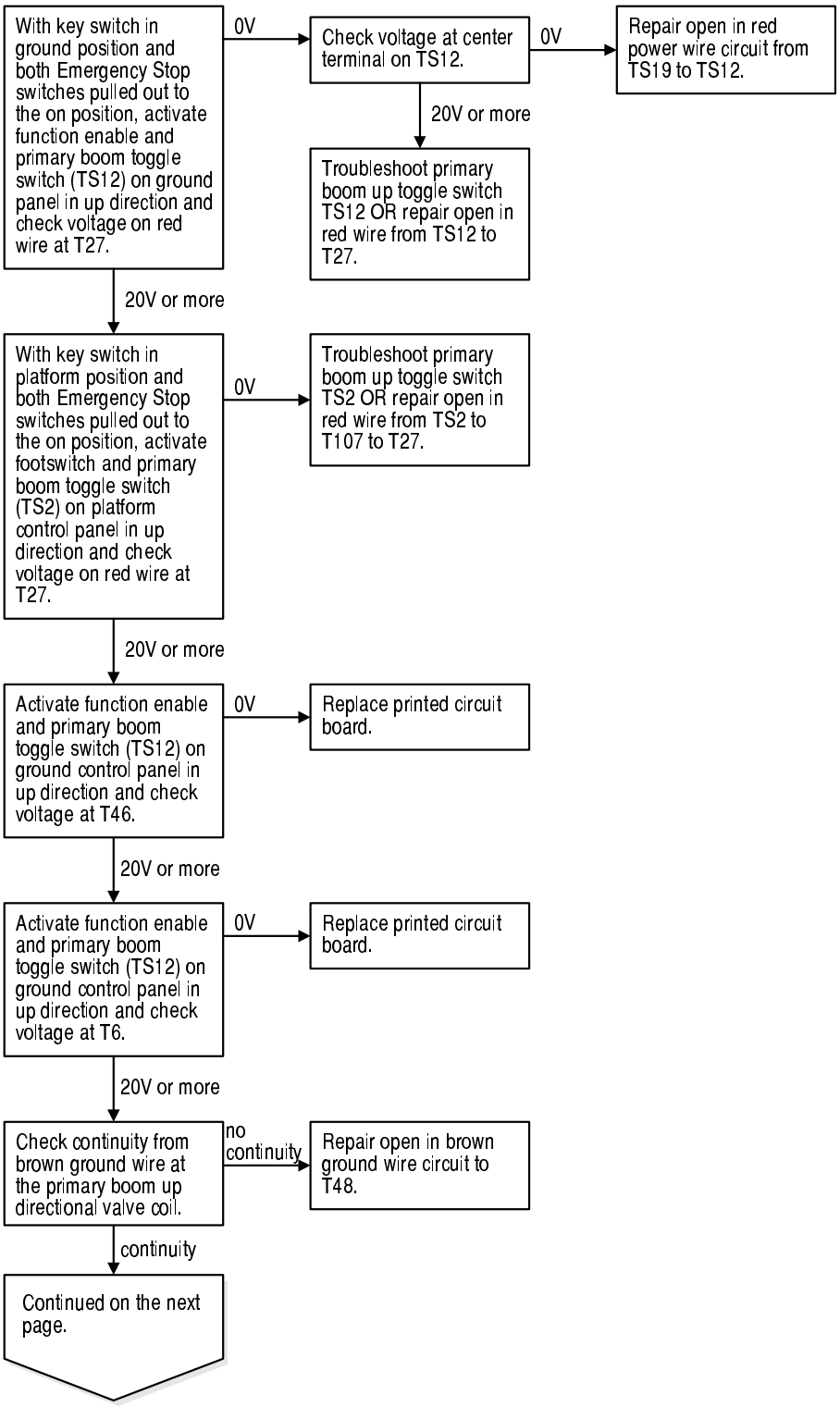


CHART 7

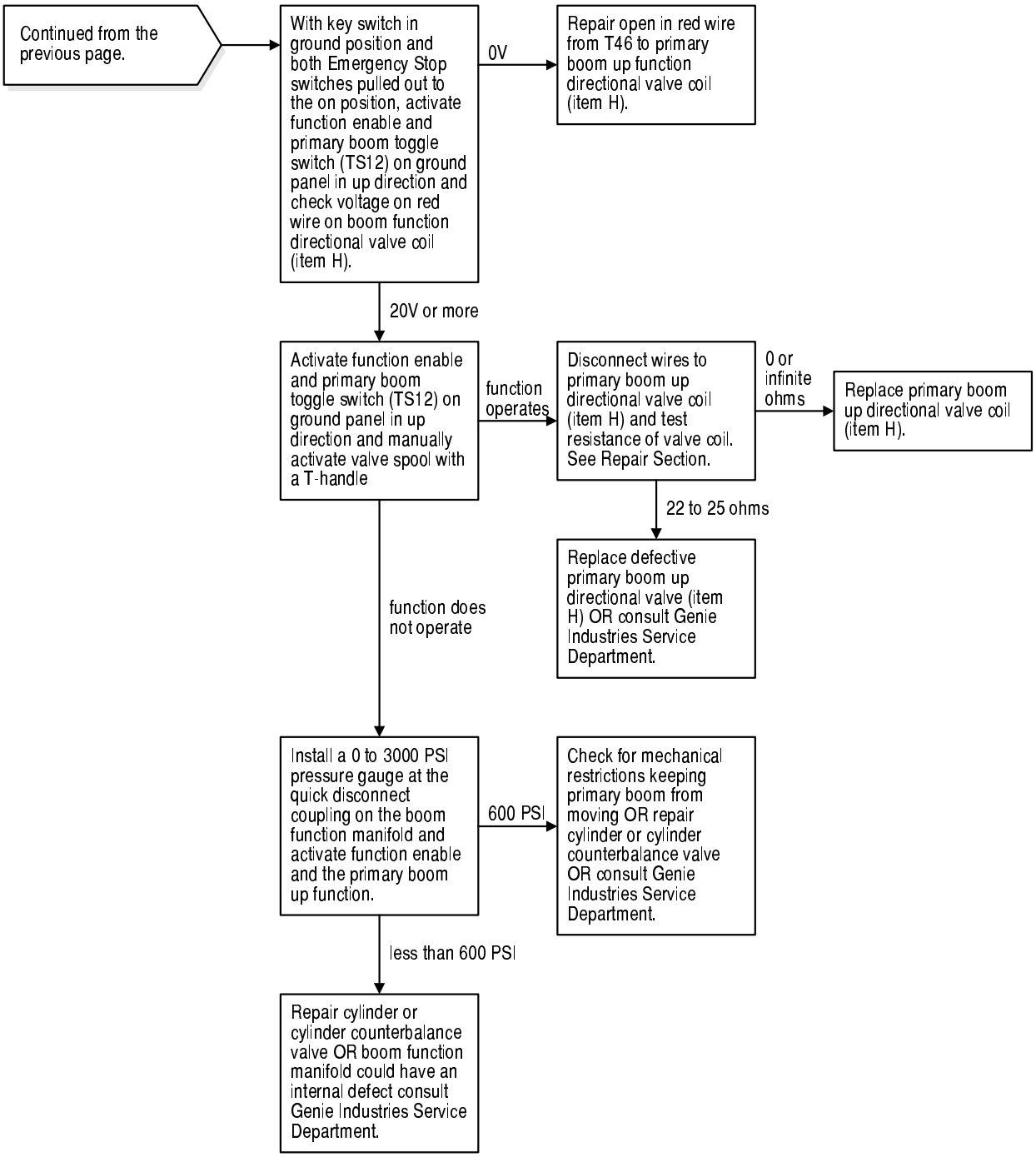

Continued from the previous page.
With key switch in ground position and both Emergency Stop switches pulled out to the on position, activate function enable and primary boom toggle switch (TS12) on ground panel in up direction and check voltage on red wire on boom function directional valve coil (item H).
0V
Repair open in red wire from T46 to primary boom up function directional valve coil (item H).
20V or more
Activate function enable and primary boom toggle switch (TS12) on ground panel in up direction and manually activate valve spool with a T-handle
function operates
Disconnect wires to primary boom up directional valve coil (item H) and test resistance of valve coil. See Repair Section.
0 or infinite ohms
Replace primary boom up directional valve coil (item H).
22 to 25 ohms
Replace defective primary boom up directional valve (item H) OR consult Genie Industries Service Department.
function does not operate
Install a 0 to 3000 PSI pressure gauge at the quick disconnect coupling on the boom function manifold and activate function enable and the primary boom up function.
600 PSI
Check for mechanical restrictions keeping primary boom from moving OR repair cylinder or cylinder counterbalance valve OR consult Genie Industries Service Department.
less than 600 PSI
Repair cylinder or cylinder counterbalance valve OR boom function manifold could have an internal defect consult Genie Industries Service Department.

Chart 8

Primary Boom Down Function Inoperative

Be sure key switch is in the appropriate position.

Be sure the Emergency Stop switches are pulled out to the ON position.

Be sure the batteries are fully charged.

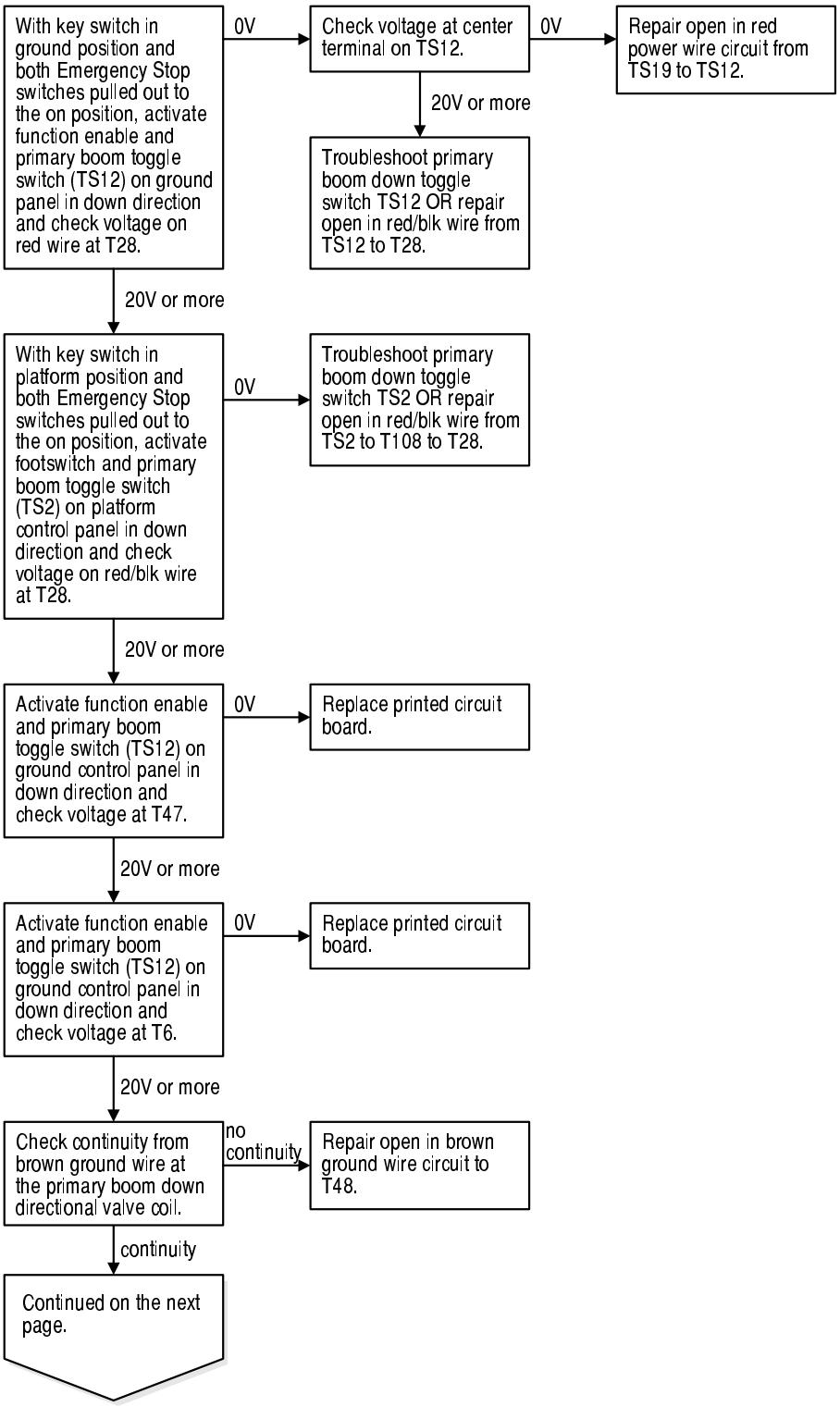


CHART 8

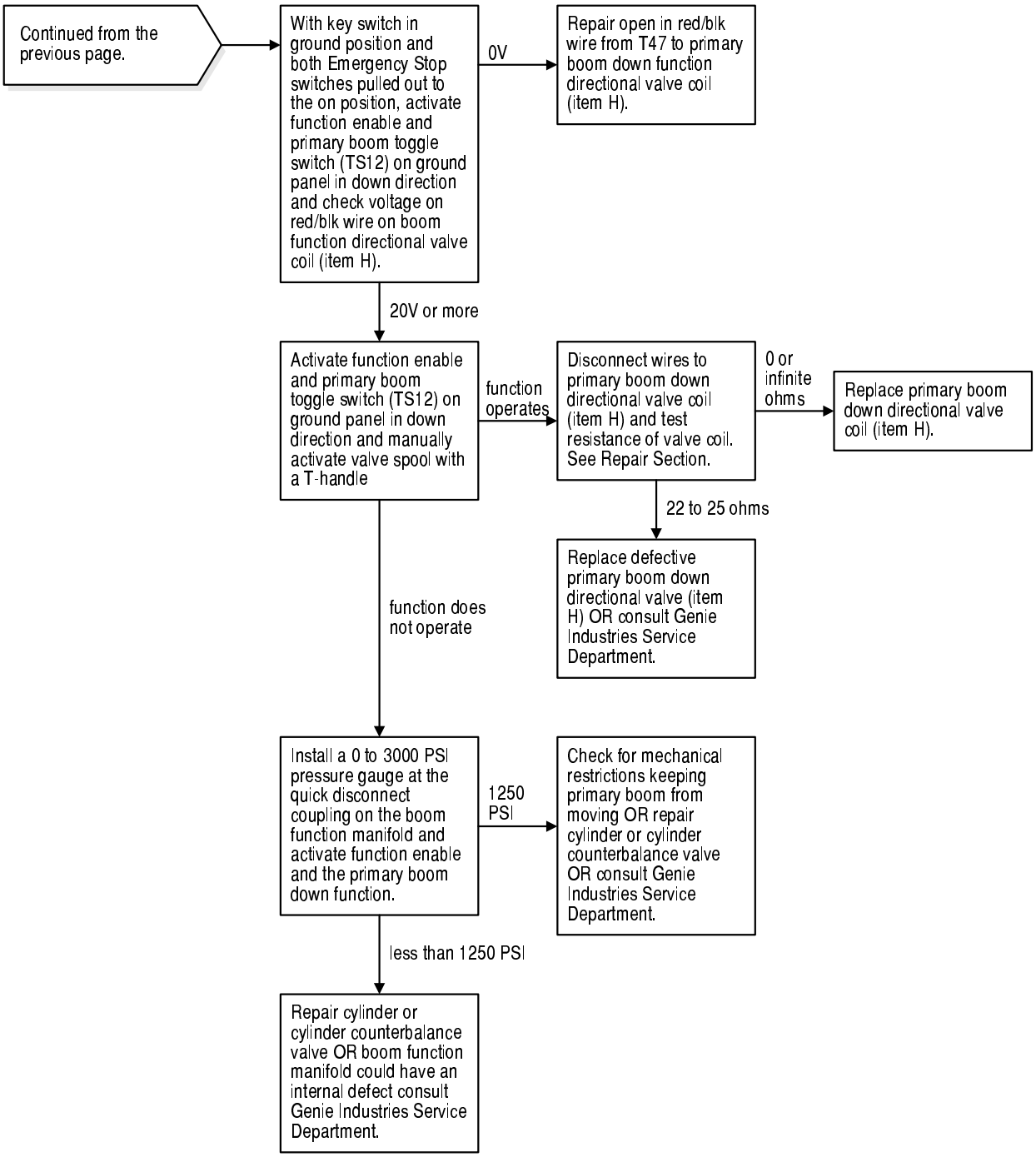

Continued from the previous page.
With key switch in ground position and both Emergency Stop switches pulled out to the on position, activate function enable and primary boom toggle switch (TS12) on ground panel in down direction and check voltage on red/blk wire on boom function directional valve coil (item H).
0V
Repair open in red/blk wire from T47 to primary boom down function directional valve coil (item H).
20V or more
Activate function enable and primary boom toggle switch (TS12) on ground panel in down direction and manually activate valve spool with a T-handle
function operates
Disconnect wires to primary boom down directional valve coil (item H) and test resistance of valve coil. See Repair Section.
0 or infinite ohms
Replace primary boom down directional valve coil (item H).
22 to 25 ohms
Replace defective primary boom down directional valve (item H) OR consult Genie Industries Service Department.
function does not operate
Install a 0 to 3000 PSI pressure gauge at the quick disconnect coupling on the boom function manifold and activate function enable and the primary boom down function.
1250 PSI
Check for mechanical restrictions keeping primary boom from moving OR repair cylinder or cylinder counterbalance valve OR consult Genie Industries Service Department.
less than 1250 PSI
Repair cylinder or cylinder counterbalance valve OR boom function manifold could have an internal defect consult Genie Industries Service Department.

Chart 9

Secondary Boom Up Function Inoperative

Be sure key switch is in the appropriate position.

Be sure the Emergency Stop switches are pulled out to the ON position.

Be sure the batteries are fully charged.

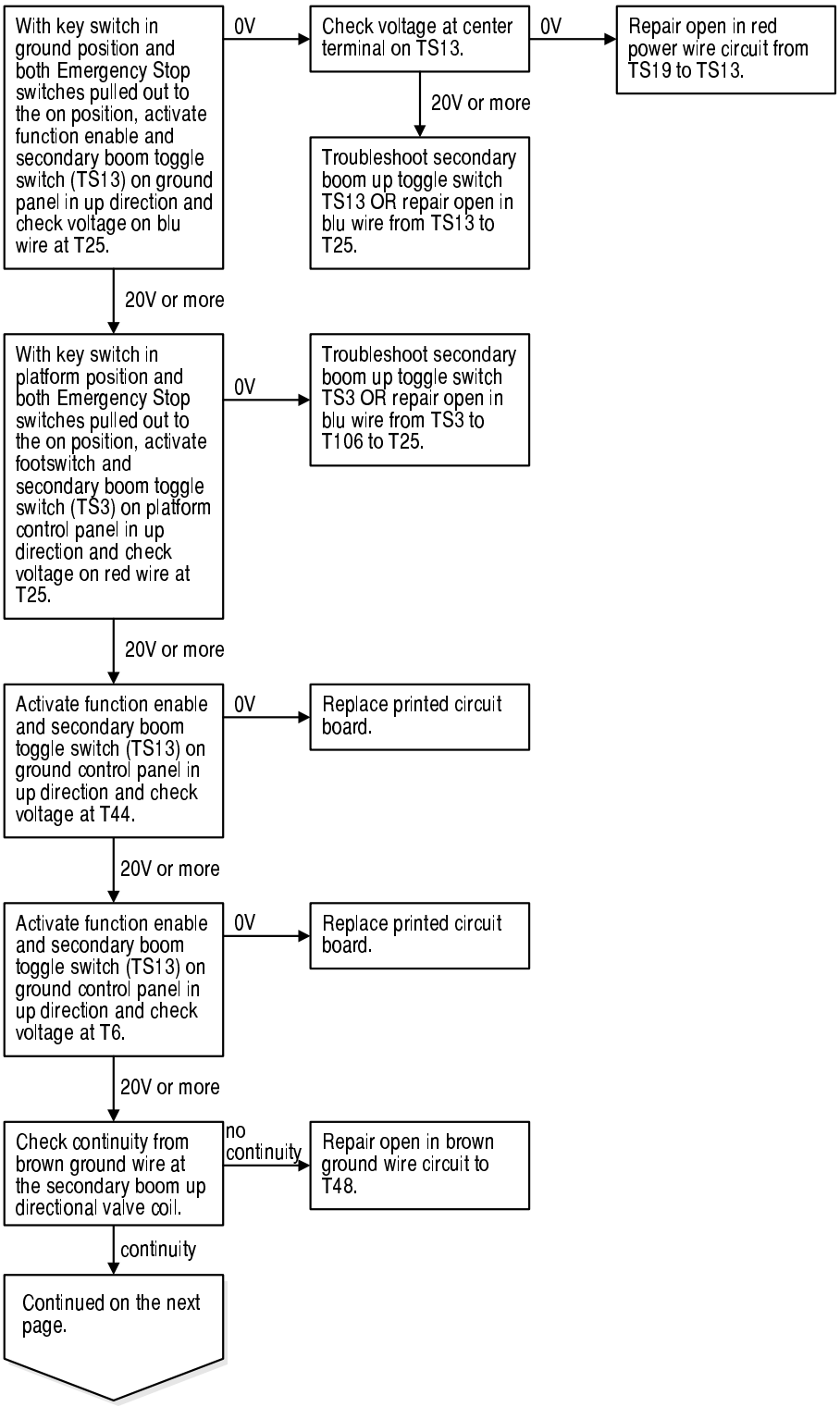


CHART 9

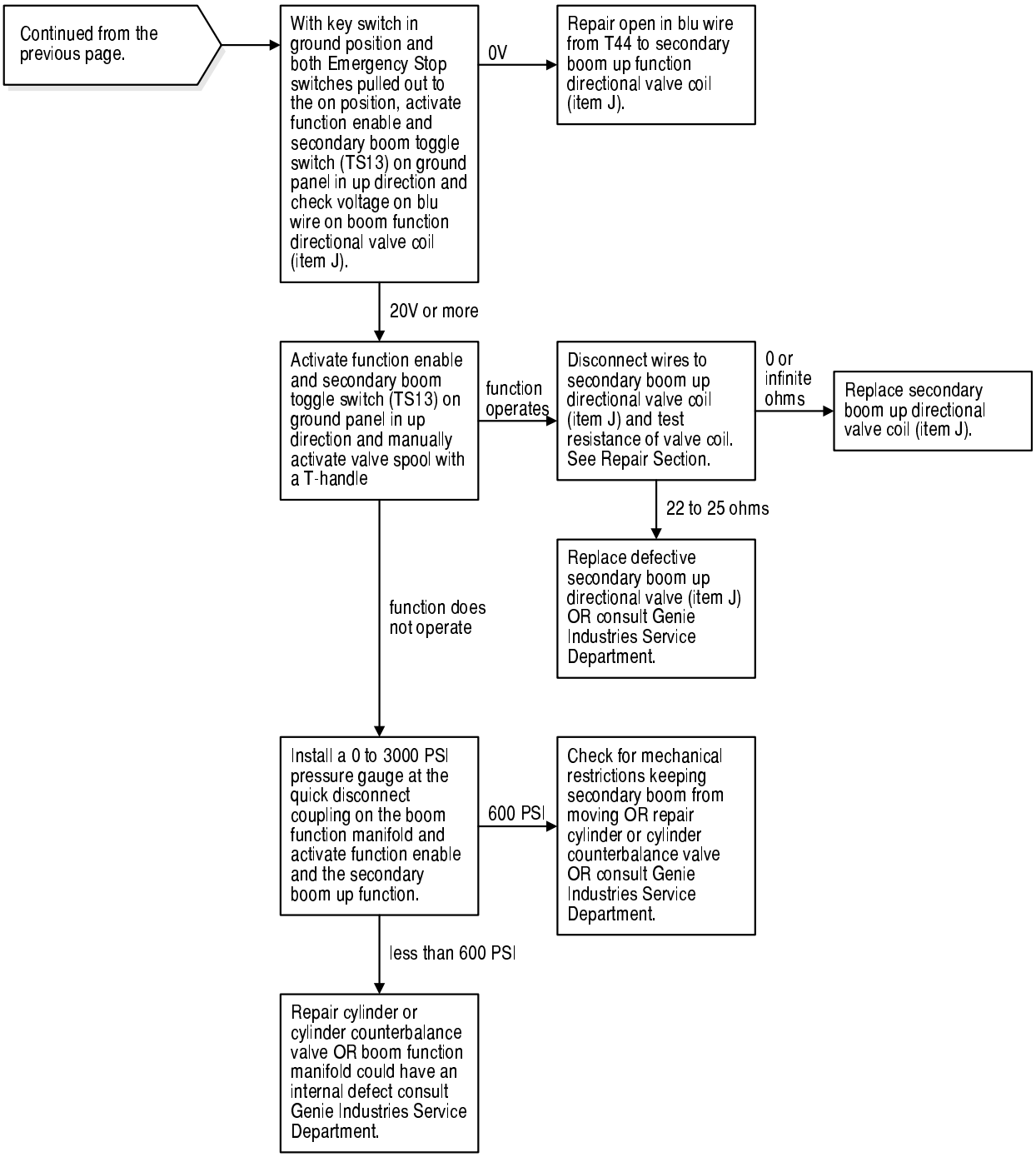

Continued from the previous page.
With key switch in ground position and both Emergency Stop switches pulled out to the on position, activate function enable and secondary boom toggle switch (TS13) on ground panel in up direction and check voltage on blu wire on boom function directional valve coil (item J).
0V
Repair open in blu wire from T44 to secondary boom up function directional valve coil (item J).
20V or more
Activate function enable and secondary boom toggle switch (TS13) on ground panel in up direction and manually activate valve spool with a T-handle
function operates
Disconnect wires to secondary boom up directional valve coil (item J) and test resistance of valve coil. See Repair Section.
0 or infinite ohms
Replace secondary boom up directional valve coil (item J).
22 to 25 ohms
Replace defective secondary boom up directional valve (item J) OR consult Genie Industries Service Department.
function does not operate
Install a 0 to 3000 PSI pressure gauge at the quick disconnect coupling on the boom function manifold and activate function enable and the secondary boom up function.
600 PSI
Check for mechanical restrictions keeping secondary boom from moving OR repair cylinder or cylinder counterbalance valve OR consult Genie Industries Service Department.
less than 600 PSI
Repair cylinder or cylinder counterbalance valve OR boom function manifold could have an internal defect consult Genie Industries Service Department.

Chart 10

Secondary Boom Down Function Inoperative

Be sure key switch is in the appropriate position.

Be sure the Emergency Stop switches are pulled out to the ON position.

Be sure the batteries are fully charged.

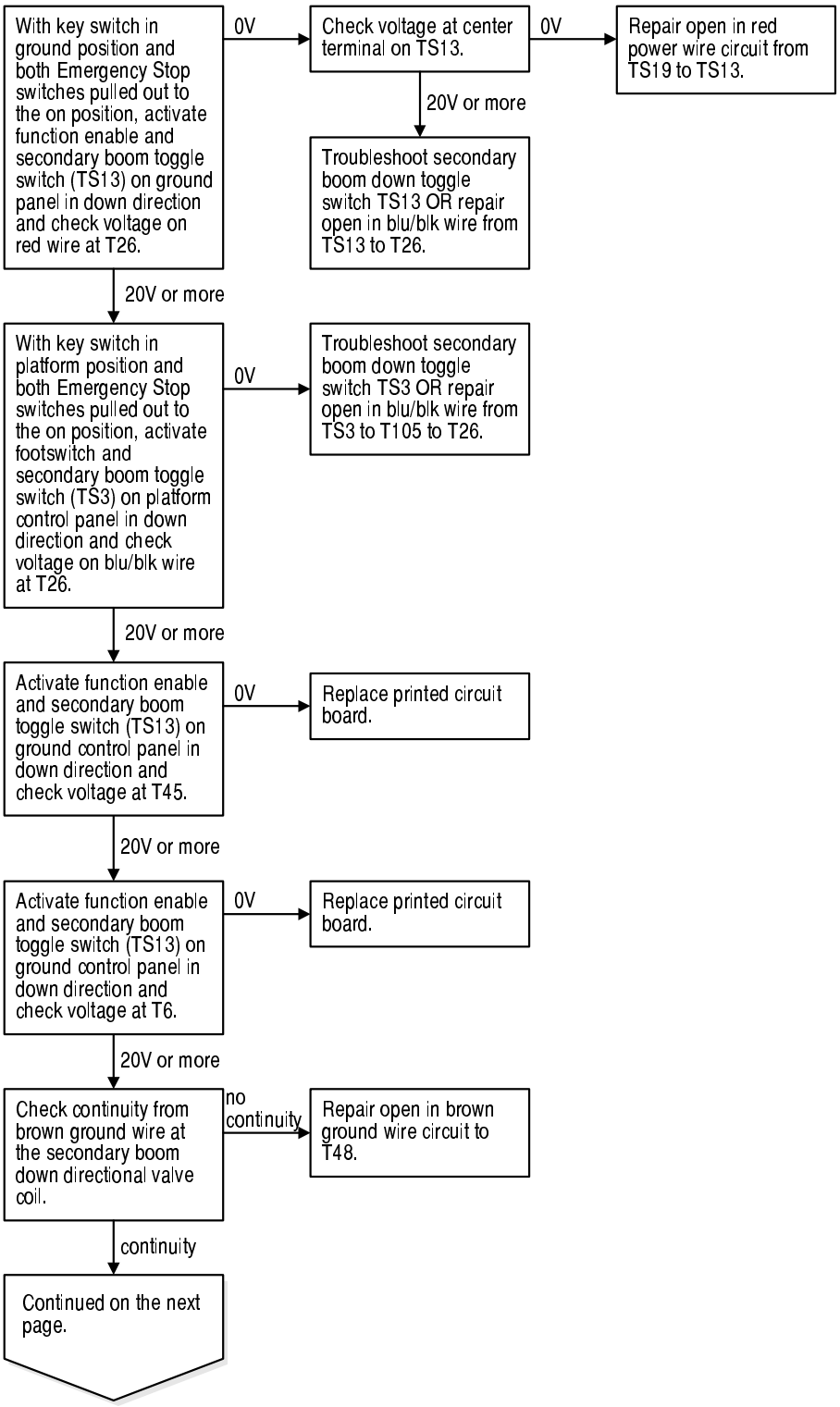


CHART 10

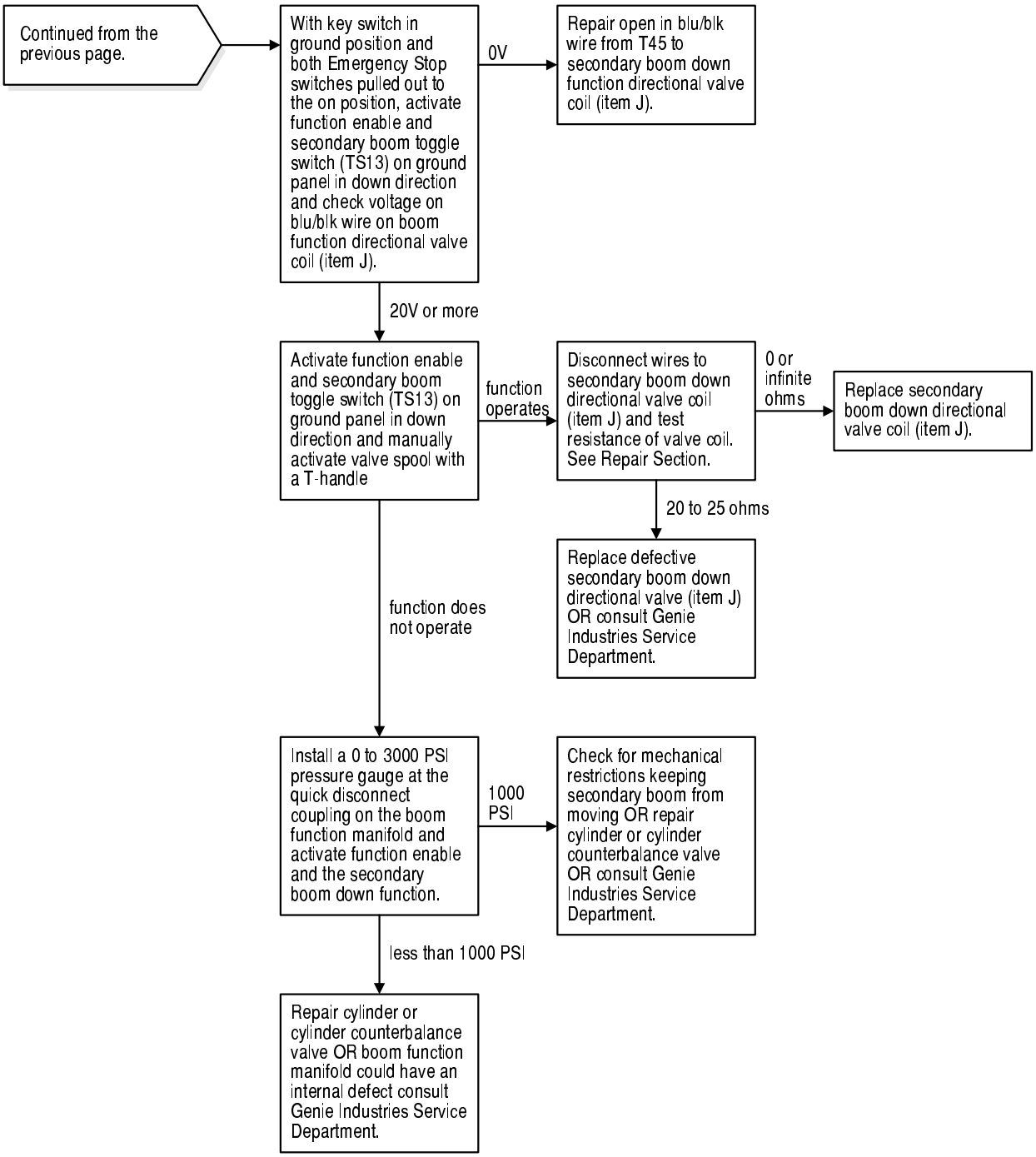

Continued from the previous page.
With key switch in ground position and both Emergency Stop switches pulled out to the on position, activate function enable and secondary boom toggle switch (TS13) on ground panel in down direction and check voltage on blu/blk wire on boom function directional valve coil (item J).
0V
Repair open in blu/blk wire from T45 to secondary boom down function directional valve coil (item J).
20V or more
Activate function enable and secondary boom toggle switch (TS13) on ground panel in down direction and manually activate valve spool with a T-handle
function operates
Disconnect wires to secondary boom down directional valve coil (item J) and test resistance of valve coil. See Repair Section.
0 or infinite ohms
Replace secondary boom down directional valve coil (item J).
20 to 25 ohms
Replace defective secondary boom down directional valve (item J) OR consult Genie Industries Service Department.
function does not operate
Install a 0 to 3000 PSI pressure gauge at the quick disconnect coupling on the boom function manifold and activate function enable and the secondary boom down function.
1000 PSI
Check for mechanical restrictions keeping secondary boom from moving OR repair cylinder or cylinder counterbalance valve OR consult Genie Industries Service Department.
less than 1000 PSI
Repair cylinder or cylinder counterbalance valve OR boom function manifold could have an internal defect consult Genie Industries Service Department.

Chart 11

Primary Boom Extend Function Inoperative

Be sure key switch is in the appropriate position.

Be sure the Emergency Stop switches are pulled out to the ON position.

Be sure the batteries are fully charged.

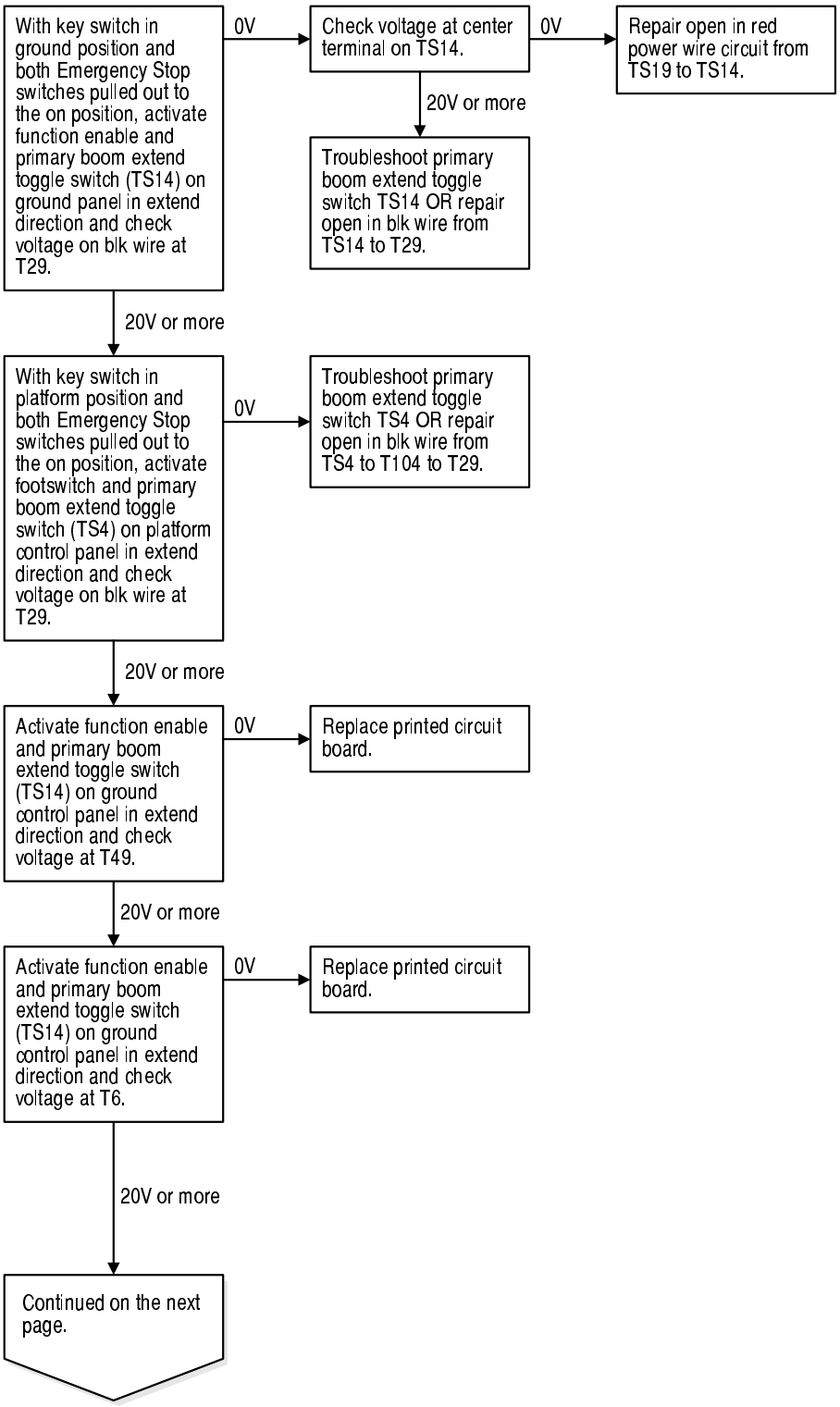


CHART 11

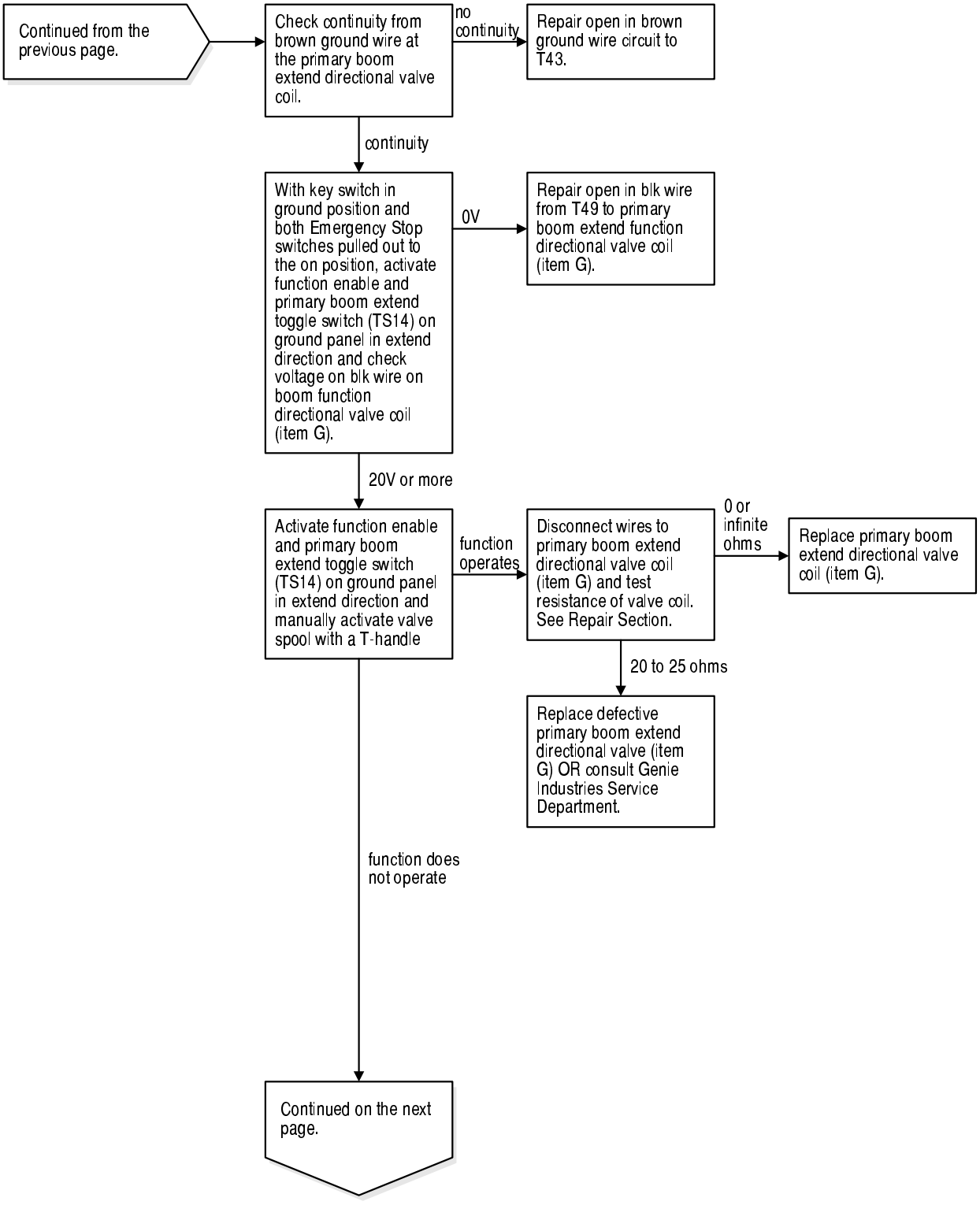

Continued from the previous page.
Check continuity from brown ground wire at the primary boom extend directional valve coil.
no continuity
Repair open in brown ground wire circuit to T43.
continuity
With key switch in ground position and both Emergency Stop switches pulled out to the on position, activate function enable and primary boom extend toggle switch (TS14) on ground panel in extend direction and check voltage on blk wire on boom function directional valve coil (item G).
0V
Repair open in blk wire from T49 to primary boom extend function directional valve coil (item G).
20V or more
Activate function enable and primary boom extend toggle switch (TS14) on ground panel in extend direction and manually activate valve spool with a T-handle
function operates
Disconnect wires to primary boom extend directional valve coil (item G) and test resistance of valve coil. See Repair Section.
0 or infinite ohms
Replace primary boom extend directional valve coil (item G).
20 to 25 ohms
Replace defective primary boom extend directional valve (item G) OR consult Genie Industries Service Department.
function does not operate
Continued on the next page.

CHART 11

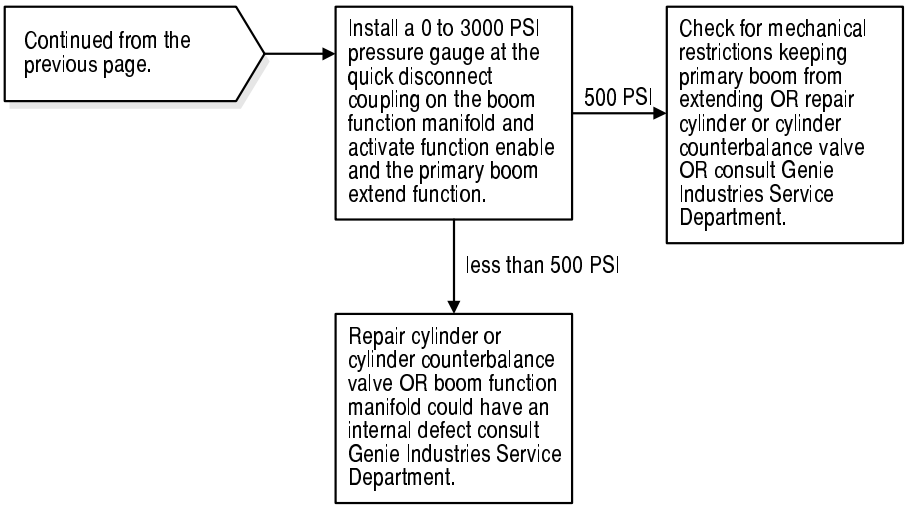

Continued from the previous page.
Install a 0 to 3000 PSI pressure gauge at the quick disconnect coupling on the boom function manifold and activate function enable and the primary boom extend function.
500 PSI
Check for mechanical restrictions keeping primary boom from extending OR repair cylinder or cylinder counterbalance valve OR consult Genie Industries Service Department.
less than 500 PSI
Repair cylinder or cylinder counterbalance valve OR boom function manifold could have an internal defect consult Genie Industries Service Department.

Chart 12

Primary Boom Retract Function Inoperative

Be sure key switch is in the appropriate position.

Be sure the Emergency Stop switches are pulled out to the ON position.

Be sure the batteries are fully charged.

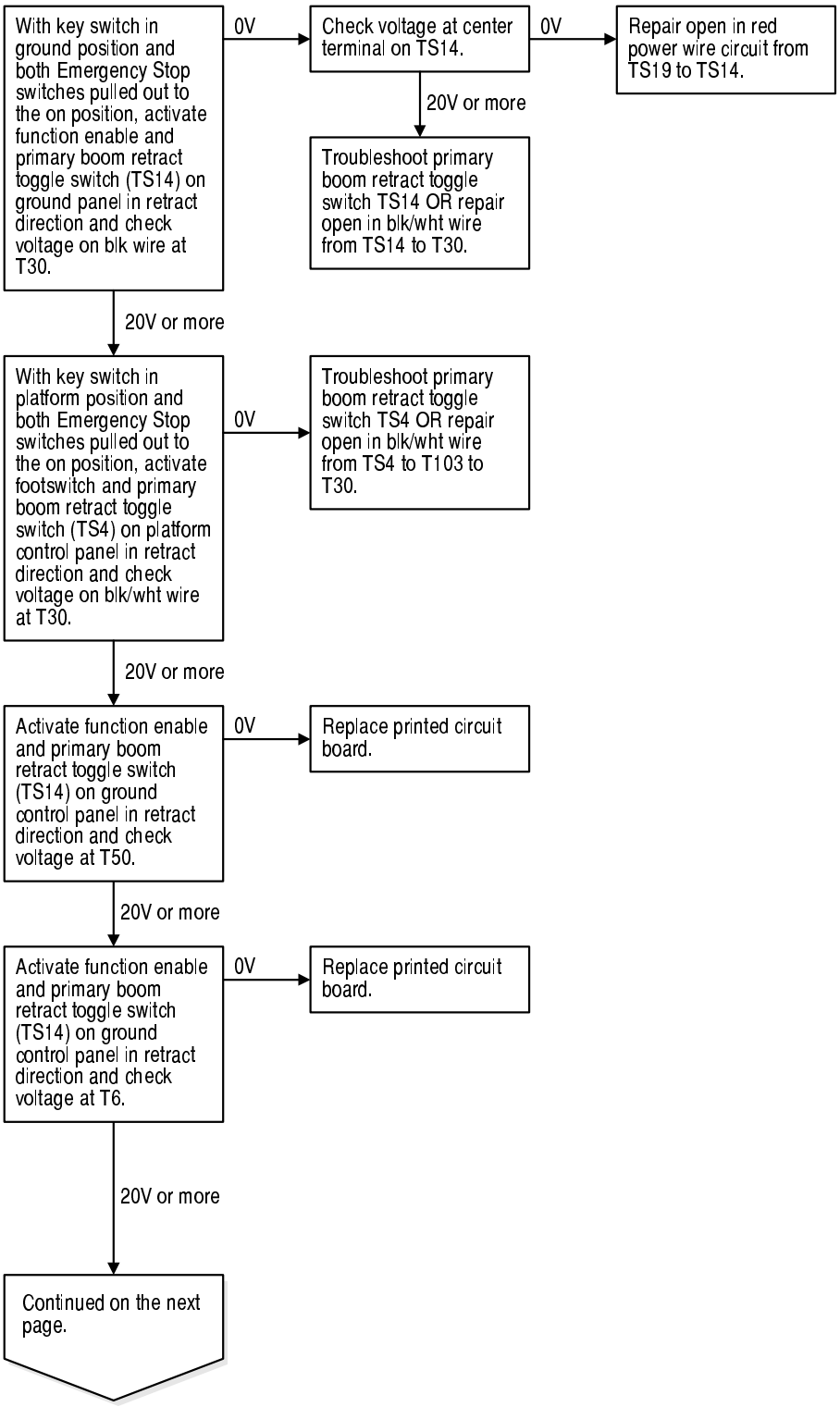


CHART 12

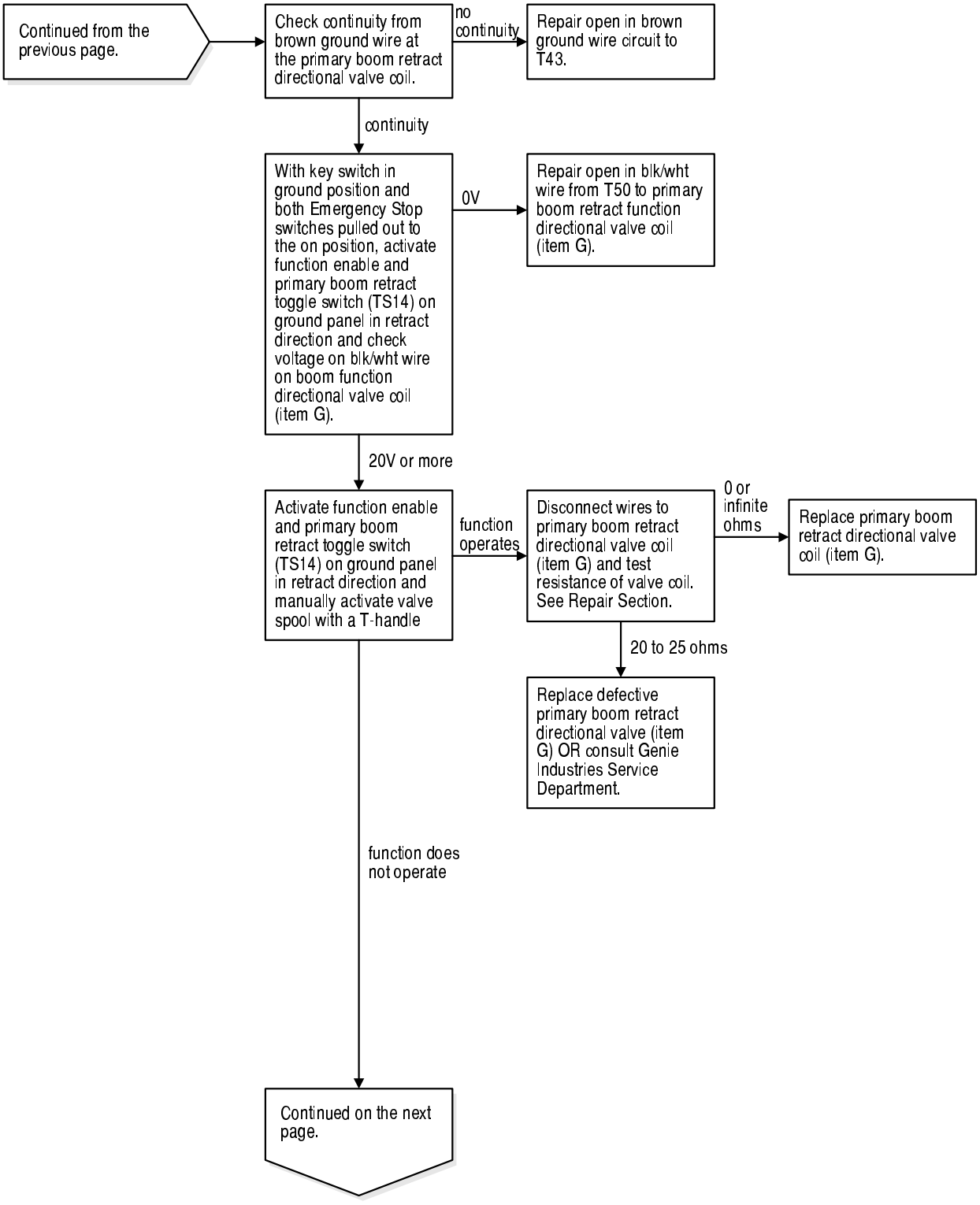

Continued from the previous page.
Check continuity from brown ground wire at the primary boom retract directional valve coil.
no continuity
Repair open in brown ground wire circuit to T43.
continuity
With key switch in ground position and both Emergency Stop switches pulled out to the on position, activate function enable and primary boom retract toggle switch (TS14) on ground panel in retract direction and check voltage on blk/wht wire on boom function directional valve coil (item G).
0V
Repair open in blk/wht wire from T50 to primary boom retract function directional valve coil (item G).
20V or more
Activate function enable and primary boom retract toggle switch (TS14) on ground panel in retract direction and manually activate valve spool with a T-handle
function operates
Disconnect wires to primary boom retract directional valve coil (item G) and test resistance of valve coil. See Repair Section.
0 or infinite ohms
Replace primary boom retract directional valve coil (item G).
20 to 25 ohms
Replace defective primary boom retract directional valve (item G) OR consult Genie Industries Service Department.
function does not operate
Continued on the next page.

CHART 12

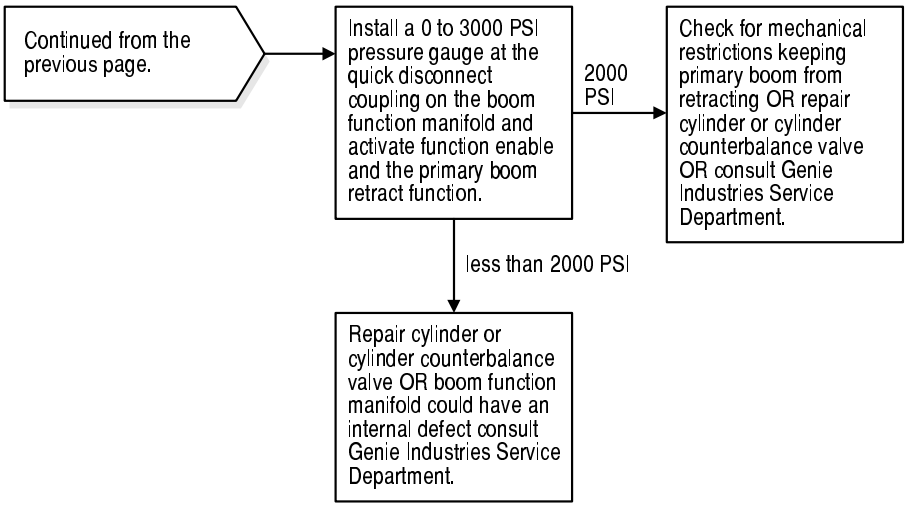

Continued from the previous page.
Install a 0 to 3000 PSI pressure gauge at the quick disconnect coupling on the boom function manifold and activate function enable and the primary boom retract function.
2000 PSI
Check for mechanical restrictions keeping primary boom from retracting OR repair cylinder or cylinder counterbalance valve OR consult Genie Industries Service Department.
less than 2000 PSI
Repair cylinder or cylinder counterbalance valve OR boom function manifold could have an internal defect consult Genie Industries Service Department.

Chart 13

Turntable Rotate Left Function Inoperative

Be sure key switch is in the appropriate position.

Be sure the Emergency Stop switches are pulled out to the ON position.

Be sure the batteries are fully charged.

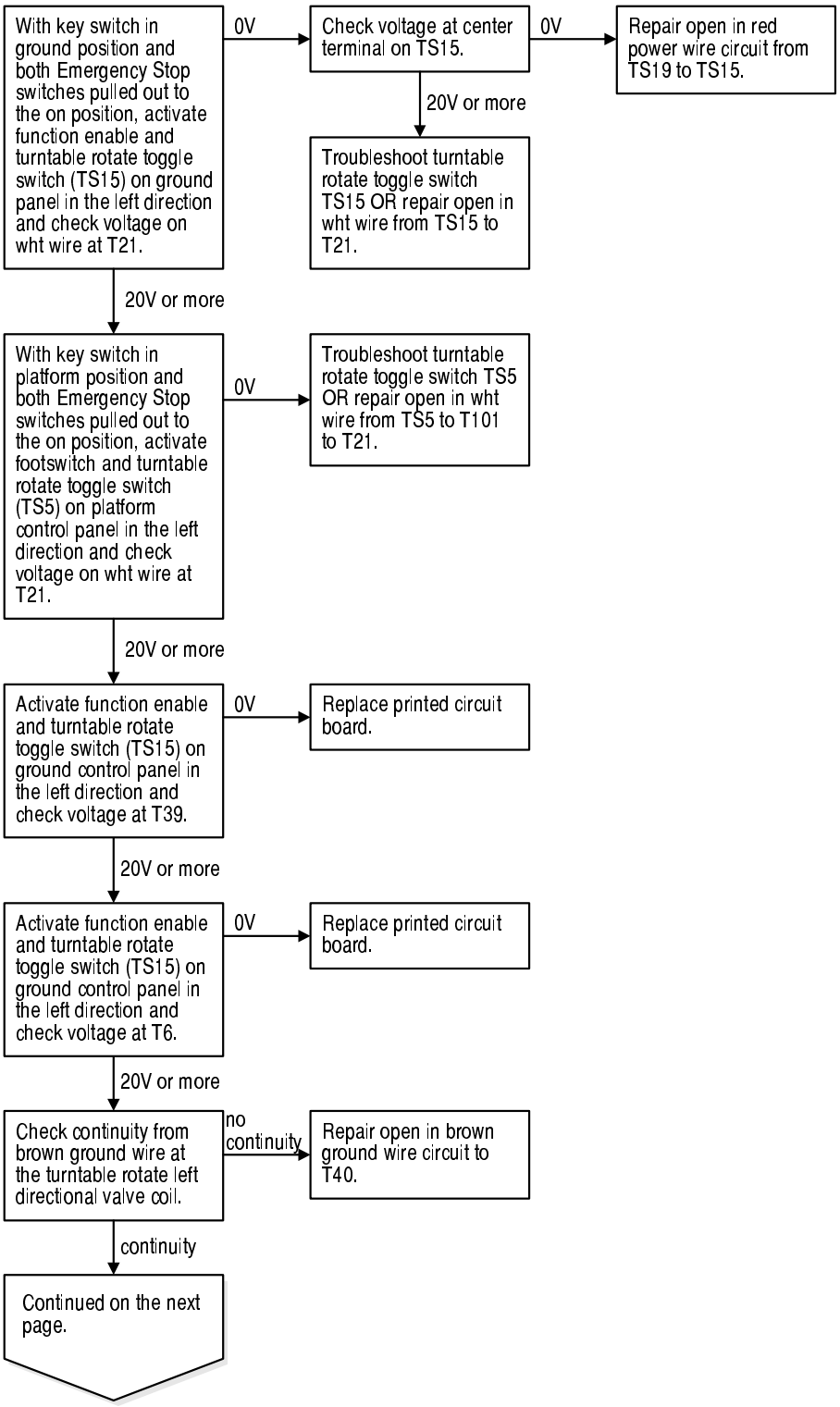


CHART 13

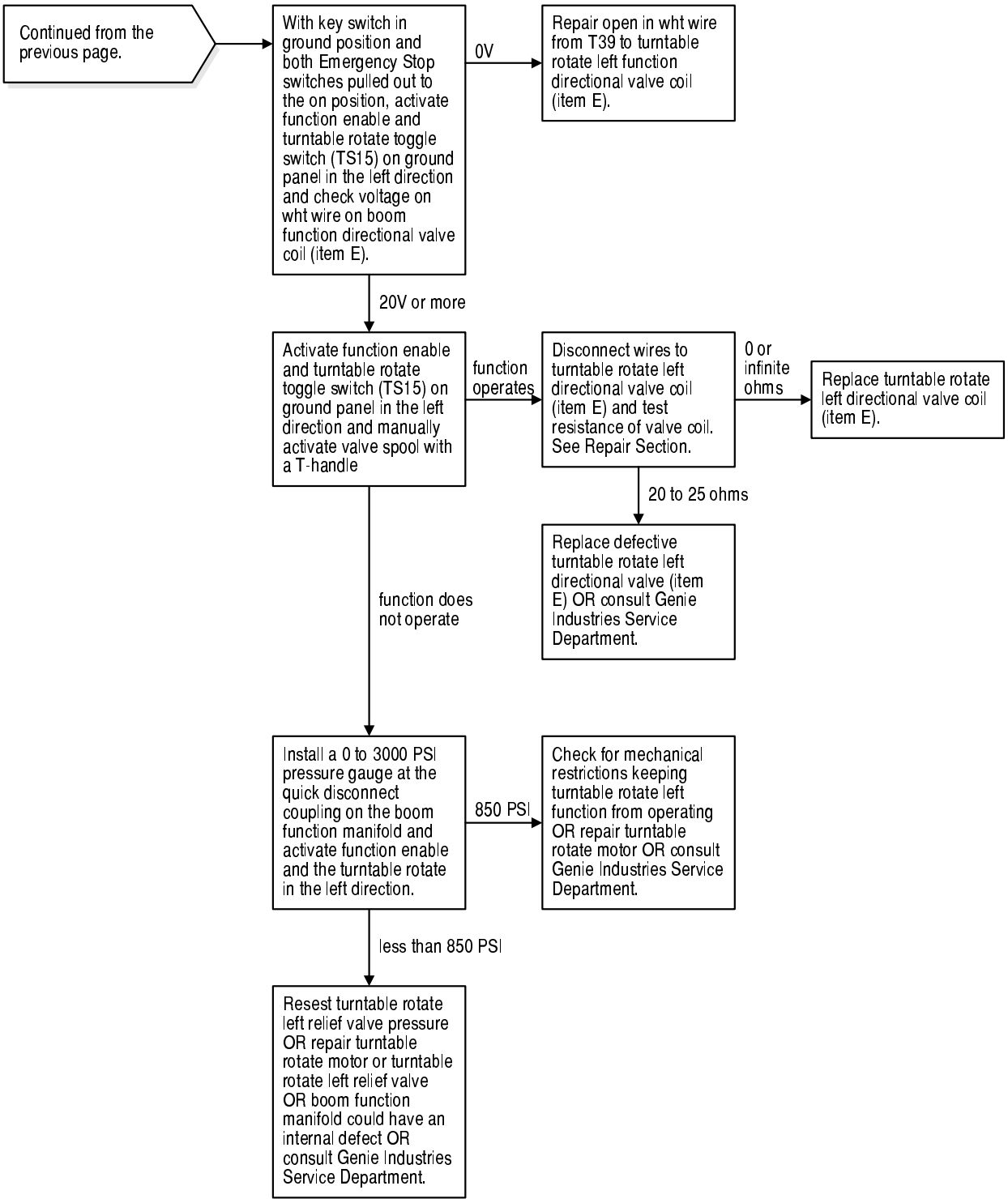

Continued from the previous page.
With key switch in ground position and both Emergency Stop switches pulled out to the on position, activate function enable and turntable rotate toggle switch (TS15) on ground panel in the left direction and check voltage on wht wire on boom function directional valve coil (item E).
0V
Repair open in wht wire from T39 to turntable rotate left function directional valve coil (item E).
20V or more
Activate function enable and turntable rotate toggle switch (TS15) on ground panel in the left direction and manually activate valve spool with a T-handle
function operates
Disconnect wires to turntable rotate left directional valve coil (item E) and test resistance of valve coil. See Repair Section.
0 or infinite ohms
Replace turntable rotate left directional valve coil (item E).
20 to 25 ohms
Replace defective turntable rotate left directional valve (item E) OR consult Genie Industries Service Department.
function does not operate
Install a 0 to 3000 PSI pressure gauge at the quick disconnect coupling on the boom function manifold and activate function enable and the turntable rotate in the left direction.
850 PSI
Check for mechanical restrictions keeping turntable rotate left function from operating OR repair turntable rotate motor OR consult Genie Industries Service Department.
less than 850 PSI
Resest turntable rotate left relief valve pressure OR repair turntable rotate motor or turntable rotate left relief valve OR boom function manifold could have an internal defect OR consult Genie Industries Service Department.

Chart 14

Turntable Rotate Right Function Inoperative

Be sure key switch is in the appropriate position.

Be sure the Emergency Stop switches are pulled out to the ON position.

Be sure the batteries are fully charged.

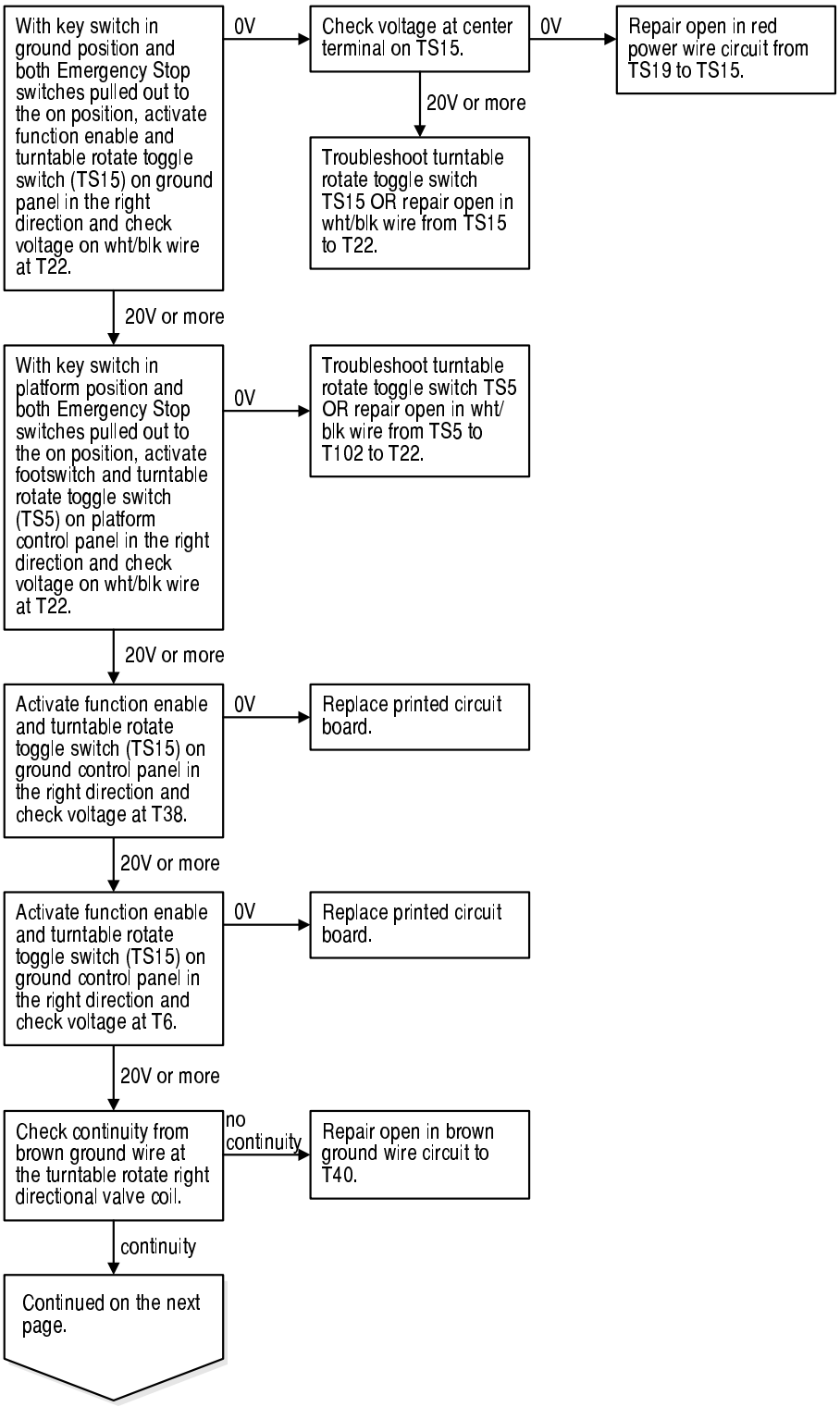


CHART 14

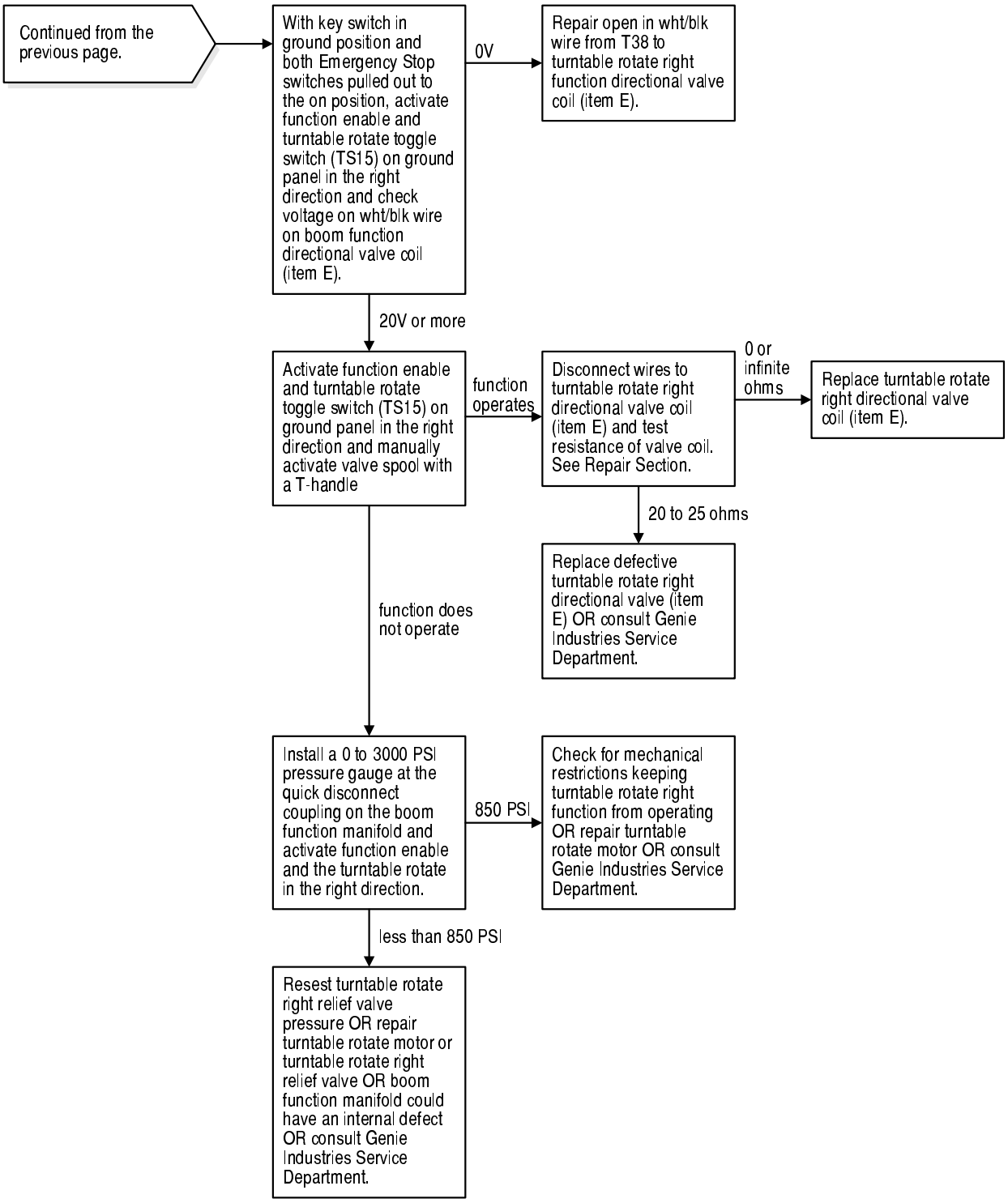

Continued from the previous page.
With key switch in ground position and both Emergency Stop switches pulled out to the on position, activate function enable and turntable rotate toggle switch (TS15) on ground panel in the right direction and check voltage on wht/blk wire on boom function directional valve coil (item E).
0V
Repair open in wht/blk wire from T38 to turntable rotate right function directional valve coil (item E).
20V or more
Activate function enable and turntable rotate toggle switch (TS15) on ground panel in the right direction and manually activate valve spool with a T-handle
function operates
Disconnect wires to turntable rotate right directional valve coil (item E) and test resistance of valve coil. See Repair Section.
0 or infinite ohms
Replace turntable rotate right directional valve coil (item E).
20 to 25 ohms
Replace defective turntable rotate right directional valve (item E) OR consult Genie Industries Service Department.
function does not operate
Install a 0 to 3000 PSI pressure gauge at the quick disconnect coupling on the boom function manifold and activate function enable and the turntable rotate in the right direction.
850 PSI
Check for mechanical restrictions keeping turntable rotate right function from operating OR repair turntable rotate motor OR consult Genie Industries Service Department.
less than 850 PSI
Resest turntable rotate right relief valve pressure OR repair turntable rotate motor or turntable rotate right relief valve OR boom function manifold could have an internal defect OR consult Genie Industries Service Department.

Chart 15

All Platform Level Functions Inoperative

Be sure key switch is in the appropriate position.

Be sure the Emergency Stop switches are pulled out to the ON position.

Be sure the batteries are fully charged.

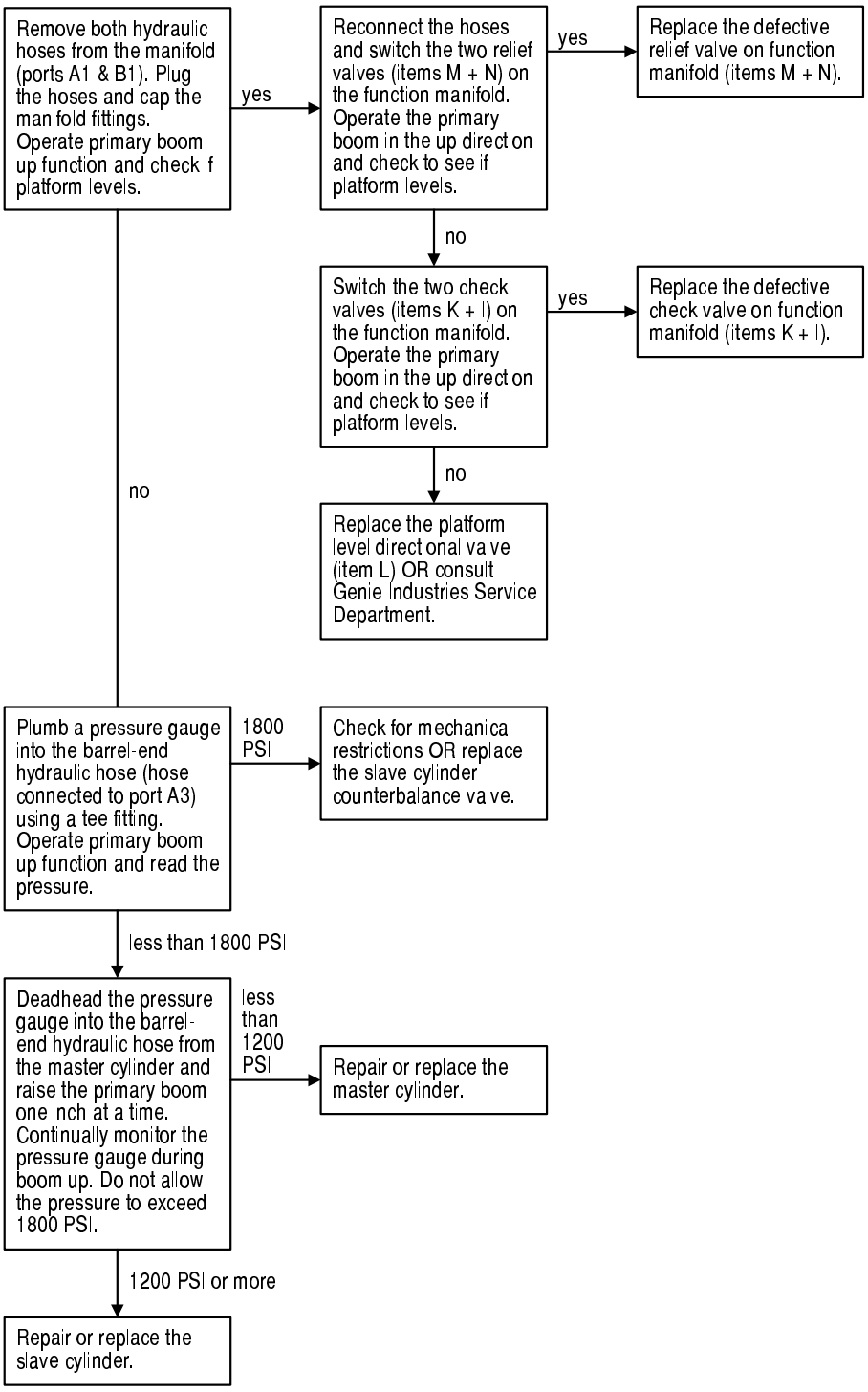


Chart 16

Platform Level Up Function Inoperative

Be sure key switch is in the appropriate position.

Be sure the Emergency Stop switches are pulled out to the ON position.

Be sure the batteries are fully charged.

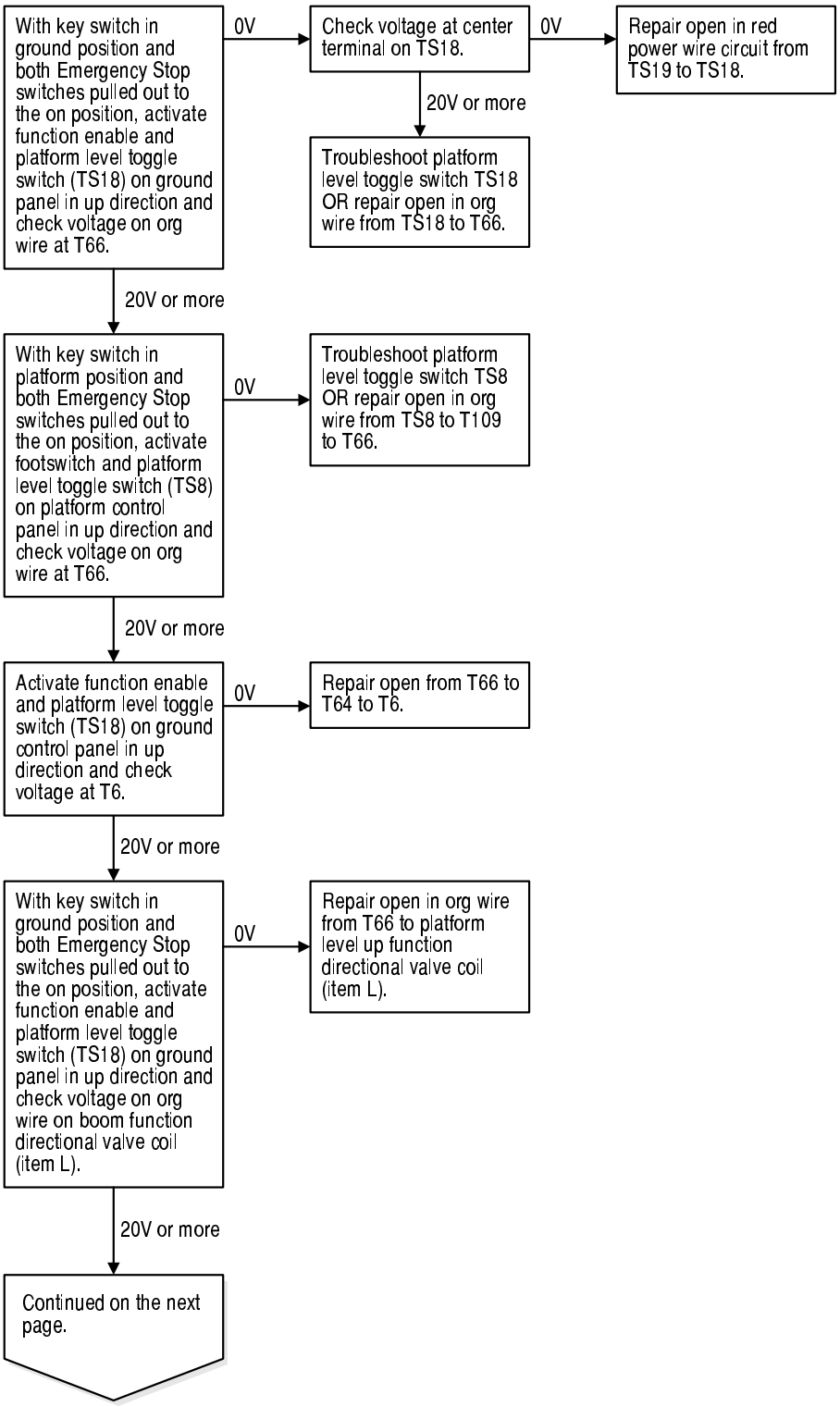


CHART 16

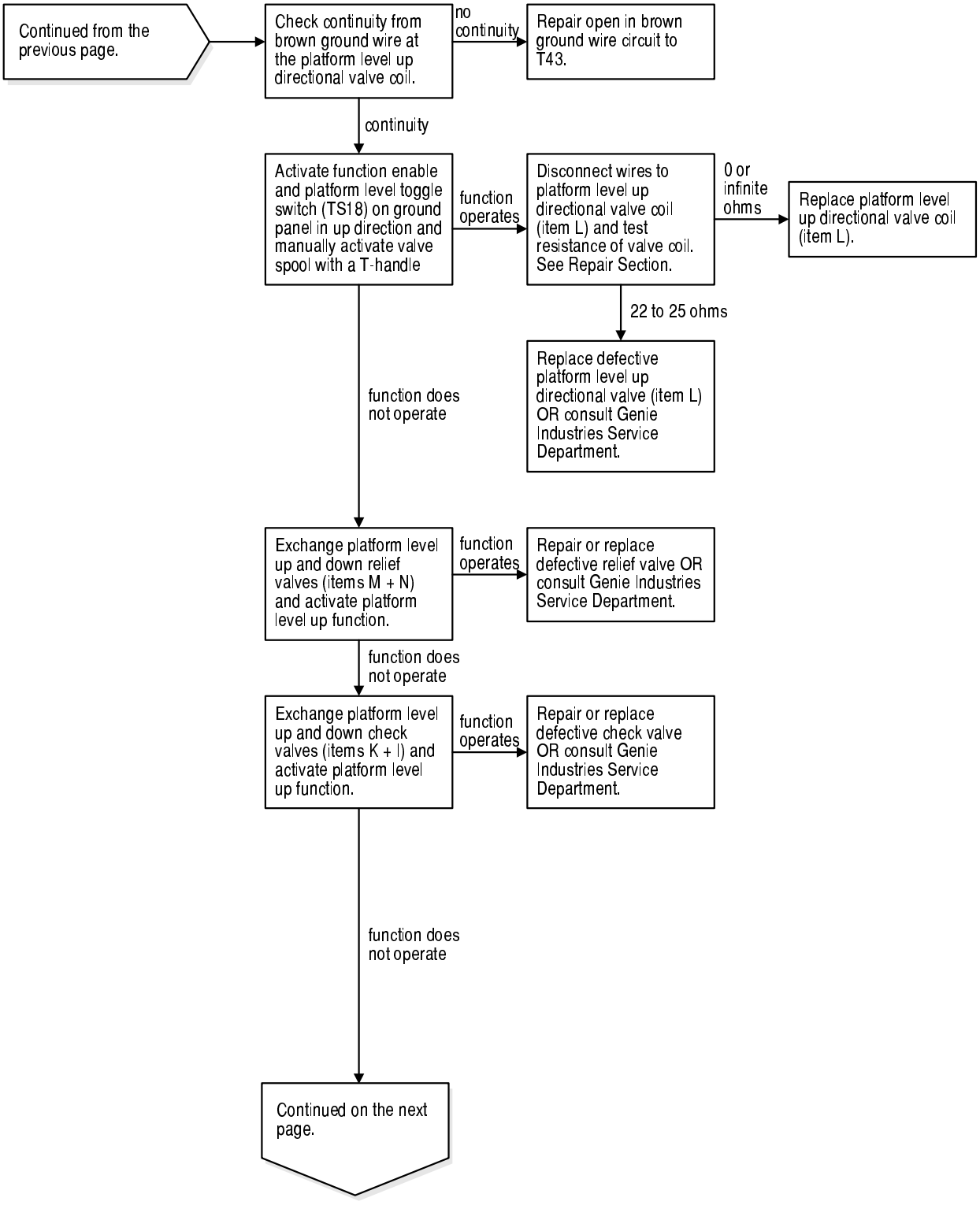

Continued from the previous page.
Check continuity from brown ground wire at the platform level up directional valve coil.
no continuity
Repair open in brown ground wire circuit to T43.
continuity
Activate function enable and platform level toggle switch (TS18) on ground panel in up direction and manually activate valve spool with a T-handle
function operates
Disconnect wires to platform level up directional valve coil (item L) and test resistance of valve coil. See Repair Section.
0 or infinite ohms
Replace platform level up directional valve coil (item L).
22 to 25 ohms
Replace defective platform level up directional valve (item L) OR consult Genie Industries Service Department.
function does not operate
Exchange platform level up and down relief valves (items M + N) and activate platform level up function.
function operates
Repair or replace defective relief valve OR consult Genie Industries Service Department.
function does not operate
Exchange platform level up and down check valves (items K + I) and activate platform level up function.
function operates
Repair or replace defective check valve OR consult Genie Industries Service Department.
function does not operate
Continued on the next page.

CHART 16

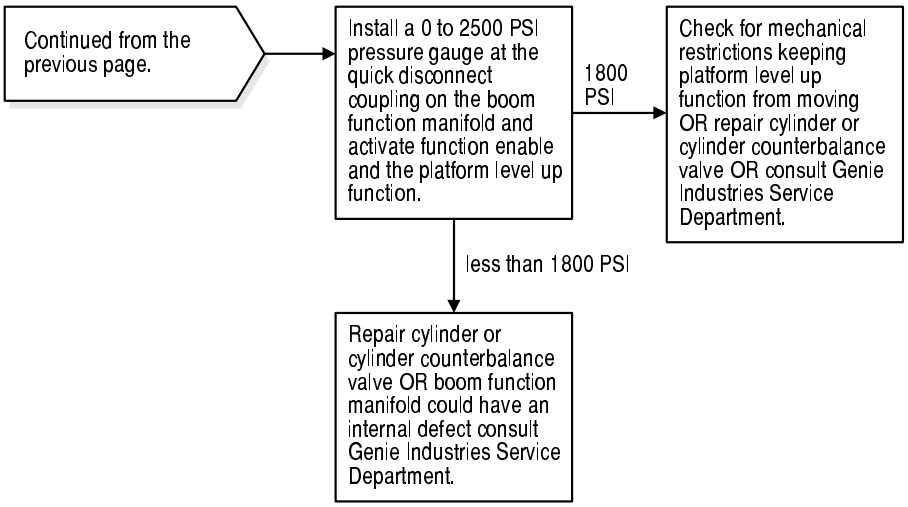

Continued from the previous page.
Install a 0 to 2500 PSI pressure gauge at the quick disconnect coupling on the boom function manifold and activate function enable and the platform level up function.
1800 PSI
Check for mechanical restrictions keeping platform level up function from moving OR repair cylinder or cylinder counterbalance valve OR consult Genie Industries Service Department.
less than 1800 PSI
Repair cylinder or cylinder counterbalance valve OR boom function manifold could have an internal defect consult Genie Industries Service Department.

Chart 17

Platform Level Down Function Inoperative

Be sure key switch is in the appropriate position.

Be sure the Emergency Stop switches are pulled out to the ON position.

Be sure the batteries are fully charged.

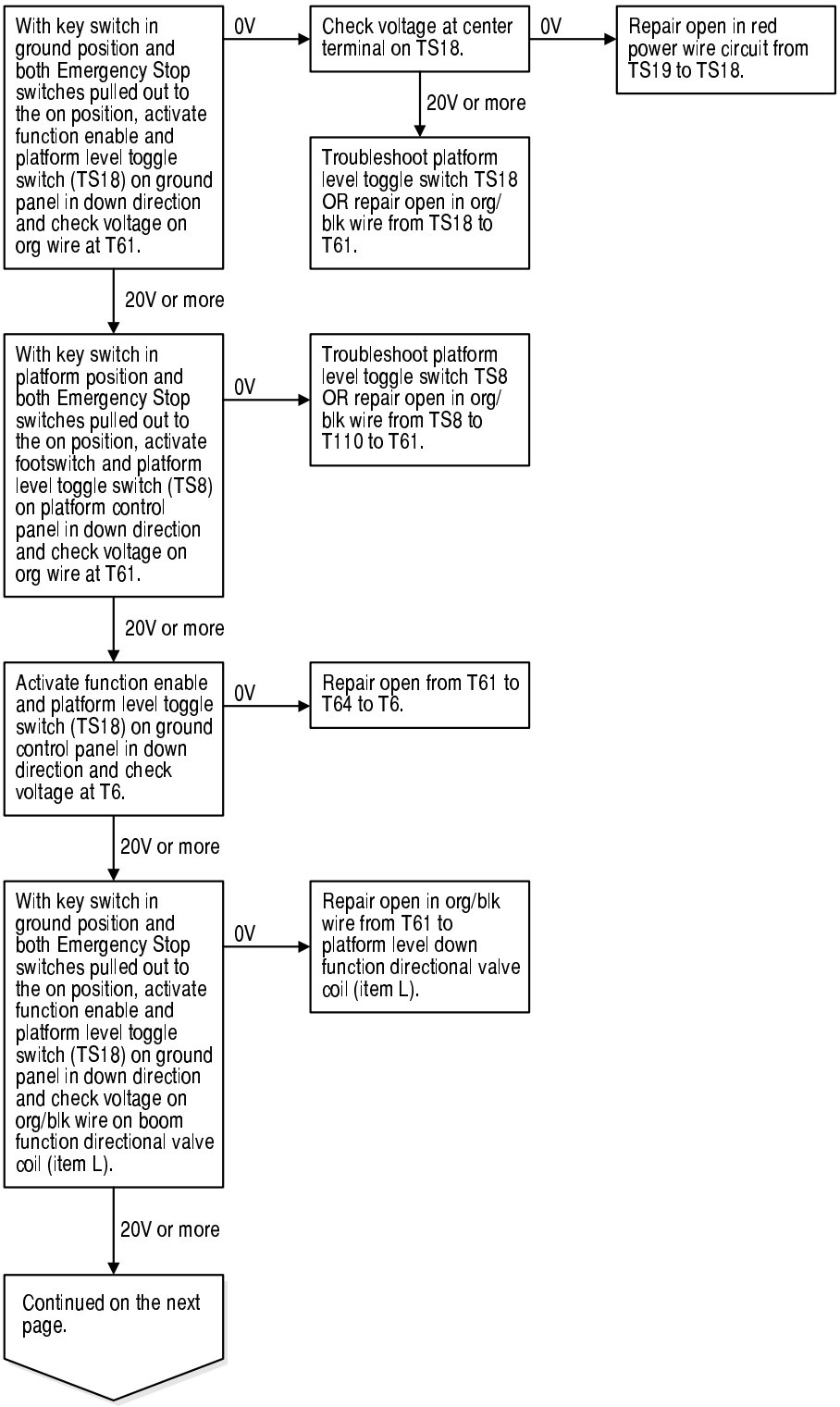


CHART 17

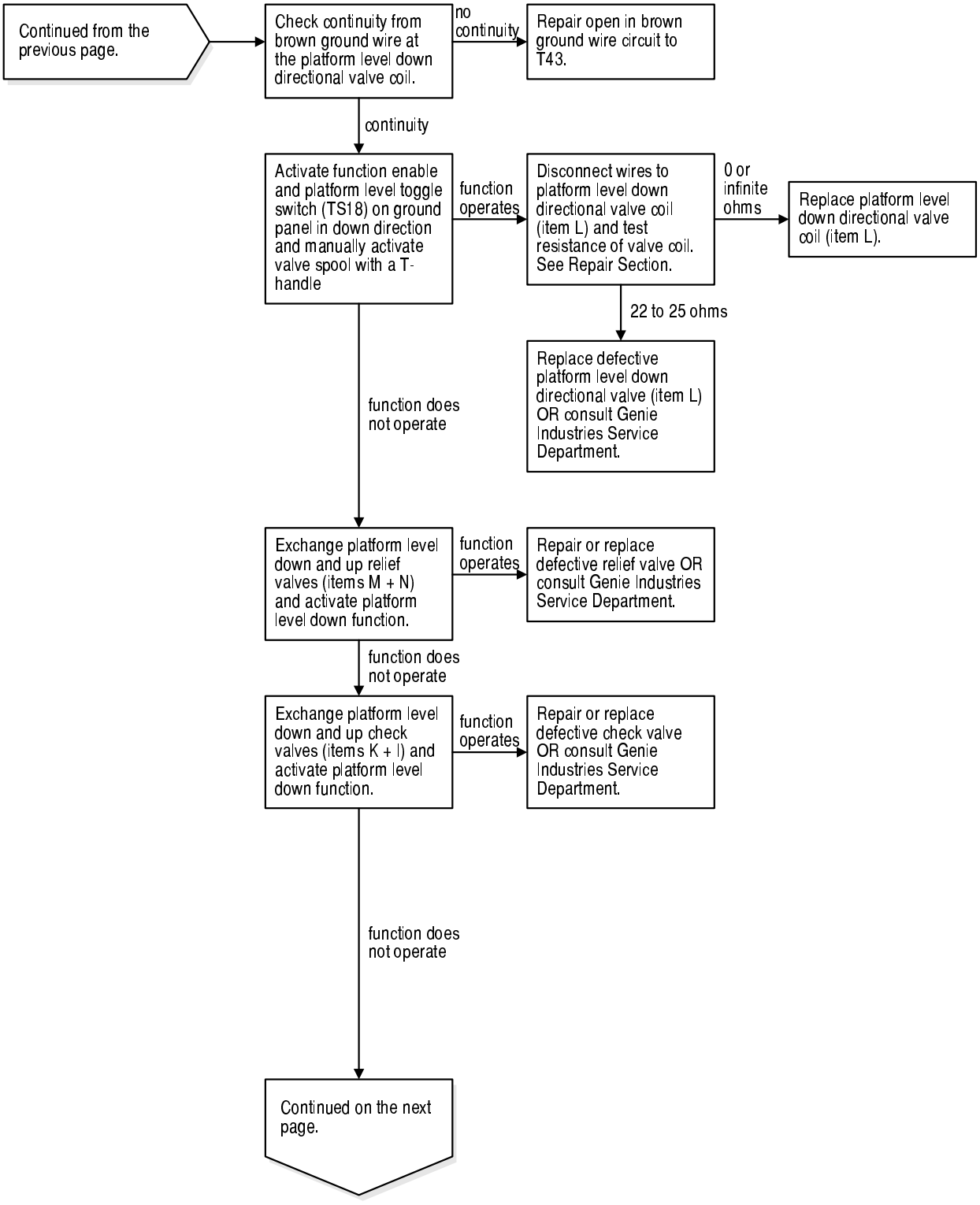

Continued from the previous page.
Check continuity from brown ground wire at the platform level down directional valve coil.
no continuity
Repair open in brown ground wire circuit to T43.
continuity
Activate function enable and platform level toggle switch (TS18) on ground panel in down direction and manually activate valve spool with a T-handle
function operates
Disconnect wires to platform level down directional valve coil (item L) and test resistance of valve coil. See Repair Section.
0 or infinite ohms
Replace platform level down directional valve coil (item L).
22 to 25 ohms
Replace defective platform level down directional valve (item L) OR consult Genie Industries Service Department.
function does not operate
Exchange platform level down and up relief valves (items M + N) and activate platform level down function.
function operates
Repair or replace defective relief valve OR consult Genie Industries Service Department.
function does not operate
Exchange platform level down and up check valves (items K + I) and activate platform level down function.
function operates
Repair or replace defective check valve OR consult Genie Industries Service Department.
function does not operate
Continued on the next page.

CHART 17

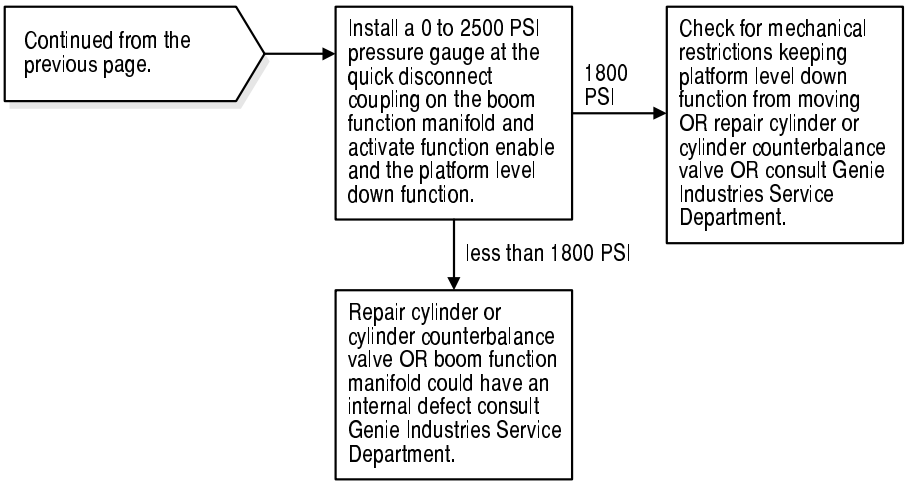

Continued from the previous page.
Install a 0 to 2500 PSI pressure gauge at the quick disconnect coupling on the boom function manifold and activate function enable and the platform level down function.
1800 PSI
Check for mechanical restrictions keeping platform level down function from moving OR repair cylinder or cylinder counterbalance valve OR consult Genie Industries Service Department.
less than 1800 PSI
Repair cylinder or cylinder counterbalance valve OR boom function manifold could have an internal defect consult Genie Industries Service Department.

Chart 18

Steer Left Function Inoperative

Be sure key switch is in the appropriate position.

Be sure the Emergency Stop switches are pulled out to the ON position.

Be sure the batteries are fully charged.

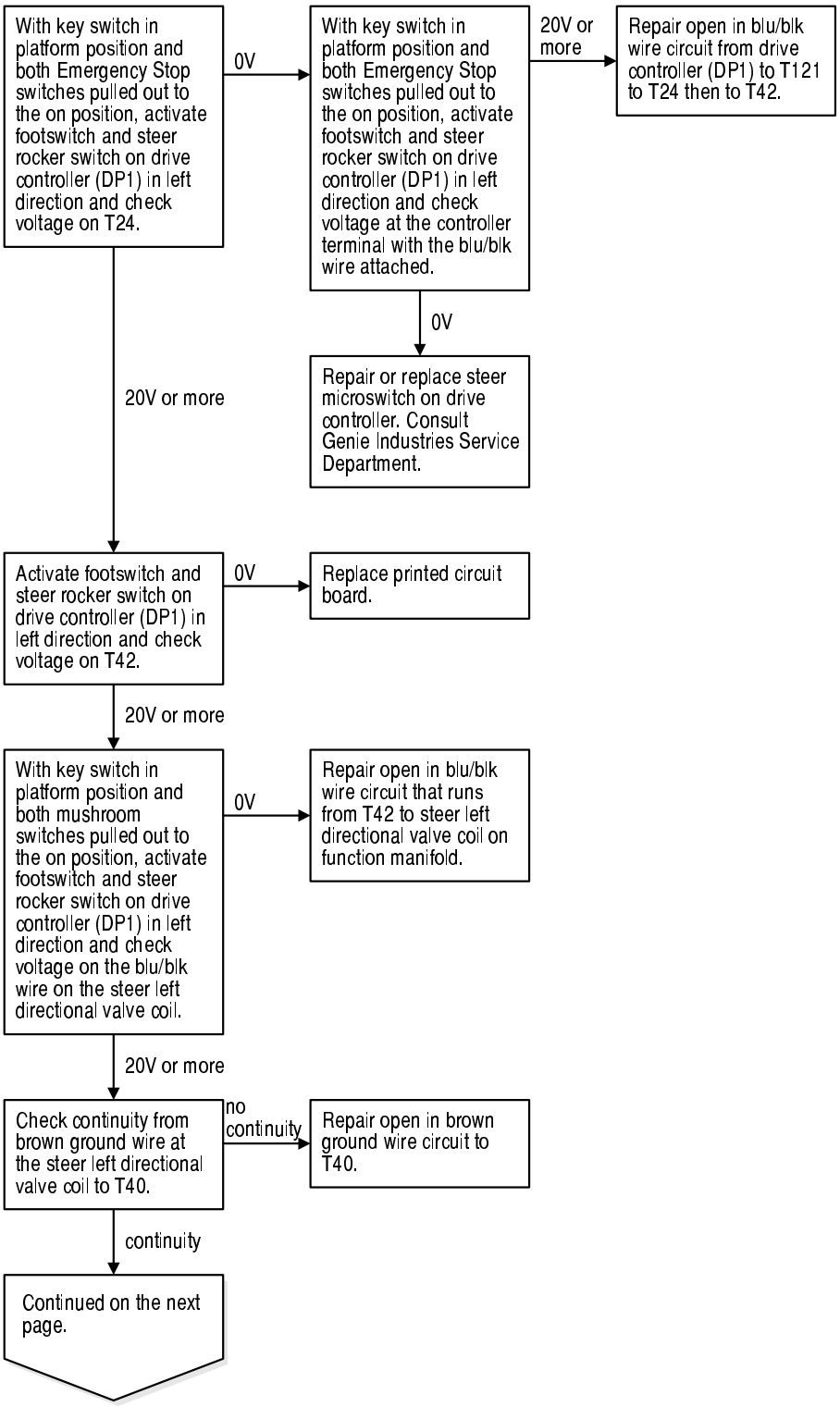


CHART 18

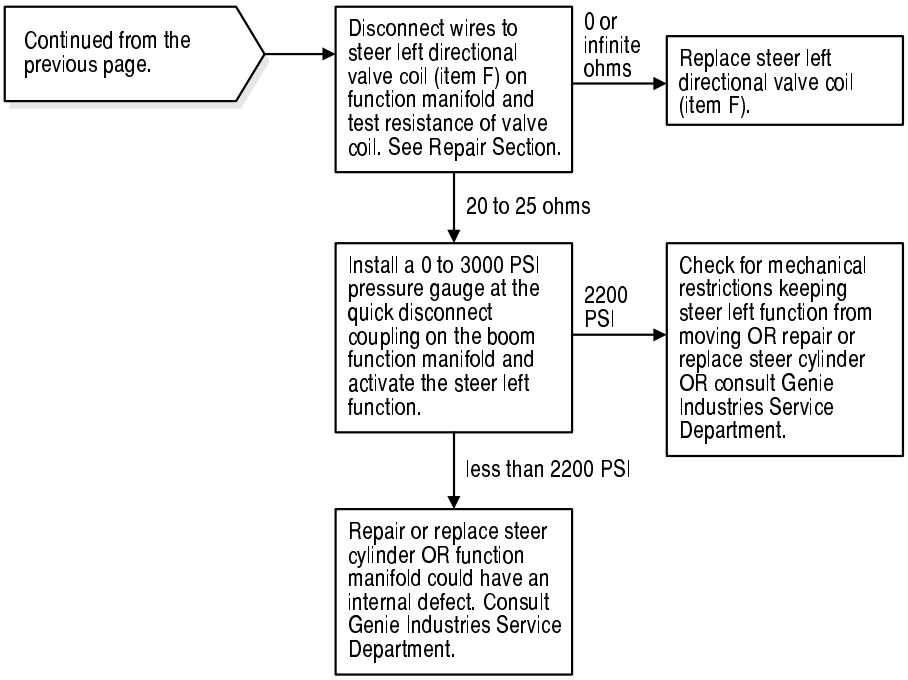

Continued from the previous page.
Disconnect wires to steer left directional valve coil (item F) on function manifold and test resistance of valve coil. See Repair Section.
0 or infinite ohms
Replace steer left directional valve coil (item F).
20 to 25 ohms
Install a 0 to 3000 PSI pressure gauge at the quick disconnect coupling on the boom function manifold and activate the steer left function.
2200 PSI
Check for mechanical restrictions keeping steer left function from moving OR repair or replace steer cylinder OR consult Genie Industries Service Department.
less than 2200 PSI
Repair or replace steer cylinder OR function manifold could have an internal defect. Consult Genie Industries Service Department.

Chart 19

Steer Right Function Inoperative

Be sure key switch is in the appropriate position.

Be sure the Emergency Stop switches are pulled out to the ON position.

Be sure the batteries are fully charged.

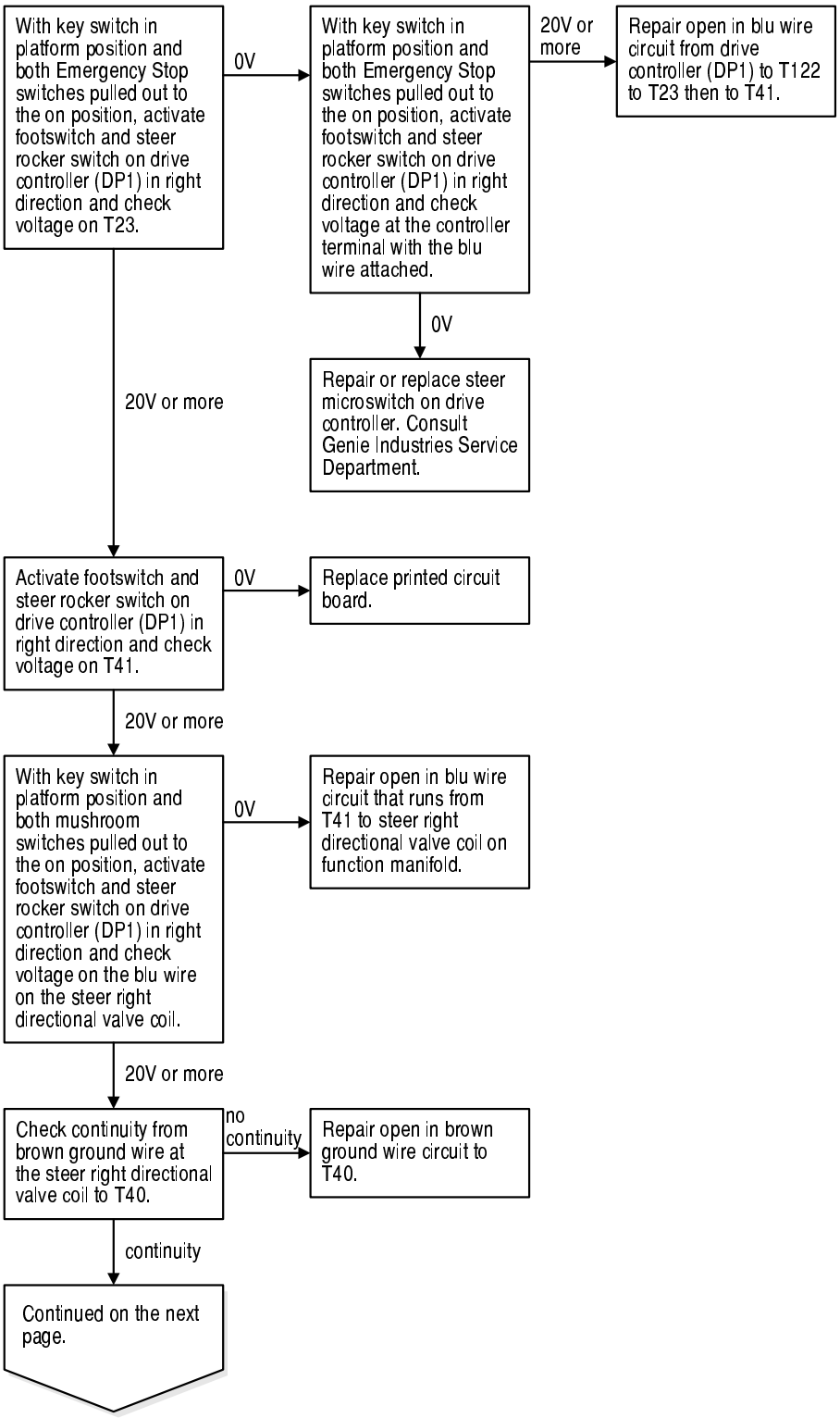


CHART 19

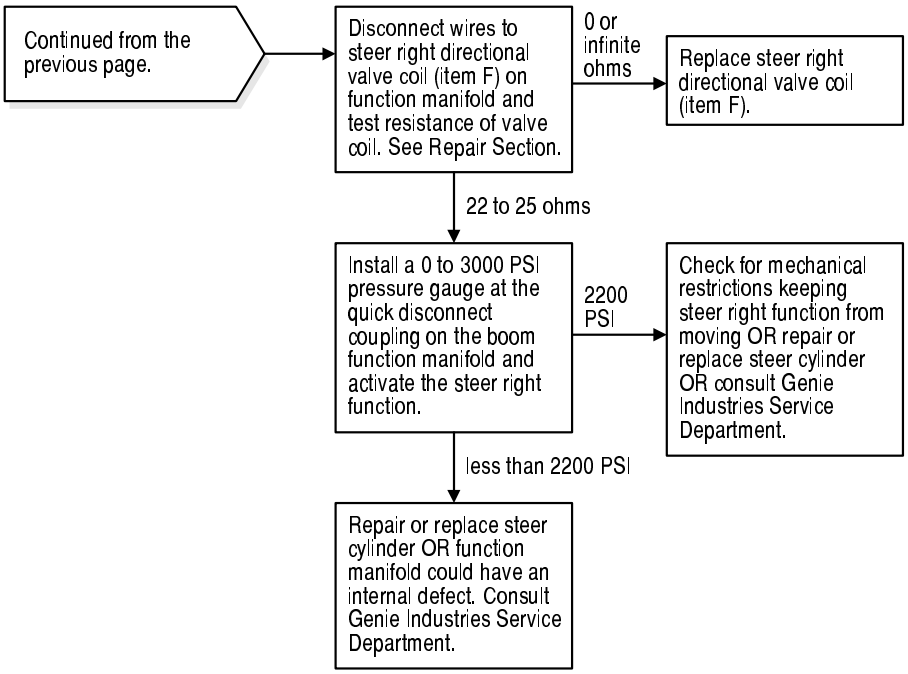

Continued from the previous page.
Disconnect wires to steer right directional valve coil (item F) on function manifold and test resistance of valve coil. See Repair Section.
0 or infinite ohms
Replace steer right directional valve coil (item F).
22 to 25 ohms
Install a 0 to 3000 PSI pressure gauge at the quick disconnect coupling on the boom function manifold and activate the steer right function.
2200 PSI
Check for mechanical restrictions keeping steer right function from moving OR repair or replace steer cylinder OR consult Genie Industries Service Department.
less than 2200 PSI
Repair or replace steer cylinder OR function manifold could have an internal defect. Consult Genie Industries Service Department.

Chart 20

All Drive Functions Inoperative, all Other Functions Operate Normally

Be sure the unit is in the fully stowed position with the boom located between the drive tires.

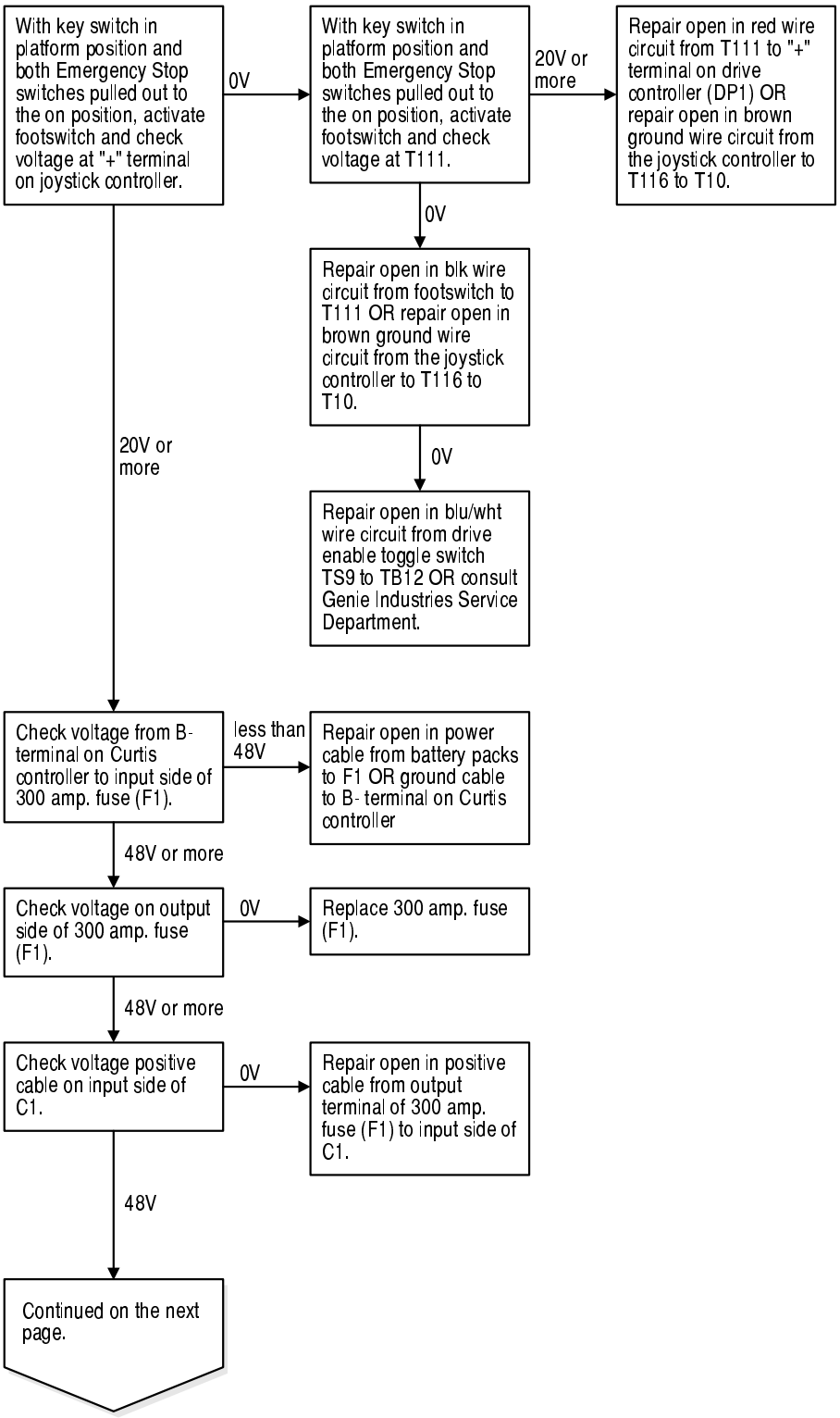


CHART 20

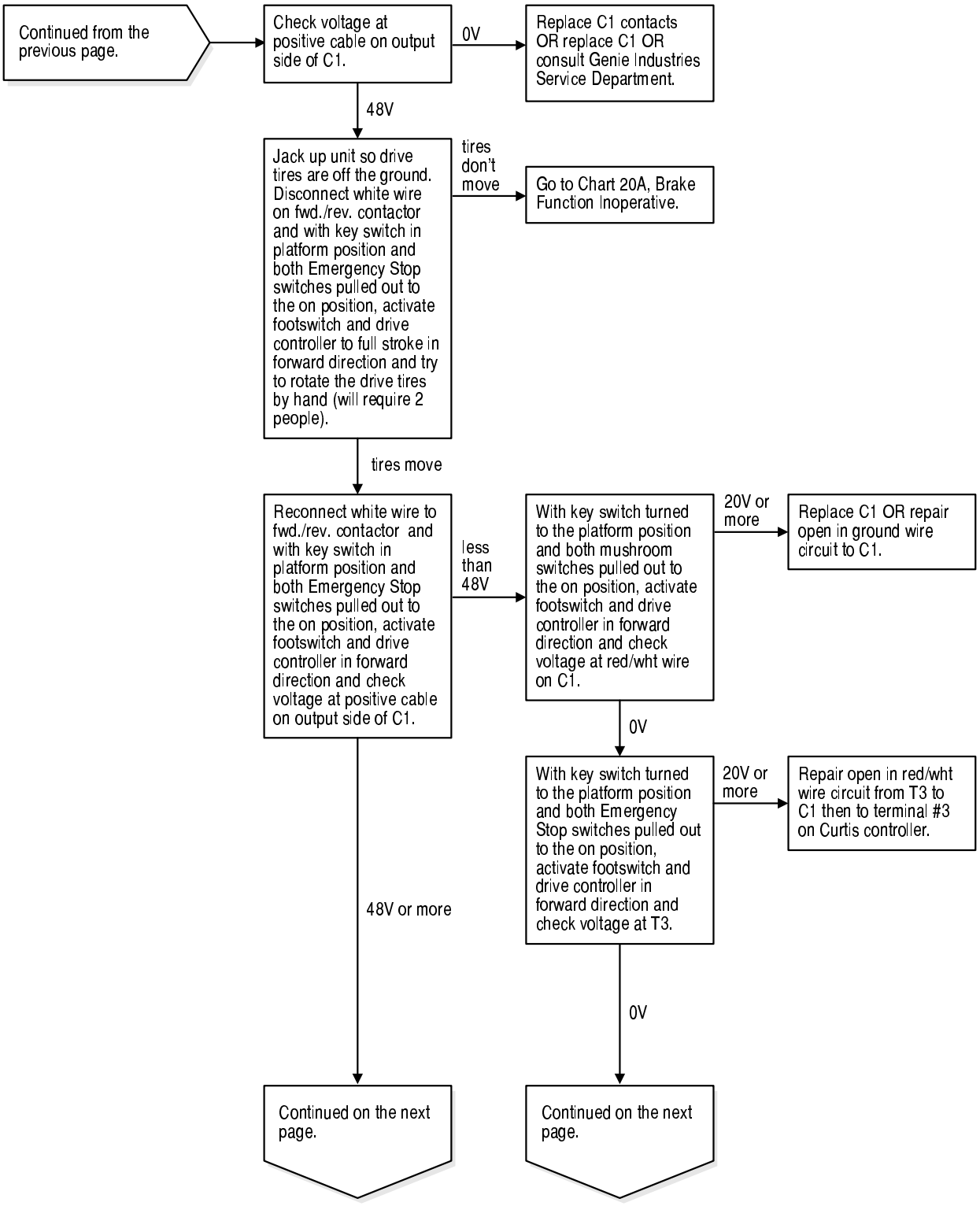

Continued from the previous page.
Check voltage at positive cable on output side of C1.
0V
Replace C1 contacts OR replace C1 OR consult Genie Industries Service Department.
48V
Jack up unit so drive tires are off the ground. Disconnect white wire on fwd./rev. contactor and with key switch in platform position and both Emergency Stop switches pulled out to the on position, activate footswitch and drive controller to full stroke in forward direction and try to rotate the drive tires by hand (will require 2 people).
tires don't move
Go to Chart 20A, Brake Function Inoperative.
tires move
Reconnect white wire to fwd./rev. contactor and with key switch in platform position and both Emergency Stop switches pulled out to the on position, activate footswitch and drive controller in forward direction and check voltage at positive cable on output side of C1.
less than 48V
With key switch turned to the platform position and both mushroom switches pulled out to the on position, activate footswitch and drive controller in forward direction and check voltage at red/wht wire on C1.
20V or more
Replace C1 OR repair open in ground wire circuit to C1.
0V
With key switch turned to the platform position and both Emergency Stop switches pulled out to the on position, activate footswitch and drive controller in forward direction and check voltage at T3.
20V or more
Repair open in red/wht wire circuit from T3 to C1 then to terminal #3 on Curtis controller.
48V or more
0V
Continued on the next page.
Continued on the next page.

CHART 20

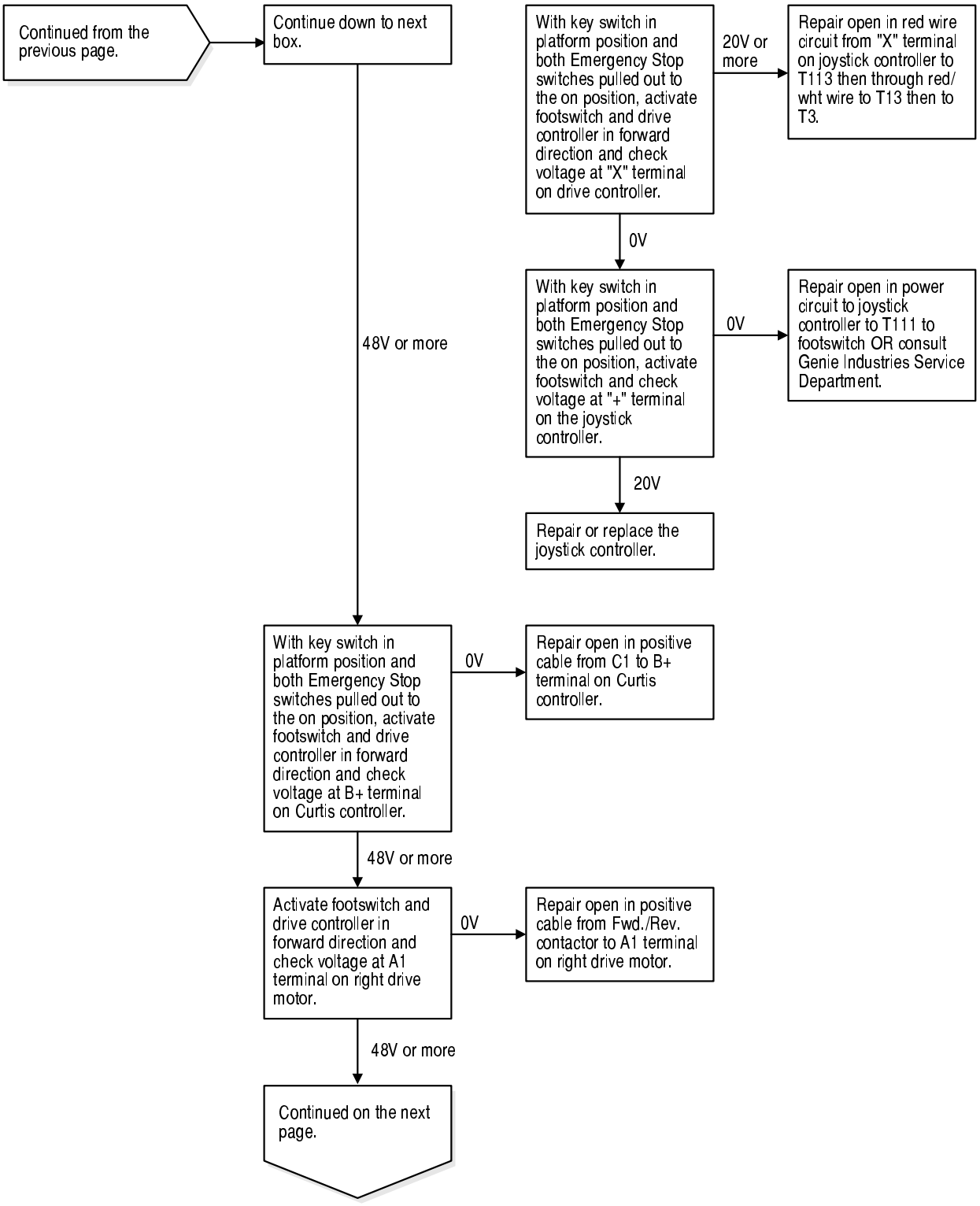

Continued from the previous page.
Continue down to next box.
With key switch in platform position and both Emergency Stop switches pulled out to the on position, activate footswitch and drive controller in forward direction and check voltage at "X" terminal on drive controller.
20V or more
Repair open in red wire circuit from "X" terminal on joystick controller to T113 then through red/wht wire to T13 then to T3.
0V
With key switch in platform position and both Emergency Stop switches pulled out to the on position, activate footswitch and check voltage at "+" terminal on the joystick controller.
0V
Repair open in power circuit to joystick controller to T111 to footswitch OR consult Genie Industries Service Department.
20V
Repair or replace the joystick controller.
48V or more
With key switch in platform position and both Emergency Stop switches pulled out to the on position, activate footswitch and drive controller in forward direction and check voltage at B+ terminal on Curtis controller.
0V
Repair open in positive cable from C1 to B+ terminal on Curtis controller.
48V or more
Activate footswitch and drive controller in forward direction and check voltage at A1 terminal on right drive motor.
0V
Repair open in positive cable from Fwd./Rev. contactor to A1 terminal on right drive motor.
48V or more
Continued on the next page.

CHART 20

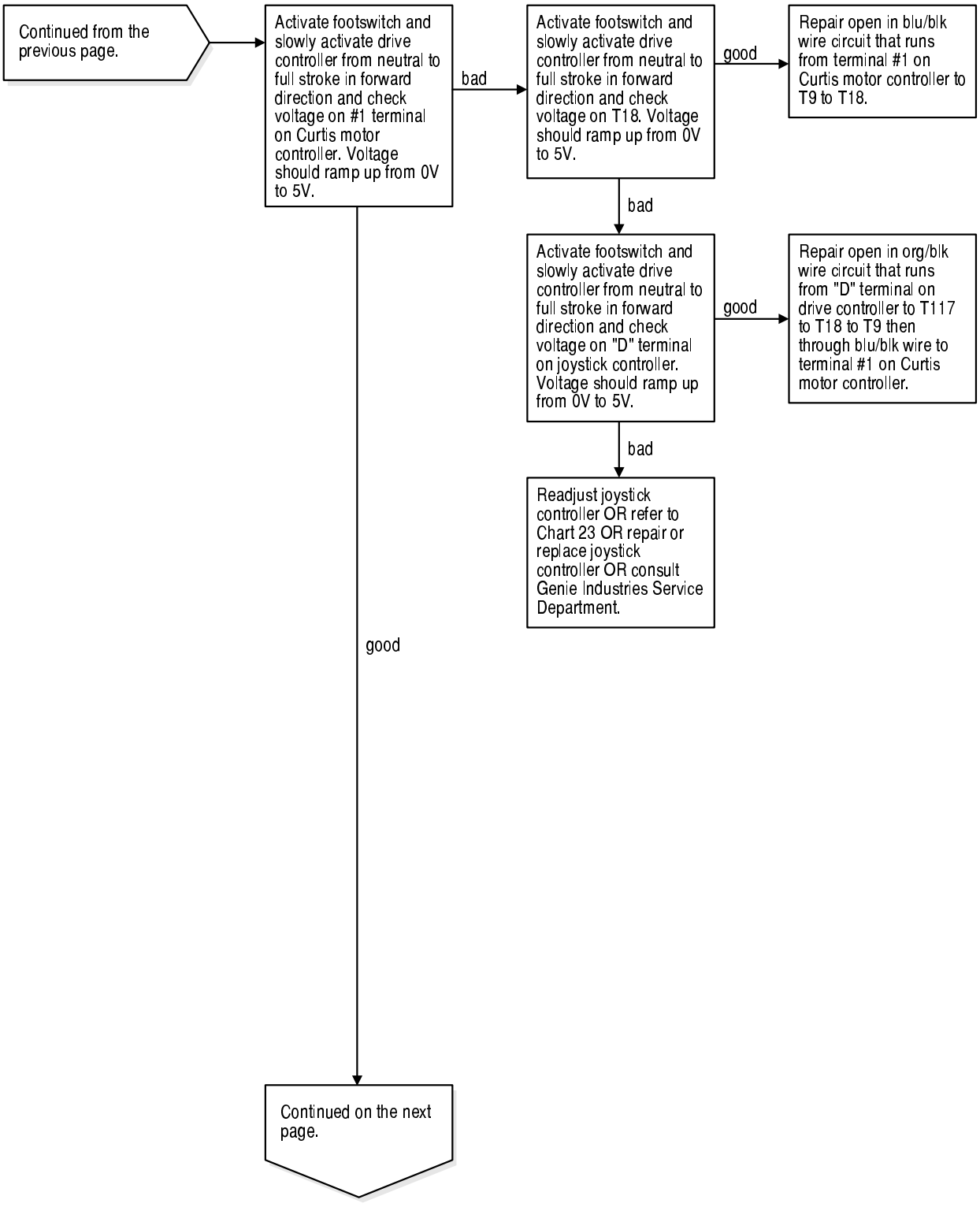

Continued from the previous page.
Activate footswitch and slowly activate drive controller from neutral to full stroke in forward direction and check voltage on #1 terminal on Curtis motor controller. Voltage should ramp up from 0V to 5V.
bad
Activate footswitch and slowly activate drive controller from neutral to full stroke in forward direction and check voltage on T18. Voltage should ramp up from 0V to 5V.
good
Repair open in blu/blk wire circuit that runs from terminal #1 on Curtis motor controller to T9 to T18.
bad
Activate footswitch and slowly activate drive controller from neutral to full stroke in forward direction and check voltage on "D" terminal on joystick controller. Voltage should ramp up from 0V to 5V.
good
Repair open in org/blk wire circuit that runs from "D" terminal on drive controller to T117 to T18 to T9 then through blu/blk wire to terminal #1 on Curtis motor controller.
bad
Readjust joystick controller OR refer to Chart 23 OR repair or replace joystick controller OR consult Genie Industries Service Department.
good
Continued on the next page.

CHART 20

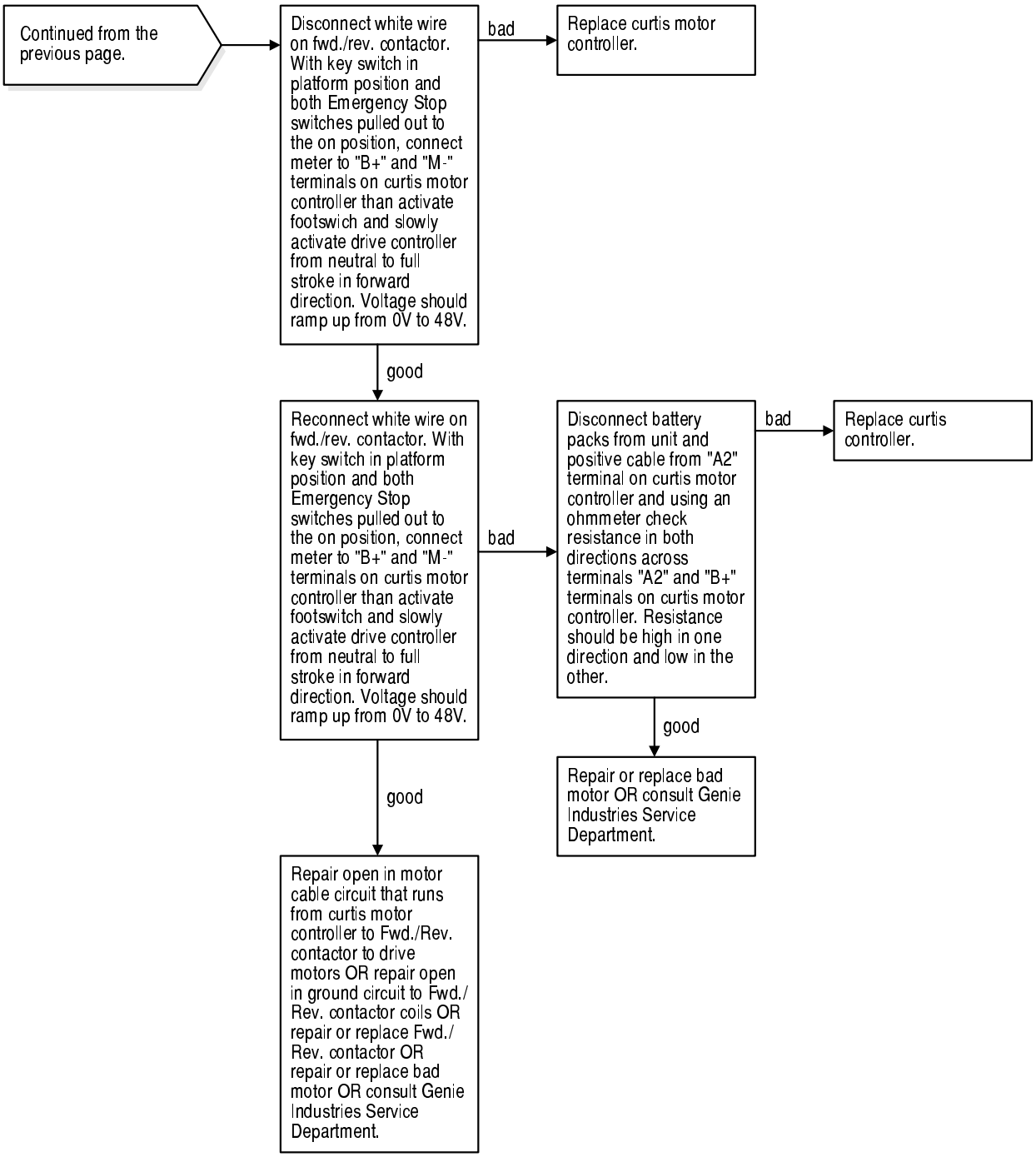

Continued from the previous page.
Disconnect white wire on fwd./rev. contactor. With key switch in platform position and both Emergency Stop switches pulled out to the on position, connect meter to "B+" and "M-" terminals on curtis motor controller than activate footswich and slowly activate drive controller from neutral to full stroke in forward direction. Voltage should ramp up from 0V to 48V.
bad
Replace curtis motor controller.
good
Reconnect white wire on fwd./rev. contactor. With key switch in platform position and both Emergency Stop switches pulled out to the on position, connect meter to "B+" and "M-" terminals on curtis motor controller than activate footswitch and slowly activate drive controller from neutral to full stroke in forward direction. Voltage should ramp up from 0V to 48V.
bad
Disconnect battery packs from unit and positive cable from "A2" terminal on curtis motor controller and using an ohmmeter check resistance in both directions across terminals "A2" and "B+" terminals on curtis motor controller. Resistance should be high in one direction and low in the other.
bad
Replace curtis controller.
good
Repair or replace bad motor OR consult Genie Industries Service Department.
good
Repair open in motor cable circuit that runs from curtis motor controller to Fwd./Rev. contactor to drive motors OR repair open in ground circuit to Fwd./ Rev. contactor coils OR repair or replace Fwd./ Rev. contactor OR repair or replace bad motor OR consult Genie Industries Service Department.

Chart 20A

Brake Function Inoperative

Be sure torque hubs are not disengaged.

Be sure remote brake release is removed.

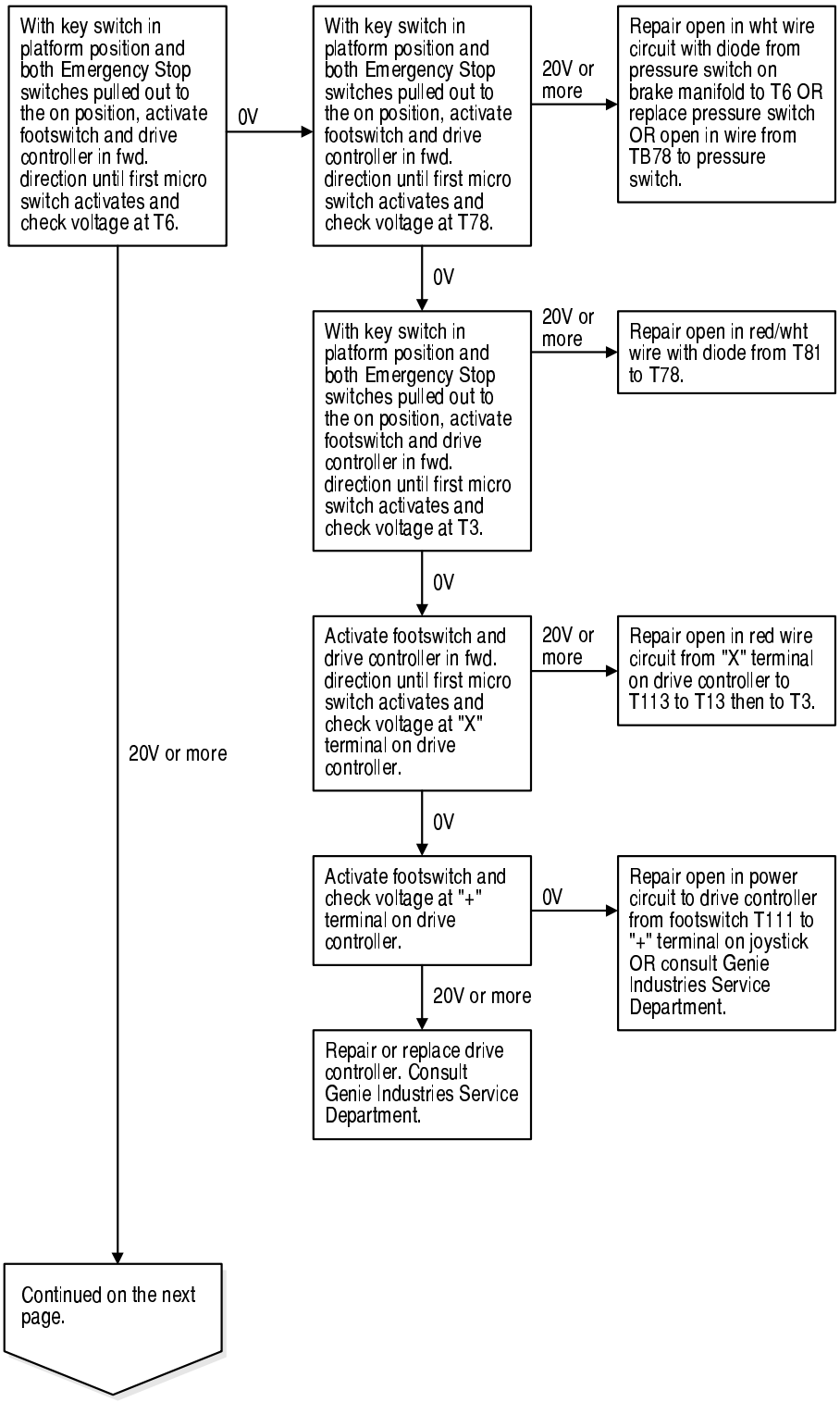


CHART 20A

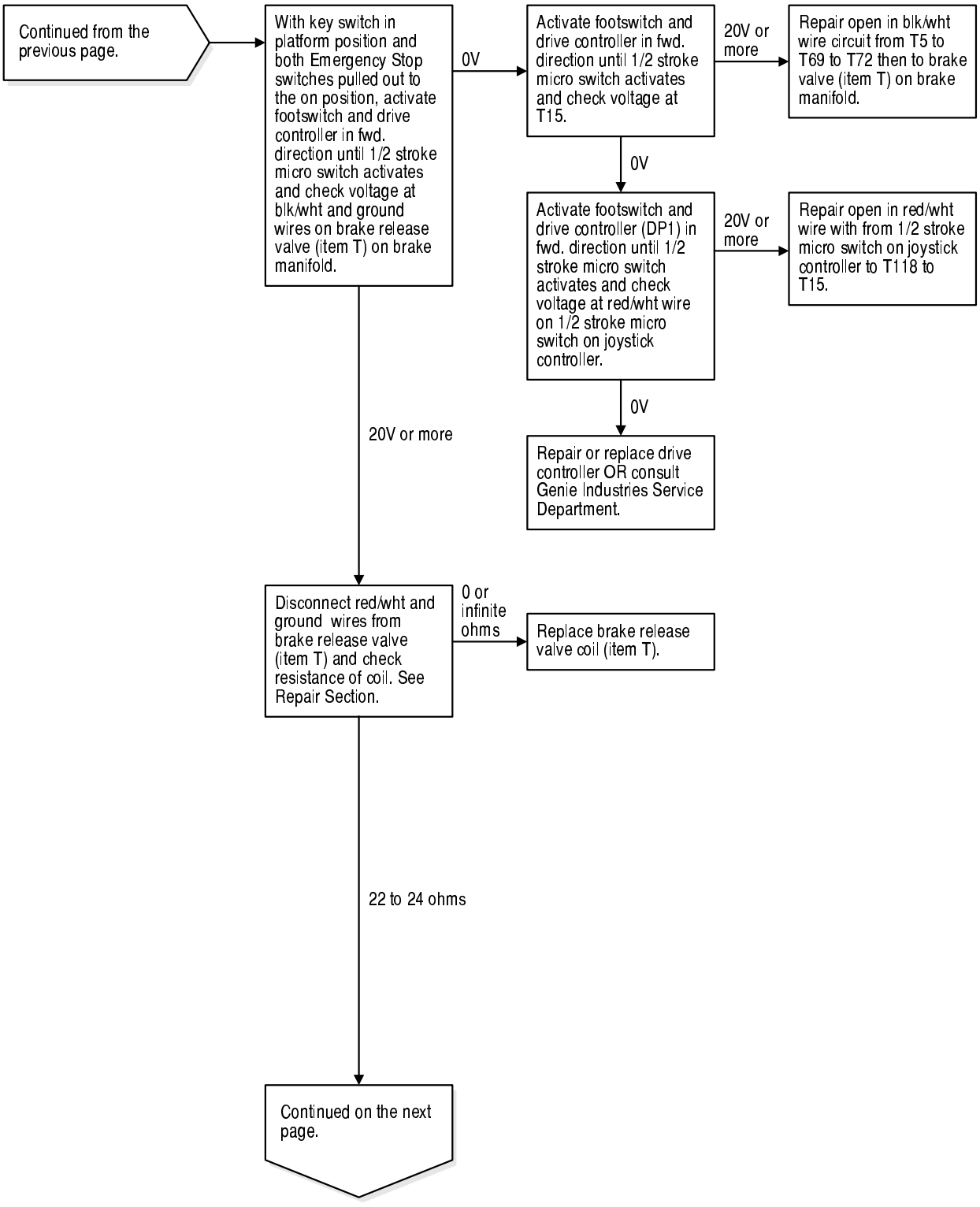

Continued from the previous page.
With key switch in platform position and both Emergency Stop switches pulled out to the on position, activate footswitch and drive controller in fwd. direction until 1/2 stroke micro switch activates and check voltage at blk/wht and ground wires on brake release valve (item T) on brake manifold.
0V
Activate footswitch and drive controller in fwd. direction until 1/2 stroke micro switch activates and check voltage at T15.
20V or more
Repair open in blk/wht wire circuit from T5 to T69 to T72 then to brake valve (item T) on brake manifold.
0V
Activate footswitch and drive controller (DP1) in fwd. direction until 1/2 stroke micro switch activates and check voltage at red/wht wire on 1/2 stroke micro switch on joystick controller.
20V or more
Repair open in red/wht wire with from 1/2 stroke micro switch on joystick controller to T118 to T15.
0V
Repair or replace drive controller OR consult Genie Industries Service Department.
20V or more
Disconnect red/wht and ground wires from brake release valve (item T) and check resistance of coil. See Repair Section.
0 or infinite ohms
Replace brake release valve coil (item T).
22 to 24 ohms
Continued on the next page.

CHART 20A

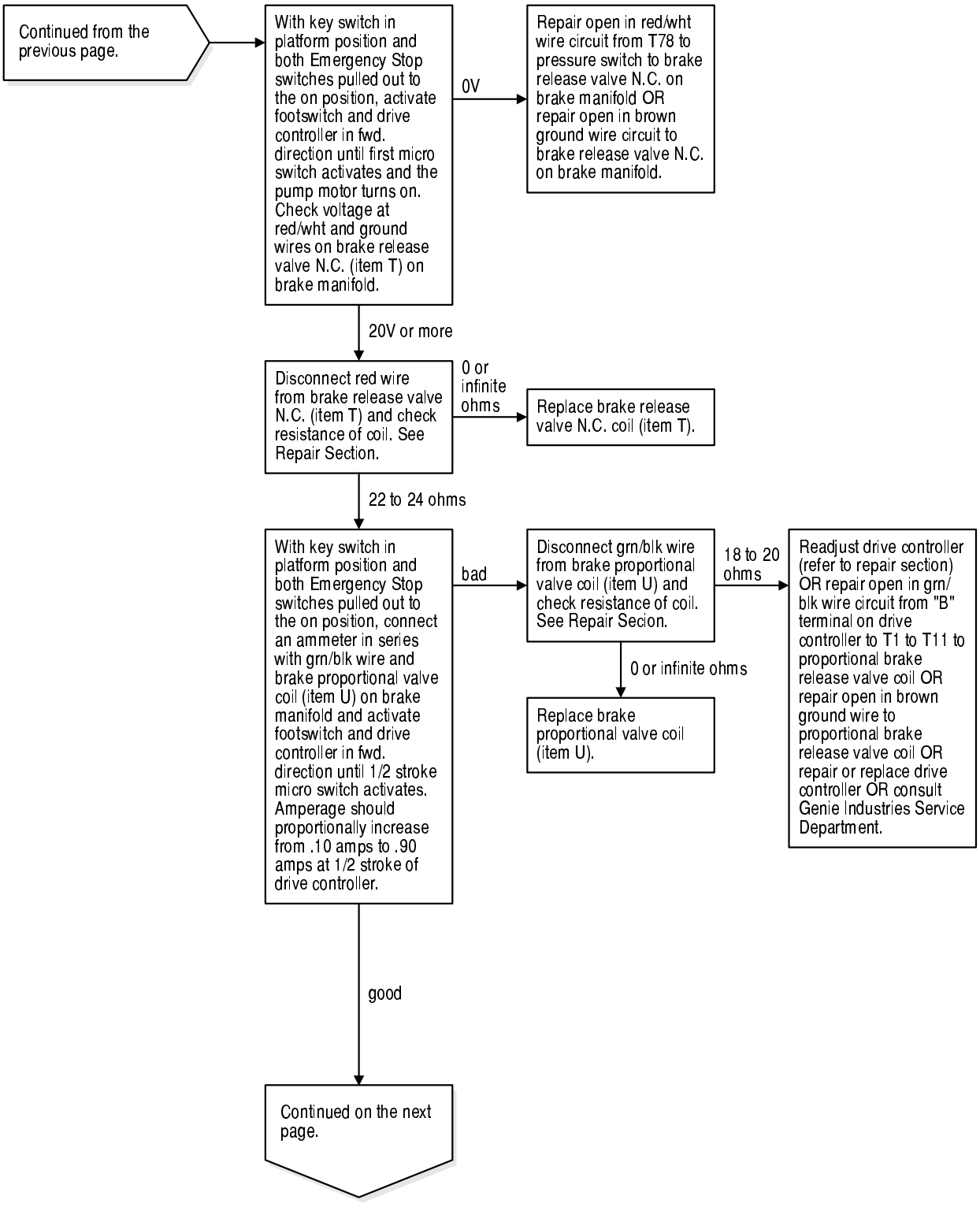

Continued from the previous page.
With key switch in platform position and both Emergency Stop switches pulled out to the on position, activate footswitch and drive controller in fwd. direction until first micro switch activates and the pump motor turns on. Check voltage at red/wht and ground wires on brake release valve N.C. (item T) on brake manifold.
0V
Repair open in red/wht wire circuit from T78 to pressure switch to brake release valve N.C. on brake manifold OR repair open in brown ground wire circuit to brake release valve N.C. on brake manifold.
20V or more
Disconnect red wire from brake release valve N.C. (item T) and check resistance of coil. See Repair Section.
0 or infinite ohms
Replace brake release valve N.C. coil (item T).
22 to 24 ohms
With key switch in platform position and both Emergency Stop switches pulled out to the on position, connect an ammeter in series with grn/blk wire and brake proportional valve coil (item U) on brake manifold and activate footswitch and drive controller in fwd. direction until 1/2 stroke micro switch activates. Amperage should proportionally increase from .10 amps to .90 amps at 1/2 stroke of drive controller.
bad
Disconnect grn/blk wire from brake proportional valve coil (item U) and check resistance of coil. See Repair Secion.
18 to 20 ohms
Readjust drive controller (refer to repair section) OR repair open in grn/blk wire circuit from "B" terminal on drive controller to T1 to T11 to proportional brake release valve coil OR repair open in brown ground wire to proportional brake release valve coil OR repair or replace drive controller OR consult Genie Industries Service Department.
0 or infinite ohms
Replace brake proportional valve coil (item U).
good
Continued on the next page.

CHART 20A

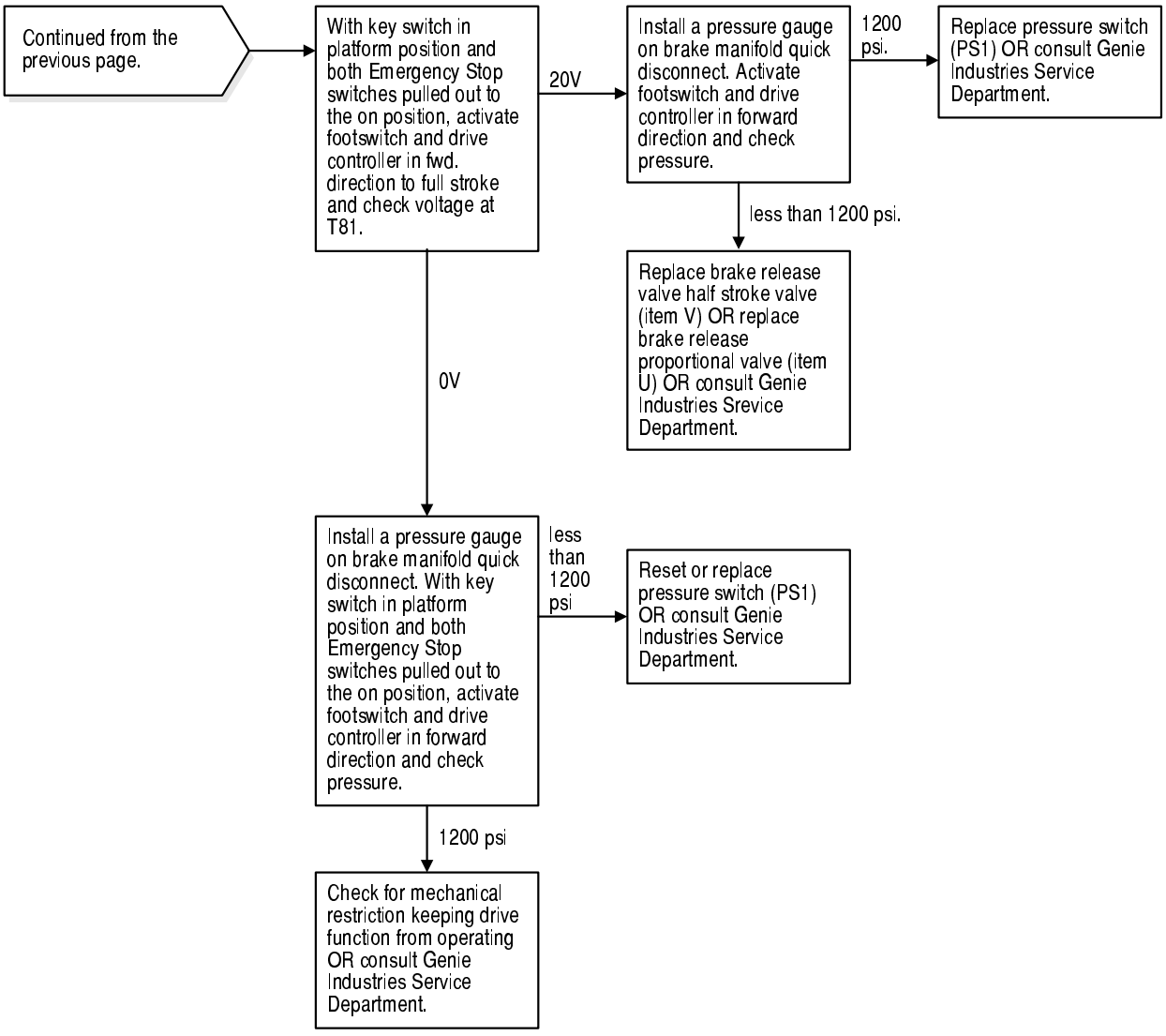

Continued from the previous page.
With key switch in platform position and both Emergency Stop switches pulled out to the on position, activate footswitch and drive controller in fwd. direction to full stroke and check voltage at T81.
20V
Install a pressure gauge on brake manifold quick disconnect. Activate footswitch and drive controller in forward direction and check pressure.
1200 psi.
Replace pressure switch (PS1) OR consult Genie Industries Service Department.
less than 1200 psi.
Replace brake release valve half stroke valve (item V) OR replace brake release proportional valve (item U) OR consult Genie Industries Srevice Department.
0V
Install a pressure gauge on brake manifold quick disconnect. With key switch in platform position and both Emergency Stop switches pulled out to the on position, activate footswitch and drive controller in forward direction and check pressure.
less than 1200 psi
Reset or replace pressure switch (PS1) OR consult Genie Industries Service Department.
1200 psi
Check for mechanical restriction keeping drive function from operating OR consult Genie Industries Service Department.

Chart 21

Drive Forward Function Inoperative

Be sure key switch is in the appropriate position.

Be sure the Emergency Stop switches are pulled out to the ON position.

Be sure the batteries are fully charged.

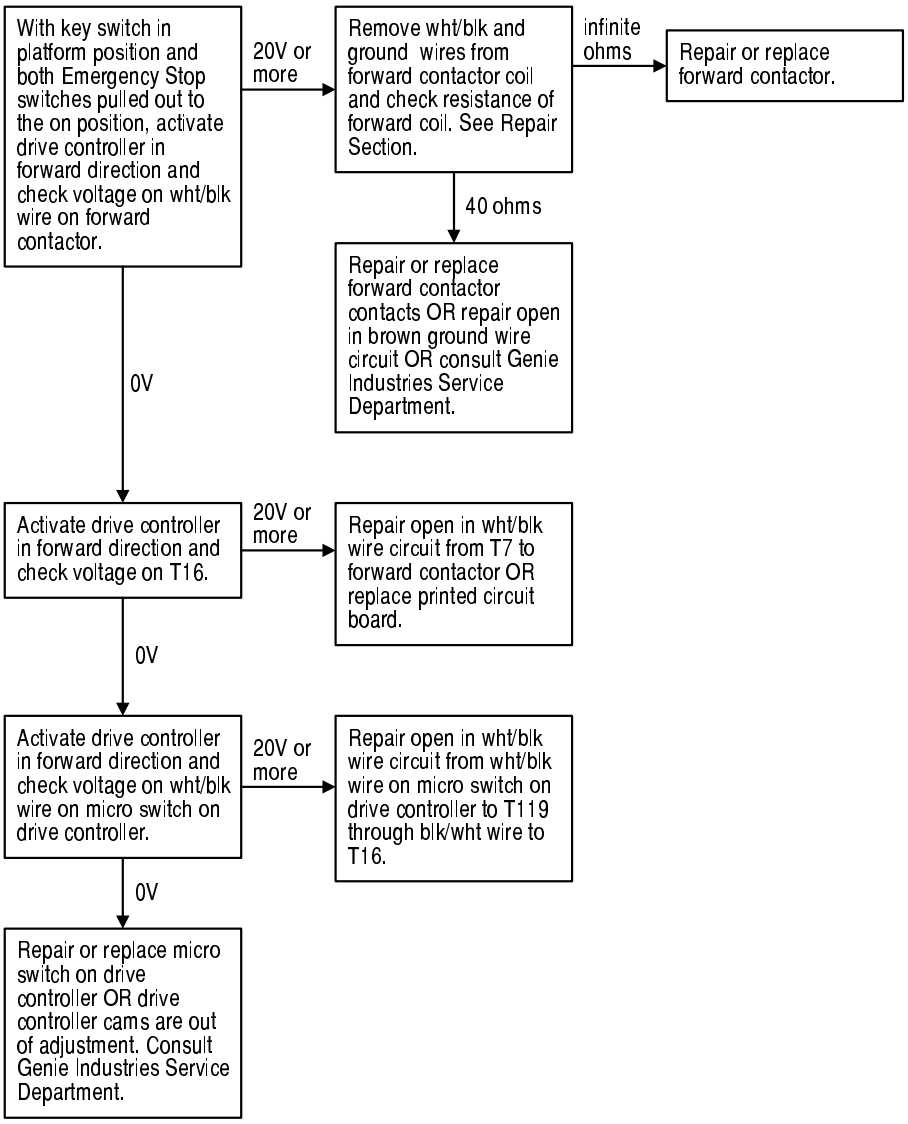


Chart 22

Drive Reverse Function Inoperative

Be sure key switch is in the appropriate position.

Be sure the Emergency Stop switches are pulled out to the ON position.

Be sure the batteries are fully charged.

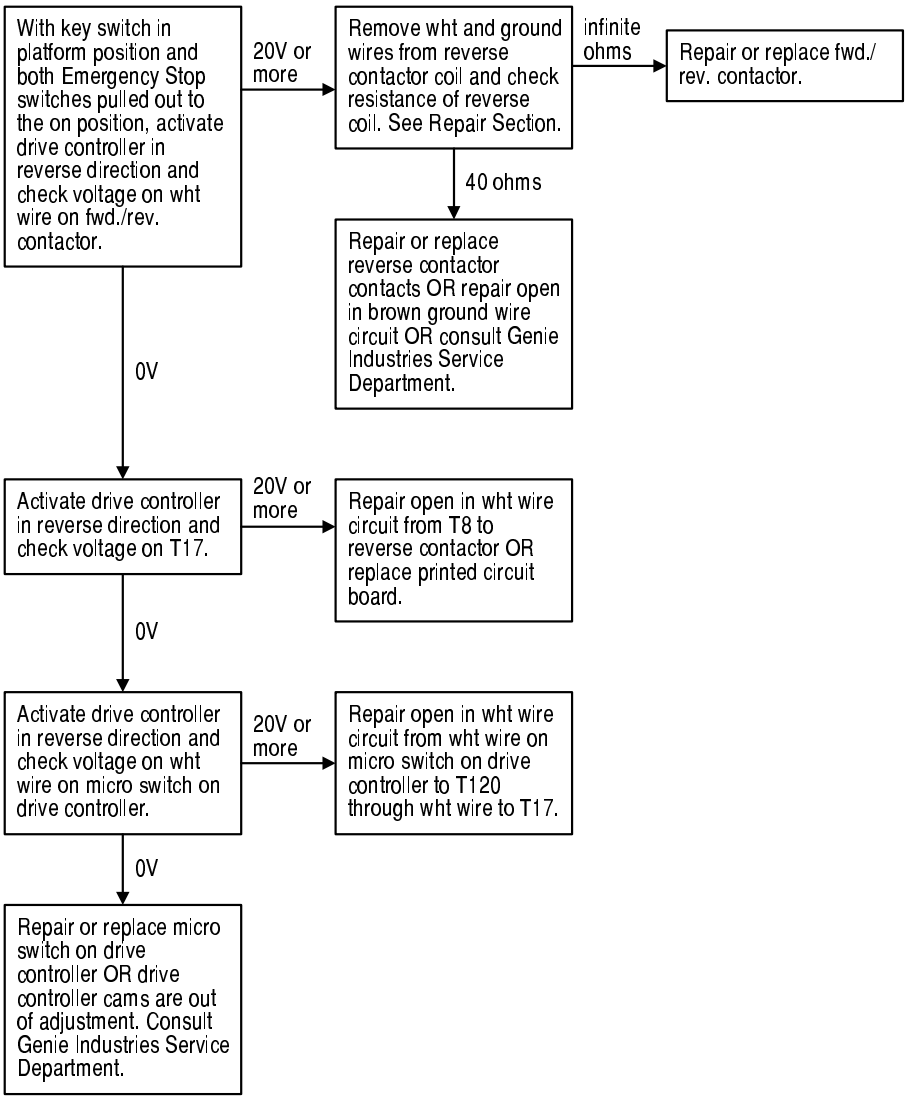


Chart 23

Machine Will Not Drive At Full Speed

Be sure machine is in fully stowed position.

Be sure the batteries are fully charged.

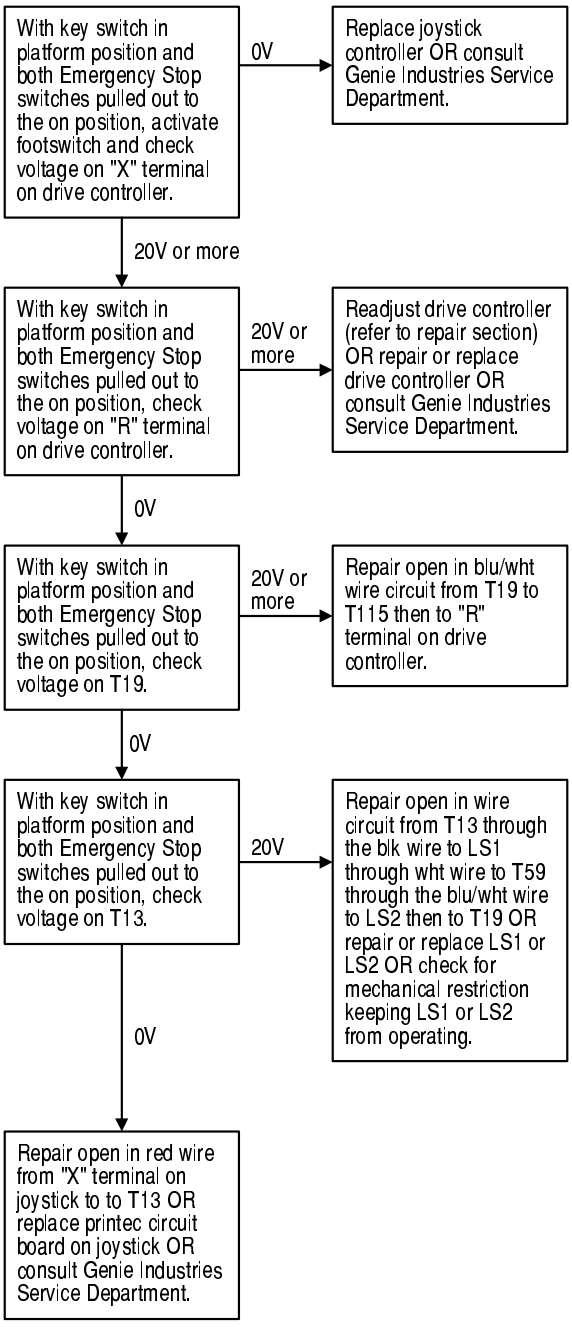


Chart 24

Machine Drives At Full Speed With Platform Raised

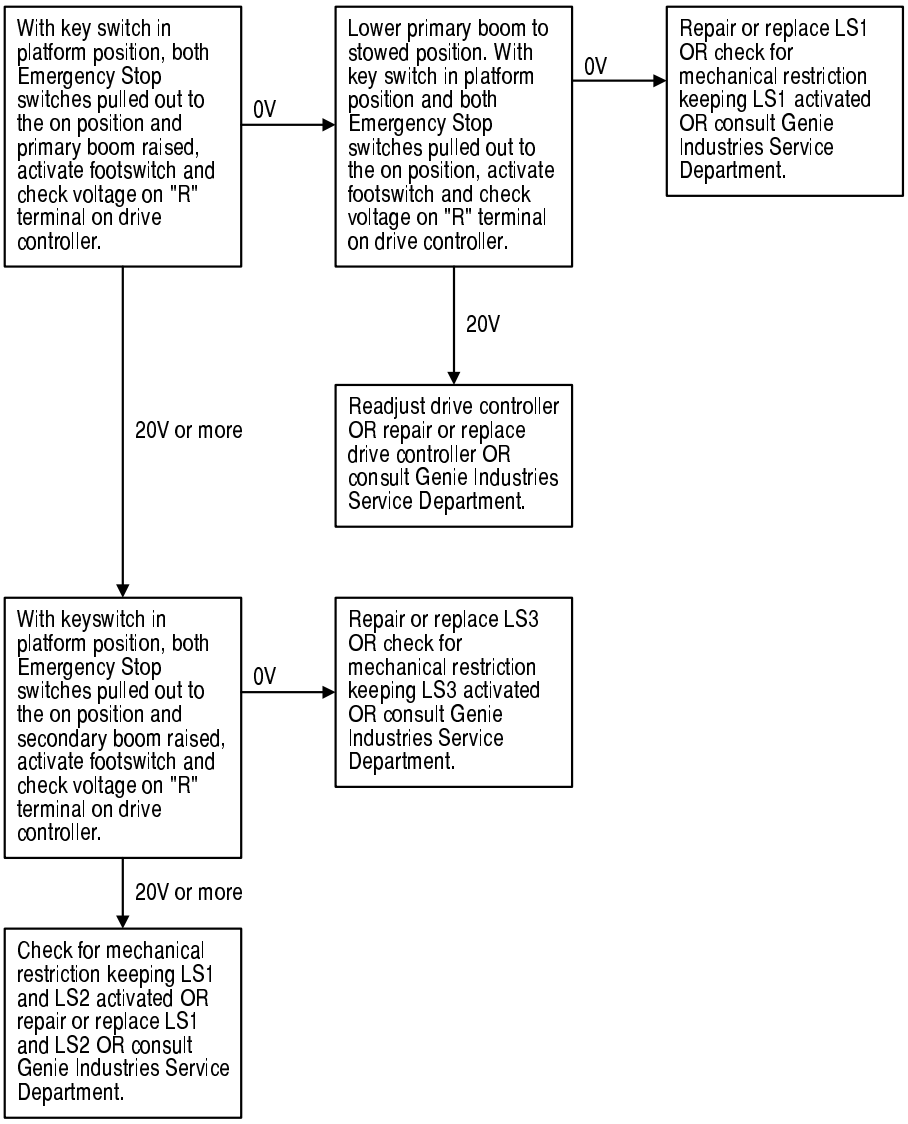


Chart 25

Remote Brake Release Inoperative

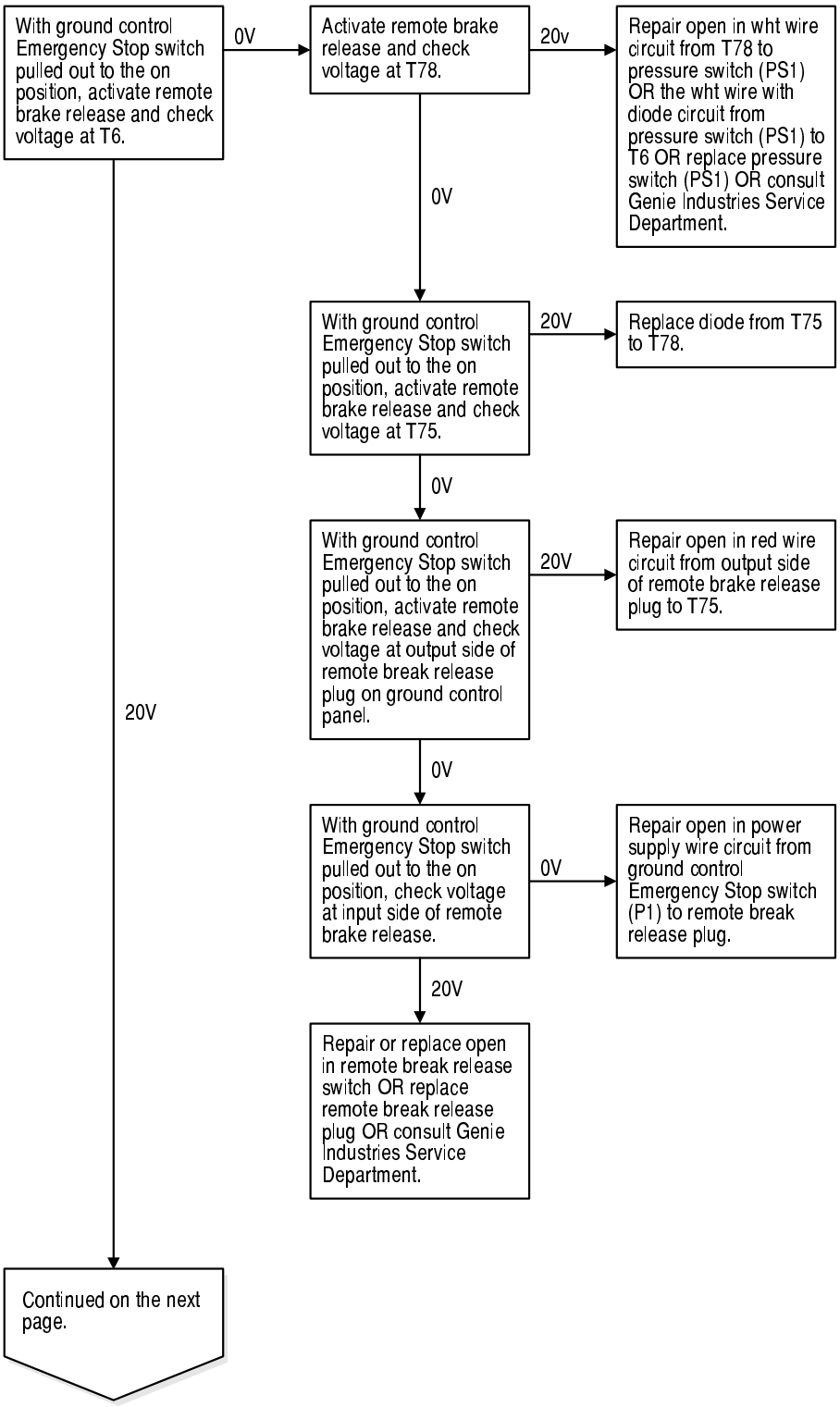


CHART 25

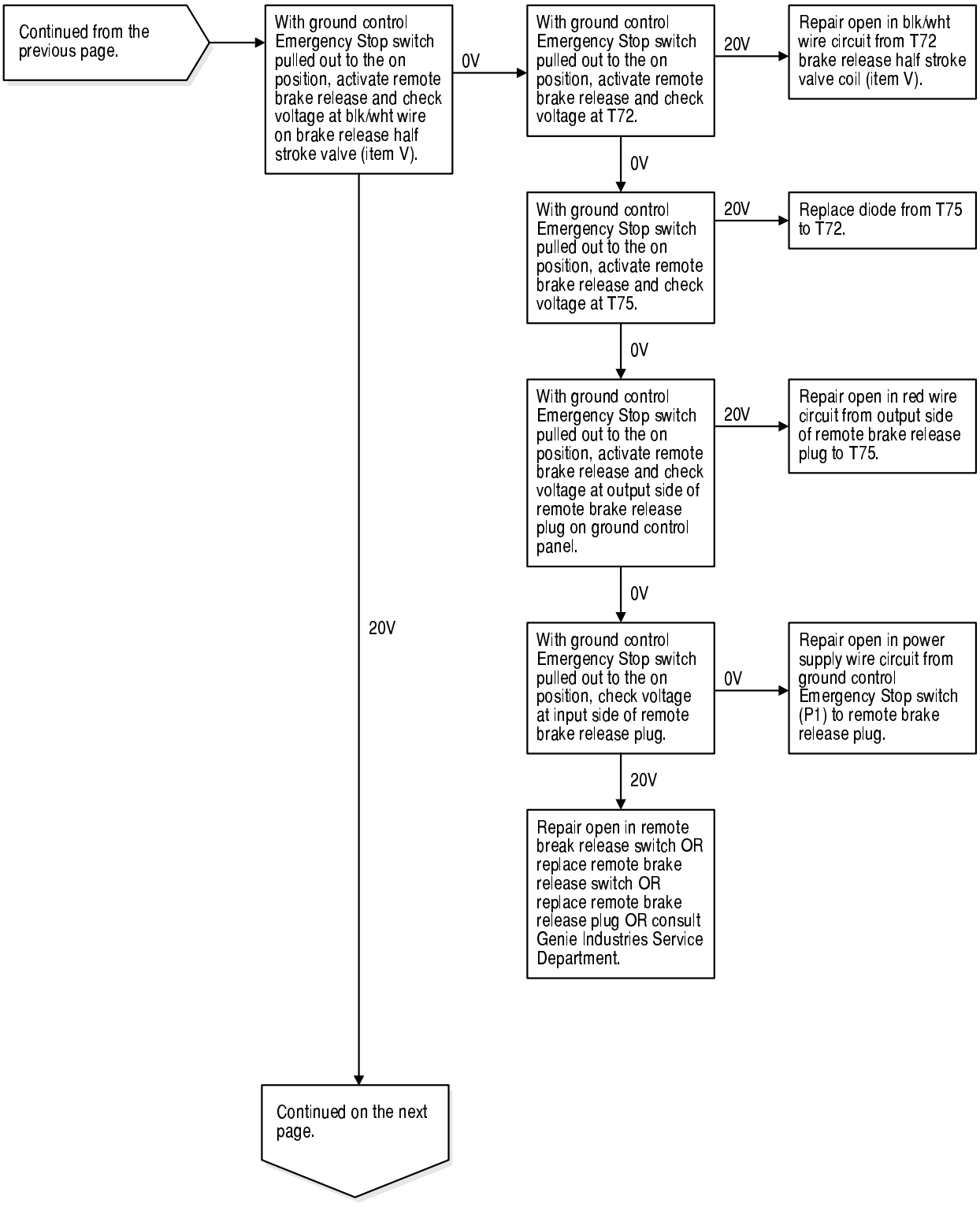
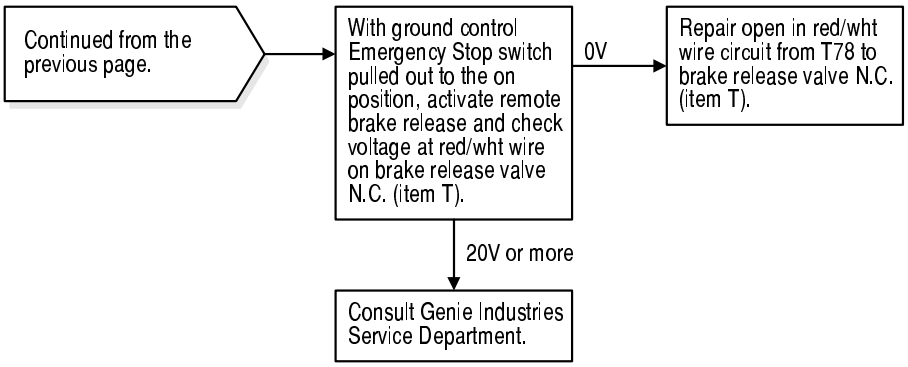
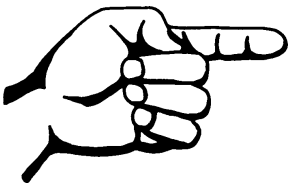

Continued from the previous page.
With ground control Emergency Stop switch pulled out to the on position, activate remote brake release and check voltage at blk/wht wire on brake release half stroke valve (item V).
0V
With ground control Emergency Stop switch pulled out to the on position, activate remote brake release and check voltage at T72.
20V
Repair open in blk/wht wire circuit from T72 brake release half stroke valve coil (item V).
0V
With ground control Emergency Stop switch pulled out to the on position, activate remote brake release and check voltage at T75.
20V
Replace diode from T75 to T72.
0V
With ground control Emergency Stop switch pulled out to the on position, activate remote brake release and check voltage at output side of remote brake release plug on ground control panel.
20V
Repair open in red wire circuit from output side of remote brake release plug to T75.
0V
With ground control Emergency Stop switch pulled out to the on position, check voltage at input side of remote brake release plug.
0V
Repair open in power supply wire circuit from ground control Emergency Stop switch (P1) to remote brake release plug.
20V
Repair open in remote break release switch OR replace remote brake release switch OR replace remote brake release plug OR consult Genie Industries Service Department.
20V
Continued on the next page.

CHART 25


Continued from the previous page.
With ground control Emergency Stop switch pulled out to the on position, activate remote brake release and check voltage at red/wht wire on brake release valve N.C. (item T).
0V
Repair open in red/wht wire circuit from T78 to brake release valve N.C. (item T).
20V or more
Consult Genie Industries Service Department.



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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 Z-30/20 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.

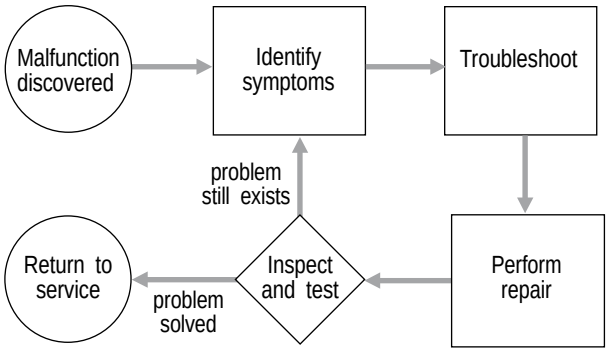
Electrical Schematics

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

Hydraulic Schematics

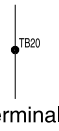
⚠WARNING Bodily injury hazard. Spraying hydraulic oil can penetrate and burn skin. Loosen hydraulic connections very slowly to allow the oil pressure to dissipate gradually. Do not allow oil to squirt or spray.

General Repair Process



Electrical Symbols Legend

Wire color with cable number

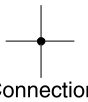


Terminal

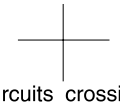
Quick disconnect terminal

T-circuits connect at terminal

T-circuits connect

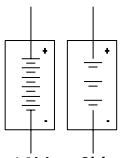


Connection no terminal

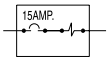


Circuits crossing no connection

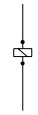
Diode



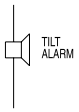
Battery



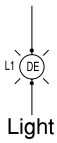
Circuit breaker



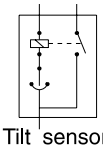
Solenoid or relay coil



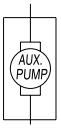
Horn



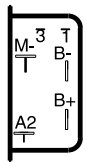
Light



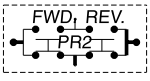
Tilt sensor



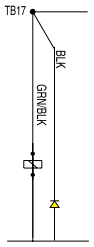
Auxiliary pump



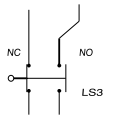
Curtis motor controller



Dual pole relay controller



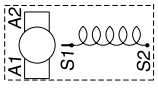
Ground supression circuit



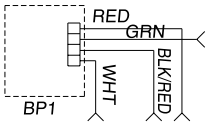
Limit switch

Limit switch normally closed held open

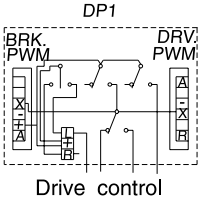
Limit switch normally open held closed



Drive motor

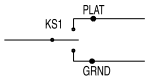


Rotary OEM flow control

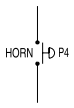


Drive control

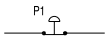
Foot switch



Key switch



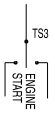
Horn button normally open



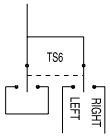
Emergency Stop button normally closed

Relay contact normally open

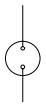
Relay panel contactor



Toggle switch SPDT



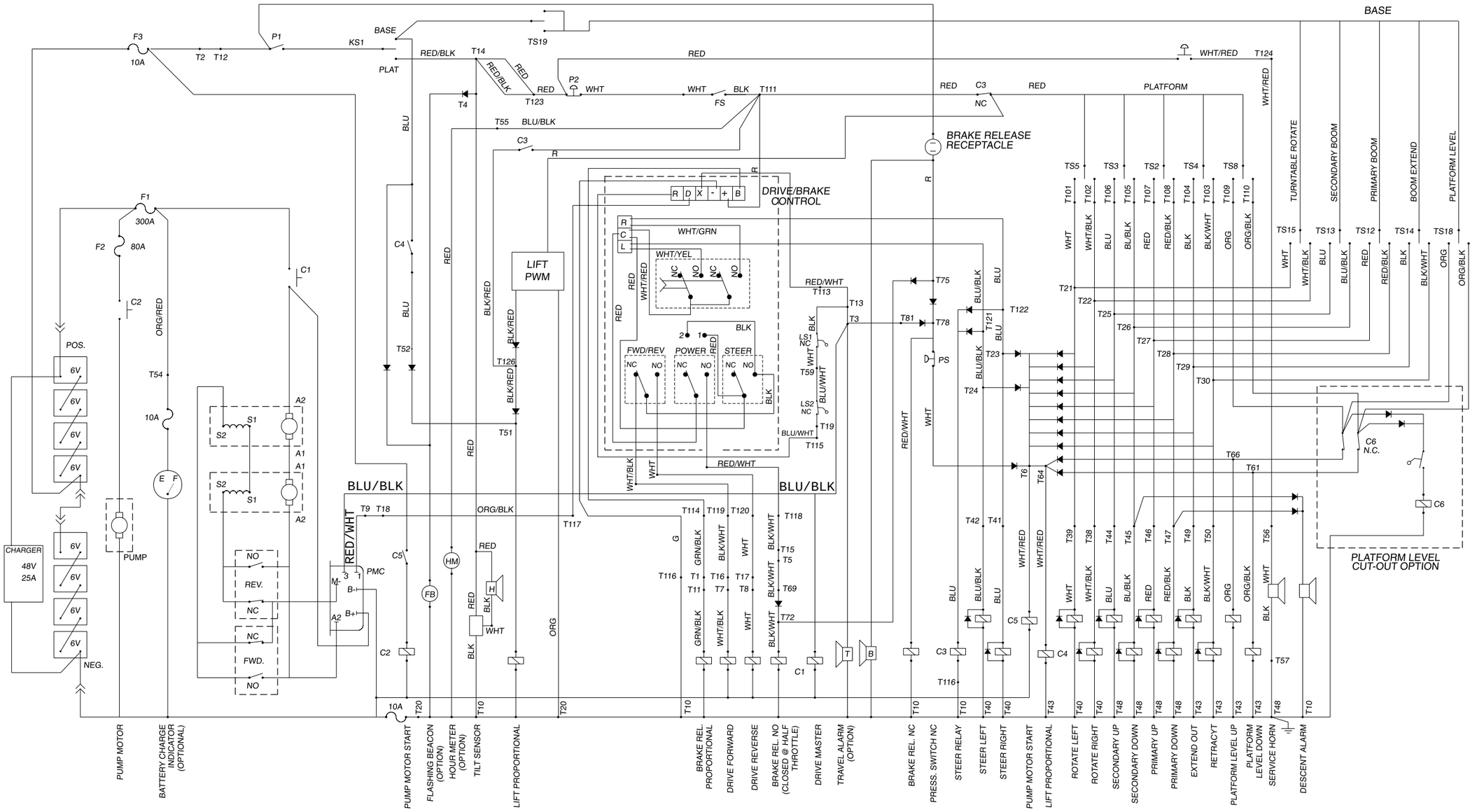
Toggle switch DPDT



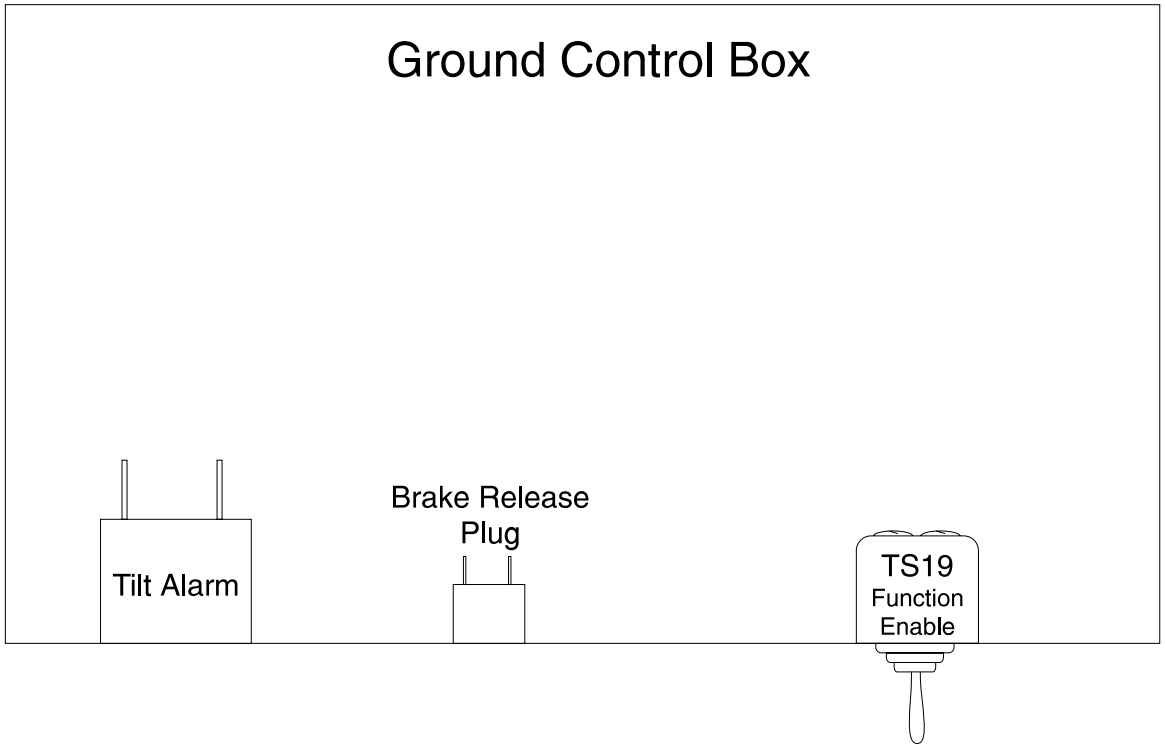
Brake release plug

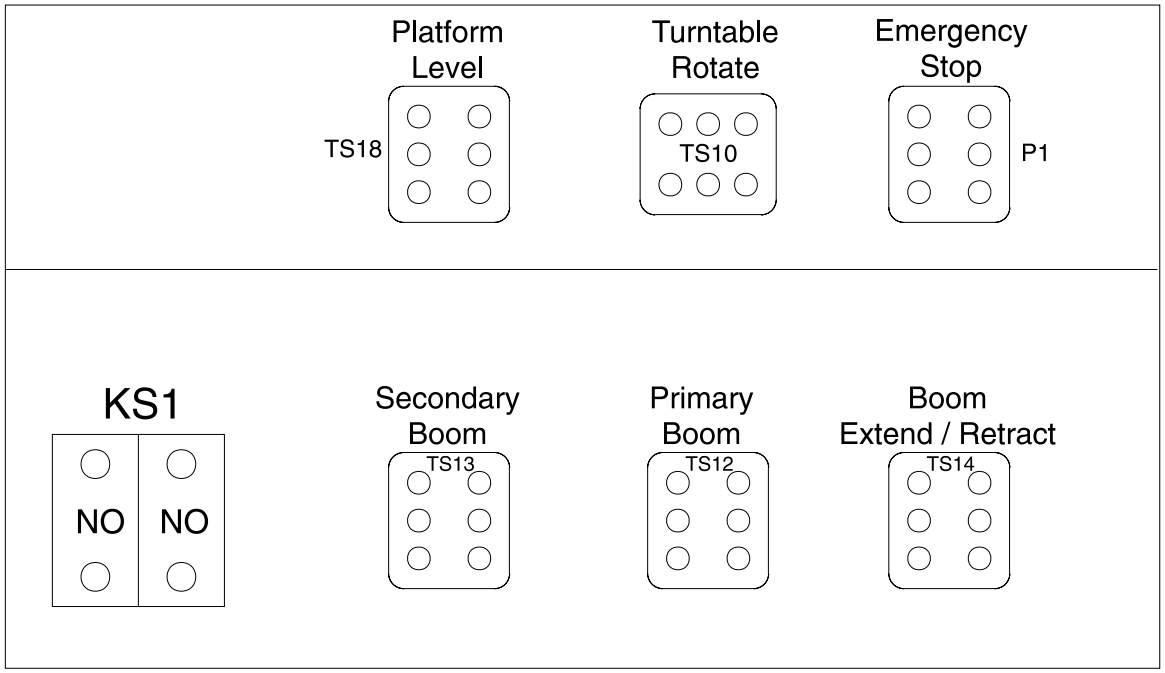
Pressure switch

Electrical Schematic



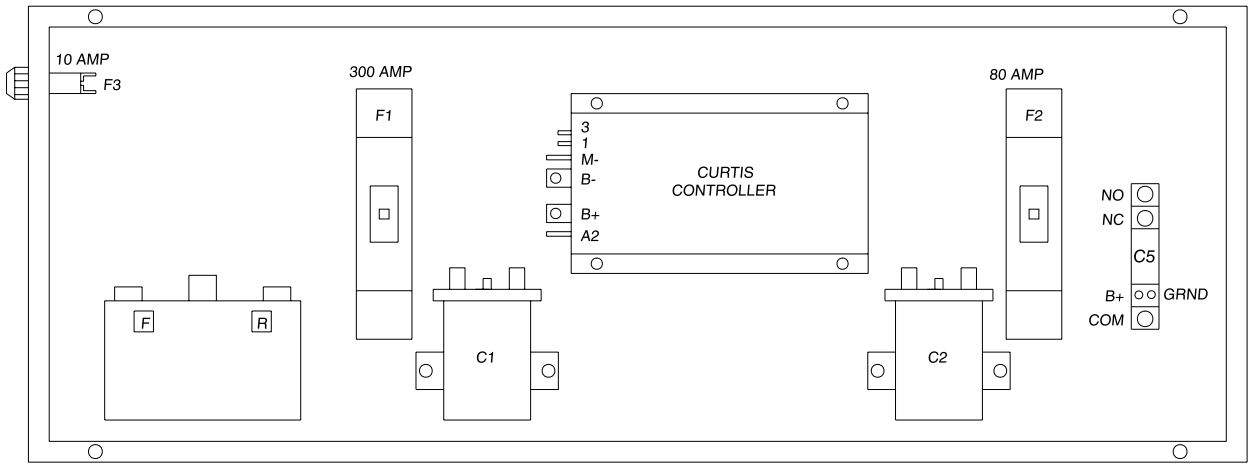
Ground Controls Legend



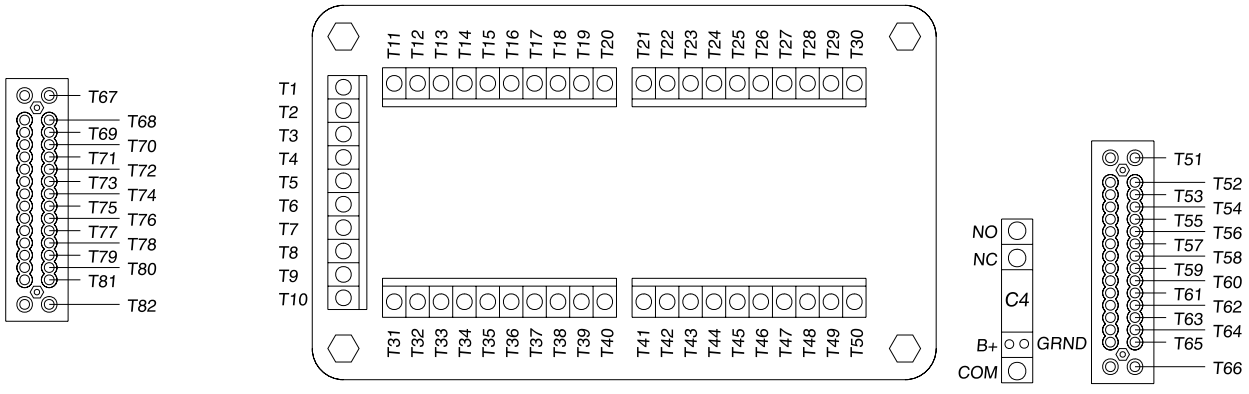


Contactor Box and Turntable PC Board Legend

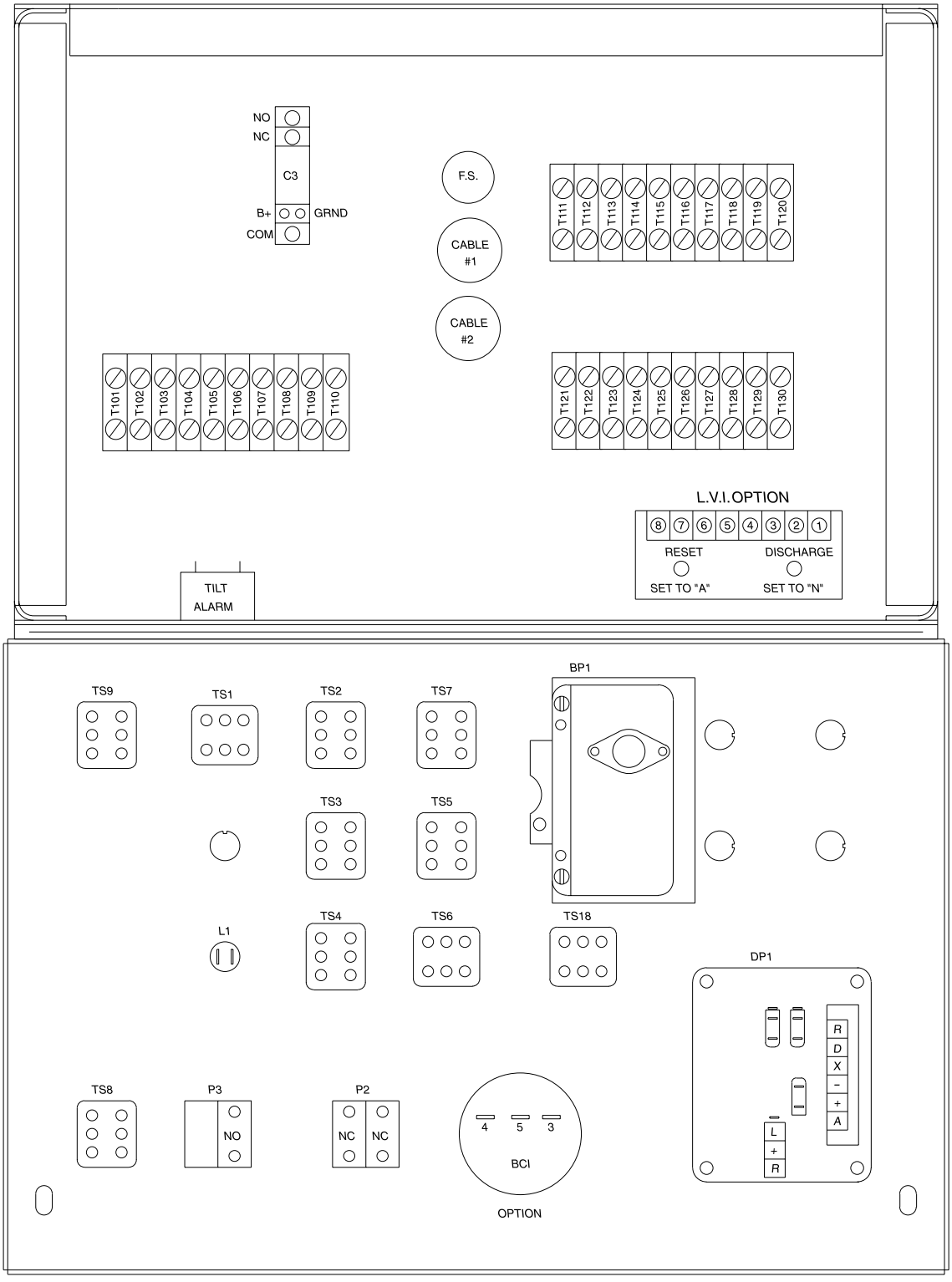
CONTACTOR BOX



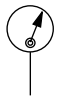
TURNTABLE PC BOARD



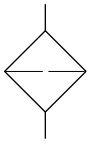
Platform Controls Legend



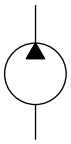
Hydraulic Symbols Legend



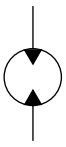
Pressure gauge



Filter

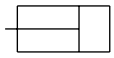


Fixed displacement pump



Bi-directional motor

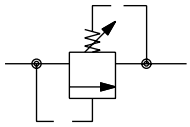
Pump prime mover engine or motor



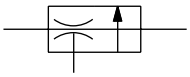
Double acting cylinder

Orifice with size

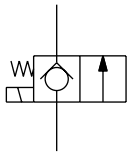
Check valve



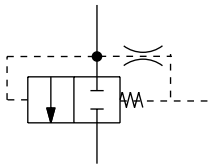
Relief valve



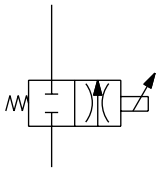
Priority flow divider



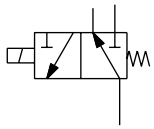
Solenoid operated dump valve



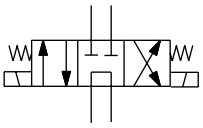
Differential sensing valve



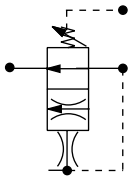
Solenoid operated proportional valve



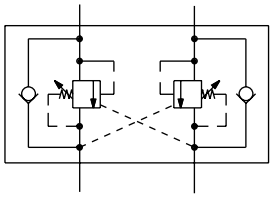
Solenoid operated 2 pos., 3 way, directional valve



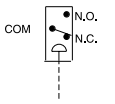
Solenoid operated 3 pos., 4 way, directional valve



Pilot operated flow control valve



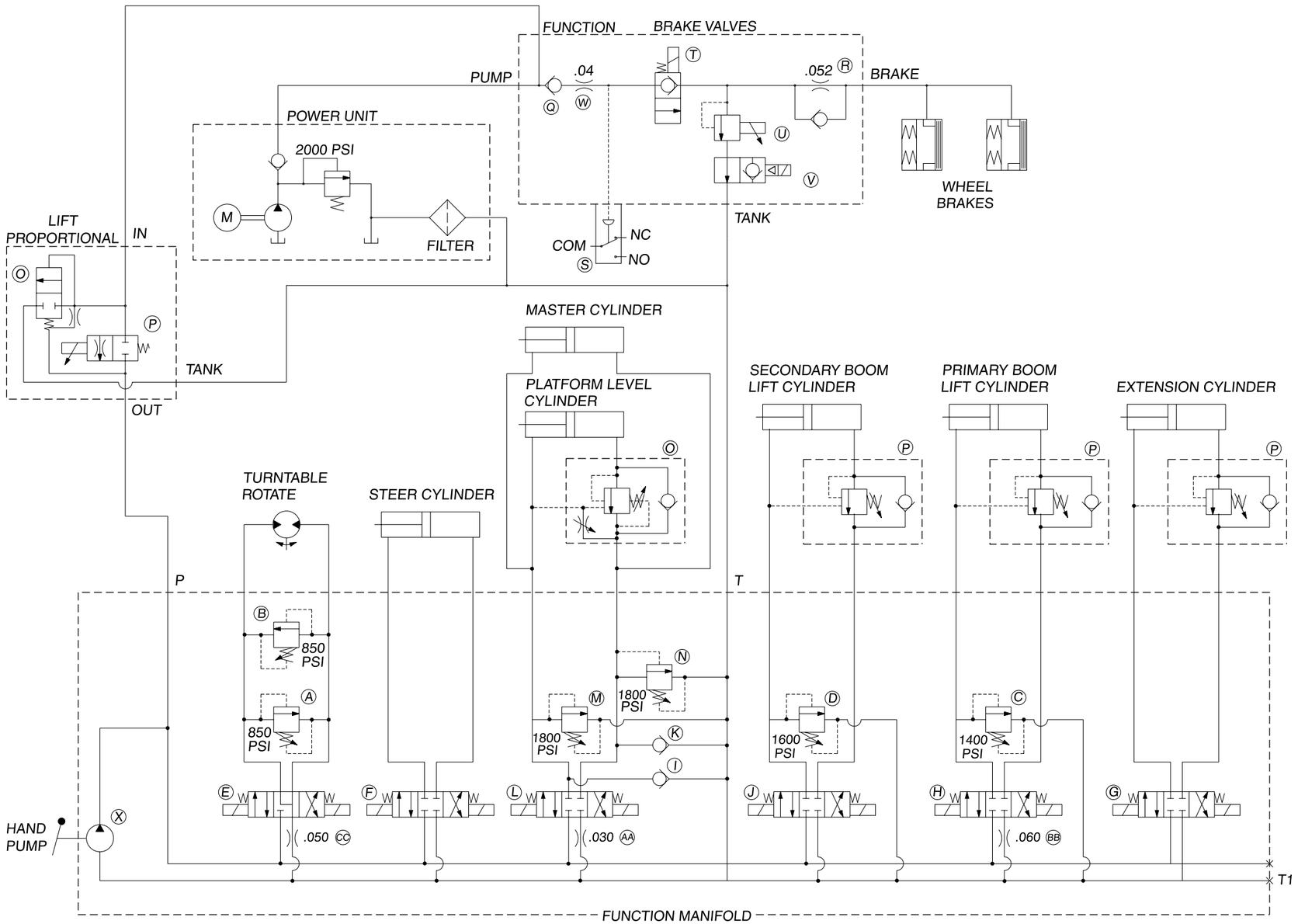
Counterbalance valve



Pressure switch

Brake

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:

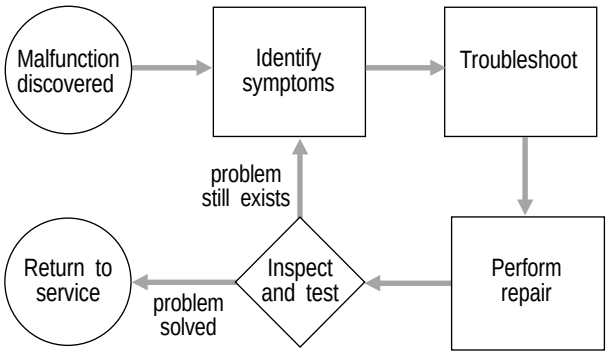
- ☑ Read, understand and obey the safety rules and operating instructions in the *Genie Z-30/20 Operator's Manual*.
- ☑ Be sure that all necessary tools and parts are available and ready for use.
- ☑ Read each procedure completely and adhere to the instructions. Attempting shortcuts may produce hazardous conditions.
- ☑ Unless otherwise specified, perform each repair procedure with the machine in the following configuration:
  - Machine parked on a flat, level surface
  - Boom in the stowed position
  - Turntable rotated with the boom between the non-steering wheels
  - Key switch in the OFF position with the key removed
  - Battery packs disconnected
  - Wheels chocked

About This Section

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

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

General Repair Process



Symbols Legend

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

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

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

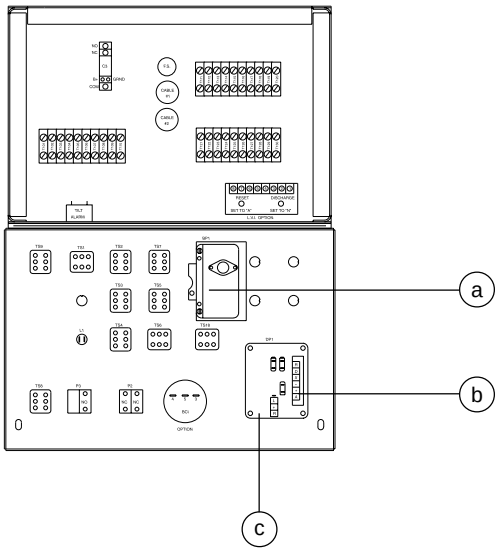
NOTICE Indicates special operation or maintenance information.

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

Platform Controls

1-1 Controllers

Maintaining the controllers at the proper setting is essential to safe machine operation. Each controller should operate smoothly and provide proportional speed control through its entire range of motion.



a boom function speed controller
b drive and brake printed circuit board
c drive controller

Drive Controller Adjustments

NOTICE Do not adjust the controllers unless the static battery supply voltage is above 24V DC.

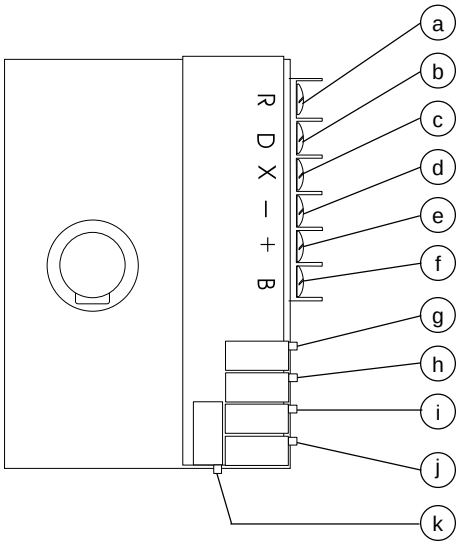
NOTICE This procedure will require the use of two multi-meters. One will be used for measuring amps and the other for voltage.

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

1 Block the steering wheels, and then center a lifting jack under the drive chassis between the non-steer tires.

2 Raise the drive chassis 1 to 2 inches (2.54 to 5.0 cm) off the ground and place jack stands under the chassis.

3 Open the platform control box lid and locate the printed circuit board on the drive controller.



a terminal "R", activates max-out range
b terminal "D", drive output
c terminal "X"
d terminal "-", ground
e terminal "+", positive
f terminal "B", brake output
g drive lo range adjustable trimpot
h drive threshold adjustable trimpot
i drive hi range adjustable trimpot
j brake threshold adjustable trimpot
k brake max out adjustable trimpot

4 Disconnect the white/red wire from the "B" terminal on the printed circuit board.

5 Connect the black (-) lead from an amp meter to the white/red wire that was removed from the circuit board. Connect the red (+) lead to the "B" terminal on the printed circuit board.

6 Connect the red (+) lead from a volt meter to the "D" terminal on the drive controller printed circuit board. Connect the black (-) lead to ground.

7 Turn the key switch to platform control and pull the Emergency Stop button to the ON position at both the ground and platform controls.

8 Set the brake threshold on the circuit board: Press down the foot switch, then slowly move the control handle off center until you hear the pump motor turn on. Adjust the amps to 0.16 amps. Turn the threshold trimpot adjustment screw clockwise to increase the amps or counterclockwise to decrease the amps.

9 Set the brake max-out on the circuit board: Press down the foot switch, then slowly move the control handle off center until you hear the pump motor turn off. Adjust the amps to 0.91 amps. Turn the max-out trimpot adjustment screw clockwise to increase the amps or counterclockwise to decrease the amps.

10 Set the drive threshold on the circuit board: Press down the foot switch, then slowly move the control handle off center until you see 0.28 to 0.30 amps on the amp meter. Hold the joystick in this position then adjust the drive threshold trimpot on the circuit board to 0.80 to 0.90V DC. Turn the threshold trimpot adjustment screw clockwise to increase the volts or counterclockwise to decrease the volts.

11 Set the drive high range on the circuit board: Press down the foot switch, then slowly move the control handle all the way to the FORWARD position. Adjust the high range trimpot on the circuit board to 5.00 to 5.20V DC. Turn the high range trimpot adjustment screw clockwise to increase the voltage or counterclockwise to decrease the voltage.

12 Raise the primary boom or the secondary boom approximately 5 feet (1.5 m) to activate the drive limit switch.

13 Set the drive lo range on the circuit board: Press down the foot switch, then move the control handle all the way to the FORWARD position. Adjust the drive lo range trimpot on the circuit board to 1.9 to 2.0V DC. Turn the lo range trimpot adjustment screw clockwise to increase the voltage or counterclockwise to decrease the voltage.

14 Lower the boom to the stowed position and remove the lifting jacks from under the drive chassis.

15 Raise the primary boom off the drive limit switch.

16 Create start and finish lines by marking two lines on the ground 40 feet (12.2 m) apart. Choose a reference point on the machine, as a reference for use when crossing the start and finish lines.

17 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.

18 Continue at full speed and note the time when the reference point crosses the finish line.

19 Adjust drive lo range trimpot on the circuit board to achieve a 40 second drive speed time. Turn the trimpot clockwise to increase the time or counterclockwise to decrease the time.

20 Lower the primary boom to the stowed position.

21 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.

22 Continue at full speed and note the time when the reference point crosses the finish line.

PLATFORM CONTROLS

23 Adjust drive high range trimpot on the circuit board to achieve a 6.1 second drive speed time. Turn the trimpot clockwise to increase the time or counterclockwise to decrease the time.

Drive controller specifications

Brake		
Threshold	0.16 amps when pump motor turns ON	
Max-out	0.91 amps when pump motor turns OFF	
Drive		
Threshold	0.8 to 0.9V DC when amp output is 0.28 to 0.30 amps	
High range	5.0 to 5.2V DC when control handle is in full forward position	
Lo range	1.9 to 2.0V DC when control handle is in full forward position	
Drive speed, boom raised	0.6 mph 40 ft/45.5 sec	1 km/h 12.2 m/45.5 sec
Drive speed, boom stowed (35:1 torque hubs)	4.3 mph 40 ft/6.1 sec	6.9 km/h 12.2 m/6.1 sec
Drive speed, boom stowed (49:1 torque hubs)	3.2 mph 40 ft/8.6 sec	5.1 km/h 12.2 m/8.6 sec

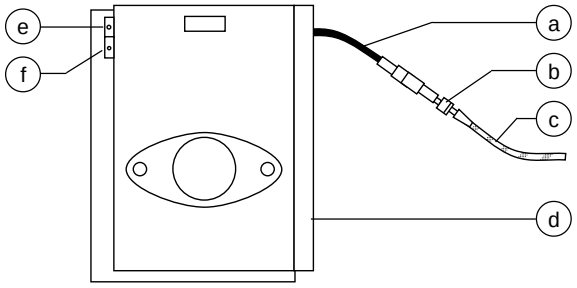
Boom Function Speed Controller Adjustments

NOTICE Do not adjust the controllers unless the static battery supply voltage is above 24V DC.

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

1 Turn the key switch to platform control and pull the Emergency Stop switch to the ON position at the ground controls. Pull up the Emergency stop button to the ON position at the platform controls.

2 Open the platform control box lid and locate the boom function speed controller.



a black/red wire
b diode
c white/red wire
d boom function speed controller
e max-out adjustable trimpot
f threshold adjustable trimpot

3 Remove the function manifold side turntable cover.

4 Locate the lift proportional manifold and disconnect the blue/red wire from the lift proportional valve coil.

5 Connect the red (+) lead from a amp meter to the wire connector of the blue/red wire that was removed from the valve coil. Connect the black (-) lead to the spade terminal on the valve coil where the blue/red wire was removed from.

6 Turn the boom function speed controller at the platform controls to the CREEP position.

7 Set the threshold: Press down the foot switch, then move the primary boom switch to the UP position until the amperage reading appears. Adjust the amperage to 0 to 0.12 amps. Turn the threshold trimpot adjustment screw clockwise to increase the amperage or counterclockwise to decrease the amperage.

8 Turn the boom function speed controller to the 9 position.

9 Set the max-out: Press down the foot switch, then move the primary boom switch to the UP position. Adjust the amperage to 0.72 to 0.75 amps. Turn the max-out trimpot adjustment screw clockwise to increase the amperage or counterclockwise to decrease the amperage.

Boom function speed controller specifications	
Threshold (controller turned to "CREEP")	0 to 0.12 amps
Max-out (controller turned to "9")	0.72 to 0.75 amps

1-2 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 the wire combination listed below and check for continuity.

Test	**Desired result**
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 the wire combination listed below and check for continuity.

Test	**Desired result**
black to white	continuity (zero Ω)

PLATFORM CONTROLS

1-3 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.

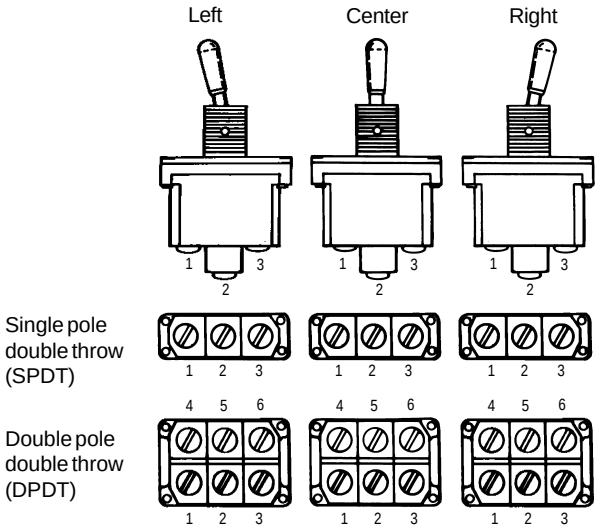
How to Test a Toggle Switch

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 Components

2-1 Platform

How to Remove the Platform

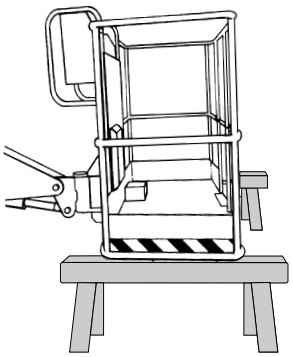
1 Separate the foot switch wiring quick disconnect plug from the platform toeboard.

NOTICE If your machine is equipped with an air line to platform option, the air line must be disconnected from the platform before removal.

2 Raise the platform and place sawhorses under the platform for support.

3 Lower the platform onto the sawhorses.

⚠WARNING Do not rest the entire weight of the boom on the sawhorses, just enough to support the platform.



4 Remove the platform mounting fasteners and remove the platform.

NOTICE During installation, be sure that the lower casting is pushed up as far as it will go onto the platform pivot weldment so that there is no space between the lower casting and the platform pivot weldment.

NOTICE Do not overtighten the platform mounting fasteners during installation.

2-2 Platform Leveling Slave Cylinder

The slave cylinder and the rotator pivot are the two primary supports for the platform. The slave cylinder keeps the platform level through the entire range of primary boom motion. It operates in a closed-circuit hydraulic loop with the master cylinder. The slave cylinder is equipped with a counterbalance valve 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. See Repair Procedure 2-2, *How to Bleed the Slave Cylinder*.

1 Raise the boom slightly and place sawhorses under the platform for support. Then lower the boom until the platform is resting on the sawhorses.

⚠WARNING Do not rest the entire weight of the boom on the sawhorses, just enough to support the platform.

2 Tag, disconnect and plug the hydraulic hoses from the slave cylinder and connect them together with a connector. Cap the fittings on the cylinder.

⚠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.

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

4 Remove the pin retaining fastener from the barrel-end pin.

PLATFORM COMPONENTS

5 Use a soft metal drift and drive the rod-end pin out.

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

NOTICE Note the quantity and location of the shims on the barrel-end pivot pin.

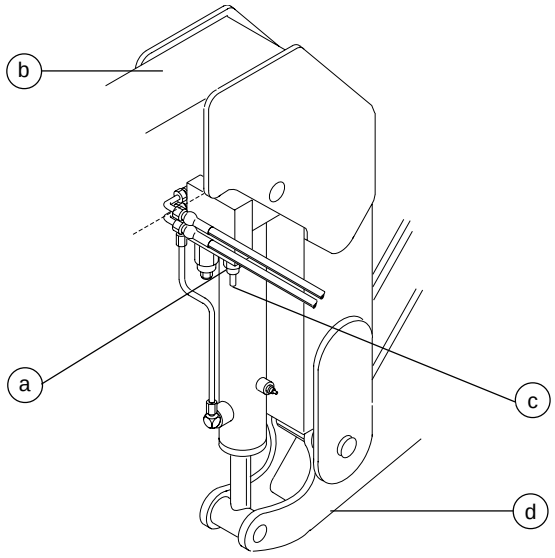
7 Remove the cylinder from the machine.

How to Bleed the Slave Cylinder

1 Raise the primary boom to a horizontal position.

2 Move the platform level switch to the down position to retract the platform leveling cylinder. Do not allow the platform to contact the ground.

3 Loosen the lock nut on the needle valve. Do not remove the valve.



a locknut
b primary extension boom
c needle valve
d platform pivot mount

4 Open the needle valve by turning the needle valve counterclockwise until it stops.

5 Hold the platform leveling switch in the down position for one minute. Close the needle valve by turning the needle valve clockwise until it stops.

6 Move the platform level switch in the up position until the platform leveling cylinder is fully extended.

7 Open the needle valve by turning the needle valve counterclockwise until it stops.

8 Hold the platform leveling switch in the up position for one minute. Close the needle valve by turning the needle valve clockwise until it stops. Tighten the lock nut.

2-3 Platform Rotator

The platform rotator is a manually-operated gear assembly used to rotate the platform 160 degrees.

How to Remove the Platform Rotator

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

2 Open the platform control box lid and remove the platform control box mounting fasteners. Lay the platform controls off to the side.

⚠CAUTION Component damage hazard. Cables can be damaged if they are kinked or pinched.

3 Remove the seven mounting bolts from the platform rotator cover, then remove the cover.

4 Remove the retaining nut from the end of the platform pivot shaft.

5 Lift the platform rotator off of the platform pivot shaft.

NOTICE Be careful not to damage the grease seal located on the bottom of the platform rotator.

How to Adjust the Platform Rotator

The platform rotator is designed to allow the platform to slip in the event of striking an object to help prevent damage to the platform. If the platform rotator is too tight, or is seized, damage to the platform may occur. If the platform rotator is too loose, the platform may rotate side to side unexpectedly, resulting in a unsafe operating condition.

1 Raise the primary boom approximately 3 feet (0.9 m).

2 Activate the function enable switch and the platform level toggle switch in the down direction until the platform is horizontal. Do not allow the platform to contact the ground.

3 Open the platform control box lid and remove the platform control box mounting fasteners. Lay the platform controls off to the side.

⚠CAUTION Component damage hazard. Cables can be damaged if they are kinked or pinched.

4 Remove the fasteners from the platform rotator cover then remove the cover.

5 Locate the locknut on the end of the platform pivot shaft.

6 Tighten the locknut in the clockwise direction on the platform pivot weldment shaft to make the platform rotator tighter or loosen the locknut in the counterclockwise direction to make the platform rotator looser.

7 Thoroughly grease the entire mechanical platform rotator assembly.

If the platform rotator is seized or is difficult to operate:

1 Open the platform control box lid and remove the platform control box mounting fasteners. Lay the platform controls off to the side.

⚠CAUTION Component damage hazard. Cables can be damaged if they are kinked or pinched.

PLATFORM COMPONENTS

2 Remove the seven mounting bolts from the platform rotator cover, then remove the cover.

3 Visually inspect the inside of the platform rotator for the following items:

- Excessive wear
- Broken or damaged parts
- Rust or corrosion
- Binding

NOTICE Replace any worn or damaged parts.

NOTICE If any parts are lightly rusted or corroded, remove them and clean rust or corrosion off with a wire brush. If parts are heavily rusted or corroded, replace them.

4 Loosen the locknut in the counterclockwise direction just enough to allow the handle to rotate.

5 Thoroughly grease the entire mechanical platform rotator assembly.

6 Tighten the locknut and check for platform tighteness by grabbing the rails of the platform and trying to twist it side to side. Tighten the locknut until it is difficult to twist the platform.

7 Operate the platform rotator and check for smooth operation.

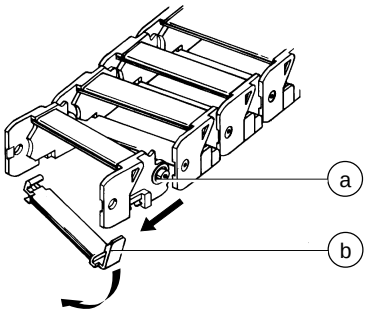
Primary Boom Components

3-1 Plastic Cable Track

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

How to Repair the Plastic Cable Track

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



a link separation point
b lower clip

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

2 Repeat step 1 for each link.

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

3-2 Primary Boom

How to Shim the Primary Boom

NOTICE Measure each wear pad. Replace the wear pad if it is less than 0.41 inches (1 cm) thick. If the wear pad is more than 0.41 inches (1 cm) 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 Primary 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 Disconnect the battery pack plugs from the machine.

3 Remove the turntable covers.

PRIMARY BOOM COMPONENTS

4 Locate the 3 cables that enter the platform control box. Number each cable and it's entry location at the platform control box.

5 Open the platform control box. Label and disconnect each wire of the 3 cables in the platform control box.

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

6 Pull all the cables out of the platform control box.

7 Tag, disconnect and plug the hydraulic hoses from the platform leveling slave cylinder. Cap the fittings on the cylinder.

⚠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.

8 Remove all the hose and cable clamps from the platform pivot weldment, cable track and the primary boom.

9 Pull all the cables and hoses through the cable track, then through the mid-pivot.

⚠CAUTION Component damage hazard. Cables and hoses can be damaged if they are kinked or pinched.

10 Support the platform pivot weldment and platform rotator with a lifting strap from an overhead crane.

11 Remove the retaining fasteners from the rod-end pivot pin of the platform level cylinder. Use a soft metal drift to remove the pin.

12 Remove the retaining fasteners from the pivot pin of the platform pivot weldment. Use a soft metal drift to remove the pin.

⚠CAUTION Crushing hazard. The platform pivot weldment and platform rotator will fall unless they are properly supported.

13 Remove the platform pivot weldment from the machine.

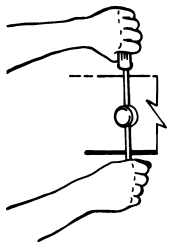
14 Support the cable track with an overhead crane.

15 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.

16 Remove the retaining fastener from the master cylinder barrel-end pivot pin.

17 Place a rod through the barrel-end pivot pin and twist to remove the pin.



18 Tag, disconnect and plug the primary boom extension cylinder hydraulic hoses. Cap the fittings on the cylinder.

⚠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.

19 Attach an overhead crane to the rod end of the primary boom lift cylinder.

20 Remove the pin retainer from the primary boom lift cylinder rod-end pin. Then use a soft metal drift to remove the pin.

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

21 Lower the rod end of the lift cylinder onto the turntable counterweight.

22 Attach a lifting strap from an overhead crane to the approximate center point of the boom.

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

24 Remove the primary boom pivot pin with a soft metal drift.

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

25 Lift the boom slightly and adjust the strap as necessary to balance the primary boom.

26 Remove the primary boom from the machine.

How to Disassemble the Primary 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 the boom. See 3-4, *How to Remove the Extension Cylinder*.

1 Remove the boom. See 3-2, *How to Remove the Primary Boom*.

2 Place blocks under the extension cylinder for support.

3 Remove the cotter pin from the extension cylinder barrel-end clevis pin. Remove the clevis pin.

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

4 Remove and label the wear pads from the outer 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 Support the extension tube with an overhead crane at the platform end of the boom.

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

6 Support and slide the outer tube off of the inner tube. Place the outer tube on blocks for support.

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

7 Remove the retaining fasteners from the extension cylinder rod-end mounting brackets at the platform end of the inner tube.

PRIMARY BOOM COMPONENTS

8 Support and slide the extension cylinder out of the pivot end of the inner tube. Place the cylinder on blocks for support.

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

3-3 Primary Boom Lift Cylinder

The primary boom lift cylinder raises and lowers the primary boom.

How to Remove the Primary Boom Lift Cylinder

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

1 Remove the two function manifold side turntable covers. Support the primary boom lift cylinder with a lifting device.

2 Tag, disconnect and plug the primary boom lift cylinder hydraulic hoses and cap the fittings on the lift cylinder.

⚠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.

3 Support the rod end of the cylinder with a lifting strap from an overhead crane.

4 Remove the pin retainer from the primary boom lift cylinder rod-end pin. Then use a soft metal drift to remove the pin.

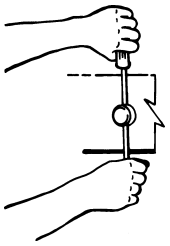
5 Lower the rod end of the cylinder onto the turntable counterweight.

⚠CAUTION Crushing hazard. When the rod-end pivot pin is removed, the primary boom lift cylinder may become unbalanced and fall if it is not properly supported.

6 Attach the strap from the overhead crane to the barrel end of the cylinder.

7 Remove the pin retainer from the pivot pin at the barrel-end of the primary boom lift cylinder and remove the pin.

8 Place a rod through the barrel-end pivot pin and twist to remove the pin.



⚠CAUTION Crushing hazard. When the barrel-end pivot pin is removed, the primary boom lift cylinder may become unbalanced and fall if it is not properly supported.

9 Carefully remove the primary boom lift cylinder from the machine.

⚠CAUTION Component damage hazard. Be sure not to damage the counterbalance valve block on the barrel end of the primary boom lift cylinder.

3-4
Extension Cylinder

The extension cylinder extends and retracts the primary boom extension tube. The extension cylinder is equipped with a counterbalance valve to prevent movement in the event of a hydraulic line failure.

How to Remove the Extension Cylinder

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

1 Raise the primary boom to the horizontal position. Then extend the boom until the extension cylinder rod-end mounting bracket retaining fasteners are accessible.

2 Activate the platform level down function until the platform level slave cylinder is fully retracted and the platform is in the horizontal position.

3 Locate the inspection cover at the platform end of the extension tube.

4 Remove the inspection cover fasteners, then remove the inspection cover.

5 Remove the cylinder rod-end retaining bracket fasteners.

6 Tag, disconnect and plug the extension cylinder hydraulic hoses. Cap the fittings on the cylinder.

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

7 Place blocks under the barrel end of the extension cylinder for support.

8 Remove the cotter pin from the barrel-end clevis pin. Remove the clevis pin.

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

9 Carefully pull out and properly support the extension cylinder from the platform end of the extension tube.

⚠CAUTION Crushing hazard. The cylinder will fall if it is not properly supported when it is pulled out of the extension tube.

⚠CAUTION Component damage hazard. Be sure not to damage the counterbalance valve block on the barrel end of the extension cylinder.

NOTICE To make installation of the extension cylinder easier, be sure that the cylinder rod is extended 2 to 3 feet (0.6 to 0.9 m).

PRIMARY BOOM COMPONENTS

3-5
Platform Leveling Master Cylinder

The master cylinder acts as a pump for the slave cylinder. It is part of the closed circuit hydraulic loop that keeps the platform level through the entire range of primary boom motion. The master cylinder is located on the mid-pivot at the pivot end of the primary boom.

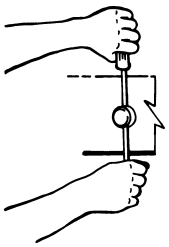
How to Remove the Platform Leveling Master Cylinder

NOTICE Before cylinder removal is considered, bleed the cylinder to be sure that there is no air in the closed loop. See 2-2, *How to Bleed the Slave Cylinder.*

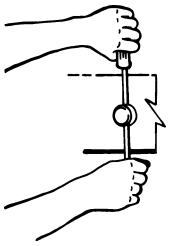
1 Tag, disconnect and plug the master cylinder hydraulic hoses. Cap the fittings on the cylinder.

⚠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.

2 Remove the pin retainer from the master cylinder rod-end pivot pin. Place a rod through the rod-end pivot pin and twist to remove the pin.

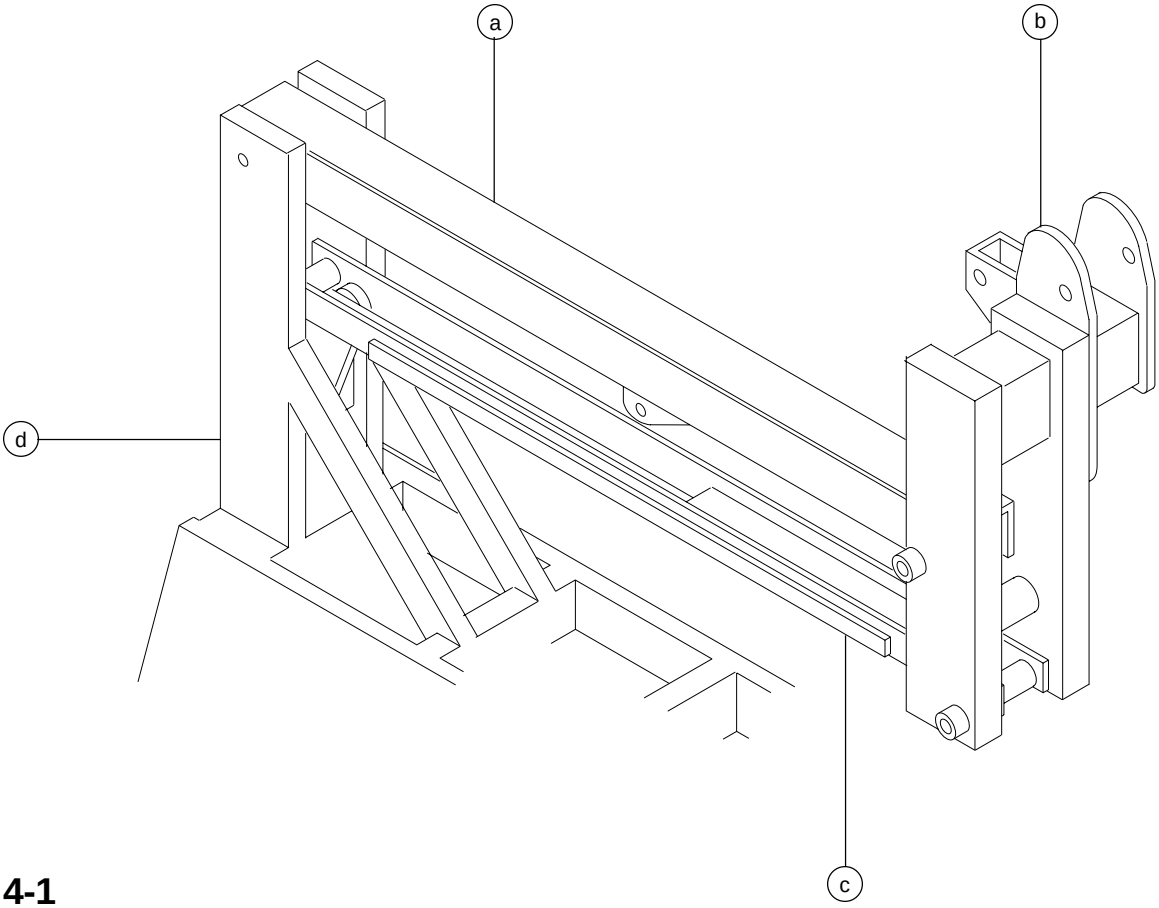


3 Remove the pin retainer from the master cylinder barrel-end pivot pin. Place a rod through the barrel-end pivot pin and twist to remove the pin.



4 Remove the cylinder from the machine.

Secondary Boom Components



Secondary Boom
a secondary boom
b mid-pivot
c tension link
d turntable pivot

4-1
Secondary Boom

How to Disassemble the Secondary Boom

⚠WARNING The procedures in this section require specific repair skills, lifting equipment and a suitable workshop. Attempting this procedure without these skills and tools may result in death or serious injury and significant component damage. Dealer service is required.

Follow the disassembly steps to the point required to complete the repair. Then re-assemble the secondary boom by following the disassembly steps in reverse order.

SECONDARY BOOM COMPONENTS

1 Lower the boom to the stowed position.

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

3 Remove the primary boom. See 3-2, *How to Remove the Primary Boom.*

4 Tag, disconnect and plug the primary boom lift cylinder and master cylinder hydraulic hoses. Cap the fittings on the cylinders.

⚠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.

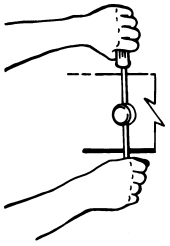
5 Remove the two hose clamps on the mid-pivot and pull all the cables and hoses through the mid-pivot.

⚠CAUTION Component damage hazard. Cables and hoses can be damaged if they are kinked or pinched.

6 Mark the location of the primary boom limit switch and then remove the limit switch fasteners.

7 Remove the pin retaining fastener from the rod-end pivot pin on the master cylinder.

8 Place a rod through the rod-end pivot pin and twist to remove the pin.



9 Support the barrel end of the primary lift cylinder with a lifting strap from an overhead crane to support it when the barrel-end pivot pin is removed.

10 Remove the pin retaining fasteners from the barrel-end pivot pin on the primary boom cylinder. Then use a soft metal drift to remove the pin.

11 Remove the primary boom lift cylinder from the machine.

⚠CAUTION Crushing hazard. The primary boom lift cylinder will fall when it is removed from the machine unless it is properly supported.

12 Remove the hose clamps from the turntable pivot above the ground controls.

13 Mark the location of the secondary boom limit switch and then remove the limit switch fasteners.

14 Pull all the hoses, cables and limit switches out of the mid-pivot and through the secondary boom and lay them off to the side.

⚠CAUTION Component damage hazard. Cables and hoses can be damaged if they are kinked or pinched.

15 Support the mid-pivot with a lifting strap from an overhead crane.

16 Remove the pin retaining fasteners from the secondary boom pivot pin and the tension link pivot pin at the mid-pivot. Do not remove the pins.

17 Support the tension link with a lifting device.

18 Use a soft metal drift to remove the tension link pivot pin at the mid-pivot.

⚠CAUTION Crushing hazard. The tension link will fall when the tension link pivot pin is removed from the mid-pivot if it is not properly supported.

19 Lower the tension link and rest it on the chassis.

20 Use a soft metal drift to remove the secondary boom pivot pin at the mid-pivot.

21 Remove the mid-pivot from the machine.

⚠WARNING Crushing hazard. The mid-pivot will fall when the secondary boom pivot pin is removed from the mid-pivot if it is not properly supported.

22 Tag, disconnect and plug the hydraulic hoses from the secondary boom lift cylinder. Cap the fittings on the cylinder.

⚠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.

23 Remove the retaining fasteners from the secondary boom lift cylinder rod-end pivot pin. Do not remove the pin.

24 Support each end of the secondary boom with a lifting strap from an overhead crane. Lift the boom slightly to support it.

⚠WARNING Crushing hazard. The secondary boom will fall unless it is properly supported.

25 Place a block of wood approximately 3 feet long (0.9 m) across the turntable counterweights.

26 Support the rod end of the secondary boom lift cylinder with a lifting device. Use a soft metal drift to remove the pin.

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

27 Lower the rod end of the secondary boom lift cylinder onto the wood block.

28 Remove the pin retaining fasteners from the secondary boom pivot pin at the turntable pivot. Use a soft metal drift to remove the pin.

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

29 Remove the secondary boom from the machine.

30 Attach the strap from an overhead crane to the secondary boom lift cylinder.

31 Remove the pin retaining fasteners from the barrel end of the secondary boom lift cylinder pivot pin. Use a soft metal drift to remove the pin.

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

32 Remove the cylinder from the machine.

⚠CAUTION Component damage hazard. Be sure not to damage the counterbalance valve block on the barrel end of the secondary boom lift cylinder.

33 Attach a lifting strap from an overhead crane to the mid-pivot end of the tension link.

34 Raise the tension link to a vertical position.

35 Remove the pin retaining fasteners from the tension link pivot pin at the turntable pivot. Use a soft metal drift to remove the pin.

⚠CAUTION If the overhead crane is not properly attached, the tension link may become unbalanced and fall when it is removed from the machine.

SECONDARY BOOM COMPONENTS

4-2
Secondary Boom Lift Cylinder

The secondary boom lift cylinder raises and lowers the secondary boom. The secondary boom lift cylinder is equipped with a counterbalance valve to prevent movement in the event of a hydraulic line failure.

How to Remove the Secondary 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 Lower the boom to the stowed position.

2 Remove all four turntable covers.

3 Tag, disconnect and plug the hydraulic hoses from the secondary boom lift cylinder. Cap the cylinder fittings.

⚠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.

4 Secure the barrel end of the cylinder to the secondary boom using a strap to prevent the cylinder from falling when the pivot pin is removed.

5 Attach a strap from an overhead crane to the rod end of the secondary boom lift cylinder. Do not lift it.

6 Remove the pin retaining fasteners from the secondary boom lift cylinder barrel-end pivot pin. Then use a soft metal drift to remove the pin.

7 Remove the pin retaining fasteners from the secondary boom lift cylinder rod-end pivot pin. Then use a soft metal drift to remove the pin.

8 Remove the cylinder from the machine.

⚠CAUTION Component damage hazard. Be sure not to damage the counterbalance valve block on the barrel end of the secondary boom lift cylinder.

Ground Controls

5-1 Toggle Switches

See 1-3, *Toggle Switches*.

5-2 Control Relays

Relays used for dual function switching are double pole double throw (DPDT) relays.

How to Test a Double Pole Double Throw Relay

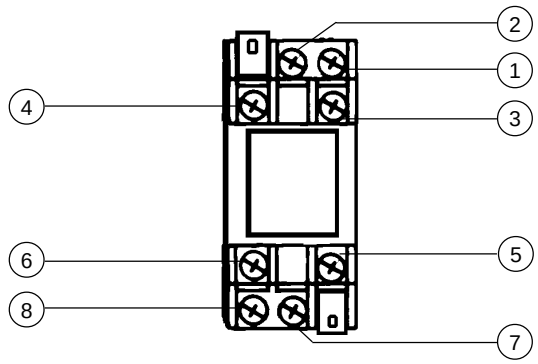
⚠WARNING Electrocution hazard. Contact with electrically charged circuits may cause death or serious injury. Remove all rings, watches and other jewelry.

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

1 Turn the key switch to the OFF position and remove the key.

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

3 Connect the leads from an ohmmeter to each terminal combination and check for continuity. Terminals 7 and 8 represent the coil and should not be tested in any other combination.

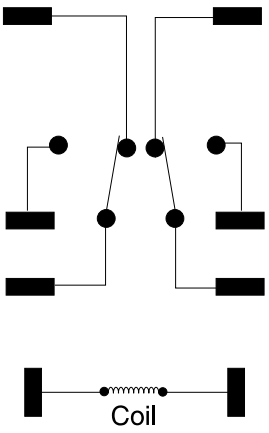


Bubble number represents the terminal number

Test	Desired result
terminal 7 to 8	640 to 650Ω
terminal 1 to 2, 3, 4 & 6	no continuity (infinite Ω)
terminal 2 to 3, 4 & 5	no continuity
terminal 3 to 6	no continuity
terminal 2 to 6	continuity (zero Ω)
terminal 1 to 5	continuity

4 Connect 24V DC to terminal 8 and a ground wire to terminal 7, then test the following terminal combinations.

Test	Desired result
terminal 1 to 2, 4, 5 & 6	no continuity (infinite Ω)
terminal 2 to 3, 5 & 6	no continuity
terminal 1 to 3	continuity (zero Ω)
terminal 2 to 4	continuity



Relay Schematic

Hydraulic Pump

6-1
Main Function Pump

How to Test the Main Function Pump

1 Disconnect and plug the high pressure hydraulic hose from the main function pump.

⚠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.

2 Connect a 0 to 5000 psi (0 to 350 bar) pressure gauge to the high pressure port on the pump.

3 Turn the key switch to ground control and lift up the Emergency Stop Switch cover at the ground controls and move the switch to the ON position.

4 Activate the function enable switch any lift function from the ground controls.

⊙ Result: If the pressure gauge reads 2000 psi (137.9 bar), immediately stop. The pump is good.

⊙ Result: If pressure fails to reach 2000 psi (137.9 bar), the internal relief valve setting is incorrect or the pump is bad and will need to be serviced or replaced.

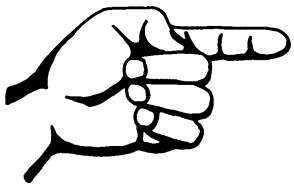
5 Remove the pressure gauge and reconnect the hydraulic hose.

How to Remove the Main Function Pump

1 Drain the reservoir into a suitable container.

2 Remove the mounting fasteners from the hydraulic reservoir. Remove the reservoir.

3 Remove the pump mounting bolts. Carefully remove the pump.



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Manifolds

7-1
Function Manifold Components

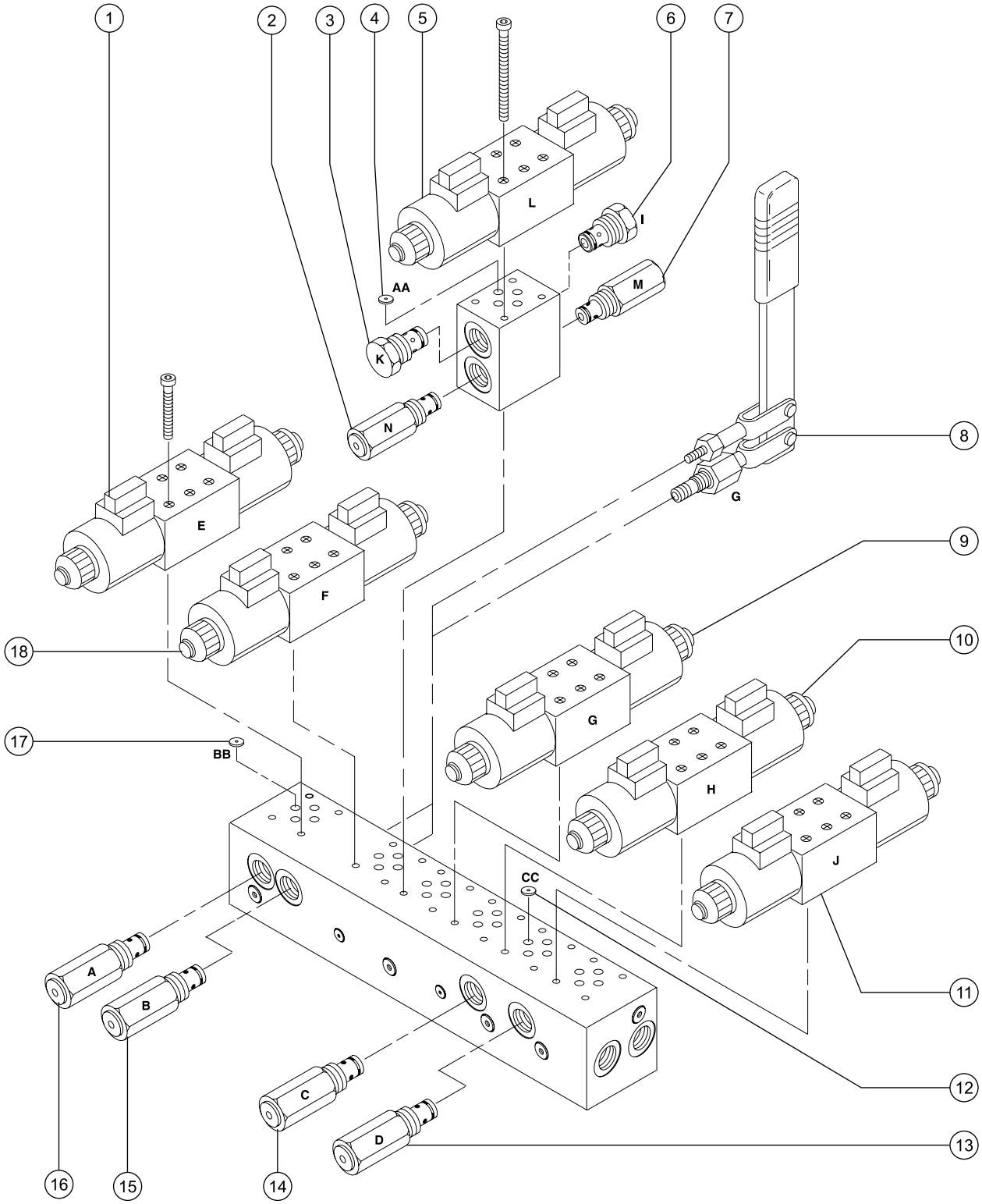
The Function Manifold is located on the turntable underneath the function manifold turntable cover.

Index No.	Description	Schematic Item	Function	Torque
1	3 position 4 way D03 valve	E	Turntable rotate left/right	30-35 in-lbs (3-4 Nm)
2	Relief valve, 1800 psi (124 bar)	N	Platform level up	25-30 ft-lbs (34-41 Nm)
3	Check valve	K	Platform level up	11-13 ft-lbs (15-18 Nm)
4	Orifice, 0.030 inch (0.76 mm)	AA	Platform level up/down	
5	3 position 4 way D03 valve	L	Platform level up/down	30-35 in-lbs (3-4 Nm)
6	Check valve	I	Platform level down	11-13 ft-lbs (15-18 Nm)
7	Relief valve, 1800 psi (124 bar)	M	Platform level down	25-30 ft-lbs (34-41 Nm)
8	Hand pump valve	X	Manual controls	11-13 ft-lbs (15-18 Nm)
9	3 position 4 way D03 valve	G	Boom extend/retract	30-35 in-lbs (3-4 Nm)
10	3 position 4 way D03valve	H	Primary boom up/down	30-35 in-lbs (3-4 Nm)
11	3 position 4 way D03 valve	J	Secondary boom up/down	30-35 in-lbs (3-4 Nm)
12	Orifice, 0.060 inch (1.52 mm)	BB	Primary boom up/down	
13	Relief valve, 1600 psi (110.3 bar)	D	Secondary boom down	25-30 ft-lbs (34-41 Nm)
14	Relief valve, 1400 psi (96.6 bar)	C	Primary boom down	25-30 ft-lbs (34-41 Nm)
15	Relief valve, 850 psi (58.6 bar)	B	Turntable rotate right	25-30 ft-lbs (34-41 Nm)
16	Relief valve, 850 psi (58.6 bar)	A	Turntable rotate left	25-30 ft-lbs (34-41 Nm)
17	Orifice, 0.050 inch (1.27 mm)	CC	Turntable left/right	
18	3 position 4 way D03 valve	F	Steer left/right	30-35 in-lbs (3-4 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

MANIFOLDS



MANIFOLDS

7-2 Valve Adjustments - Function Manifold

How to Adjust the Primary Boom Down Relief Valve

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

2 Turn the key switch to ground control and lift up the Emergency Stop Switch cover at the ground controls and move the switch to the ON position.

3 Activate the function enable switch and hold the primary boom down switch with the primary boom fully lowered, and observe the pressure reading on the pressure gauge.

4 Turn the machine off. 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.

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

6 Repeat steps 2 through 3 and recheck the valve pressure.

Primary boom down relief valve specifications

Pressure	1400 psi 97 bar

How to Adjust the Secondary Boom Down Relief Valve

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

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

2 Turn the key switch to ground control and lift up the Emergency Stop Switch cover at the ground controls and move the switch to the ON position.

3 Activate the function enable switch and hold the secondary boom down switch with the secondary boom fully lowered, and observe the pressure reading on the pressure gauge.

4 Turn the machine off. 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 Repeat steps 2 through 3 and recheck the valve pressure.

Secondary boom down relief valve specifications

Pressure	1600 psi 110 bar

How to Adjust the Turntable Rotate Relief Valves

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

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

2 Turn the key switch to ground control and lift up the Emergency Stop Switch cover at the ground controls and move the switch to the ON position.

3 Activate the function enable switch and hold the turntable rotate right switch with the turntable rotated to the right (until it is against the rotation stop), and observe the pressure reading on the pressure gauge.

4 Turn the machine off. Hold the relief valve and remove the cap (item 15, function manifold).

NOTICE If adjusting the turntable rotate left, hold switch to the left and adjust the left relief valve (item 16, 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 Repeat steps 2 through 3 and recheck the valve pressure.

Turntable rotate relief valve specifications

Pressure	850 psi 58.6 bar

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 the ohmmeter to the valve coil terminals.

Valve coil specifications - Function Manifold

3 position 4 way DO3 solenoid valve - 20V (schematic items E, F, G, H, J and L)	23 - 24Ω

MANIFOLDS

7-3
Brake Manifold Components

The Brake Manifold is located on the turntable underneath the function manifold cover.

Index No.	Description	Schematic Item	Function	Torque
1	Proportional solenoid valve	U	Brake release circuit	10-12 ft-lbs (14-16 Nm)
2	Normally closed poppet valve	T	Brake release circuit	25-30 ft-lbs (34-41 Nm)
3	Orifice, 0.052 in (1.32 mm)	R	Brake release circuit	
4	Normally open poppet valve	V	Brake release circuit	25-30 ft-lbs (34-41 Nm)
5	Check valve	Q	Brake release circuit	25-30 ft-lbs (34-41 Nm)
6	Pressure switch	S	Brake release circuit	
7	Orifice Plug 0.040 in (1.27 mm)	W	Brake release circuit	

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

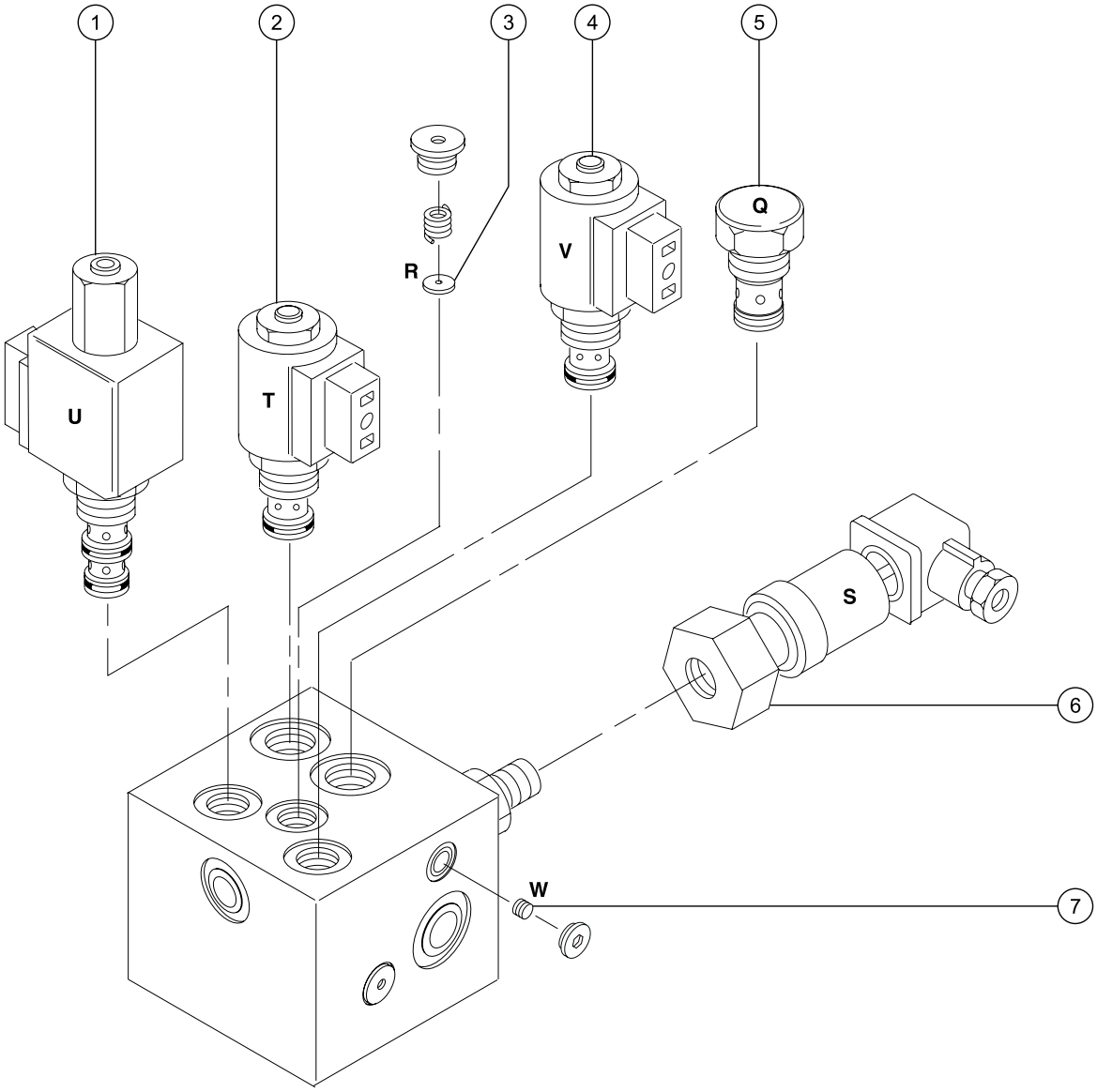
How to Check the Resistance of a Valve Coil

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 the ohmmeter to the valve coil terminals.

Valve coil specifications	
2 position 3 way solenoid valve - 20V Schematic items T and V	23 - 24Ω
Proportional solenoid valve - 24V Schematic item U	19 - 20Ω

MANIFOLDS



MANIFOLDS

7-4
Proportional Manifold Components

The Proportional Manifold is located on the turntable underneath the function manifold cover.

Index No.	Description	Schematic Item	Function	Torque
1	Proportional solenoid valve	P	Boom functions	10-12 ft-lbs (14-16 Nm)
2	Differential sensing Valve	O	Differential sensing circuit	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
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

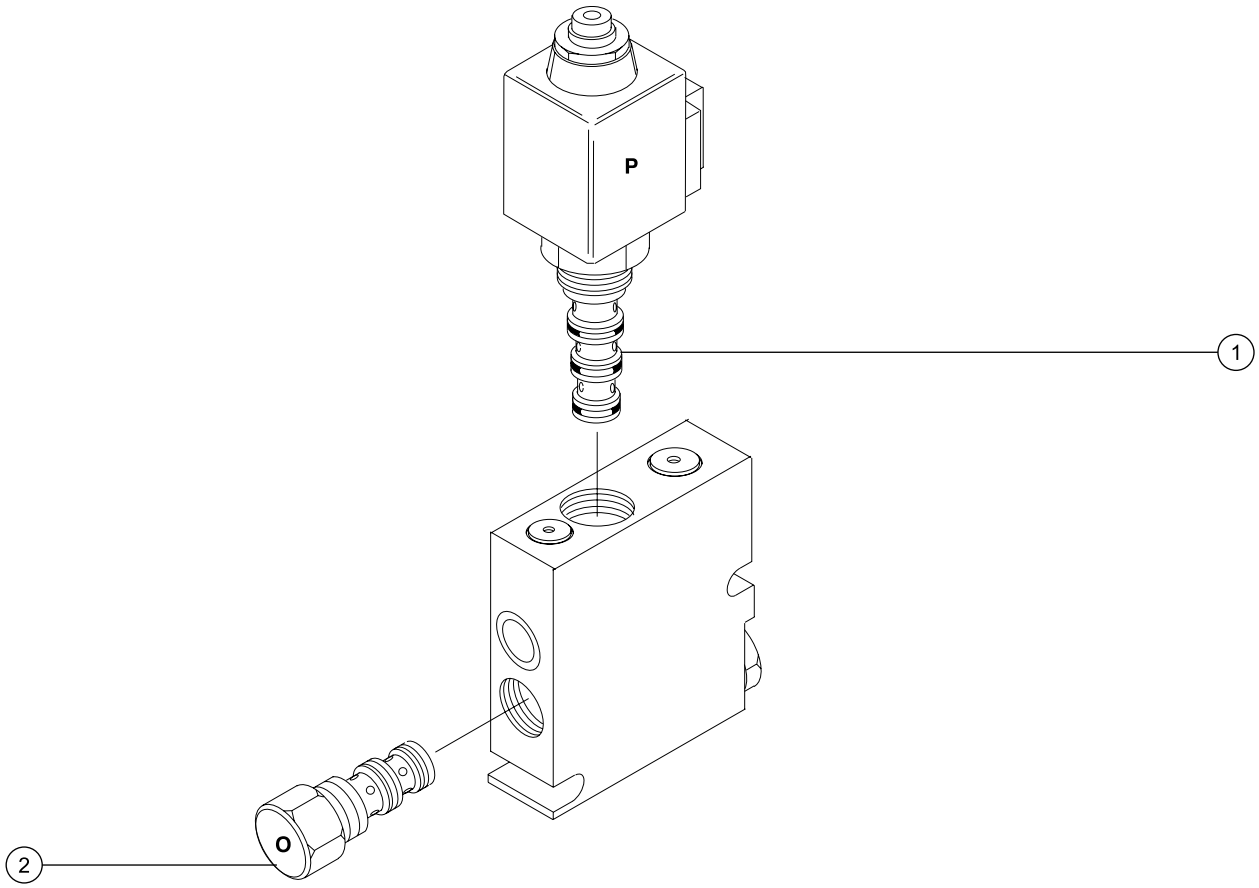
How to Check the Resistance of a Valve Coil

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 the ohmmeter to the valve coil terminals.

Valve coil specifications	
Proportional solenoid valve - 24V (schematic item P)	19 - 20Ω

MANIFOLDS



Turntable Rotation Components

8-1 Rotation Hydraulic Motor

The rotation hydraulic motor is the only serviceable component of the turntable rotation assembly. The worm gear may not be removed from the housing. In order to remove the housing, the turntable has to be removed.

How to Remove the Turntable Rotation Motor

NOTICE Do not allow the turntable to rotate until the hydraulic motor is installed.

1 Tag, disconnect and plug the hydraulic hoses from the turntable rotation motor. Cap the fittings on the motor.

⚠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.

2 Remove the turntable rotation motor mounting bolts, then remove the motor.

8-2 Rotation Bearing and Worm Drive

How to Remove the Rotation Bearing or Worm Drive

The turntable and all components above it must be removed prior to removing the rotation bearing or worm drive.

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

NOTICE Be sure that the drive chassis is level.

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

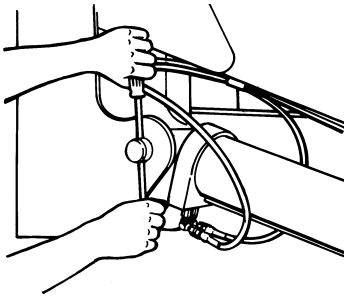
2 Remove the primary boom. See 3-2, *How to Remove the Primary Boom*.

3 Remove the turntable rotation motor. See 8-1, *How to Remove the Turntable Rotation Motor*.

4 Attach a lifting strap from an overhead crane to to the rod end of the primary boom lift cylinder. Then raise the primary lift cylinder with the crane, to a vertical position.

5 Remove the pin retainer from the pivot pin at the barrel end of the primary boom lift cylinder.

6 Place a rod through the barrel-end pivot pin and twist to remove the pin. Remove the primary lift cylinder from the machine.



⚠WARNING Crushing hazard. The primary boom lift cylinder will fall when the barrel-end pivot pin is removed if it is not properly supported.

7 Tag and disconnect the power cables from the hydraulic pump. Pull these down through the turntable.

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

8 Tag, disconnect and plug the hydraulic hoses from the steer cylinder. Pull these hoses up through the turntable. Cap the fittings on the cylinder.

⚠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.

9 Tag, disconnect and plug the hydraulic hose to the brakes. Pull this hose up through the turntable. Cap the fittings on the brakes.

⚠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.

10 Label and then disconnect all the wiring from the contactor panel to the ground controls. Pull the wiring up through the turntable.

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

11 Label and then disconnect all the wiring from the battery charger. Pull the wiring up through the turntable.

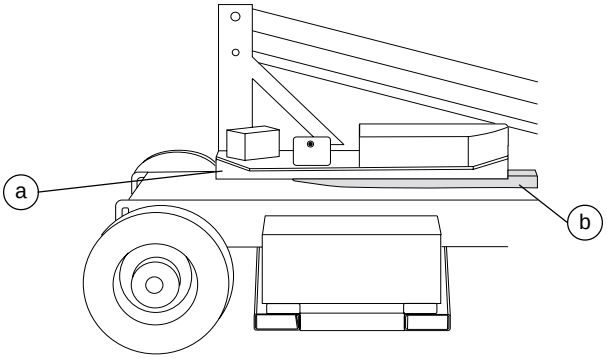
⚠WARNING Electrocution hazard. Contact with electrically charged circuits may cause death or serious injury. Remove all rings, watches and other jewelry.

12 Prepare a forklift with a minimum rating of 10,000 pounds (4536 kg) by spreading the forks to an approximate inside width of 16 inches (40.6 cm).

13 Position the forklift at the counterweight end of the turntable. Center the forks between the turntable main frame tubes and the drive chassis. Do not lift it.

⚠WARNING Crushing hazard. Turntable may be become unbalanced and fall if the forks do not extend past the center point of the turntable. Use fork extensions if necessary.

TURNTABLE ROTATION COMPONENTS



a main frame tube
b fork

14 Raise the forks up against the turntable. Do not lift.

15 Place a safety strap around the mid-pivot, then secure the strap to the forklift carriage.

16 Remove the turntable mounting bolts.

17 Carefully lift the turntable off the drive chassis. Set the turntable on blocks for support.

⚠DANGER Crushing hazard. If the turntable is not properly supported by the forklift, it may become unbalanced and fall during removal.

18 Place reference marks on the drive chassis to note the position of the worm drive housing for proper re-alignment during installation.

19 Remove the fasteners from the worm drive, then remove the worm drive.

20 Remove the mounting fasteners from both battery packs. Use a lifting device to remove the battery packs from the machine.

21 Support the large counterweight under the drive chassis with a forklift at the power unit side of the machine. Lift it slightly to take the weight off of the threaded rod. Support the smaller counterweight with a floor jack from the steer-end of the machine and lift it slightly to take the weight off of the threaded rod.

22 Remove the fasteners from the cover at the non-steer end of the drive chassis. Remove the cover from the machine.

23 Remove the nut from the threaded rod that runs through the center of the counterweights at the steer-end of the machine.

24 Pull the threaded rod through the counterweights and out of the non-steer end of the machine.

⚠WARNING Crushing hazard. The counterweights may become unbalanced and fall if they are not properly supported.

25 Pull the smaller counterweight towards the steer-end of the machine slightly and then lower the counterweight to the ground.

26 Shift the forks of the forklift to the steer-end of the machine enough for the counterweight to clear the forklift pocket tube.

27 Lower the counterweight and then remove the counterweight from the machine.

⚠WARNING Crushing hazard. The counterweight may become unbalanced and fall if it is not properly supported.

⚠DANGER Tip over hazard. Counterweights are critical to machine stability. Failure to replace the counterweights will result in death or serious injury.

How to Install the Rotation Bearing and Worm Drive

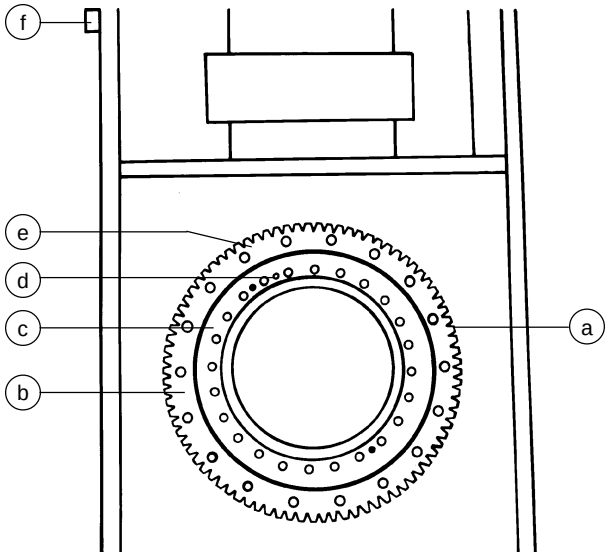
The rotation bearing is a structural component. It attaches the drive chassis to the turntable. The turntable is bolted to the inner race, with the worm gear housing sandwiched in between. This housing has to be correctly positioned to provide the correct gear lash between the worm gear and the ring gear. The outside bearing race is bolted to the drive chassis from the underside.

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

NOTICE If a repair requires that the turntable be removed from the drive chassis, installing a new rotation bearing is recommended. Consider the service life of the rotation bearing before installing a used bearing.

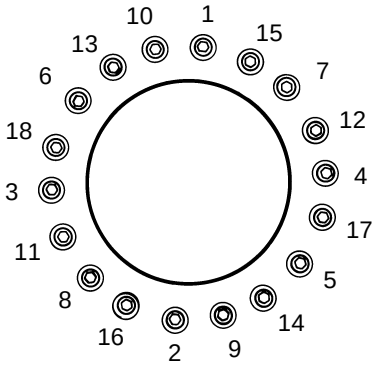
1 Position the rotation bearing on the drive chassis. Use appropriate lifting techniques.

2 Locate the “G” mark stamped on the outside bearing race. Align the mark with the rotation stop block on the chassis.



a yellow mark
b outer bearing
c inner bearing
d dowel
e "G" mark
f rotation stop block

3 Install the mounting fasteners from underneath the chassis. Use a torque wrench to tighten the fasteners in sequence to specifications.



Specifications - torque

First rotation	95 foot pounds 129 Newton meters
Second rotation	190 foot pounds 258 Newton meters

TURNTABLE ROTATION COMPONENTS

4 Locate the painted mark on the outside bearing and the dowel on the inside bearing.

5 Position the inside bearing dowel 90 degrees counterclockwise from the painted mark on the outside bearing.

6 Install a grease fitting on the inside bearing and apply grease until it comes out of the inner seal.

7 Apply grease to 10 gear teeth on each side of the painted mark on the outside bearing.

8 Center the worm drive over the painted mark on the outside bearing and install the two 5/16 inch fasteners. Hand tighten the bolts.

9 Push the worm drive towards the rotation bearing to be as close as possible.

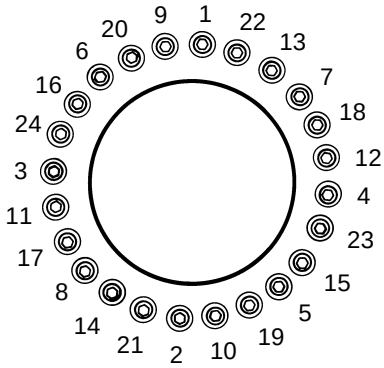
10 Position a dial indicator to measure the worm drive in relation to the ring gear. Pull the worm drive away from the rotate bearing 0.035 inches (0.889 mm) ±0.020 inches (0.508 mm).

11 Tighten the two 5/16 fasteners. Observe the dial indicator to be sure that the worm drive does not move while tightening the fasteners.

12 Locate the 1 inch hex head on the end of the worm gear housing. Turn the hex head to rotate the worm drive until it is positioned within the original reference marks on the drive chassis.

13 Position the turntable so that the flat side of the turntable is parallel with the worm drive gear.

14 Install the turntable mounting fasteners. Use a torque wrench to tighten the fasteners in sequence to specifications.



Specifications - torque

First rotation	95 foot-pounds 129 Newton meters
Second rotation	190 foot-pounds 258 Newton meters

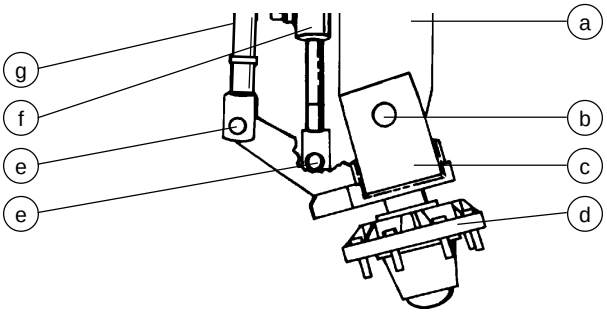
NOTICE After complete assembly, the turntable should rotate smoothly without jerking or grinding.

Steering Axle Components

9-1
Yoke and Hub

How to Remove the Yoke and Hub

1 Remove the cotter pin, and the clevis pin from both the steering cylinder and the tie rod.



a axle
b king pin
c yoke
d hub
e clevis pin and cotter pin
f steering cylinder
g tie rod

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 drive chassis for support.

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

6 Remove the cotter pin from the tie-rod and the steer cylinder.

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

7 Remove the retaining fastener from the king pin.

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

9 Use a soft metal drift to remove the pin.

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

Torque specifications

Lug nuts	125 foot-pounds 169.5 Newton meters

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 drive chassis for support.

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

5 Remove the dust cap, cotter pin and castle 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 grease seal evenly into the hub until it is flush.

4 Apply a small amount of grease onto the yoke spindle.

5 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.

6 Place the outer bearing into the hub.

7 Install the washer and castle nut.

8 Tighten the castle nut to 35 foot-pounds (47 Nm).

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

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

11 Install the dust cap, then the tire and wheel assembly. Torque the wheel lug nuts to 125 foot-pounds (169.5 Nm).

9-2 Steering Cylinder

How to Remove a Steering Cylinder

1 Tag, disconnect and plug the hydraulic hoses from the steering cylinder. 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.

2 Remove the cotter pins from the clevis pins at each end of the steer cylinder. Then remove the clevis pin from each end of the steering cylinder.

3 Remove the steering cylinder.

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

9-3 Tie Rod

How to Remove the Tie Rod

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

2 Remove the tie rod.

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

Non-steering Axle Components

10-1 Drive Motor

How to Remove a Drive Motor

A drive motor can only be removed from the inside of the drive chassis.

1 Disconnect the battery packs from the machine.

2 Remove the drive chassis cover from the non-steer end of the machine.

3 Tag and disconnect the power cables from the drive motor to be removed.

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

4 Remove the drive motor mounting fasteners.

5 Guide the drive motor shaft out of the brake and then remove the drive motor.

10-2 Torque Hub

How to Remove a Drive Torque Hub

1 Chock the steer tires.

2 Remove the drive motor. See 12-1, *How to Remove a Drive Motor*.

3 Disconnect the hydraulic hose from the brake and plug it. Cap the fitting on the brake.

⚠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.

4 Remove the brake mounting fasteners. Then slide the brake out of the torque hub.

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

6 Center a lifting jack under the non-steering axle. Raise the machine and place blocks under the drive chassis for support.

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

8 Place a second lifting jack under the torque hub for support.

9 Remove the fasteners that attach the torque hub to the drive chassis, then remove the torque hub.

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

Torque specifications

Lug nuts	125 ft-lbs 169.5 Nm
Drive torque hub mounting fasteners	210 ft-lbs 285 Nm

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