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Troubleshooting Manual

Model
1250AJP

3128411

April 5, 2007

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SECTION A. INTRODUCTION

A.1 HOW TO USE THIS MANUAL

Troubleshooting system problems can be difficult. System wiring and hydraulic diagrams are provided in this book to help isolate problems.

Follow the flow chart of Figure A-1. Troubleshooting Flowchart on Pg. 3. Only perform calibrations when indicated in procedures or in section 5.1 Calibration Instructions on Pg. 289.

Each troubleshooting step setup is specified in the step instructions and applies only to that step. **Any special wiring, disconnected connectors, programming modes, etc. should be removed, re-connected, restored, etc. after completing the step unless directed otherwise.** Some procedures call for swapping components, connections, etc. All instructions to repair refer to the machine as assembled before the procedure started. Reinstall to proper locations all swapped components, connections before repairing machine.

When a function will not operate with the same speed or power as a machine in good working condition, refer to the topic which most closely describes the problem.

Conclude each session by rerunning the system test, checking for other problems.

If this method does not identify the problem, contact the factory for assistance.

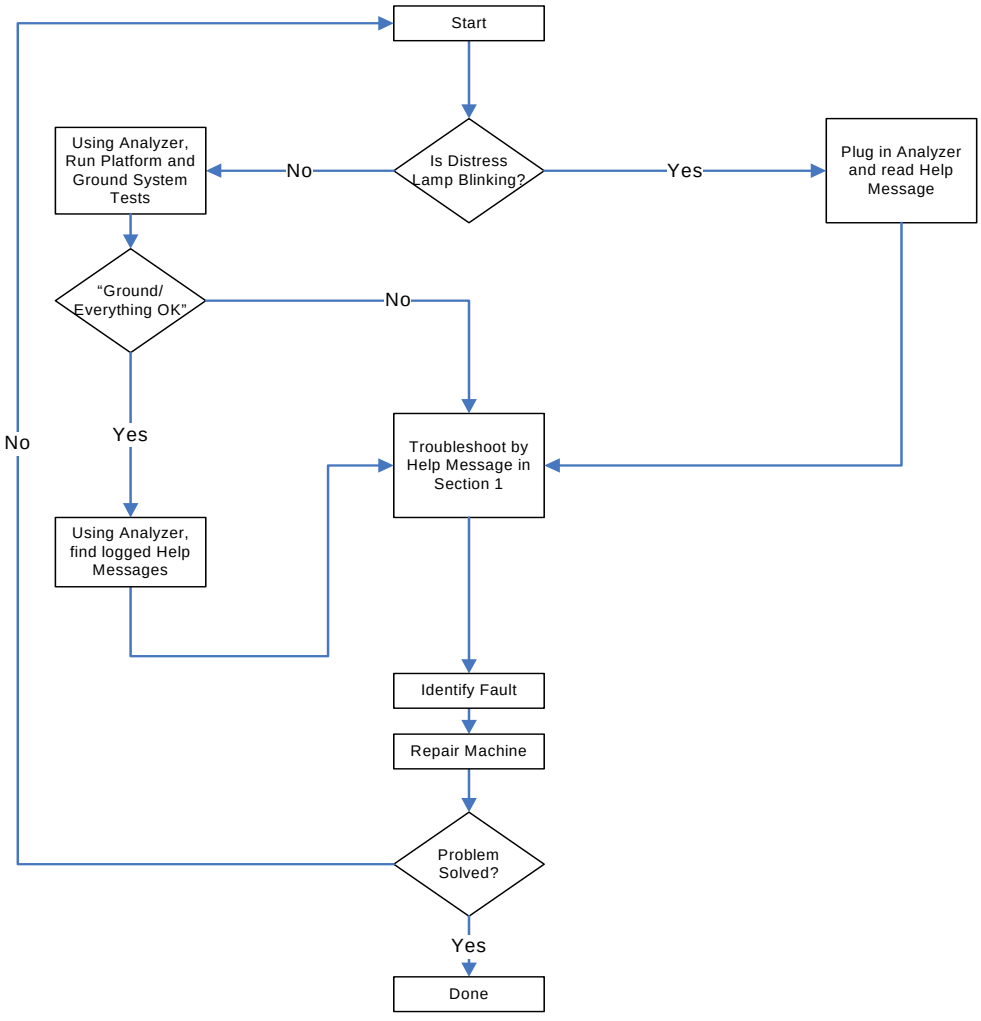


Figure A-1. Troubleshooting Flowchart

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A.2 VISUAL INSPECTION

Perform a thorough visual and “hands on” inspection before starting any troubleshooting procedure. Also, perform a visual inspection at every connector, sensor, hose, harness, etc. opened or accessed during the procedure. You can quickly find the cause of many problems just by looking.

Has the machine been serviced recently? Check that everything has been reconnected properly.

Inspect Hoses for:

- Correct routing
- Pinches and kinks
- Splits, cuts, or breaks.

Inspect Wiring for:

- Contact with sharp edges
- Contact with hot surfaces
- Pinched, burned or chafed insulation
- Proper routing and connections

Check Sensors and Actuators for Damage.

Check Electrical Connectors for:

- Corrosion on pins
- Moisture in the housing or on the contacts
- Bent or damaged pins
- Contacts not properly seated in housing
- Bad wire crimps to terminals

A.3 READING FAULT CODES

Current and logged system fault codes and ADE service flash codes can be read from the analyzer. Refer to 4.2 Using the Analyzer on Pg. 261. Fault logs are separated by POWER CYCLE messages. In Troubleshooting, you may be asked to see all of the currently active faults. This simply means all of the faults since the latest power cycle. Scroll through the chronological faults on the analyzer, listing all the faults until the first “POWER CYCLE” message. Troubleshoot each of these items separately unless instructed otherwise.

ADE service flash codes can also be read from the green LED on the face of the ground module or the system distress lamp in the platform console, see Figure A-2. Ground Module and Platform Fault (System Distress) Lights on Pg. 4. Use the table in A.8 Service Fault Code Cross References on Pg. 9 to find possible faults based on the flashed code.

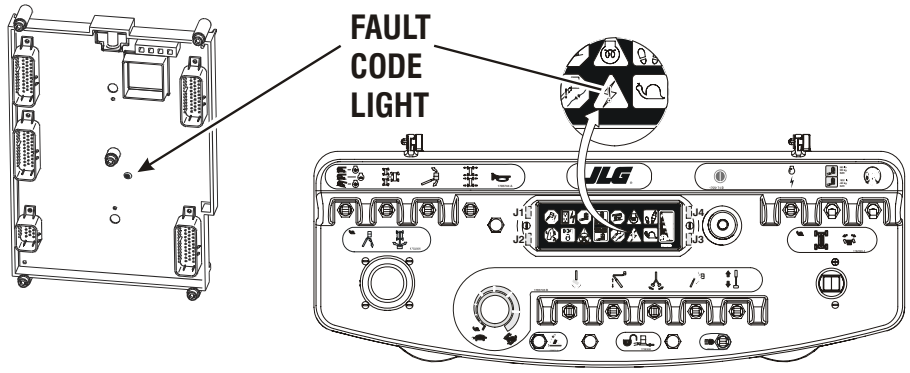


Figure A-2. Ground Module and Platform Fault (System Distress) Lights

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A.4 CONNECTOR REFERENCES

Electrical connectors are given a three digit identifier number preceded with “X”. See 2.1 Connector Index on Pg. 209 for a list.

For Example:
[X006.21] refers to terminal 21 (pin and socket) of connector X006.
[X006.21.soc] refers to the socket side of terminal 21, connector X006.
[X006.21.pin] refers to the pin side of terminal 21, connector X006.

A.5 GROUND REFERENCE

Battery negative [X117] should be used as the ground reference for voltage measurements, unless stated otherwise.

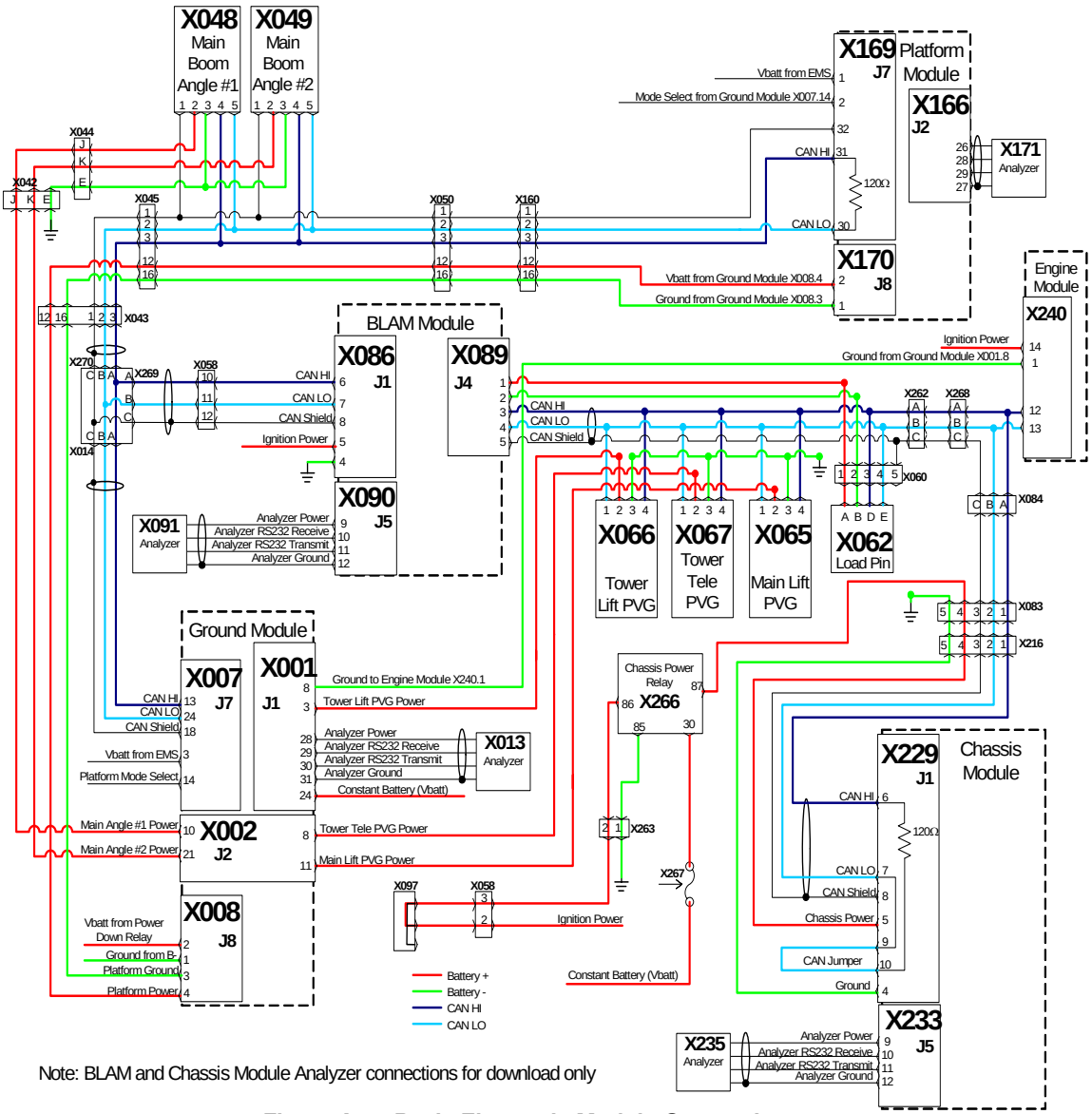
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A.6 CONTROL MODULE POWER

Always make sure that all of the control models are properly powered. See Figure A-3. Basic Electronic Module Connections on Pg. 6

1. For Ground Module operation, Terminals [X001.24], and [X008.2] should have a voltage of Vbatt. Terminal [X008.1] should be grounded.
2. CAN communication wires should have 60Ω resistance between CAN HI and CAN LO whenever both the Platform Module and Chassis Module are connected or 120Ω when one of them are disconnected. Both CAN HI and CAN LO should be isolated (show very high resistance or overload, OL) from the shield and ground. A CAN termination 120Ω resistor is located at both ends of the CAN bus. One is embedded in the platform module. The other terminator is jumpered in the chassis module.



Note: BLAM and Chassis Module Analyzer connections for download only

Figure A-3. Basic Electronic Module Connections

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A.7 CRITICAL SENSORS

Tower Angle Sensors

Tower Boom Angle Sensor #1 (Right) [X099]

Tower Boom Angle Sensor #2 (Left) [X100]

ANALYZER ⇒ ACCESS LEVEL 1 ⇒ DIAGNOSTICS ⇒ BOOM SENSORS ⇒ TOWER ANGLE 1 A/D: XXXXX
ANALYZER ⇒ ACCESS LEVEL 1 ⇒ DIAGNOSTICS ⇒ BOOM SENSORS ⇒ TOWER ANGLE 2 A/D: XXXXX

Digital Inclinometers measure the angle of the tower boom with respect to gravity. The sensors are mounted such that they generate opposite signals with respect to boom movement. Clockwise rotation of the sensor (looking at the cover) will produce a signal of increased angle. The tower angle sensors communicate with the BLAM module using serial communications. There should be 12 volts between X099.1 and X099.3 on the right sensor and 12 volts between X100.1 and X100.3 on the left sensor. In transport position TOWER ANGLE 1 A/D and TOWER ANGLE 2 A/D are typically between -26 and -35.

Tower Cylinder Angle Sensor

Tower Lift Cylinder Pivot Pin Angle Sensor [X092]

5V between [X092.A] and [X092.C]

ANALYZER ⇒ DIAGNOSTICS ⇒ BOOM SENSORS ⇒ TOWER CYLINDER ANGLE: XX.X
In transport position, the sensor value should be at 5.9 degrees or less
ANALYZER ⇒ ACCESS LEVEL 1 ⇒ DIAGNOSTICS ⇒ BOOM SENSORS ⇒ TOWER CYLINDER ANGLE A/D: XXXXX
In transport position, the A/D value should be 4721 - 11385
Fully lifted, the A/D value should be 22871 - 29535

A hall effect analog potentiometer that measures the angle of the tower boom cylinder with respect to the turntable. The sensor's analog output is read by the BLAM module. The sensor is powered by a 5 volt reference and ground from the BLAM module.

Main Angle Sensors

Main Boom Rotary Angle Sensor #1 (Right) [X048]

Main Boom Rotary Angle Sensor #2 (Left) [X049]

Measure the angle of the main boom with respect to the tower boom. Power is supplied by the Ground Module so the sensors can be turned on separately at startup for identification and diagnostic purposes. Once initialized, a constant 12 volts should be supplied by the Ground Module. Main Angle Sensor #1, [X048.2] is powered by [X002.10]. Main Angle Sensor #2, [X049.2] is powered by [X002.21]. These sensors communicate with the system on the CAN bus.

ANALYZER ⇒ ACCESS LEVEL 1 ⇒ DIAGNOSTICS ⇒ BOOM SENSORS ⇒ MAIN LIFT 1 ANGLE A/D: XXXXX
ANALYZER ⇒ ACCESS LEVEL 1 ⇒ DIAGNOSTICS ⇒ BOOM SENSORS ⇒ MAIN LIFT 2 ANGLE A/D: XXXXX
ANALYZER ⇒ ACCESS LEVEL 1 ⇒ DIAGNOSTICS ⇒ BOOM SENSORS ⇒ MAIN LIFT 1 RAW ANGLE A/D: XXXXX
ANALYZER ⇒ ACCESS LEVEL 1 ⇒ DIAGNOSTICS ⇒ BOOM SENSORS ⇒ MAIN LIFT 2 RAW ANGLE A/D: XXXXX

In transport position typical values are:

MAIN LIFT 1 ANGLE A/D: 2800 - 6000
MAIN LIFT 2 ANGLE A/D: 26000 - 30010
MAIN LIFT 1 RAW ANGLE A/D: 15 - 33
MAIN LIFT 2 RAW ANGLE A/D: 145 - 165

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Tower Length Sensors

Tower Boom Length Sensor #1 (Top Right) [X093]
Tower Boom Length Sensor #2 (Bottom Left) [X094]

ANALYZER ⇒ DIAGNOSTICS ⇒ BOOM SENSORS ⇒ TOWER LENGTH 1 SENSOR: X.X"
ANALYZER ⇒ DIAGNOSTICS ⇒ BOOM SENSORS ⇒ TOWER LENGTH 2 SENSOR: X.X"
ANALYZER ⇒ ACCESS LEVEL 1 ⇒ DIAGNOSTICS ⇒ BOOM SENSORS ⇒ TOWER LENGTH 1 A/D: XXXXX
ANALYZER ⇒ ACCESS LEVEL 1 ⇒ DIAGNOSTICS ⇒ BOOM SENSORS ⇒ TOWER LENGTH 2 A/D: XXXXX

Cable potentiometers that measure the total stroke of the tower boom. The sensors' analog outputs are read by the BLAM module. Both increase as the boom length increases. Each sensor is powered by a 5 volt reference and ground from the BLAM module. Each sensor should measure 5k Ω resistance between the A and B pins.

In transport position typical values are:

TOWER LENGTH 1 SENSOR: 305.4"
TOWER LENGTH 2 SENSOR: 305.4"
TOWER LENGTH 1 A/D: 880
TOWER LENGTH 2 A/D: 1180

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A.8 SERVICE FAULT CODE CROSS REFERENCES

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0-0 EVERYTHING OK	1-73
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SECTION B. TROUBLESHOOTING SAFETY PRECAUTIONS

B.1 GENERAL

This section contains the general safety precautions which must be observed during troubleshooting of the aerial platform. It is of utmost importance that maintenance personnel pay strict attention to these warnings and precautions to avoid possible injury to themselves or others, or damage to the equipment. A maintenance program must be followed to ensure that the machine is safe to operate.

⚠ WARNING

MODIFICATION OF THE MACHINE WITHOUT CERTIFICATION BY A RESPONSIBLE AUTHORITY THAT THE MACHINE IS AT LEAST AS SAFE AS ORIGINALLY MANUFACTURED, IS A SAFETY VIOLATION.

The specific precautions to be observed during troubleshooting are inserted at the appropriate point in the manual. These precautions are, for the most part, those that apply when servicing hydraulic and larger machine component parts.

Your safety, and that of others, is the first consideration when engaging in the troubleshooting of equipment. Always be conscious of weight. Never attempt to move heavy parts without the aid of a mechanical device. Do not allow heavy objects to rest in an unstable position. When raising a portion of the equipment, ensure that adequate support is provided.

SINCE THE MACHINE MANUFACTURER HAS NO DIRECT CONTROL OVER troubleshooting, SAFETY IN THIS AREA IS THE RESPONSIBILITY OF THE OWNER/ OPERATOR.

B.2 HYDRAULIC SYSTEM SAFETY

It should be noted that the machines hydraulic systems operate at extremely high potentially dangerous pressures. Every effort should be made to relieve any system pressure prior to disconnecting or removing any portion of the system.

B.3 TROUBLESHOOTING SAFETY

⚠ WARNING

FAILURE TO COMPLY WITH SAFETY PRECAUTIONS LISTED IN THIS SECTION MAY RESULT IN MACHINE DAMAGE, PERSONNEL INJURY OR DEATH AND IS A SAFETY VIOLATION.

- No smoking is mandatory. Never refuel during electrical storms. Ensure that fuel cap is closed and secure at all other times.
- Remove all rings, watches and jewelry when performing any troubleshooting.
- Do not wear long hair unrestrained, or loose-fitting clothing and neckties which are apt to become caught on or entangled in equipment.
- Observe and obey all warnings and cautions on machine and in service and operators manuals.
- Keep oil, grease, water, etc. wiped from standing surfaces and hand holds.
- Use caution when checking a hot, pressurized coolant system.
- Never work under an elevated boom until boom has been safely restrained from any movement by blocking or overhead sling, or boom safety prop has been engaged.
- A machine that is damaged or malfunctioning should immediately be tagged and removed from service.
- Repair any machine damage or malfunction before operating the machine.
- Unless otherwise specified, perform any troubleshooting procedure with the machine parked on a flat level surface, boom stowed, key switch off and key removed, park brake applied.
- Battery should always be disconnected during replacement of electrical components.
- Keep all support equipment and attachments stowed in their proper place.
- Use only approved, nonflammable cleaning solvents.

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REVISION LOG

January 16, 2006	- Original issue of fault guide for use with P7.0 Software.
August 29, 2006	- Incremental release. Updated and added many procedures.
February 12, 2007	- Fault definitions added.
April 5, 2007	- Cover icon added.

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SECTION 1. FAULT DICTIONARY AND SELECTED TROUBLESHOOTING

For a cross-reference list of fault codes, see A.8 Service Fault Code Cross References on Pg. 9

1.1 AIR FILTER BYPASSED

Flash Code: 4-3

Air filter bypassed. This fault should never occur on properly configured machines. Reload ground module software or replace the ground module.

1.2 ALTERNATOR POWER SHORT TO GROUND

Flash Code: 3-3

Alternator power short to ground. The alternator power output [X001.10] is shorted to ground. See 1.378 COMMON STG PROCEDURE on Pg. 175.

1.3 AUX POWER OPEN CIRCUIT

Flash Code: 3-3

Auxiliary power open circuit. There is an open circuit in the auxiliary power output [X001.13]. See 1.377 COMMON STB OR OC PROCEDURE on Pg. 174.

1.4 AUX POWER SHORT TO BATTERY

Flash Code: 3-3

Auxiliary power short to battery. The auxiliary power output [X001.13] is shorted to battery voltage. See 1.377 COMMON STB OR OC PROCEDURE on Pg. 174.

1.5 AUX POWER SHORT TO GROUND

Flash Code: 3-3

Auxiliary power short to ground. The auxiliary power output [X001.13] is shorted to ground. See 1.378 COMMON STG PROCEDURE on Pg. 175.

1.6 AXLE EXT STB OR OC

Flash Code: 8-6

Axle extend short to battery or open circuit. The control system detected a short to battery or open circuit on the axle extension valve output [X230.11] controlling the front axle extend solenoid [X206] and rear axle extend solenoid [X224]. See 1.377 COMMON STB OR OC PROCEDURE on Pg. 174.

1.7 AXLE EXT STG

Flash Code: 8-6

Axle extend short to ground. The control system detected a short to ground on the axle extension valves output [X230.11] controlling the front axle extend solenoid [X206] and rear axle extend solenoid [X224]. See 1.378 COMMON STG PROCEDURE on Pg. 175.

1.8 AXLE RET STB OR OC

Flash Code: 8-6

Axle retract short to battery or open circuit. The control system detected a short to battery or open circuit on the axle retract valves output [X230.12] controlling the front axles retract solenoid [X209] and the rear axles retract solenoid [X221]. See 1.377 COMMON STB OR OC PROCEDURE on Pg. 174.

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1.9 AXLE RET STG

Flash Code: 8-6

Axle retract short to ground. The control system detected a short to ground on the axle retract valves output [X230.12] controlling the front axle extend solenoid [X206] and rear axle extend solenoid [X224]. See 1.378 COMMON STG PROCEDURE on Pg. 175.

1.10 BACKUP BLAM COMMUNICATIONS ACTIVE

Flash Code: 2-5

Backup BLAM communications active. Notification that the serial backup communications link to the BLAM module is active. Look for 6-6 CAN fault codes in the fault log and troubleshoot those faults.

1.11 BASKET DOWN OVERRIDE OPEN CIRCUIT

Flash Code: 3-3

Basket down override open circuit. The ground module J2 platform level down override output [X002.7] is open. If the open is in or near the platform down solenoid [X137], the fault 1.14 BASKET DOWN SHORT TO BATTERY OR OPEN CIRCUIT on Pg. 36 should also be active. See 1.377 COMMON STB OR OC PROCEDURE on Pg. 174.

1.12 BASKET DOWN OVERRIDE SHORT TO BATTERY

Flash Code: 3-3

Basket down override short to battery. The ground module J2 platform level down override output [X002.7] is shorted to battery. If there are no open wires, the fault 1.14 BASKET DOWN SHORT TO BATTERY OR OPEN CIRCUIT on Pg. 36 should also be active. See 1.377 COMMON STB OR OC PROCEDURE on Pg. 174.

1.13 BASKET DOWN OVERRIDE SHORT TO GROUND

Flash Code: 3-3

Basket down override short to ground. The ground module J2 platform level down override output [X002.7] is shorted to ground. If there are no open wires, the fault 1.15 BASKET DOWN SHORT TO GROUND on Pg. 36 should also be active. See 1.378 COMMON STG PROCEDURE on Pg. 175.

1.14 BASKET DOWN SHORT TO BATTERY OR OPEN CIRCUIT

Flash Code: 3-4

Basket down short to battery or open circuit. The platform module J7 platform level down output [X169.16] is shorted to battery or open. If there are no open wires, the fault 1.12 BASKET DOWN OVERRIDE SHORT TO BATTERY on Pg. 36 should also be active. See 1.377 COMMON STB OR OC PROCEDURE on Pg. 174.

1.15 BASKET DOWN SHORT TO GROUND

Flash Code: 3-4

Basket down short to ground. The platform module J7 platform level down output [X169.16] is shorted to ground. If there are no open wires, the fault 1.13 BASKET DOWN OVERRIDE SHORT TO GROUND on Pg. 36 should also be active. See 1.378 COMMON STG PROCEDURE on Pg. 175.

1.16 BASKET LEFT OPEN CIRCUIT

Flash Code: 3-4

Basket left open circuit. The platform module J7 platform rotate left output [X169.5] is open. See 1.377 COMMON STB OR OC PROCEDURE on Pg. 174.

1.17 BASKET LEFT SHORT TO BATTERY

Flash Code: 3-4

Basket left short to battery. The platform module J7 platform rotate left output [X169.5] is shorted to battery. See 1.377 COMMON STB OR OC PROCEDURE on Pg. 174.

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1.18 BASKET LEFT SHORT TO GROUND

Flash Code: 3-4

Basket left short to ground. The platform module J7 platform rotate left output [X169.5] is shorted to ground. See 1.378 COMMON STG PROCEDURE on Pg. 175.

1.19 BASKET LEVELING CRACKPOINT DOWN NOT CALIBRATED

Flash Code: 8-3

Basket leveling crackpoint down not calibrated. The control system detected there was no stored calibration data for the platform leveling down valve current crackpoint. This could be due to installing a new ground module that has not yet been calibrated or prematurely escaping from a level down calibration. A default crackpoint will be assumed, but automatic platform leveling will be disabled. Platform leveling can still be performed manually, but the BASKET LEVELING SYSTEM TIME-OUT fault will still be enabled. Complete a level down crackpoint calibration, see 5.6 Calibrating Platform Level on Pg. 302

Note	Pretest Instructions	Test	Result	Corrective Action
1.19.1	Run a system test	Are there any basket leveling sensor faults?	Yes	Troubleshoot those faults first.
			No	Go to step 1.19.2
1.19.2		Complete a level down crackpoint calibration, see 5.6 Calibrating Platform Level on Pg. 302. Did it complete successfully?	Yes	Troubleshooting complete
			No	Go to step 1.19.3
1.19.3	Install a high pressure gauge on port M2 of the platform valve. Start engine.	Activate level down to end of stroke. Does gauge read or adjust to about 2000 psi?	Yes	Go to step 1.19.4
			No	Keep machine in same condition. Go to step 1.19.5 .
1.19.4	Remove hose from platform valve port L1. - Cap port L1. Install a high pressure gauge on end of hose.	Start engine. Activate level down. Does pressure on gauge read about 2000 psi?	Yes	Repair/replace level circuit check valve
			No	Repair/replace level cylinder holding valve.
1.19.5	Install a high pressure gauge on port MP of the platform valve. Start engine.	Activate level down to end of stroke. Does gauge read about 3400psi?	Yes	Go to step 1.19.8
			No	Go to step 1.19.6
1.19.6	Install a high pressure gauge on port mp1 of the main valve. Start engine.	Activate level down to end of stroke. Does gauge read about 3400psi?	Yes	Unclog/repair/replace pressure filter at the platform and/or hose from main valve port P3 to platform valve port P.
			No	Keep machine in same condition. Go to step 1.19.7.
1.19.7	Install a high pressure gauge on port MP1 of the main valve. start engine.	Activate level down to end of stroke. Adjust high pressure relief to 3400psi. See Figure 3-2. Pumps Layout on Pg. 248 for location. Can it be adjusted to proper pressure?	Yes	Inspect/repair/replace hydraulics between main valve and platform valve, including filter at platform valve.
			No	Repair/replace function pump and/or high pressure relief
1.19.8	Start engine.	Do the other platform functions operate?	Yes	Go to step 1.19.10
			No	Go to step 1.19.9
1.19.9	Turn off machine. Disconnect platform dump solenoid [X135].	Does the platform dump solenoid [X135] measure about 6.4 Ω?	Yes	Clean/repair/replace platform dump valve [X135] cartridge.
			No	Replace platform dump solenoid [X135]
1.19.10		In the platform valve, swap cartridge common to level up solenoid [X136] and level down solenoid [X135] with the cartridge common to rotate right [X138] and rotate left [X139]. Does the crackpoint calibrate?	Yes	Repair/replace cartridge that was originally installed common to level up solenoid [X136] and level down solenoid [X135]
			No	Go to step 1.19.11

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Note	Pretest Instructions	Test	Result	Corrective Action
1.19.11	Cap platform valve port L2 and its hose. Install a high pressure gauge in port M2. Start engine.	Operate level down to end of stroke. Adjust pressure of the platform level down relief for 2000psi. See Figure 3-3. Platform Valve Layout on Pg. 249 for location. Does gauge read the proper pressure?	Yes	Repair/replace platform level cylinder
			No	Repair/replace platform level down relief

1.20 BASKET LEVELING CRACKPOINT UP NOT CALIBRATED

Flash Code: 8-3

Basket leveling crackpoint up not calibrated. The control system detected there was no stored calibration data for the platform leveling up valve current crackpoint. This could be due to installing a new ground module that has not yet been calibrated or prematurely escaping from a level down calibration. A default crackpoint will be assumed, but automatic platform leveling will be disabled. Platform leveling can still be performed manually, but the BASKET LEVELING SYSTEM TIMEOUT fault will still be enabled. Complete a level up crackpoint calibration, see 5.6 Calibrating Platform Level on Pg. 302

Note	Pretest Instructions	Test	Result	Corrective Action
1.20.1	Run a system test	Are there any basket leveling sensor faults?	Yes	Troubleshoot those faults first.
			No	Go to step 1.20.2
1.20.2		Complete a level up crackpoint calibration, see 5.6 Calibrating Platform Level on Pg. 302. Did it complete successfully?	Yes	Troubleshooting complete
			No	Go to step 1.20.3
1.20.3	Install a high pressure gauge on port M1 of the platform valve. Start engine.	Activate level up to end of stroke. Does gauge read or adjust to about 3000 psi?	Yes	Go to step 1.20.4
			No	Keep machine in same condition. Go to step 1.20.5.
1.20.4	Remove hose from platform valve port L2. - Cap port L2. Install a high pressure gauge on end of hose.	Start engine. Activate level down. Does pressure on gauge read about 3000 psi?	Yes	Repair/replace level circuit check valve
			No	Repair/replace level cylinder holding valve.
1.20.5	Install a high pressure gauge on port MP of the platform valve. Start engine.	Activate level down to end of stroke. Does gauge read about 3400psi?	Yes	Go to step 1.20.8
			No	Go to step 1.20.6
1.20.6	Install a high pressure gauge on port MP1 of the main valve. Start engine.	Activate level down to end of stroke. Does gauge read about 3400psi?	Yes	Unclog/repair/replace pressure filter at the platform and/or hose from main valve port P3 to platform valve port P.
			No	Keep machine in same condition. Go to step 1.20.7.
1.20.7	Install a high pressure gauge on port MP1 of the main valve. Start engine.	Activate level down to end of stroke. Adjust high pressure relief to 3400psi. See Figure 3-2. Pumps Layout on Pg. 248 for location. Can it be adjusted to proper pressure?	Yes	Inspect/repair/replace hydraulics between main valve and platform valve, including filter at platform valve.
			No	Repair/replace function pump and/or high pressure relief
1.20.8	Start engine.	Do the other platform functions operate?	Yes	Go to step 1.20.10
			No	Go to step 1.20.9
1.20.9	Turn off machine. Disconnect platform dump solenoid [X135].	Does the platform dump solenoid [X135] measure about 6.4 Ω?	Yes	Clean/repair/replace platform dump valve [X135] cartridge.
			No	Replace platform dump solenoid [X135]

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Note	Pretest Instructions	Test	Result	Corrective Action
1.20.10		In the platform valve, swap cartridge common to level up solenoid [X136] and level down solenoid [X135] with the cartridge common to rotate right [X138] and rotate left [X139]. Does the crackpoint calibrate?	Yes	Repair/replace cartridge that was originally installed common to level up solenoid [X136] and level down solenoid [X135]
			No	Go to step 1.20.11
1.20.11	Cap platform valve port L2 and its hose. Install a high pressure gauge in port M2. Start engine.	Operate level up to end of stroke. Adjust pressure of the platform level down relief for 3000psi. See Figure 3-3. Platform Valve Layout on Pg. 249 for location. Does gauge read the proper pressure?	Yes	Repair/replace platform level cylinder
			No	Repair/replace platform level up relief

1.21 BASKET LEVELING OVERRIDE OFF

Flash Code: 8-3

Basket leveling override off. This fault only applies to service access levels. Notification that the user has forced basket leveling off.

1.22 BASKET LEVELING OVERRIDE ON

Flash Code: 8-3

Basket leveling override on. This fault only applies to service access levels. Notification that the user has forced basket leveling on.

1.23 BASKET LEVELING SENSOR 1 SHORT TO BATTERY

Flash Code: 8-3

Basket leveling sensor 1 short to battery. The platform module J1 right platform level sensor communication terminal [X016.25] is shorted to battery. See 1.377 COMMON STB OR OC PROCEDURE on Pg. 174.

1.24 BASKET LEVELING SENSOR 1 SHORT TO GROUND OR OPEN CIRCUIT

Flash Code: 8-3

Basket leveling sensor 1 short to ground or open circuit. The platform module J1 right platform level sensor communication terminal [X016.25] is shorted to ground or open. See 1.378 COMMON STG PROCEDURE on Pg. 175.

1.25 BASKET LEVELING SENSOR 2 SHORT TO BATTERY

Flash Code: 8-3

Basket leveling sensor 2 short to battery. The platform module J1 left platform level sensor communication terminal [X016.26] is shorted to battery. See 1.377 COMMON STB OR OC PROCEDURE on Pg. 174.

1.26 BASKET LEVELING SENSOR 2 SHORT TO GROUND OR OPEN CIRCUIT

Flash Code: 8-3

Basket leveling sensor 2 short to ground or open circuit. The platform module J1 left platform level sensor communication terminal [X016.26] is shorted to ground or open. See 1.378 COMMON STG PROCEDURE on Pg. 175.

1.27 BASKET LEVELING SYSTEM TIMEOUT

Flash Code: 8-3

Basket leveling system timeout. The control system detected the platform tilt angle was not within 5.0° of the setpoint for at least 2 seconds while out of transport or for at least 15 seconds while in the transport position. These values are program-

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able. This fault can happen when driving too fast over abrupt terrain changes because the basket leveling system cannot respond fast enough. Platform operations will be disabled.

Note	Pretest Instructions	Test	Result	Corrective Action
1.27.1	Examine active faults	Are there any other basket leveling faults?	Yes	Troubleshoot those first
			No	Go to step 1.27.2
1.27.2		Does the fault only occur when driving over changing terrain?	Yes	Drive slower. If fault still occurs, go to step 1.27.3
			No	Go to step 1.27.3
1.27.3		Are the mounting blocks for both sensors properly assembled? -AND- Is the hardware tight?	Yes	Go to step 1.27.4
			No	Repair as needed
1.27.4	Disconnect platform level sensor #1 (Right) connector [X150]	Is the fault BASKET LEVELING TILT SENSOR 1 COMMUNICATIONS LOST now an active fault?	Yes	Go to step 1.27.5
			No	Connections are swapped. Make proper harness connections to sensors.
1.27.5		Does the platform move slowly or not at all when commanded?	Yes	Perform platform leveling calibration. See 5.6 Calibrating Platform Level on Pg. 302. If this does not fix problem go to step 1.27.6
			No	Go to step 1.27.6
1.27.6		Do the other platform functions operate?	Yes	Go to step 1.27.10
			No	Go to step 1.27.7
1.27.7	Install a high pressure gauge on port MP of the platform valve. Start engine.	Activate level down to end of stroke. Does gauge read about 3400psi?	Yes	Go to step 1.27.9
			No	Go to step 1.27.8
1.27.8	Install a high pressure gauge on port MP1 of the main valve. Start engine.	Activate level down to end of stroke. Adjust high pressure relief to 3400psi. See Figure 3-2. Pumps Layout on Pg. 248 for location. Can it be adjusted to proper pressure?	Yes	Inspect/repair/replace hydraulics between main valve and platform valve, including filter at platform valve.
			No	Repair/replace function pump and/or high pressure relief
1.27.9	Turn off machine. Disconnect platform dump solenoid [X135].	Does the platform dump solenoid [X135] measure about 6.4 Ω?	Yes	Clean/repair/replace platform dump valve [X135] cartridge.
			No	Replace platform dump solenoid [X135]
1.27.10	Turn off machine. Disconnect platform level UP [X136] and level DOWN [X137].	Do both solenoids measure 10.1Ω?	Yes	Go to step 1.27.11
			No	Replace platform level valve coil [X136] [X137]
1.27.11	Take cartridge from platform level valve [X136] [X137] and swap it with the one in the jib swing valve [X142] [X143]	Does problem clear or move?	Yes	Replace cartridge originally in the platform level valve [X136] [X137].
			No	Go to step 1.27.12
1.27.12	Install a high pressure gauge on ports M1 and M2 of the platform valve. Start engine.	Activate level down to end of stroke. Does pressure measure or adjust to about 2000 psi? Also, activate level up to end of stroke. Does pressure measure or adjust to about 2500 psi?	Yes	Repair/replace 75psi check valve and/or level cylinder assembly
			No	Repair/replace relief valve that does not produce proper pressure.

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1.28 BASKET LEVELING TILT REFERENCE 1 OUT OF RANGE

Flash Code: 8-3

Basket leveling tilt reference 1 out of range. Platform J7, terminal 11 [X169.11] is reading outside of the expected range of 4.9V to 5.1V. This terminal is not used and should not be connected. Check the wiring. An EMS cycle is required. This fault is present only in software before version P7.0.

Note	Pretest Instructions	Test	Result	Corrective Action
1.28.1	Cycle power	Is fault still present?	Yes	Go to step 1.28.2
			No	Troubleshooting complete
1.28.2		Inspect harness and at platform module J7. Is there a wire or short to terminal 11 [X169.11]?	Yes	Repair/replace harness
			No	Reprogram/replace platform module

1.29 BASKET LEVELING TILT REFERENCE 2 OUT OF RANGE

Flash Code: 8-3

Basket leveling tilt reference 2 out of range. Platform J7, terminal 12 [X169.12] is reading outside of the expected range of 4.9V to 5.1V. This terminal is not used and should not be connected. Check the wiring. An EMS cycle is required. This fault is present only in software before version P7.0.

Note	Pretest Instructions	Test	Result	Corrective Action
1.29.1	Cycle power	Is fault still present?	Yes	Go to step 1.29.2
			No	Troubleshooting complete
1.29.2		Inspect harness and at platform module J7. Is there a wire or short to terminal 12 [X169.12]?	Yes	Repair/replace harness
			No	Reprogram/replace platform module

1.30 BASKET LEVELING TILT SENSOR 1 COMMUNICATIONS LOST

Flash Code: 8-3

Basket leveling tilt sensor 1 communications lost. The control system lost serial communications with platform tilt angle sensor #1 (right). A power cycle is required.

Note	Pretest Instructions	Test	Result	Corrective Action
1.30.1		Is harness from platform level sensor 1 [X150] plugged into the platform level passthru 1 [X162]? Also, are those connections in good condition?	Yes	Go to step 1.30.2
			No	Correct wiring
1.30.2	Check the faults.	Is the fault BASKET LEVELING TILT SENSOR 2 COMMUNICATIONS LOST active?	Yes	Go to step 1.30.9
			No	Go to step 1.30.3
1.30.3	Plug platform level sensor 2 (left) [X148] into connector for platform level sensor 1 (right) [X150]	Does the BASKET LEVELING TILT SENSOR 1 COMMUNICATIONS LOST fault clear?	Yes	Replace original platform level sensor 1 (RIGHT) [X150]
			No	Go to step 1.30.4
1.30.4	Disconnect platform level sensor 1 [X150]. Turn on machine.	Measure voltage between platform level sensor 1 pin1 [X150.1.pin] and pin 3 [X150.3.pin]. Does it measure about 12VDC?	Yes	Go to step 1.30.5
			No	Go to step 1.30.7
1.30.5	Disconnect platform level sensor 1 [X150] and platform module J1	Is there continuity between platform level sensor 1 pin 2 [X150.2.pin] and platform module J1 socket 25 [X165.25.soc]?	Yes	Replace platform level sensor 1 [X150]
			No	Go to step 1.30.6

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Note	Pretest Instructions	Test	Result	Corrective Action
1.30.6	Disconnect platform level passthru 1 [X162] and platform module J1 [X165]	Is there continuity between platform level passthru 1 pin 2 [X162.2.pin] and platform module J1 socket 25 [X165.25.soc]?	Yes	Repair/replace harness between platform level passthru 1 [X162] and platform level sensor 1 [X150]
			No	Repair/replace harness between platform level passthru 1 [X162] and platform module J1 [X165]
1.30.7	Disconnect platform module J2 [X166]. Ground meter. See Grounding on Pg. 319 for details.	Turn on machine. Measure voltage between platform module J2 pin 32 [X166.32] and ground. Does it measure about 12VDC?	Yes	Go to step 1.30.8
			No	Replace platform module
1.30.8	Disconnect platform level passthru 1 [X162]. Turn on machine.	Measure voltage between platform level passthru 1 pin 1 [X162.1.pin] and pin 3 [X162.3.pin]. Does it measure about 12VDC?	Yes	Repair/replace harness between platform level passthru 1 [X162] and platform level sensor 1 [X150]
			No	Repair/replace harness between platform level passthru 1 [X162] and platform module J7 [X169] and/or J1 [X165]
1.30.9	Take the following measurement by backprobing. See Backprobing on Pg. 319 for details.	Is there about 12 VDC between platform module J2 terminal 32 [X166.32] and platform module J7 terminal 21 [X169.21]?	Yes	Go to step 1.30.10
			No	Replace platform module
1.30.10	Turn on machine.	Measure voltage between platform level sensor 1 pin 1 [X150.1.pin] and pin 3 [X150.3.pin]. Also, between platform level sensor 2 pin 1 [X148.1.pin] and pin 3 [X148.3.pin]. Do they measure about 12 VDC?	Yes	Go to step 1.30.12
			No	Go to step 1.30.11
1.30.11	Turn on machine. Disconnect platform level passthru 1 [X162] and platform level passthru 2 [X163]	Measure voltage between platform level passthru pin 1 [X162.1.pin] and pin 3 [X162.3.pin]. Also, measure voltage between platform level passthru 2 pin 1 [X163.1.pin] and pin 3 [X163.3.pin]. Do they measure about 12 VDC?	Yes	Repair/replace harness between the platform level sensor and platform level passthru connector that did not have the proper voltage.
			No	Repair/Replace harness between the platform level passthru connector +1 [X162] and 2 [X163] and the platform module connector J1 [X165] that did not have the proper voltage.
1.30.12	Disconnect platform level passthru 1 [X162] and platform level passthru 2 [X163]. Ground meter.	Is there continuity between platform level passthru 1 pin 3 [X162.3.pin] and ground? Also, is there continuity between platform level passthru 2 pin 3 [X163.3.pin] and ground?	Yes	Go to step 1.30.13
			No	Repair/replace harness between platform module J7 [X169] and the connectors platform level passthru 1 [X162] and platform level passthru 2 [X163].
1.30.13	Disconnect platform level sensor 1 [X150] and platform level sensor 2 [X148]. Ground meter.	Is there continuity between platform level sensor 1 pin 3 [X150.3.pin] and ground. Also, is there continuity between platform level sensor 2 pin 3 [X148.3.pin] and ground.	Yes	Replace both platform level sensors
			No	Repair/replace harness(es) that did not have continuity.

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1.31 BASKET LEVELING TILT SENSOR 2 COMMUNICATIONS LOST

Flash Code: 8-3

Basket leveling tilt sensor 2 communications lost. The control system lost serial communications with platform tilt angle sensor #2 (Left).

Note	Pretest Instructions	Test	Result	Corrective Action
1.31.1		Is harness from platform level sensor 2 [X148] plugged into the platform level passthru 2 [X163]? Also, are those connections in good condition?	Yes	Go to step 1.31.2
			No	Correct wiring
1.31.2	Check the faults.	Is the fault BASKET LEVELING TILT SENSOR 1 COMMUNICATIONS LOST active?	Yes	Go to step 1.31.9
			No	Go to step 1.31.3
1.31.3	Plug platform level sensor 1 (right) [X150] into connector for platform level sensor 2 (left) [X148]	Does the BASKET LEVELING TILT SENSOR 2 COMMUNICATIONS LOST fault clear?	Yes	Replace original platform level sensor 2 (left) [X148]
			No	Go to step 1.31.4
1.31.4	Disconnect platform level sensor 2 (left) [X148]. Turn on machine.	Measure voltage between platform level sensor 2 pin1 [X148.1.pin] and pin 3 [X148.3.pin]. Does it measure about 12VDC?	Yes	Go to step 1.31.5
			No	Go to step 1.31.7
1.31.5	Disconnect platform level sensor 2 (left) [X148] and platform module J1	Is there continuity between platform level sensor 1 pin 2 [X148.2.pin] and platform module J1 socket 26 [X165.26.soc]?	Yes	Replace platform level sensor 2 (left) [X148]
			No	Go to step 1.31.6
1.31.6	Disconnect platform level passthru 2 [X163] and platform module J1 [X165]	Is there continuity between platform level passthru 2 pin 5 [X163.5.pin] and platform module J1 socket 26 [X165.26.soc]?	Yes	Repair/replace harness between platform level passthru 2 [X163] and platform level sensor 2 (LEFT) [X148]
			No	Repair/replace harness between platform level passthru 2 [X163] and platform module J1 [X165]
1.31.7	Disconnect platform module J2 [X166]. Ground meter. See Grounding on Pg. 319 for details.	Turn on machine. Measure voltage between platform module J2 pin 32 [X166.32] and ground. Does it measure about 12VDC?	Yes	Go to step 1.31.8
			No	Replace platform module
1.31.8	Disconnect platform level passthru 1 [X162]. Turn on machine.	Measure voltage between platform level passthru 1 pin 1 [X162.1.pin] and pin 3 [X162.3.pin]. Does it measure about 12VDC?	Yes	Repair/replace harness between platform level passthru 1 [X162] and platform level sensor 1 [X150]
			No	Repair/replace harness between platform level passthru 1 [X162] and platform module J7 [X169] and/or J1 [X165]
1.31.9	Take the following measurement by backprobing. See Backprobing on Pg. 319 for details.	Is there about 12 VDC between platform module J2 terminal 32 [X166.32] and platform module J7 terminal 21 [X169.21]?	Yes	Go to step 1.31.10
			No	Replace platform module
1.31.10	Turn on machine.	Measure voltage between platform level sensor 1 pin 1 [X150.1.pin] and pin 3 [X150.3.pin]. -AND- measure voltage between platform level sensor 2 pin 1 [X148.1.pin] and pin 3 [X148.3.pin]. Do they measure about 12 VDC?	Yes	Go to step 1.31.12
			No	Go to step 1.31.11

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Note	Pretest Instructions	Test	Result	Corrective Action
1.31.11	Turn on machine. Disconnect platform level passthru 1 [X162] and platform level passthru 2 [X163]	Measure voltage between platform level passthru pin 1 [X162.1.pin] and pin 3 [X162.3.pin]. -AND- measure voltage between platform level passthru 2 pin 1 [X163.1.pin] and pin 3 [X163.3.pin]. Do they measure about 12 VDC?	Yes	Repair/Replace harness between the platform level sensor and platform level passthru connector that did not have the proper voltage.
			No	Repair/Replace harness between the platform level passthru connector 1 [X162] and 2 [X163] and the platform module connector J1 [X165] that did not have the proper voltage.
1.31.12	Disconnect platform level passthru 1 [X162] and platform level passthru 2 [X163]. Ground meter.	Is there continuity between platform level passthru 1 pin 3 [X162.3.pin] and ground? -AND- Is there continuity between platform level passthru 2 pin 3 [X163.3.pin] and ground?	Yes	Go to step 1.31.13
			No	Repair/replace harness between platform module J7 [X169] and the connectors platform level passthru 1 [X162] and platform level passthru 2 [X163].
1.31.13	Disconnect platform level sensor 1 [X150] and platform level sensor 2 [X148]. Ground meter.	Is there continuity between platform level sensor 1 pin 3 [X150.3.pin] and ground. -AND- Is there continuity between platform level sensor 2 pin 3 [X148.3.pin] and ground.	Yes	Replace both platform level sensors
			No	Repair/replace harness(es) that did not have continuity.

1.32 BASKET LEVELING TILT SENSOR DIFFERENCE TOO GREAT

Flash Code: 8-3

Basket leveling tilt sensor difference too great. The basket leveling tilt readings from platform tilt sensor #1 and #2 both appear to be good, but their measurements are not within 5.0° of each other. This value is programmable. A power cycle is required.

Note	Pretest Instructions	Test	Result	Corrective Action
1.32.1		Are there any other basket leveling faults?	Yes	Troubleshoot them first
			No	Go to step 1.32.2
1.32.2		Are both sensors mounted properly and securely?	Yes	Go to step 1.32.3
			No	Repair as needed
1.32.3	Disconnect platform level sensor #1 (Right) [X150]	Turn on machine. Does the BASKET LEVELING TILT SENSOR 1 COMMUNICATIONS LOST fault appear?	Yes	Go to step 1.32.4
			No	Wires to wrong sensor. Swap harness connections and ensure they attach to the correct sensor.
1.32.4	Perform 5.6 Calibrating Platform Level on Pg. 302. (There is also helpful information in section 5.5 Electronic Platform Leveling on Pg. 299.)	Does it calibrate successfully? -AND- Does fault clear?	Yes	Troubleshooting complete
			No	Replace both platform level sensors, #1 [X148] and #2 [X150]

1.33 BASKET RIGHT OPEN CIRCUIT

Flash Code: 3-4

Basket right open circuit. The platform module J7 platform rotate right output [X169.6] is open. See 1.377 COMMON STB OR OC PROCEDURE on Pg. 174.

1.34 BASKET RIGHT SHORT TO BATTERY

Flash Code: 3-4

Basket right short to battery. The platform module J7 platform rotate right output [X169.6] is shorted to battery. See 1.377 COMMON STB OR OC PROCEDURE on Pg. 174.

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1.35 BASKET RIGHT SHORT TO GROUND

Flash Code: 3-4

Basket right short to ground. The platform module J7 platform rotate right output [X169.6] is shorted to ground. See 1.378 COMMON STG PROCEDURE on Pg. 175.

1.36 BASKET UP OVERRIDE OPEN CIRCUIT

Flash Code: 3-3

Basket up override open circuit. The ground module J2 platform level up override output [X002.5] is open. If the open is in or near the platform up solenoid [X136], the fault 1.39 BASKET UP SHORT TO BATTERY OR OPEN CIRCUIT on Pg. 45 should also be active. See 1.377 COMMON STB OR OC PROCEDURE on Pg. 174.

1.37 BASKET UP OVERRIDE SHORT TO BATTERY

Flash Code: 3-3

Basket up override short to battery. The ground module J2 platform level up override output [X002.5] is shorted to battery. If there are no open wires, the fault 1.39 BASKET UP SHORT TO BATTERY OR OPEN CIRCUIT on Pg. 45 should also be active. See 1.377 COMMON STB OR OC PROCEDURE on Pg. 174.

1.38 BASKET UP OVERRIDE SHORT TO GROUND

Flash Code: 3-3

Basket up override short to ground. The ground module J2 platform level up override output [X002.5] is shorted to ground. If there are no open wires, the fault 1.40 BASKET UP SHORT TO GROUND on Pg. 45 should also be active. See 1.378 COMMON STG PROCEDURE on Pg. 175.

1.39 BASKET UP SHORT TO BATTERY OR OPEN CIRCUIT

Flash Code: 3-4

Basket up short to battery or open circuit. The platform module J7 platform level up output [X169.15] is shorted to battery or open. If there are no open wires, the fault 1.37 BASKET UP OVERRIDE SHORT TO BATTERY on Pg. 45 should also be active. See 1.377 COMMON STB OR OC PROCEDURE on Pg. 174.

1.40 BASKET UP SHORT TO GROUND

Flash Code: 3-4

Basket up short to ground. The platform module J7 platform level up output [X169.15] is shorted to ground. If there are no open wires, the fault 1.38 BASKET UP OVERRIDE SHORT TO GROUND on Pg. 45 should also be active. See 1.378 COMMON STG PROCEDURE on Pg. 175.

1.41 BATTERY LOW

Flash Code: 4-4

Battery low. A warning that the voltage at ground module J8 [X008.2] is below 11 volts. Remove any corrosion on battery terminals and battery cable terminals. Recharge or replace battery.

1.42 BATTERY TOO HIGH - SYSTEM SHUT DOWN

Flash Code: 4-4

Battery too high - system shut down. The voltage at ground module J8 [X008.2] is above 18.69 volts. The system will shut down. Check battery and battery connections or replace battery.

1.43 BATTERY TOO LOW - SYSTEM SHUT DOWN

Flash Code: 4-4

Battery too low - system shut down. A warning that the voltage at ground module J8 [X008.2] is below 9 volts. The system will shut down after about 5 seconds. Remove any corrosion on battery terminals and battery cable terminals. Recharge or replace battery.

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1.44 BLAM BACKUP COMMUNICATIONS LINK FAULTY

Flash Code: 9-9

BLAM backup communications link faulty. The ground module was not able to communicate with the BLAM during the start-up test of the backup communications link. The BCS indicator will turn on and the machine will not leave transport position.

Note	Pretest Instructions	Test	Result	Corrective Action
1.44.1	Connect analyzer at ground module. Turn on machine.	Does the analyzer turn on?	Yes	Keep test setup in place. Go to step 1.44.4
			No	Go to step 1.44.2
1.44.2	Take the following measurement by backprobing. See Backprobing on Pg. 319.	Is there about 8.5 VDC between ground module J1 terminal 28 [X001.28] and terminal 31[X001.31]?	Yes	Go to step 1.44.3
			No	Reprogram/replace ground module
1.44.3	Disconnect ground module J1 [X001]	Is there continuity between ground module J1 socket 31 [X001] and ground analyzer pin 4 [X013.4.pin]?	Yes	Repair/replace harness between ground module J1 socket 28 [X001.28.soc] and ground analyzer pin 1 [X013.1.pin]
			No	Repair/replace harness between ground module J1 socket 31 [X001.31.soc] and ground analyzer pin 4 [X013.4.pin]
1.44.4	Connect analyzer at ground module. Turn on machine	Does the analyzer start up and say "MENU: HELP: PRESS ENTER"?	Yes	Go to step 1.44.8
			No	Keep analyzer connected and machine on. Go to step 1.44.5
1.44.5	Connect analyzer at ground module. Turn on machine.	Does the analyzer say, "CONNECT FAILURE"?	Yes	Go to step 1.44.6
			No	Go to step 1.44.8
1.44.6	Disconnect ground module J1 [X001]	Is there continuity between ground module J1 socket 29 [X001.29.soc] and ground analyzer pin 2 [X013.2.pin]? -AND- Is there continuity between ground module J1 socket 30 [X001.30.soc] and ground analyzer pin 3 [X013.3.pin]?	Yes	Replace ground module
			No	Go to step 1.44.7
1.44.7	Disconnect RS-232 passthru [X015]	Is there continuity between RS-232 passthru pin 1 [X015.1.pin] and RS-232 passthru pin 2 [X015.2.pin]? Also, is there continuity between RS-232 passthru pin 5 [X015.5.pin] and RS-232 passthru pin 6 [X015.6.pin]?	Yes	Repair/replace harness between ground module J1 [X001] and RS-232 passthru [X015]
			No	Repair/replace RS-232 backup relay assembly.
1.44.8	Disconnect RS-232 passthru [X015]	Is there 160Ω ±15% between RS-234 passthru pin 4 [X015.4.pin] and pin 8 [X015.8.pin]?	Yes	Keep RS-232 passthru disconnected. Go to step 1.44.9
			No	Replace RS-232 backup relay
1.44.9	Turn off machine. Disconnect RS-232 passthru [X015].	Turn on machine. About 4 seconds after machine is turned on does voltage measure about 8.5 VDC between RS-232 passthru socket 4 [X015.4.soc] and socket 8 [X015.8.soc]?	Yes	Go to step 1.44.12
			No	Keep connector disconnected. Go to step 1.44.10
1.44.10	Disconnect RS-232 passthru [X015] and ground module J2	Is there continuity between RS-232 passthru socket 4[X015.4.soc] and ground module J2 socket 45 [X002.45.soc]?	Yes	Keep connectors disconnected Go to step 1.44.11.
			No	Repair/replace harness between RS-232 passthru [X015] and ground module J2
1.44.11	Disconnect RS-232 passthru [X015] and ground module J1	Is there continuity between RS-232 passthru socket 8[X015.8.soc] and ground module J1 socket 9 [X002.9.soc]?	Yes	Replace ground module
			No	Repair/replace harness between RS-232 passthru [X015] and ground module J1

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Note	Pretest Instructions	Test	Result	Corrective Action
1.44.12	Turn off machine. Disconnect RS-232 passthru [X015]. Remove socket 4 with ORN/Red wire [X015.4.soc] and socket 8 with Black wire [X015.8.soc] from connector body. Insert them onto the mating pin. Disconnect CAN line to ground module at the T-connection in MTB.	Turn on machine. Ignore faults generated by the test setup. Is there continuity between RS-232 passthru pin 1 [X015.1.pin] and pin 3 [X015.3.pin] -AND- Is there continuity between pin 5 [X015.5.pin] and pin 7 [X015.7.pin]?	Yes	Keep RS-232 passthru [X015] disconnected. Go to step 1.44.13
			No	Replace RS-232 backup relay and harness assembly
1.44.13	Turn off machine. Disconnect RS-232 passthru [X015] and BLAM J5 [X090].	Is there continuity between RS-232 passthru socket 3 [X015.3.soc] and BLAM J5 socket 10 [X090.10.soc]?	Yes	Go to step 1.44.15
			No	Keep RS-232 passthru [X015] disconnected. Go to step 1.44.14.
1.44.14	Turn off machine. Disconnect RS-232 passthru [X015] and RS-232 backup passthru [X059].	Is there continuity between RS-232 passthru socket 3 [X015.3.soc] and RS-232 backup passthru socket 1 [X059.1.soc]?	Yes	Repair/replace harness between RS-232 backup passthru socket 1 [X059.1.soc] and BLAM J5 socket 10 [X090.10.soc]
			No	Repair/replace harness between RS-232 passthru socket 3 [X015.3.soc] and RS-232 backup passthru socket 1 [X059.1.soc]
1.44.15	Turn off machine. Disconnect RS-232 passthru [X015] and BLAM J5 [X090].	Is there continuity between RS-232 passthru socket 7 [X015.3.soc] and BLAM J5 socket 11 [X090.11.soc]?	Yes	Keep BLAM J5 [X090] disconnected. Go to step 1.44.17
			No	Keep RS-232 passthru [X015] disconnected. Go to step 1.44.16
1.44.16	Turn off machine. Disconnect RS-232 passthru [X015] and RS-232 backup passthru [X059].	Is there continuity RS-232 passthru socket 7 [X015.7.soc] and RS-232 backup passthru socket 2 [X059]?	Yes	Repair/replace harness between RS-232 backup passthru socket 2 [X059] and BLAM J5 socket 11 [X090.11.soc]
			No	Repair/replace harness between RS-232 passthru socket 7 [X015.7.soc] and RS-232 backup passthru socket 2 [X059]
1.44.17	Disconnect ground module J1 [X001] and BLAM J5 [X090]	Is there continuity between ground module J 1 socket 5 [X001.5.soc] and BLAM J5 socket 12 [X090.12.soc]?	Yes	Reprogram/replace BLAM
			No	Keep BLAM disconnected. Go to step 1.44.18
1.44.18	Disconnect BLAM J5 [X090] and RS-232 backup passthru [X059]	Is there continuity between RS-232 backup passthru pin 3 [X059.3.pin] and BLAM J5 socket 12 [X090.12.soc]?	Yes	Repair/replace harness between ground module J1 [X001] and BLAM J5 [X090]
			No	Repair/replace harness between RS-232 backup passthru [X059] and BLAM J5 [X090]

1.45 BLAM BACKUP COMMUNICATIONS LOST - HYDRAULICS SUSPENDED

Flash Code: 9-9

BLAM backup communications lost - hydraulics suspended. If the ground module loses CAN communications with the BLAM it will attempt to communicate via the RS-232 backup communications link. If the backup communications link cannot be established, all main boom, tower boom, jib, swing and drive functions are disabled, and this fault is logged.

Note	Pretest Instructions	Test	Result	Corrective Action
1.45.1		Have all personnel been removed from basket and has it been lowered to transport position?	Yes	See 1.44 BLAM BACKUP COMMUNICATIONS LINK FAULTY on Pg. 46
			No	Call JLG for help.

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1.46 BLAM CAN COMMUNICATIONS LOST

Flash Code: 6-6

BLAM CAN communications lost. The system cannot communicate with the Boom Length Angle Module (BLAM). This may be due to wiring problems between the platform and chassis modules. Since the trunk of the CAN bus passes through the BLAM, other CAN faults are also likely active. If power is lost to the BLAM, then power will not be provided to the cylinder load pin and the CYLINDER LOAD PIN CAN COMMUNICATIONS LOST fault will also be active.

Note	Pretest Instructions	Test	Result	Corrective Action
1.46.1	Check the fault log for other modules having lost communication (6-6 codes)	Is the CYLINDER LOAD PIN CAN COMMUNICATIONS LOST fault active?	Yes	Go to step 1.46.2
			No	Go to step 1.46.5
1.46.2	Disconnect the BLAM module J1 connector [X086]	Does the voltage between socket 5 and socket 4 of the BLAM module J1 connector [X086.5.soc X086.4.soc] measure 12VDC?	Yes	Go to step 1.46.5
			No	Go to step 1.46.3
1.46.3	Disconnect the 12 position BLAM passthru connector [X058]	Does the voltage between socket 1 and socket 6 of the 12 position BLAM passthru connector [X058.1.soc X058.6.soc] measure 12VDC?	Yes	Repair/replace the YEL/RED 2-70-2 and/or BLACK wires between the Power or ground bus connector [X010 X009] and the 12 position BLAM passthru connector [X058]
			No	Go to step 1.46.4
1.46.4		Does the voltage between any terminal of the MTB Power Bus [X010] and any terminal of the MTB ground bus [X009] measure 12VDC?	Yes	Repair the YEL/RED 2-70-2 and/or BLACK wires between the battery and terminal 5 and terminal 4 of the BLAM module J1 connector [X086.5 X086.4]
			No	Check the connections, make sure the machine is turned on, and return to step 1.46.2
1.46.5		Does the CAN resistance between terminal 6 and terminal 7 of the BLAM module J1 connector [X086.6 X086.7] measure 60Ω and open circuit between terminal 6 and shield [X086.6] and open circuit between terminal 7 and shield [X086.7]?	Yes	Go to step 1.46.8
			No	Go to step 1.46.6
1.46.6	Disconnect the BLAM module J1 connector [X086]	Does the CAN resistance between socket 6 and socket 7 of the BLAM module J1 connector [X086.6.soc X086.7.soc] measure 120Ω and open circuit between socket 6 and shield [X086.6.soc] and open circuit between socket 7 and shield [X086.7.soc]?	Yes	Go to step 1.46.26
			No	Go to step 1.46.7
1.46.7		Is the MAIN ANGL1 CAN COMMUNICATIONS LOST fault active in the fault log?	Yes	Go to step 1.46.13 to examine the CAN wiring between the ground module and BLAM module
			No	Go to step 1.46.8
1.46.8	Disconnect the BLAM module J1 connector [X086] and the ground module J7 connector [X007]	Is there CAN HI continuity between socket 6 of the BLAM module J1 connector [X086.6.soc] and socket 13 of the ground module J7 connector [X007.13.soc] and CAN LO continuity between socket 7 of the BLAM module J1 connector [X086.7.soc] and socket 24 of the ground module J7 connector [X007.24.soc]?	Yes	Go to step 1.46.9
			No	Go to step 1.46.10
1.46.9	View ANALYZER ⇒ DIAGNOSTICS ⇒ VERSIONS ⇒ GROUND MODULE SOFTWARE: Px.x and B.L.A. MODULE SOFTWARE: Px.x	Are the BLAM and ground modules BOTH running the current software version?	Yes	Replace the BLAM module.
			No	Update all the software to the same version (latest available)

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Note	Pretest Instructions	Test	Result	Corrective Action
1.46.10	Disconnect the 12 position BLAM passthru connector [X058] and the ground module J7 connector [X007]	Is there CAN HI continuity between socket 10 of the 12 position BLAM passthru connector [X058.10.soc] and socket 13 of the ground module J7 connector [X007.13.soc] and CAN LO continuity between socket 11 of the 12 position BLAM passthru connector [X058.11.soc] and socket 24 of the ground module J7 connector [X007.24.soc]?	Yes	Repair/Replace the harness between the BLAM module J1 connector [X086] and the 12 position BLAM passthru connector [X058]
			No	Go to step 1.46.11
1.46.11	Disconnect the BLAM side of the 3 way CAN connector in the main terminal box [X269] and the ground module J7 connector [X007]	Is there CAN HI continuity between pin A of the 3 way CAN connector [X269.A.pin] and socket 13 of the ground module J7 connector [X007.13.soc] and CAN LO continuity between pin B of the 3 way CAN connector [X269.B.pin] and socket 24 of the ground module J7 connector [X007.24.soc]?	Yes	Repair/Replace the harness between the 12 position BLAM passthru connector [X058] and the 3 way CAN connector in the main terminal box [X269]
			No	Go to step 1.46.12
1.46.12	Disconnect the ground module side of the 3 way CAN connector in the main terminal box [X014] and the ground module J7 connector [X007]	Is there CAN HI continuity between socket A of the 3 way CAN connector [X014.A.soc] and socket 13 of the ground module J7 connector [X007.13.soc] and CAN LO continuity between socket B of the 3 way CAN connector [X269.B.soc] and socket 24 of the ground module J7 connector [X007.24.soc]?	Yes	Repair/Replace the 3 way CAN connector in the main terminal box [X014 X269 X270]
			No	Repair/Replace the harness between the 3 way CAN connector in the main terminal box [X014] and the ground module J7 connector [X007]
1.46.13	Disconnect the main boom angle sensor 1 connector [X048] and the BLAM module J1 connector [X086]	Does the CAN resistance between socket 6 and socket 7 of the BLAM module J1 connector [X086.6.soc X086.7.soc] measure 120Ω and open circuit between socket 6 and shield [X086.6.soc] and open circuit between socket 7 and shield [X086.7.soc]?	Yes	Replace main boom angle sensor 1
			No	Go to step 1.46.14
1.46.14	Disconnect the main boom angle sensor 2 connector [X049] and the BLAM module J1 connector [X086]	Does the CAN resistance between socket 6 and socket 7 of the BLAM module J1 connector [X086.6.soc X086.7.soc] measure 120Ω and open circuit between socket 6 and shield [X086.6.soc] and open circuit between socket 7 and shield [X086.7.soc]?	Yes	Replace main boom angle sensor 2
			No	Go to step 1.46.15
1.46.15	Disconnect the ground module J7 connector [X007] and the BLAM module J1 connector [X086]	Does the CAN resistance between socket 6 and socket 7 of the BLAM module J1 connector [X086.6.soc X086.7.soc] measure 120Ω and open circuit between socket 6 and shield [X086.6.soc] and open circuit between socket 7 and shield [X086.7.soc]?	Yes	Replace the ground module
			No	Go to step 1.46.16
1.46.16	Disconnect the platform module J7 connector [X007]	Does the CAN resistance between socket 31 and socket 30 of the platform module J7 connector [X169.31.soc X169.30.soc] measure 120Ω and open circuit between socket 6 and shield [X086.6.soc] and open circuit between socket 7 and shield [X086.7.soc]?	Yes	Go to step 1.46.17
			No	Go to step 1.46.18
1.46.17	Disconnect the platform module J7 connector [X007]	Does the CAN resistance between pin 31 and pin 30 of the platform module J7 connector [X169.31.pin X169.30.pin] measure 120Ω and open circuit between pin 31and shield [X169.32.pin] and open circuit between pin 30 and shield [X169.32.pin]?	Yes	Check the connections at the platform module J7 connector [X169]
			No	Replace the platform module

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Note	Pretest Instructions	Test	Result	Corrective Action
1.46.18	Disconnect the ground module side of the 3 way CAN connector in the main terminal box [X014] and the BLAM module J1 connector [X086]	Does the CAN resistance between socket 6 and socket 7 of the BLAM module J1 connector [X086.6.soc X086.7.soc] measure 120Ω and open circuit between socket 6 and shield [X086.6.soc] and open circuit between socket 7 and shield [X086.7.soc]?	Yes	Repair/Replace the harness between the ground module side of the 3 way CAN connector in the main terminal box [X014] and the ground module J7 connector [X007]
			No	Go to step 1.46.19
1.46.19	Disconnect the 12 position BLAM passthru connector [X058]	Does the CAN resistance between socket 10 and socket 11 of the 12 position BLAM passthru connector [X058.10.soc X058.11.soc] measure 120Ω and open circuit between socket 10 and socket 12 [X058.10.soc X058.12.soc] and open circuit between socket 11 and socket 12 [X058.11.soc X058.12.soc]?	Yes	Repair/Replace the harness between the BLAM module J1 connector [X086] and the 12 position BLAM passthru connector [X058]
			No	Go to step 1.46.20
1.46.20	Disconnect the BLAM module side of the 3 way CAN connector in the main terminal box [X269]	Does the CAN resistance between socket A and socket B of the BLAM module side of the 3 way CAN connector in the main terminal box [X269.A.soc X269.B.soc] measure 120Ω and open circuit between socket A and socket C [X269.A.soc X269.C.soc] and open circuit between socket B and socket C [X269.B.soc X269.C.soc]?	Yes	Repair/Replace the harness between the BLAM module side of the 3 way CAN connector in the main terminal box [X269] and the 12 position BLAM passthru connector [X058]
			No	Go to step 1.46.21
1.46.21	Disconnect the platform module side of the 3 way CAN connector in the main terminal box [X270]	Does the CAN resistance between socket A and socket B of the platform module side of the 3 way CAN connector in the main terminal box [X270.A.soc X270.B.soc] measure 120Ω and open circuit between socket A and socket C [X270.A.soc X270.C.soc] and open circuit between socket B and socket C [X270.B.soc X270.C.soc]?	Yes	Repair/Replace the 3 way CAN connector in the main terminal box [X014 X269 X270]
			No	Go to step 1.46.22
1.46.22	Disconnect the 19 position main terminal box passthru connector [X043]	Does the CAN resistance between socket 2 and socket 3 of the 19 position main terminal box passthru connector [X043.2.soc X043.3.soc] measure 120Ω and open circuit between socket 2 and socket 1 [X043.2.soc X043.1.soc] and open circuit between socket 3 and socket 1 [X043.3.soc X043.1.soc]?	Yes	Repair/Replace the harness between the 19 position main terminal box passthru connector [X043] and the platform module side of the 3 way CAN connector in the main terminal box [X270]
			No	Go to step 1.46.23
1.46.23	Disconnect the 19 position tower boom passthru connector [X045]	Does the CAN resistance between pin 2 and pin 3 of the 19 position tower boom passthru connector [X045.2.pin X045.3.pin] measure 120Ω and open circuit between pin 2 and pin 1 [X045.2.pin X045.1.pin] and open circuit between pin 3 and pin 1 [X045.3.pin X045.1.pin]?	Yes	Repair/Replace the harness between the 19 position tower boom passthru connector [X045] and the 19 position main terminal box passthru connector [X043]
			No	Go to step 1.46.24
1.46.24	Disconnect the 19 position boom sensor passthru connector [X050]	Does the CAN resistance between socket 2 and socket 3 of the 19 position boom sensor passthru connector [X050.2.soc X050.3.soc] measure 120Ω and open circuit between socket 2 and socket 1 [X050.2.soc X050.1.soc] and open circuit between socket 3 and socket 1 [X050.3.soc X050.1.soc]?	Yes	Repair/Replace the harness between the 19 position boom sensor passthru connector [X050] and the 19 position tower boom passthru connector [X045]
			No	Go to step 1.46.25

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Note	Pretest Instructions	Test	Result	Corrective Action
1.46.25	Disconnect the 19 position platform control box passthru connector [X160]	Does the CAN resistance between pin 2 and pin 3 of the 19 position platform control box passthru connector [X160.2.pin X160.3.pin] measure 120Ω and open circuit between pin 2 and pin 1 [X160.2.pin X160.1.pin] and open circuit between pin 3 and pin 1 [X160.3.pin X160.1.pin]?	Yes	Repair/Replace the harness between the 19 position platform control box passthru connector [X160] and the 19 position boom sensor passthru connector [X050]
			No	Repair/Replace the harness between the platform module J7 connector [X169] and the 19 position platform control box passthru connector [X160]
1.46.26	Disconnect the BLAM module J4 connector [X089]	Does the CAN resistance between socket 3 and socket 4 of the BLAM module J4 connector [X089.3.soc X089.4.soc] measure 120Ω and open circuit between socket 3 and shield [X089.3.soc X089.5.soc] and open circuit between socket 4 and shield [X089.4.soc X089.5.soc]?	Yes	Go to step 1.46.27
			No	Go to step 1.46.28
1.46.27	Disconnect the BLAM module J4 connector [X089]	Does the CAN resistance between pin 3 and pin 4 of the BLAM module J4 connector [X089.3.pin X089.4.pin] measure 120Ω and open circuit between pin 3 and shield [X089.3.pin X089.5.pin] and open circuit between pin 4 and shield [X089.4.pin X089.5.pin]?	Yes	Check the connections at the BLAM module J4 connector [X089]
			No	Replace the BLAM module
1.46.28	Disconnect the load pin passthru connector[X060] located near the tower lift cylinder load pin and the BLAM module J4 connector [X089]	Does the CAN resistance between socket 3 and socket 4 of the BLAM module J4 connector [X089.3.soc X089.4.soc] measure 120Ω and open circuit between socket 3 and shield [X089.3.soc X089.5.soc] and open circuit between socket 4 and shield [X089.4.soc X089.5.soc]?	Yes	Go to step 1.46.29
			No	Go to step 1.46.30
1.46.29	Disconnect the load pin connector[X062] and the load pin passthru connector[X060] located near the tower lift cylinder load pin	Is there CAN HI continuity between socket D of the load pin connector [X062.D.soc] and socket 3 of the load pin passthru connector[X060.3.soc] and CAN LO continuity between socket E of the load pin connector [X062.E.soc] and socket 4 of the load pin passthru connector[X060.4.soc]	Yes	Replace the load pin
			No	Repair/Replace the harness between the load pin connector [X062.D X062.E] and the load pin passthru connector[X060.3 X060.4]
1.46.30	Disconnect the top swivel connector [X083]	Does the CAN resistance between pin 1 and pin 2 of the top swivel connector [X083.1.pin X083.2.pin] measure 120Ω and open circuit between pin 1 and shield [X083.1.pin X083.3.pin] and open circuit between pin 2 and shield [X083.2.pin X083.3.pin]?	Yes	Go to step 1.46.31
			No	Go to step 1.46.38 to examine the CAN wiring in the swivel and chassis
1.46.31	Disconnect the 3 position deutz EMR2 chassis CAN connector [X084]	Does the CAN resistance between pin A and pin B of the 3 position Deutz EMR2 Chassis CAN connector [X084.A.pin X084.B.pin] measure 120Ω and open circuit between pin A and pin C [X084.A.pin X084.C.pin] and open circuit between pin B and pin C [X084.B.pin X084.C.pin]?	Yes	Go to step 1.46.32
			No	Repair/Replace the harness between the 3 position Deutz EMR2 Chassis CAN connector [X084] and the top swivel connector [X083]

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Note	Pretest Instructions	Test	Result	Corrective Action
1.46.32	Disconnect the engine module connector [X240] and the BLAM module J4 connector [X089]	Does the CAN resistance between socket 3 and socket 4 of the BLAM module J4 connector [X089.3.soc X089.4.soc] measure 120Ω and open circuit between socket 3 and shield [X089.3.soc X089.5.soc] and open circuit between socket 4 and shield [X089.4.soc X089.5.soc]?	Yes	Replace the engine module
			No	Go to step 1.46.33
1.46.33	Disconnect the engine module can connector [X268] and the BLAM module J4 connector [X089]	Does the CAN resistance between pin A and pin B of the engine module CAN connector [X268.A.pin X268.B.pin] measure 120Ω and open circuit between pin A and pin C [X268.A.pin X268.C.pin] and open circuit between pin B and pin C [X268.B.pin X268.C.pin]?	Yes	Go to step 1.46.34
			No	Repair/replace the harness between the engine module CAN connector [X268], the engine module connector [X240], and the 3 position deutz EMR2 chassis CAN connector [X084]
1.46.34	Disconnect the 3 position load pin CAN pass thru connector [X262]	Does the CAN resistance between pin A and pin B of the 3 position load pin can pass thru connector [X262.A.pin X262.B.pin] measure 120Ω and open circuit between pin A and pin C [X262.A.pin X262.C.pin] and open circuit between pin B and pin C [X262.B.pin X262.C.pin]?	Yes	Go to step 1.46.35
			No	Repair/Replace the harness between the 3 position load pin can pass thru connector [X262] and the engine module CAN connector [X268]
1.46.35	Disconnect the tower lift PVG connector [X066] and the BLAM module J4 connector [X089]	Does the CAN resistance between socket 3 and socket 4 of the BLAM module J4 connector [X089.3.soc X089.4.soc] measure 120Ω and open circuit between socket 3 and shield [X089.3.soc X089.5.soc] and open circuit between socket 4 and shield [X089.4.soc X089.5.soc]?	Yes	Replace the tower lift PVG valve section
			No	Go to step 1.46.36
1.46.36	Disconnect the tower tele PVG connector [X067] and the BLAM module J4 connector [X089]	Does the CAN resistance between socket 3 and socket 4 of the BLAM module J4 connector [X089.3.soc X089.4.soc] measure 120Ω and open circuit between socket 3 and shield [X089.3.soc X089.5.soc] and open circuit between socket 4 and shield [X089.4.soc X089.5.soc]?	Yes	Replace the tower tele PVG valve section
			No	Go to step 1.46.37
1.46.37	Disconnect the main lift PVG connector [X065] and the BLAM module J4 connector [X089]	Does the CAN resistance between socket 3 and socket 4 of the BLAM module J4 connector [X089.3.soc X089.4.soc] measure 120Ω and open circuit between socket 3 and shield [X089.3.soc X089.5.soc] and open circuit between socket 4 and shield [X089.4.soc X089.5.soc]?	Yes	Replace the main lift PVG valve section
			No	Repair/Replace the harness between the BLAM module J4 connector [X089], the tower lift PVG connector [X066], the tower tele PVG connector [X067], the main lift PVG connector [X065], and the 3 position load pin can pass thru connector [X262]
1.46.38	Disconnect the bottom swivel connector [X216]	Does the CAN resistance between socket 1 and socket 2 of the bottom swivel connector [X216.1.soc X216.2.soc] measure 120Ω and open circuit between socket 1 and shield [X216.1.soc X216.3.soc] and open circuit between socket 2 and shield [X216.2.soc X216.3.soc]?	Yes	Go to step 1.46.39
			No	Repair/replace the slip ring connections in the swivel

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Note	Pretest Instructions	Test	Result	Corrective Action
1.46.39	Disconnect the chassis module J1 connector [X229]	Does the CAN resistance between socket 6 and socket 7 of the chassis module J1 connector [X229.6.soc X229.7.soc] measure 120Ω and open circuit between socket 6 and shield [X229.6.soc X229.8.soc] and open circuit between socket 7 and shield [X229.7.soc X229.8.soc]?	Yes	Go to step 1.46.40
			No	Repair/Replace the harness between the Bottom Swivel connector [X216] and the chassis module J1 connector [X229]
1.46.40	Disconnect the chassis module J1 connector [X229]	Is the jumper in place between socket 9 and socket 10 of the chassis module J1 connector [X229.9 X229.10] (is there continuity)	Yes	Replace the chassis module
			No	Replace the CAN jumper between socket 9 and socket 10 of the chassis module J1 connector

1.47 BLAM HIGH RES A/D FAILURE

Flash Code: 9-9

BLAM high resolution analog to digital converter failure. A BLAM internal circuit to measure sensor output had a failure. A power cycle is required.

Note	Pretest Instructions	Test	Result	Corrective Action
1.47.1	Cycle power. Check faults.	Does fault continue to occur after cycling power?	Yes	Reprogram/replace BLAM
			No	Troubleshooting complete

1.48 BLAM SENSOR SUPPLY OUT OF RANGE HIGH

Flash Code: 9-9

BLAM sensor supply out of range high. BLAM sensor power supply voltage for the boom angle sensors is above the expected range. A power cycle is required.

Note	Pretest Instructions	Test	Result	Corrective Action
1.48.1	Cycle power	Does fault clear?	Yes	Troubleshooting complete
			No	Go to step 1.48.2
1.48.2	Ensure all optional power sources are de-energized, including welding and off-board power.	Does fault clear?	Yes	Leave all optional power sources de-energized. Go to step 1.48.3.
			No	Go to step 1.48.4
1.48.3	Ensure all optional power sources are de-energized, including welding and off-board power.	Re-energize one source and re-check faults. Does fault re-appear?	Yes	Look for shorts in the harness for that system to harness at BLAM J3.
			No	Go to "Test" box in this step.
1.48.4	Disconnect BLAM J3 [X088]. Turn on machine.	Is there between 5.5 V and 4.5 volts measured between the following points on BLAM J3: pin 1 [X088.8.pin] to pin 3 [X088.3.pin]; pin 4 [X088.4.pin] to pin 6 [X088.6.pin]; pin 7 [X088.7.pin] to pin 9 [X088.9.pin]; pin 10 [X088.10.pin] to pin 12 [X088.12.pin]?	Yes	Go to step 1.48.5
			No	Replace BLAM
1.48.5	Disconnect BLAM J3 [X088]. Disconnect battery (+) terminal [X116]	Is there a short between the battery (+) terminal [X116] and any of the following: BLAM J3, socket 1 [X088.1.soc], socket 4 [X088.4.soc], socket 7 [X088.7.soc], or socket 10 [X088.10.soc]?	Yes	Troubleshoot BLAM J3 [X088] harness wire with short
			No	Reprogram/replace BLAM

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1.49 BLAM SENSOR SUPPLY OUT OF RANGE LOW

Flash Code: 9-9

BLAM sensor supply out of range low. BLAM sensor power supply voltage for the boom angle sensors is below the expected range. A power cycle is required.

Note	Pretest Instructions	Test	Result	Corrective Action
1.49.1	Cycle power	Does fault clear?	Yes	Troubleshooting complete
			No	Go to step 1.49.2
1.49.2	Disconnect BLAM J3 [X088]. Turn on machine.	Is there between 5.5 V and 4.5 volts measured between the following points on BLAM J3: pin 1 [X088.8.pin] to pin 3 [X088.3.pin]; pin 4 [X088.4.pin] to pin 6 [X088.6.pin]; pin 7 [X088.7.pin] to pin 9 [X088.9.pin]; pin 10 [X088.10.pin] to pin 12 [X088.12.pin]?	Yes	Go to step 1.49.3
			No	Replace BLAM
1.49.3	Disconnect BLAM J3 [X088]. Disconnect battery (-) terminal [X117]	Is there a short between the battery (-) terminal [X117] and any of the following: chassis module J3, socket 1 [X088.1.soc], socket 4 [X088.4.soc], socket 7 [X088.7.soc], or socket 10 [X088.10.soc]?	Yes	Troubleshoot BLAM J3 [X088] harness wire with short
			No	Reprogram/replace BLAM

1.50 BOOM ANGLE SENSOR #1 COMMUNICATIONS FAULT

Flash Code: 8-4

Boom angle sensor #1 communications fault. The control system lost serial communications with tower angle sensor #1 (Right).

Note	Pretest Instructions	Test	Result	Corrective Action
1.50.1		Are there loose or damaged connections at the right tower boom angle sensor connector [X099]?	Yes	Repair any loose or damaged wires or connectors
			No	Go to step 1.50.2
1.50.2		Does the fault log show BOOM ANGLE SENSOR #2 COMMUNICATIONS FAULT before a power cycle?	Yes	Go to step 1.50.4
			No	Go to step 1.50.3
1.50.3	Turn on machine. Disconnect right tower boom angle sensor connector [X099]	Is there 12VDC on right tower boom angle sensor connector socket 1 [X099.1.soc] and socket 3 [X099.3.soc]?	Yes	Leave connector disconnected. Go to step 1.50.8.
			No	Go to step 1.50.4
1.50.4	Turn on machine. Backprobe between the 12-pin ground bus connector [X098] and 12-pin V-Batt+ bus connector [X097] by the BLAM. (See Section 6. Multimeter Basics on Pg. 319 for details on backprobing.)	Is there 12VDC between 12-pin V-Batt+ bus connector[X097] and 12-pin ground bus connector [X098]?	Yes	Repair/replace 12-pin V-Batt+ bus connector [X097] and/or 12-pin ground bus connector [X098].
			No	Leave machine on. Go to step 1.50.5.
1.50.5	Turn on machine. Disconnect 12-pin Deutsch connector [X058].	Is there 12VDC between 12-pin Deutsch socket 2 [X058.2soc] and socket 5 [X058.5.soc]?	Yes	Go to step 1.50.11
			No	Leave 12-pin Deutsch connector [X058] diconnected. Go to step 1.50.6.

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Note	Pretest Instructions	Test	Result	Corrective Action
1.50.6	Disconnect 12-pin Deutsch connector [X058] and Power Down Relay [X011]	Is there a short between 12-pin Deutsch connector socket 2 [X058.2.soc] and Power Down Relay socket 87 [X011.87.soc]?	Yes	Leave 12-pin Deutsch connector [X058] disconnected. Go to step 1.50.7.
			No	Repair/Replace harness between 12-pin Deutsch connector [X058], including the bus connector itself and the Power Down Relay [X011]
1.50.7	Disconnect 12-pin Deutsch connector [X058] and ground control module J3 [X008]	Is there a short between 12-pin Deutsch connector socket 2 [X058.2.soc] and ground control module J3 socket 3 [X008.3.soc]?	Yes	Ensure both contacts of the 12-pin Deutsch connector socket 2 [X058.2] are seated properly in the connector bodies and that there is continuity between all pins.
			No	Repair/replace harness and or connectors between 12-pin Deutsch connector [X058] and ground control module J3 socket 3 [X008.3]
1.50.8	Plug the tower boom angle sensor connector #2 (Left) [X100] into the #1 (right) sensor and the tower boom angle sensor #1 (Right) connector [X099] into the #2 (left) sensor. Read faults.	Does the BOOM ANGLE SENSOR #2 COMMUNICATIONS FAULT appear?	Yes	Replace sensor #1
			No	Go to step 1.50.9
1.50.9	Disconnect right tower boom angle sensor connector [X099] and BLAM J2 [X087]	Is there continuity between right angle sensor socket 2 [X099.2.soc] and BLAM J2 socket 8 [X087.8.soc]?	Yes	Go to step 1.50.11
			No	Leave the right angle sensor [X099] disconnected. Go to step 1.50.10.
1.50.10	Disconnect the right angle sensor [X099] and tower angle sensor 1 passthru [X095] (See Figure 2-7. Main Valve Area Connectors on Pg. 189 for location).	Is there continuity between right angle sensor socket 2 [X099.2.soc] and tower angle sensor 1 passthru [X095.2.soc]? Also, are the contacts free from damage?	Yes	Repair/replace harness between tower angle sensor 1 pass through [X095] and BLAM J2 [X087]
			No	Repair/replace harness between right angle sensor socket 2 [X099.2.soc] and tower angle sensor 1 passthru - 4 position [X095]
1.50.11	Disconnect the #1 right side tower boom angle sensor passthru - 4 position [X095]. Turn on the machine.	Is there 12VDC between the #1 right side tower boom angle sensor passthru pin 1 [X095.1.pin] and pin 3 [X095.3.pin]?	Yes	Leave the connector disconnected and machine on. Go to step 1.50.13.
			No	Go to step 1.50.12
1.50.12	Disconnect battery busbar - 12 pos. [X097] and ground busbar - 12 pos. [X098]	Is there 12VDC between battery busbar socket 5 [X097.5.soc] and ANY of the sockets in ground busbar [X098]?	Yes	Repair/replace harness and or connectors between #1 right side tower boom angle sensor passthru [X095] and the 12-pin V-Batt+ bus connector sockets [X097] and/or 12-pin ground bus connector sockets [X098].
			No	Repair/replace harness and or connectors between battery busbar - 12 pos. [X097] and 12-pin Deutsch connector socket 2 [X058.2.soc] and/or the ground busbar - 12 pos. [X098] and 12-pin Deutsch connector socket 5 [X058.5.soc]
1.50.13	Disconnect the #1 right side tower boom angle sensor [X099]. Turn on the machine.	Is there 12VDC between the #1 right side tower boom angle sensor harness connector closest to the sensor socket 1 [X099.1.soc] and socket 3 [X099.3.soc]?	Yes	Leave the connector disconnected. Go to step 1.50.14.
			No	Repair/replace the harness and or connectors between the #1 right side tower boom angle sensor [X099] and #1 right side tower boom angle sensor passthru [X095]

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Note	Pretest Instructions	Test	Result	Corrective Action
1.50.14	Disconnect the #1 right side tower boom angle sensor [X099] and the BLAM connector J2 [X087]	Is there continuity between #1 right side tower boom angle sensor socket 2 [X099.2.soc] and the BLAM connector J2 socket 8 [X087.8.soc]? Also, are the contacts free from damage?	Yes	Reprogram/replace the BLAM
			No	Repair/replace harness and/or contacts as needed

1.51 BOOM ANGLE SENSOR #2 COMMUNICATIONS FAULT

Flash Code: 8-4

Boom angle sensor #2 communications fault. The control system lost serial communications with tower angle sensor #2 (Left).

Note	Pretest Instructions	Test	Result	Corrective Action
1.51.1		Are there loose or damaged connections at the left tower boom angle sensor connector [X100]?	Yes	Repair any loose or damaged wires or connectors
			No	Go to step 1.51.2
1.51.2		Does the fault log show BOOM ANGLE SENSOR #1 COMMUNICATIONS FAULT before a power cycle?	Yes	Go to step 1.51.4
			No	Go to step 1.51.3
1.51.3	Turn on machine. Disconnect left tower boom angle sensor #2 connector [X100]	Is there 12VDC on left tower boom angle sensor #2 connector socket 1 [X100.1.soc] and socket 3 [X100.3.soc]?	Yes	Leave connector disconnected. Go to step 1.51.8.
			No	Go to step 1.51.4
1.51.4	Turn on machine. Backprobe between the 12-pin ground bus connector [X098] and 12-pin V-Batt+ bus connector [X097] by the BLAM. (See Backprobing on Pg. 319 for details on backprobing.)	Is there 12VDC between 12-pin V-Batt+ bus connector[X097] and 12-pin ground bus connector [X098]?	Yes	Repair/replace 12-pin V-Batt+ bus connector [X097] and/or 12-pin ground bus connector [X098].
			No	Leave machine on. Go to step 1.51.5.
1.51.5	Turn on machine. Disconnect 12-pin Deutsch connector [X058].	Is there 12VDC between 12-pin Deutsch socket 2 [X058.2soc] and socket 5 [X058.5.soc]?	Yes	Go to step 1.51.11
			No	Leave 12-pin Deutsch connector [X058] diconnected. Go to step 1.51.6.
1.51.6	Disconnect 12-pin Deutsch connector [X058] and Power Down Relay [X011]	Is there a short between 12-pin Deutsch connector socket 2 [X058.2.soc] and Power Down Relay socket 87 [X011.87.soc]?	Yes	Leave 12-pin Deutsch connector [X058] disconnected. Go to step 1.51.7.
			No	Repair/Replace harness between 12-pin Deutsch connector [X058], including the bus connector itself and the Power Down Relay [X011]
1.51.7	Disconnect 12-pin Deutsch connector [X058] and ground control module J3 [X008]	Is there a short between 12-pin Deutsch connector socket 2 [X058.2.soc] and ground control module J3 socket 3 [X008.3.soc]?	Yes	Ensure both contacts of the 12-pin Deutsch connector socket 2 [X058.2] are seated properly in the connector bodies and that there is continuity between all pins.
			No	Repair/replace harness and or connectors between 12-pin Deutsch connector [X058] and ground control module J3 socket 3 [X008.3]

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Note	Pretest Instructions	Test	Result	Corrective Action
1.51.8	Plug the tower boom angle sensor connector #1 (Right) [X099] into the #2 (left) sensor and the tower boom angle sensor #2 (Left) connector [X100] into the #1 (right) sensor. Read faults.	Does the BOOM ANGLE SENSOR #1 COMMUNICATIONS FAULT appear?	Yes	Replace sensor #2
			No	Go to step 1.51.9
1.51.9	Disconnect tower boom angle sensor #2 (Left) connector [X100] and BLAM J2 [X087]	Is there continuity between left angle sensor socket 2 [X100.2.soc] and BLAM J2 socket 8 [X087.8.soc]?	Yes	Go to step 1.51.11
			No	Leave the left angle sensor [X100] disconnected. Go to step 1.51.10.
1.51.10	Disconnect the left angle sensor [X100] and tower angle sensor 2 passthru [X096] (See Figure 2-7. Main Valve Area Connectors on Pg. 189 for location).	Is there continuity between left angle sensor socket 2 [X100.2.soc] and tower angle sensor 2 passthru [X096.2.soc]? Also, are the contacts free from damage?	Yes	Repair/replace harness between tower angle sensor 2 pass through [X096] and BLAM J2 [X087]
			No	Repair/replace harness between left angle sensor socket 2 [X100.2.soc] and tower angle sensor 2 passthru - 4 position [X096]
1.51.11	Disconnect the #2 left side tower boom angle sensor passthru - 4 position [X096]. Turn on the machine.	Is there 12VDC between the #2 left side tower boom angle sensor passthru pin 1 [X096.1.pin] and pin 3 [X096.3.pin]?	Yes	Leave the connector disconnected and machine on. Go to step 1.51.13
			No	Go to step 1.51.12
1.51.12	Disconnect battery busbar - 12 pos. [X097] and ground busbar - 12 pos. [X098]	Is there 12VDC between battery busbar socket 5 [X097.5.soc] and ANY of the sockets in ground busbar [X098]?	Yes	Repair/replace harness and or connectors between #2 left side tower boom angle sensor passthru [X096] and the 12-pin V-Batt+ bus connector sockets [X097] and/or 12-pin ground bus connector sockets [X098].
			No	Repair/replace harness and or connectors between battery busbar - 12 pos. [X097] and 12-pin Deutsch connector socket 2 [X058.2.soc] and/or the ground Busbar - 12 pos. [X098] and 12-pin Deutsch connector socket 5 [X058.5.soc]
1.51.13	Disconnect the #2 left side tower boom angle sensor [X100]. Turn on the machine.	Is there 12VDC between the #2 left side tower boom angle sensor harness connector closest to the sensor socket 1 [X100.1.soc] and socket 3 [X100.3.soc]?	Yes	Leave the connector disconnected. Go to step 1.51.14
			No	Repair/replace the harness and or connectors between the #2 left side tower boom angle sensor [X100] and #2 left side tower boom angle sensor passthru [X096].
1.51.14	Disconnect the #2 left side tower boom angle sensor [X100] and the BLAM connector J2 [X087]	Is there continuity between #2 left side tower boom angle sensor socket 2 [X100.2.soc] and the BLAM connector J2 socket 9 [X087.9.soc]? Also, are the contacts free from damage?	Yes	Reprogram/replace the BLAM
			No	Repair/replace harness and/or contacts as needed

1.52 BOOM LENGTH SENSOR #1 OUT OF RANGE HIGH

Flash Code: 8-4

Tower boom length sensor #1 out of range high. The BLAM module J3 input [X088.8] for tower boom length sensor #1 (Top) is reading over 4.95 volts. See 1.366 TWR LENGTH SENSOR ONE VALUE OUT OF RANGE HIGH on Pg. 167.

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1.53 BOOM LENGTH SENSOR #1 OUT OF RANGE LOW

Flash Code: 8-4

Tower boom length sensor #1 out of range low. The BLAM module J3 input [X088.8] for tower boom length sensor #1 (Top) is reading under 0.007 volts. See 1.367 TWR LENGTH SENSOR ONE VALUE OUT OF RANGE LOW on Pg. 168.

1.54 BOOM LENGTH SENSOR #2 OUT OF RANGE HIGH

Flash Code: 8-4

Tower boom length sensor #2 out of range high. The BLAM module J3 input [X088.11] for tower boom length sensor #2 (Bottom) is reading over 4.95 volts. See 1.368 TWR LENGTH SENSOR TWO VALUE OUT OF RANGE HIGH on Pg. 169.

1.55 BOOM LENGTH SENSOR #2 OUT OF RANGE LOW

Flash Code: 8-4

Tower boom length sensor #2 out of range low. The BLAM module J3 input [X088.11] for tower boom length sensor #2 (Bottom) is reading under 0.007 volts. See 1.369 TWR LENGTH SENSOR TWO VALUE OUT OF RANGE LOW on Pg. 170.

1.56 BOOM PREVENTED - DRIVE SELECTED

Flash Code: 2-5

Boom prevented - drive selected. Notification that ANALYZER ⇒ MACHINE SETUP ⇒ FUNCTION CUTOUT is set to BOOM CUTOUT and the machine is driving above elevation and a boom function is being attempted. Operate drive and boom separately or change the machine setup.

1.57 BOOM SENSORS NOT CALIBRATED

Flash Code: 9-9

Boom sensors not calibrated. The Boom sensors require calibration. See 5.1 Calibration Instructions on Pg. 289, Table 5-2. Calibrations Listed by Service Action on Pg. 289 and 5.8 Boom Sensor Calibration on Pg. 309 for more details. The machine will be in electrical retrieval mode until in transport position. Then, tower path control, controlled angle, auto main lift, main lift up, and tower lift up will be disabled.

Note	Pretest Instructions	Test	Result	Corrective Action
1.57.1	Read active faults	Are there any boom sensor faults?	Yes	Troubleshoot those faults first
			No	Go to step 1.57.2
1.57.2	Perform boom sensor calibration.	Does machine calibrate successfully?	Yes	Troubleshooting complete
			No	Troubleshoot in accordance with calibration fault

1.58 CAN DONGLE ATTACHED - HYDRAULICS NOT RESTRICTED

Flash Code: 2-5

CAN dongle attached - hydraulics not restricted. Notification the production dongle control tool is connected.

1.59 CHASSIS CAN COMMUNICATIONS LOST

Flash Code: 6-6

Chassis CAN communications lost. The system cannot communicate with the chassis module. This may be due to wiring problems between the chassis and ground module.

Note	Pretest Instructions	Test	Result	Corrective Action
1.59.1	Check fault log for other modules having lost communication	Have most modules lost communications?	Yes	See 1.93 EXCESSIVE CAN BUS COMMUNICATION ERRORS on Pg. 73
			No	Go to step 1.59.2

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Note	Pretest Instructions	Test	Result	Corrective Action
1.59.2		Is Chassis Power fuse [X267] blown? (Located by Aux Power Pump.)	Yes	Replace with 30A fuse. If it blows again immediately, repair the short to ground on terminals 30 and/or 87a of Chassis Power Relay [X266.30 X266.87a]. It it blows again, but only after turning on the machine, go to step 1.59.17
			No	Go to step 1.59.3
1.59.3	Disconnect the chassis module J1 connector [X229]. Turn on machine	Is there 11VDC or more between socket 5 and socket 4 of the chassis module J1 connector [X229.5.soc X229.4.soc]?	Yes	See 1.93 EXCESSIVE CAN BUS COMMUNICATION ERRORS on Pg. 73 fault step 1.93.3
			No	Keep machine on. Go to step 1.59.4
1.59.4	Disconnect the chassis module J1 connector [X229]. Turn on machine	Is there zero VDC between socket 5 and socket 4 of the chassis module J1 connector [X229.5.soc X229.4.soc]?	Yes	Keep machine on. Go to step 1.59.6
			No	Go to step 1.59.5
1.59.5	Remove any corrosion on battery terminals and battery cable terminals. Run machine to recharge battery.	Does battery still exhibit low power?	Yes	Replace battery
			No	Retry normal vehicle operation
1.59.6	Disconnect Lower Swivel connector [X216]. Turn on machine	Is there 11VDC or more between socket 4 and socket 5 of the Lower Swivel connector [X216.4.soc X216.5.soc]?	Yes	Inspect/repair/replace harness between the Lower Swivel connector [X216] and the chassis module J1 connector [X229]
			No	Go to step 1.59.7
1.59.7	Disconnect Upper Swivel connector [X083]. Turn on machine	Is there 11VDC or more between socket 4 and socket 5 of the Upper Swivel connector [X083.4.soc X083.5.soc]?	Yes	Repair/replace swivel harness or replace Swivel
			No	Go to step 1.59.8
1.59.8	Turn on machine	Is there 11VDC or more at the Chassis Power relay terminal 87 [X266.87]?	Yes	Repair/replace harness between the Upper Swivel connector [X083] and the Chassis Power relay terminal 87 [X266.87]
			No	Keep machine on. Go to step 1.59.9
1.59.9	Disconnect Chassis Power Relay [X266]. Turn on machine	Is there about 12 VDC at the Chassis Power relay terminal 30 [X266.30]?	Yes	Go to step 1.59.12
			No	Go to step 1.59.10
1.59.10	Remove the Chassis Power Fuse from the holder [X267]	Is there about 12 VDC at the relay side of the Chassis Power fuse holder [X267]?	Yes	Repair/replace harness between the Chassis Power fuse connector [X267] and the Chassis Power relay terminal 30 [X266.30]
			No	Go to step 1.59.11
1.59.11	Remove the Chassis Power Fuse from the holder [X267]	Is there about 12 VDC at the Auxiliary pump side of the Chassis Power fuse holder [X267]?	Yes	Replace the Chassis Power Fuse
			No	Repair/replace harness between the Chassis Power fuse connector [X267] and the battery positive [X116] through the Auxiliary Pump Relay positive terminal [X108]
1.59.12	Disconnect Chassis Power Relay [X266]. Turn on machine.	Is there about 12 VDC between socket 86 and socket 85 of the Chassis Power relay connector [X266.86.soc X266.85.soc]?	Yes	Replace Chassis Power relay
			No	Go to step 1.59.13
1.59.13	Disconnect the 2 position chassis power connector [X263]. Turn on machine	Is there about 12 VDC between socket 2 and socket 1 of the 2 position chassis power connector [X263.2.soc X263.1.soc]?	Yes	Repair/replace harness between the 2 position chassis power connector [X263] and the chassis power relay connector [X266]
			No	Go to step 1.59.14
1.59.14	Disconnect the 12 position BLAM passthru connector [X058]. Turn on machine	Is there about 12 VDC at pin 3 of the 12 position BLAM passthru connector [X058.3.pin]?	Yes	Go to step 1.59.15
			No	Go to step 1.59.16

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Note	Pretest Instructions	Test	Result	Corrective Action
1.59.15		Is there continuity between terminal 1 of the 2 position chassis power connector [X263.1] and the ground bus connector [X009]?	Yes	Repair/replace the YEL/RED 2-70-4 wire between the 2 position chassis power connector [X263.2] and the 12 position BLAM passthru connector [X058.3]
			No	Repair/replace the Black wire/harness between the 2 position chassis power connector [X263.1] and the ground bus connector [X009] or battery negative [X117]
1.59.16		Do the faults BOOM ANGLE SENSOR #1 COMMUNICATIONS FAULT and BOOM ANGLE SENSOR #2 COMMUNICATIONS FAULT both show in the fault log before a power cycle?	Yes	See 1.50 BOOM ANGLE SENSOR #1 COMMUNICATIONS FAULT on Pg. 54 to troubleshoot the power supply
			No	Repair/replace harness between the 12 position BLAM passthru connector [X058] and the 12-pin V-Batt+ bus connector [X097] and/or the 12-pin ground bus connector [X098]
1.59.17	Disconnect chassis module J1 connector [X229]	Is there a short to ground on socket 5 of chassis module J1 connector [X229.5.soc]?	Yes	Go to step 1.59.19
			No	Leave chassis module disconnected. Go to step 1.59.18
1.59.18	Disconnect chassis module J1 connector [X229]	Is there a short between pin 4 and pin 5 of the chassis module J1 connector [X229.4.pin X229.5.pin]?	Yes	Replace the chassis module
			No	Check the connections at the chassis module J1 connector [X229]
1.59.19	Disconnect Lower Swivel connector [X216]	Is there a short between pin 4 and pin 5 of the Lower Swivel connector [X216.4.pin X216.5.pin]?	Yes	Repair/replace Chassis harness between the Lower Swivel connector [X216] and chassis module J1 connector [X229]
			No	Go to step 1.59.20
1.59.20	Disconnect Upper Swivel connector [X083]	Is there a short between pin 4 and pin 5 of the Upper Swivel connector [X083.4.pin X083.5.pin]?	Yes	Repair Swivel harness or replace Swivel
			No	Go to step 1.59.21
1.59.21	Disconnect the chassis power relay connector [X266]	Is there a short between socket 87 of the Chassis Power Relay connector [X266.87.soc] and socket 85 of the Chassis Power Relay connector [X266.85.soc] or the negative side of the battery [X117]?	Yes	Repair/replace harness between the chassis power relay connector [X266] and the Upper Swivel connector [X083]
			No	Leave the chassis power relay connector disconnected. Go to step 1.59.22
1.59.22	Disconnect the chassis power relay connector [X266]	Is there a short between socket 30 of the Chassis Power Relay connector [X266.30.soc] and socket 85 of the Chassis Power Relay connector [X266.85.soc] or the negative side of the battery [X117]?	Yes	Repair/replace harness between the Chassis Power Relay [X266] and the Chassis Power Fuse [X267]
			No	Replace Chassis Power Relay

1.60 CHASSIS SENSOR SUPPLY OUT OF RANGE HIGH

Flash Code: 9-9

Chassis sensor supply out of range high. The supply voltage for steer angle sensors is above the expected range. A power cycle is required.

Note	Pretest Instructions	Test	Result	Corrective Action
1.60.1	Cycle power	Does fault clear?	Yes	Troubleshooting complete
			No	Go to step 1.60.2

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Note	Pretest Instructions	Test	Result	Corrective Action
1.60.2	Ensure all optional power sources are de-energized, including welding and off-board power.	Does fault clear?	Yes	Leave all optional power sources de-energized. Go to step 1.60.3.
			No	Go to step 1.60.4
1.60.3	Ensure all optional power sources are de-energized, including welding and off-board power.	Re-energize one source and re-check faults. Does fault re-appear?	Yes	Look for shorts in the harness for the system just energized to harness at chassis module J3.
			No	Go to "Test" box in this step. Repeat until source of fault is found.
1.60.4	Disconnect chassis module J3 [X231]. Turn on machine.	Is there between 5.5 V and 4.5 volts measured between the following points on chassis module J3: pin 1 [X231.1.pin] to pin 3 [X231.3.pin]; pin 4 [X231.4.pin] to pin 6 [X231.6.pin]; pin 7 [X231.7.pin] to pin 9 [X231.9.pin]; pin 10 [X231.10.pin] to pin 12 [X231.12.pin]?	Yes	Go to step 1.60.5
			No	Replace chassis module
1.60.5	Disconnect chassis module J3 [X231]. Disconnect battery (+) terminal [X116]	Is there a short between the battery (+) terminal [X116] and any of the following: chassis module J3, socket 1 [X231.1.soc], socket 4 [X231.4.soc], socket 7 [X231.7.soc], or socket 10 [X231.10.soc]?	Yes	Troubleshoot chassis module J3 [X231] harness wire with short
			No	Reprogram/replace chassis module

1.61 CHASSIS SENSOR SUPPLY OUT OF RANGE LOW

Flash Code: 9-9

Chassis sensor supply out of range low. The supply voltage for chassis steer angle sensors is below the expected range. A power cycle is required.

Note	Pretest Instructions	Test	Result	Corrective Action
1.61.1	Cycle power	Does fault clear?	Yes	Troubleshooting complete
			No	Go to step 1.61.2
1.61.2	Disconnect chassis module J3 [X231]. Turn on machine.	Is there between 5.5 V and 4.5 volts measured between the following points on chassis module J3: pin 1 [X231.1.pin] to pin 3 [X231.3.pin]; pin 4 [X231.4.pin] to pin 6 [X231.6.pin]; pin 7 [X231.7.pin] to pin 9 [X231.9.pin]; pin 10 [X231.10.pin] to pin 12 [X231.12.pin]?	Yes	Go to step 1.61.3
			No	Replace chassis module
1.61.3	Disconnect chassis module J3 [X231]. Disconnect battery - terminal [X117]	Is there a short between the battery (-) terminal [X117] and any of the following: chassis module J3, socket 1 [X231.1.soc], socket 4 [X231.4.soc], socket 7 [X231.7.soc], or socket 10 [X231.10.soc]?	Yes	Troubleshoot chassis module J3 [X231] harness wire with short
			No	Reprogram/replace chassis module

1.62 CHASSIS TILT SENSOR GAIN OUT OF RANGE

Flash Code: 9-9

Chassis tilt sensor gain out of range. Chassis tilt sensor calibration information has been corrupted. This calibration data is programmed into the ground module during its manufacture, not in the field.

Note	Pretest Instructions	Test	Result	Corrective Action
1.62.1	Cycle power	Does fault clear?	Yes	Troubleshooting complete
			No	Replace ground module

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1.63 CHASSIS TILT SENSOR NOT CALIBRATED

Flash Code: 8-1

Chassis tilt sensor not calibrated. Notification that the chassis tilt sensor calibration information has been lost. Machine will indicate that it is tilted at all times. Perform tilt calibration. See 5.7 Calibrating Tilt Sensor on Pg. 307.

1.64 CHASSIS TILT SENSOR NOT GAIN CALIBRATED

Flash Code: 9-9

Chassis tilt sensor not gain calibrated. Chassis tilt sensor calibration information has been lost. Machine will indicate that it is tilted at all times. This calibration data is programmed into the ground module during its manufacture, not in the field.

Note	Pretest Instructions	Test	Result	Corrective Action
1.64.1	Cycle power	Does fault clear?	Yes	Troubleshooting complete
			No	Replace ground module

1.65 CHASSIS TILT SENSOR OUT OF RANGE

Flash Code: 0-0

Chassis tilt sensor out of range. Chassis tilt sensor has indicated a tilt angle greater than 19° for more than 4 seconds.

Note	Pretest Instructions	Test	Result	Corrective Action
1.65.1	Put machine on level surface	Did fault clear?	Yes	Normal operation. Troubleshooting complete.
			No	Go to step 1.65.2
1.65.2	Perform Tilt calibration. See 5.7 Calibrating Tilt Sensor on Pg. 307.	Did it calibrate successfully?	Yes	Troubleshooting complete
			No	Replace ground module

1.66 COLD START ADVANCE SOLENOID OPEN CIRCUIT

Flash Code: 3-3

Cold start advance solenoid open circuit. This fault should never occur on properly configured machines. Reload ground module software or replace the ground module.

1.67 COLD START ADVANCE SOLENOID SHORT TO BATTERY

Flash Code: 3-3

Cold start advance solenoid short to battery. This fault should never occur on properly configured machines. Reload ground module software or replace the ground module.

1.68 COLD START ADVANCE SOLENOID SHORT TO GROUND

Flash Code: 3-3

Cold start advance solenoid short to ground. This fault should never occur on properly configured machines. Reload ground module software or replace the ground module.

1.69 COOLANT TEMPERATURE SHORT TO GROUND

Flash Code: 4-3

Coolant temperature short to ground. This fault is only active for machines configured with older non-ECM Deutz engines. The engine coolant temperature input [X001.14] is shorted to ground.

1.70 CYL ANGLE SENSOR/SW DISAGREEMENT

Flash Code: 8-4

Tower cylinder angle sensor/switch disagreement. The BLAM module reads the tower lift cylinder angle from the tower lift cylinder angle sensor [X092]. The BLAM module transmits this angle over the CAN bus to the ground module. As a commu-

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nications backup, the BLAM module also sets a digital output [X090.4] to the ground module [X007.22] high if the tower lift cylinder angle sensor raw reading is at or below the stored elevation point recorded during calibration. The ground module treats this digital input as a switch. This fault occurs when this digital input t to the ground module disagrees with the tower lift cylinder angle sensor [X092] data from the CAN bus. If CAN communications are operating properly, this probably means there is a problem with the digital signal line between the ground and BLAM modules.

Note	Pretest Instructions	Test	Result	Corrective Action
1.70.1		Ensure the tower lift cylinder angle sensor [X092] is mounted properly, the keeper pin on cylinder pin is in tact and that the Pilot Adapter is installed. Is fault still present?	Yes	Go to step 1.70.2
			No	Troubleshooting complete.
1.70.2	Disconnect BLAM J5 [X090] and ground module J7 [X007]	Is there continuity between BLAM J5 socket 4 [X090.4.soc] and ground module J7 socket 22 [X090.22.soc]?	Yes	Go to step 1.70.5
			No	Leave connectors disconnected. Go to step 1.70.3
1.70.3	Disconnect BLAM J5 [X090], ground module J7 [X007] and BLAM pump passthru [X106].	Is there continuity between BLAM J5 socket 4 [X090.4.soc] and pump passthru socket 5 [X106]?	Yes	Leave ground module J7 [X007] and BLAM pump passthru [X106] disconnected. Go to step 1.70.4
			No	Repair/replace harness between BLAM J5 [X090] and BLAM pump passthru [X106]
1.70.4	Disconnect ground module J7 [X007] and BLAM pump passthru [X106].	Is there continuity between ground module J7 socket 22 [X007.22.soc] and BLAM pump passthru pin 5 [X106.5.pin]?	Yes	Go to 1.70.5
			No	Repair/replace harness between ground module J7 [X007] and BLAM pump passthru [X106]
1.70.5	Perform 5.8 Boom Sensor Calibration on Pg. 309	Receive calibration failure message: CYL ANGL FAULT?	Yes	Replace Cylinder Angle sensor and recalibrate.
			No	Retain calibration failure message if any. Go to step 1.70.6
1.70.6		Any other calibration failure message?	Yes	Troubleshoot in accordance with calibration fault
			No	Troubleshooting complete

1.71 CYLINDER LOAD PIN CAN COMMUNICATIONS LOST

Flash Code: 6-6

Cylinder load pin CAN communications lost. The system cannot communicate with the cylinder load pin. This may be due to wiring problems between the cylinder load pin and BLAM module.

Note	Pretest Instructions	Test	Result	Corrective Action
1.71.1		Is the EXCESSIVE CAN BUS COMMUNICATION ERRORS fault active in the fault log?	Yes	Troubleshoot 1.93 EXCESSIVE CAN BUS COMMUNICATION ERRORS on Pg. 73 first
			No	Go to step 1.71.2
1.71.2		Does the BLAM software version show "??" in ANALYZER ⇒ DIAGNOSTICS ⇒ VERSIONS ⇒ B.L.A. MODULE SOFTWARE:?	Yes	See 1.46 BLAM CAN COMMUNICATIONS LOST on Pg. 48
			No	Go to step 1.71.3
1.71.3	Disconnect the load pin connector [X062]. Turn on the machine	Does the voltage between socket A and socket B of the load pin connector [X062.A.soc X062.B.soc] measure 12VDC?	Yes	Go to step 1.71.5
			No	Go to step 1.71.4
1.71.4	Backprobe terminal 1 and terminal 2 of the BLAM module J4 connector [X089.1 X089.2]	Does the voltage between terminal 1 and terminal 2 of the BLAM module J4 connector [X089.1 X089.2] measure 12VDC?	Yes	Repair the WHITE and/or GREEN wires between terminal 1 and terminal 2 of the BLAM module J4 connector [X089.1 X089.2] and terminals A and B of the load pin connector [X062.A X062.B]
			No	Replace the BLAM module

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Note	Pretest Instructions	Test	Result	Corrective Action
1.71.5	Backprobe terminal 3, terminal 4, and terminal 5 of the BLAM module J4 connector [X089.3 X089.4 X089.5]	Does the CAN resistance between terminal 3 and terminal 4 of the BLAM module J4 connector [X089.3 X089.4] measure 60Ω and open circuit between terminal 3 and shield on terminal 5 [X089.3 X089.5] and open circuit between terminal 4 and shield on terminal 5 [X089.4 X089.5]?	Yes	Go to step 1.71.6
			No	See 1.46 BLAM CAN COMMUNICATIONS LOST on Pg. 48
1.71.6	Disconnect the load pin connector [X062] and the BLAM module J4 connector [X089].	Is there CAN HI continuity between socket D of the load pin connector [X062.D.soc] and socket 3 of the BLAM module J4 connector [X089.3.soc] and CAN LO continuity between socket E of the load pin connector [X062.E.soc] and socket 4 of the BLAM module J4 connector [X089.4.soc]?	Yes	Replace the load pin
			No	Check the RED, BLACK, and Shield wires between the load pin connector [X062.D X062.E] and the BLAM module J4 connector [X089.3 X089.4]

1.72 D/S JOY. CENTER TAP BAD

Flash Code: 2-2

Drive/Steer joystick center tap bad. The drive joystick center tap input [X168.2] is not reading the correct voltage, +/- 10% from the reference voltage middle point.

1.73 D/S JOY. OUT OF RANGE HIGH

Flash Code: 2-2

Drive/Steer joystick out of range high. The drive joystick input [X168.3] is above the working voltage range.

1.74 D/S JOY. OUT OF RANGE LOW

Flash Code: 2-2

Drive/Steer joystick out of range low. The drive joystick input [X168.3] is below the working voltage range.

1.75 DCAP LEN SW DISAGREEMENT

Flash Code: 8-4

Dual Capacity Length Switch Disagreement. The two main boom dual capacity limit switches are reading the same state. As in Figure 2-2. Dual Capacity / Transport Switch Mounting on Pg. 179 and Table 2-3. Switch States / Boom Length Regions on Pg. 179, the dual capacity limit switches should always read opposite, except at the B/C transition.

Note	Pretest Instructions	Test	Result	Corrective Action
1.75.1	Access the dual capacity switches #1 [X052] and #2 [X053].	Are any of these switches stuck or frozen?	Yes	Clean/repair/replace as needed.
			No	Keep access to the switches. Go to step 1.75.2
1.75.2	Access the dual capacity switches #1 [X052] and #2 [X053]. Fully retract the boom. Note the cams that the switch levers ride upon on the side of the fly boom.	Are the switches and cam strips mounted so that the switch levers engage the entire length of cam? Also, are the switch levers mounted at 90° to housing as seen when not engaging a cam?	Yes	Keep access to the switches. Go to step 1.75.3
			No	Repair as needed
1.75.3	Access the dual capacity switches #1 [X052] and #2 [X053].	Are both switches off cam?	Yes	Check for mechanical failure of the boom telescope cylinder mechanism.
			No	Keep access to switches. Keep machine on. Go to step 1.75.4

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Note	Pretest Instructions	Test	Result	Corrective Action
1.75.4	Turn on machine and switch to 500 lb. mode. Ground the meter to clean, non-painted metal surface on boom. (See Section 6. Multimeter Basics on Pg. 319 for details on "grounding the meter".) Access black and white wires in the dual capacity switches #1 [X052] and #2 [X053].	Move boom such that switch #1 (top) is off cam and switch #2 (bottom) is on cam. Switch #1 should measure 12VDC on white and 12 VDC on black. Switch #2 should measure 9VDC on white and 12 VDC on black. Move boom such that switch #1 (top) is on cam and switch #2 (bottom) is off cam. Switch #1 should measure 12VDC on white and 9 VDC on black. Switch #2 should measure 12VDC on white and 12 VDC on black. Do switches respond correctly?	Yes	Keep machine on and switched to 500 lb. mode. Go to step 1.75.5 .
			No	Keep access to switch wires, machine on and switched to 500 lb. mode. Go to step 1.75.6 .
1.75.5	Turn on machine and switch to 500 lb. mode. Ground the meter to clean, non-painted metal surface near MTB passthru - 21 position [X042] and ground control module. Take the following readings by backprobing the contact in question. (See Section 6. Multimeter Basics on Pg. 319 for backprobing details.)	Move boom such that switch #1 (top) is off cam and switch #2 (bottom) is on cam. MTB passthru - 21 position contact B [X042.B] should measure 12VDC. Switch #1 should make ground control module J4 contact 18 [X004.18] measure 12 VDC. Switch #2 should make ground control module J4 contact 6 [X004.6] measure 9VDC. Move boom such that switch #1 (top) is on cam and switch #2 (bottom) is off cam. MTB passthru - 21 position contact B [X042.B] should measure 12VDC. Switch #1 should make ground control module J4 contact 18 [X004.18] measure 9 VDC. Switch #2 should make ground control module J4 contact 6 [X004.6] measure 12VDC. Are voltages correct?	Yes	Reprogram/replace ground control module
			No	Go to step 1.75.12
1.75.6	Access switch wire terminals. Disconnect dual capacity switch passthru - 3 position [X046] near left main rotary angle sensor [X049]. Turn on machine and switch to 500 lb. mode.	Move boom such that switch #1 is off cam and switch #2 is on cam. Is there continuity between switch #1 terminals 21 and 22?	Yes	Keep machine in same condition. Go to step 1.75.7 .
			No	Replace switch dual capacity switch #1
1.75.7	Access terminals in dual capacity switches #1 [X052] and #2 [X053]. Disconnect dual capacity switch passthru - 3 position [X046]. Turn on machine and switch to 500 lb. mode.	Move boom such that switch #1 is off cam and switch #2 is on cam. Is there continuity between switch #2 terminals 21 and 22?	Yes	Replace switch dual capacity switch #2
			No	Go to step 1.75.8 .
1.75.8	Access terminals in dual capacity switches #1 [X052] and #2 [X053]. Disconnect dual capacity switch passthru - 3 position [X046]. Turn on machine and switch to 500 lb. mode.	Move boom such that switch #1 is on cam and switch #2 is off cam. Is there continuity between switch #1 terminals 21 and 22?	Yes	Replace switch dual capacity switch #1
			No	Keep machine in same condition. Go to step 1.75.9 .

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Note	Pretest Instructions	Test	Result	Corrective Action
1.75.9	Access terminals in dual capacity switches #1 [X052] and #2 [X053]. Disconnect dual capacity switch passthru - 3 position [X046]. Turn on machine and switch to 500 lb. mode.	Move boom such that switch #1 is on cam and switch #2 is off cam. Is there continuity between switch #2 terminals 21 and 22?	Yes	Keep access switch terminals. Go to step 1.75.10 .
			No	Replace switch dual capacity switch #2
1.75.10	Turn on machine. Access terminals in dual capacity switches #1 [X052] and #2 [X053]. Take the following readings by grounding meter near switches.	Is there 12 VDC on switch #1 terminal 22 and on switch #2 terminal 21?	Yes	Keep machine on. Go to step 1.75.14 .
			No	Keep machine on. Go to step 1.75.11 .
1.75.11	Turn on machine. Take the following readings by back-probing and grounding meter near connector.	Is there 12 VDC on turntable passthru - 21 position contact B [X044.B]?	Yes	Keep machine on. Go to step 1.75.12 .
			No	Keep machine on. Go to step 1.75.13
1.75.12	Turn on machine. Take the following readings by back-probing and grounding meter near connector.	Is there 12 VDC on dual capacity switch passthru contact A [X046.A]?	Yes	Repair/replace harness between dual capacity switch passthru [X046] and any dual capacity switch that didn't have the proper voltage in step 1.75.10
			No	Repair/replace harness between dual capacity switch passthru [X046] and turntable passthru - 21 position [X044]
1.75.13	Turn on machine. Take the following readings by back-probing and grounding meter near connector.	Is there 12 VDC on MTB passthru - 21 position contact B [X042.B]?	Yes	Repair/replace harness between MTB passthru - 21 position [X042] and turntable passthru - 21 position [X044]
			No	Repair/replace harness between MTB passthru - 21 position [X042] and Power Down Relay [X011]
1.75.14	Turn on machine and switch to 500 lb. mode. Take the following readings by back-probing and grounding meter near connector.	Move boom such that switch #1 is on cam and switch #2 is off cam. Is there 12VDC on MTB passthru - 21 position contact M [X042.M]?	Yes	Keep machine in same condition. Go to step 1.75.15
			No	Repair/replace harness between MTB passthru - 21 position [X042] and turntable passthru - 21 position [X044]
1.75.15	Turn on machine and switch to 500 lb. mode. Take the following readings by back-probing and grounding meter near connector.	Move boom such that switch #1 is on cam and switch #2 is off cam. Is there 12VDC on ground control module J4 contact 6 [X004.6]?	Yes	Keep machine in same condition. Go to step 1.75.16 .
			No	Repair/replace harness between MTB passthru - 21 position [X042] and ground control module J4 [X004].
1.75.16	Turn on machine and switch to 500 lb. mode. Take the following readings by back-probing and grounding meter near connector.	Move boom such that switch #1 is off cam and switch #2 is on cam. Is there 12VDC on turntable passthru - 21 position contact L [X044.L]?	Yes	Keep machine in same condition. Go to step 1.75.18
			No	Keep machine in same condition. Go to step 1.75.17
1.75.17	Turn on machine and switch to 500 lb. mode. Take the following readings by back-probing and grounding meter near connector.	Move boom such that switch #1 is off cam and switch #2 is on cam. Is there 12VDC on dual capacity switch passthru - 3 position contact B [X046.B]?	Yes	Repair/replace harness between turntable passthru - 21 position [X044] and dual capacity switch passthru - 3 position [X046]
			No	Repair/replace harness between and dual capacity switch #1 and dual capacity switch passthru - 3 position [X046]

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Note	Pretest Instructions	Test	Result	Corrective Action
1.75.18	Turn on machine and switch to 500 lb. mode. Take the following readings by back-probing and grounding meter near connector.	Move boom such that switch #1 is off cam and switch #2 is on cam. Is there 12VDC on MTB passthru - 21 position contact L [X042.L]?	Yes	Keep machine in same condition. Go to step 1.75.19
			No	Repair/replace harness between MTB passthru - 21 position [X042] and turntable passthru - 21 position [X044]
1.75.19	Turn on machine and switch to 500 lb. mode. Take the following readings by back-probing and grounding meter near connector.	Move boom such that switch #1 is off cam and switch #2 is on cam. Is there 12VDC on ground control module J4 contact 18 [X004.18]?	Yes	Reprogram/replace ground control module.
			No	Repair/replace harness between MTB passthru - 21 position [X042] and ground control module J4 [X004].

1.76 DISCONNECT ANALYZER AND CYCLE EMS TO PERFORM BOOM RETRIEVAL

Flash Code: 2-5

Disconnect analyzer and cycle ems to perform boom retrieval. The ground module has detected that it needs to use the backup communications link to the BLAM module but an analyzer is connected. Remove the analyzer and cycle power.

1.77 DRIVE & BOOM PREVENTED - PLATFORM OVERLOADED

Flash Code: 8-2

Drive & boom prevented - platform overloaded. Only applies to machines configured with platform load sensing. Drive and boom functions will be prevented while the platform is overloaded.

1.78 DRIVE CRACKPOINTS NOT CALIBRATED

Flash Code: 9-9

Drive crackpoints not calibrated. The drive valves require a calibration that has not been performed.

Note	Pretest Instructions	Test	Result	Corrective Action
1.78.1		Are there any Drive faults?	Yes	Troubleshoot those first
			No	Go to step 1.78.2
1.78.2	Perform dive calibration. See 5.3 Calibrating Drive on Pg. 292.	Did calibration complete successfully?	Yes	Troubleshooting complete
			No	Go to step 1.78.3
1.78.3		Were there any calibration faults?	Yes	Troubleshoot all calibration faults
			No	Go to step 1.78.4
1.78.4	Tee in a 1000 psi pressure gauge next to the pressure switch on the traction control valve manifold	While drive is activated in the transport position does the gauge read about 500 psi?	Yes	Replace the ground module
			No	Go to step 1.78.5
1.78.5	Connect a 1000 psi pressure gauge to the MP port on the traction control valve manifold	With the machine idling, can the pressure be adjusted with the adjacent charge relief valve so that the gauge reads 500psi?	Yes	Replace the axle lockout valve cartridge
			No	Go to step 1.78.6
1.78.6	Disconnect, plug and cap all four drive hoses at the top of the swivel (ports 3, 4, 5, and 6). Tee in a gauge with the hoses at the charge (pressure) filter (on engine side). Plug open lines.	Start engine and let it idle. Ensure hydraulic oil has been warmed up. Does the gauge read about 500psi?	Yes	Reassemble, but keep gauge installed. Go to step 1.78.8.
			No	Shut down, and reassemble, but keep gauge installed. Go to step 1.78.7.

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Note	Pretest Instructions	Test	Result	Corrective Action
1.78.7	Tee in a gauge with the hoses at the charge filter. Disconnect the front drive pump charge pressure lines (ports Fa and Fe). A jumper hose between the fittings on the pump is required to prevent pump damage.	Start engine and let it idle. Ensure hydraulic oil has been warmed up. Does the gauge read about 500psi?	Yes	Repair/replace right side drive pump
			No	Repair/replace left side drive pump.
1.78.8	Disconnect, plug and cap all four drive hoses at the bottom of the swivel (ports 3, 4, 5, and 6). Tee in a gauge with the hoses at the charge filter. Plug open lines.	Start engine and let it idle. Ensure hydraulic oil has been warmed up. Does the gauge read about 500psi?	Yes	Shut down, and reassemble, but keep gauge installed. Go to step 1.78.9.
			No	Repair seals in swivel.
1.78.9	Disconnect hoses to traction valve ports A3, a4, A5, A6, B3, B4, B5, and B6. Plug/cap open lines and ports. Tee a gauge in with the hoses at the charge filter.	Start engine and let it idle. Ensure hydraulic oil has been warmed up. Does the gauge read about 500psi?	Yes	Repair drive motor leakage or replace drive motor.
			No	Repair/replace traction valve.

1.79 DRIVE LOCKED - JOYSTICK MOVED BEFORE FOOTSWITCH

Flash Code: 2-2

Drive locked - joystick moved before footswitch. Notification that drive was selected before and during footswitch signal [X007.15] closure. Can be reported during power-up sequence. Allow the joystick to return to neutral before activating the footswitch. This may also indicated a problem with the footswitch wiring.

1.80 DRIVE PREVENTED - ABOVE ELEVATION

Flash Code: 2-5

Drive prevented - above elevation. Notification that drive was selected while above elevation and drive cutout is configured to prevent drive.

1.81 DRIVE PREVENTED - BOOM SELECTED

Flash Code: 2-5

Drive prevented - boom selected. Notification that drive was selected while a boom function was selected and drive cutout is configured to prevent simultaneous drive & boom operation.

1.82 DRIVE PREVENTED - TILTED & ABOVE ELEVATION

Flash Code: 2-5

Drive prevented - tilted & above elevation. Notification that drive was selected while tilted and above elevation and tilt is configured to cutout drive.

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1.83 EEPROM FAILURE - CHECK ALL SETTINGS

Flash Code: 9-9

EEPROM failure - check all settings. A critical failure occurred with the EEPROM. Personalities, machine configuration digits, etc. may be reset to default values and should be checked. A power cycle is required. This can occur if new software that adds a personality or other configurations, is downloaded to the machine.

Note	Pretest Instructions	Test	Result	Corrective Action
1.83.1	Cycle power	Does fault clear?	Yes	Troubleshooting complete
			No	Reprogram/replace ground module

1.84 ELECTRIC PUMP OPEN CIRCUIT

Flash Code: 3-3

Electric pump open circuit. This fault should never occur on properly configured machines. Reload ground module software or replace the ground module.

1.85 ELECTRIC PUMP SHORT TO BATTERY

Flash Code: 3-3

Electric pump short to battery. This fault should never occur on properly configured machines. Reload ground module software or replace the ground module.

1.86 ELECTRIC PUMP SHORT TO GROUND

Flash Code: 3-3

Electric pump short to ground. This fault should never occur on properly configured machines. Reload ground module software or replace the ground module.

1.87 ENGINE CONTROLLER CAN COMMUNICATIONS LOST

Flash Code: 6-6

Engine controller CAN communications lost. The ground module is not receiving CAN messages from the engine controller.

Note	Pretest Instructions	Test	Result	Corrective Action
1.87.1		Is the EXCESSIVE CAN BUS COMMUNICATION ERRORS fault active in the fault log?	Yes	Troubleshoot 1.93 EXCESSIVE CAN BUS COMMUNICATION ERRORS on Pg. 73 first
			No	Go to step 1.87.2
1.87.2		Does the BLAM software version show "??" in ANALYZER ⇒ DIAGNOSTICS ⇒ VERSIONS ⇒ B.L.A. MODULE SOFTWARE:?	Yes	See 1.46 BLAM CAN COMMUNICATIONS LOST on Pg. 48
			No	Go to step 1.87.3
1.87.3	Disconnect the EMR2 ECU equipment connector [X240]. Turn on the machine	Does the voltage between socket 14 and socket 1 of the EMR2 ECU equipment connector [X240.14.soc X240.1.soc] measure 12VDC?	Yes	Go to step 1.87.5
			No	Go to step 1.87.4
1.87.4	Backprobe between any terminal of the MTB power bus connector [X010] and terminal 8 of the ground module J1 connector [X001.8]	Does the voltage between any terminal of the MTB power bus connector [X010] and terminal 8 of the ground module J1 connector [X001.8] measure 12VDC?	Yes	Repair the YEL/RED 2-1-99 wire between he MTB power bus connector [X010] and terminal 14 of the EMR2 ECU equipment connector [X240.14] and/or the black wire between terminal 1 of the EMR2 ECU equipment connector [X240] and terminal 8 of the ground module J1 connector [X001.8]
			No	Check the connections, make sure the machine is turned on, and return to step 1.87.3. If the problem persists, replace the ground module

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Note	Pretest Instructions	Test	Result	Corrective Action
1.87.5	Backprobe terminal 12 and terminal 13 of the EMR2 ECU equipment connector [X240]	Does the CAN resistance between terminal 12 and terminal 13 of the EMR2 ECU equipment connector [X240] measure 60Ω?	Yes	Go to step 1.87.6
			No	See 1.46 BLAM CAN COMMUNICATIONS LOST on Pg. 48
1.87.6	Disconnect the EMR2 ECU equipment connector [X240] and the BLAM module J4 connector [X089]. See 6.2 Continuity Measurement Over Long Distances on Pg. 321.	Is there CAN HI continuity between socket 12 of the EMR2 ECU equipment connector [X240.12.soc] and socket 3 of the BLAM module J4 connector [X089.3.soc] and CAN LO continuity between socket 13 of the EMR2 ECU equipment connector [X240.13.soc] and socket 4 of the BLAM module J4 connector [X089.4.soc]?	Yes	Replace the engine module
			No	Go to step 1.87.7
1.87.7	Disconnect the EMR2 ECU equipment connector [X240] and the CAN pass thru for EMR2 - 3 position connector [X268]. See 6.2 Continuity Measurement Over Long Distances on Pg. 321.	Is there CAN HI continuity between socket 12 of the EMR2 ECU equipment connector [X240.12.soc] and pin A of the CAN pass thru for EMR2 - 3 position connector [X268.A.pin] and CAN LO continuity between socket 13 of the EMR2 ECU equipment connector [X240.13.soc] and pin B of the CAN pass thru for EMR2 - 3 position connector [X268.B.pin]?	Yes	Replace the valve harness between the BLAM module J4 connector [X089] and the CAN pass thru for EMR2 - 3 position connector [X268]
			No	Check the RED and BLACK wires between the EMR2 ECU equipment connector [X240.12 X240.13] and the CAN pass thru for EMR2 - 3 position connector [X268.A X268.B]

1.88 ENGINE SHUTDOWN - AXLE LOCKOUT VALVE FAULT

Flash Code: 8-6

Engine shutdown - axle lockout valve fault. The control system detected a short to battery or open circuit on the axle lockout valve and detects pressure on the pressure switch and the boom is out of transport position. Engine starting will be prevented while this fault is active. Use auxiliary power to lower the boom to transport. See 1.265 RESTRICTED TO TRANSPORT - AXLE LOCKOUT VALVE STB OR OC on Pg. 134.

1.89 ENGINE TROUBLE CODE

Flash Code: 4-3

Engine trouble code. This fault text is followed by the engine's specific fault code. This code could represent engine faults like low oil pressure warning, high coolant temperature warning, etc. See Table 1-1. Common Deutz Engine Fault Codes on Pg. 70 or consult the engine control module manual to interpret the engine specific fault code.

Table 1-1. Common Deutz Engine Fault Codes

Fault Code using JLG Analyzer	Fault Code using Deutz SERDIA	Fault Description	Cause	Results	Troubleshooting Engine	Troubleshooting Machine
190:8	1	Speed sensor	Engine speed sensor failure OR Gap from sensor tip to ringgear too large OR Additional incorrect impulses received OR Wiring to sensor interrupted.	Loss of engine speed signal will cause the engine to shut down or not start.	Check distance from sensor to ringgear. Check for contamination on sensor end. Check wiring connection. Check sensor located at flywheel housing and replace if required.	

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Table 1-1. Common Deutz Engine Fault Codes

Fault Code using JLG Analyzer	Fault Code using Deutz SERDIA	Fault Description	Cause	Results	Troubleshooting Engine	Troubleshooting Machine
100:2	8	Oil Pressure	Fault at corresponding sensor OR wiring connection has a short circuit or open circuit.	The engine will continue operating with the failure of either Oil Pressure or Coolant Temperature sensors. However with a failure of the sensor, the associated monitoring function is de-activated	Check relevant sensor replace if required. Check relevant wiring and connections between sensor and ECU.	
110:2	9	Coolant temperature				
100:1	30	Oil Pressure warning	Engine Oil Pressure has fallen below acceptable value.	Fault message occurs. Engine may also shutdown depending on JLG Machine programming	Check engine oil level. Check oil pressure sensor and wiring. Check engine for other possible mechanical causes. The engine has a 12 second monitoring delay on startup, so proceed carefully not to cause further low oil pressure damage to engine on repeated start attempts	Depending on Machine Programming the engine will either Shutdown OR only give a warning
110:0	31	Coolant Temperature warning	Engine Oil Temperature has exceeded acceptable value.	Fault message occurs. Engine may also shutdown depending on JLG Machine programming. Fault will disappear when Oil Temperature drops below preset recovery temperature.	Check engine oil level. Check Oil temperature sensor and wiring. Check cooling system for leaks or contamination, etc.	Depending on Machine Programming the engine will either Shutdown OR only give a warning
702:14	35	Overspeed warning (with thrust mode operation).	Engine RPM was or is above maximum allowed rpm limit limit. "Thrust mode" function is active	If engine exceeds maximum rpm set point (3300 rpm) the fuel rack is set to zero position until engine speed returns below acceptable recovery speed (2810 rpm).	If condition persists: Check fuel rack. Check actuator and replace if required. Check wiring to actuator. Check engine speed sensor, ringgear teeth, etc.	Check for external environmental conditions that could cause engine overspeed condition

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Table 1-1. Common Deutz Engine Fault Codes

Fault Code using JLG Analyzer	Fault Code using Deutz SERDIA	Fault Description	Cause	Results	Troubleshooting Engine	Troubleshooting Machine
100:1	40	Oil pressure switch off	Oil pressure below switch-off limit.	Normally this would cause an Emergency stop of the engine. But EMR is not programmed to directly shutdown the engine in JLG machines. Only if the JLG machine is programmed to shutdown will this occur	See Oil Pressure Warning info	
110:0	41	Coolant temperature switch-off	Oil temperature has exceeded switch off limit	Normally this would cause an Emergency stop of the engine. But EMR is not programmed to directly shutdown the engine in JLG machines. Only if the JLG machine is programmed to shutdown will this occur	See Coolant Temperature Warning info	
91:11	67	Error Hand Setp1	Loss of CAN bus input.	Engine will only run at constant speed of 1835 rpm	Check CAN connection and wiring connection entering engine ECU from machine. Check ECU for proper CAN bus data flow and correct programming.	Check relevant wiring and connections between machine and ECU for open or short circuit. Check Terminating resistor in machine wiring
898:2	68	Error CAN Setp1				
743:12	70	CAN-Bus controller	Controller for CAN-bus is faulty. Fault removal despite reinitializing continuously not possible.	Engine will shutdown or not restart OR Engine will only run at constant speed of 1835 rpm		
743:9	71	CAN interface SAE J 1939	Overflow in input buffer or a transmission cannot be placed on the bus.			
743:14	74	CAN Passive error	Open or Short circuit in wiring	Engine will shutdown or not restart OR engine will only run at constant speed of 1835 rpm	Check CAN connection and wiring connection entering engine ECU from machine.	

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1.90 ENVELOPE CONTROL DISABLED

Flash Code: 9-9

Envelope control disabled. The user has forced envelope control off with the analyzer from access level 0. This can happen if calibration procedure is not followed properly.

Note	Pretest Instructions	Test	Result	Corrective Action
1.90.1	Perform 5.8 Boom Sensor Calibration on Pg. 309 then cycle power.	Did fault clear?	Yes	Troubleshooting complete
			No	Reprogram/replace ground module

1.91 ENVELOPE ENCROACHED - HYDRAULICS SUSPENDED

Flash Code: 0-0

Envelope encroached - hydraulics suspended. The system detected a violation of the safe operating area envelope. If platform is stuck in the air call JLG for help.

Note	Pretest Instructions	Test	Result	Corrective Action
1.91.1		Is the platform stuck in the air?	Yes	Call JLG for help
			No	Go to step 1.91.2
1.91.2	Perform boom sensor calibration	Did calibration complete successfully?	Yes	Go to step 1.91.3
			No	Troubleshoot according to calibration fault
1.91.3	Perform Chassis Tilt calibration	Did calibration complete successfully?	Yes	Troubleshooting complete
			No	Troubleshoot according to calibration fault

1.92 EVERYTHING OK

Flash Code: 0-0

Everything OK. The "normal" help message when the analyzer is plugged into the platform. No troubleshooting is needed.

1.93 EXCESSIVE CAN BUS COMMUNICATION ERRORS

Flash Code: 6-6

Excessive CAN bus communication errors. More than 500 bus off or more than 500 bus passive conditions have been detected by the ground module in the current power cycle. This could be due to faulty bus wiring or termination resistors, capacitance on the bus, or a module not communicating.

Note	Pretest Instructions	Test	Result	Corrective Action
1.93.1		Does the CAN resistance between terminal 13 and terminal 24 of the ground module J7 connector [X007.13 X007.24] measure 60Ω and open circuit between terminal 13 and shield [X007.18] and open circuit between terminal 24 and shield [X007.18]?	Yes	Go to step 1.93.2
			No	Go to step 1.93.29 to examine the CAN termination
1.93.2		Does the platform software version show "??" in ANALYZER ⇒ DIAGNOSTICS ⇒ VERSIONS ⇒ PLATFORM MODULE SOFTWARE:??	Yes	Go to step 1.93.3
			No	Go to step 1.93.13
1.93.3	For help with this type of test see 6.2 Continuity Measurement Over Long Distances on Pg. 321	Is there CAN HI continuity between terminal 31 of the platform module J7 connector [X169.31] and terminal 13 of the ground module J7 connector [X007.13] and CAN LO continuity between terminal 30 of the platform module J7 connector [X169.30] and terminal 24 of the ground module J7 connector [X007.24]?	Yes	Go to step 1.93.13
			No	Go to step 1.93.4

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Note	Pretest Instructions	Test	Result	Corrective Action
1.93.4		Is there CAN HI continuity between terminal 3 of the platform control box passthru - 19 position connector [X160.3] and terminal 13 of the ground module J7 connector [X007.13] and CAN LO continuity between terminal 2 of the platform control box passthru - 19 position connector [X160.2] and terminal 24 of the ground module J7 connector [X007.24]?	Yes	Check the RED, BLACK, and Shield wires between the platform module J7 connector [X169] and the platform control box passthru - 19 position connector [X160]
			No	Go to step 1.93.5
1.93.5		Is there CAN HI continuity between terminal 3 of the boom sensor passthru - 19 position connector [X050.3] and terminal 13 of the ground module J7 connector [X007.13] and CAN LO continuity between terminal 2 of the boom sensor passthru - 19 position connector [X050.2] and terminal 24 of the ground module J7 connector [X007.24]?	Yes	Check the RED, BLACK, and Shield wires between the platform control box passthru - 19 position connector [X160] and the boom sensor passthru - 19 position connector [X050]
			No	Go to step 1.93.6
1.93.6		Is there CAN HI continuity between terminal 4 of the main boom angle sensor 2 (Left) connector [X049.4] and terminal 13 of the ground module J7 connector [X007.13] and CAN LO continuity between terminal 5 of the main boom angle sensor 2 (Left) connector [X049.5] and terminal 24 of the ground module J7 connector [X007.24]?	Yes	Check the RED, BLACK, and Shield wires between the main boom angle sensor 2 (Left) connector [X049] and the boom sensor passthru - 19 position connector [X050]
			No	Go to step 1.93.7
1.93.7		Is there CAN HI continuity between terminal 4 of the main boom angle sensor 1 (Right) connector [X048.4] and terminal 13 of the ground module J7 connector [X007.13] and CAN LO continuity between terminal 5 of the main boom angle sensor 1 connector [X048.5] and terminal 24 of the ground module J7 connector [X007.24]?	Yes	Check the RED, BLACK, and Shield wires between the main boom angle sensor 1 (Right) connector [X048] and the boom sensor passthru - 19 position connector [X050]
			No	Go to step 1.93.8
1.93.8		Is there CAN HI continuity between terminal 3 of the tower boom passthru - 19 position connector [X045.3] and terminal 13 of the ground module J7 connector [X007.13] and CAN LO continuity between terminal 2 of the tower boom passthru - 19 position connector [X045.2] and terminal 24 of the ground module J7 connector [X007.24]?	Yes	Check the RED, BLACK, and Shield wires between the tower boom passthru - 19 position connector [X045] and the boom sensor passthru - 19 position connector [X050]
			No	Go to step 1.93.9
1.93.9		Is there CAN HI continuity between terminal 3 of the MTB pass thru - 19 position connector [X043.3] and terminal 13 of the ground module J7 connector [X007.13] and CAN LO continuity between terminal 2 of the MTB pass thru - 19 position connector [X043.2] and terminal 24 of the ground module J7 connector [X007.24]?	Yes	Check the RED, BLACK, and Shield wires between the MTB pass thru - 19 position connector [X043] and the tower boom passthru - 19 position connector [X045]
			No	Go to step 1.93.10

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Note	Pretest Instructions	Test	Result	Corrective Action
1.93.10		Is there CAN HI continuity between terminal 3 of the MTB pass thru - 19 position connector [X043.3] and terminal 13 of the ground module J7 connector [X007.13] and CAN LO continuity between terminal 2 of the MTB pass thru - 19 position connector [X043.2] and terminal 24 of the ground module J7 connector [X007.24]?	Yes	Check the RED, BLACK, and Shield wires between the MTB pass thru - 19 position connector [X043] and the tower boom passthru - 19 position connector [X045]
			No	Go to step 1.93.11
1.93.11		Is there CAN HI continuity between terminal A of the platform module side of the 3 way CAN connector in the main terminal box [X270.A] and terminal 13 of the ground module J7 connector [X007.13] and CAN LO continuity between terminal B of the platform module side of the 3 way CAN connector in the main terminal box [X270.B] and terminal 24 of the ground module J7 connector [X007.24]?	Yes	Check the RED, BLACK, and Shield wires between the platform module side of the 3 way CAN connector in the main terminal box [X270] and the MTB pass thru - 19 position connector [X043]
			No	Go to step 1.93.12
1.93.12		Is there CAN HI continuity between terminal A of the 3 way CAN connector [X014.A] and terminal 13 of the ground module J7 connector [X007.13] and CAN LO continuity between terminal B of the 3 way CAN connector [X269.B] and terminal 24 of the ground module J7 connector [X007.24]?	Yes	Repair/Replace the 3 way CAN connector in the main terminal box [X014 X269 X270]
			No	Repair/Replace the harness between the 3 way CAN connector in the main terminal box [X014] and the ground module J7 connector [X007]
1.93.13		Is the MAIN ANGL1 CAN COMMUNICATIONS LOST fault active in the fault log?	Yes	Go to step 1.93.14
			No	Go to step 1.93.15
1.93.14	For help with this type of test see 6.2 Continuity Measurement Over Long Distances on Pg. 321	Is there CAN HI continuity between terminal 4 of the main boom angle #1 connector [X048.4] and terminal 13 of the ground module J7 connector [X007.13] and CAN LO continuity between terminal 5 of the main boom angle #1 connector [X048.5] and terminal 24 of the ground module J7 connector [X007.24]?	Yes	Go to step 1.93.15
			No	Check the RED, BLACK, and Shield wires between the main boom angle #1 connector [X048] and the ground module J7 connector [X007]. See step 1.93.6
1.93.15		Is the MAIN ANGL2 CAN COMMUNICATIONS LOST fault active in the fault log?	Yes	Go to step 1.93.16
			No	Go to step 1.93.17
1.93.16	For help with this type of test see 6.2 Continuity Measurement Over Long Distances on Pg. 321	Is there CAN HI continuity between terminal 4 of the main boom angle #2 connector [X049.4] and terminal 13 of the ground module J7 connector [X007.13] and CAN LO continuity between terminal 5 of the main boom angle #2 connector [X049.5] and terminal 24 of the ground module J7 connector [X007.24]?	Yes	Go to step 1.93.17
			No	Check the RED, BLACK, and Shield wires between the main boom angle #2 connector [X049] and the ground module J7 connector [X007]. See step 1.93.6
1.93.17		Does the BLAM software version show "??" in ANALYZER ⇒ DIAGNOSTICS ⇒ VERSIONS ⇒ B.L.A. MODULE SOFTWARE:??	Yes	Go to step 1.93.18
			No	Go to step 1.93.19

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Note	Pretest Instructions	Test	Result	Corrective Action
1.93.18	For help with this type of test see 6.2 Continuity Measurement Over Long Distances on Pg. 321	Is there CAN HI continuity between terminal 6 of the BLAM module J1 connector [X086.6] and terminal 13 of the ground module J7 connector [X007.13] and CAN LO continuity between terminal 7 of the BLAM module J1 connector [X086.7] and terminal 24 of the ground module J7 connector [X007.24]?	Yes	Go to step 1.93.19
			No	Check the RED, BLACK, and Shield wires between the BLAM module J1 connector [X086] and the ground module J7 connector [X007]. See step 1.46.8 of 1.46 BLAM CAN COMMUNICATIONS LOST on Pg. 48
1.93.19		Is the TOWER LIFT PVG VALVE COMMUNICATIONS fault active in the fault log?	Yes	Go to step 1.93.20
			No	Go to step 1.93.21
1.93.20	For help with this type of test see 6.2 Continuity Measurement Over Long Distances on Pg. 321	Is there CAN HI continuity between terminal 4 of the tower lift PVG valve connector [X066.4] and terminal 13 of the ground module J7 connector [X007.13] and CAN LO continuity between terminal 1 of the tower lift PVG valve connector [X066.1] and terminal 24 of the ground module J7 connector [X007.24]?	Yes	Go to step 1.93.21
			No	Check the RED, BLACK, and Shield wires between the tower lift PVG valve connector [X066] and the ground module J7 connector [X007]. See step 1.46.8 of 1.46 BLAM CAN COMMUNICATIONS LOST on Pg. 48
1.93.21		Is the TOWER TELESCOPE PVG VALVE COMMUNICATIONS fault active in the fault log?	Yes	Go to step 1.93.22
			No	Go to step 1.93.23
1.93.22	For help with this type of test see 6.2 Continuity Measurement Over Long Distances on Pg. 321	Is there CAN HI continuity between terminal 4 of the tower tele PVG valve connector [X067.4] and terminal 13 of the ground module J7 connector [X007.13] and CAN LO continuity between terminal 1 of the tower tele PVG valve connector [X067.1] and terminal 24 of the ground module J7 connector [X007.24]?	Yes	Go to step 1.93.23
			No	Check the RED, BLACK, and Shield wires between the tower tele PVG valve connector [X067] and the ground module J7 connector [X007]. See step 1.46.8 of 1.46 BLAM CAN COMMUNICATIONS LOST on Pg. 48
1.93.23		Is the MAIN LIFT PVG VALVE COMMUNICATIONS fault active in the fault log?	Yes	Go to step 1.93.24
			No	Go to step 1.93.25
1.93.24	For help with this type of test see 6.2 Continuity Measurement Over Long Distances on Pg. 321	Is there CAN HI continuity between terminal 4 of the main lift PVG valve connector [X065.4] and terminal 13 of the ground module J7 connector [X007.13] and CAN LO continuity between terminal 1 of the main lift PVG valve connector [X065.1] and terminal 24 of the ground module J7 connector [X007.24]?	Yes	Go to step 1.93.25
			No	Check the RED, BLACK, and Shield wires between the main lift PVG valve connector [X065] and the ground module J7 connector [X007]. See step 1.46.8 of 1.46 BLAM CAN COMMUNICATIONS LOST on Pg. 48
1.93.25		Is the ENGINE CONTROLLER CAN COMMUNICATIONS LOST fault active in the fault log?	Yes	Go to step 1.93.26
			No	Go to step 1.93.27
1.93.26	For help with this type of test see 6.2 Continuity Measurement Over Long Distances on Pg. 321	Is there CAN HI continuity between terminal 12 of the engine module connector [X240.12] and terminal 13 of the ground module J7 connector [X007.13] and CAN LO continuity between terminal 13 of the engine module connector [X240.13] and terminal 24 of the ground module J7 connector [X007.24]?	Yes	Go to step 1.93.27
			No	Check the RED, BLACK, and shield wires between the engine module connector [X240] and the ground module J7 connector [X007]
1.93.27		Does the Chassis software version show "??" in ANALYZER ⇒ DIAGNOSTICS ⇒ VERSIONS ⇒ CHASSIS MODULE SOFTWARE:??	Yes	Go to step 1.93.28
			No	Go to step 1.93.29

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Note	Pretest Instructions	Test	Result	Corrective Action
1.93.28	For help with this type of test see 6.2 Continuity Measurement Over Long Distances on Pg. 321	Is there CAN HI continuity between terminal 6 of the chassis module J1 connector [X229.6] and terminal 13 of the ground module J7 connector [X007.13] and CAN LO continuity between terminal 7 of the chassis module J1 connector [X229.7] and terminal 24 of the ground module J7 connector [X007.24]?	Yes	Check all CAN connections for moisture and bad connections
			No	Check the RED, BLACK, and Shield wires between the chassis module J1 connector [X229], through the swivel [X083 X216] and the ground module J7 connector [X007]
1.93.29	Disconnect the platform module J7 connector [X167]	Does the CAN resistance between pin 31 and pin 30 of the platform module J7 connector [X169.31.pin X169.30.pin] measure 120Ω?	Yes	Go to step 1.93.30
			No	Replace the platform module
1.93.30	Disconnect the chassis module J1 connector [X229]	Does the CAN resistance between pin 6 and pin 10 of the chassis module J1 connector [X229.6.pin X229.10.pin] measure 120Ω?	Yes	Leave the chassis module disconnected and go to step 1.93.31
			No	Replace the chassis module
1.93.31	Disconnect the chassis module J1 connector [X229]	Does the CAN resistance between socket 9 and socket 10 of the chassis module J1 connector [X229.9.soc X229.10.soc] measure 0Ω?	Yes	Go to step 1.93.32
			No	Repair/Replace the Chassis harness or CAN termination jumper wire between socket 9 and socket 10 of the platform module J7 connector [X229.9.soc X229.10.soc]
1.93.32	Disconnect the Top Swivel connector [X083]	Does the CAN resistance between socket 1 and socket 2 of the Top Swivel connector [X083.1.soc X083.2.soc] measure 120Ω?	Yes	Go to step 1.93.33
			No	Go to step 1.93.34
1.93.33	Disconnect the Bottom Swivel connector [X216]	Does the CAN resistance between socket 1 and socket 2 of the Bottom Swivel connector [X216.1.soc X216.2.soc] measure 120Ω?	Yes	Repair the RED, BLACK, and/or Shield wires between the Bottom Swivel connector [X216] and the chassis module J1 connector [X229]
			No	Replace the Swivel
1.93.34	Disconnect the BLAM module J1 connector [X086]	Does the CAN resistance between socket 6 and socket 7 of the BLAM module J1 connector [X087.6.soc X087.7.soc] measure 120Ω?	Yes	Repair the RED, BLACK, and/or Shield wires between the Top Swivel connector [X083] and the BLAM module J1 connector [X086]
			No	Repair the RED, BLACK, and/or Shield wires between the ground module J7 connector [X007] and the BLAM module J1 connector [X086]

1.94 FOOTSWITCH SELECTED BEFORE START

Flash Code: 2-3

Footswitch selected before start. Notification that the footswitch was selected before starting the machine. Release the footswitch before starting the machine.

1.95 FRONT LEFT WHEEL BLOCKED

Flash Code: 8-6

Front left wheel blocked. The control system is unable to steer the front left wheel. Steering was commanded for at least 1.3 seconds without sensing an appropriate change in angle from the front left steer angle sensor. This could be caused by a mechanical blockage, a hydraulic problem or a faulty angle sensor.

Note	Pretest Instructions	Test	Result	Corrective Action
1.95.1		Is the front left wheel kept from moving?	Yes	Free the wheel from any obstructions
			No	Go to step 1.95.2

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Note	Pretest Instructions	Test	Result	Corrective Action
1.95.2		Check the fault log for primary faults, LT FNT STEER LT STB OR OC, LT FNT STEER LT STG, LT FNT STEER RT STB OR OC, LT FNT STEER RT STG, or any steering angle sensor fault	Yes	If a primary fault is found, troubleshoot it before this fault
			No	Go to step 1.95.3
1.95.3	Note that glow plug's large power draw can aggravate existing problems with power distribution wiring and low battery power. Frequent starting can drain battery when preheating.	When engine coolant temperature is below 140°F (60°C), air temperature is below 59°F (15°C), and battery voltage is less than 11VDC before starting, does fault mainly occur within 30 seconds after starting engine?	Yes	Examine the battery condition and contacts within the Chassis power distribution wiring. Repair/replace as needed.
			No	Go to step 1.95.4
1.95.4	Watch the angle sensor value on ANALYZER ⇒ ACCESS LEVEL 1 ⇒ CALIBRATIONS ⇒ STEER ⇒ CALIBRATE? Press Enter to view raw value FRONT LT STEER VALUE = XX Do not press Enter.	Steer completely left, pause, then completely right, pause. Does the value continuously and smoothly change while steering?	Yes	ESC out of calibrate mode. Cycle E-stop switch to clear failed calibration message. Go to step 1.95.5
			No	Repair/Replace the sensor and calibrate.
1.95.5		If the wheel will not steer in either direction, check the steer valve for a stuck spool.	Yes	Repair/Replace the valve
			No	Go to step 1.95.6
1.95.6		Are there any bent, damaged, or seized steering components?	Yes	Repair/Replace the component
			No	Go to step 1.95.7
1.95.7	Ensure proper pressure with ANALYZER ⇒ ACCESS LEVEL 1 ⇒ CALIBRATIONS ⇒ STEER ⇒ FRONT LT STEER VALUE = XX.	Install a 3000 psi gauge or higher on Front Steer Axle valve port MS1 and MS2 Adjust steer pressures on Front Steer/Axle valve. Adjust relief next to port to 2600 psi ± 10% on gauge on port MS1. Adjust relief next to port to 2000 psi ± 10% on port MS2. ESC out of calibrate mode. Cycle E-stop switch to clear failed calibration message. Is condition clear?	Yes	Troubleshooting complete
			No	Do not remove gauges. Go to step 1.95.8
1.95.8	Install a low pressure gauge (1000 psi) on main manifold MP1 and adjust to 450 psi ± 10% on load sense	Is condition clear?	Yes	Troubleshooting complete
			No	Do not remove gauges. Go to step 1.95.9
1.95.9	Swap valve section with the one on the other side of machine.	Does condition follow valve section to other side of machine?	Yes	Repair/replace valve section
			No	Repair/replace front left steer cylinder and/or hoses.

1.96 FRONT LEFT WHEEL SENSOR FAULT - CHECK MOUNTING

Flash Code: 8-6

Front left wheel sensor fault - check mounting. The control system detected the front left steer angle sensor value was below the mechanical minimum angle while the wheel was detected as blocked. The mechanical limitations on the maximum steering angle depend on the axle extension. When fully retracted, the steering will be mechanically limited to about 25°. As the axle is extended, the mechanical limit will increase to about 45°, however the control system will maintain a 25° limit until the

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axle is fully extended, when the control system allows the full 45° of steering. The sensor may be mounted improperly or the sensor may be faulty.

Note	Pretest Instructions	Test	Result	Corrective Action
1.96.1	Check faults	Is the fault FRONT LEFT WHEEL BLOCKED present?	Yes	Troubleshoot that first
			No	1.96.2
1.96.2	Disconnect front left steer sensor [X203]	Do the connectors have any loose, damaged, corroded contacts or moisture inside?	Yes	Repair as needed
			No	Go to step 1.96.3
1.96.3		Is the front left wheel sensor X203] in tact and properly installed? This includes checking that the sensor pin will turn the sensor and the sensor is properly tensioned.	Yes	Go to step 1.96.4
			No	Reinstall and recheck
1.96.4	Extend axles. Go to ANALYZER ⇒ DIAGNOSTICS ⇒ DRIVE ⇒ L FRONT WHEEL ANGL	Monitor value while operating steering. Steer fully to the left, then fully to the right. Does the displayed angle ever climb above ±42.11? -OR- Does the value pause, jump or act erratically?	Yes	Repair/replace sensor and mounting as needed
			No	Go to step 1.96.5
1.96.5	Swap front left wheel sensor [X203] with a sensor that doesn't have a fault.	Check faults. Does the new location now have a wheel sensor fault?	Yes	Replace sensor originally at the front left wheel.
			No	Go to step 1.96.6
1.96.6		Calibrate steering. Does fault clear?	Yes	Troubleshooting complete
			No	Go to step 1.96.7
1.96.7	Disconnect front left wheel sensor [X203]	Turn on machine. Is there 5VDC between front left wheel sensor socket A [X203.A.soc] and socket C [X203.C.soc]?	Yes	Keep sensor disconnected. Go to step 1.96.8.
			No	Go to step 1.96.10
1.96.8	Disconnect front left wheel sensor [X203] and chassis module J3 [X231]	Is there continuity between front left wheel sensor socket B [X203.B.soc] and chassis module J3 socket 5 [X231.5.soc]?	Yes	Reprogram/replace ground module
			No	Keep front left wheel sensor [X203] disconnected. Go to step 1.96.9
1.96.9	Disconnect front left wheel sensor [X203] and front left steer passthru - 4 pos. [X202]	Is there continuity between front left wheel sensor socket B [X203.B.soc] and front left steer passthru pin 2 [X202.2.pin]?	Yes	Repair harness between front left steer passthru socket 2 [X202.2.soc] and chassis module J3 socket 5 [X231.5.soc]
			No	Repair/replace harness between front left wheel sensor socket B [X203.B.soc] and front left steer passthru pin 2 [X202.2.pin]
1.96.10	Disconnect front left steer passthru - 4 pos. [X202]. Turn on machine.	Is there 5VDC between front left steer passthru socket 1 [X202.1.soc] and socket 3 [X202.3.soc]?	Yes	Repair/replace harness between front left steer passthru [X202] and front left wheel sensor [X203]
			No	Go to step 1.96.11
1.96.11	Disconnect chassis module J3. Turn on machine.	Is there 5VDC between chassis module J3 pin 4 [X231.4.pin] and pin 6 [X231.6.pin]?	Yes	Repair/Replace harness between front left steer passthru [X202] and chassis module J3 [X231]
			No	Replace chassis module

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1.97 FRONT LEFT WHEEL SENSOR OUT OF RANGE HIGH

Flash Code: 8-6

Front left wheel sensor out of range high. The control system detected the front left steer angle sensor value was above the electrical maximum. This may be due to a short to battery or a wiring problem.

Note	Pretest Instructions	Test	Result	Corrective Action
1.97.1		Is the front left steer angle sensor [X203] installed and connected properly?	Yes	Go to step 1.97.2
			No	Repair as needed
1.97.2	Extend axles. Enable crab steering mode. Go to ANALYZER ⇒ DIAGNOSTICS ⇒ DRIVE ⇒ L FRONT WHEEL ANGL.	Observe angle while operating steering. Steer fully to the left. Check all wheel angles. They should be within 2 °. Return to L FRONT WHEEL ANGL analyzer screen. Steer to right about two seconds while monitoring the value. Repeat checks. Repeat process for entire swing of wheel. Did the value, while steering, pause, jump or act erratically? -OR- Was the left front wheel angle more than 2° difference from other wheels?	Yes	Go to step 1.97.3
			No	Go to step 1.97.5
1.97.3	Swap front left wheel sensor [X203] with a sensor that doesn't have a fault.	Check faults. Does the new location now have a wheel sensor out of range high fault?	Yes	Replace sensor originally at the front left wheel.
			No	Go to step 1.97.4
1.97.4		Calibrate steering. Does fault clear?	Yes	Troubleshooting complete
			No	Go to step 1.97.5
1.97.5	Disconnect front left wheel sensor [X203]	Turn on machine. Is there 5VDC between front left wheel sensor socket A [X203.A.soc] and socket C [X203.C.soc]?	Yes	Keep sensor disconnected. Go to step 1.97.6.
			No	Go to step 1.97.8
1.97.6	Disconnect front left wheel sensor [X203] and chassis module J3 [X231]	Is there continuity between front left wheel sensor socket B [X203.B.soc] and chassis module J3 socket 5 [X231.5.soc]?	Yes	Reprogram/replace ground module
			No	Keep front left wheel sensor [X203] disconnected. Go to step 1.97.7
1.97.7	Disconnect front left wheel sensor [X203] and front left steer passthru - 4 pos. [X202]	Is there continuity between front left wheel sensor socket B [X203.B.soc] and front left steer passthru pin 2 [X202.2.pin]?	Yes	Repair harness between front left steer passthru socket 2 [X202.2.soc] and chassis module J3 socket 5 [X231.5.soc]
			No	Repair/replace harness between front left wheel sensor socket B [X203.B.soc] and front left steer passthru pin 2 [X202.2.pin]
1.97.8	Disconnect front left steer passthru - 4 pos. [X202]. Turn on machine.	Is there 5VDC between front left steer passthru socket 1 [X202.1.soc] and socket 3 [X202.3.soc]?	Yes	Repair/replace harness between front left steer passthru [X202] and front left wheel sensor [X203]
			No	Go to step 1.97.9
1.97.9	Disconnect chassis module J3. Turn on machine.	Is there 5VDC between chassis module J3 pin 4 [X231.4.pin] and pin 6 [X231.6.pin]?	Yes	Repair/Replace harness between front left steer passthru [X202] and chassis module J3 [X231]
			No	Replace chassis module

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1.98 FRONT LEFT WHEEL SENSOR OUT OF RANGE LOW

Flash Code: 8-6

Front left wheel sensor out of range low. The control system detected the front left steer angle sensor value was below the electrical minimum. This may be due to an open circuit or a poor connection.

Note	Pretest Instructions	Test	Result	Corrective Action
1.98.1		Is the front left steer angle sensor [X203] installed and connected properly?	Yes	Go to step 1.98.2
			No	Repair as needed
1.98.2	Extend axles. Enable crab steering mode. Go to ANALYZER ⇒ DIAGNOSTICS ⇒ DRIVE ⇒ L FRONT WHEEL ANGL.	Observe angle while operating steering. Steer fully to the left. Check all wheel angles. They should be within 2 °. Return to L FRONT WHEEL ANGL analyzer screen. Steer to right about two seconds while monitoring the value. Repeat checks. Repeat process for entire swing of wheel. Did the value, while steering, pause, jump or act erratically? -OR- Was the left front wheel angle more than 2° difference from other wheels?	Yes	Go to step 1.98.3
			No	Go to step 1.98.5
1.98.3	Swap front left wheel sensor [X203] with a sensor that doesn't have a fault.	Check faults. Does the new location now have a wheel sensor out of range low fault?	Yes	Replace sensor originally at the front left wheel.
			No	Go to step 1.98.4
1.98.4		Calibrate steering. Does fault clear?	Yes	Troubleshooting complete
			No	Go to step 1.98.5
1.98.5	Disconnect front left wheel sensor [X203]	Turn on machine. Is there 5VDC between front left wheel sensor socket A [X203.A.soc] and socket C [X203.C.soc]?	Yes	Keep sensor disconnected. Go to step 1.98.6.
			No	Go to step 1.98.8
1.98.6	Disconnect front left wheel sensor [X203] and chassis module J3 [X231]	Is there continuity between front left wheel sensor socket B [X203.B.soc] and chassis module J3 socket 5 [X231.5.soc]?	Yes	Reprogram/replace ground module
			No	Keep front left wheel sensor [X203] disconnected. Go to step 1.98.7
1.98.7	Disconnect front left wheel sensor [X203] and front left steer passthru - 4 pos. [X202]	Is there continuity between front left wheel sensor socket B [X203.B.soc] and front left steer passthru pin 2 [X202.2.pin]?	Yes	Repair harness between front left steer passthru socket 2 [X202.2.soc] and chassis module J3 socket 5 [X231.5.soc]
			No	Repair/replace harness between front left wheel sensor socket B [X203.B.soc] and front left steer passthru pin 2 [X202.2.pin]
1.98.8	Disconnect front left steer passthru - 4 pos. [X202]. Turn on machine.	Is there 5VDC between front left steer passthru socket 1 [X202.1.soc] and socket 3 [X202.3.soc]?	Yes	Repair/replace harness between front left steer passthru [X202] and front left wheel sensor [X203]
			No	Go to step 1.98.9
1.98.9	Disconnect chassis module J3. Turn on machine.	Is there 5VDC between chassis module J3 pin 4 [X231.4.pin] and pin 6 [X231.6.pin]?	Yes	Repair/Replace harness between front left steer passthru [X202] and chassis module J3 [X231]
			No	Replace chassis module

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1.99 FRONT RIGHT WHEEL BLOCKED

Flash Code: 8-6

Front right wheel blocked. The control system is unable to steer the front right wheel. Steering was commanded for at least 1.3 seconds without sensing an appropriate change in angle from the front left steer angle sensor. This could be caused by a mechanical blockage, a hydraulic problem or a faulty angle sensor.

Note	Pretest Instructions	Test	Result	Corrective Action
1.99.1		Is the front right wheel kept from moving?	Yes	Free the wheel from any obstructions
			No	Go to step 1.99.2
1.99.2		Check the fault log for primary faults, RT FNT STEER LT STB OR OC, RT FNT STEER LT STG, RT FNT STEER RT STB OR OC, RT FNT STEER RT STG, or any sensor value too high or too low	Yes	If a primary fault is found, troubleshoot it before this fault
			No	Go to step 1.99.3
1.99.3	Note that glow plug's large power draw can aggravate existing problems with power distribution wiring and low battery power. Frequent starting can drain battery when preheating.	When engine coolant temperature is below 140°F (60°C), air temperature is below 59°F (15°C), and battery voltage is less than 11VDC before starting, does fault mainly occur within 30 seconds after starting engine?	Yes	Examine the battery condition and contacts within the Chassis power distribution wiring. Repair/replace as needed.
			No	Go to step 1.99.4
1.99.4	Watch the angle sensor value on ANALYZER ⇒ ACCESS LEVEL 1 ⇒ CALIBRATIONS ⇒ STEER ⇒ CALIBRATE? Press Enter then right arrow to view FRONT RT STEER VALUE = XX Do not press Enter.	Steer completely left, pause, then completely right, pause. Does the value continuously and smoothly change while steering?	Yes	ESC out of calibrate mode. Cycle E-stop switch to clear failed calibration message. Go to step 1.99.5
			No	Repair/Replace the sensor and calibrate.
1.99.5		If the wheel will not steer in either direction, check the steer valve for a stuck spool.	Yes	Repair/Replace the valve
			No	Go to step 1.99.6
1.99.6		Are there any bent, damaged, or seized steering components?	Yes	Repair/Replace the component
			No	Go to step 1.99.7
1.99.7	Ensure proper pressure with ANALYZER ⇒ ACCESS LEVEL 1 ⇒ CALIBRATIONS ⇒ STEER ⇒ FRONT RT STEER VALUE = XX.	Install a 3000 psi gauge or higher on Front Steer Axle valve port MS3 and MS4 Adjust steer pressures on Front Steer/Axle valve. Adjust proper cartridge for 2600 psi ± 10% on gauge on port MS3. Adjust proper cartridge for 2000 psi ± 10% on port MS4. ESC out of calibrate mode. Cycle E-stop switch to clear failed calibration message. Is condition clear?	Yes	Troubleshooting complete
			No	Do not remove gauges. Go to step 1.99.8
1.99.8	Install a low pressure gauge (1000 psi) on main manifold MP1 and adjust to 450 psi ± 10% on load sense	Is condition clear?	Yes	Troubleshooting complete
			No	Do not remove gauges. Go to step 1.99.9
1.99.9	Swap valve section with the one on the other side of machine.	Does condition follow valve section to other side of machine?	Yes	Repair/replace valve section
			No	Repair/replace front left steer cylinder and/or hoses.

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1.100 FRONT RIGHT WHEEL SENSOR FAULT - CHECK MOUNTING

Flash Code: 8-6

Front right wheel sensor fault - check mounting. The control system detected the front right steer angle sensor value was below the mechanical minimum angle while the wheel was detected as blocked. The sensor may be mounted improperly or the sensor may be faulty.

Note	Pretest Instructions	Test	Result	Corrective Action
1.100.1	Check faults	Is the fault FRONT RIGHT WHEEL BLOCKED present?	Yes	Troubleshoot that first
			No	Go to step 1.100.2
1.100.2	Disconnect front right steer sensor [X200]	Do the connectors have any loose, damaged, corroded contacts or moisture inside?	Yes	Repair as needed
			No	Go to step 1.100.3
1.100.3		Is the front right wheel sensor [X200] in tact and properly installed? This includes checking that the sensor pin will turn the sensor and the sensor is properly tensioned.	Yes	Go to step 1.100.4
			No	Reinstall and recheck
1.100.4	Extend axles. Go to ANALYZER ⇒ DIAGNOSTICS ⇒ DRIVE ⇒R FRONT WHEEL ANGL	Monitor value while operating steering. Steer fully to the left, then fully to the right. Does the displayed angle ever climb above ±42.11? -OR- Does the value pause, jump or act erratically?	Yes	Repair/replace sensor and mounting as needed
			No	Go to step 1.100.5
1.100.5	Swap front right wheel sensor [X200] with a sensor that doesn't have a fault.	Check faults. Does the new location now have a wheel sensor fault?	Yes	Replace sensor originally at the front right wheel.
			No	Go to step 1.100.6
1.100.6		Calibrate steering. Does fault clear?	Yes	Troubleshooting complete
			No	Go to step 1.100.7
1.100.7	Disconnect front right wheel sensor [X200]	Turn on machine. Is there 5VDC between front right wheel sensor socket A [X200.A.soc] and socket C [X200.C.soc]?	Yes	Keep sensor disconnected. Go to step 1.100.8.
			No	Go to step 1.100.10
1.100.8	Disconnect front right wheel sensor [X200] and chassis module J3 [X231]	Is there continuity between front left wheel sensor socket B [X200.B.soc] and chassis module J3 socket 2 [X231.2.soc]?	Yes	Reprogram/replace ground module
			No	Keep front right wheel sensor [X200] disconnected. Go to step 1.100.9
1.100.9	Disconnect front right wheel sensor [X200] and front right steer passthru - 4 pos. [X201]	Is there continuity between front right wheel sensor socket B [X200.B.soc] and front right steer passthru pin 2 [X201.2.pin]?	Yes	Repair harness between front right steer passthru socket 2 [X201.2.soc] and chassis module J3 socket 2 [X231.2.soc]
			No	Repair/replace harness between front right wheel sensor socket B [X200.B.soc] and front right steer passthru pin 2 [X201.2.pin]
1.100.10	Disconnect front right steer passthru - 4 pos. [X201]. Turn on machine.	Is there 5VDC between front right steer passthru socket 1 [X201.1.soc] and socket 3 [X201.3.soc]?	Yes	Repair/replace harness between front right steer passthru [X201] and front right wheel sensor [X200]
			No	Go to step 1.100.11
1.100.11	Disconnect chassis module J3. Turn on machine.	Is there 5VDC between chassis module J3 pin 1 [X231.1.pin] and pin 3 [X231.3.pin]?	Yes	Repair/Replace harness between front right steer passthru [X201] and chassis module J3 [X231]
			No	Replace chassis module

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1.101 FRONT RIGHT WHEEL SENSOR OUT OF RANGE HIGH

Flash Code: 8-6

Front right wheel sensor out of range high. The control system detected the front right steer angle sensor value was above the electrical maximum. This may be due to a short to battery or a wiring problem.

Note	Pretest Instructions	Test	Result	Corrective Action
1.101.1		Is the front right steer angle sensor [X200] installed and connected properly?	Yes	Go to step 1.101.2
			No	Repair as needed
1.101.2	Extend axles. Enable crab steering mode. Go to ANALYZER ⇒ DIAGNOSTICS ⇒ DRIVE ⇒ L FRONT WHEEL ANGL.	Observe angle while operating steering. Steer fully to the left. Check all wheel angles. They should be within 2 °. Return to R FRONT WHEEL ANGL analyzer screen. Steer to right about two seconds while monitoring the value. Repeat checks. Repeat process for entire swing of wheel. Did the value, while steering, pause, jump or act erratically? -OR- Was the right front wheel angle more than 2° difference from other wheels?	Yes	Go to step 1.101.3
			No	Go to step 1.101.5
1.101.3	Swap front right wheel sensor [X200] with a sensor that doesn't have a fault.	Check faults. Does the new location now have a wheel sensor out of range high fault?	Yes	Replace sensor originally at the front right wheel.
			No	Go to step 1.101.4
1.101.4		Calibrate steering. Does fault clear?	Yes	Troubleshooting complete
			No	Go to step 1.101.5
1.101.5	Disconnect front right wheel sensor [X200]	Turn on machine. Is there 5VDC between front right wheel sensor socket A [X200.A.soc] and socket C [X200.C.soc]?	Yes	Keep sensor disconnected. Go to step 1.101.6.
			No	Go to step 1.101.8
1.101.6	Disconnect front right wheel sensor [X200] and chassis module J3 [X231]	Is there continuity between front right wheel sensor socket B [X200.B.soc] and chassis module J3 socket 2 [X231.2.soc]?	Yes	Reprogram/replace ground module
			No	Keep front right wheel sensor [X200] disconnected. Go to step 1.101.7
1.101.7	Disconnect front right wheel sensor [X200] and front right steer passthru - 4 pos. [X201]	Is there continuity between front right wheel sensor socket B [X200.B.soc] and front right steer passthru pin 2 [X201.2.pin]?	Yes	Repair harness between front right steer passthru socket 2 [X202.2.soc] and chassis module J3 socket 2 [X231.2.soc]
			No	Repair/replace harness between front right wheel sensor socket B [X200.B.soc] and front right steer passthru pin 2 [X201.2.pin]
1.101.8	Disconnect front right steer passthru - 4 pos. [X201]. Turn on machine.	Is there 5VDC between front right steer passthru socket 1 [X201.1.soc] and socket 3 [X201.3.soc]?	Yes	Repair/replace harness between front right steer passthru [X201] and front right wheel sensor [X201]
			No	Go to step 1.101.9
1.101.9	Disconnect chassis module J3. Turn on machine.	Is there 5VDC between chassis module J3 pin 1 [X231.1.pin] and pin 3 [X231.3.pin]?	Yes	Repair/Replace harness between front right steer passthru [X201] and chassis module J3 [X231]
			No	Replace chassis module

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1.102 FRONT RIGHT WHEEL SENSOR OUT OF RANGE LOW

Flash Code: 8-6

Front right wheel sensor out of range low. The control system detected the front right steer angle sensor value was below the electrical minimum. This may be due to an open circuit or a poor connection.

Note	Pretest Instructions	Test	Result	Corrective Action
1.102.1		Is the front right steer angle sensor [X200] installed and connected properly?	Yes	Go to step 1.102.2
			No	Repair as needed
1.102.2	Extend axles. Enable crab steering mode. Go to ANALYZER ⇒ DIAGNOSTICS ⇒ DRIVE ⇒ R FRONT WHEEL ANGL.	Observe angle while operating steering. Steer fully to the left. Check all wheel angles. They should be within 2 °. Return to R FRONT WHEEL ANGL analyzer screen. Steer to right about two seconds while monitoring the value. Repeat checks. Repeat process for entire swing of wheel. Did the value, while steering, pause, jump or act erratically? -OR- Was the left front wheel angle more than 2° difference from other wheels?	Yes	Go to step 1.102.3
			No	Go to 1.102.5
1.102.3	Swap front right wheel sensor [X200] with a sensor that doesn't have a fault.	Check faults. Does the new location now have a wheel sensor out of range low fault?	Yes	Replace sensor originally at the front right wheel.
			No	Go to step 1.102.4
1.102.4		Calibrate steering. Does fault clear?	Yes	Troubleshooting complete
			No	Go to step 1.102.5
1.102.5	Disconnect front right wheel sensor [X200]	Turn on machine. Is there 5VDC between front right wheel sensor socket A [X200.A.soc] and socket C [X200.C.soc]?	Yes	Keep sensor disconnected. Go to step 1.102.6.
			No	Go to step 1.102.8
1.102.6	Disconnect front right wheel sensor [X200] and chassis module J3 [X231]	Is there continuity between front right wheel sensor socket B [X200.B.soc] and chassis module J3 socket 2 [X231.2.soc]?	Yes	Reprogram/replace ground module
			No	Keep front right wheel sensor [X200] disconnected. Go to step 1.102.7
1.102.7	Disconnect front right wheel sensor [X200] and front right steer passthru - 4 pos. [X201]	Is there continuity between front right wheel sensor socket B [X200.B.soc] and front right steer passthru pin 2 [X201.2.pin]?	Yes	Repair harness between front right steer passthru socket 2 [X201.2.soc] and chassis module J3 socket 2 [X231.2.soc]
			No	Repair/replace harness between front right wheel sensor socket B [X200.B.soc] and front left steer passthru pin 2 [X201.2.pin]
1.102.8	Disconnect front right steer passthru - 4 pos. [X201]. Turn on machine.	Is there 5VDC between front right steer passthru socket 1 [X201.1.soc] and socket 3 [X202.3.soc]?	Yes	Repair/replace harness between front right steer passthru [X201] and front right wheel sensor [X200]
			No	Go to step 1.102.9
1.102.9	Disconnect chassis module J3. Turn on machine.	Is there 5VDC between chassis module J3 pin 1 [X231.1.pin] and pin 3 [X231.3.pin]?	Yes	Repair/Replace harness between front right steer passthru [X201] and chassis module J3 [X231]
			No	Replace chassis module

1.103 FSW FAULTY

Flash Code: 2-1

Footswitch faulty. The two footswitch inputs [X169.8 X007.15] have read the same state for more than one second. These signals should always be opposite. Check the footswitch and wiring for shorts or open circuits.

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1.104 FSW INTERLOCK TRIPPED

Flash Code: 2-2

Footswitch interlock tripped. Notification that the footswitch was closed for seven seconds with no function selected. Release the footswitch, close the footswitch again, then activate the desired function with seven seconds.

1.105 FSW OPEN

Flash Code: 0-0

Footswitch open. A drive or boom function has been selected but the platform footswitch[X152] is open. This could be caused by operator not depressing the footswitch before utilizing a machine control in the platform.

Note	Pretest Instructions	Test	Result	Corrective Action
1.105.1	Go to ANALYZER ⇒ DIAGNOSTICS ⇒ SYSTEM ⇒ FOOTSWITCH INPUT PLATFORM	Does the analyzer read OPEN? -AND- Does the analyzer read CLOSED with the footswitch depressed?	Yes	If fault is clear, this is normal operation. Otherwise reprogram/replace the ground module
			No	Go to step 1.105.2
1.105.2	Locate platform passthru - 15 pos [X164]. Ground meter. See Grounding on Pg. 319 for details. Take the following reading by backprobing. See Backprobing on Pg. 319 for details.	Turn on machine. Is there about 12 VDC on platform passthru terminal 8 [X164.8]?	Yes	Keep the test setup in same condition. Go to step 1.105.4
			No	Go to step 1.105.3
1.105.3	Ground meter. Take the following measurement by backprobing.	Turn on machine. Is there about 12 VDC on platform module J2 terminal 3 [X166.3]?	Yes	Repair/replace harness between platform module J2 terminal 3 [X166.3] and platform passthru terminal 8 [X164.8]
			No	Replace platform module
1.105.4	Locate platform passthru [X164]. Ground meter. Take the following reading by backprobing.	Turn on machine. Is there about 12 VDC on platform passthru terminal 7 [X164.7]?	Yes	Go to step 1.105.5
			No	Repair/replace footswitch
1.105.5	Disconnect platform passthru [X164] and platform module J7 [X169]	Is there continuity between platform passthru pin 7 [X164.7.pin] and platform module J7 socket 8 [X169.8.soc]?	Yes	Go to step 1.105.6
			No	Repair/replace harness between platform passthru pin 7 [X164.7.pin] and platform module J7 socket 8 [X169.8.soc]
1.105.6	Locate platform control box passthru - 19 pos [X160]. Ground meter. Take the following reading by backprobing.	Turn on machine. Is there about 12 VDC on platform control box terminal 6 [X160.6]?	Yes	Repair/replace footswitch
			No	Keep test setup in place. Go to step 1.105.7
1.105.7	Locate platform control box passthru - 19 pos [X160]. Ground meter. Take the following reading by backprobing.	Turn on machine. Depress footswitch. Is there about 12 VDC on platform control box terminal 6 [X160.6]?	Yes	Go to step 1.105.8
			No	Repair/replace footswitch
1.105.8	Disconnect ground module J7 [X007]. With a helper or an object, hold the footswitch down. Ground the meter near the main terminal box. Take the following measurement by backprobing.	Turn on machine. Is there about 12 VDC on ground module J7 terminal 15 [X007.15]?	Yes	Reprogram/replace platform module and/or ground module
			No	Go to step 1.105.9

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Note	Pretest Instructions	Test	Result	Corrective Action
1.105.9	Disconnect ground module J7 [X007] and tower boom passthru - 19 pos [X045]	Is there continuity between ground module J7 socket15 [X007.15.soc] to tower boom passthru socket 6 [X045.6.soc]?	Yes	Go to step 1.105.11
			No	Go to step 1.105.10
1.105.10	Disconnect ground module J7 [X007] and MTB passthru - 19 pos [X043]	Is there continuity between ground module J7 socket 15 [X007.15.soc] and MTB passthru pin 6 [X043.6.pin]?	Yes	Repair/replace harness between MTB passthru socket 6 [X043.6.soc] and tower boom passthru socket 6 [X045.6.soc]
			No	Repair/replace harness between ground module J7 socket 15 [X007.15.soc] and MTB passthru pin 6 [X043.6.pin]
1.105.11	Disconnect tower boom passthru - 19 pos [X045] and boom sensor passthru - 19 pos [X050]	Is there continuity between tower boom passthru pin 6 [X045.6.pin] and boom sensor passthru pin 6 [X050.6.pin]?	Yes	Repair/replace harness between tower boom passthru socket 6 [X045.6.soc] and platform control box socket 6 [X160.6.soc]
			No	Repair/replace harness between tower boom passthru pin 6 [X045.6.pin] and boom sensor passthru pin 6 [X050.6.pin]

1.106 FUEL SENSOR SHORT TO BATTERY

Flash Code: 4-3

Fuel sensor short to battery. Indicates that the fuel sensor signal [X002.25] may be shorted to battery. See 1.377 COMMON STB OR OC PROCEDURE on Pg. 174.

1.107 FUEL SENSOR SHORT TO GROUND

Flash Code: 4-3

Fuel sensor short to ground. Indicates that the fuel sensor signal [X002.25] may be shorted to ground. See 1.378 COMMON STG PROCEDURE on Pg. 175.

1.108 FUNCTIONS LOCKED OUT - BLAM MODULE SOFTWARE VERSION IMPROPER

Flash Code: 2-5

Functions locked out - BLAM module software version improper. Notification that the functions have been locked out because the major version of the BLAM module software does not match the major version of the ground module software. Load the same version of software in the BLAM and ground modules.

1.109 FUNCTIONS LOCKED OUT - CHASSIS MODULE SOFTWARE VERSION IMPROPER

Flash Code: 2-5

Functions locked out - chassis module software version improper. Notification that the functions have been locked out because the major version of the chassis module software does not match the major version of the ground module software. Load the same version of software in the chassis and ground modules.

1.110 FUNCTIONS LOCKED OUT - PLATFORM MODULE SOFTWARE VERSION IMPROPER

Flash Code: 2-5

Functions locked out - platform module software version improper. Notification that the functions have been locked out because the major version of the platform module software does not match the major version of the ground module software. Load the same version of software in the platform and ground modules.

1.111 GEN SET/WELDER OPEN CIRCUIT

Flash Code: 3-3

Generator set/welder open circuit. The output for the generator [X001.22] is open. See 1.377 COMMON STB OR OC PROCEDURE on Pg. 174.

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1.112 GEN SET/WELDER SHORT TO BATTERY

Flash Code: 3-3

Generator set/welder short to battery. The output for the generator [X001.22] is shorted to battery. See 1.377 COMMON STB OR OC PROCEDURE on Pg. 174.

1.113 GEN SET/WELDER SHORT TO GROUND

Flash Code: 3-3

Generator set/welder short to ground. The output for the generator [X001.22] is shorted to ground. See 1.378 COMMON STG PROCEDURE on Pg. 175.

1.114 GENERATOR MOTION CUTOUT ACTIVE

Flash Code: 2-5

Generator motion cutout active. Notification that the generator motion cutout is configured and the machine is in platform mode with the generator active and a function was engaged. Do not engage functions while the generator is active or change the machine configuration.

1.115 GLOW PLUG OPEN CIRCUIT

Flash Code: 3-3

Glow plug open circuit. The glow plug / intake heater output [X001.12] is open. See 1.377 COMMON STB OR OC PROCEDURE on Pg. 174.

1.116 GLOW PLUG SHORT TO BATTERY

Flash Code: 3-3

Glow plug short to battery. The glow plug / intake heater output [X001.12] is shorted to battery. See 1.377 COMMON STB OR OC PROCEDURE on Pg. 174.

1.117 GLOW PLUG SHORT TO GROUND

Flash Code: 3-3

Glow plug short to ground. The glow plug / intake heater output [X001.12] is shorted to ground. See 1.378 COMMON STG PROCEDURE on Pg. 175.

1.118 GROUND ALARM OPEN CIRCUIT

Flash Code: 3-3

Ground alarm open circuit. The ground alarm output [X002.27] is open. See 1.377 COMMON STB OR OC PROCEDURE on Pg. 174.

1.119 GROUND ALARM SHORT TO BATTERY

Flash Code: 3-3

Ground alarm short to battery. The ground alarm output [X002.27] is shorted to battery. See 1.377 COMMON STB OR OC PROCEDURE on Pg. 174.

1.120 GROUND ALARM SHORT TO GROUND

Flash Code: 3-3

Ground alarm short to ground. The ground alarm output [X002.27] is shorted to ground. See 1.378 COMMON STG PROCEDURE on Pg. 175.

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1.121 GROUND MODULE CONSTANT DATA UPDATE REQUIRED

Flash Code: 9-9

Ground module constant data update required. The ground module has old constant data that is not compatible with the current ground module software. The ground module constant data must be updated to a newer version. A power cycle is required.

Note	Pretest Instructions	Test	Result	Corrective Action
1.121.1	Cycle power	Does fault clear?	Yes	Troubleshooting complete
			No	Reprogram/replace ground module

1.122 GROUND MODULE FAILURE: HWFS CODE 1

Flash Code: 9-9

Ground module failure: hardware failsafe code 1. The ground module V(low) FET has failed. A power cycle is required.

Note	Pretest Instructions	Test	Result	Corrective Action
1.122.1	Cycle power	Does fault clear?	Yes	Troubleshooting complete
			No	Replace ground module

1.123 GROUND MODULE FAILURE:HIGH SIDE DRIVER CUTOUT FAULTY

Flash Code: 9-9

Ground module failure: high side driver cutout faulty. There is an internal problem with the ground module.

1.124 GROUND SENSOR REF VOLTAGE OUT OF RANGE

Flash Code: 9-9

Ground sensor reference voltage out of range. The ground module 7VDC reference voltage is out of acceptable range. This reference voltage is unused at this time. Possible causes of this fault include bad supply circuit in the module, or wires mistakenly connected to the following pins on ground module J7 [X007]: J7-5, J7-16, J7-26, or J7-27.

Note	Pretest Instructions	Test	Result	Corrective Action
1.124.1		Are there any wires present in any of the following terminals: ground module J7 terminal 5 [X007.5], terminal 16 [X007.16], terminal 26 [X007.26], or terminal 27 [X007.27]?	Yes	Make note of other faults then remove one wire. If any new faults appear or faults go away, use that information to find proper place for the wire. Repeat until all wires are placed correctly.
			No	Go to step 1.124.2
1.124.2	Use backprobing for following measurement. See Backprobing on Pg. 319 for details.	Is there 6.6VDC - 7.5VDC at the following terminals: ground module J7 terminal 5 [X007.5], terminal 16 [X007.16], terminal 26 [X007.26], or terminal 27 [X007.27]?	Yes	Reprogram/replace the ground module
			No	Replace the ground module

1.125 HEAD TAIL LIGHT OPEN CIRCUIT

Flash Code: 3-3

Head tail light open circuit. The head and tail light output [X002.26] is open. See 1.377 COMMON STB OR OC PROCEDURE on Pg. 174.

1.126 HEAD TAIL LIGHT SHORT TO BATTERY

Flash Code: 3-3

Head tail light short to battery. The head and tail light output [X002.26] is shorted to battery. See 1.377 COMMON STB OR OC PROCEDURE on Pg. 174.

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1.127 HEAD TAIL LIGHT SHORT TO GROUND

Flash Code: 3-3

Head tail light short to ground. The head and tail light output [X002.26] is shorted to ground. See 1.378 COMMON STG PROCEDURE on Pg. 175.

1.128 HIGH ENGINE TEMP

Flash Code: 4-3

High engine temperature. This fault should only occur on machines configured with non-ECM engines. The engine temperature is above 130°C.

1.129 HIGH RESOLUTION A2D FAILURE-INTERRUPT LOST

Flash Code: 9-9

High resolution analog to digital failure-interrupt lost. This fault should only occur with software versions prior to 7.0. There is an internal problem with the platform module.

1.130 HIGH RESOLUTION A2D FAILURE-REINIT LIMIT

Flash Code: 9-9

High resolution analog to digital failure - reinit limit. This fault should only occur with software versions prior to 7.0. There is an internal problem with the platform module.

1.131 HORN OPEN CIRCUIT

Flash Code: 3-3

Horn open circuit. The ground module horn output [X002.2] is open. See 1.377 COMMON STB OR OC PROCEDURE on Pg. 174.

1.132 HORN SHORT TO BATTERY

Flash Code: 3-3

Horn short to battery. The ground module horn output [X002.2] is shorted to battery. See 1.377 COMMON STB OR OC PROCEDURE on Pg. 174.

1.133 HORN SHORT TO GROUND

Flash Code: 3-3

Horn short to ground. The ground module horn output [X002.2] is shorted to ground. See 1.378 COMMON STG PROCEDURE on Pg. 175.

1.134 HOUR METER SHORT TO BATTERY

Flash Code: 3-3

Hour meter short to battery. The hourmeter output [X004.12] is shorted to battery. See 1.377 COMMON STB OR OC PROCEDURE on Pg. 174.

1.135 HOUR METER SHORT TO GROUND

Flash Code: 3-3

Hour meter short to ground. The hourmeter output [X004.12] is shorted to ground. See 1.378 COMMON STG PROCEDURE on Pg. 175.

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1.136 INVALID ANGLE SENSOR #1 MODEL

Flash Code: 8-4

Invalid angle sensor #1 model. The tower angle sensor #1 (Right) is sending 10 bits of data instead of 11 bits of data. The sensor must be replaced.

Note	Pretest Instructions	Test	Result	Corrective Action
1.136.1	Read fault log.	Is INVALID ANGLE SENSOR #2 MODEL in log?	Yes	Replace both sensors.
			No	Go to step 1.136.2
1.136.2	Plug the right tower boom angle sensor connector [X099] into the tower angle sensor #2 and the left tower boom angle sensor connector [X100] into tower angle sensor #1	Is the message INVALID ANGLE SENSOR #2 MODEL gone and the message INVALID ANGLE SENSOR #2 MODEL in the fault stack?	Yes	Replace sensor #1
			No	Reprogram/replace BLAM

1.137 INVALID ANGLE SENSOR #2 MODEL

Flash Code: 8-4

Invalid angle sensor #2 model. The tower angle sensor #2 (Left) is sending 10 bits of data instead of 11 bits of data. The sensor must be replaced.

Note	Pretest Instructions	Test	Result	Corrective Action
1.137.1	Read fault log.	Is INVALID ANGLE SENSOR #1 MODEL in log?	Yes	Replace both sensors.
			No	Go to step 1.137.2
1.137.2	Plug the left tower boom angle sensor connector [X100] into the tower angle sensor #1 and the right tower boom angle sensor connector [X099] into tower angle sensor #2	Is the message INVALID ANGLE SENSOR #1 MODEL gone and the message INVALID ANGLE SENSOR #2 MODEL in the fault stack?	Yes	Replace sensor #2
			No	Reprogram/replace BLAM

1.138 JIB DOWN OPEN CIRCUIT

Flash Code: 3-4

Jib down open circuit. The jib down output [X169.26] is open. See 1.377 COMMON STB OR OC PROCEDURE on Pg. 174.

1.139 JIB DOWN SHORT TO BATTERY

Flash Code: 3-4

Jib down short to battery. The jib down output [X169.26] is shorted to battery. See 1.377 COMMON STB OR OC PROCEDURE on Pg. 174.

1.140 JIB DOWN SHORT TO GROUND

Flash Code: 3-4

Jib down short to ground. The jib down output [X169.26] is shorted to ground. See 1.378 COMMON STG PROCEDURE on Pg. 175.

1.141 JIB LEFT OPEN CIRCUIT

Flash Code: 3-4

Jib left open circuit. The jib swing left output [X169.28] is open. See 1.377 COMMON STB OR OC PROCEDURE on Pg. 174.

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1.142 JIB LEFT SHORT TO BATTERY

Flash Code: 3-4

Jib left short to battery. The jib swing left output [X169.28] is shorted to battery. See 1.377 COMMON STB OR OC PROCEDURE on Pg. 174.

1.143 JIB LEFT SHORT TO GROUND

Flash Code: 3-4

Jib left short to ground. The jib swing left output [X169.28] is shorted to ground. See 1.378 COMMON STG PROCEDURE on Pg. 175.

1.144 JIB RIGHT OPEN CIRCUIT

Flash Code: 3-4

Jib right open circuit. The jib swing right output [X169.27] is open. See 1.377 COMMON STB OR OC PROCEDURE on Pg. 174.

1.145 JIB RIGHT SHORT TO BATTERY

Flash Code: 3-4

Jib right short to battery. The jib swing right output [X169.27] is shorted to battery. See 1.377 COMMON STB OR OC PROCEDURE on Pg. 174.

1.146 JIB RIGHT SHORT TO GROUND

Flash Code: 3-4

Jib right short to ground. The jib swing right output [X169.27] is shorted to ground. See 1.378 COMMON STG PROCEDURE on Pg. 175.

1.147 JIB SWING PREVENTED - IN 1000# MODE

Flash Code: 2-5

Jib swing prevented - in 1000 pound mode. Notification that the machine is in 1000# mode and the jib swing function was engaged. Swinging the jib is not allowed in 1000# mode.

1.148 JIB UP OPEN CIRCUIT

Flash Code: 3-4

Jib up open circuit. The jib up output [X169.25] is open. See 1.377 COMMON STB OR OC PROCEDURE on Pg. 174.

1.149 JIB UP SHORT TO BATTERY

Flash Code: 3-4

Jib up short to battery. The jib up output [X169.25] is shorted to battery. See 1.377 COMMON STB OR OC PROCEDURE on Pg. 174.

1.150 JIB UP SHORT TO GROUND

Flash Code: 3-4

Jib up short to ground. The jib up output [X169.25] is shorted to ground. See 1.378 COMMON STG PROCEDURE on Pg. 175.

1.151 KEYSWITCH FAULTY

Flash Code: 2-1

Keyswitch faulty. Both platform [X007.2] and ground [X007.3] modes are selected simultaneously. This could be due to a bad keyswitch [X030], wiring, or bad diodes at the power down relay [X011].

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1.152 L/S JOY. CENTER TAP BAD

Flash Code: 2-3

Lift/Swing joystick center tap bad. The lift and/or swing joystick center tap inputs [X167.2 X167.5] are not reading the correct voltage, +/- 10% from the reference voltage middle point.

1.153 L/S JOY. OUT OF RANGE HIGH

Flash Code: 2-3

Lift/Swing joystick out of range high. The lift and/or swing joystick input [X167.3 X167.4] is above the working voltage range.

1.154 L/S JOY. OUT OF RANGE LOW

Flash Code: 2-3

Lift/Swing joystick out of range low. The lift and/or swing joystick input [X167.3 X167.4] is below the working voltage range.

1.155 LEFT FORWARD DRIVE PUMP OPEN CIRCUIT

Flash Code: 3-3

Left forward drive pump open circuit. The left forward drive pump output [X090.1] is open. See 1.377 COMMON STB OR OC PROCEDURE on Pg. 174.

1.156 LEFT FORWARD DRIVE PUMP SHORT TO BATTERY

Flash Code: 3-3

Left forward drive pump short to battery. The left forward drive pump output [X090.1] is shorted to battery. See 1.377 COMMON STB OR OC PROCEDURE on Pg. 174.

1.157 LEFT FORWARD DRIVE PUMP SHORT TO GROUND

Flash Code: 3-3

Left forward drive pump short to ground. The left forward drive pump output [X090.1] is shorted to ground. See 1.378 COMMON STG PROCEDURE on Pg. 175.

1.158 LEFT REVERSE DRIVE PUMP OPEN CIRCUIT

Flash Code: 3-3

Left reverse drive pump open circuit. The left reverse drive pump output [X090.2] is open. See 1.377 COMMON STB OR OC PROCEDURE on Pg. 174.

1.159 LEFT REVERSE DRIVE PUMP SHORT TO BATTERY

Flash Code: 3-3

Left reverse drive pump short to battery. The left reverse drive pump output [X090.2] is shorted to battery. See 1.377 COMMON STB OR OC PROCEDURE on Pg. 174.

1.160 LEFT REVERSE DRIVE PUMP SHORT TO GROUND

Flash Code: 3-3

Left reverse drive pump short to ground. The left reverse drive pump output [X090.2] is shorted to ground. See 1.378 COMMON STG PROCEDURE on Pg. 175.

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1.161 LENGTH SENSOR REF VOLTAGE HIGH

Flash Code: 9-9

Length sensor reference voltage high. Supply voltage for the boom length sensors is above 5.5VDC. A power cycle is required.

Note	Pretest Instructions	Test	Result	Corrective Action
1.161.1	Cycle power	Did fault clear?	Yes	Troubleshooting complete
			No	Go to step 1.161.2
1.161.2	Disconnect all on-board and off-board optional power systems such as 110VAC and welders to keep them from energizing	Did fault clear?	Yes	Isolate system by turing on each optional power system individually and checking fault. Then look for shorts between length sensor harness and faulty system harness.
			No	Go to step 1.161.3
1.161.3	Disconnect BLAM J3 [X088]. Turn on machine.	Is there between 5.5 VDC and 4.5 VDC measured between all of the following points on BLAM J3: pin 1 [X088.1.pin] to pin 3 [X088.3.pin]; pin 4 [X088.4.pin] to pin 6 [X088.6.pin]; pin 7 [X088.7.pin] to pin 9 [X088.9.pin]; pin 10 [X088.10.pin] to pin 12 [X088.12.pin]?	Yes	Go to step 1.161.4
			No	Replace BLAM
1.161.4	Disconnect BLAM J3 [X088] and battery + terminal [X116].	Is there a short between the battery (+) terminal [X116] and any of the following: BLAM J3 socket 1 [X088.1.soc], socket 4 [X088.4.soc], socket 7 [X088.7.soc], or socket 10 [X088.10.soc]?	Yes	Troubleshoot BLAM J3 [X088] harness wire(s) with short
			No	Reprogram/replace BLAM

1.162 LENGTH SENSOR REF VOLTAGE LOW

Flash Code: 9-9

Length sensor reference voltage low. Supply voltage for the boom length sensors is below 4.5VDC. A power cycle is required.

Note	Pretest Instructions	Test	Result	Corrective Action
1.162.1	Cycle power	Did fault clear?	Yes	Troubleshooting complete
			No	Go to step 1.161.3
1.162.2	Disconnect BLAM J3 [X088]. Turn on machine.	Is there between 5.5 VDC and 4.5 VDC measured between the following points on BLAM J3: pin 1 [X088.1.pin] to pin 3 [X088.3.pin]; pin 4 [X088.4.pin] to pin 6 [X088.6.pin]; pin 7 [X088.7.pin] to pin 9 [X088.9.pin]; pin 10 [X088.10.pin] to pin 12 [X088.12.pin]?	Yes	Go to step 1.161.4
			No	Replace BLAM
1.162.3	Disconnect BLAM J3 [X088]. Ground meter. See Grounding on Pg. 319 for details.	Is there a short between ground and any of the following: BLAM J3 socket 1 [X088.1.soc], socket 4 [X088.4.soc], socket 7 [X088.7.soc], or socket 10 [X088.10.soc]?	Yes	Troubleshoot BLAM J3 [X088] harness wire(s) with short
			No	Reprogram/replace BLAM

1.163 LIFT UP & TELE OUT PREVENTED - PLATFORM OVERLOADED

Flash Code: 8-2

Lift up & telescope out prevented - platform overloaded. Notification that the machine is configured with load system cut-outs, the platform is overloaded, and lift up or tele out is selected. Lift up and telescope out are prevented while the platform is overloaded.

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1.164 LIFT/SWING LOCKED - JOYSTICK MOVED BEFORE FOOTSWITCH

Flash Code: 2-3

Lift/swing locked - joystick moved before footswitch. Notification that the platform lift and/or swing joystick was not centered before the footswitch was closed. Lift and swing will be prevented. Close the footswitch before selecting any function or moving the joystick. This could also be due to faulty joystick not returning to center.

1.165 LOAD PIN FORCE TOO LOW OVER MAIN ANGLE CHANGE

Flash Code: 8-5

Load pin force too low over main angle change. Reported when the tower is above elevation and the force magnitude remains less than 5000 pounds for more than 45° net main lift movement and the main boom angle referenced to gravity is not between +15° and -15°. This fault also invalidates the current load pin calibration. There may be a problem with the load pin or its mounting. See 5.8 Boom Sensor Calibration on Pg. 309.

1.166 LOAD PIN FORCE TOO LOW OVER MAIN LENGTH TRANSITION

Flash Code: 8-5

Load pin force too low over main length transition. Reported when the tower is above elevation and the force magnitude remains less than 5000 pounds during main boom length transitions from C to A. This fault also invalidates the current load pin calibration. There may be a problem with the load pin or its mounting. See 5.8 Boom Sensor Calibration on Pg. 309.

1.167 LOAD PIN FORCE TOO LOW OVER TOWER ANGLE CHANGE

Flash Code: 8-5

Load pin force too low over tower angle change. Reported when the force magnitude remains less than 5000 pounds for more than 45° of net tower lift cylinder angle movement slower then 0.5 seconds. This fault also invalidates the current load pin calibration. There may be a problem with the load pin or its mounting. See 5.8 Boom Sensor Calibration on Pg. 309.

1.168 LOAD PIN FORCE VALUES NOT CHANGING

Flash Code: 8-5

Load pin force values not changing. Reported when tower lift is being commanded for at least 2 seconds, not lifting down below elevation and the load pin is not reporting changes in both the x and y force values of at least 100 pounds per 3° of tower lift cylinder angle change slower then 0.5 seconds. Except, if the greater tower inclinometer angle is between 15° and 50°, the y force check shall be ignored. This fault also invalidates the current load pin calibration. There may be a problem with the load pin or its mounting. See 5.8 Boom Sensor Calibration on Pg. 309.

1.169 LOAD PIN HORIZONTAL FORCE OUT OF RANGE

Flash Code: 8-5

Load pin horizontal force out of range. The X component of the load pin has been out of range, greater than +125,000 lbs or less than -125,000 lbs, for at least 1.0 second. This fault also invalidates the current load pin calibration. There may be a problem with the load pin or its mounting. See 5.8 Boom Sensor Calibration on Pg. 309.

1.170 LOAD PIN NOT CALIBRATED

Flash Code: 9-9

Load pin not calibrated. The tower lift cylinder load pin is not calibrated, or the calibration data has been removed because of a fault condition. Calibration could be invalidated by a rotated pin and cause this fault.

Note	Pretest Instructions	Test	Result	Corrective Action
1.170.1	Check faults	Is CYLINDER LOAD PIN CAN COMMUNICATIONS LOST or LOAD PIN/TOWER LIFT CYLINDER ANGLE DISAGREEMENT fault present?	Yes	Troubleshoot that fault first
			No	Go to step 1.170.2
1.170.2		Is the load pin mounting hardware in good condition and secure, including the keeper pin and keeper pin bolt?	Yes	Go to step 1.170.3
			No	Repair as needed

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Note	Pretest Instructions	Test	Result	Corrective Action
1.170.3	Perform 5.8 Boom Sensor Calibration on Pg. 309.	Does it calibrate successfully?	Yes	Troubleshooting complete
			No	Troubleshoot in accordance with calibration fault.

1.171 LOAD PIN SENSOR FAULT

Flash Code: 8-5

Load pin sensor fault. This fault is reported when any load pin fault(s) other than the over range and under range faults are detected. Check the fault log for the specific fault: 1.165 LOAD PIN FORCE TOO LOW OVER MAIN ANGLE CHANGE on Pg. 95, 1.166 LOAD PIN FORCE TOO LOW OVER MAIN LENGTH TRANSITION on Pg. 95, 1.167 LOAD PIN FORCE TOO LOW OVER TOWER ANGLE CHANGE on Pg. 95, 1.168 LOAD PIN FORCE VALUES NOT CHANGING on Pg. 95, 1.170 LOAD PIN NOT CALIBRATED on Pg. 95, or 1.173 LOAD PIN/TOWER LIFT CYLINDER ANGLE DISAGREEMENT on Pg. 96. Refer to the troubleshooting for that fault.

1.172 LOAD PIN VERTICAL FORCE OUT OF RANGE

Flash Code: 8-5

Load pin vertical force out of range. The Y component of the load pin has been out of range, greater than +125,000 lbs or less than -125,000 lbs, for at least 1.0 second. This fault also invalidates the current load pin calibration. There may be a problem with the load pin or its mounting. See 5.8 Boom Sensor Calibration on Pg. 309.

1.173 LOAD PIN/TOWER LIFT CYLINDER ANGLE DISAGREEMENT

Flash Code: 8-5

Load pin/tower lift cylinder angle disagreement. This fault is reported if the force magnitude is greater than 50000 lbs and the angle of the load pin force vector and the tower lift cylinder angle sensor reading disagree by 20° for 5 seconds. This fault also invalidates the current load pin calibration. There may be a problem with the load pin or its mounting or the tower cylinder angle sensor or its wiring. Check for other load pin or cylinder angle faults in the fault log. See 5.8 Boom Sensor Calibration on Pg. 309.

1.174 LOAD SENSOR NOT CALIBRATED

Flash Code: 8-2

Load sensor not calibrated. The load sense system (LSS) sensors require calibration. See the calibration procedure in the LSS manual for more details.

1.175 LOAD SENSOR READING UNDER WEIGHT

Flash Code: 0-0

Load sensor reading under weight. The load sensor is reading 20% or more under the calibrated zero point. This fault may occur if the basket is resting on the ground. Not reported during the 2 second power-up.

Note	Pretest Instructions	Test	Result	Corrective Action
1.175.1	Safely ensure basket is not resting on anything.	Does fault clear?	Yes	Troubleshooting complete
			No	Go to step 1.175.2
1.175.2	Perform 5.8 Boom Sensor Calibration on Pg. 309.	Does calibration complete successfully?	Yes	Troubleshooting complete
			No	Troubleshoot according to calibration fault

1.176 LOW OIL PRESSURE

Flash Code: 4-3

Low oil pressure. This fault should only occur on machines configured with non-ECM engines. Notification that the oil pressure input [X001.15] is below 8 PSI and the engine has been running for at least 10 seconds.

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1.177 LT FNT STEER LT STB OR OC

Flash Code: 8-6

Left front steer left short to battery or open circuit. The control system detected a short to battery or open circuit on the chassis module left front steer left valve output [X233.4].

Note	Pretest Instructions	Test	Result	Corrective Action
1.177.1	Connect analyzer and read fault log	Does fault log shows other steer STB or OC faults.	Yes	Go to step 1.177.2
			No	Go to step 1.177.4
1.177.2	Disconnect chassis module J1 [X230] and battery negative terminal [X117]	Check for an open between chassis module J1 [X229] socket 4 [X229.4.soc] and the negative battery terminal	Yes	Leave negative battery terminal disconnected. Go to step 1.177.8
			No	Go to step 1.177.3
1.177.3		Is there a bad connection at chassis module J5 connector [X233] or the left front steer left solenoid connector [X210]?	Yes	Re-connect connector
			No	Go to step 1.177.4
1.177.4	Disconnect the left front steer left solenoid connector [X210]. Measure the solenoid resistance.	Is the solenoid resistance about 4.9 Ω?	Yes	Go to step 1.177.5
			No	Replace solenoid
1.177.5	Disconnect the left front steer left solenoid connector [X210] and chassis module J5 [X233].	Are all contacts good and is there continuity between left front steer left solenoid connector yellow wire and Chassis module J5 socket 4 [X233.4.soc]?	Yes	Leave solenoid connector and chassis module J5 disconnected. Go to step 1.177.6
			No	Repair/Replace harness
1.177.6	Disconnect positive battery terminal [X116], left front steer left solenoid [X210] and chassis module J5 [X233].	Is there a short between left front steer left solenoid [X210] YELLOW 9-1 wire and positive battery terminal [X116]?	Yes	Repair/Replace harness
			No	Go to step 1.177.7
1.177.7	Check black ground wire between terminal 5 of the bottom (chassis) swivel connector [X216.5.soc] and the left front steer left solenoid connector [X210]	Are there loose, bent, broken or corroded wires or contacts or moisture in the connectors?	Yes	Repair/Replace harness
			No	Repair/Replace connector as needed.
1.177.8	Disconnect Upper Swivel connector [X083] and negative battery terminal [X117].	Is there an open between socket 5 [X083.5.soc] and battery negative terminal [X117]?	Yes	Leave negative battery terminal disconnected. Go to step 1.177.10
			No	Leave negative battery terminal disconnected. Go to step 1.177.9
1.177.9	Disconnect negative battery terminal [X117] and Lower Swivel connector [X216].	Is there an open between negative battery terminal [X117] and Lower Swivel connector pin 5 [X216.5.pin]?	Yes	Replace swivel
			No	Repair/replace harness to Chassis module.
1.177.10	Disconnect negative battery terminal [X117]	Is there an open between Auxiliary Power Pump negative terminal and the negative battery terminal [X117].	Yes	Repair/replace harness between Auxiliary Power Pump negative terminal and negative battery terminal.
			No	Repair/replace harness between Upper Swivel connector and Auxiliary Power Pump negative connector.

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1.178 LT FNT STEER LT STG

Flash Code: 8-6

Left front steer left short to ground. The control system detected a short to ground on the chassis module left front steer left valve output [X233.4].

Note	Pretest Instructions	Test	Result	Corrective Action
1.178.1	Disconnect the left front steer left solenoid connector [X210].	Is the solenoid about 4.9 Ω?	Yes	Leave the left front steer left solenoid [X210] disconnected. Go to step 1.178.2
			No	Replace the solenoid
1.178.2	Disconnect chassis module connector J5 [X233] left front steer left solenoid connector [X210] and the Lower Swivel connector [X216]	Is there a short between YELLOW 9-1 on the left front steer left solenoid connector [X210] and the Lower Swivel connector socket 5 [X216.5.soc]?	Yes	Repair/Replace harness
			No	Check for loose, bent or corroded contacts or moisture in the connectors. Repair/Replace connector as needed.

1.179 LT FNT STEER RT STB OR OC

Flash Code: 8-6

Left front steer right short to battery or open circuit. The control system detected a short to battery or open circuit on the chassis module left front steer left valve output [X233.3].

Note	Pretest Instructions	Test	Result	Corrective Action
1.179.1	Connect analyzer and read fault log	Does fault log shows other steer STB or OC faults.	Yes	Go to step 1.179.2
			No	Go to step 1.179.4
1.179.2	Disconnect chassis module J1 [X230] and battery negative terminal [X117]	Check for an open between chassis module J1 [X229] socket 4 [X229.4.soc] and the negative battery terminal	Yes	Leave negative battery terminal disconnected. Go to step 1.179.8
			No	Go to step 1.179.3
1.179.3		Is there a bad connection at chassis module J5 connector [X233] or the left front steer right solenoid connector [X207]?	Yes	Re-connect connector
			No	Go to step 1.179.4
1.179.4	Disconnect the left front steer right solenoid connector [X207]. Measure the solenoid resistance.	Is the solenoid resistance about 4.9 Ω?	Yes	Go to step 1.179.5
			No	Replace solenoid
1.179.5	Disconnect the left front steer right solenoid connector [X207] and chassis module J5 [X233].	Are all contacts good and is there continuity between left front steer right solenoid connector [X207] YELLOW wire and Chassis module J5 socket 4 [X233.4.soc]?	Yes	Leave solenoid connector and chassis module J5 disconnected. Go to step 1.179.6
			No	Repair/Replace harness
1.179.6	Disconnect positive battery terminal [X116], left front steer right solenoid [X207] and chassis module J5 [X233].	Is there a short between left front steer right solenoid [X207] YELLOW 9-1 wire and positive battery terminal [X116]?	Yes	Repair/Replace harness
			No	Go to step 1.179.7
1.179.7	Check black ground wire between terminal 5 of the bottom swivel connector [X216.5.soc] and the left front steer right solenoid connector [X207]	Are there loose, bent, broken or corroded wires or contacts or moisture in the connectors?	Yes	Repair/Replace harness
			No	Repair/Replace connector as needed.

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Note	Pretest Instructions	Test	Result	Corrective Action
1.179.8	Disconnect Upper Swivel connector [X083] and negative battery terminal [X117].	Is there an open between socket 5 [X083.5.soc] and battery negative terminal [X117]?	Yes	Leave negative battery terminal disconnected. Go to step 1.179.10
			No	Leave negative battery terminal disconnected. Go to step 1.179.9
1.179.9	Disconnect negative battery terminal [X117] and Lower Swivel connector [X216].	Is there an open between negative battery terminal [X117] and Lower Swivel connector pin 5 [X216.5.pin]?	Yes	Replace swivel
			No	Repair/replace harness to Chassis module.
1.179.10	Disconnect negative battery terminal [X117]	Is there an open between Auxiliary Power Pump negative terminal and the negative battery terminal [X117].	Yes	Repair/replace harness between Auxiliary Power Pump negative terminal and negative battery terminal.
			No	Repair/replace harness between Upper Swivel connector and Auxiliary Power Pump negative connector.

1.180 LT FNT STEER RT STG

Flash Code: 8-6

Left front steer right short to ground. The control system detected a short to ground on the chassis module left front steer right valve output [X233.3].

Note	Pretest Instructions	Test	Result	Corrective Action
1.180.1	Disconnect the left front steer right solenoid connector [X207]	Is the solenoid about 4.9 Ω?	Yes	Leave the left front steer right solenoid connector [X207] disconnected. Go to step
			No	Replace solenoid
1.180.2	Disconnect the left front steer right solenoid connector [X207], the chassis module J5 connector and the and the Lower Swivel connector [X216].	Is there a short between the left front steer right solenoid connector [X207] YELLOW 10-1 wire and the Lower Swivel connector socket 5 [X216.5.soc]?	Yes	Repair/Replace harness
			No	Check for loose, bent or corroded contacts or moisture in the connectors. Repair/Replace connector as needed.

1.181 LT REAR STEER LT STB OR OC

Flash Code: 8-6

Left rear steer left short to battery or open circuit. the control system detected a short to battery or open circuit on the chassis module left rear steer left valve output [X233.8]. See 1.377 COMMON STB OR OC PROCEDURE on Pg. 174.

1.182 LT REAR STEER LT STG

Flash Code: 8-6

Left rear steer left short to ground. The control system detected a short to ground on the chassis module left rear steer left valve output [X233.8]. See 1.378 COMMON STG PROCEDURE on Pg. 175.

1.183 LT REAR STEER RT STB OR OC

Flash Code: 8-6

Left rear steer right short to battery or open circuit. the control system detected a short to battery or open circuit on the chassis module left rear steer right valve output [X233.7]. See 1.377 COMMON STB OR OC PROCEDURE on Pg. 174.

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1.184 LT REAR STEER RT STG

Flash Code: 8-6

Left rear steer right short to ground. The control system detected a short to ground on the chassis module left rear steer right valve output [X233.7]. See 1.378 COMMON STG PROCEDURE on Pg. 175.

1.185 MAIN ANGL1 CAN COMMUNICATIONS LOST

Flash Code: 6-6

Main angle sensor 1 (right) CAN bus communications lost. The system cannot communicate with main angle sensor #1 (right). This may be due to wiring problems between main angle sensor #1 and ground module.

Note	Pretest Instructions	Test	Result	Corrective Action
1.185.1		Is the EXCESSIVE CAN BUS COMMUNICATION ERRORS fault active in the fault log?	Yes	Troubleshoot 1.93 EXCESSIVE CAN BUS COMMUNICATION ERRORS on Pg. 73 first
			No	Go to step 1.185.2
1.185.2		Does the BLAM software version show "??" in ANALYZER ⇒ DIAGNOSTICS ⇒ VERSIONS ⇒ B.L.A. MODULE SOFTWARE: ??	Yes	See 1.46 BLAM CAN COMMUNICATIONS LOST on Pg. 48
			No	Go to step 1.185.3
1.185.3	Disconnect the main boom angle sensor 1 (right) connector [X048]. Turn on the machine	Does the voltage between socket 2 and socket 3 of the main boom angle sensor 1 (right) connector [X048.2.soc X048.3.soc] measure more than 7 VDC?	Yes	Go to step 1.185.4
			No	Go to step 1.185.5
1.185.4	Ground meter and take the following measurement by backprobing. See Grounding and Backprobing on Pg. 319 for details.	Use meter's min/max feature or observe meter while turning on machine. Set up to measure voltage at ground module J2 terminal 10 [X002.10]. Turn on the machine. Does voltage peak at 12 VDC? (This may need to be repeated several times to see voltage spike.)	Yes	Go to step 1.185.8
			No	Replace ground module
1.185.5	Disconnect the tower boom passthru - 21 position connector [X044]. Turn on the machine	Does the voltage between socket J and socket E of the tower boom passthru connector [X044.J.soc X044.E.soc] measure more than 7 VDC?	Yes	Repair the RED/BLK and/or BLACK wires between the tower boom passthru connector [X044.J X044.E] and the main boom angle sensor 1 (right) connector [X048.2 X048.3]
			No	Go to step 1.185.6
1.185.6	Disconnect the MTB pass thru - 21 position connector [X042]. Turn on the machine	Does the voltage between pin J and pin E of the MTB pass thru connector [X042.J.pin X042.E.pin] measure more than 7 VDC?	Yes	Repair the RED/BLK and/or BLACK wires between the MTB pass thru connector [X042.J X042.E] and the tower boom passthru connector [X044.J X044.E]
			No	Go to step 1.185.7
1.185.7	Ground meter and take the following measurement by backprobing. Turn on the machine.	Does the voltage on terminal 10 of the ground module J2 connector [X002.10] measure more than 7VDC?	Yes	Repair the WHT/RED 57-10 wire between the MTB pass thru connector [X042.J] and the ground module J2 connector [X002.10] and/or the BLACK wire between the MTB pass thru connector and ground [X042.E]
			No	Replace the ground module
1.185.8	Disconnect the main boom angle sensor 1 (right) connector [X048]	Is there 60 Ω between main boom angle sensor 1 socket 4 and socket 5 [X048.4.soc X048.5.soc]?	Yes	Go to step 1.185.9
			No	See 1.46 BLAM CAN COMMUNICATIONS LOST on Pg. 48

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Note	Pretest Instructions	Test	Result	Corrective Action
1.185.9	Disconnect CAN 3 way - to platform [X270], CAN 3 way - to BLAM [X269] and ground module J7	Is there CAN HI continuity between CAN 3 way - to platform pin A [X270.A.pin] and socket 13 of the ground module J7 connector [X007.13.soc] also CAN LO continuity between CAN 3 way - to platform pin B [X270.B.pin] and socket 24 of the ground module J7 connector [X007.24.soc]? -AND- Is it open between CAN 3 way - to platform pin A [X270.A.pin] and CAN 3 way - to platform pin C [X270.C.pin]? -AND- Is it open between CAN 3 way - to platform pin B [X270.B.pin] and CAN 3 way - to platform pin C [X270.C.pin]	Yes	Go to step 1.185.10
			No	Repair/replace the RED, BLACK, and Shield wires, harness and/or CAN 3-way between the CAN 3 way - to platform pin A,B,C [X270.A.pin X270.B.pin X270.C.pin] and the ground module J7 connector [X007.13 X007.24 X007.18]. See step 1.93.14 of 1.93 EXCESSIVE CAN BUS COMMUNICATION ERRORS on Pg. 73
1.185.10	Swap the right main boom angle sensor 1 with t he left main boom angle sensor 2, plugging the right harness plug [X048] into the left sensor [X049]	Does this fault still occur?	Yes	Check the connections at the right main boom angle sensor 1 connector [X048] and see 1.93 EXCESSIVE CAN BUS COMMUNICATION ERRORS on Pg. 73
			No	Repair/replace the sensor that was originally installed on the right [X048]. Re-calibration of the boom sensors will be necessary

1.186 MAIN ANGL1 INVALID ANGLE

Flash Code: 8-4

Main angle sensor 1 (right) invalid angle. The right main boom angle sensor #1 is reading an angle less than 3° or greater than 177°. The control system is able to communicate with this sensor over the CAN bus, but the value returned from the sensor is outside of the allowed range. When fully stowed, the screen ANALYZER ⇒ ACCESS LEVEL 1 ⇒ DIAGNOSTICS ⇒ BOOM SENSORS ⇒ MAIN LIFT 1 ANGLE A/D: XXXX should show between 5 and 25.

Note	Pretest Instructions	Test	Result	Corrective Action
1.186.1	Examine fault log	Does the fault EXCESSIVE CAN BUS COMMUNICATION ERRORS appear?	Yes	Trouble shot that fault first.
			No	Go to step 1.186.2
1.186.2		Examine the coupling, clamps, rotary sensor, mounting blocks and the cross bolt in the main boom pivot pin for loose hardware or damage. Is there any? See Figure 2-5. Boom Area Connectors on Pg. 185 for details.	Yes	Repair as needed
			No	Go to step 1.186.3
1.186.3	Retract and lower boom completely	Is the timing mark for the sensor in the proper place? See Figure 2-5. Boom Area Connectors on Pg. 185 for details.	Yes	Go to step 1.186.4
			No	Re-align mark on shaft to the mark on the face near "R", for right side, on label. It is on the side opposite of the connector. See Figure 2-5. Boom Area Connectors on Pg. 185. Go to step 1.186.5.
1.186.4	Remove sensor coupler	Is it between 2.6 and 2.8 inches?	Yes	Go to step 1.186.5
			No	Replace any coupler outside the given length
1.186.5		Perform boom calibration. Does it pass?	Yes	Troubleshooting complete
			No	Go to step 1.186.6
1.186.6		Manually adjust angle sensor that failed calibration previous in step. Perform boom calibration. Does it pass?	Yes	Troubleshooting complete
			No	Repeat this step. If a sensor cannot be adjusted or continually falls outside of calibration replace the sensor.

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1.187 MAIN ANGL2 CAN COMMUNICATIONS LOST

Flash Code: 6-6

Main angle sensor 2 CAN communications lost. The system cannot communicate with main angle sensor #2 (Left). This may be due to wiring problems between main angle sensor #2 and ground module.

Note	Pretest Instructions	Test	Result	Corrective Action
1.187.1		Is the EXCESSIVE CAN BUS COMMUNICATION ERRORS fault active in the fault log?	Yes	Troubleshoot 1.93 EXCESSIVE CAN BUS COMMUNICATION ERRORS on Pg. 73 first
			No	Go to step 1.187.2
1.187.2		Does the BLAM software version show "??" in ANALYZER ⇒ DIAGNOSTICS ⇒ VERSIONS ⇒ B.L.A. MODULE SOFTWARE: ??	Yes	See 1.46 BLAM CAN COMMUNICATIONS LOST on Pg. 48
			No	Go to step 1.187.3
1.187.3	Disconnect the main boom angle sensor 2 (left) connector [X049]. Turn on the machine	Does the voltage between socket 2 and socket 3 of the main boom angle sensor 2 (left) connector [X049.2.soc X049.3.soc] measure more than 7 VDC?	Yes	Go to step 1.187.4
			No	Go to step 1.187.5
1.187.4	Ground meter and take the following measurement by backprobing. See Grounding and Backprobing on Pg. 319 for details.	Use meter's min/max feature or observe meter while turning on machine. Set up to measure voltage at ground module J2 terminal 21 [X002.21]. Turn on the machine. Does voltage peak at 12 VDC? (This may need to be repeated several times to see voltage spike.)	Yes	Go to step 1.187.8
			No	Replace ground module
1.187.5	Disconnect the tower boom passthru - 21 position connector [X044]. Turn on the machine	Does the voltage between socket K and socket E of the tower boom passthru connector [X044.K.soc X044.E.soc] measure more than 7 VDC?	Yes	Repair the RED/BLK and/or BLACK wires between the tower boom passthru connector [X044.K X044.E] and the main boom angle sensor 2 (left) connector [X049.2 X049.3]
			No	Go to step 1.187.6
1.187.6	Disconnect the MTB pass thru - 21 position connector [X042]. Turn on the machine	Does the voltage between pin K and pin E of the MTB pass thru connector [X042.K.pin X042.E.pin] measure more than 7 VDC?	Yes	Repair the RED/BLK and/or BLACK wires between the MTB pass thru connector [X042.K X042.E] and the tower boom passthru connector [X044.K X044.E]
			No	Go to step 1.187.7
1.187.7	Ground meter and take the following measurement by backprobing. Turn on the machine.	Does the voltage on terminal 21 of the ground module J2 connector [X002.21] measure more than 7VDC?	Yes	Repair the WHT/RED 57-11 wire between the MTB pass thru connector [X042.K] and the ground module J2 connector [X002.21] and/or the BLACK wire between the MTB pass thru connector and ground [X042.E]
			No	Replace the ground module
1.187.8	Disconnect the main boom angle sensor 2 (left) connector [X049]	Is there 60 Ω between main boom angle sensor 2 socket 4 and socket 5 [X049.4.soc X049.5.soc]?	Yes	Go to step 1.187.9
			No	See 1.46 BLAM CAN COMMUNICATIONS LOST on Pg. 48

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Note	Pretest Instructions	Test	Result	Corrective Action
1.187.9	Disconnect CAN 3 way - to platform [X270], CAN 3 way - to BLAM [X269] and ground module J7	Is there CAN HI continuity between CAN 3 way - to platform pin A [X270.A.pin] and socket 13 of the ground module J7 connector [X007.13.soc] also CAN LO continuity between CAN 3 way - to platform pin B [X270.B.pin] and socket 24 of the ground module J7 connector [X007.24.soc]? -AND- Is it open between CAN 3 way - to platform pin A [X270.A.pin] and CAN 3 way - to platform pin C [X270.C.pin]? -AND- Is it open between CAN 3 way - to platform pin B [X270.B.pin] and CAN 3 way - to platform pin C [X270.C.pin]	Yes	Go to step 1.187.10
			No	Repair/replace the RED, BLACK, and Shield wires, harness and/or CAN 3-way between the CAN 3 way - to platform pin A,B,C [X270.A.pin X270.B.pin X270.C.pin] and the ground module J7 connector [X007.13 X007.24 X007.18]. See step 1.93.14 of 1.93 EXCESSIVE CAN BUS COMMUNICATION ERRORS on Pg. 73
1.187.10	Swap the right main boom angle sensor 1 with t he left main boom angle sensor 2, plugging the right harness plug [X048] into the left sensor [X049]	Does this fault still occur?	Yes	Check the connections at the right main boom angle sensor 2 connector [X049] and see 1.93 EXCESSIVE CAN BUS COMMUNICATION ERRORS on Pg. 73
			No	Repair/replace the sensor that was originally installed on the left [X049]. Re-calibration of the boom sensors will be necessary

1.188 MAIN ANGL2 INVALID ANGLE

Flash Code: 8-4

Main angle sensor 2 (left) invalid angle. The left main boom angle sensor #2 is reading an angle less than 3° or greater than 177°. The control system is able to communicate with this sensor over the CAN bus, but the value returned from the sensor is outside of the allowed range. When fully stowed, the screen ANALYZER ⇒ ACCESS LEVEL 1 ⇒ DIAGNOSTICS ⇒ BOOM SENSORS ⇒ MAIN LIFT 2 ANGLE A/D: XXXX should show between 5 and 25.

Note	Pretest Instructions	Test	Result	Corrective Action
1.188.1	Examine fault log	Does the fault EXCESSIVE CAN BUS COMMUNICATION ERRORS appear?	Yes	Trouble shot that fault first.
			No	Go to step 1.188.2
1.188.2		Examine the coupling, clamps, rotary sensor, mounting blocks and the cross bolt in the main boom pivot pin for loose hardware or damage. Is there any? See Figure 2-5. Boom Area Connectors on Pg. 185 for details.	Yes	Repair as needed
			No	Go to step 1.188.3
1.188.3	Retract and lower boom completely	Is the timing mark for the sensor in the proper place? See Figure 2-5. Boom Area Connectors on Pg. 185 for details.	Yes	Go to step 1.188.4
			No	Re-align mark on shaft to the mark on the face near "L", for left side, on label. It is on the same side as the connector. See Figure 2-5. Boom Area Connectors on Pg. 185. Go to step 1.186.5.
1.188.4	Remove sensor coupler	Is it between 2.6 and 2.8 inches?	Yes	Go to step 1.188.5
			No	Replace any coupler outside the given length
1.188.5		Perform boom calibration. Does it pass?	Yes	Troubleshooting complete
			No	Go to step 1.188.6
1.188.6		Manually adjust angle sensor that failed calibration previous in step. Perform boom calibration. Does it pass?	Yes	Troubleshooting complete
			No	Repeat this step. If a sensor cannot be adjusted or continually falls outside of calibration replace sensor.

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1.189 MAIN ANGLE MOVEMENT WITHOUT CMD

Flash Code: 8-4

Main angle movement without command. The control system detected at least 2.5° of main angle movement in 0.5 seconds, while the main lift command was not being operated. This is most likely caused by a problem with the hydraulics.

Note	Pretest Instructions	Test	Result	Corrective Action
1.189.1	Read fault log.	Does the main lift PVG valve have one or more faults in the stack?	Yes	Repair main lift PVG valve in accordance with fault(s) in stack.
			No	Go to step 1.189.2
1.189.2		Open main boom to maximum angle and return to fully closed. Does fault still occur?	Yes	Go to step 1.189.3
			No	Air was in cylinder. Troubleshooting complete.
1.189.3	Read fault log.	Are there any 3-3 faults regarding main lift pilot pressure?	Yes	Repair machine in accordance with those fault(s) first.
			No	Go to step 1.189.4
1.189.4		Are there visible hydraulic leaks?	Yes	Repair/replace as needed
			No	Go to step 1.189.5
1.189.5		Are the main lift cylinder hydraulic connections good?	Yes	Go to step 1.189.6
			No	Repair as needed
1.189.6	Swap cartridge from main lift enable valve [X082] to tower tele enable valve [X081].	Does this fault still occur?	No	Repair/replace main lift enable valve [X082]
			Yes	Go to step 1.189.7
1.189.7	Rig wires from battery + and ground to reach the main lift enable valve [X082]. Raise main boom. Do not allow stripped area of wires to touch each other.	Disconnect main lift enable connector [X082]. Energize main lift enable valve [X082] by touching wires from battery (+) and (-) wires to solenoid contacts. Does main boom move when solenoid is energized?	Yes	Keep machine in same condition. Go to step 1.189.8.
			No	Repair/replace main cylinder
1.189.8	Ensure machine is set up the same as in step 1.189.7. Disconnect hose on port 2 from main lift enable valve [X082].	Disconnect main lift enable connector [X082]. Energize main lift enable valve [X082] by touching wires from battery (+) and (-) wires to solenoid contacts. Is there fluid flowing out of the hose?	Yes	Repair/replace main cylinder holding valve
			No	Repack main cylinder piston seal

1.190 MAIN ANGLE SENSOR DISAGREEMENT

Flash Code: 8-4

Main angle sensor disagreement. The BLAM detected a difference between the left and right main boom angle sensors. A difference greater than 3.0° was held for at least 2.0 seconds.

Note	Pretest Instructions	Test	Result	Corrective Action
1.190.1		Check the fault log for primary faults, MAIN ANGL1 CAN COMMUNICATIONS LOST, MAIN ANGL1 INVALID ANGLE, MAIN ANGL2 CAN COMMUNICATIONS LOST, or MAIN ANGL2 INVALID ANGLE. Are any primary faults present?	Yes	Troubleshoot the primary fault before continuing
			No	Go to step 1.190.2

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Note	Pretest Instructions	Test	Result	Corrective Action
1.190.2		Examine the couplings, rotary sensors, and mounting blocks. Is there any loose hardware or boom side to side movement on the pivot pin in excess of 0.375"?	Yes	Tighten any loose hardware and use thrust washers to limit excess movement on the pin. For more information, see Figure 2-5. Boom Area Connectors on Pg. 185.
			No	Go to step 1.190.3
1.190.3		In the transport position, are the left and right main angle sensors rotated to align with their corresponding timing marks?	Yes	Go to step 1.190.4
			No	Re-align. For more information, see Figure 2-5. Boom Area Connectors on Pg. 185.
1.190.4		Is each coupler's length is between 2.6 and 2.8 inches?	Yes	Go to step 1.190.5
			No	Replace couplers. For more information, see Figure 2-5. Boom Area Connectors on Pg. 185.
1.190.5	Perform a boom sensor calibration, see 5.8 Boom Sensor Calibration on Pg. 309	Did the calibration complete successfully?	Yes	Cycle power to clear the fault
			No	Do not cycle power and Go to step 1.190.6
1.190.6	If power was cycled, go to step 1.190.5	Did the calibration fail with a MAIN ANGL1 FAULT or MAINANGL2 FAULT? (Note that terminal 10 of the ground module J2 connector [X002.10] must power the RIGHT main angle sensor and terminal 21 of the ground module J2 connector [X002.21] must power the LEFT main angle sensor.)	Yes	Adjust sensor #1 to read between 5° and 25° in ANALYZER ⇒ ACCESS LEVEL 1 ⇒ DIAGNOSTICS ⇒ BOOM SENSORS ⇒ MAIN LIFT 1 RAW ANGLE: XXX.X and sensor #2 between 155° and 175° in ANALYZER ⇒ ACCESS LEVEL 1 ⇒ DIAGNOSTICS ⇒ BOOM SENSORS ⇒ MAIN LIFT 2 RAW ANGLE: XXX.X. Go to step 1.190.5. If a sensor cannot be adjusted into range or continually fails calibration, replace that main angle sensor and recalibrate
			No	Follow the calibration instructions to calibrate the boom sensors

1.191 MAIN ANGLE SENSOR NOT DETECTING ANGLE CHANGE

Flash Code: 8-4

Main angle sensor not detecting angle change. The control system did not detect at least 0.3° of movement within 6 seconds while the main lift function was commanded. This fault is not detected for main lift Up within 2° of the maximum angle or main lift Down within 2° of the minimum angle. This fault is most likely caused by a mechanical or hydraulic failure, preventing the machine from responding.

Note	Pretest Instructions	Test	Result	Corrective Action
1.191.1	Read active faults	Are there any faults with the main dump valve [X074], PVG enable valve [X086], or main lift enable valve [X082]	Yes	Troubleshoot them first.
			No	Go to step 1.191.2
1.191.2		Are the main angle sensors securely mounted to the machine? Also does the pin attached to the main rotary angle sensors [X048] and [X049] have the cross bolt and nut secure? (See Figure 2-5. Boom Area Connectors on Pg. 185 for details.)	Yes	Go to step 1.191.3
			No	Repair as needed
1.191.3	View fault log	Are any engine faults indicated?	Yes	Troubleshoot them first
			No	Go to step 1.191.4
1.191.4		Are there any leaks between function pump, PVG main lift valve, and main lift cylinder?	Yes	Repair/replace as needed
			No	Go to step 1.191.5

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Note	Pretest Instructions	Test	Result	Corrective Action
1.191.5	Install a high pressure gauge on the LS port on main valve block next to main lift PVG valve. turn on machine. Extend axles. ANALYZER ⇒ ACCESS LEVEL 1 ⇒ SERVICE MODE ⇒ SET PRESSURES ⇒ Enter code 14605 ⇒ SET PRESSURES: MAIN LIFT ⇒ WARNING: MOVEMENT POSSIBLE.	**⚠ WARNING** **WHEN THE STABILITY CONTROL IS OFF, THE MACHINE WILL TIP IF USED INCORRECTLY.** Observe pressure while operating main lift UP and main lift DOWN. Are both pressures between 2755psi and 3088 psi? If analyzer read "SERVICE FAILED" repair/replace main lift enable valve [X082] and recheck for fault.	Yes	Turn off machine. Go to step 1.191.6
			No	Record which pressure is not within range. Keep machine in same condition. Go to step 1.191.11
1.191.6	ANALYZER ⇒ DIAGNOSTICS ⇒ SYSTEM ⇒ MAIN LIFT PILOT PRES.SW.	Does analyzer indicate "CL" while operating main lift?	Yes	Repair/replace main lift cylinder
			No	Go to step 1.191.7
1.191.7	Disconnect main lift enable valve solenoid [X082]. Measure resistance across the solenoid.	Does the solenoid measure approximately 8.7Ω?	Yes	Go to step 1.191.8
			No	Replace solenoid
1.191.8	Disconnect main lift enable valve solenoid [X082]. Ground meter. See Section 6. Multimeter Basics on Pg. 319 for details.	Is there continuity between the black wire in the connector for the main lift enable valve solenoid [X082] and ground?	Yes	Go to step 1.191.9
			No	Repair/replace harness between main lift enable valve solenoid [X082] and ground including ground bus connector [X009].
1.191.9	Disconnect main lift enable valve solenoid [X082]. Start machine. Fully stow boom, center turntable between rear wheels. ANALYZER ⇒ ACCESS LEVEL 1 ⇒ SERVICE MODE ⇒ MAIN LIFT. Enter code 55050.	**⚠ WARNING** **WHEN THE STABILITY CONTROL IS OFF, THE MACHINE WILL TIP IF USED INCORRECTLY.** Measure voltage across main lift enable valve solenoid [X082] while operating boom lift. Only lift a few feet or operate it several seconds. Does the meter read about 12VDC?	Yes	Repair/replace main lift enable valve [X082]. Look for stuck spool, etc.
			No	Keep machine in the same condition. Go to step 1.191.10
1.191.10	Ensure machine is in same condition as step 1.191.9 Pretest Instructions. Fully stow boom. Ground meter. Take the following measurement by backprobing. (See Section 6. Multimeter Basics on Pg. 319 for details.)	**⚠ WARNING** **WHEN THE STABILITY CONTROL IS OFF, THE MACHINE WILL TIP IF USED INCORRECTLY.** Measure voltage at ground control module J2 pin 23 [X002.23.pin] while operating boom lift. Only lift a few feet. Does the meter read about 12VDC?	Yes	Repair/replace harness between ground control module and main lift enable valve [X082].
			No	Reprogram/replace ground control module
1.191.11	Keep machine in same condition as step 1.191.5.	Ensure the adjusting screw, just below the LS port, is turned fully clockwise. Are pressures between 2755psi and 3088 psi?	Yes	Turn off machine. Troubleshooting complete
			No	Turn off machine. Go to step 1.191.12
1.191.12	Install a low pressure gauge to the "MP1" port on the main valve block.	Start engine. The pressure can be adjusted using the adjustment screw under the low pressure relief adjustment cover nut on the function pump. Does the gauge read 450 psi or adjust to it?	Yes	Go to step 1.191.13
			No	Repair/replace function pump/low pressure relief

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Note	Pretest Instructions	Test	Result	Corrective Action
1.191.13		Swap cartridge in main dump valve [X074] with the one in the PVG enable valve[X068]. Does fault clear?	Yes	Replace cartridge originally in the main dump valve [X074]
			No	Go to step 1.191.14
1.191.14	Disconnect main dump solenoid [X074].	Measure resistance across the solenoid. Does the solenoid measure approximately 7.2Ω?	Yes	Go to step 1.191.15
			No	Replace solenoid
1.191.15	Disconnect main dump solenoid [X074]. Ground meter.	Is there continuity between the black wire in the connector for the main lift enable valve solenoid [X082] and ground?	Yes	Go to step 1.191.16
			No	Repair/replace harness to ground including MTB ground bus connector [X009]
1.191.16	Disconnect main dump solenoid [X074]. Start machine. Fully stow boom, center turntable between rear wheels. ANALYZER ⇒ ACCESS LEVEL 1 ⇒ SERVICE MODE ⇒ MAIN LIFT. Enter code 55050.	**⚠ WARNING** **WHEN THE STABILITY CONTROL IS OFF, THE MACHINE WILL TIP IF USED INCORRECTLY.** Measure voltage across main dump solenoid [X074] while operating boom lift. Only lift a few feet or operate it several seconds. Does the meter read about 12 VDC?	Yes	Go to step 1.191.18
			No	Keep machine in same condition. Go to step 1.191.17
1.191.17	Ensure machine is in same condition as step 1.191.16 Pretest Instructions. Fully stow boom. Ground meter. Take the following measurement by backprobing. (See Section 6. Multimeter Basics on Pg. 319 for details.)	**⚠ WARNING** **WHEN THE STABILITY CONTROL IS OFF, THE MACHINE WILL TIP IF USED INCORRECTLY.** Measure voltage at ground control module J2 pin 13 [X002.13.pin] while operating boom lift. Only lift a few feet. Does the meter read about 12VDC?	Yes	Turn off machine. Repair/replace harness between ground control module J2 [X002] and main dump solenoid [X074]
			No	Turn off machine. Replace ground control module.
1.191.18	Install a high pressure gauge at the "MP1" port on the main valve block. Remove coil for the main tele proportional valve [X072], but leave harness connected.	Start engine. While activating main tele, observe pressure. Adjust pressure with the adjustment screw under the high pressure relief adjustment cover nut on the function pump. Does the pressure read or adjust to 3400 psi?	Yes	Keep machine in same condition. Go to step 1.191.19.
			No	Repair/replace function pump or high pressure relief circuit on the function pump
1.191.19	Turn off machine. Disconnect PVG enable [X068]. Measure resistance of PVG enable solenoid.	Is resistance approximately 4.7 Ω?	Yes	Keep machine in same condition. Go to step 1.191.20.
			No	Replace PVG enable solenoid [X068]
1.191.20	Swap cartridge from PVG enable valve [[X068] with the one in the main dump valve [X074]	Does fault clear?	Yes	Replace PVG enable valve [X068] cartridge
			No	Go to step 1.191.21
1.191.21	Turn off machine. Disconnect PVG enable [X068]. Ground meter. (See Section 6. Multimeter Basics on Pg. 319 for details.)	Is there continuity between the black wire in the connector of the PVG enable solenoid [X068] and ground?	Yes	Go to step 1.191.22
			No	Repair/replace harness to ground including MTB ground bus connector [X009]

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Note	Pretest Instructions	Test	Result	Corrective Action
1.191.22	Disconnect PVG enable [X068]. Start machine. Fully stow boom, center turntable between rear wheels. ANALYZER ⇒ ACCESS LEVEL 1 ⇒ SERVICE MODE ⇒ MAIN LIFT. Enter code 55050.	**⚠ WARNING** **WHEN THE STABILITY CONTROL IS OFF, THE MACHINE WILL TIP IF USED INCORRECTLY.** Measure voltage across PVG enable [X068] while operating boom lift momentarily. Only lift a few feet. Does the meter read about 12VDC?	Yes	Replace any main lift PVG valve [X074] shock valve that was not in specified range as recorded in step 1.191.5
			No	Keep machine in same condition. Go to step 1.191.23.
1.191.23	Ensure machine is in same condition as step 1.191.22 Pretest Instructions. Return boom to fully stowed position. Ground meter. Take the following readings by backprobing the contact in question. (See Section 6. Multimeter Basics on Pg. 319 for details.)	**⚠ WARNING** **WHEN THE STABILITY CONTROL IS OFF, THE MACHINE WILL TIP IF USED INCORRECTLY.** Measure voltage at ground control module J2 pin 31 [X002.31.pin] by backprobing while operating boom lift. Only lift a few feet. Does the meter read about 12VDC?	Yes	Turn off machine. Repair/replace harness between ground control module J2 [X002] and PVG enable [X068]
			No	Turn off machine. Replace ground control module.

1.192 MAIN BOOM TRN ANGLE SW/SENSOR DISAGREEMENT

Flash Code: 8-4

Main boom transport angle switch and sensor disagreement. The main boom transport angle switch changed states outside of the +4/-8° tolerance window to the stored calibration point. This could indicate a problem with the main boom transport switch, the main boom angle sensor, or the calibration stored transport switch point.

Note	Pretest Instructions	Test	Result	Corrective Action
1.192.1		Are the following faults present? MAIN TRANSPORT ANGLE SWITCH FAILED, main angle sensor faults	Yes	Troubleshoot those first
			No	Go to step 1.192.2
1.192.2		Examine the coupling, rotary sensor, mounting blocks and the cross bolt in the main boom pivot pin for loose hardware or damage. See Figure 2-5. Boom Area Connectors on Pg. 185 for details. Is there any?	Yes	Repair as needed
			No	Go to step 1.192.3
1.192.3	Retract and lower boom completely	Is the timing mark for the sensor in the proper place? See Figure 2-5. Boom Area Connectors on Pg. 185 for details.	Yes	Go to step 1.192.4
			No	Re-align mark on shaft to the mark on the face near "R", for right side, on label. It is on the side opposite of the connector. Go to step 1.192.8
1.192.4	Remove sensor coupler	Is it between 2.6 and 2.8 inches?	Yes	Go to step 1.192.5
			No	Replace any coupler outside the given length
1.192.5	Retract and lower boom completely	Is there 0.075+/-0.030 inches clearance between the sensor mount and the main boom pivot doubler?	Yes	Go to step 1.192.6
			No	Adjust sensor mount to achieve proper distance.
1.192.6	Retract and lower boom completely	Remove main transport angle switch [X051] mount. is the sensor flush +/- 0.015 inches with bottom of counterbore in sensor mount?	Yes	Do not re-install sensor mount. Go to step 1.192.7.
			No	Adjust sensor to achieve proper distance.

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Note	Pretest Instructions	Test	Result	Corrective Action
1.192.7	Remove main transport angle switch [X051] mount and reconnect harness.	Hold the mount and sensor to the metal surface of the boom. In ANALYZER ⇒ DIAGNOSTICS ⇒ BOOM SWITCHES ⇒ MAIN LIFT ANGLE SWITCH, check the switch states. Is the NC Switch CLOSED and NO switch OPEN?	Yes	Go to step 1.192.8
			No	Go to 1.229 MAIN TRN ANGLE SW FAILED on Pg. 116
1.192.8		Perform boom calibration. Did calibration pass?	Yes	Troubleshooting complete
			No	Repair according to calibration failure

1.193 MAIN DUMP OPEN CIRCUIT

Flash Code: 3-3

Main dump open circuit. The main dump output [X002.13] is open. See 1.377 COMMON STB OR OC PROCEDURE on Pg. 174.

1.194 MAIN DUMP SHORT TO BATTERY

Flash Code: 3-3

Main dump short to battery. The main dump output [X002.13] is shorted to battery. See 1.377 COMMON STB OR OC PROCEDURE on Pg. 174.

1.195 MAIN DUMP SHORT TO GROUND

Flash Code: 3-3

Main dump short to ground. The main dump output [X002.13] is shorted to ground. See 1.378 COMMON STG PROCEDURE on Pg. 175.

1.196 MAIN ENVELOPE ENCROACHED - HYDRAULICS SUSPENDED

Flash Code: 0-0

Main envelope encroached - hydraulics suspended. Notification that the system has detected a main envelope violation and suspended hydraulics to prevent further encroachment. Use the APU to telescope in or lift down inside the envelope. See 1.91 ENVELOPE ENCROACHED - HYDRAULICS SUSPENDED on Pg. 73.

1.197 MAIN IN OPEN CIRCUIT

Flash Code: 3-3

Main telescope in open circuit. The main telescope in output [X002.4] is open. See 1.377 COMMON STB OR OC PROCEDURE on Pg. 174.

1.198 MAIN IN SHORT TO BATTERY

Flash Code: 3-3

Main telescope in short to battery. The main telescope in output [X002.4] is shorted to battery. See 1.377 COMMON STB OR OC PROCEDURE on Pg. 174.

1.199 MAIN IN SHORT TO GROUND

Flash Code: 3-3

Main telescope in short to ground. The main telescope in output [X002.4] is shorted to ground. See 1.378 COMMON STG PROCEDURE on Pg. 175.

1.200 MAIN LIFT APU OPEN CIRCUIT

Flash Code: 3-3

Main lift auxiliary power unit pilot valve open circuit. The main lift pilot valve output [X002.1] is open. See 1.377 COMMON STB OR OC PROCEDURE on Pg. 174.

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1.201 MAIN LIFT APU SHORT TO BATTERY

Flash Code: 3-3

Main lift auxiliary power unit pilot valve short to battery. The main lift pilot valve output [X002.1] is shorted to battery. See 1.377 COMMON STB OR OC PROCEDURE on Pg. 174.

1.202 MAIN LIFT APU SHORT TO GROUND

Flash Code: 3-3

Main lift auxiliary power unit pilot valve short to ground. The main lift pilot valve output [X002.1] is shorted to ground. See 1.378 COMMON STG PROCEDURE on Pg. 175.

1.203 MAIN LIFT ENABLE OPEN CIRCUIT

Flash Code: 3-3

Main lift enable open circuit. The main lift enable valve output [X002.23] is open. See 1.377 COMMON STB OR OC PROCEDURE on Pg. 174.

1.204 MAIN LIFT ENABLE SHORT TO BATTERY

Flash Code: 3-3

Main lift enable short to battery. The main lift enable valve output [X002.23] is shorted to battery. See 1.377 COMMON STB OR OC PROCEDURE on Pg. 174.

1.205 MAIN LIFT ENABLE SHORT TO GROUND

Flash Code: 3-3

Main lift enable short to ground. The main lift enable valve output [X002.23] is shorted to ground. See 1.378 COMMON STG PROCEDURE on Pg. 175.

1.206 MAIN LIFT PILOT PRESSURE FAILURE

Flash Code: 3-3

Main lift pilot pressure failure. Notification that the main lift pilot valve output [X002.1] is not engaged, but the main lift pilot pressure switch input [X001.21] is indicating pressure. The hydraulics will be suspended while this fault is active. This could be a problem with the main lift pilot pressure switch [X079], the switch wiring, wrong hydraulic connections, or residual pressure in the lift circuit. With the key on, engine off, check for the fault 1.207 MAIN LIFT PILOT PRESSURE SWITCH FAILURE on Pg. 110.

1.207 MAIN LIFT PILOT PRESSURE SWITCH FAILURE

Flash Code: 3-3

Main lift pilot pressure switch failure. Notification that the machine is not running and the machine is not in auxiliary power mode, but the main lift pilot pressure switch input [X001.21] is indicating pressure. This is likely due to a problem with the main lift pilot pressure switch [X079] or its wiring.

1.208 MAIN LIFT PVG VALVE COMMAND IMPROPER

Flash Code: 4-5

Main lift PVG valve command improper. Main lift PVG valve received an incorrect instruction from the CAN bus. This could be due to a CAN bus problem or a ground module problem.

Note	Pretest Instructions	Test	Result	Corrective Action
1.208.1	Check faults	Is EXCESSIVE CAN BUS COMMUNICATION ERRORS present?	Yes	Troubleshoot that fault first
			No	Go to step 1.208.2
1.208.2		Cycle power. Does problem clear?	Yes	Troubleshooting complete
			No	Reprogram/replace ground module

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1.209 MAIN LIFT PVG VALVE COMMUNICATIONS

Flash Code: 4-5

Main lift PVG valve communications. The main lift PVG valve is required to send it's status message every 100mS. If the status message from the PVG valve is not received within 500mS then this fault is issued.

Note	Pretest Instructions	Test	Result	Corrective Action
1.209.1	Check faults	Is EXCESSIVE CAN BUS COMMUNICATION ERRORS present?	Yes	Troubleshoot that fault first
			No	Go to step 1.209.2
1.209.2	Disconnect main lift PVG - 4 pos. [X065]. Turn on machine.	Measure voltage between main lift PVG connector socket 2 [X065.2.soc] and socket 3 [X065.3.soc]. Is it about 12 VDC?	Yes	Go to step 1.209.4
			No	Go to step 1.209.3
1.209.3	Disconnect main lift PVG - 4 pos. [X065] and ground module J2 [X002]	Is there continuity between main lift PVG - 4 pos. socket 2 [X065.2.soc] and ground module J2 socket 11 [X002.11.soc]?	Yes	Repair harness between main lift PVG - 4 pos. [X065] and battery ground
			No	Repair harness between main lift PVG - 4 pos. [X065] and ground module J2
1.209.4	Turn off machine. Disconnect main lift PVG - 4 pos. [X065].	Measure resistance between main lift PVG socket 1 [X065.1.soc] and socket 4 [X065.4.soc]. Is it about 60Ω?	Yes	Replace main lift PVG valve [X065] actuator
			No	Go to step 1.209.5
1.209.5	Turn off machine. Disconnect main lift PVG - 4 pos. [X065] and BLAM J4 [X089].	Is there continuity between main lift PVG socket 1 [X065.1.soc] and BLAM J4 socket 4 [X089.4.soc]? AND Is there continuity between main lift PVG socket 4 [X065.4.soc] and BLAM J4 socket 3 [X089.3.soc]?	Yes	Replace main lift PVG valve [X065] actuator or see 1.46 BLAM CAN COMMUNICATIONS LOST on Pg. 48
			No	Repair harness between main lift PVG - 4 pos. [X065] and BLAM J4 [X089]

1.210 MAIN LIFT PVG VALVE HIGH VOLTAGE

Flash Code: 4-5

Main lift PVG valve high voltage. Voltage powering the main lift PVG valve exceeded 32 VDC. Restore proper system voltage to clear fault.

Note	Pretest Instructions	Test	Result	Corrective Action
1.210.1	Ensure all off-board power connections, such as 110VAC, are disconnected. Ensure all on-board power systems are turned off, such as generators, welders, etc.	Turn on machine and start engine. Is battery voltage about 12 VDC? -AND- Does charging and 12VDC electrical power generation system appear to be working properly?	Yes	Go to step 1.210.2
			No	Repair 12 VDC charging and electrical power generation system.
1.210.2	Turn off machine. Ensure all off-board power connections, such as 110VAC, are disconnected. Ensure all on-board power systems are turned off, such as generators, welders, etc. Turn off machine. Disconnect main lift PVG valve [X065]	Are there any shorts between main lift PVG valve socket 2 [X065.2.soc] or socket 3 [X065.3.soc] and wiring for off-board power sources such as 110VAC, or on-board power sources such as welder or generator outputs, etc.? Note, main lift PVG valve socket 3 [X065.3.soc] to ground continuity is OK. Be sure to check for intermittent problems.	Yes	Repair shorts as needed
			No	Transient condition likely set fault. If fault keeps occurring, go to step 1.210.3.
1.210.3	Measure voltage on the second main lift PVG valve connector[X259] using a spare harness exposing terminals 2 [X259.2] and 3 [X259.3], or use insulated alligator clips to those terminals.	Observe 12VDC system voltage at the valve over an extended time under various operating conditions, for example, during engine start. See Min/Max on Pg. 319 for details. Is it performing properly?	Yes	Replace main lift PVG valve actuator [X065]
			No	Repair as needed

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1.211 MAIN LIFT PVG VALVE INTERNAL FAULT

Flash Code: 4-5

Main lift PVG valve internal fault. Hardware or software inside the main lift PVG valve caused an error. There are no serviceable parts that cause this problem.

Note	Pretest Instructions	Test	Result	Corrective Action
1.211.1	Read faults	Are there any 6-6 communication faults?	Yes	Troubleshoot those first
			No	Go to step 1.211.2
1.211.2		Cycle machine power. Keep power off at least 20 seconds. Does fault still occur?	Yes	Replace main lift PVG valve actuator [X065]
			No	Troubleshooting complete

1.212 MAIN LIFT PVG VALVE LOCATION IMPROPER

Flash Code: 4-5

Main lift PVG valve location improper. Main lift PVG valve parameters entered into the incorrect valve. This could be due to a calibration or wiring problem. The valve harnesses have one wire in it that is labeled with a number. The valves are located as follows: main lift at lower left with wire TAN 55-50, tower lift at top left with wire TAN 55-51, tower tele at top right with wire BROWN 55-50.

Note	Pretest Instructions	Test	Result	Corrective Action
1.212.1	Open hood covering the main valve body. Locate the LED's on the PVG valves.	Turn on the machine while watching the LED's. Do they start off, then turn on, in order, LEFT, CENTER, then RIGHT?	Yes	Calibrate boom valves. See 5.4 Calibrating Boom Valves on Pg. 296 for details.
			No	Connect harnesses to the correct PVG valve according to wires listed above in description. Then calibrate boom valves and recheck. See 5.4 Calibrating Boom Valves on Pg. 296 for details.

1.213 MAIN LIFT PVG VALVE LOW VOLTAGE

Flash Code: 4-5

Main lift PVG valve low voltage. Voltage powering the main lift PVG valve fell below about 10 VDC. Increase system voltage above 11 VDC to clear fault.

Note	Pretest Instructions	Test	Result	Corrective Action
1.213.1		Are either of the faults MAIN LIFT PVG VALVE COMMUNICATIONS or BLAM CAN COMMUNICATIONS LOST present?	Yes	Troubleshoot them first.
			No	Go to step 1.213.2
1.213.2		Are the battery and battery connections good?	Yes	Go to step 1.213.3
			No	Repair/replace as needed
1.213.3		Turn on machine and start engine. Is battery voltage about 12 VDC and does system appear to be working properly?	Yes	Go to step 1.213.4
			No	Repair charging and 12 VDC electrical power generation system.
1.213.4	Disconnect main lift PVG valve connector [X065]. Turn on machine.	Is there about 12 VDC between main lift PVG valve socket 2 [X065.2.soc] and socket 3 [X065.3.soc]?	Yes	Transient caused condition. If it occurs again troubleshoot charging and 12 VDC electrical power generation system.
			No	Go to step 1.213.5

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Note	Pretest Instructions	Test	Result	Corrective Action
1.213.5	Take the following measurement by backprobing. See Backprobing on Pg. 319 for details. Turn on machine after setting up measurement.	Is there about 12VDC between ground module J2 terminal 11 [X002.11] and any terminal on the MTB ground bus -12 pos. [X009]?	Yes	Repair/replace harness from main lift PVG valve [X065] to ground J2 [X002] and the MTB ground bus -12 pos. [X009].
			No	Go to step 1.213.6
1.213.6	Take the following measurement by backprobing. Turn on machine after setting up measurement.	Is there about 12VDC between ground module J2 terminal 11 [X002.11] and ground module J8 terminal 1?	Yes	Repair harness between ground module J2 [X002] and MTB ground bus -12 pos. [X009]
			No	Reprogram/replace ground module

1.214 MAIN LIFT PVG VALVE OBSTRUCTED

Flash Code: 4-5

Main lift PVG valve obstructed. Main lift PVG valve spool is not free to move completely. This could be from contamination inside the valve or a blocked filter.

Note	Pretest Instructions	Test	Result	Corrective Action
1.214.1		Is there dirt in the hydraulic module part of the valve, especially around the spool?	Yes	Clean and repair as needed. Go to step 1.214.2
			No	Go to step 1.214.2
1.214.2		Is the filter at the main lift PVG valve [X065] pilot oil inlet blocked?	Yes	Clean and repair as needed. Go to step 1.214.3.
			No	Go to step 1.214.3
1.214.3		Is the fault clear?	Yes	Go to step 1.214.5
			No	Go to step 1.214.4
1.214.4	Mark to identify the main lift PVG valve actuator [X065] using string, tape, etc. Swap it with an actuator that doesn't have a fault.	Perform 5.4 Calibrating Boom Valves on Pg. 296. Does fault move to new location of actuator?	Yes	Replace PVG valve actuator that was initially on the main lift PVG valve [X065]. Go to step 1.214.5
			No	Replace hydraulic module of main lift PVG valve [X065]. Go to step 1.214.5
1.214.5		Does the return filter have contamination in filter media or housing?	Yes	Go to step 1.214.6
			No	Troubleshooting complete
1.214.6	Inspect all 4 hydraulic filters and housings and replace all 4 filters: output of function pump, platform filter (If filter is not external to platform valve it must be updated.), return filter and charge filter (for drive pump). Take note of filters/housings that have contamination.	Cycle boom from fully lowered and retracted to fully extended and then back. Test hydraulic fluid. Does it test bad, appear cloudy, appear dark, smell burned or is otherwise abnormal? -OR- Was there any contamination in the filters or housings?	Yes	Replace all hydraulic fluid Go to step 1.214.7
			No	Go to step 1.214.7
1.214.7		Do machine hydraulics function properly?	Yes	Troubleshooting complete
			No	Replace hydraulic components that are not functioning properly. Focus first on components upstream of any filters/housings with contamination. Calibrate if necessary.

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1.215 MAIN LIFT PVG VALVE PARAMETERS INCORRECT

Flash Code: 4-5

Main lift PVG valve parameters incorrect. Programing parameters contained in the main lift PVG valve do not match those stored in the ground module. The valve needs to be calibrated.

Note	Pretest Instructions	Test	Result	Corrective Action
1.215.1	Calibrate boom valves. See 5.4 Calibrating Boom Valves on Pg. 296 for details.	Did it pass calibration?	Yes	Troubleshooting complete. If fault is recurring replace main lift PVG valve [X065] actuator.
			No	Replace main lift PVG valve [X065] actuator

1.216 MAIN LIFT PVG VALVE SENT UNRECOGNIZED FAULT

Flash Code: 4-5

Main lift PVG valve sent unrecognized fault. An error code sent by the main lift PVG valve was not recognized by the control system.

Note	Pretest Instructions	Test	Result	Corrective Action
1.216.1	Cycle machine power	Operate main lift. Does fault occur again?	Yes	Replace main lift PVG valve [X065] actuator
			No	Troubleshooting complete. If fault is recurring, replace main lift PVG valve [X065] actuator.

1.217 MAIN LIFT PVG VALVE SETUP FAULT

Flash Code: 4-5

Main lift PVG valve setup fault. Main lift PVG valve received programing parameter values that are not allowed. PVG setup is done over the CAN bus by the ground module.

Note	Pretest Instructions	Test	Result	Corrective Action
1.217.1	Check faults	Is EXCESSIVE CAN BUS COMMUNICATION ERRORS or other CAN bus communication error faults present?	Yes	Troubleshoot other fault(s) first
			No	Go to step 1.217.2
1.217.2	Perform 5.4 Calibrating Boom Valves on Pg. 296	Does the valve calibrate successfully? -AND- Does fault clear?	Yes	Troubleshooting complete. If fault is recurring, reprogram/replace ground module.
			No	Reprogram/replace ground module

1.218 MAIN LIFT PVG VALVE STUCK EXTENDED

Flash Code: 4-5

Main lift PVG valve stuck extended. The main lift PVG valve spool has moved out further than intended. Follow same procedure as 1.214 MAIN LIFT PVG VALVE OBSTRUCTED on Pg. 113.

1.219 MAIN LIFT PVG VALVE STUCK NEUTRAL

Flash Code: 4-5

Main lift PVG valve stuck neutral. The main lift PVG valve spool stuck outside of neutral position. This could be cause by dirt in the valve body or a PVG valve software issue. Follow same procedure as 1.214 MAIN LIFT PVG VALVE OBSTRUCTED on Pg. 113.

1.220 MAIN LIFT PVG VALVE STUCK RETRACTED

Flash Code: 4-5

Main lift PVG valve stuck retracted. Main lift PVG valve spool did not move in the required time. Follow same procedure as 1.214 MAIN LIFT PVG VALVE OBSTRUCTED on Pg. 113.

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1.221 MAIN LIFT PVG VALVE TIMEOUT

Flash Code: 4-5

Main lift PVG valve timeout. Position instructions were not received by the main lift PVG valve within the allowed amount of time.

Note	Pretest Instructions	Test	Result	Corrective Action
1.221.1		Is EXCESSIVE CAN BUS COMMUNICATION ERRORS or other CAN bus communication error faults present?	Yes	Troubleshoot those faults first
			No	Go to step 1.221.2
1.221.2	Disconnect main lift PVG valve [X065]	Does MAIN LIFT PVG VALVE COMMUNICATIONS fault appear?	Yes	Replace main lift PVG valve [X065] actuator
			No	Reprogram/replace ground module

1.222 MAIN LIFT PVG VALVE WIRING INCORRECT

Flash Code: 4-5

Main lift PVG valve wiring incorrect. A different valve powered up during power up time for main lift PVG valve or the main lift PVG valve powered up outside of the allotted PVG valve power up time. This could be due to a calibration or wiring problem. The valves are located as follows: main lift at lower left with wire TAN 55-50, tower lift at top left (center of three) with wire TAN 55-51, tower tele at top right with wire BROWN 55-50.

Note	Pretest Instructions	Test	Result	Corrective Action
1.222.1	Open hood covering the main valve body. Locate the LED's on the PVG valves.	Turn on the machine while watching the LED's. Do they start all off, then turn on in this order: LEFT, CENTER, then RIGHT?	Yes	Calibrate boom valves. See 5.4 Calibrating Boom Valves on Pg. 296 for details.
			No	Go to step 1.222.2
1.222.2	Turn off machine. Disconnect ignition on relay [X012] and main lift PVG valve [X065].	Is there a short between ignition on relay socket 30 [X012.30.soc] and main lift PVG valve socket 2 [X065.2.soc]?	Yes	Repair/replace harness between relay [X012] and main lift PVG valve [X065]
			No	Connect harnesses to the correct PVG valve as in the description above. Then calibrate boom valves. See 5.4 Calibrating Boom Valves on Pg. 296 for details.

1.223 MAIN OUT OPEN CIRCUIT

Flash Code: 3-3

Main telescope out open circuit. The main telescope out output [X002.16] is open. See 1.377 COMMON STB OR OC PROCEDURE on Pg. 174.

1.224 MAIN OUT SHORT TO BATTERY

Flash Code: 3-3

Main telescope out short to battery. The main telescope out output [X002.16] is shorted to battery. See 1.377 COMMON STB OR OC PROCEDURE on Pg. 174.

1.225 MAIN OUT SHORT TO GROUND

Flash Code: 3-3

Main telescope out short to ground. The main telescope out output [X002.16] is shorted to ground. See 1.378 COMMON STG PROCEDURE on Pg. 175.

1.226 MAIN TELE FLOW CONTROL OPEN CIRCUIT

Flash Code: 3-3

Main telescope flow control valve open circuit. The main telescope proportional valve output [X002.9] is open. See 1.377 COMMON STB OR OC PROCEDURE on Pg. 174.

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1.227 MAIN TELE FLOW CONTROL SHORT TO BATTERY

Flash Code: 3-3

Main telescope flow control short to battery. The main telescope proportional valve output [X002.9] is shorted to battery. See 1.377 COMMON STB OR OC PROCEDURE on Pg. 174.

1.228 MAIN TELE FLOW CONTROL SHORT TO GROUND

Flash Code: 3-3

Main telescope flow control short to ground. The main telescope proportional valve output [X002.9] is shorted to ground. See 1.377 COMMON STB OR OC PROCEDURE on Pg. 174.

1.229 MAIN TRN ANGLE SW FAILED

Flash Code: 8-4

Main transport angle switch failed. The two main boom transport angle switch [X051] inputs at the ground control module are reading the same state. The normally closed (NC) and normally open (NO) switch inputs should always read opposite. In the Transport position the NC contacts are closed and the NO contacts are open. Switch states are visible in ANALYZER ⇒ DIAGNOSTICS ⇒ BOOM SWITCHES ⇒ MAIN LIFT ANGLE SWITCH Nx.

Note	Pretest Instructions	Test	Result	Corrective Action
1.229.1	Disconnect main boom transport angle switch [X051]. Turn on machine.	Measure main boom transport angle switch voltage between socket 1 [X051.1.soc] and socket 3 [X051.3.soc]. Does it measure 12VDC?	Yes	Go to step 1.229.7
			No	Go to step 1.229.2
1.229.2	Turn on machine. Take following measurement by backprobing. See Backprobing on Pg. 319 for details.	Measure voltage between mtb pass thru - 21 position terminal B [X042.B] and terminal E [X042.E]. Is it about 12 VDC?	Yes	Go to step 1.229.4
			No	Go to step 1.229.3
1.229.3	Turn on machine. ground multimeter. See Grounding on Pg. 319 for details. Take the following measurement by backprobing.	Measure voltage between MTB pass Thru - 21 position terminal B [X042.B] (backprobing) and ground. Is it about 12 VDC?	Yes	Repair/replace harness between MTB pass thru - 21 position pin E [X042.E.pin] and MTB ground bus [X009]
			No	Repair/replace harness between MTB pass thru - 21 position pin B [X042.B.pin] and Power Down Relay [X011]
1.229.4	Turn on machine. Take the following measurement by backprobing.	Measure voltage between turntable pass thru - 21 position terminal B [X044.B] and terminal E [X044.E]. Is it about 12 VDC?	Yes	Go to step 1.229.6
			No	Go to step 1.229.5
1.229.5	Turn on machine. Ground multimeter. Take the following measurement by backprobing.	Measure voltage between turntable pass thru - 21 position terminal B [X044.B] (backprobing) and ground. Is it about 12 VDC?	Yes	Repair/replace harness between turntable pass thru - 21 position socket E [X044.E.soc] and MTB pass thru - 21 position pin E [X042.E.pin]
			No	Repair/replace harness between turntable pass Thru - 21 position socket B [X044.B.soc] and MTB pass thru - 21 position pin B [X042.B.pin]
1.229.6	Disconnect main boom transport angle switch [X051]. Turn on machine. Ground multimeter.	Measure main boom transport angle switch voltage between socket 1 [X051.1.soc] and Ground. Is it about 12 VDC?	Yes	Repair/replace harness between main boom transport angle switch socket 3 [X051.3.soc] and turntable pass thru - 21 position pin E [X044.E.soc]
			No	Repair/replace harness between main boom transport angle switch socket 1 [X051.1.soc] and turntable pass thru - 21 position pin B [X044.B.soc]

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Note	Pretest Instructions	Test	Result	Corrective Action
1.229.7	Fully retract and lower the boom. Remove sensor from machine, but reconnect harness. Turn on machine. Ground meter by backprobing boom transport angle switch terminal 3 [X051.3].	Backprobe boom transport angle switch pin 2 [X051.2.pin] to measure voltage. Touch the sensor face (opposite of the wires) to a part of the boom. Does it measure about 12VDC?	Yes	Keep machine in same condition. Go to step 1.229.8.
			No	Replace boom transport angle switch [X051]
1.229.8	Ensure machine is set up as in step 1.229.7, except do not ground meter. Hold sensor to a part of the boom.	In ANALYZER ⇒ DIAGNOSTICS ⇒ BOOM SWITCHES ⇒ MAIN LIFT ANGLE SWITCH, check the switch states. Is the NC Switch CLOSED?	Yes	Keep machine in same condition. Go to step 1.229.12.
			No	Keep machine in same condition. Go to step 1.229.9
1.229.9	Ensure machine is set up as in step 1.229.7	Backprobe MTB passthru - 21 position terminal R [X042.R] to measure voltage. Touch the sensor face (opposite of the wires) to a part of the boom. Does it measure about 12VDC?	Yes	Keep machine in same condition. Go to step 1.229.10.
			No	Keep machine in same condition. Go to step 1.229.11
1.229.10	Ensure machine is set up as in step 1.229.7	Backprobe ground module J7 terminal 22 [X007.22] to measure voltage. Touch the sensor face (opposite of the wires) to a part of the boom. Does it measure about 12VDC?	Yes	Reprogram/replace ground module.
			No	Repair/replace harness between ground module J7 socket 22 [X007.22.soc] and MTB passthru - 21 position pin R [X042.R.pin]
1.229.11	Ensure machine is set up as in step 1.229.7	Backprobe turntable passthru R [X044.R] to measure voltage. Touch the sensor face (opposite of the wires) to a part of the boom. Does it measure about 12VDC?	Yes	Repair/replace harness between turntable passthru socket R [X044.R.soc] and MTB passthru - 21position pin R [X042.R.pin]
			No	Repair/replace harness between turntable passthru pin R [X044.R.pin] and boom transport angle switch socket 2 [X051.2.soc]
1.229.12	Ensure machine is set up as in step 1.229.7 with meter grounded.	Backprobe boom transport angle switch terminal 4 [X051.4] to measure voltage while sensor is removed and away from metal. Does it measure about 12VDC?	Yes	Keep machine in same condition. Go to step 1.229.13.
			No	Replace boom transport angle switch [X051]
1.229.13	Ensure machine is set up as in step 1.229.7, except do not ground meter. Hold sensor away from metal.	In ANALYZER ⇒ DIAGNOSTICS ⇒ BOOM SWITCHES ⇒ MAIN LIFT ANGLE SWITCH, check the switch state. Is the NO Switch CLOSED?	Yes	Reprogram/replace ground control module.
			No	Go to step 1.229.14
1.229.14	Ensure machine is set up as in step 1.229.7	Backprobe MTB passthru - 21 position terminal N [X042.N] to measure voltage. Touch the sensor to a part of the boom. Does it measure about 12VDC?	Yes	Keep machine in same condition. Go to step 1.229.15.
			No	Keep machine in same condition. Go to step 1.229.16
1.229.15	Ensure machine is set up as in step 1.229.7	Backprobe ground module J7 terminal 11 [X007.11] to measure voltage. Touch the sensor to a part of the boom. Does it measure about 12VDC?	Yes	Reprogram/replace ground module.
			No	Repair/replace harness between ground module J7 socket 11 [X007.11.soc] and MTB passthru - 21 position pin N [X042.N.pin]
1.229.16	Ensure machine is set up as in step 1.229.7	Backprobe turntable passthru terminal N [X044.N] to measure voltage. Touch the sensor to a part of the boom. Does it measure about 12VDC?	Yes	Repair/replace harness between turntable passthru socket N [X044.N.soc] and MTB passthru - 21 position pin N [X042.N.pin]
			No	Repair/replace harness between turntable passthru pin N [X044.N.pin] and boom transport angle switch socket 4 [X051.4.soc]

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1.230 MAIN TRN LEN SW DISAGREEMENT

Flash Code: 8-4

Main Transport Length Switch Disagreement. The two main boom transport length switches are reading the same state. As in Figure 2-2. Dual Capacity / Transport Switch Mounting on Pg. 179 and Table 2-3. Switch States / Boom Length Regions on Pg. 179, the main boom transport length switches should always read opposite, except at the A/B and C/D transitions.

Note	Pretest Instructions	Test	Result	Corrective Action
1.230.1	Access the main boom transport switches #1 [X054] and #2 [X055]	Are any of these switches stuck or frozen	Yes	Clean/repair/replace as needed
			No	Keep access to the switches open. Go to step 1.230.2
1.230.2	Access the main boom transport switches #1 [X054] and #2 [X055]. Fully retract the boom. Note the cam strips that the switch levers ride upon on the side of the fly boom.	Are the switches and cam strips mounted so that the switch levers engage the entire length of cam? Are the cams and switches securely mounted? Also, are the switch levers mounted at 90° to housing as seen when not engaging a cam?	Yes	Keep access to the switches open. Go to step 1.230.3
			No	Repair as needed
1.230.3	Access the main boom transport switches #1 [X054] and #2 [X055]. Fully retract the boom.	Are both switches off cam?	Yes	Check for mechanical failure of the boom telescope cylinder mechanism
			No	Keep access to the switches and the boom in the same position. Go to step 1.230.4.
1.230.4	On right side of boom access the main boom transport switches #1 [X054] interior terminals. Ground multimeter.	Turn on machine. Measure voltage on main boom transport switch #1 (top) [X054] terminal 22 (white wire) and terminal 21 (black wire). Do they both measure about 12 volts?	Yes	Keep machine in same condition. Go to step 1.230.8.
			No	Go to step 1.230.5
1.230.5	Fully retract main boom. Ground meter near tower boom passthru [X044]. Take the following measurement by backprobing. See Grounding and Backprobing on Pg. 319 for details.	Turn on machine. Is there about 12 VDC on tower boom passthru socket B [X044.B.soc].	Yes	Keep machine in same condition. Go to step 1.230.6
			No	Keep machine in same condition. Go to step 1.230.7
1.230.6	Fully retract main boom. Ground meter near main boom transport switch passthru [X047]. Take the following measurement by backprobing.	Turn on machine. Is there about 12 VDC on main boom transport switch passthru pin A [X047.A.pin]?	Yes	Repair/replace switch wiring between main boom transport switches #1 and #2 (top and bottom) [X054] [X055] and main boom transport switch passthru [X047]
			No	Repair/replace harness between main boom transport switch passthru pin A [X047.A.pin] and tower boom passthru socket B [X044.B.soc]
1.230.7	Fully retract main boom. Ground meter near MTB passthru - 21 position [X042]. Take the following measurement by backprobing.	Turn on machine. Is there about 12 VDC on MTB passthru - 21 position socket B [X042.B.soc]?	Yes	Repair/replace harness between MTB passthru - 21 position socket B [X042.B.soc] and tower boom passthru socket B [X044.B.soc]
			No	Repair/replace harness between MTB passthru - 21 position socket B [X042.B.soc] and Power Down Relay [X011]

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Note	Pretest Instructions	Test	Result	Corrective Action
1.230.8	On right side of boom access the main boom transport switches #1 [X054] interior terminals. Ground multimeter. See Grounding on Pg. 319 for details.	Turn on machine. Fully retract the boom. Measure voltage on main boom transport switch #2 (bottom) [X055]. Is there about 9 volts on terminal 22 (white wire)? Also, is there about 12 volts on terminal 21 (black wire)?	Yes	Keep machine in same condition. Go to step 1.230.9.
			No	Replace switch
1.230.9	On right side of boom access the main boom transport switch #2 [X055] interior terminals. Ground multimeter.	Turn on machine. From the fully retracted position, extend main boom approximately 6 ft. (2 m.) to get out of transport length. Measure voltage on main boom transport switch #1 (top) terminal 22 (white wire) [X054]. Is there about 12 volts? Measure voltage on terminal 21 (black wire) [X054]. Is there about 9 volts?	Yes	Keep machine in same condition. Go to step 1.230.10.
			No	Replace switch
1.230.10	On right side of boom access the main boom transport switches #2 [X055] interior terminals. Ground multimeter.	Turn on machine. From the fully retracted position, extend main boom approximately 6 ft. (2 m.) to get out of transport length. Measure voltage on main boom transport switch #2 (bottom) terminal 22 (black wire) [X055] and on terminal 21 (white wire). Is there about 12 volts in both places?	Yes	Keep machine in same condition. Go to step 1.230.11.
			No	Replace switch
1.230.11	Read switch position in ANALYZER ⇒ DIAGNOSTICS BOOM SWITCHES ⇒ MAIN BOOM LENGTH SWITCH NC	Fully retract main boom. Does switch read, "CLOSED"? Also, extend boom about 6 ft. (2 m.) out of transport position. Does switch read "OPEN"?	Yes	Go to step 1.230.16
			No	Go to step 1.230.12
1.230.12	Fully retract main boom. Ground meter near tower boom passthru [X044]. Take the following measurement by backprobing.	Turn on machine. Is there about 12 VDC on tower boom passthru socket S [X044.S.soc]?	Yes	Keep machine in same condition. Go to step 1.230.13.
			No	Keep machine in same condition. Go to step 1.230.14.
1.230.13	Fully retract main boom. Ground meter near main boom transport switch passthru [X047]. Take the following measurement by backprobing.	Turn on machine. Is there about 12 VDC on main boom transport switch passthru socket B [X047.B.soc]?	Yes	Repair/replace harness between main boom transport switch passthru socket B [X047.B.soc] and tower boom passthru socket S [X044.S.soc
			No	Repair/replace switch wiring between main boom transport switch #1 (top) [X054] and main boom transport switch passthru [X047]
1.230.14	Fully retract main boom. Ground meter near MTB passthru - 21 position [X042]. Take the following measurement by backprobing.	Turn on machine. Is there about 12 VDC on MTB passthru - 21 position pin S [X042.S.pin]?	Yes	Go to step 1.230.15
			No	Repair/replace harness between MTB passthru - 21 position pin S [X042.S.pin] and tower boom passthru socket S [X044.S.soc]
1.230.15	Fully retract main boom. Ground meter near MTB passthru - 21 position [X042]. Take the following measurement by backprobing.	Turn on machine. Is there about 12 VDC on ground module J7 socket 12 [X007.12.soc]?	Yes	Inspect connection contacts. If OK, reprogram/ replace ground module.
			No	Repair/replace harness between MTB passthru - 21 position pin S [X042.S.pin] and ground module J7 socket 12 [X007.12.soc]

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Note	Pretest Instructions	Test	Result	Corrective Action
1.230.16	Turn on machine. Read switch position in ANALYZER ⇒ DIAGNOSTICS BOOM SWITCHES ⇒ MAIN BOOM LENGTH SWITCH NO	Fully retract main boom. Does switch read, "OPEN"? Also, extend boom about 6 ft. (2 m.) out of transport position. Does switch read "CLOSED"?	Yes	Reprogram/replace ground module
			No	Go to step 1.230.17
1.230.17	Extend boom about 6 ft. (2m.) from fully retracted. Ground meter near tower boom passthru [X044]. Take the following measurement by backprobing. See Grounding and Backprobing on Pg. 319 for details.	Turn on machine. Is there about 12 VDC on tower boom passthru socket U [X044.S.soc]?	Yes	Keep machine in same condition. Go to step 1.230.19
			No	Keep machine in same condition. Go to step 1.230.18
1.230.18	Extend boom about 6 ft. (2m.) from fully retracted. Ground meter near main boom transport switch passthru [X047]. Take the following measurement by backprobing.	Turn on machine. Is there about 12 VDC on main boom transport switch passthru socket C [X047.C.soc]?	Yes	Repair/replace harness between main boom transport switch passthru socket C [X047.C.soc] and tower boom passthru socket U [X044.U.soc]
			No	Repair/replace switch wiring between main boom transport switch #2 (bottom) [X055] and main boom transport switch passthru [X047]
1.230.19	Extend boom about 6 ft. (2m.) from fully retracted. Ground meter near MTB passthru - 21 position [X042]. Take the following measurement by backprobing.	Turn on machine. Is there about 12 VDC on MTB passthru - 21 position pin U [X042.U.pin]?	Yes	Keep machine in same condition. Go to step 1.230.20
			No	Repair/replace harness between MTB passthru - 21 position pin U [X042.U.pin] and tower boom passthru socket U [X044.U.soc]
1.230.20	Extend boom about 6 ft. (2m.) from fully retracted. Ground meter near MTB passthru - 21 position [X042]. Take the following measurement by backprobing.	Turn on machine. Is there about 12 VDC on ground module J7 socket 12 [X007.12.soc]?	Yes	Inspect connection contacts. If OK, reprogram/replace ground module.
			No	Repair/replace harness between MTB passthru - 21 position pin S [X042.S.pin] and ground module J7 socket 12 [X007.12.soc]

1.231 MODEL CHANGED - HYDRAULICS SUSPENDED - CYCLE EMS

Flash Code: 2-5

Model changed - hydraulics suspended - cycle emergency stop switch. Notification that the model number was changed using the analyzer. The hydraulics will be suspended until the power is cycled.

1.232 MOMENT CONTROL DISABLED

Flash Code: 9-9

Moment control disabled. The user has forced envelope control off with the analyzer from access level 0.

Note	Pretest Instructions	Test	Result	Corrective Action
1.232.1	Cycle power	Does fault still occur?	Yes	Go to step 1.232.2
			No	Troubleshooting complete
1.232.2	Perform 5.8 Boom Sensor Calibration on Pg. 309	Does fault still occur?	Yes	Replace ground module
			No	Troubleshooting complete

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1.233 NEW LOAD PIN DETECTED FAULT

Flash Code: 8-5

New load pin detected fault. The load pin currently communicating on the CAN bus is not the same serial number pin as that stored in calibration information. APU mode will be active until a valid load pin calibration is performed. Perform a boom sensor calibration, see 5.8 Boom Sensor Calibration on Pg. 309.

1.234 NEW MAIN ANGL1 SENSOR DETECTED

Flash Code: 8-7

New main angle 1 sensor detected. The serial number for the current main angle sensor 1 is different from the one stored during previous calibration.

Note	Pretest Instructions	Test	Result	Corrective Action
1.234.1	Disconnect main angle sensor 1 (right) [X048]. Check faults.	Does the fault MAIN ANGL1 CAN COMMUNICATIONS LOST appear?	Yes	Go to step 1.234.2
			No	Harness connections to sensors are swapped. Connect harness to correct sensors.
1.234.2	Calibrate boom sensors	Is calibration successful?	Yes	Troubleshooting complete
			No	Troubleshoot in accordance with calibration fault

1.235 NEW MAIN ANGL2 SENSOR DETECTED

Flash Code: 8-7

New main angle 2 sensor detected. The serial number for the current main angle sensor 2 is different from the one stored during previous calibration.

Note	Pretest Instructions	Test	Result	Corrective Action
1.235.1	Disconnect main angle sensor 2 (Left) [X049]. Check faults.	Does the fault MAIN ANGL2 CAN COMMUNICATIONS LOST appear?	Yes	Go to step 1.235.2
			No	Harness connections to sensors are swapped. Connect harness to correct sensors.
1.235.2	Calibrate boom sensors	Is calibration successfull?	Yes	Troubleshooting complete
			No	Troubleshoot in accordance with calibration fault

1.236 NO ALTERNATOR OUTPUT

Flash Code: 4-3

No alternator output. Notification that the engine has been running for 15 seconds or more and the battery voltage is still below 11.5 volts. This probably indicates a problem with the alternator or its wiring.

1.237 NO MAIN LIFT PILOT PRESSURE

Flash Code: 3-3

No main lift pilot pressure. This fault will be set when the main lift pilot valve output [X002.1] is engaged, but the main lift pilot pressure switch input [X001.21] is not indicating pressure. This could be caused by a problem with the main lift pilot pressure switch [X079], its wiring, wrong hydraulic connections, or a hydraulic failure.

1.238 OIL PRESSURE SHORT TO BATTERY

Flash Code: 4-3

Oil pressure short to battery. This fault should only occur on machines configured with non-ECM engines. The engine oil pressure input [X001.15] is shorted to battery. See 1.377 COMMON STB OR OC PROCEDURE on Pg. 174.

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1.239 OIL PRESSURE SHORT TO GROUND

Flash Code: 4-3

Oil pressure short to ground. This fault should only occur on machines configured with non-ECM engines. The engine oil pressure input [X001.15] is shorted to ground. See 1.378 COMMON STG PROCEDURE on Pg. 175.

1.240 PARKING BRAKE OPEN CIRCUIT

Flash Code: 3-3

Parking brake open circuit. The parking brake output [X001.23] is open. See 1.377 COMMON STB OR OC PROCEDURE on Pg. 174.

1.241 PARKING BRAKE SHORT TO BATTERY

Flash Code: 3-3

Parking brake short to battery. The parking brake output [X001.23] is shorted to battery. See 1.377 COMMON STB OR OC PROCEDURE on Pg. 174.

1.242 PARKING BRAKE SHORT TO GROUND

Flash Code: 3-3

Parking brake short to ground. The parking brake output [X001.23] is shorted to ground. See 1.378 COMMON STG PROCEDURE on Pg. 175.

1.243 PLATFORM CAN COMMUNICATIONS LOST

Flash Code: 6-6

Platform CAN communications lost. The system cannot communicate with the platform module. This may be due to wiring problems between platform and ground modules.

Note	Pretest Instructions	Test	Result	Corrective Action
1.243.1	Check fault log for other modules having lost communication	Have most modules lost communications?	Yes	See 1.93 EXCESSIVE CAN BUS COMMUNICATION ERRORS on Pg. 73
			No	Go to step 1.243.2
1.243.2	Disconnect the platform module J8 connector [X170]. Turn machine on in platform mode	Is there 11VDC or more between socket 2 and socket 1 of the platform module J8 connector [X170.2.soc X170.1.soc]?	Yes	See 1.93 EXCESSIVE CAN BUS COMMUNICATION ERRORS on Pg. 73 fault step 1.93.3
			No	Keep machine on. Go to step 1.243.3
1.243.3	Disconnect the platform module J8 connector [X170]. Turn machine on in platform mode	Is there zero VDC between socket 2 and socket 1 of the platform module J8 connector [X170.2.soc X170.1.soc]?	Yes	Keep machine on. Go to step 1.243.5
			No	Go to step 1.243.4
1.243.4	Remove any corrosion on battery terminals and battery cable terminals. Run machine to recharge battery.	Does battery still exhibit low power?	Yes	Replace battery
			No	Retry normal vehicle operation
1.243.5	Turn machine on in platform mode. Backprobe to take the following measurement. See Backprobing on Pg. 319 for details.	Is there 11VDC or more between terminal 12 and terminal 16 of the 19 position platform control box passthru connector [X160.12 X160.16]?	Yes	Repair/replace harness between the 19 position platform control box passthru connector [X160] and the platform module J8 connector [X170]
			No	Go to step 1.243.6
1.243.6	Disconnect boom sensor passthru - 19 position connector [X050]	Turn machine on in platform mode. Is there 11VDC or more between socket 12 and socket 16 of the boom sensor passthru - 19 position connector [X050.12.soc X050.16.soc]?	Yes	Repair/replace harness between the boom sensor passthru - 19 position connector [X050] and the 19 position platform control box passthru connector [X160]
			No	Go to step 1.243.7

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Note	Pretest Instructions	Test	Result	Corrective Action
1.243.7	Disconnect boom sensor passthru - 19 position connector [X045]	Turn machine on in platform mode. Is there 11VDC or more between socket 12 and socket 16 of the tower boom passthru - 19 position connector [X045.12 X045.16]?	Yes	Repair/replace harness between the tower boom passthru - 19 position connector [X045] and the boom sensor passthru - 19 position connector [X050]
			No	Go to step 1.243.8
1.243.8	Take the following measurement by backprobing	Turn machine on in platform mode. Is there 11VDC or more between pin 12 and pin 16 of the MTB pass thru - 19 position connector [X043.12.pin X043.16.pin]?	Yes	Repair/replace harness between the MTB pass thru - 19 position connector [X043] and the tower boom passthru - 19 position connector [X045]
			No	Go to step 1.243.9
1.243.9	Take the following measurement by backprobing	Turn machine on in platform mode. Is there 11VDC or more between pin 4 and pin 3 of the ground module J8 connector [X008.4 X008.3]?	Yes	Repair/replace harness between the ground module J8 connector [X008] and the MTB pass thru - 19 position connector [X043]
			No	Go to step 1.243.10
1.243.10	Disconnect the ground module J8 connector [X008]. Turn machine on in platform mode	Is there 11VDC or more between pin 4 and pin 3 of the ground module J8 connector [X008.4 X008.3]?	Yes	Repair/replace harness between the ground module J8 connector [X008] and the MTB pass thru - 19 position connector [X043]
			No	Replace the ground module

1.244 PLATFORM CONTROL VALVE OPEN CIRCUIT

Flash Code: 3-4

Platform control valve open circuit. The platform dump valve output [X002.3] is open. See 1.377 COMMON STB OR OC PROCEDURE on Pg. 174.

1.245 PLATFORM CONTROL VALVE SHORT TO BATTERY

Flash Code: 3-4

Platform control valve short to battery. The platform dump valve output [X002.3] is shorted to battery. See 1.377 COMMON STB OR OC PROCEDURE on Pg. 174.

1.246 PLATFORM CONTROL VALVE SHORT TO GROUND

Flash Code: 3-4

Platform control valve short to ground. The platform dump valve output [X002.3] is shorted to ground. See 1.378 COMMON STG PROCEDURE on Pg. 175.

1.247 PLATFORM MODULE FAILURE: HWFS CODE 1

Flash Code: 9-9

Platform module failure: hardware failsafe code 1. Platform module V(low) FET has failed. A power cycle is required.

Note	Pretest Instructions	Test	Result	Corrective Action
1.247.1	Cycle power	Does fault clear?	Yes	Troubleshooting complete
			No	Replace platform module

1.248 PLATFORM MODULE SOFTWARE UPDATE REQUIRED

Flash Code: 9-9

Platform module software update required. The platform module software is a different major version than the ground module. Load new platform module software.

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1.249 PLATFORM SENSOR REF VOLTAGE OUT OF RANGE

Flash Code: 9-9

Platform sensor reference voltage out of range. The platform module 7VDC reference voltage is out of acceptable range. This supply is used for the lift, swing, drive and pump controls.

Note	Pretest Instructions	Test	Result	Corrective Action
1.249.1	Disconnect platform module J5 [X167]	Is there about 2.5kΩ between platform module J5 socket 1 [X167.1.soc] and J5 socket 7 [X167.7.soc]?	Yes	Keep connector disconnected. Go to step 1.249.2.
			No	Repair/replace Lift & Swing joystick assembly and/or wiring
1.249.2	Disconnect platform module J5 [X167] and J6 [X168] and hyd speed pot passthru - 6 pos [X199]. Turn on machine.	Is there 6.6V - 7.5V between platform module J5 pin 1 [X167.1.pin] and J5 pin 7 [X167.7.pin]?	Yes	Keep J5 [X167] disconnected. Go to step 1.249.3.
			No	Go to step 1.249.12
1.249.3	Disconnect platform module J5 [X167]. Ground multimeter. See Grounding on Pg. 319 for details.	Is there a short between platform module J5 socket 1 [X167.1.soc] and ground?	Yes	Repair/replace harness affecting Lift & Swing joystick wiring.
			No	Go to step 1.249.4
1.249.4	Disconnect platform module J5 [X167]. Ground multimeter. See Grounding on Pg. 319 for details.	Turn on machine. Is there about 12 VDC between platform module J5 socket 1 [X167.1.soc] and ground?	Yes	Short to battery. Repair/replace harness affecting the Lift & Swing joystick wiring.
			No	Go to step 1.249.5
1.249.5	Disconnect platform module J6 [X168]	Is there about 5kΩ between platform module J6 socket 1 [X168.1.soc] and J6 socket 7 [X168.7.soc]?	Yes	Go to step 1.249.6
			No	Repair/replace Drive joystick and/or wiring
1.249.6	Disconnect platform module J6 [X168]. Ground multimeter. See Grounding on Pg. 319 for details.	Is there a short between platform module J6 socket 1 [X168.1.soc] and ground?	Yes	Short to ground. Repair/replace harness affecting Drive joystick assembly.
			No	Go to step 1.249.7
1.249.7	Disconnect platform module J6 [X168]. Ground multimeter. See Grounding on Pg. 319 for details.	Turn on machine. Is there about 12 VDC between platform module J6 socket 1 [X168.1.soc] and ground?	Yes	Short to battery. Repair/replace harness affecting Drive joystick wiring.
			No	Go to step 1.249.8
1.249.8	Disconnect hyd speed pot passthru - 6 pos. [X199]	Measure resistance between hyd speed pot passthru socket 4 [X199.4.soc] and socket 5 [X199.5.soc]. Is there a short or open?	Yes	Repair/replace hyd speed pot passthru [X199] and or Speed Controller [X192]
			No	Keep hyd speed pot passthru [X199] disconnected. Go to step 1.249.9
1.249.9	Disconnect hyd speed pot passthru - 6 pos. [X199].	Measure resistance from hyd speed pot passthru pin 4 [X199.4.pin] and pin 5 [X199.5.pin]. Is there a short?	Yes	Keep hyd speed pot passthru [X199] disconnected. Go to step 1.249.10
			No	Keep hyd speed pot passthru [X199] disconnected. Go to step 1.249.11
1.249.10	Disconnect hyd speed pot passthru [X199] and platform module J1 [X165].	Measure resistance from platform module J1 socket 13 [X165.13.soc] and socket 34 [X165.34.soc]. Is there a short?	Yes	Repair/replace harness between hyd speed pot passthru [X199] pin 4 [X199.4.pin] and pin 6 [X199.6.pin] and platform module J1 [X165] socket 13 [X165.13.soc] and socket 34 [X165.34.soc]
			No	Short inside module. Replace platform module

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Note	Pretest Instructions	Test	Result	Corrective Action
1.249.11	Disconnect hyd speed pot passthru [X199]	Measure resistance between hyd speed pot passthru socket 3 [X199.3.soc] and socket 4 [X199.4.soc]. Is there a short?	Yes	Repair/replace Speed Controller [X192]
			No	Keep hyd speed pot passthru [X199] disconnected. Go to step 1.249.12
1.249.12	Disconnect hyd speed pot passthru [X199]	Measure resistance between hyd speed pot passthru pin 3[X199.3.pin] and pin 4 [X199.4.pin]. Is there a short?	Yes	Keep hyd speed pot passthru [X199] disconnected. Go to step 1.249.13.
			No	Reprogram/replace platform module
1.249.13	Disconnect hyd speed pot passthru [X199] and platform module J1 [X165]	Measure resistance between hyd speed pot passthru pin 3[X199.3.pin] and pin 4 [X199.4.pin]. Is there a short?	Yes	Repair/replace harness between hyd speed pot passthru pin 3[X199.3.pin] and pin 4 [X199.4.pin]
			No	Short inside module. Replace platform module.

1.250 PUMP SWITCHES FAULTY - CHECK DIAGNOSTICS/BOOM

Flash Code: 2-3

Pump switches faulty - check diagnostics/boom. A ground control or platform control boom function switch (lower lift, telescope, platform level, platform rotate, jib, etc.) has both directions selected together. This may be caused by a problem with a switch or its wiring. Run ANALYZER ⇒ SYSTEM TEST from the ground controls and platform controls to find the specific switch.

1.251 PUMP SWITCHES LOCKED - SELECTED BEFORE AUX POWER

Flash Code: 2-3

Pump switches locked - selected before aux power. A ground function switch input (lower lift, telescope, platform level, platform rotate, jib) was selected before the ground auxiliary power switch input [X004.16]. The auxiliary power (enable) switch must be activated before the desired function switch. This also may be caused by a problem with a switch or its wiring. Run ANALYZER ⇒ SYSTEM TEST from the ground controls to find the specific switch.

1.252 PUMP SWITCHES LOCKED - SELECTED BEFORE FOOTSWITCH

Flash Code: 2-3

Pump switches locked - selected before footswitch. A platform boom function switch input (lower lift, telescope, basket level, basket rotate, jib) was selected before key switch or footswitch input [X169.8] closure. The footswitch must be activated before any function. This may be caused by a problem with a switch or its wiring. Run ANALYZER ⇒ SYSTEM TEST from the platform controls to find the specific switch.

1.253 PUMP SWITCHES LOCKED - SELECTED BEFORE START SWITCH

Flash Code: 2-3

Pump switches locked - selected before start switch. A ground control or platform control boom function switch (lower lift, telescope, platform level, platform rotate, jib, etc.) input was selected before the start switch input [X165.14 X004.4]. The start switch may only be activated when no function is commanded. This also may be caused by a problem with a switch or its wiring. Run ANALYZER ⇒ SYSTEM TEST from the ground controls and platform controls to find the specific switch.

1.254 PVG VALVE ENABLE OPEN CIRCUIT

Flash Code: 3-3

PVG valve enable open circuit. The PVG valve enable output [X002.31] is open. See 1.377 COMMON STB OR OC PROCEDURE on Pg. 174.

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1.255 PVG VALVE ENABLE SHORT TO BATTERY

Flash Code: 3-3

PVG valve enable short to battery. The PVG valve enable output [X002.31] is shorted to battery. See 1.377 COMMON STB OR OC PROCEDURE on Pg. 174.

1.256 PVG VALVE ENABLE SHORT TO GROUND

Flash Code: 3-3

PVG valve enable short to ground. The PVG valve enable output [X002.31] is shorted to ground. See 1.378 COMMON STG PROCEDURE on Pg. 175.

1.257 REAR LEFT WHEEL BLOCKED

Flash Code: 8-6

Rear left wheel blocked. The control system is unable to steer the rear left wheel. Steering was commanded for at least 1.3 seconds without sensing an appropriate change in angle from the rear left steer angle sensor. This could be caused by a mechanical blockage, a hydraulic problem, or a faulty angle sensor.

Note	Pretest Instructions	Test	Result	Corrective Action
1.257.1		Is the rear left wheel kept from moving?	Yes	Free the wheel from any obstructions
			No	Go to step 1.257.2
1.257.2		Check the fault log for primary faults, LT REAR STEER LT STB OR OC, LT REAR STEER LT STG, LT REAR STEER RT STB OR OC, LT REAR STEER RT STG, or any steer angle sensor fault	Yes	If a primary fault is found, troubleshoot it before this fault
			No	Go to step 1.257.3
1.257.3	Note that glow plug's large power draw can aggravate existing problems with power distribution wiring and low battery power. Frequent starting can drain battery when preheating.	When engine coolant temperature is below 140°F (60°C), air temperature is below 59°F (15°C), and battery voltage is less than 11VDC before starting, does fault mainly occur within 30 seconds after starting engine?	Yes	Examine the battery condition and contacts within the Chassis power distribution wiring. Repair/replace as needed.
			No	Go to step 1.257.4
1.257.4	Watch the angle sensor value on ANALYZER ⇒ ACCESS LEVEL 1 ⇒ CALIBRATIONS ⇒ STEER ⇒ CALIBRATE? Press Enter to view raw value REAR LT STEER VALUE = XX Do not press Enter.	Steer completely left, pause, then completely right, pause. Does the value continuously and smoothly change while steering?	Yes	ESC out of calibrate mode. Cycle E-stop switch to clear failed calibration message. Go to step 1.257.5
			No	Repair/Replace the sensor and calibrate.
1.257.5		If the wheel will not steer in either direction, check the steer valve for a stuck spool.	Yes	Repair/Replace the valve
			No	Go to step 1.257.6
1.257.6		Are there any bent, damaged, or seized steering components?	Yes	Repair/Replace the component
			No	Go to step 1.257.7
1.257.7	Ensure proper pressure with ANALYZER ⇒ ACCESS LEVEL 1 ⇒ CALIBRATIONS ⇒ STEER ⇒ REAR LT STEER VALUE = XX.	Install a 3000 psi gauge or higher on Rear Steer Axle valve port MS1 and MS2 Adjust steer pressures on Rear Steer/Axle valve. Adjust relief next to port to 2600 psi ± 10% on gauge on port MS1. Adjust relief next to port to 2000 psi ± 10% on port MS2. ESC out of calibrate mode. Cycle E-stop switch to clear failed calibration message. Is condition clear?	Yes	Troubleshooting complete
			No	Do not remove gauges. Go to step 1.257.8

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Note	Pretest Instructions	Test	Result	Corrective Action
1.257.8	Install a low pressure gauge (1000 psi) on main manifold MP1 and adjust to 450 psi ± 10% on load sense	Is condition clear?	Yes	Troubleshooting complete
			No	Do not remove gauges. Go to step 1.257.9
1.257.9	Swap valve section with the one on the other side of machine.	Does condition follow valve section to other side of machine?	Yes	Repair/replace valve section
			No	Repair/replace rear left steer cylinder and/or hoses.

1.258 REAR LEFT WHEEL SENSOR FAULT - CHECK MOUNTING

Flash Code: 8-6

Rear left wheel sensor fault - check mounting. The control system detected the rear left steer angle sensor value was below the mechanical minimum angle while the wheel was detected as blocked. The sensor may be mounted improperly or the sensor may be faulty.

Note	Pretest Instructions	Test	Result	Corrective Action
1.258.1	Check faults	Is the fault REAR LEFT WHEEL BLOCKED present?	Yes	Troubleshoot that first
			No	1.258.2
1.258.2	Disconnect rear left steer sensor [X238]	Do the connectors have any loose, damaged, corroded contacts or moisture inside?	Yes	Repair as needed
			No	Go to step 1.258.3
1.258.3		Is the rear left wheel sensor [X238] in tact and properly installed? This includes checking that the sensor pin will turn the sensor and the sensor is properly tensioned.	Yes	Go to step 1.258.4
			No	Reinstall and recheck
1.258.4	Extend axles. Go to ANALYZER ⇒ DIAGNOSTICS ⇒ DRIVE ⇒ L REAR WHEEL ANGL	Monitor value while operating steering. Steer fully to the left, then fully to the right. Does the displayed angle ever climb above ±42.11? -OR- Does the value pause, jump or act erratically?	Yes	Repair/replace sensor and mounting as needed
			No	Go to step 1.258.5
1.258.5	Swap rear left wheel sensor [X238] with a sensor that doesn't have a fault.	Check faults. Does the new location now have a wheel sensor fault?	Yes	Replace sensor originally at the rear left wheel.
			No	Go to step 1.258.6
1.258.6		Calibrate steering. Does fault clear?	Yes	Troubleshooting complete
			No	Go to step 1.258.7
1.258.7	Disconnect rear left wheel sensor [X238]	Turn on machine. Is there 5VDC between rear left wheel sensor socket A [X238.A.soc] and socket C [X238.C.soc]?	Yes	Keep sensor disconnected. Go to step 1.258.8.
			No	Go to step 1.258.10
1.258.8	Disconnect rear left wheel sensor [X238] and chassis module J3 [X231]	Is there continuity between rear left wheel sensor socket B [X238.B.soc] and chassis module J3 socket 11 [X231.11.soc]?	Yes	Reprogram/replace ground module
			No	Keep rear left wheel sensor [X238] disconnected. Go to step 1.258.9
1.258.9	Disconnect rear left wheel sensor [X238] and rear left steer passthru - 4 pos. [X237]	Is there continuity between rear left wheel sensor socket B [X238.B.soc] and rear left steer passthru pin 2 [X237.2.pin]?	Yes	Repair harness between rear left steer passthru socket 2 [X238.2.soc] and chassis module J3 socket 11 [X231.11.soc]
			No	Repair/replace harness between rear left wheel sensor socket B [X238.B.soc] and rear left steer passthru pin 2 [X237.2.pin]

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Note	Pretest Instructions	Test	Result	Corrective Action
1.258.10	Disconnect rear left steer passthru - 4 pos. [X237]. Turn on machine.	Is there 5VDC between rear left steer passthru socket 1 [X237.1.soc] and socket 3 [X237.3.soc]?	Yes	Repair/replace harness between rear left steer passthru [X237] and rear left wheel sensor [X238]
			No	Go to step 1.258.11
1.258.11	Disconnect chassis module J3. Turn on machine.	Is there 5VDC between chassis module J3 pin 10 [X231.10.pin] and pin 12 [X231.12.pin]?	Yes	Repair/Replace harness between rear left steer passthru [X237] and chassis module J3 [X231]
			No	Replace chassis module

1.259 REAR LEFT WHEEL SENSOR OUT OF RANGE HIGH

Flash Code: 8-6

Rear left wheel sensor out of range high. The control system detected the rear left steer angle sensor value was above the electrical maximum. This may be due to a short to battery or a wiring problem.

Note	Pretest Instructions	Test	Result	Corrective Action
1.259.1		Is the rear left steer angle sensor [X238] installed and connected properly?	Yes	Go to step 1.259.2
			No	Repair as needed
1.259.2	Extend axles. Enable crab steering mode. Go to ANALYZER ⇒ DIAGNOSTICS ⇒ DRIVE ⇒ L REAR WHEEL ANGL.	Observe angle while operating steering. Steer fully to the left. Check all wheel angles. They should be within 2 °. Return to L REAR WHEEL ANGL analyzer screen. Steer to right about two seconds while monitoring the value. Repeat checks. Repeat process for entire swing of wheel. Did the value, while steering, pause, jump or act erratically? -OR- Was the left rear wheel angle more than 2° difference from other wheels?	Yes	Go to step 1.259.3
			No	Go to step 1.259.5
1.259.3	Swap rear left wheel sensor [X238] with a sensor that doesn't have a fault.	Check faults. Does the new location now have a wheel sensor out of range high fault?	Yes	Replace sensor originally at the rear left wheel.
			No	Go to step 1.259.4
1.259.4		Calibrate steering. Does fault clear?	Yes	Troubleshooting complete
			No	Go to step 1.259.5
1.259.5	Disconnect rear left wheel sensor [X238]	Turn on machine. Is there 5VDC between rear left wheel sensor socket A [X238.A.soc] and socket C [X238.C.soc]?	Yes	Keep sensor disconnected. Go to step 1.259.6.
			No	Go to step 1.259.8
1.259.6	Disconnect rear left wheel sensor [X238] and chassis module J3 [X231]	Is there continuity between rear left wheel sensor socket B [X238.B.soc] and chassis module J3 socket 11 [X231.11.soc]?	Yes	Reprogram/replace ground module
			No	Keep rear left wheel sensor [X238] disconnected. Go to step 1.259.7
1.259.7	Disconnect rear left wheel sensor [X238] and rear left steer passthru - 4 pos. [X237]	Is there continuity between rear left wheel sensor socket B [X238.B.soc] and rear left steer passthru pin 2 [X237.2.pin]?	Yes	Repair harness between rear left steer passthru socket 2 [X237.2.soc] and chassis module J3 socket 11 [X231.11.soc]
			No	Repair/replace harness between rear left wheel sensor socket B [X238.B.soc] and rear left steer passthru pin 2 [X237.2.pin]
1.259.8	Disconnect rear left steer passthru - 4 pos. [X237]. Turn on machine.	Is there 5VDC between rear left steer passthru socket 1 [X237.1.soc] and socket 3 [X237.3.soc]?	Yes	Repair/replace harness between rear left steer passthru [X237] and rear left wheel sensor [X238]
			No	Go to step 1.259.9

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Note	Pretest Instructions	Test	Result	Corrective Action
1.259.9	Disconnect chassis module J3. Turn on machine.	Is there 5VDC between chassis module J3 pin 10 [X231.10.pin] and pin 12 [X231.12.pin]?	Yes	Repair/Replace harness between rear left steer passthru [X237] and chassis module J3 [X231]
			No	Replace chassis module

1.260 REAR LEFT WHEEL SENSOR OUT OF RANGE LOW

Flash Code: 8-6

Rear left wheel sensor out of range low. The control system detected the rear left steer angle sensor value was below the electrical minimum. This may be due to an open circuit or a poor connection.

Note	Pretest Instructions	Test	Result	Corrective Action
1.260.1		Is the rear left steer angle sensor [X238] installed and connected properly?	Yes	Go to step 1.260.2
			No	Repair as needed
1.260.2	Extend axles. Enable crab steering mode. Go to ANALYZER ⇒ DIAGNOSTICS ⇒ DRIVE ⇒ L REAR WHEEL ANGL.	Observe angle while operating steering. Steer fully to the left. Check all wheel angles. They should be within 2 °. Return to L REAR WHEEL ANGL analyzer screen. Steer to right about two seconds while monitoring the value. Repeat checks. Repeat process for entire swing of wheel. Did the value, while steering, pause, jump or act erratically? -OR- Was the left front wheel angle more than 2° difference from other wheels?	Yes	Go to step 1.260.3
			No	Go to step 1.260.5
1.260.3	Swap rear left wheel sensor [X238] with a sensor that doesn't have a fault.	Check faults. Does the new location now have a wheel sensor out of range low fault?	Yes	Replace sensor originally at the front left wheel.
			No	Go to step 1.260.4
1.260.4		Calibrate steering. Does fault clear?	Yes	Troubleshooting complete
			No	Go to step 1.260.5
1.260.5	Disconnect rear left wheel sensor [X238]	Turn on machine. Is there 5VDC between rear left wheel sensor socket A [X238.A.soc] and socket C [X238.C.soc]?	Yes	Keep sensor disconnected. Go to step 1.260.6.
			No	Go to step 1.260.8
1.260.6	Disconnect rear left wheel sensor [X238] and chassis module J3 [X231]	Is there continuity between rear left wheel sensor socket B [X238.B.soc] and chassis module J3 socket 11 [X231.11.soc]?	Yes	Reprogram/replace ground module
			No	Keep rear left wheel sensor [X238] disconnected. Go to step 1.260.7
1.260.7	Disconnect rear left wheel sensor [X238] and rear left steer passthru - 4 pos. [X237]	Is there continuity between rear left wheel sensor socket B [X238.B.soc] and rear left steer passthru pin 2 [X237.2.pin]?	Yes	Repair harness between rear left steer passthru socket 2 [X2.237.soc] and chassis module J3 socket 11 [X231.11.soc]
			No	Repair/replace harness between rear left wheel sensor socket B [X238.B.soc] and rear left steer passthru pin 2 [X237.2.pin]
1.260.8	Disconnect rear left steer passthru - 4 pos. [X237]. Turn on machine.	Is there 5VDC between rear left steer passthru socket 1 [X237.1.soc] and socket 3 [X237.3.soc]?	Yes	Repair/replace harness between rear left steer passthru [X237] and rear left wheel sensor [X237]
			No	Go to step 1.260.9
1.260.9	Disconnect chassis module J3. Turn on machine.	Is there 5VDC between chassis module J3 pin 10 [X231.10.pin] and pin 12 [X231.12.pin]?	Yes	Repair/Replace harness between rear left steer passthru [X237] and chassis module J3 [X231]
			No	Replace chassis module

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1.261 REAR RIGHT WHEEL BLOCKED

Flash Code: 8-6

Rear right wheel blocked. The control system is unable to steer the rear right wheel. Steering was commanded for at least 1.3 seconds without sensing an appropriate change in angle from the rear right steer angle sensor. This could be caused by a mechanical blockage, a hydraulic problem, or a faulty angle sensor.

Note	Pretest Instructions	Test	Result	Corrective Action
1.261.1		Is the right rear wheel kept from moving?	Yes	Free the wheel from any obstructions
			No	Go to step 1.261.2
1.261.2		Check the fault log for primary faults, RT REAR STEER LT STB OR OC, RT REAR STEER LT STG, RT REAR STEER RT STB OR OC, RT REAR STEER RT STG, or any steer angle sensor fault	Yes	If a primary fault is found, troubleshoot it before this fault
			No	Go to step 1.261.3
1.261.3	Note that glow plug's large power draw can aggravate existing problems with power distribution wiring and low battery power. Frequent starting can drain battery when preheating.	When engine coolant temperature is below 140°F (60°C), air temperature is below 59°F (15°C), and battery voltage is less than 11VDC before starting, does fault mainly occur within 30 seconds after starting engine?	Yes	Examine the battery condition and contacts within the Chassis power distribution wiring. Repair/replace as needed.
			No	Go to step 1.261.4
1.261.4	Watch the angle sensor value on ANALYZER ⇒ ACCESS LEVEL 1 ⇒ CALIBRATIONS ⇒ STEER ⇒ CALIBRATE? Press Enter to view raw value REAR RT STEER VALUE = XX Do not press Enter.	Steer completely left, pause, then completely right, pause. Does the value continuously and smoothly change while steering?	Yes	ESC out of calibrate mode. Cycle E-stop switch to clear failed calibration message. Go to step 1.261.5
			No	Repair/Replace the sensor and calibrate.
1.261.5		If the wheel will not steer in either direction, check the steer valve for a stuck spool.	Yes	Repair/Replace the valve
			No	Go to step 1.261.6
1.261.6		Are there any bent, damaged, or seized steering components?	Yes	Repair/Replace the component
			No	Go to step 1.261.7
1.261.7	Ensure proper pressure with ANALYZER ⇒ ACCESS LEVEL 1 ⇒ CALIBRATIONS ⇒ STEER ⇒ REAR RT STEER VALUE = XX.	Install a 3000 psi gauge or higher on Rear Steer Axle valve port MS1 and MS2 Adjust steer pressures on Rear Steer/Axle valve. Adjust relief next to port to 2600 psi ± 10% on gauge on port MS1. Adjust relief next to port to 2000 psi ± 10% on port MS2. ESC out of calibrate mode. Cycle E-stop switch to clear failed calibration message. Is condition clear?	Yes	Troubleshooting complete
			No	Do not remove gauges. Go to step 1.261.8
1.261.8	Install a low pressure gauge (1000 psi) on main manifold MP1 and adjust to 450 psi ± 10% on load sense	Is condition clear?	Yes	Troubleshooting complete
			No	Do not remove gauges. Go to step 1.261.9
1.261.9	Swap valve section with the one on the other side of machine.	Does condition follow valve section to other side of machine?	Yes	Repair/replace valve section
			No	Repair/replace front left steer cylinder and/or hoses.

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1.262 REAR RIGHT WHEEL SENSOR FAULT - CHECK MOUNTING

Flash Code: 8-6

Rear right wheel sensor fault - check mounting. The control system detected the rear right steer angle sensor value was below the mechanical minimum angle while the wheel was detected as blocked. The sensor may be mounted improperly or the sensor may be faulty.

Note	Pretest Instructions	Test	Result	Corrective Action
1.262.1	Check faults	Is the fault REAR RIGHT WHEEL BLOCKED present?	Yes	Troubleshoot that first
			No	1.262.2
1.262.2	Disconnect rear right steer sensor [X239]	Do the connectors have any loose, damaged, corroded contacts or moisture inside?	Yes	Repair as needed
			No	Go to step 1.262.3
1.262.3		Is the rear right wheel sensor [X239] in tact and properly installed? This includes checking that the sensor pin will turn the sensor and the sensor is properly tensioned.	Yes	Go to step 1.262.4
			No	Reinstall and recheck
1.262.4	Extend axles. Go to ANALYZER ⇒ DIAGNOSTICS ⇒ DRIVE ⇒ R REAR WHEEL ANGL	Monitor value while operating steering. Steer fully to the left, then fully to the right. Does the displayed angle ever climb above ±42.11? -OR- Does the value pause, jump or act erratically?	Yes	Repair/replace sensor and mounting as needed
			No	Go to step 1.262.5
1.262.5	Swap rear right wheel sensor [X239] with a sensor that doesn't have a fault.	Check faults. Does the new location now have a wheel sensor fault?	Yes	Replace sensor originally at the rear right wheel.
			No	Go to step 1.262.6
1.262.6		Calibrate steering. Does fault clear?	Yes	Troubleshooting complete
			No	Go to step 1.262.7
1.262.7	Disconnect rear right wheel sensor [X239]	Turn on machine. Is there 5VDC between rear right wheel sensor socket A [X239.A.soc] and socket C [X239.C.soc]?	Yes	Keep sensor disconnected. Go to step 1.262.8.
			No	Go to step 1.262.10
1.262.8	Disconnect rear right wheel sensor [X239] and chassis module J3 [X231]	Is there continuity between rear right wheel sensor socket B [X239.B.soc] and chassis module J3 socket 8 [X231.8.soc]?	Yes	Reprogram/replace ground module
			No	Keep rear right wheel sensor [X239] disconnected. Go to step 1.262.9
1.262.9	Disconnect rear right wheel sensor [X239] and rear right steer passthru - 4 pos. [X236]	Is there continuity between rear right wheel sensor socket B [X239.B.soc] and rear right steer passthru pin 2 [X236.2.pin]?	Yes	Repair harness between rear right steer passthru socket 2 [X236.2.soc] and chassis module J3 socket 8 [X231.8.soc]
			No	Repair/replace harness between rear right wheel sensor socket B [X239.B.soc] and rear right steer passthru pin 2 [X236.2.pin]
1.262.10	Disconnect rear left steer passthru - 4 pos. [X237]. Turn on machine.	Is there 5VDC between rear right steer passthru socket 1 [X236.1.soc] and socket 3 [X236.3.soc]?	Yes	Repair/replace harness between rear left steer passthru [X237] and rear left wheel sensor [X238]
			No	Go to step 1.262.11
1.262.11	Disconnect chassis module J3. Turn on machine.	Is there 5VDC between chassis module J3 pin 10 [X231.10.pin] and pin 12 [X231.12.pin]?	Yes	Repair/Replace harness between rear right steer passthru [X236] and chassis module J3 [X231]
			No	Replace chassis module

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1.263 REAR RIGHT WHEEL SENSOR OUT OF RANGE HIGH

Flash Code: 8-6

Rear right wheel sensor out of range high. The control system detected the rear right steer angle sensor value was above the electrical maximum. This may be due to a short to battery or a wiring problem.

Note	Pretest Instructions	Test	Result	Corrective Action
1.263.1		Is the rear right steer angle sensor [X239] installed and connected properly?	Yes	Go to step 1.263.2
			No	Repair as needed
1.263.2	Extend axles. Enable crab steering mode. Go to ANALYZER ⇒ DIAGNOSTICS ⇒ DRIVE ⇒ R REAR WHEEL ANGL.	Observe angle while operating steering. Steer fully to the left. Check all wheel angles. They should be within 2 °. Return to R REAR WHEEL ANGL analyzer screen. Steer to right about two seconds while monitoring the value. Repeat checks. Repeat process for entire swing of wheel. Did the value, while steering, pause, jump or act erratically? -OR- Was the right rear wheel angle more than 2° difference from other wheels?	Yes	Go to step 1.263.3
			No	Go to step 1.263.5
1.263.3	Swap rear right wheel sensor [X239] with a sensor that doesn't have a fault.	Check faults. Does the new location now have a wheel sensor out of range high fault?	Yes	Replace sensor originally at the rear right wheel.
			No	Go to step 1.263.4
1.263.4		Calibrate steering. Does fault clear?	Yes	Troubleshooting complete
			No	Go to step 1.263.5
1.263.5	Disconnect rear right wheel sensor [X239]	Turn on machine. Is there 5VDC between rear right wheel sensor socket A [X239.A.soc] and socket C [X239.C.soc]?	Yes	Keep sensor disconnected. Go to step 1.263.6.
			No	Go to step 1.263.8
1.263.6	Disconnect rear right wheel sensor [X239] and chassis module J3 [X231]	Is there continuity between rear right wheel sensor socket B [X239.B.soc] and chassis module J3 socket 8 [X231.8.soc]?	Yes	Reprogram/replace ground module
			No	Keep rear right wheel sensor [X239] disconnected. Go to step 1.263.7
1.263.7	Disconnect rear right wheel sensor [X239] and rear left steer passthru - 4 pos. [X236]	Is there continuity between rear right wheel sensor socket B [X239.B.soc] and rear right steer passthru pin 2 [X236.2.pin]?	Yes	Repair harness between rear right steer passthru socket 2 [X236.2.soc] and chassis module J3 socket 8 [X231.8.soc]
			No	Repair/replace harness between rear right wheel sensor socket B [X239.B.soc] and rear right steer passthru pin 2 [X236.2.pin]
1.263.8	Disconnect rear right steer passthru - 4 pos. [X236]. Turn on machine.	Is there 5VDC between rear right steer passthru socket 1 [X237.1.soc] and socket 3 [X236.3.soc]?	Yes	Repair/replace harness between rear right steer passthru [X236] and rear right wheel sensor [X239]
			No	Go to step 1.263.9
1.263.9	Disconnect chassis module J3. Turn on machine.	Is there 5VDC between chassis module J3 pin 7 [X231.7.pin] and pin 9 [X231.9.pin]?	Yes	Repair/Replace harness between rear right steer passthru [X236] and chassis module J3 [X231]
			No	Replace chassis module

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1.264 REAR RIGHT WHEEL SENSOR OUT OF RANGE LOW

Flash Code: 8-6

Rear right wheel sensor out of range low. The control system detected the rear right steer angle sensor value was below the electrical minimum. This may be due to an open circuit or a poor connection.

Note	Pretest Instructions	Test	Result	Corrective Action
1.264.1		Is the rear right steer angle sensor [X239] installed and connected properly?	Yes	Go to step 1.264.2
			No	Repair as needed
1.264.2	Extend axles. Enable crab steering mode. Go to ANALYZER ⇒ DIAGNOSTICS ⇒ DRIVE ⇒ R REAR WHEEL ANGL.	Observe angle while operating steering. Steer fully to the left. Check all wheel angles. They should be within 2 °. Return to R REAR WHEEL ANGL analyzer screen. Steer to right about two seconds while monitoring the value. Repeat checks. Repeat process for entire swing of wheel. Did the value, while steering, pause, jump or act erratically? -OR- Was the left front wheel angle more than 2° difference from other wheels?	Yes	Go to step 1.264.3
			No	Go to step 1.264.5
1.264.3	Swap rear right wheel sensor [X239] with a sensor that doesn't have a fault.	Check faults. Does the new location now have a wheel sensor out of range low fault?	Yes	Replace sensor originally at the rear right wheel.
			No	Go to step 1.264.4
1.264.4		Calibrate steering. Does fault clear?	Yes	Troubleshooting complete
			No	Go to step 1.264.5
1.264.5	Disconnect rear right wheel sensor [X239]	Turn on machine. Is there 5VDC between rear right wheel sensor socket A [X239.A.soc] and socket C [X239.C.soc]?	Yes	Keep sensor disconnected. Go to step 1.264.6.
			No	Go to step 1.264.8
1.264.6	Disconnect rear right wheel sensor [X239] and chassis module J3 [X231]	Is there continuity between rear right wheel sensor socket B [X239.B.soc] and chassis module J3 socket 8 [X231.8.soc]?	Yes	Reprogram/replace ground module
			No	Keep rear right wheel sensor [X239] disconnected. Go to step 1.264.7
1.264.7	Disconnect rear right wheel sensor [X239] and rear right steer passthru - 4 pos. [X236]	Is there continuity between rear right wheel sensor socket B [X239.B.soc] and rear right steer passthru pin 2 [X236.2.pin]?	Yes	Repair harness between rear right steer passthru socket 2 [X2.236.soc] and chassis module J3 socket 8 [X231.8.soc]
			No	Repair/replace harness between rear right wheel sensor socket B [X239.B.soc] and rear right steer passthru pin 2 [X236.2.pin]
1.264.8	Disconnect rear right steer passthru - 4 pos. [X236]. Turn on machine.	Is there 5VDC between rear right steer passthru socket 1 [X236.1.soc] and socket 3 [X236.3.soc]?	Yes	Repair/replace harness between rear right steer passthru [X236] and rear right wheel sensor [X239]
			No	Go to step 1.264.9
1.264.9	Disconnect chassis module J3. Turn on machine.	Is there 5VDC between chassis module J3 pin 7 [X231.10.pin] and pin 9 [X231.9.pin]?	Yes	Repair/Replace harness between rear right steer passthru [X236] and chassis module J3 [X231]
			No	Replace chassis module

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1.265 RESTRICTED TO TRANSPORT - AXLE LOCKOUT VALVE STB OR OC

Flash Code: 3-3

Restricted to transport - Axle lockout valve short to battery or open circuit. The control system detected a short to battery or an open circuit on the PWM output for the Axle Lockout valve.

Note	Pretest Instructions	Test	Result	Corrective Action
1.265.1		Is the resistance of the axle lockout valve solenoid [X212] 6.2Ω	Yes	Go to step 1.265.2
			No	Replace the axle lockout valve solenoid
1.265.2	Disconnect the axle lockout valve solenoid DIN connector [X212]	Does the voltage between the positive battery terminal [X116] and terminal 2 of the Axle Lockout valve solenoid DIN connector [X212.2.soc] measure 12VDC?	Yes	Go to step 1.265.10
			No	Go to step 1.265.3
1.265.3		Does the voltage between the positive battery terminal [X116] and terminal 2 of the chassis module J4 connector [X232.2.pin] measure 12VDC?	Yes	Repair/replace the black wire between terminal 2 of the axle lockout valve solenoid DIN connector [X212.2.soc] and terminal 2 of the chassis module J4 connector [X232.2.soc]
			No	Go to step 1.265.4
1.265.4		Does the voltage between the positive battery terminal [X116] and terminal 4 of the chassis module J1 connector [X229.4] measure 12VDC?	Yes	Replace the chassis module
			No	Go to step 1.265.5
1.265.5		Does the voltage between the positive battery terminal [X116] and terminal 5 of the chassis (bottom) swivel connector [X216.5] measure 12VDC?	Yes	Repair/Replace the black wire between terminal 5 of the chassis (bottom) swivel connector [X216.5] and terminal 4 of the chassis module J1 connector [X229.4]
			No	Go to step 1.265.6
1.265.6		Does the voltage between the positive battery terminal [X116] and terminal 5 of the Turntable (top) Swivel connector [X083.5] measure 12VDC?	Yes	Replace the Collector Ring and swivel harness
			No	Go to step 1.265.7
1.265.7		Does the voltage between the positive battery terminal [X116] and any terminal of the 12 position MTB ground buss connector [X009] measure 12VDC?	Yes	Replace the valve harness
			No	Go to step 1.265.8
1.265.8		Does the voltage between the positive battery terminal [X116] and terminal 3 of the ground module J8 connector [X008.3] measure 12VDC?	Yes	Repair/Replace the Black wire between terminal 3 of the ground module J8 connector [X008.3] and the MTB ground buss connector [X009]
			No	Go to step 1.265.9
1.265.9		Does the voltage between the positive battery terminal [X116] and terminal 1 of the ground module J8 connector [X008.1] measure 12VDC?	Yes	Replace the ground module
			No	Repair/Replace the Black wire from the battery
1.265.10	Disconnect the axle lockout valve solenoid DIN connector [X212]	Does the voltage on terminal 1 of the axle lockout valve solenoid DIN connector [X212.1.soc] measure 12VDC?	Yes	Go to step 1.265.11
			No	Go to step 1.265.15
1.265.11	Remove terminal 8 of the chassis (bottom) swivel connector [X216.8]	Does the voltage on terminal 1 of the axle lockout valve solenoid DIN connector [X212.1.soc] measure 12VDC?	Yes	Repair/replace the ORANGE 60-2 wire between terminal 1 of the axle lockout valve solenoid connector [212.1] and terminal 8 of the chassis (bottom) swivel connector [X216.8]
			No	Go to step 1.265.12

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Note	Pretest Instructions	Test	Result	Corrective Action
1.265.12	Remove terminal 8 of the turntable (top) swivel connector [X083.8]	Does the voltage on terminal 1 of the axle lockout valve solenoid DIN connector [X212.1.soc] measure 12VDC?	Yes	Replace the collector ring and swivel harness
			No	Go to step 1.265.13
1.265.13	Remove terminal 4 of the 12 position BLAM-Valve harness passthru connector [X058.4]	Does the voltage on terminal 1 of the axle lockout valve solenoid DIN connector [X212.1.soc] measure 12VDC?	Yes	Repair/Replace the ORANGE 60-1 wire between terminal 4 of the 12 position BLAM-Valve harness passthru connector [X058.4] and terminal 8 of the Turntable (top) swivel connector [X083.8]
			No	Go to step 1.265.14
1.265.14	Remove terminal 3 of the BLAM module J5 connector [X090.3]	Does the voltage on terminal 1 of the axle lockout valve solenoid DIN connector [X212.1.soc] measure 12VDC?	Yes	Repair/Replace the ORANGE 60-1 wire between terminal 3 of the BLAM module J5 connector [X090.3] and terminal 4 of the 12 position BLAM-Valve harness passthru connector [X058.4]
			No	Replace the BLAM module
1.265.15	Remove terminal 8 of the chassis (bottom) swivel connector [X216.8] and disconnect the axle lockout valve solenoid DIN connector [X212]	Is there continuity between terminal 8 of the chassis (bottom) swivel connector [X216.8.pin] and terminal 1 of the axle lockout valve solenoid DIN connector [X212.1.soc]?	Yes	Go to step 1.265.16
			No	Repair/replace the ORANGE 60-2 wire between terminal 1 of the axle lockout valve solenoid connector [212.1] and terminal 8 of the chassis (bottom) swivel connector [X216.8]
1.265.16	Remove terminal 8 of the Turntable (top) swivel connector [X083.8] and disconnect the axle lockout valve solenoid DIN connector [X212]	Is there continuity between terminal 8 of the Turntable (top) swivel connector [X083.8] and terminal 1 of the axle lockout valve solenoid DIN connector [X212.1.soc]?	Yes	Go to step 1.265.17
			No	Replace the Collector Ring and swivel harness
1.265.17	Remove terminal 4 of the 12 position BLAM-Valve harness passthru connector [X058.4] and disconnect the axle lockout valve solenoid DIN connector [X212]	Is there continuity between terminal 4 of the 12 position BLAM-Valve harness passthru connector [X058.4] and disconnect the axle lockout valve solenoid DIN connector [X212] and terminal 1 of the axle lockout valve solenoid DIN connector [X212.1.soc]?	Yes	Go to step 1.265.18
			No	Repair/Replace the ORANGE 60-1 wire between terminal 4 of the 12 position BLAM-Valve harness passthru connector [X058.4] and terminal 8 of the Turntable (top) swivel connector [X083.8]
1.265.18	Remove terminal 3 of the BLAM module J5 connector [X090.3] and disconnect the axle lockout valve solenoid DIN connector [X212]	Is there continuity between terminal 3 of the BLAM module J5 connector [X090.3] and terminal 1 of the axle lockout valve solenoid DIN connector [X212.1.soc]?	Yes	Replace the BLAM module
			No	Repair/Replace the ORANGE 60-1 wire between terminal 3 of the BLAM module J5 connector [X090.3] and terminal 4 of the 12 position BLAM-Valve harness passthru connector [X058.4]

1.266 RESTRICTED TO TRANSPORT - OSC AXLE PRESS SW DISAGREEMENT

Flash Code: 8-6

Restricted to transport - Oscillating axle pressure switch disagreement. The control system detected hydraulic pressure at the oscillating axle lockout pressure switch while the oscillating axle lockout valve solenoid was not being energized or did not detect pressure while the solenoid was energized. These fault conditions were detected for at least 5 seconds. This fault is ignored if the engine speed is under 1200 RPM. Only when driving in transport position should the oscillating axle lockout valve solenoid be energized, closing the oscillating axle lockout pressure switch and unlocking the oscillating axle cylinders. When out of transport position, drive/steer, tower lift up, main lift up, and main telescope out are prevented. This fault will be

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active until an EMS cycle, the engine will be stopped if out of transport and pressure is indicated with this fault, and engine starting will be prevented while out of transport and pressure is indicated by this switch.

Note	Pretest Instructions	Test	Result	Corrective Action
1.266.1		Is the primary fault, RESTRICTED TO TRANSPORT - AXLE LOCKOUT VALVE STB OR OC present in the fault log?	Yes	Troubleshoot any primary faults first
			No	Go to step 1.266.2
1.266.2		With the machine idling, does ANALYZER ⇒ DIAGNOSTICS ⇒ SYSTEM ⇒ OSCILATING AXLE PRES. SW. read CLOSED?	Yes	Go to step 1.266.14
			No	Go to step 1.266.3
1.266.3		While drive is activated in the transport position does ANALYZER ⇒ DIAGNOSTICS ⇒ SYSTEM ⇒ OSCILATING AXLE PRES. SW. read CLOSED?	Yes	Go to step 1.266.4
			No	Go to step 1.266.5
1.266.4		While drive is activated in the elevated position does ANALYZER ⇒ DIAGNOSTICS ⇒ SYSTEM ⇒ OSCILATING AXLE PRES. SW. read OPEN?	Yes	Perform drive calibration. See 5.3 Calibrating Drive on Pg. 292.
			No	Check the fault log. Troubleshoot any 3-3 codes in the fault log first
1.266.5	Tee in a 1000 psi pressure gauge next to the pressure switch on the traction control valve manifold	While drive is activated in the transport position does the gauge read above 200 psi?	Yes	Go to step 1.266.11
			No	Go to step 1.266.6
1.266.6	Connect a 1000 psi pressure gauge to the MP port on the traction control valve manifold	With the machine idling, can the pressure be adjusted with the adjacent charge relief valve so that the gauge reads 500psi?	Yes	Replace the axle lockout valve cartridge
			No	Go to step 1.266.7
1.266.7	Disconnect, plug and cap all four drive hoses at the top of the swivel (ports 3, 4, 5, and 6). Tee a gauge in with the hoses at the charge (pressure) filter (on engine side). Plug open lines.	Start engine and let it idle. Ensure hydraulic oil has been warmed up. Does the gauge read about 500psi?	Yes	Reassemble, but keep gauge installed. Go to step 1.266.9.
			No	Shut down, and reassemble, but keep gauge installed. Go to step 1.266.8.
1.266.8	Tee a gauge in with the hoses at the charge filter. Disconnect the front drive pump charge pressure lines (ports Fa and Fe). A jumper hose between the fittings on the pump is required to prevent pump damage.	Start engine and let it idle. Ensure hydraulic oil has been warmed up. Does the gauge read about 500psi?	Yes	Repair/replace right side drive pump
			No	Repair/replace left side drive pump.
1.266.9	Disconnect, plug and cap all four drive hoses at the bottom of the swivel (ports 3, 4, 5, and 6). Tee a gauge in with the hoses at the charge filter. Plug open lines.	Start engine and let it idle. Ensure hydraulic oil has been warmed up. Does the gauge read about 500psi?	Yes	Shut down, and reassemble, but keep gauge installed. Go to step 1.266.10.
			No	Repair seals in swivel.
1.266.10	Disconnect hoses to traction valve ports A3, a4, A5, A6, B3, B4, B5, and B6. Plug/cap open lines and ports. Tee a gauge in with the hoses at the charge filter.	Start engine and let it idle. Ensure hydraulic oil has been warmed up. Does the gauge read about 500psi?	Yes	Repair drive motor leakage or replace.
			No	Repair/replace traction valve.

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Note	Pretest Instructions	Test	Result	Corrective Action
1.266.11		Does the voltage at the axle lockout pressure switch connector YEL/RED 2-1-7 wire [X213.1.soc] measure 12VDC?	Yes	Go to step 1.266.12
			No	Check YEL/RED 2-1-7 wire for breaks between the axle lockout pressure switch [X213] and terminal 1 of the Chassis module J4 connector [X232.1]
1.266.12		While drive is activated in the transport position, does the voltage at the axle lockout pressure switch connector ORN/RED 49-107 wire [X213.3] measure 12VDC?	Yes	Go to step 1.266.13
			No	Replace the axle lockout pressure switch
1.266.13		While drive is activated in the transport position, does the voltage at terminal 7 of the chassis module J2 connector ORN/RED 49-107 wire [X230.7.soc] measure 12VDC?	Yes	Replace the chassis module
			No	Check ORN/RED 49-107 wire for breaks between the axle lockout pressure switch [X213] and terminal 7 of the Chassis module J2 connector [X230.7]
1.266.14	Plumb a 1000 psi pressure gauge to the pressure switch port on the traction control valve manifold	With the machine idling, does the gauge read any pressure?	Yes	Go to step 1.266.15
			No	Go to step 1.266.16
1.266.15	Remove the axle lockout valve solenoid from the valve. Tee in a 1000 psi pressure gauge next to the pressure switch on the traction control valve manifold	With the machine idling, does the gauge read any pressure?	Yes	Replace the axle lockout valve cartridge
			No	Go to 1.265 RESTRICTED TO TRANSPORT - AXLE LOCKOUT VALVE STB OR OC
1.266.16	Disconnect the axle lockout pressure switch DIN connector [X213]	With the machine idling, does ANALYZER ⇒ DIAGNOSTICS ⇒ SYSTEM ⇒ OSCILATING AXLE PRES. SW. read CLOSED?	Yes	Go to step 1.266.17
			No	Replace the axle lockout pressure switch
1.266.17	Remove socket 7 from the chassis module J2 connector [X230.7.soc]	With the machine idling, does ANALYZER ⇒ DIAGNOSTICS ⇒ SYSTEM ⇒ OSCILATING AXLE PRES. SW. read CLOSED?	Yes	Replace the chassis module
			No	Check the ORN/RED 49-107 wire for shorts between the axle lockout pressure switch [X213] and terminal 7 of the Chassis module J2 connector [X230.7]

1.267 RESTRICTED TO TRANSPORT - PARKING BRAKE STB

Flash Code: 3-3

Restricted to transport - parking brake short to battery. The parking brake output [X001.23] is shorted to battery so the boom cannot go above the transport position. See 1.241 PARKING BRAKE SHORT TO BATTERY on Pg. 122.

1.268 RIGHT FORWARD DRIVE PUMP OPEN CIRCUIT

Flash Code: 3-3

Right forward drive pump open circuit. The right forward drive pump output [X087.1] is open. See 1.377 COMMON STB OR OC PROCEDURE on Pg. 174.

1.269 RIGHT FORWARD DRIVE PUMP SHORT TO BATTERY

Flash Code: 3-3

Right forward drive pump short to battery. The right forward drive pump output [X087.1] is shorted to battery. See 1.377 COMMON STB OR OC PROCEDURE on Pg. 174.

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1.270 RIGHT FORWARD DRIVE PUMP SHORT TO GROUND

Flash Code: 3-3

Right forward drive pump short to ground. The right forward drive pump output [X087.1] is shorted to ground. See 1.378 COMMON STG PROCEDURE on Pg. 175.

1.271 RIGHT REVERSE DRIVE PUMP OPEN CIRCUIT

Flash Code: 3-3

Right reverse drive pump open circuit. The right reverse drive pump output [X087.12] is open. See 1.377 COMMON STB OR OC PROCEDURE on Pg. 174.

1.272 RIGHT REVERSE DRIVE PUMP SHORT TO BATTERY

Flash Code: 3-3

Right reverse drive pump short to battery. The right reverse drive pump output [X087.12] is shorted to battery. See 1.377 COMMON STB OR OC PROCEDURE on Pg. 174.

1.273 RIGHT REVERSE DRIVE PUMP SHORT TO GROUND

Flash Code: 3-3

Right reverse drive pump short to ground. The right reverse drive pump output [X087.12] is shorted to ground. See 1.378 COMMON STG PROCEDURE on Pg. 175.

1.274 RT FNT STEER LT STB OR OC

Flash Code: 8-6

Right front steer left short to battery or open circuit. The control system detected a short to battery or open circuit on the chassis module right front steer left valve output [X233.2]. See 1.377 COMMON STB OR OC PROCEDURE on Pg. 174.

1.275 RT FNT STEER LT STG

Flash Code: 8-6

Right front steer left short to ground. The control system detected a short to ground on the chassis module right front steer left valve output [X233.2]. See 1.378 COMMON STG PROCEDURE on Pg. 175.

1.276 RT FNT STEER RT STB OR OC

Flash Code: 8-6

Right front steer right short to battery or open circuit. The control system detected a short to battery or open circuit on the chassis module right front steer right valve output [X233.1]. See 1.377 COMMON STB OR OC PROCEDURE on Pg. 174.

1.277 RT FNT STEER RT STG

Flash Code: 8-6

Right front steer right short to ground. The control system detected a short to ground on the chassis module right front steer right valve output [X233.1]. See 1.378 COMMON STG PROCEDURE on Pg. 175.

1.278 RT REAR STEER LT STB OR OC

Flash Code: 8-6

Right rear steer left short to battery or open circuit. The control system detected a short to battery or open circuit on the chassis module right rear steer left valve output [233.6]. See 1.377 COMMON STB OR OC PROCEDURE on Pg. 174.

1.279 RT REAR STEER LT STG

Flash Code: 8-6

Right rear steer left short to ground. The control system detected a short to ground on the chassis module right rear steer left valve output [233.6]. See 1.378 COMMON STG PROCEDURE on Pg. 175.

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1.280 RT REAR STEER RT STB OR OC

Flash Code: 8-6

Right rear steer right short to battery or open circuit. The control system detected a short to battery or open circuit on the chassis module right rear steer right valve output [233.5]. See 1.377 COMMON STB OR OC PROCEDURE on Pg. 174.

1.281 RT REAR STEER RT STG

Flash Code: 8-6

Right rear steer right short to ground. The control system detected a short to ground on the chassis module right rear steer right valve output [233.5]. See 1.378 COMMON STG PROCEDURE on Pg. 175.

1.282 RUNNING AT CREEP - CREEP SWITCH OPEN

Flash Code: 9-9

Running at creep - creep switch open. All function speeds are limited to creep because the creep switch is open. This switch is part of the hydraulic speed potentiometer operated by a knob on the platform console. The creep indicator will light when in creep mode or blink in super creep mode. Circumstances that cause the machine to automatically enter creep/super creep mode include encroachment of the operating envelope limit by tower or main boom, platform leveling fault, throttle actuator failure, stowed basket, software version faults, boom sensor failures, hydraulic warm-up mode, and hydraulic or electrical retrieval mode.

Note	Pretest Instructions	Test	Result	Corrective Action
1.282.1		Are any of the circumstances that cause creep or super creep mode automatically present?	Yes	Clear any condition present
			No	Go to step 1.282.2
1.282.2	Rotate function speed control knob fully CCW until it clicks.	Is creep light on?	Yes	Go to step 1.282.7
			No	Go to step 1.282.3
1.282.3		Watch creep light while turning on machine from both the platform. Is creep light on for the lamp check?	Yes	Go to step 1.282.4
			No	Replace LED light panel with light that is bad.
1.282.4	Disconnect hyd speed pot passthru - 6 pos. [X199]. Ground meter. See Grounding on Pg. 319 for details. Turn on machine.	Is there about 12VDC at hyd speed pot passthru socket 3 [X199.3.soc]?	Yes	Keep hyd speed pot passthru - 6 pos. [X199] disconnected. Go to step 1.282.6
			No	Keep hyd speed pot passthru - 6 pos. [X199] disconnected. Go to step 1.282.5
1.282.5	Disconnect hyd speed pot passthru - 6 pos. [X199] and platform module J1 [X165]	Is there continuity between hyd speed pot passthru socket 3 [X199.3.soc] and platform module J1 socket 18 [X165.18.soc]?	Yes	Replace platform module
			No	Replace/repair harness between hyd speed pot passthru socket 3 [X199.3.soc] and platform module J1 socket 18 [X165.18.soc]
1.282.6	Disconnect hyd speed pot passthru - 6 pos. [X199] and platform module J1 [X165]	Is there continuity between hyd speed pot passthru pin 2 [X199.2.pin] and platform module J1socket 32 [X165.32.soc]?	Yes	Repair/replace hyd speed pot and/or harness [X199]
			No	Repair/replace harness between hyd speed pot passthru pin 2 [X199.2.pin] and platform module J1socket 32 [X165.32.soc]
1.282.7	Turn on machine. Rotate function speed control knob CW 1/4 turn to 9 o'clock position.	Does creep light turn off?	Yes	Keep machine in same condition. Go to step 1.282.8
			No	Go to step 1.282.9
1.282.8	Turn on machine. Rotate function speed control knob CW 1/4 turn to 9 o'clock position.	Does fault message clear?	Yes	Normal operation. Troubleshooting complete.
			No	Reprogram/replace ground module

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Note	Pretest Instructions	Test	Result	Corrective Action
1.282.9	Rotate function speed control knob CW 1/4 turn to 9 o'clock position. Disconnect hyd speed pot passthru - 6 pos. [X199].	Is there a short between hyd speed pot passthru socket 2 [X199.2.soc] and pin 3 [X199.3.pin]?	Yes	Repair/replace function speed control and/or harness to hyd speed pot passthru - 6 pos. [X199]
			No	Go to step 1.282.10
1.282.10	Disconnect hyd speed pot passthru - 6 pos. [X199] and platform module J1 [X165]	Is there a short between platform module J1 socket 32 [X165.32.soc] and socket 18 [X165.18.soc]?	Yes	Repair/replace harness between platform module J1 socket 32 [X165.32.soc] and socket 18 [X165.18.soc]
			No	Keep hyd speed pot passthru - 6 pos. [X199] disconnected. Go to step 1.282.11
1.282.11	Disconnect hyd speed pot passthru - 6 pos. [X199].Ground meter. Turn on machine.	Is there about 12 VDC on hyd speed pot passthru pin 2 [X199.2.pin]?	Yes	Repair/replace harness between hyd speed pot passthru pin 2 [X199.2.pin]
			No	Reprogram/replace platform module

1.283 RUNNING AT CREEP - PLATFORM OVERLOADED

Flash Code: 8-2

Running at creep - platform overloaded. Reported when the platform is overloaded, causing the machine to be in creep mode. Only displayed when the load sensor machine configuration is set to WARN ONLY.

1.284 RUNNING AT CREEP - TILTED AND ABOVE ELEVATION

Flash Code: 0-0

Running at creep - tilted and above elevation. All boom function speeds are limited to creep because the machine is tilted and above elevation. The machine is "Tilted" if the chassis is greater than 5.0° in any direction, or 3.0° to the side when the tower angle is greater than 60°. If Tilt calibration has not been performed after the ground module or the main terminal box has been removed or replaced the machine will also indicate it is tilted. The machine is "Above Elevation" if either the tower boom or main boom is above elevation. The tower boom is above elevation if it is greater than +2.0° from the turntable. If one sensor has failed the tower boom is above elevation if the good sensor indicates greater than +8.4° from the turntable. This resets at +5.9°. The main boom is above elevation if it is greater than +2.0° from the tower boom. This resets at 0.0°. If there is a main boom angle sensor failure the main boom is above elevation as indicated by the main boom transport angle switch.

Note	Pretest Instructions	Test	Result	Corrective Action
1.284.1	Return machine to Transport position and level ground	Is fault still active?	Yes	Go to step 1.284.2
			No	Troubleshooting complete
1.284.2		Are there any boom sensor or Chassis tilt sensor faults?	Yes	Troubleshoot those faults
			No	Go to step 1.284.3
1.284.3	Return machine to Transport position and level ground. ANALYZER ⇒ DIAGNOSTICS ⇒ TRANSPORT DATA	Does TOWER LIFT and MAIN LIFT read STOWED?	Yes	Go to step 1.284.4
			No	Perform 5.8 Boom Sensor Calibration on Pg. 309
1.284.4		Is the Tilt indicator on?	Yes	Perform 5.7 Calibrating Tilt Sensor on Pg. 307
			No	Repair/reprogram ground module

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1.285 RUNNING AT CUTBACK - OUT OF TRANSPORT POSITION

Flash Code: 0-0

Running at cutback - out of transport position. Drive speed is limited to programmed maximum because the vehicle is out of transport position. Maximum drive speed is set in the Personality of the machine. Transport position is defined as main boom retracted to less than 4' and parallel to tower boom, and the tower boom retracted and down to within 2.0° of the turntable.

Note	Pretest Instructions	Test	Result	Corrective Action
1.285.1	Read faults	Are there any tower angle sensor, tower length sensor, main (boom) angle sensor, dual capacity switch or transport length switch faults?	Yes	Troubleshoot those faults first
			No	Go to step 1.285.2
1.285.2	Return machine to transport position	Did fault clear?	Yes	Troubleshooting Complete
			No	Go to step 1.285.3
1.285.3	ANALYZER ⇒ DIAGNOSTICS ⇒ TRANSPORT DATA ⇒ TRANSPORT MODE	Does it read OUT OF TRANSPORT?	Yes	Go to step 1.285.4
			No	Reprogram/replace ground module
1.285.4	ANALYZER ⇒ DIAGNOSTICS ⇒ TRANSPORT DATA ⇒ TOWER LIFT STATUS	Does it read STOWED, or can the tower boom be lowered to make it read STOWED?	Yes	Keep analyzer connected. Go to step 1.285.5
			No	Calibrate boom sensors
1.285.5	ANALYZER ⇒ DIAGNOSTICS ⇒ TRANSPORT DATA ⇒ TOWER TELESCOPE STATUS	Does it read RETRACTED, or can the main boom be moved within the transport position envelope to make it read RETRACTED?	Yes	Keep analyzer connected. Go to step 1.285.6
			No	Calibrate boom sensors
1.285.6	ANALYZER ⇒ DIAGNOSTICS ⇒ TRANSPORT DATA ⇒ MAIN LIFT STATUS	Does it read STOWED, or can the main boom be lowered to make it read STOWED?	Yes	Keep analyzer connected. Go to step 1.285.7
			No	Calibrate boom sensors
1.285.7	ANALYZER ⇒ DIAGNOSTICS ⇒ TRANSPORT DATA ⇒ MAIN TELESCOPE STATUS	Does it read RETRACTED, or can the main boom be moved within the transport position envelope to make it read RETRACTED?	Yes	Normal operation. Troubleshooting complete.
			No	Calibrate boom sensors

1.286 SPEED INPUT LOST

Flash Code: 5-5

Speed input lost. This fault should only occur on machines configured with non-ECM engines. Notification that there is no engine speed detected on the engine flywheel speed sensor input [X001.16], but the oil pressure input [X001.15] reads above 8 PSI for more than 3 seconds.

1.287 SPEED SENSOR READING INVALID SPEED

Flash Code: 5-5

Speed sensor reading invalid speed. This fault should only occur on machines configured with non-ECM engines. Notification that the engine flywheel speed sensor input [X001.16] is indicating a speed that greater than 4000 RPM or approximately 8875 Hz.

1.288 START SOLENOID OPEN CIRCUIT

Flash Code: 3-3

Start solenoid open circuit. The engine start solenoid output [X001.11] is open. See 1.377 COMMON STB OR OC PROCEDURE on Pg. 174.

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1.289 START SOLENOID SHORT TO BATTERY

Flash Code: 3-3

Start solenoid short to battery. The engine start solenoid output [X001.11] is shorted to battery. See 1.377 COMMON STB OR OC PROCEDURE on Pg. 174.

1.290 START SOLENOID SHORT TO GROUND

Flash Code: 3-3

Start solenoid short to ground. The engine start solenoid output [X001.11] is shorted to ground. See 1.378 COMMON STG PROCEDURE on Pg. 175.

1.291 START SWITCH LOCKED - SELECTED BEFORE KEYSWITCH

Flash Code: 2-3

Start switch locked - selected before keyswitch. The start switch input [X004.4] was selected at startup. The engine start switch [X026] is likely stuck or the wiring is shorted.

1.292 STEER LOCKED - SELECTED BEFORE FOOTSWITCH

Flash Code: 2-2

Steer locked - selected before footswitch. Notification that one of the platform steer inputs [X168.5 X168.6] was selected before the footswitch was closed. Steering will be prevented. Close the footswitch before steering. This could also be due to a faulty steer switch [X176] or wiring.

1.293 STEER SENSORS NOT CALIBRATED

Flash Code: 9-9

Steer sensors not calibrated. The steering sensors require calibration. This fault can happen if calibration is incorrect or a new chassis module has been installed and steering calibration is not done.

Note	Pretest Instructions	Test	Result	Corrective Action
1.293.1	Perform 5.2 Calibrating Steer on Pg. 290.	Does calibration complete successfully?	Yes	Troubleshooting complete
			No	Troubleshoot according to calibration fault

1.294 STEER SWITCHES FAULTY

Flash Code: 2-2

Steer switches faulty. Notification that both left and right steer switch inputs [X168.5 X168.6] are active at the same time. This could be due to a faulty steer switch [X176] or wiring.

1.295 SWING LEFT OPEN CIRCUIT

Flash Code: 3-3

Swing left open circuit. The swing left valve output [X002.34] is open. See 1.377 COMMON STB OR OC PROCEDURE on Pg. 174.

1.296 SWING LEFT SHORT TO BATTERY

Flash Code: 3-3

Swing left short to battery. The swing left valve output [X002.34] is shorted to battery. See 1.377 COMMON STB OR OC PROCEDURE on Pg. 174.

1.297 SWING RIGHT OPEN CIRCUIT

Flash Code: 3-3

Swing right open circuit. The swing right valve output [X002.35] is open. See 1.377 COMMON STB OR OC PROCEDURE on Pg. 174.

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1.298 SWING RIGHT SHORT TO BATTERY

Flash Code: 3-3

Swing right short to battery. The swing right valve output [X002.35] is shorted to battery. See 1.377 COMMON STB OR OC PROCEDURE on Pg. 174.

1.299 THROTTLE ACTUATOR FAILURE

Flash Code: 4-3

Throttle actuator failure. This fault should only occur on machines configured with non-ECM engines. The engine is over-speeding, reading over 3050 RPM. This probably indicates the throttle actuator has failed.

1.300 THROTTLE ACTUATOR OPEN CIRCUIT

Flash Code: 3-3

Throttle actuator open circuit. This fault should only occur on machines configured with non-ECM engines. The engine throttle actuator output [X001.1] is open. See 1.377 COMMON STB OR OC PROCEDURE on Pg. 174.

1.301 THROTTLE ACTUATOR SHORT TO BATTERY

Flash Code: 3-3

Throttle actuator short to battery. This fault should only occur on machines configured with non-ECM engines. The engine throttle actuator output [X001.1] is shorted to battery. See 1.377 COMMON STB OR OC PROCEDURE on Pg. 174.

1.302 THROTTLE ACTUATOR SHORT TO GROUND

Flash Code: 3-3

Throttle actuator short to ground. This fault should only occur on machines configured with non-ECM engines. The engine throttle actuator output [X001.1] is shorted to ground. See 1.378 COMMON STG PROCEDURE on Pg. 175.

1.303 TOWER ANGLE SENSOR DISAGREEMENT

Flash Code: 8-4

Tower angle sensor disagreement. The control system detected a difference between the #1 (Right) [X099] and #2 (Left) [X100] tower boom angle sensors. A difference greater than 1.5° was held for at least 2.0 seconds. A power cycle is required.

Note	Pretest Instructions	Test	Result	Corrective Action
1.303.1	Read fault log	Are any of the following faults active on the machine? TWR ANGL1 (or 2) INVALID ANGLE or INVALID ANGLE SENSOR #1 (or 2) MODEL or BOOM ANGLE SENSOR #1 (or 2) COMMUNICATIONS FAULT	Yes	Troubleshoot them first
			No	Go to step 1.303.2
1.303.2	Access tower boom angle sensor #1 (Right) [X099]	Check they aren't swapped by unplugging tower boom angle sensor #1 (Right) [X099]. Does the BOOM ANGLE SENSOR #1 COMMUNICATIONS FAULT show?	Yes	Go to step 1.303.3
			No	Plug sensor harnesses into correct sensors
1.303.3	Fully retract and lower boom. ANALYZER ⇒ DIAGNOSTICS ⇒ BOOM SENSORS ⇒ TOWER ANGLE # SENSOR	Are both sensor angles approximately -4.3 ± 1.5°?	Yes	Go to step 1.303.4
			No	Replace sensor out of specified range
1.303.4	Calibrate boom	Did boom calibrate successfully?	Yes	Troubleshooting complete
			No	Troubleshoot according to calibration fault

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1.304 TOWER ENVELOPE ENCROACHED - HYDRAULICS SUSPENDED

Flash Code: 0-0

Tower envelope encroached - hydraulics suspended. The system has detected a tower envelope violation and suspended hydraulics to prevent further encroachment. Use the APU to telescope in or lift down inside the envelope. See 1.91 ENVELOPE ENCROACHED - HYDRAULICS SUSPENDED on Pg. 73.

1.305 TOWER LENGTH SENSOR DISAGREEMENT

Flash Code: 8-4

Tower length sensor disagreement. The control system detected a difference between the #1 (top) and #2 (bottom) tower boom length sensors. A difference greater than 2.0“was held for at least 2.0 seconds. The lengths are visible in ANALYZER ⇒ DIAGNOSTICS ⇒ BOOM SENSORS ⇒ TOWER LENGTH 1 SENSOR and TOWER LENGTH 2 SENSOR.

Note	Pretest Instructions	Test	Result	Corrective Action
1.305.1	Read fault log with analyzer	Are there any tower length sensor value out of range faults?	Yes	Troubleshoot, fix and clear them first
			No	Go to step 1.305.2
1.305.2		Examine the cables, tower boom length sensors #1 [X093] and #2 [X094], and mounting blocks. Is there any visible damage, loose hardware, kinked or stuck cables, etc.? Or, are there any corroded or wet electrical connections?	Yes	Tighten any loose hardware. Clean, repair or replace any bad connections. Repair/replace damaged items. Do not disassemble length sensor.
			No	Go to step 1.305.3
1.305.3	Disconnect cable at sensor #1 (top) [X093].	If sensor #1 (top) [X093] is unplugged at the top tower boom length sensor connector [X093], message TWR LENGTH SENSOR ONE VALUE OUT OF RANGE LOW should show in the fault log. If sensor 2 shows, the wires are swapped. Are the wires swapped?	Yes	Connect the top tower boom length sensor connector [X093] to sensor #1 (top) and the bottom tower boom length sensor connector [X094] to sensor #2 (bottom)
			No	Go to step 1.305.4
1.305.4	Fully lower tower. Check this by looking for marks on the tower boom from the wear pads to be hidden. ANALYZER ⇒ DIAGNOSTICS ⇒ BOOM SENSORS	TOWER LENGTH 1 and TOWER LENGTH 2 should read approximately 305 inches. Do they?	Yes	Keep tower lowered and analyzer reading boom sensors. Go to step 1.305.9
			No	Note sensor(s) with bad reading. Go to step 1.305.5
1.305.5		Is the sensor with bad reading sensor #1?	Yes	Go to step 1.305.6
			No	Go to step 1.305.10
1.305.6	Turn on machine. Disconnect tower boom length sensor #1 [X093].	Measure voltage from socket A[X093].A.soc] to socket B [X093.B.soc]. Does voltage read 5VDC?	Yes	Go to step 1.305.8
			No	Go to step 1.305.7
1.305.7	Turn on machine. Disconnect BLAM J3 [X088].	Measure voltage from pin 7 [X088.7.pin] to pin 9 [X088.9.pin]. Does voltage read about 5VDC?	Yes	Repair/replace harness between tower boom length sensor #1 [X093] and BLAM J3 [X088]
			No	Replace BLAM
1.305.8	Disconnect tower boom length sensor #1 [X093]. Disconnect BLAM J3 [X088].	Is there continuity from tower boom length sensor #1 socket C [X093.C.soc] socket C to BLAM J3 socket 8 [X088.8.soc]?	Yes	Go to step 1.305.9
			No	Repair/replace harness between tower boom length sensor #1 [X093] and BLAM J3 [X088]
1.305.9	Remove tower boom length sensor #1 (top) [X093]. Measure resistance from pin A [X093.A.pin] to pin C [X093.C.pin].	Have second person slowly walk cable out and back completely. The sensor cable extends 400 inches (33’ 4"). (Do not allow cable to retract in an uncontrolled or rapid manner. This will break the sensor.) Does resistance change smoothly and consistently up to 5000 Ω ± 500 Ω and back?	Yes	Go to step 1.305.13
			No	Replace tower boom length sensor #1 [X093]

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Note	Pretest Instructions	Test	Result	Corrective Action
1.305.10	Turn on machine. Disconnect tower boom length sensor #2 [X094].	Measure voltage from socket A [X094.A.soc] to socket B [X094.B.soc]. Does voltage read 5VDC?	Yes	Go to step 1.305.12
			No	Go to step 1.305.11
1.305.11	Turn on machine. Disconnect BLAM J3 [X088].	Measure voltage from pin 4 [X088.4.pin] to pin 6 [X088.6.pin]. Does voltage read 5VDC?	Yes	Repair/replace harness between tower boom length sensor #2 [X094] and BLAM J3 [X088]
			No	Replace BLAM
1.305.12	Disconnect tower boom length sensor #2 [X094]. Disconnect BLAM J3 [X088].	Is there continuity from tower boom length sensor #2 pin C [X094.C.soc] to BLAM J3 socket 8 [X088.8.soc]?	Yes	Go to step 1.305.13
			No	Repair/replace harness between tower boom length sensor #2 [X094] and BLAM J3 [X088]
1.305.13	Remove tower boom length sensor #2 (bottom) [X094]. Measure resistance from pin A [X094.A.pin] to pin C [X094.C.pin].	Have second person slowly walk cable out and back completely. The sensor cable extends 400 inches (33' 4"). (Do not allow cable to retract in an uncontrolled or rapid manner. This will break the sensor.) Does resistance change smoothly and consistently up to 5000 Ω ± 500 Ω and back?	Yes	Go to step 1.305.14
			No	Replace tower boom length sensor #2 [X094]
1.305.14		Perform a boom sensor Calibration, see 5.8 Boom Sensor Calibration on Pg. 309. Did fault clear?	Yes	Troubleshooting complete
			No	Replace sensor causing failure

1.306 TOWER LENGTH SWITCH/SENSOR DISAGREEMENT

Flash Code: 8-4

Tower length switch/sensor disagreement. The tower length switch did not change states by 306.4 inches while retracting or by 315.4 inches while extending. Measured by tower length sensor #1. The calibrated switch point can be viewed in ANALYZER ⇒ ACCESS LEVEL 1 ⇒ DIAGNOSTICS ⇒ BOOM SENSORS ⇒ TOWER TRIP POINT LENGTH. The length is visible in ANALYZER ⇒ DIAGNOSTICS ⇒ BOOM SENSORS ⇒ TOWER LENGTH 1 SENSOR. The normally closed tower length switch should be closed when the tower is telescoped in to transport position and the limit switch arm is off the cam. The length switch state is visible in ANALYZER ⇒ DIAGNOSTICS ⇒ BOOM SWITCHES ⇒ TOWER TELESCOPE SWITCH NC. This could be caused by a sticking switch and may be an intermittent fault.

Note	Pretest Instructions	Test	Result	Corrective Action
1.306.1		Check the fault log for primary faults, TOWER LENGTH SENSOR DISAGREEMENT, TWR LENGTH SENSOR NOT DETECTING LENGTH CHANGE, TWR LENGTH SENSOR ONE VALUE OUT OF RANGE HIGH, TWR LENGTH SENSOR ONE VALUE OUT OF RANGE LOW, or TWR TRN SW DISAGREEMENT	Yes	Troubleshoot the primary fault before continuing
			No	Go to step 1.306.2
1.306.2		Verify that the tower length limit switch [X056] is operating smoothly and in the transport position the switch arm is oriented at 90 degrees from the switch body	Yes	Go to step 1.306.3
			No	Repair, lubricate, or replace the switch
1.306.3		Is there any loose hardware on the length sensors [X093 X094], length switch [X056], mounting points, or cable mounts	Yes	Tighten any loose hardware
			No	Go to step 1.306.4

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Note	Pretest Instructions	Test	Result	Corrective Action
1.306.4		Check circuit connections at the tower boom transport length switch [X056], 6 position Mate-N-Lok connector in the main terminal box [X017], ground module J7 connector [X007], right & left tower boom length sensor [X093, X094], and BLAM module J3 connector [X088]. Are there any loose terminals or moisture or corrosion?	Yes	Clean or replace any bad connections
			No	Go to step 1.306.5
1.306.5		Check the tower boom transport length switch power. Terminal 14 and 22 of the tower boom transport switch [X056.14 X056.22] should measure 12VDC.	Yes	Go to step 1.306.8
			No	Go to step 1.306.6
1.306.6		In the transport position, terminal 1 of the 6 position Mate-N-Lok connector in the main terminal box [X017.1] should measure 12VDC.	Yes	Repair/Replace the white wire between the switch and the 6 position Mate-N-Lok connector in the main terminal box [X017.1]
			No	Go to step 1.306.7
1.306.7		In the transport position, terminal 29 of the ground module J7 connector [X007.29] should measure 12VDC.	Yes	Repair/Replace the YEL/RED 2-60 wire between the 6 position Mate-N-Lok connector in the main terminal box [X017.1] and terminal 29 of the ground module J7 connector [X007.29]
			No	Repair/Replace the ground module
1.306.8		In the transport position, does terminal 13 of the tower boom transport switch [X056.13] measure 12VDC?	Yes	Repair/Replace the tower boom transport length switch
			No	Go to step 1.306.9
1.306.9	Manually close the tower boom transport length switch by rotating and holding the switch arm	In the transport position, terminal 13 of the tower boom transport switch [X056.13] should measure 12VDC	Yes	Go to step 1.306.13
			No	Go to step 1.306.10
1.306.10	Manually close the tower boom transport length switch by rotating and holding the switch arm	In the transport position, terminal 6 of the 6 position Mate-N-Lok connector in the main terminal box [X017.6] should measure 12VDC	Yes	Repair/Replace the red wire between the switch and the 6 position Mate-N-Lok connector in the main terminal box [X017.6]
			No	Go to step 1.306.11
1.306.11	Manually close the tower boom transport length switch by rotating and holding the switch arm	In the transport position, terminal 35 of the ground module J7 connector [X007.35] should measure 12VDC	Yes	Repair/Replace the ORN/RED 49-65 wire between the 6 position Mate-N-Lok connector in the main terminal box [X017.6] and terminal 35 of the ground module J7 connector [X007.35]
			No	Go to step 1.306.12
1.306.12	Manually close the tower boom transport length switch by rotating and holding the switch arm	Check that ANALYZER ⇒ DIAGNOSTICS ⇒ BOOM SWITCHES ⇒ TOWER TELESCOPE SWITCH NO: CLOSED is displayed.	Yes	Go to step 1.306.13
			No	Replace the ground module
1.306.13		In the transport position, terminal 21 of the tower boom transport switch [X056.21] should measure 12VDC	Yes	Go to step 1.306.14
			No	Repair/Replace the tower boom transport length switch
1.306.14		In the transport position, terminal 2 of the 6 position Mate-N-Lok connector in the main terminal box [X017.2] should measure 12VDC	Yes	Go to step 1.306.15
			No	Repair/Replace the black wire between the switch and terminal 2 of the 6 position Mate-N-Lok connector in the main terminal box [X017.2]

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Note	Pretest Instructions	Test	Result	Corrective Action
1.306.15		In the transport position, terminal 11 of the ground module J7 connector [X007.11] should measure 12VDC	Yes	Go to step 1.306.16
			No	Repair/Replace the ORN/RED 49-64 wire between the 6 position Mate-N-Lok connector in the main terminal box [X017.2] and terminal 11 of the ground module J7 connector [X007.11]
1.306.16		Check that ANALYZER ⇒ DIAGNOSTICS ⇒ BOOM SWITCHES ⇒ TOWER TELESCOPE SWITCH NC: CLOSED is displayed.	No	Replace the ground module
			Yes	Go to step 1.306.17
1.306.17	Recalibrate, see 5.8 Boom Sensor Calibration on Pg. 309	Does recalibration clear this fault?	No	Go to step 1.306.18
			Yes	Troubleshooting complete
1.306.18		Does ANALYZER ⇒ DIAGNOSTICS ⇒ BOOM SENSORS ⇒ TOWER LENGTH 1 SENSOR read about 305" when in transport position?	Yes	Recycle the EMS switch, then go to step 1.306.17
			No	Go to step 1.306.19
1.306.19	Disconnect the BLAM module J3 connector [X088]	Does the resistance between terminals 7 and 9 of the BLAM module J3 connector [X088.7.soc and X088.9.soc] measure 5kΩ?	Yes	Go to step 1.306.21
			No	Go to step 1.306.20
1.306.20	Disconnect the right tower length sensor connector [X093]	Does the resistance between terminals A and B of the right tower length sensor connector [X093.A.pin and X093.B.pin] measure 5kΩ?	Yes	Repair/replace the red and black wires between the right tower length sensor [X093] and the BLAM module J3 connector [X088]
			No	Repair/replace the right tower length sensor
1.306.21	Disconnect the BLAM module J3 connector [X088]	Does the resistance between terminals 10 and 12 of the BLAM module J3 connector [X088.10 and X088.12] measure 5kΩ?	Yes	Go to step 1.306.23
			No	Go to step 1.306.22
1.306.22	Disconnect the left tower length sensor connector [X094]	Does the resistance between terminals A and B of the left tower length sensor connector [X094.A.pin and X094.B.pin] measure 5kΩ?	Yes	Repair/replace the Orange and Black wires between the left tower length sensor [X094] and the BLAM module J3 connector [X088]
			No	Repair/replace the left tower length sensor
1.306.23		Does the voltage between terminals A and B of the right tower length sensor connector [X093] measure 5VDC?	Yes	Possible Causes: Faulty sensor, Faulty BLAM module
			No	Go to step 1.306.24
1.306.24	Disconnect the BLAM module J3 connector [X088]	Does the voltage between terminals 7 and 9 of the BLAM module J3 connector [X088.7.pin and X088.9.pin] measure 5VDC?	Yes	Possible Causes: Faulty sensor, Faulty BLAM module
			No	Possible Causes: Faulty BLAM module

1.307 TOWER LIFT APU VALVE OPEN CIRCUIT

Flash Code: 3-3

Tower lift auxiliary power unit pilot valve open circuit. The tower lift pilot valve output [X002.12] is open. See 1.377 COMMON STB OR OC PROCEDURE on Pg. 174.

1.308 TOWER LIFT APU VALVE SHORT TO BATTERY

Flash Code: 3-3

Tower lift auxiliary power unit pilot valve short to battery. The tower lift pilot valve output [X002.12] is shorted to battery. See 1.377 COMMON STB OR OC PROCEDURE on Pg. 174.

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1.309 TOWER LIFT APU VALVE SHORT TO GROUND

Flash Code: 3-3

Tower lift auxiliary power unit pilot valve short to ground. The tower lift pilot valve output [X002.12] is shorted to ground. See 1.378 COMMON STG PROCEDURE on Pg. 175.

1.310 TOWER LIFT APU VALVE STUCK OPEN

Flash Code: 3-3

Tower lift auxiliary power unit pilot valve stuck open. This fault is detected at the end of a tower lift down command. The controller keeps the tower lift enable valve [X080] on with the tower lift PVG valve [X066] off and looks for tower angle sensor movement. If movement is detected, the tower lift pilot valve [X075] is likely stuck open.

1.311 TOWER LIFT ENABLE OPEN CIRCUIT

Flash Code: 3-3

Tower lift enable open circuit. The tower lift enable output [X002.33] is open. See 1.377 COMMON STB OR OC PROCEDURE on Pg. 174.

1.312 TOWER LIFT ENABLE SHORT TO BATTERY

Flash Code: 3-3

Tower lift enable short to battery. The tower lift enable output [X002.33] is shorted to battery. See 1.377 COMMON STB OR OC PROCEDURE on Pg. 174.

1.313 TOWER LIFT ENABLE SHORT TO GROUND

Flash Code: 3-3

Tower lift enable short to ground. The tower lift enable output [X002.33] is shorted to ground. See 1.378 COMMON STG PROCEDURE on Pg. 175.

1.314 TOWER LIFT ENABLE STUCK OPEN

Flash Code: 3-3

Tower lift enable stuck open. Fault is detected when a tower lift up is engaged. The controller keeps the tower lift enable valve [X080] off and engages the tower lift PVG valve [X066] and looks for tower angle sensor movement. If movement is detected, the tower lift enable valve is likely stuck open.

1.315 TOWER LIFT PVG VALVE COMMAND IMPROPER

Flash Code: 4-5

Tower lift PVG valve command improper. Tower lift PVG valve received an incorrect instruction from the CAN bus. This could be due to a CAN bus problem or a ground module problem.

Note	Pretest Instructions	Test	Result	Corrective Action
1.315.1	Check faults	Is EXCESSIVE CAN BUS COMMUNICATION ERRORS present?	Yes	Troubleshoot that fault first
			No	Go to step 1.315.2
1.315.2		Cycle power. Does problem clear?	Yes	Troubleshooting complete
			No	Reprogram/replace ground module

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1.316 TOWER LIFT PVG VALVE COMMUNICATIONS

Flash Code: 4-5

Tower lift PVG valve communications. The tower lift PVG valve is required to send it's status message every 100mS. If the status message from the PVG valve is not received within 500mS then this fault is issued.

Note	Pretest Instructions	Test	Result	Corrective Action
1.316.1	Check faults	Is EXCESSIVE CAN BUS COMMUNICATION ERRORS present?	Yes	Troubleshoot that fault first
			No	Go to step 1.316.2
1.316.2	Disconnect tower lift PVG - 4 pos. [X066]. Turn on machine.	Measure voltage between tower lift PVG connector socket 2 [X066.2.soc] and socket 3 [X066.3.soc]. Is it about 12 VDC?	Yes	Go to step 1.316.4
			No	Go to step 1.316.3
1.316.3	Disconnect tower lift PVG - 4 pos. [X066] and ground module J2 [X002]	Is there continuity between tower lift PVG - 4 pos. socket 2 [X066.2.soc] and ground module J1 socket 3 [X001.3.soc]?	Yes	Repair harness between tower lift PVG - 4 pos. [X066] and battery ground
			No	Repair harness between tower lift PVG - 4 pos. [X066] and ground module J1
1.316.4	Turn off machine. Disconnect tower lift PVG - 4 pos. [X066].	Measure resistance between tower lift PVG socket 1 [X066.1.soc] and socket 4 [X066.4.soc]. Is it about 60Ω?	Yes	Replace tower lift PVG valve [X066] actuator
			No	Go to step 1.316.5
1.316.5	Turn off machine. Disconnect tower lift PVG - 4 pos. [X066] and BLAM J4 [X089].	Is there continuity between tower lift PVG socket 1 [X066.1.soc] and BLAM J4 socket 4 [X089.4.soc]? - AND - Is there continuity between tower lift PVG socket 4 [X066.4.soc] and BLAM J4 socket 3 [X089.3.soc]?	Yes	Replace tower lift PVG valve [X066] actuator or see 1.46 BLAM CAN COMMUNICATIONS LOST on Pg. 48
			No	Repair harness between tower lift PVG - 4 pos. [X066] and BLAM J4 [X089]

1.317 TOWER LIFT PVG VALVE HIGH VOLTAGE

Flash Code: 4-5

Tower lift PVG valve high voltage. Voltage powering the tower lift PVG valve exceeded 32 VDC. Restore proper system voltage to clear fault.

Note	Pretest Instructions	Test	Result	Corrective Action
1.317.1	Ensure all off-board power connections, such as 110VAC, are disconnected. Ensure all on-board power systems are turned off, such as generators, welders, etc.	Turn on machine and start engine. Is battery voltage about 12 VDC? -AND- Does charging and 12VDC electrical power generation system appear to be working properly?	Yes	Go to step 1.317.2
			No	Repair 12 VDC charging and electrical power generation system.
1.317.2	Turn off machine. Ensure all off-board power connections, such as 110VAC, are disconnected. Ensure all on-board power systems are turned off, such as generators, welders, etc. Turn off machine. Disconnect tower lift PVG valve [X066]	Are there any shorts between tower lift PVG valve socket 2 [X066.2.soc] or socket 3 [X066.3.soc] and wiring for off-board power sources such as 110VAC, or on-board power sources such as welder or generator outputs, etc.? Note, tower lift PVG valve socket 3 [X066.3.soc] to ground continuity is OK. Be sure to check for intermittent problems.	Yes	Repair shorts as needed
			No	Transient condition likely set fault. If fault keeps occurring, go to step 1.317.3.
1.317.3	Measure voltage on the second tower lift PVG valve connector[X260] using a spare harness exposing terminal 2 [X260.2] and 3 [X260.3], or use insulated alligator clips to those terminals.	Observe 12VDC system voltage at the valve over an extended time under various operating conditions, for example, during engine start. See Min/Max on Pg. 319 for details. Is it performing properly?	Yes	Replace tower lift PVG valve actuator [X066]
			No	Repair as needed

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1.318 TOWER LIFT PVG VALVE INTERNAL FAULT

Flash Code: 4-5

Tower lift PVG valve internal fault. Hardware or software inside the tower lift PVG valve caused an error. There are no serviceable parts that cause this problem.

Note	Pretest Instructions	Test	Result	Corrective Action
1.318.1	Read faults	Are there any 6-6 communication faults?	Yes	Troubleshoot those first
			No	Go to step 1.318.2
1.318.2		Cycle machine power. Keep power off at least 20 seconds. Does fault still occur?	Yes	Replace tower lift PVG valve actuator [X066]
			No	Troubleshooting complete

1.319 TOWER LIFT PVG VALVE LOCATION IMPROPER

Flash Code: 4-5

Tower lift PVG valve location improper. Tower lift PVG valve parameters entered into the incorrect valve. This could be due to a calibration or wiring problem. The valve harnesses have one wire in it that is labeled with a number. The valves are located as follows: main lift at lower left with wire TAN 55-50, tower lift at top left with wire TAN 55-51, tower tele at top right with wire BROWN 55-50.

Note	Pretest Instructions	Test	Result	Corrective Action
1.319.1	Open hood covering the main valve body. Locate the LED's on the PVG valves.	Turn on the machine while watching the LED's. Do they start off, then turn on, in order, LEFT, CENTER, then RIGHT?	Yes	Calibrate boom valves. See 5.4 Calibrating Boom Valves on Pg. 296 for details.
			No	Connect harnesses to the correct PVG valve according to wires listed above in description. Then calibrate boom valves and recheck. See 5.4 Calibrating Boom Valves on Pg. 296 for details.

1.320 TOWER LIFT PVG VALVE LOW VOLTAGE

Flash Code: 4-5

Tower lift PVG valve low voltage. Voltage powering the tower lift PVG valve fell below about 10 VDC. Increase system voltage above 11 VDC to clear fault.

Note	Pretest Instructions	Test	Result	Corrective Action
1.320.1		Are either of the faults TOWER LIFT PVG VALVE COMMUNICATIONS or BLAM CAN COMMUNICATIONS LOST present?	Yes	Troubleshoot them first.
			No	Go to step 1.320.2
1.320.2		Are the battery and battery connections good?	Yes	Go to step 1.320.3
			No	Repair/replace as needed
1.320.3		Turn on machine and start engine. Is battery voltage about 12 VDC and does system appear to be working properly?	Yes	Go to step 1.320.4
			No	Repair charging and 12 VDC electrical power generation system.
1.320.4	Disconnect tower lift PVG valve connector [X066]. Turn on machine.	Is there about 12 VDC between tower lift PVG valve socket 2 [X066.2.soc] and socket 3 [X066.3.soc]?	Yes	Transient caused condition. If it occurs again troubleshoot charging and 12 VDC electrical power generation system.
			No	Go to step 1.320.5

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Note	Pretest Instructions	Test	Result	Corrective Action
1.320.5	Take the following measurement by backprobing. See Backprobing on Pg. 319 for details. Turn on machine after setting up measurement.	Is there about 12VDC between ground module J1 terminal 3 [X001.3] and any terminal on the MTB ground bus -12 pos. [X009]?	Yes	Repair/replace harness from tower lift PVG valve [X066] to ground J1 [X001] and the MTB ground bus -12 pos. [X009].
			No	Go to step 1.320.6
1.320.6	Take the following measurement by backprobing. Turn on machine after setting up measurement.	Is there about 12VDC between ground module J1 terminal 3 [X002.3] and ground module J8 terminal 1?	Yes	Repair harness between ground module J1 [X001] and MTB ground bus -12 pos. [X009]
			No	Reprogram/replace ground module

1.321 TOWER LIFT PVG VALVE OBSTRUCTED

Flash Code: 4-5

Tower lift PVG valve obstructed. Tower lift PVG valve spool is not free to move completely. This could be from contamination inside the valve or a blocked filter.

Note	Pretest Instructions	Test	Result	Corrective Action
1.321.1		Is there dirt in the hydraulic module part of the valve, especially around the spool?	Yes	Clean and repair as needed. Go to step 1.321.2
			No	Go to step 1.321.2
1.321.2		Is the filter at the tower lift PVG valve [X066] pilot oil inlet blocked?	Yes	Clean and repair as needed. Go to step 1.321.3.
			No	Go to step 1.321.3
1.321.3		Is the fault clear?	Yes	Go to step 1.321.5
			No	Go to step 1.321.4
1.321.4	Mark to identify the tower lift PVG valve actuator [X066] using string, tape, etc. Swap it with an actuator that doesn't have a fault.	Perform 5.4 Calibrating Boom Valves on Pg. 296. Does fault move to new location of actuator?	Yes	Replace PVG valve actuator that was initially on the tower lift PVG valve [X066]. Go to step 1.321.5
			No	Replace hydraulic module of tower lift PVG valve [X066]. Go to step 1.321.5
1.321.5		Does the return filter have contamination in filter media or housing?	Yes	Go to step 1.321.6
			No	Troubleshooting complete
1.321.6	Inspect all 4 hydraulic filters and housings and replace all 4 filters: output of function pump, platform filter (If filter is not external to platform valve it must be updated.), return filter and charge filter (for drive pump). Take note of filters/housings that have contamination.	Cycle boom from fully lowered and retracted to fully extended and then back. Test hydraulic fluid. Does it test bad, appear cloudy, appear dark, smell burned or is otherwise abnormal? -OR- Was there any contamination in the filters or housings?	Yes	Replace all hydraulic fluid Go to step 1.321.7
			No	Go to step 1.321.7
1.321.7		Do machine hydraulics function properly?	Yes	Troubleshooting complete
			No	Replace hydraulic components that are not functioning properly. Focus first on components upstream of any filters/housings with contamination. Calibrate if necessary.

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1.322 TOWER LIFT PVG VALVE PARAMETERS INCORRECT

Flash Code: 4-5

Tower lift PVG valve parameters incorrect. Programing parameters contained in the tower lift PVG valve do not match those stored in the ground module. The valve needs to be calibrated.

Note	Pretest Instructions	Test	Result	Corrective Action
1.322.1	Calibrate boom valves. See 5.4 Calibrating Boom Valves on Pg. 296 for details.	Did it pass calibration?	Yes	Troubleshooting complete. If fault is recurring replace tower lift PVG valve [X066] actuator.
			No	Replace tower lift PVG valve [X066] actuator

1.323 TOWER LIFT PVG VALVE SEND UNRECOGNIZED FAULT

Flash Code: 4-5

Tower lift PVG valve send unrecognized fault. An error code sent by the tower lift PVG valve was not recognized by the control system.

Note	Pretest Instructions	Test	Result	Corrective Action
1.323.1	Cycle machine power	Operate main lift. Does fault occur again?	Yes	Replace tower lift PVG valve [X066] actuator
			No	Troubleshooting complete. If fault is recurring, replace tower lift PVG valve [X066] actuator.

1.324 TOWER LIFT PVG VALVE SETUP FAULT

Flash Code: 4-5

Tower lift PVG valve setup fault. Tower lift PVG valve received programing parameter values that are not allowed. PVG setup is done over the CAN bus by the ground module.

Note	Pretest Instructions	Test	Result	Corrective Action
1.324.1	Check faults	Is EXCESSIVE CAN BUS COMMUNICATION ERRORS or other CAN bus communication error faults present?	Yes	Troubleshoot other fault(s) first
			No	Go to step 1.324.2
1.324.2	Perform 5.4 Calibrating Boom Valves on Pg. 296	Does the valve calibrate successfully? -AND- Does fault clear?	Yes	Troubleshooting complete. If fault is recurring, reprogram/replace ground module.
			No	Reprogram/replace ground module

1.325 TOWER LIFT PVG VALVE STUCK EXTENDED

Flash Code: 4-5

Tower lift PVG valve stuck extended. The tower lift PVG valve spool has moved out further than intended. Follow same procedure as 1.321 TOWER LIFT PVG VALVE OBSTRUCTED on Pg. 151.

1.326 TOWER LIFT PVG VALVE STUCK NEUTRAL

Flash Code: 4-5

Tower lift PVG valve stuck neutral. The tower lift PVG valve spool stuck outside of neutral position. This could be caused by dirt in the valve body or a PVG valve software issue. Follow same procedure as 1.321 TOWER LIFT PVG VALVE OBSTRUCTED on Pg. 151.

1.327 TOWER LIFT PVG VALVE STUCK RETRACTED

Flash Code: 4-5

Tower lift PVG valve stuck retracted. Tower lift PVG valve spool did not move in the required time. Follow same procedure as 1.321 TOWER LIFT PVG VALVE OBSTRUCTED on Pg. 151.

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1.328 TOWER LIFT PVG VALVE TIMEOUT

Flash Code: 4-5

Tower lift PVG valve timeout. Position instructions were not received by the tower lift PVG valve within the allowed amount of time.

Note	Pretest Instructions	Test	Result	Corrective Action
1.328.1		Is EXCESSIVE CAN BUS COMMUNICATION ERRORS or other CAN bus communication error faults present?	Yes	Troubleshoot those faults first
			No	Go to step 1.328.2
1.328.2	Disconnect tower lift PVG valve [X066]	Does TOWER LIFT PVG VALVE COMMUNICATIONS fault appear?	Yes	Replace tower lift PVG valve [X066] actuator
			No	Reprogram/replace ground module

1.329 TOWER LIFT PVG VALVE WIRING INCORRECT

Flash Code: 4-5

Tower lift PVG valve wiring incorrect. A different valve powered up during power up time for tower lift PVG valve or the tower lift PVG valve powered up outside of the allotted PVG valve power up time. This could be due to a calibration or wiring problem. The valves are located as follows: main lift at lower left with wire TAN 55-50, tower lift at top left (center of three) with wire TAN 55-51, tower tele at top right with wire BROWN 55-50.

Note	Pretest Instructions	Test	Result	Corrective Action
1.329.1	Open hood covering the main valve body. Locate the LED's on the PVG valves.	Turn on the machine while watching the LED's. Do they start all off, then turn on in this order: LEFT, CENTER, then RIGHT?	Yes	Calibrate boom valves. See 5.4 Calibrating Boom Valves on Pg. 296 for details.
			No	Go to step 1.329.2
1.329.2	Turn off machine. Disconnect Ignition On Relay [X012] and tower lift PVG valve [X066].	Is there a short between Ignition On Relay socket 30 [X012.30.soc]and tower lift PVG valve socket 2 [X066.2.soc]?	Yes	Repair/replace harness between Relay [X012] and tower lift PVG valve [X066].
			No	Connect harnesses to the correct PVG valve as in the description above. Then calibrate boom valves. See 5.4 Calibrating Boom Valves on Pg. 296 for details.

1.330 TOWER TELE APU VALVE STUCK OPEN

Flash Code: 3-3

Tower telescope auxiliary power unit pilot valve stuck open. This fault is detected at the end of a tower lift down command. The controller keeps the tower tele enable valve [X081] on with the tower tele PVG valve [X067] off and looks for tower length sensor movement. If movement is detected, the tower tele pilot valve [X076] is likely stuck open.

1.331 TOWER TELE ENABLE OPEN CIRCUIT

Flash Code: 3-3

Tower telescope enable open circuit. The tower telescope enable valve output [X001.6] is open. See 1.377 COMMON STB OR OC PROCEDURE on Pg. 174.

1.332 TOWER TELE ENABLE SHORT TO BATTERY

Flash Code: 3-3

Tower telescope enable short to battery. The tower telescope enable valve output [X001.6] is shorted to battery. See 1.377 COMMON STB OR OC PROCEDURE on Pg. 174.

1.333 TOWER TELE ENABLE SHORT TO GROUND

Flash Code: 3-3

Tower telescope enable short to ground. The tower telescope enable valve output [X001.6] is shorted to ground. See 1.378 COMMON STG PROCEDURE on Pg. 175.

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1.334 TOWER TELE ENABLE STUCK OPEN

Flash Code: 3-3

Tower telescope enable stuck open. This fault is detected when a tower lift up is engaged. The controller keeps the tower tele enable valve [X081] off and engages the tower tele PVG valve [X067] and looks for tower length sensor movement. If movement is detected, the tower tele enable valve is likely stuck open.

1.335 TOWER TELESCOPE APU OPEN CIRCUIT

Flash Code: 3-3

Tower telescope auxiliary power unit pilot valve open circuit. The tower telescope pilot valve output [X002.32] is open. See 1.377 COMMON STB OR OC PROCEDURE on Pg. 174.

1.336 TOWER TELESCOPE APU SHORT TO BATTERY

Flash Code: 3-3

Tower telescope auxiliary power unit pilot valve short to battery. The tower telescope pilot valve output [X002.32] is shorted to battery. See 1.377 COMMON STB OR OC PROCEDURE on Pg. 174.

1.337 TOWER TELESCOPE APU SHORT TO GROUND

Flash Code: 3-3

Tower telescope auxiliary power unit pilot valve short to ground. The tower telescope pilot valve output [X002.32] is shorted to ground. See 1.378 COMMON STG PROCEDURE on Pg. 175.

1.338 TOWER TELESCOPE PVG VALVE COMMAND IMPROPER

Flash Code: 4-5

Tower telescope PVG valve command improper. Tower telescope PVG valve received an incorrect instruction from the CAN bus. This could be due to a CAN bus problem or a ground module problem.

Note	Pretest Instructions	Test	Result	Corrective Action
1.338.1	Check faults	Is EXCESSIVE CAN BUS COMMUNICATION ERRORS present?	Yes	Troubleshoot that fault first
			No	Go to step 1.338.2
1.338.2		Cycle power. Does problem clear?	Yes	Troubleshooting complete
			No	Reprogram/replace ground module

1.339 TOWER TELESCOPE PVG VALVE COMMUNICATIONS

Flash Code: 4-5

Tower telescope PVG valve communications. The tower telescope PVG valve is required to send it's status message every 100mS. If the status message from the PVG valve is not received within 500mS then this fault is issued.

Note	Pretest Instructions	Test	Result	Corrective Action
1.339.1	Check faults	Is EXCESSIVE CAN BUS COMMUNICATION ERRORS present?	Yes	Troubleshoot that fault first
			No	Go to step 1.339.2
1.339.2	Disconnect tower tele PVG - 4 pos. [X067]. Turn on machine.	Measure voltage between tower tele PVG connector socket 2 [X067.2.soc] and socket 3 [X067.3.soc]. Is it about 12 VDC?	Yes	Go to step 1.339.4
			No	Go to step 1.339.3
1.339.3	Disconnect tower tele PVG - 4 pos. [X067] and ground module J2 [X002]	Is there continuity between tower tele PVG - 4 pos. socket 2 [X067.2.soc] and ground module J1 socket? [X001.?.soc]?	Yes	Repair harness between tower tele PVG - 4 pos. [X067] and battery ground
			No	Repair harness between tower tele PVG - 4 pos. [X067] and ground module J1

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Note	Pretest Instructions	Test	Result	Corrective Action
1.339.4	Turn off machine. Disconnect tower tele PVG - 4 pos. [X067].	Measure resistance between tower tele PVG socket 1 [X067.1.soc] and socket 4 [X067.4.soc]. Is it about 60Ω?	Yes	Replace tower tele PVG valve [X067] actuator
			No	Go to step 1.339.5
1.339.5	Turn off machine. Disconnect tower tele PVG - 4 pos. [X067] and BLAM J4 [X089].	Is there continuity between tower tele PVG socket 1 [X067.1.soc] and BLAM J4 socket 4 [X089.4.soc]? - AND - Is there continuity between tower tele PVG socket 4 [X067.4.soc] and BLAM J4 socket 3 [X089.3.soc]?	Yes	Replace tower tele PVG valve [X067] actuator or see 1.46 BLAM CAN COMMUNICATIONS LOST on Pg. 48
			No	Repair harness between tower tele PVG - 4 pos. [X067] and BLAM J4 [X089]

1.340 TOWER TELESCOPE PVG VALVE HIGH VOLTAGE

Flash Code: 4-5

Tower telescope PVG valve high voltage. Voltage powering the tower telescope PVG valve exceeded 32 VDC. Restore proper system voltage to clear fault.

Note	Pretest Instructions	Test	Result	Corrective Action
1.340.1	Ensure all off-board power connections, such as 110VAC, are disconnected. Ensure all on-board power systems are turned off, such as generators, welders, etc.	Turn on machine and start engine. Is battery voltage about 12 VDC? -AND- Does charging and 12VDC electrical power generation system appear to be working properly?	Yes	Go to step 1.340.2
			No	Repair 12 VDC charging and electrical power generation system.
1.340.2	Turn off machine. Ensure all off-board power connections, such as 110VAC, are disconnected. Ensure all on-board power systems are turned off, such as generators, welders, etc. Turn off machine. Disconnect tower tele PVG valve [X067]	Are there any shorts between tower tele PVG valve socket 2 [X067.2.soc] or socket 3 [X067.3.soc] and wiring for off-board power sources such as 110VAC, or on-board power sources such as welder or generator outputs, etc.? Note, tower tele PVG valve socket 3 [X067.3.soc] to ground continuity is OK. Be sure to check for intermittent problems.	Yes	Repair shorts as needed
			No	Transient condition likely set fault. If fault keeps occurring, go to step 1.340.3.
1.340.3	Measure voltage on the second tower tele PVG valve connector[X261] using a spare harness exposing terminal 2 [X261.2] and 3 [X261.3], or use insulated alligator clips to those terminals.	Observe 12VDC system voltage at the valve over an extended time under various operating conditions, for example, during engine start. See Min/Max on Pg. 319 for details. Is it performing properly?	Yes	Replace tower tele PVG valve actuator [X067]
			No	Repair as needed

1.341 TOWER TELESCOPE PVG VALVE INTERNAL FAULT

Flash Code: 4-5

Tower telescope PVG valve internal fault. Hardware or software inside the tower telescope PVG valve caused an error. There are no serviceable parts that cause this problem.

Note	Pretest Instructions	Test	Result	Corrective Action
1.341.1	Read faults	Are there any 6-6 communication faults?	Yes	Troubleshoot those first
			No	Go to step 1.341.2
1.341.2		Cycle machine power. Keep power off at least 20 seconds. Does fault still occur?	Yes	Replace tower tele PVG valve actuator [X067]
			No	Troubleshooting complete

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1.342 TOWER TELESCOPE PVG VALVE LOCATION IMPROPER

Flash Code: 4-5

Tower telescope PVG valve location improper. Tower telescope PVG valve parameters entered into the incorrect valve. This could be due to a calibration or wiring problem. The valve harnesses have one wire in it that is labeled with a number. The valves are located as follows: main lift at lower left with wire TAN 55-50, tower lift at top left with wire TAN 55-51, tower tele at top right with wire BROWN 55-50.

Note	Pretest Instructions	Test	Result	Corrective Action
1.342.1	Open hood covering the main valve body. Locate the LED's on the PVG valves.	Turn on the machine while watching the LED's. Do they start off, then turn on, in order, LEFT, CENTER, then RIGHT?	Yes	Calibrate boom valves. See 5.4 Calibrating Boom Valves on Pg. 296 for details.
			No	Connect harnesses to the correct PVG valve according to wires listed above in description. Then calibrate boom valves and recheck. See 5.4 Calibrating Boom Valves on Pg. 296 for details.

1.343 TOWER TELESCOPE PVG VALVE LOW VOLTAGE

Flash Code: 4-5

Tower telescope PVG valve low voltage. Voltage powering the tower telescope PVG valve fell below about 10 VDC. Increase system voltage above 11 VDC to clear fault.

Note	Pretest Instructions	Test	Result	Corrective Action
1.343.1		Are either of the faults TOWER TELESCOPE PVG VALVE COMMUNICATIONS or BLAM CAN COMMUNICATIONS LOST present?	Yes	Troubleshoot them first.
			No	Go to step 1.343.2
1.343.2		Are the battery and battery connections good?	Yes	Go to step 1.343.3
			No	Repair/replace as needed
1.343.3		Turn on machine and start engine. Is battery voltage about 12 VDC and does system appear to be working properly?	Yes	Go to step 1.343.4
			No	Repair charging and 12 VDC electrical power generation system.
1.343.4	Disconnect tower tele PVG valve connector [X067]. Turn on machine.	Is there about 12 VDC between tower tele PVG valve socket 2 [X067.2.soc] and socket 3 [X067.3.soc]?	Yes	Transient caused condition. If it occurs again troubleshoot charging and 12 VDC electrical power generation system.
			No	Go to step 1.343.5
1.343.5	Take the following measurement by backprobing. See Backprobing on Pg. 319 for details. Turn on machine after setting up measurement.	Is there about 12VDC between ground module J1 terminal 3 [X001.3] and any terminal on the MTB ground bus -12 pos. [X009]?	Yes	Repair/replace harness from tower tele PVG valve [X067] to ground J1 [X001] and the MTB ground bus -12 pos. [X009].
			No	Go to step 1.343.6
1.343.6	Take the following measurement by backprobing. Turn on machine after setting up measurement.	Is there about 12VDC between ground module J1 terminal 3 [X001.3] and ground module J8 terminal 1?	Yes	Repair harness between ground module J1 [X001] and MTB ground bus -12 pos. [X009]
			No	Reprogram/replace ground module

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1.344 TOWER TELESCOPE PVG VALVE OBSTRUCTED

Flash Code: 4-5

Tower telescope PVG valve obstructed. Tower telescope PVG valve spool is not free to move completely. This could be from contamination inside the valve or a blocked filter.

Note	Pretest Instructions	Test	Result	Corrective Action
1.344.1		Is there dirt in the hydraulic module part of the valve, especially around the spool?	Yes	Clean and repair as needed. Go to step 1.344.2
			No	Go to step 1.344.2
1.344.2		Is the filter at the tower tele PVG valve [X067] pilot oil inlet blocked?	Yes	Clean and repair as needed. Go to step 1.344.3.
			No	Go to step 1.344.3
1.344.3		Is the fault clear?	Yes	Go to step 1.344.5
			No	Go to step 1.344.4
1.344.4	Mark to identify the tower tele PVG valve actuator [X067] using string, tape, etc. Swap it with an actuator that doesn't have a fault.	Perform 5.4 Calibrating Boom Valves on Pg. 296. Does fault move to new location of actuator?	Yes	Replace PVG valve actuator that was initially on the tower tele PVG valve [X067]. Go to step 1.344.5
			No	Replace hydraulic module of tower tele PVG valve [X067]. Go to step 1.344.5
1.344.5		Does the return filter have contamination in filter media or housing?	Yes	Go to step 1.344.6
			No	Troubleshooting complete
1.344.6	Inspect all 4 hydraulic filters and housings and replace all 4 filters: output of function pump, platform filter (If filter is not external to platform valve it must be updated.), return filter and charge filter (for drive pump). Take note of filters/housings that have contamination.	Cycle boom from fully lowered and retracted to fully extended and then back. Test hydraulic fluid. Does it test bad, appear cloudy, appear dark, smell burned or is otherwise abnormal? -OR- Was there any contamination in the filters or housings?	Yes	Replace all hydraulic fluid Go to step 1.344.7
			No	Go to step 1.344.7
1.344.7		Do machine hydraulics function properly?	Yes	Troubleshooting complete
			No	Replace hydraulic components that are not functioning properly. Focus first on components upstream of any filters/housings with contamination. Calibrate if necessary.

1.345 TOWER TELESCOPE PVG VALVE PARAMETERS INCORRECT

Flash Code: 4-5

Tower telescope PVG valve parameters incorrect. Programing parameters contained in the tower telescope PVG valve do not match those stored in the ground module. The valve needs to be calibrated.

Note	Pretest Instructions	Test	Result	Corrective Action
1.345.1	Calibrate boom valves. See 5.4 Calibrating Boom Valves on Pg. 296 for details.	Did it pass calibration?	Yes	Troubleshooting complete. If fault is recurring replace tower tele PVG valve [X067] actuator.
			No	Replace tower tele PVG valve [X067] actuator

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1.346 TOWER TELESCOPE PVG VALVE SENT UNRECOGNIZED FAULT

Flash Code: 4-5

Tower telescope PVG valve sent unrecognized fault. An error code sent by the tower telescope PVG valve was not recognized by the control system.

Note	Pretest Instructions	Test	Result	Corrective Action
1.346.1	Cycle machine power	Operate main lift. Does fault occur again?	Yes	Replace tower tele PVG valve [X067] actuator
			No	Troubleshooting complete. If fault is recurring, replace tower tele PVG valve [X067] actuator.

1.347 TOWER TELESCOPE PVG VALVE SETUP FAULT

Flash Code: 4-5

Tower telescope PVG valve setup fault. Tower telescope PVG valve received programing parameter values that are not allowed. PVG setup is done over the CAN bus by the ground module.

Note	Pretest Instructions	Test	Result	Corrective Action
1.347.1	Check faults	Is EXCESSIVE CAN BUS COMMUNICATION ERRORS or other CAN bus communication error faults present?	Yes	Troubleshoot other fault(s) first
			No	Go to step 1.347.2
1.347.2	Perform 5.4 Calibrating Boom Valves on Pg. 296	Does the valve calibrate successfully? -AND- Does fault clear?	Yes	Troubleshooting complete. If fault is recurring, reprogram/replace ground module.
			No	Reprogram/replace ground module

1.348 TOWER TELESCOPE PVG VALVE STUCK EXTENDED

Flash Code: 4-5

Tower telescope PVG valve stuck extended. The tower telescope PVG valve spool has moved out further than intended. Follow same procedure as 1.344 TOWER TELESCOPE PVG VALVE OBSTRUCTED on Pg. 157.

1.349 TOWER TELESCOPE PVG VALVE STUCK NEUTRAL

Flash Code: 4-5

Tower telescope PVG valve stuck neutral. The tower telescope PVG valve spool stuck outside of neutral position. This could be cause by dirt in the valve body or a PVG valve software issue. Follow same procedure as 1.344 TOWER TELESCOPE PVG VALVE OBSTRUCTED on Pg. 157.

1.350 TOWER TELESCOPE PVG VALVE STUCK RETRACTED

Flash Code: 4-5

Tower telescope PVG valve stuck retracted. Tower telescope PVG valve spool did not move in the required time. Follow same procedure as 1.344 TOWER TELESCOPE PVG VALVE OBSTRUCTED on Pg. 157.

1.351 TOWER TELESCOPE PVG VALVE TIMEOUT

Flash Code: 4-5

Tower telescope PVG valve timeout. Position instructions were not received by the tower telescope PVG valve within the allowed amount of time.

Note	Pretest Instructions	Test	Result	Corrective Action
1.351.1		Is EXCESSIVE CAN BUS COMMUNICATION ERRORS or other CAN bus communication error faults present?	Yes	Troubleshoot those faults first
			No	Go to step 1.351.2

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Note	Pretest Instructions	Test	Result	Corrective Action
1.351.2	Disconnect tower tele PVG valve [X067]	Does TOWER TELESCOPE PVG VALVE COMMUNICATIONS fault appear?	Yes	Replace tower tele PVG valve [X067] actuator
			No	Reprogram/replace ground module

1.352 TOWER TELESCOPE PVG VALVE WIRING INCORRECT

Flash Code: 4-5

Tower telescope PVG valve wiring incorrect. A different valve powered up during power up time for tower tele PVG valve or the tower tele PVG valve powered up outside of the allotted PVG valve power up time. This could be due to a calibration or wiring problem. The valves are located as follows: main lift at lower left with wire TAN 55-50, tower lift at top left (center of three) with wire TAN 55-51, tower tele at top right with wire BROWN 55-50.

Note	Pretest Instructions	Test	Result	Corrective Action
1.352.1	Open hood covering the main valve body. Locate the LED's on the PVG valves.	Turn on the machine while watching the LED's. Do they start all off, then turn on in this order: LEFT, CENTER, then RIGHT?	Yes	Calibrate boom valves. See 5.4 Calibrating Boom Valves on Pg. 296 for details.
			No	Go to step 1.222.2
1.352.2	Turn off machine. Disconnect Ignition On Relay [X012] and tower tele PVG valve [X067].	Is there a short between Ignition On Relay socket 30 [X012.30.soc] and tower tele PVG valve socket 2 [X067.2.soc]?	Yes	Repair/replace harness between Relay [X012] and tower tele PVG valve [X067]
			No	Connect harnesses to the correct PVG valve as in the description above. Then calibrate boom valves. See 5.4 Calibrating Boom Valves on Pg. 296 for details.

1.353 TRN DUAL CAP BAD TRANSITION

Flash Code: 8-4

Transport or Dual Capacity Bad Transition. The control system detected that the main boom length switches did not transition in the correct sequence based on the telescope command, as in Table 2-3. Switch States / Boom Length Regions on Pg. 179 and Figure 2-2. Dual Capacity / Transport Switch Mounting on Pg. 179. If in the 1000# mode of operation, the main telescope function will be disabled. This could be caused by incorrect wiring to the main boom transport or dual capacity switches or a hydraulic problem preventing the boom from telescoping in the direction commanded.

Note	Pretest Instructions	Test	Result	Corrective Action
1.353.1		Are there any faults for the DCAP Length Switches [X052] & [X053], main boom transport switches [X054] & [X055], MAIN IN... -OR- MAIN OUT...?	Yes	Troubleshoot them first
			No	Go to step 1.353.2
1.353.2		Operate main boom telescope IN and OUT. Is the response correct?	Yes	Go to step 1.353.5
			No	Go to step 1.353.3
1.353.3		Does the hosing between the main valve - main tele section and main tele cylinder match the schematic in Figure 3-12. Hydraulic Schematic - Boom Control - Sheet 1 of 2 on Pg. 258?	Yes	Go to step 1.353.4
			No	Correct hosing as needed
1.353.4	Disconnect main tele retract [X073] connector	Does the fault MAIN IN OPEN CIRCUIT appear?	Yes	Repair/replace main tele cylinder holding valve
			No	Harnesses for main tele retract [X073] and main tele extend [X071] are swapped. Correct them.

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Note	Pretest Instructions	Test	Result	Corrective Action
1.353.5	Access DCAP Length Switches [X052] & [X053] and main boom transport switches [X054] & [X055]. Switch to 500 lb. mode.	Are the switches free to move? Also, are the switch levers mounted at 90° to housing as seen when not engaging a cam? Also, are the switches and cam strips mounted so that the switch levers engage the entire length of cam? Also, are the strips mounted such that they match Figure 2-2. Dual Capacity / Transport Switch Mounting on Pg. 179.	Yes	Ensure the dual capacity switch passthru [X046] and main boom transport switch passthru [X047] connections are not swapped. Also, ensure wiring of switches is correct.
			No	Repair as needed

1.354 TRN DUAL CAP SWITCHES BAD

Flash Code: 8-4

Transport or dual capacity switches bad. The main length transport switches are reporting “A/D”, but the dual capacity length switches are reporting a disagreement. See Table 2-3. Switch States / Boom Length Regions and Figure 2-1. Main Boom Angle and Length Zones on Pg. 178. The dual capacity length switches should only report a disagreement while passing between the B and C regions. The main boom allowable functions for angle regions 1,2,7 and 8 will follow Dual Capacity Zones D1,D2,D7 and D8 respectively. For angle regions 3 and 4 the allowable functions will follow Dual Capacity Zone D3 and for angle regions 5 and 6 the allowable functions will follow Dual Capacity Zone D6. If the tower boom is recognized as being in transport position then main boom lift down will be allowed.

Note	Pretest Instructions	Test	Result	Corrective Action
1.354.1		Is the fault DCAP LEN SW DISAGREEMENT present?	Yes	Go to 1.75 DCAP LEN SW DISAGREEMENT on Pg. 64. If instructed to replace module DO NOT. Go to step 1.354.2 instead.
			No	Go to step 1.354.2
1.354.2		Is the fault MAIN TRN LEN SW DISAGREEMENT present?	Yes	Go to 1.230 MAIN TRN LEN SW DISAGREEMENT on Pg. 118
			No	Go to step 1.354.3
1.354.3		Go to 1.75 DCAP LEN SW DISAGREEMENT on Pg. 64. If instructed to replace module, DO NOT. Did fault clear?	Yes	Done troubleshooting
			No	Go to 1.230 MAIN TRN LEN SW DISAGREEMENT on Pg. 118

1.355 TWO SPEED OPEN CIRCUIT

Flash Code: 3-3

Two speed open circuit. The two speed valve output [X001.20] is open. See 1.377 COMMON STB OR OC PROCEDURE on Pg. 174.

1.356 TWO SPEED SHORT TO BATTERY

Flash Code: 3-3

Two speed short to battery. The two speed valve output [X001.20] is shorted to battery. See 1.377 COMMON STB OR OC PROCEDURE on Pg. 174.

1.357 TWO SPEED SHORT TO GROUND

Flash Code: 3-3

Two speed short to ground. The two speed valve output [X001.20] is shorted to ground. See 1.378 COMMON STG PROCEDURE on Pg. 175.

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1.358 TWR ANGL1 INVALID ANGLE

Flash Code: 8-4

Tower angle 1 (right side) invalid angle. Tower boom angle sensor #1 (Right) is reporting an invalid angle, over +85° or less than -30°.

Note	Pretest Instructions	Test	Result	Corrective Action
1.358.1	Read fault log	Are any of the following faults active on the machine? BOOM ANGLE SENSOR #1 (or 2) COMMUNICATIONS FAULT	Yes	Troubleshoot them first
			No	Go to step 1.358.2
1.358.2	Access tower boom angle sensor 1 (Right) [X099] and 2 (Left) [X100]	Is there any lose mounting hardware, etc.?	Yes	Repair as needed
			No	Keep access to tower boom angle sensor #1 (Right) [X099] open. Go to step 1.358.3
1.358.3	Access tower boom angle sensor #1 (Right) [X099]	Check the sensors aren't swapped by unplugging tower boom angle sensor #1 (Right) [X099]. Does the BOOM ANGLE SENSOR #1 COMMUNICATIONS FAULT show?	Yes	Go to step 1.358.4
			No	Ensure harnesses go to correct sensor, tower boom angle sensor #1 (Right) [X099] with Red, Blue, and Black wires; and #2 (Left) [X100] with Orange, Yellow and Black wires. See Figure 2-13. BLAM Electrical Schematic on Pg. 201 for details.
1.358.4	Fully retract and lower boom. ANALYZER ⇒ DIAGNOSTICS ⇒ BOOM SENSORS ⇒ TOWER ANGLE 1 (and 2) SENSOR	Are both sensor angles approximately -4.3° ± 1.5°?	Yes	Go to step 1.358.5
			No	Replace sensor out of specified range
1.358.5	Calibrate boom sensors. See 5.8 Boom Sensor Calibration on Pg. 309.	Did boom calibrate successfully?	Yes	Troubleshooting complete
			No	Troubleshoot according to calibration fault

1.359 TWR ANGL2 INVALID ANGLE

Flash Code: 8-4

Tower angle 2 (left) invalid angle. Tower boom angle sensor #2 (Left) is reporting an invalid angle, over +85° or less than -30°.

Note	Pretest Instructions	Test	Result	Corrective Action
1.359.1	Read fault log	Are any of the following faults active on the machine? BOOM ANGLE SENSOR #2 (or 1) COMMUNICATIONS FAULT	Yes	Troubleshoot them first
			No	Go to step 1.359.2
1.359.2	Access tower boom angle sensor 1 (Right) [X099] and 2 (Left) [X100]	Is there any lose mounting hardware, etc.?	Yes	Repair as needed
			No	Keep access to tower boom angle sensor #2 (Left) [X100] open. Go to step 1.359.3
1.359.3	Access tower boom angle sensor #2 (Left) [X100]	Check the sensors aren't swapped by unplugging tower boom angle sensor #2 (Left) [X100]. Does the BOOM ANGLE SENSOR #2 COMMUNICATIONS FAULT show?	Yes	Go to step 1.359.4
			No	Ensure harnesses go to correct sensor, tower boom angle sensor #1 (Right) [X099] with Red, Blue, and Black wires; and #2 (Left) [X100] with Orange, Yellow and Black wires. See Figure 2-13. BLAM Electrical Schematic on Pg. 201 for details.

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Note	Pretest Instructions	Test	Result	Corrective Action
1.359.4	Fully retract and lower boom. ANALYZER ⇒ DIAGNOSTICS ⇒ BOOM SENSORS ⇒ TOWER ANGLE 1 (and 2) SENSOR	Are both sensor angles approximately -4.3° ± 1.5°?	Yes	Go to step 1.359.5
			No	Replace sensor out of specified range
1.359.5	Calibrate boom sensors. See 5.8 Boom Sensor Calibration on Pg. 309.	Did boom calibrate successfully?	Yes	Troubleshooting complete
			No	Troubleshoot according to calibration fault

1.360 TWR CYL ANGLE MOVEMENT WITHOUT CMD

Flash Code: 8-4

Tower cylinder angle movement without command. The control system detected greater than 2.5° of tower angle movement in 0.5 seconds, while the tower lift command was not being operated. This is most likely caused by a problem with the hydraulics.

Note	Pretest Instructions	Test	Result	Corrective Action
1.360.1	Read fault log.	Does the tower lift PVG valve have any faults in the stack?	Yes	Repair tower lift PVG valve in accordance with faults in stack.
			No	Go to step 1.360.2
1.360.2		Open tower boom to maximum angle and return to fully closed. Does fault still occur?	Yes	Go to step 1.360.3
			No	Air was in cylinder. Troubleshooting complete.
1.360.3		Are there visible hydraulic leaks?	Yes	Repair/replace as needed
			No	Go to step 1.360.4
1.360.4		Are the tower lift cylinder hydraulic connections correct?	Yes	Go to step 1.360.5
			No	Repair as needed
1.360.5	Swap main lift enable valve [X082] cartridge with tower lift enable valve [X080] cartridge.	Does this fault still occur?	No	Repair/replace cartridge originally in tower lift enable valve [X080]
			Yes	Go to step 1.360.6
1.360.6	Rig wires from battery (+) [X116] and battery (-) [X117] to reach the tower lift enable valve [X080]. Do not allow uninsulated area of wires to touch other conductors. Raise tower boom.	Disconnect tower lift enable solenoid [X080]. Energize tower lift enable solenoid [X080] by touching wires from battery (+) and (-) wires to solenoid contacts. Does tower boom move when solenoid is energized?	Yes	Remove wires from solenoid. Keep the rest of the test setup in place. Go to step 1.360.7
			No	Repair/replace tower lift cylinder
1.360.7	Ensure machine is set up the same as in step 1.360.6. Disconnect hose on port 2 from tower lift enable valve [X080].	Disconnect tower lift enable solenoid [X080]. Energize tower lift enable solenoid [X080] by touching wires from battery (+) and (-) wires to solenoid contacts. Is there fluid flowing out of the hose continuously?	Yes	Repair/replace tower lift cylinder holding valve
			No	Repack tower lift cylinder piston seal

1.361 TWR CYL ANGLE NOT DETECTING ANGLE CHANGE

Flash Code: 8-4

Tower cylinder angle not detecting angle change. The control system did not detect at least 0.5° of movement within 3 seconds while the tower lift function was commanded. This fault is not detected for tower lift up angles greater than 79.9° or

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tower lift down angles less than 3°. This fault is most likely caused by a mechanical or hydraulic failure, preventing the machine from responding. Before troubleshooting, warm up the oil to operating temperature.

Note	Pretest Instructions	Test	Result	Corrective Action
1.361.1		Examine the electrical connections at the tower cylinder angle sensor [X092] and BLAM module J3 connector [X088]. Is there any loose connections or moisture or corrosion?	Yes	Clean or replace any bad connections
			No	Go to step 1.361.2
1.361.2		Is the tower angle sensor properly mounted to the machine?	Yes	Go to step 1.361.3
			No	Remount the sensor
1.361.3	Connect a 1000 psi pressure gauge to MP1 on the main valve manifold	With the machine idling, does the gauge read about 300 psi?	Yes	Go to step 1.361.4
			No	Adjust the outside relief on the function pump till gauge reads 300 psi. If adjustment does not correct the pressure, replace the control valve on the function pump
1.361.4	Connect a 5000 psi pressure gauge to MP1 on the main valve manifold. Remove the solenoid from the main tele proportional valve	While activating main telescope in, does the gauge read 3400 psi?	Yes	Go to step 1.361.6
			No	Adjust the inside relief on the function pump till the gauge reads 3400 psi while activating the function. If adjustment does not correct the pressure, go to step 1.361.5
1.361.5	Swap the main dump cartridge with the PVG enable cartridge. Connect a 5000 psi pressure gauge to MP1 on the main valve manifold. Remove the solenoid from the main tele proportional valve	While activating main telescope in, does the gauge read 3400 psi?	Yes	Replace the cartridge originally from the main dump valve
			No	Replace the control valve on the function pump
1.361.6	Connect a 5000 psi pressure gauge to LS on the main valve manifold. ANALYZER ⇒ ACCESS LEVEL 1 ⇒ SERVICE MODE ⇒ SET PRESSURES ⇒ CODE(146005) ⇒ TWR LIFT? ⇒ ENTER	While activating tower lift UP, does the gauge read 2755 to 3088 psi AND while activating tower lift DOWN, does the gauge read 2755 to 3088?	Yes	Go to step 1.361.7
			No	Replace the tower lift PVG Section
1.361.7	Connect a 5000 psi pressure gauge to LS on the main valve manifold. ANALYZER ⇒ ACCESS LEVEL 1 ⇒ SERVICE MODE ⇒ SET PRESSURES ⇒ CODE(146005) ⇒ TWR TELE? ⇒ ENTER	While activating tower tele Out, does the gauge read 2537 to 2871 psi AND while activating tower tele IN, does the gauge read 2537 to 2871?	Yes	Go to step 1.361.8
			No	Replace the tower tele PVG Section
1.361.8	Swap the tower lift enable valve cartridge with the main lift enable valve cartridge	Will the tower now lift and is the fault cleared?	Yes	Replace the valve cartridge originally from the tower lift enable
			No	Go to step 1.361.9
1.361.9	Swap the tower tele enable valve cartridge with the main lift enable valve cartridge	Will the tower now lift and tele and is the fault cleared?	Yes	Replace the valve cartridge originally from the tower tele enable
			No	Go to step 1.361.10

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Note	Pretest Instructions	Test	Result	Corrective Action
1.361.10		While activating tower lift, does the tower boom move?	Yes	Replace tower cylinder angle sensor
			No	Possible Causes: Faulty counterbalance valve, faulty tower lift or tele cylinder

1.362 TWR CYL ANGLE SENSOR OUT OF RANGE HIGH

Flash Code: 8-4

Tower cylinder angle sensor out of range high. The tower lift cylinder angle sensor [X092] is reading over 23484 A/D counts (4.46 volts).

Note	Pretest Instructions	Test	Result	Corrective Action
1.362.1		Is there any loose mounting hardware? Also, is the sensor not mounted properly?	Yes	Repair as needed
			No	Go to step 1.362.2
1.362.2	Disconnect tower lift cyl angle sensor [X092] and BLAM J3 [X088]. Ground meter. See Grounding on Pg. 319 for details.	Turn on machine. Is there any voltage between tower lift cyl angle sensor pin B [X092.B.pin] (Blue wire) and ground?	Yes	Repair/replace harness and/or blue wire between tower lift cyl angle sensor [X092] and BLAM J3 [X088]
			No	Go to step 1.362.3
1.362.3	Disconnect tower lift cyl angle sensor [X092]. Turn on machine.	Is there 5 VDC between tower lift cyl angle sensor pin A[X092.A.pin] (Red wire) and pin C [X092.C.pin] (Black wire)?	Yes	Replace sensor
			No	Go to step 1.362.4
1.362.4	Turn on machine. Take the following measurement by backprobing. (See Backprobing on Pg. 319 for details.)	Is there about 5 VDC between BLAM J3 pin 4 [X088.4.pin] and pin 6 [X088.6.pin]?	No	Replace BLAM
			Yes	Repair/replace harness between BLAM J3 [X088] and tower lift cyl angle sensor [X092]

1.363 TWR CYL ANGLE SENSOR OUT OF RANGE LOW

Flash Code: 8-4

Tower cylinder angle sensor out of range low. The tower lift cylinder angle sensor [X092] is reading less than 3949 A/D counts (0.75 volts).

Note	Pretest Instructions	Test	Result	Corrective Action
1.363.1		Is there any loose mounting hardware? Also, is the sensor not mounted properly?	Yes	Repair as needed
			No	Go to step 1.363.2
1.363.2	Disconnect tower lift cyl angle sensor [X092] and BLAM J3 [X088]	Is there any damage, moisture or corrosion in the connections?	Yes	Clean/repair as needed
			No	Keep connectors disconnected. Go to step 1.363.3.
1.363.3	Disconnect tower lift cyl angle sensor [X092], BLAM J3 [X088]. Ground meter. See Grounding on Pg. 319 for details.	Is there a short between ground and the blue wire on either tower lift cyl angle sensor pin B [X092.B.pin] -OR- between ground and the blue wire at BLAM J3 socket 5 [X088.5.soc]?	Yes	Repair blue wire (including associated contacts) or replace harness between tower lift cyl angle sensor [X092], BLAM J3 [X088]. Also repair short/replace harness in the battery harness - side [X117].
			No	Keep connectors disconnected. Go to step 1.363.4.
1.363.4	Disconnect tower lift cyl angle sensor [X092] and BLAM J3 [X088].	Is there continuity between tower lift cyl angle sensor pin B [X092.B.pin] and BLAM J3 pin 5 [X088.5.pin]	Yes	Go to step 1.363.5
			No	Repair blue wire (including contacts) or replace harness between tower lift cyl angle sensor [X092] and BLAM J3 [X088]

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Note	Pretest Instructions	Test	Result	Corrective Action
1.363.5	Disconnect tower lift cyl angle sensor [X092]. Turn on machine.	Is there 5 VDC between tower lift cyl angle sensor pin A[X092.A.pin] (Red wire) and pin C [X092.C.pin] (Black wire)?	Yes	Replace sensor
			No	Go to step 1.363.6
1.363.6	Turn on machine. Take the following measurement by backprobing. (See Backprobing on Pg. 319 for details.)	Is there about 5 VDC between BLAM J3 pin 4 [X088.4.pin] and pin 6 [X088.6.pin]?	No	Replace BLAM
			Yes	Repair/replace harness between BLAM J3 [X088] and tower lift cyl angle sensor [X092]

1.364 TWR LENGTH MOVEMENT WITHOUT CMD

Flash Code: 8-4

Tower length movement without command. The control system detected at least 4.0“of tower length movement in 0.8 seconds, while the tower telescope command was not being operated. This is most likely caused by a problem with the hydraulics.

Note	Pretest Instructions	Test	Result	Corrective Action
1.364.1	Read fault log.	Does the tower tele PVG valve have one or more faults in the stack?	Yes	Repair tower tele PVG valve in accordance with fault(s) in stack.
			No	Go to step 1.364.2
1.364.2		Telescope main boom to maximum length and return to fully retracted. Does fault still occur?	Yes	Go to step 1.364.3
			No	Air was in cylinder. Troubleshooting complete.
1.364.3		Are there visible hydraulic leaks?	Yes	Repair/replace as needed
			No	Go to step 1.364.4
1.364.4		Are the tower tele cylinder hydraulic connections correct?	Yes	Go to step 1.364.5
			No	Repair as needed
1.364.5	Swap main lift enable valve [X082] cartridge with tower tele enable valve [X081].	Does this fault still occur?	No	Repair/replace cartridge originally in tower tele enable valve [X081]
			Yes	Go to step 1.364.6
1.364.6	Rig wires from battery (+) [X116] and battery (-) [X117] to reach the tower tele enable valve [X081]. Do not allow stripped area of wires to touch each other. Raise and extend main boom.	Disconnect tower tele enable valve [X081] connector. Energize tower tele enable valve [X081] by touching wires from battery (+) [X116] and (-) [X117] wires to solenoid contacts. Does main boom retract when solenoid is energized?	Yes	Keep machine in same condition. Go to step 1.364.7
			No	Repair/replace tower tele cylinder
1.364.7	Ensure machine is set up the same as in step 1.364.6. Disconnect hose on port 2 from tower tele enable valve [X081].	Is there fluid flowing continuously out of the hose?	Yes	Repair/replace tower tele cylinder holding valve
			No	Repack tower tele cylinder piston seal

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1.365 TWR LENGTH SENSOR NOT DETECTING LENGTH CHANGE

Flash Code: 8-4

Tower length sensor not detecting length change. The control system did not detect at least 0.3“of movement within 3 seconds while the tower telescope function was commanded. This fault is not detected for tower telescope within 5" of the maximum or minimum mechanical length.

Note	Pretest Instructions	Test	Result	Corrective Action
1.365.1	Check fault log	Are there any other tower length sensor or tower tele PVG or tower tele enable faults?	Yes	Troubleshoot them first
			No	Go to step 1.365.2
1.365.2		Examine the electrical connections at the tower boom length sensor [X093] and BLAM module J3 connector [X088]. Are there any loose connections, moisture or corrosion?	Yes	Clean or replace any bad connections
			No	Go to step 1.365.3
1.365.3		Are the tower boom length sensors #1 (Top) [X093] and #2 (bottom) [X094] properly mounted to the machine. -AND- Are the sensor cables free to move with boom?	Yes	Go to step 1.365.4
			No	Remount/repair any affected sensor
1.365.4	Connect a 1000 psi pressure gauge to MP1 on the main valve manifold	With the machine idling, does the gauge read 400 - 450 psi?	Yes	Go to step 1.365.5
			No	Adjust the low pressure relief on the function pump till gauge reads 450 psi. See Figure 3-2. Pumps Layout on Pg. 248 for location. If adjustment does not correct the pressure, replace the control valve on the function pump.
1.365.5	Connect a 5000 psi pressure gauge to MP1 on the main valve manifold. Remove the solenoid from the main tele proportional valve.	While activating main telescope in, does the gauge read 3400 psi?	Yes	Go to step 1.365.8
			No	Adjust the high pressure relief on the function pump till the gauge reads 3400 psi while activating the function. See Figure 3-2. Pumps Layout on Pg. 248 for location. If adjustment does not correct the pressure, go to step 1.365.6.
1.365.6	Disconnect main dump valve solenoid [X074]	Does the solenoid measure 7.2 Ω?	Yes	Go to step 1.365.7
			No	Replace solenoid
1.365.7	Swap the main dump enable valve [X074] cartridge with the main lift enable valve [X082] cartridge. Connect a 5000 psi pressure gauge to MP1 on the main valve manifold. Remove the solenoid from the main tele proportional valve, but keep solenoid connected to the harness.	While activating main telescope in, does the gauge read 3400 psi?	Yes	Replace the cartridge originally from the main dump valve
			No	Replace the control valve on the function pump
1.365.8	Disconnect PVG enable valve connector [X068]	Does the solenoid measure 7.2 Ω?	Yes	Go to 1.365.9
			No	Replace PVG enable valve solenoid [X081]
1.365.9	Swap the PVG enable valve [X068] cartridge with the main lift enable valve [X082] cartridge.	Does fault clear?	Yes	Replace cartridge originally in PVG enable valve [X081]
			No	Go to step 1.365.10

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Note	Pretest Instructions	Test	Result	Corrective Action
1.365.10	Connect a 5000 psi pressure gauge to LS on the main valve manifold. ANALYZER ⇒ ACCESS LEVEL 1 ⇒ SERVICE MODE ⇒ SET PRESSURES ⇒ CODE(14605) ⇒ TWR LIFT? ⇒ WARNING MOVEMENT POSSIBLE	**⚠ WARNING** **WHEN THE STABILITY CONTROL IS OFF, THE MACHINE WILL TIP IF USED INCORRECTLY.** While activating tower lift UP, does the gauge read 2755 to 3088 psi? -AND- While activating tower lift DOWN, does the gauge read 2755 to 3088?	Yes	Go to step 1.365.11
			No	Replace the tower lift PVG Section
1.365.11	Connect a 5000 psi pressure gauge to LS on the main valve manifold. ANALYZER ⇒ ACCESS LEVEL 1 ⇒ SERVICE MODE ⇒ SET PRESSURES ⇒ CODE(14605) ⇒ TWR TELE? ⇒ WARNING MOVEMENT POSSIBLE	**⚠ WARNING** **WHEN THE STABILITY CONTROL IS OFF, THE MACHINE WILL TIP IF USED INCORRECTLY.** While activating tower tele OUT, AND while activating tower tele IN, does the gauge read 2537 to 2871?	Yes	Go to step 1.365.12
			No	Replace the tower tele PVG section
1.365.12	Disconnect tower tele enable valve connector [X081]	Does it measure 4.8 Ω?	Yes	Go to step 1.365.13
			No	Replace tower tele enable valve solenoid [X081]
1.365.13	Swap the tower tele enable valve cartridge with the main lift enable valve cartridge	Will the tower now extend and is the fault cleared?	Yes	Replace the valve cartridge originally from the tower tele enable
			No	Go to step 1.365.14
1.365.14	Raise tower. Disconnect hose from port 2 of the tower tele enable valve [X081]	Does fluid flow out of hose continuously?	Yes	Repair/replace tower tele holding valve
			No	Repack tower tele cylinder

1.366 TWR LENGTH SENSOR ONE VALUE OUT OF RANGE HIGH

Flash Code: 8-4

Tower length sensor 1 (top) value out of range high. The BLAM module is reading a value above 675.4" for the calibrated tower boom length sensor #1 (top). This sensor should always read between 299.4" and 675.4". This could be caused by a mechanical problem with the sensor or cable, the sensor ground wire being broken, or a sensor failure.

Note	Pretest Instructions	Test	Result	Corrective Action
1.366.1		Is the tower boom length sensor #1 (top) [X093] securely mounted to the machine and is cable free to move?	Yes	Go to step 1.366.2
			No	Repair as needed
1.366.2	Disconnect tower boom length sensor #1 (top) [X093]	Does the tower boom length sensor #1 (top) connector [X093] have moisture, damage or corrosion?	Yes	Repair as needed
			No	Keep tower boom length sensor #1 (top) [X093] disconnected. Go to step 1.366.3
1.366.3	Turn on machine. Disconnect tower boom length sensor #1 (top) [X093]	Is there about 5VDC between tower boom length sensor #1 (top) socket A [X093.A.soc] and socket B [X093.B.soc]?	Yes	Go to step 1.366.5.
			No	Keep machine in same state. Go to step 1.366.4
1.366.4	Turn on machine. Disconnect BLAM J 3 [X088]	Is there about 5VDC between BLAM J 3 pin 7 [X088.7.pin] and pin 9 [X088.7.pin]?	Yes	Repair/replace harness between BLAM J3 [X088] and tower boom length sensor #1 (top) [X093]
			No	Replace BLAM

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Note	Pretest Instructions	Test	Result	Corrective Action
1.366.5	Unclip sensor #1 cable from boom. Observe resistance between tower boom length sensor 1 (Top) pin A [X093.A.pin] and pin C [X093.C.pin].	Have second person slowly walk cable out and back completely. The sensor cable extends 400 inches (33' 4"). (Do not allow cable to retract in an uncontrolled or rapid manner. This will break the sensor.) Does resistance change smoothly and consistently up to 5000 Ω ± 500 Ω and back?	Yes	Go to step 1.366.6
			No	Replace tower boom length sensor #1 (top) [X093]
1.366.6	Disconnect tower boom length sensor #1 (top) [X093] and BLAM module J3 connector [X088].	Is there a short between the Blue wire in tower boom length sensor #1 (top) socket C [X093.C.soc] and socket A [X093.A.soc] -OR- between tower boom length sensor #1 (top) socket C [X093.C.soc] and battery positive [X116]?	Yes	Repair short or replace harness between tower boom length sensor #1 (top) socket C [X093.C.soc] and socket A [X093.A.soc] or BLAM module J3 connector socket 8 [X088.8.soc] to battery positive [X116]
			No	Leave tower boom length sensor #1 (top) [X093] and BLAM module J3 [X088] disconnected. Go to step 1.366.7
1.366.7	Disconnect tower boom length sensor #1 (top) [X093] and BLAM module J3 connector [X088].	Is there continuity between tower boom length sensor #1 (top) socket C [X093.C.soc] and BLAM module J3 socket 8 [X088.8.soc]?	Yes	Go to step 1.366.8
			No	Repair/replace harness between tower boom length sensor #1 (top) [X093] and BLAM module J3 connector [X088].
1.366.8	Disconnect tower boom length sensor #1 (top) [X093] and BLAM module J3 connector [X088]	Is there continuity between tower boom length sensor #1 (top) socket B [X093.B.soc] and BLAM module J3 connector socket 9 [X088.9.soc]?	Yes	Leave tower boom length sensor #1 (top) [X093] disconnected. Go to step 1.366.9
			No	Repair/replace harness between tower boom length sensor #1 (top) socket B [X093.B.soc] and BLAM module J3 connector socket 9 [X088.9.soc]
1.366.9	Turn on machine. Disconnect tower boom length sensor #1 (top) [X093]	Does the fault become inactive -AND- the fault TWR LENGTH SENSOR ONE VALUE OUT OF RANGE LOW appear?	Yes	Replace tower boom length sensor #1 (top) [X093]
			No	Reprogram/replace BLAM

1.367 TWR LENGTH SENSOR ONE VALUE OUT OF RANGE LOW

Flash Code: 8-4

Tower length sensor 1 (top) value out of range low. The BLAM module is reading a value below 299.4" for the calibrated tower boom length sensor #1 (top) [X093]. This sensor should always read between 299.4" and 675.4". This could be caused by a mechanical problem with the sensor or cable, a disconnected or broken sensor cable clip, the sensor power and/or signal wire being broken, or sensor failure.

Note	Pretest Instructions	Test	Result	Corrective Action
1.367.1		Is the tower boom length sensor #1 (top) [X093] securely mounted to the machine, is cable free to move and is it connected correctly?	Yes	Go to step 1.367.2
			No	Repair as needed
1.367.2	Disconnect tower boom length sensor #1 (top) [X093]	Does the tower boom length sensor #1 (top) connector [X093] have moisture, damage or corrosion?	Yes	Repair as needed
			No	Keep tower boom length sensor #1 (top) [X093] disconnected and machine on. Go to step 1.367.3
1.367.3	Disconnect tower boom length sensor #1 (top) [X093]. Turn on machine.	Is there about 5VDC between tower boom length sensor #1 (top) socket A [X093.A.soc] and socket B [X093.B.soc]?	Yes	Leave machine on. Go to step1.367.5
			No	Go to step 1.367.4

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Note	Pretest Instructions	Test	Result	Corrective Action
1.367.4	Disconnect BLAM J3 X088]. Turn on machine.	I s there about 5VDC between BLAM J3 pin 7 [X088.7.pin] and pin 9 [X088.9.pin]?	Yes	Repair/replace harness between BLAM J3 [X088] and tower boom length sensor #1 (top) [X093]
			No	Replace BLAM
1.367.5	Unclip sensor #1 cable from boom. Observe resistance between tower boom length sensor 1 (Top) pin A [X093.A.pin] and pin C [X093.C.pin].	Have second person slowly walk cable out and back completely. The sensor cable extends 400 inches (33' 4"). (Do not allow cable to retract in an uncontrolled or rapid manner. This will break the sensor.) Does resistance change smoothly and consistently up to 5000 Ω ± 500 Ω and back?	Yes	Go to step 1.367.6
			No	Replace tower boom length sensor #1 (top) [X093]
1.367.6	Disconnect tower boom length sensor #1 (top) [X093] and BLAM J3 [X088]	Is there a short between tower boom length sensor #1 (top) socket C [X093.C.soc] or BLAM J3 socket 8 [X088.8.soc] to battery negative [X117]?	Yes	Repair/Replace harness between tower boom length sensor #1 (top) socket C [X093.C.soc], BLAM J3 socket 8 [X088.8.soc] and battery negative [X117]
			No	Leave tower boom length sensor #1 (top) [X093] and BLAM J3 [X088] disconnected. Go to step 1.367.7
1.367.7	Disconnect tower boom length sensor #1 (top) [X093] and BLAM J3 [X088]	Is there continuity between tower boom length sensor #1 (top) socket C [X093.C.soc] and BLAM J3 socket 8 [X088.8.soc]?	Yes	Go to step 1.367.8
			No	Repair/Replace harness between tower boom length sensor #1 (top) socket C [X093.C.soc], BLAM J3 socket 8 [X088.8.soc].
1.367.8	Disconnect tower boom length sensor #1 (top) [X093] and BLAM J3 [X088]	Is there a short between tower boom length sensor #1 (top) socket C [X093.C.soc] and socket B [X093.B.soc]?	Yes	Repair/Replace harness between tower boom length sensor #1 (top) socket C [X093.C.soc] and socket B [X093.B.soc]
			No	Reprogram/replace BLAM

1.368 TWR LENGTH SENSOR TWO VALUE OUT OF RANGE HIGH

Flash Code: 8-4

Tower length sensor 2 (bottom) value out of range high. The BLAM module is reading a value above 675.4" for the calibrated tower length sensor #2 (bottom). This sensor should always read between 299.4" and 675.4". This could be caused by a mechanical problem with the sensor or cable, the sensor ground wire being broken, or a sensor failure.

Note	Pretest Instructions	Test	Result	Corrective Action
1.368.1		Is the tower boom length sensor #2 (bottom) [X094] securely mounted to the machine and is cable free to move?	Yes	Go to step 1.368.2
			No	Repair as needed
1.368.2	Disconnect tower boom length sensor #2 (top) [X094]	Does the tower boom length sensor #2 (bottom) connector [X094] have moisture, damage or corrosion?	Yes	Repair as needed
			No	Keep tower boom length sensor #2 (bottom) [X094] disconnected. Go to step 1.368.3
1.368.3	Turn on machine. Disconnect tower boom length sensor #2 (bottom) [X094]	Is there about 5VDC between tower boom length sensor #2 (bottom) socket A [X094.A.soc] and socket B [X094.B.soc]?	Yes	Go to step 1.368.5.
			No	Keep machine in same state. Go to step 1.368.4
1.368.4	Turn on machine. Disconnect BLAM J 3 [X088]	Is there about 5VDC between BLAM J 3 socket 7 [X088.7.pin] and pin 9 [X088.9.pin]?	Yes	Repair/replace harness between BLAM J3 [X088] and tower boom length sensor #2 (bottom) [X094]
			No	Replace BLAM

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Note	Pretest Instructions	Test	Result	Corrective Action
1.368.5	Unclip sensor #2 cable from boom. Observe resistance between tower boom length sensor #2 (bottom) pin A [X094.A.pin] and pin C [X094.C.pin].	Have second person slowly walk cable out and back completely. The sensor cable extends 400 inches (33' 4"). (Do not allow cable to retract in an uncontrolled or rapid manner. This will break the sensor.) Does resistance change smoothly and consistently up to 5000 Ω ± 500 Ω and back?	Yes	Go to step 1.368.6
			No	Replace tower boom length sensor #2 (bottom) [X094]
1.368.6	Disconnect tower boom length sensor #2 (bottom) [X094] and BLAM module J3 connector [X088].	Is there a short between the Blue wire in tower boom length sensor #2 (bottom) [X094] socket C [X094.C.socket] and socket A [X094.A.socket] -OR- between tower boom length sensor #2 (bottom) socket C [X094.C.socket] and battery positive [X116]?	Yes	Repair short or replace harness between tower boom length sensor #2 (bottom) socket C [X094.C.socket] and socket A [X094.A.socket] or BLAM module J3 connector socket 8 [X088.8.soc] to battery positive [X116]
			No	Leave tower boom length sensor #2 (bottom) [X094] and BLAM module J3 [X088] disconnected. Go to step 1.368.7
1.368.7	Disconnect tower boom length sensor #2 (bottom) [X094] and BLAM module J3 connector [X088].	Is there continuity between tower boom length sensor #2 (bottom) socket C [X094.C.socket] and BLAM module J3 socket 8 [X088.8.soc]?	Yes	Go to step 1.368.8
			No	Repair/replace harness between tower boom length sensor #2 (bottom) [X094] and BLAM module J3 connector [X088].
1.368.8	Disconnect tower boom length sensor #2 (bottom) [X094] and BLAM module J3 connector [X088]	Is there continuity between tower boom length sensor #2 (bottom) socket B [X094.B.socket] and BLAM module J3 connector socket 9 [X088.9.soc]?	Yes	Leave tower boom length sensor #2 (bottom) [X094] disconnected. Go to step 1.368.9.
			No	Repair/replace harness between tower boom length sensor #2 (bottom) socket B [X094.B.socket] and BLAM module J3 connector socket 9 [X088.9.soc]
1.368.9	Turn on machine. Disconnect tower boom length sensor #2 (bottom) [X094]	Does the fault become inactive -AND- the fault TWR LENGTH SENSOR ONE VALUE OUT OF RANGE LOW appear?	Yes	Replace tower boom length sensor #2 (bottom) [X094]
			No	Reprogram/replace BLAM

1.369 TWR LENGTH SENSOR TWO VALUE OUT OF RANGE LOW

Flash Code: 8-4

Tower length sensor 2 (bottom) value out of range low. The BLAM module is reading a value below 299.4" for the calibrated tower boom length sensor #2 (bottom) [X094]. This sensor should always read between 299.4" and 675.4". This could be caused by a mechanical problem with the sensor or cable, a disconnected or broken sensor cable clip, the sensor power and/or signal wire being broken, or sensor failure.

Note	Pretest Instructions	Test	Result	Corrective Action
1.369.1		Is the tower boom length sensor #2 (bottom) [X094] securely mounted to the machine, is cable free to move and is it connected correctly?	Yes	Go to step 1.369.2
			No	Repair as needed
1.369.2	Disconnect tower boom length sensor #2 (bottom) [X094]	Does the tower boom length sensor #2 (bottom) [X094] have moisture, damage or corrosion?	Yes	Repair as needed
			No	Keep tower boom length sensor #2 (bottom) [X094] disconnected and machine on. Go to step 1.369.3
1.369.3	Disconnect tower boom length sensor #2 (bottom) [X094]. Turn on machine.	Is there about 5VDC between tower boom length sensor #2 (bottom) socket A [X094.A.soc] and socket B [X094.B.soc]?	Yes	Leave machine on. Go to step1.369.5
			No	Go to step 1.369.4

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Note	Pretest Instructions	Test	Result	Corrective Action
1.369.4	Disconnect BLAM J3 X088]. Turn on machine.	Is there about 5VDC between BLAM J3 pin 10 [X088.10.pin] and pin 12 [X088.12.pin]?	Yes	Repair/replace harness between BLAM J3 [X088] and tower boom length sensor #2 (top) [X094]
			No	Replace BLAM
1.369.5	Unclip sensor #2 (bottom) [X094] cable from boom. Observe resistance between tower boom length sensor 1 (Top) pin A [X094.A.pin] and pin C [X094.C.pin].	Have second person slowly walk cable out and back completely. The sensor cable extends 400 inches (33' 4"). (Do not allow cable to retract in an uncontrolled or rapid manner. This will break the sensor.) Does resistance change smoothly and consistently up to 5000 Ω ± 500 Ω and back?	Yes	Go to step 1.369.6
			No	Replace tower boom length sensor #2 (bottom) [X094]
1.369.6	Disconnect tower boom length sensor #2 (bottom) [X094] and BLAM J3 [X088]	Is there a short between tower boom length sensor #2 (bottom) socket C [X094.C.soc] or BLAM J3 socket 11 [X088.11.soc] to battery negative [X117]?	Yes	Repair/Replace harness between tower boom length sensor #2 (bottom) socket C [X094.C.soc], BLAM J3 socket 11 [X088.11.soc] and battery negative [X117]
			No	Leave tower boom length sensor #2 (bottom) [X094] and BLAM J3 [X088] disconnected. Go to step 1.369.7
1.369.7	Disconnect tower boom length sensor #2 (bottom) [X094] and BLAM J3 [X088]	Is there continuity between tower boom length sensor #2 (bottom) socket C [X094.C.soc] and BLAM J3 socket 11 [X088.11.soc]?	Yes	Go to step 1.369.8
			No	Repair/Replace harness between tower boom length sensor #2 (bottom) socket C [X094.C.soc], BLAM J3 socket 11 [X088.11.soc].
1.369.8	Disconnect tower boom length sensor #2 (bottom) [X094] and BLAM J3 [X088]	Is there a short between tower boom length sensor #2 (bottom) socket C [X094.C.soc] and socket B [X094.B.soc]?	Yes	Repair/Replace harness between tower boom length sensor #2 (bottom) socket C [X094.C.soc] and socket B [X094.B.soc]
			No	Reprogram/replace BLAM

1.370 TWR TRN SW DISAGREEMENT

Flash Code: 8-4

Tower transport switch disagreement. The two tower boom transport length switch inputs are reading the same state. The normally closed (NC) and normally open (NO) switch inputs should always read opposite. In the transport position the NC switch should be CLOSED and the NO switch should be OPEN. Switch states are visible in ANALYZER ⇒ DIAGNOSTICS ⇒ BOOM SWITCHES ⇒ TOWER TELESCOPE SWITCH Nx

Note	Pretest Instructions	Test	Result	Corrective Action
1.370.1		Check the tower boom transport length switch power. Terminal 14 and 22 of the tower boom transport switch [X056.22] should measure 12VDC.	Yes	Go to step 1.370.4
			No	Go to step 1.370.2
1.370.2		In the transport position, terminal 1 of the 6 position Mate-N-Lok connector in the main terminal box [X017.1] should measure 12VDC.	Yes	Repair/Replace the white wire between the switch and the 6 position Mate-N-Lok connector in the main terminal box [X017.1]
			No	Go to step 1.370.3
1.370.3		In the transport position, terminal 29 of the ground module J7 connector [X007.29] should measure 12VDC.	Yes	Repair/Replace the YEL/RED 2-60 wire between the 6 position Mate-N-Lok connector in the main terminal box [X017.1] and terminal 29 of the ground module J7 connector [X007.29]
			No	Repair/Replace the ground module

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Note	Pretest Instructions	Test	Result	Corrective Action
1.370.4		In the transport position, does terminal 13 of the tower boom transport switch [X056.13] measure 12VDC?	Yes	Repair/Replace the tower boom transport length switch
			No	Go to step 1.370.5
1.370.5	Manually close the tower boom transport length switch by rotating and holding the switch arm	In the transport position, terminal 13 of the tower boom transport switch [X056.13] should measure 12VDC	Yes	Go to step 1.370.9
			No	Go to step 1.370.6
1.370.6	Manually close the tower boom transport length switch by rotating and holding the switch arm	In the transport position, terminal 6 of the 6 position Mate-N-Lok connector in the main terminal box [X017.6] should measure 12VDC	Yes	Repair/Replace the red wire between the switch and the 6 position Mate-N-Lok connector in the main terminal box [X017.6]
			No	Go to step 1.370.7
1.370.7	Manually close the tower boom transport length switch by rotating and holding the switch arm	In the transport position, terminal 35 of the ground module J7 connector [X007.35] should measure 12VDC	Yes	Repair/Replace the ORN/RED 49-65 wire between the 6 position Mate-N-Lok connector in the main terminal box [X017.6] and terminal 35 of the ground module J7 connector [X007.35]
			No	Go to step 1.370.8
1.370.8	Manually close the tower boom transport length switch by rotating and holding the switch arm	Check that ANALYZER ⇒ DIAGNOSTICS ⇒ BOOM SWITCHES⇒ TOWER TELESCOPE SWITCH NO: CLOSED is displayed.	Yes	Go to step 1.370.9
			No	Repair/Replace the ground module
1.370.9		In the transport position, terminal 21 of the tower boom transport switch [X056.21] should measure 12VDC	Yes	Go to step 1.370.10
			No	Repair/Replace the tower boom transport length switch
1.370.10		In the transport position, terminal 2 of the 6 position Mate-N-Lok connector in the main terminal box [X017.2] should measure 12VDC	Yes	Repair/Replace the black wire between the switch and the 6 position Mate-N-Lok connector in the main terminal box [X017.2]
			No	Go to step 1.370.11
1.370.11		In the transport position, terminal 11 of the ground module J7 connector [X007.11] should measure 12VDC	Yes	Repair/Replace the ORN/RED 49-64 wire between the 6 position Mate-N-Lok connector in the main terminal box [X017.2] and terminal 11 of the ground module J7 connector [X007.11]
			No	Go to step 1.370.12
1.370.12		Check that ANALYZER ⇒ DIAGNOSTICS ⇒ BOOM SWITCHES ⇒ TOWER TELESCOPE SWITCH NC: CLOSED is displayed.	No	Repair/Replace the ground module

1.371 WAITING FOR FSW TO BE OPEN

Flash Code: 2-2

Waiting for footswitch to be open. Notification that the platform footswitch input [X169.8] was open when the platform mode was selected. This indicates that the footswitch [X152] was engaged before platform power-on and may be blocked or stuck. This can also be reported during the power-up sequence. The footswitch or its wiring may be faulty.

1.372 WRONG ENGINE SELECTED - ECM PRESENT

Flash Code: 4-3

Wrong engine selected - ECM present. The machine is configured to be a non-ECM engine, but an ECM signal is detected on the CAN bus. Change the machine engine configuration.

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1.373 WRONG MAIN LIFT RESPONSE

Flash Code: 8-4

Wrong main lift response. While the main lift was being commanded in one direction, the control system detected at least 2.5° of main angle movement in 3 seconds in the wrong direction. This is most likely caused by a problem with the hydraulics. The system will revert to the hydraulic retrieval mode of operation.

Note	Pretest Instructions	Test	Result	Corrective Action
1.373.1		Are there any main lift PVG valve or main lift pilot valve faults?	Yes	Troubleshoot those first
			No	Go to step 1.373.2
1.373.2		Are there any hydraulic leaks, especially between the main Lift PVG valve [X065] the main lift enable valve [X082] and the main lift cylinder?	Yes	Repair as needed
			No	Go to step 1.373.3
1.373.3		Do the hydraulic connections match the schematic in Figure 3-12. Hydraulic Schematic - Boom Control - Sheet 1 of 2 on Pg. 258, especially between main lift PVG valve [X065] the main lift enable valve [X082] and the main lift cylinder?	Yes	Go to step 1.373.4
			No	Repair as needed
1.373.4	Raise main boom. Disconnect the hose on the #2 port of the main lift enable valve [X082].	Does fluid continue to flow from the hose?	Yes	Repair/replace main cylinder holding valve
			No	Repack main cylinder

1.374 WRONG MAIN TELE RESPONSE

Flash Code: 8-4

Wrong main telescope response. Refer to 1.353 TRN DUAL CAP BAD TRANSITION on Pg. 159 for troubleshooting.

1.375 WRONG TWR LIFT RESPONSE

Flash Code: 8-4

Wrong tower lift response. While the tower lift was being commanded in one direction, the control system detected at least 2.5° of tower angle movement in 3 seconds in the wrong direction. This is most likely caused by a problem with the hydraulics. The system will revert to the hydraulic retrieval mode of operation.

Note	Pretest Instructions	Test	Result	Corrective Action
1.375.1		Are there any tower lift PVG valve or tower lift APU valve faults?	Yes	Troubleshoot those first
			No	Go to step 1.375.2
1.375.2		Are there any hydraulic leaks, especially between the tower lift PVG valve [X066] the tower lift enable valve [X080] and the tower lift cylinder?	Yes	Repair as needed
			No	Go to step 1.375.3
1.375.3		Do the hydraulic connections match the schematic in Figure 3-12. Hydraulic Schematic - Boom Control - Sheet 1 of 2 on Pg. 258, especially between tower lift PVG valve [X066] the tower lift enable valve [X080] and the tower lift cylinder?	Yes	Go to step 1.375.4
			No	Repair as needed
1.375.4	Raise tower boom. Disconnect the hose on the #2 port of the tower lift enable valve [X080].	Does fluid continue to flow from the hose?	Yes	Repair/replace tower cylinder holding valve
			No	Repack main cylinder

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1.376 WRONG TWR TELE RESPONSE

Flash Code: 8-4

Wrong tower telescope response. While the tower telescope was being commanded in one direction, the control system detected at least 4.0" of tower length movement in 2 seconds in the wrong direction. This is most likely caused by a problem with the hydraulics. The system will revert to the hydraulic retrieval mode of operation.

Note	Pretest Instructions	Test	Result	Corrective Action
1.376.1		Are there any tower telescope PVG valve or tower telescope APU valve faults?	Yes	Troubleshoot those first
			No	Go to step 1.376.2
1.376.2		Are there any hydraulic leaks, especially between the tower tele. PVG valve [X067] the tower tele enable valve [X081] and the main lift cylinder?	Yes	Repair as needed
			No	Go to step 1.376.3
1.376.3		Do the hydraulic connections match the schematic in Figure 3-12. Hydraulic Schematic - Boom Control - Sheet 1 of 2 on Pg. 258, especially between tower tele PVG valve [X067] the tower tele enable valve [X081] and the tower telescope cylinder?	Yes	Go to step 1.376.4
			No	Repair as needed
1.376.4	Raise tower boom. Disconnect the hose on the #2 port of the tower tele enable valve [X081].	Does fluid continue to flow from the hose?	Yes	Repair/replace main cylinder holding valve
			No	Repack main cylinder

1.377 COMMON STB OR OC PROCEDURE

Flash Code: 3-3

Common short to battery or open circuit procedure. A module input or output pin has been shorted to battery or the circuit has an open in it. All driver faults are detected in a similar manner. Open circuit faults are detected when the analog feedback reads too high and the output is commanded off. Short to battery is detected when the analog feedback reads Vbat and the output is commanded off. See the fault description for the component or module pin identification. Frequently, this is due to a failed component shorting to battery voltage. This procedure applies to a number of faults, so it leaves the determination of specific troubleshooting steps to the technician. However, it provides guidance to create those steps. Use of the machine schematics is required. Note that power for a particular component does not necessarily come directly from the battery. For example, the platform module power and ground circuits use the ground module, but the platform lighting does not. Some components are effectively a separate module, such as the main boom angle sensors and PVG valves. When opening any electrical connection, inspect the connectors for moisture inside the connector, and pins that are loose, damaged or corroded. Several examples are given starting at 1.177 LT FNT STEER LT STB OR OC on Pg. 97.

Note	Pretest Instructions	Test	Result	Corrective Action
1.377.1		Are other STB/OC faults in the fault log?	Yes	Check for an open at a point in circuit common to this fault and the others.
			No	Go to step 1.377.2
1.377.2	Find component on schematic and on the machine.	Is the component good? Check the component resistance. Resistances of coils are given in Section 2. Electrical Reference on Pg. 177. Other loads or sensors should be neither short nor open. Some values are given on the schematics. For details on what some switch positions mean see Table 2-1. Limit Switch States on Pg. 177. Also, inspect the connector for pins that are damaged, loose pushed out, etc.	Pass	Go to step 1.377.3
			Fail	Repair as needed

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Note	Pretest Instructions	Test	Result	Corrective Action
1.377.3	Find component power contacts.	Is the component power good? Turn on machine and check the harness connector contacts for power. Not all components are powered by 12VDC.	Pass	Go to step 1.377.4
			Fail	Follow power connections back to source checking for power or continuity. Typically, the failure isn't too close to the battery ground terminal because then so many things wouldn't work, this fault would not be detected. Repair as needed
1.377.4		Is the signal wire good? Check the signal wire between the component and the signal input/output on the module. Signal lists start with section 2.2 BLAM Module Connector Pinouts on Pg. 215. The information is also on the schematics. There should only be continuity between the component and the proper pin on the module in accordance with the schematic. There should not be shorts between the wire and battery + or - terminals, etc. Isolate harness sections that may have a problem by disconnecting connectors as needed. Be sure to check for pins that are damaged, loose or pushed out of the connector, etc.	Pass	Go to step 1.377.5
			Fail	Repair as needed
1.377.5		Are the other wires good? Check wire from the component in question ground connection to the nearest major component. It should have continuity to the module, swivel or bus connector in accordance with the schematic.	Pass	Recheck measurements or try troubleshooting a different fault. If the component and wiring are good, reprogram/replace the associated module.
			Fail	Repair as needed

1.378 COMMON STG PROCEDURE

Flash Code: 3-3

Common short to ground procedure. A module input or output pin has been shorted to ground. All driver faults are detected in a similar manner. Short to ground is detected when the analog feedback reads low and the output is commanded on. See the fault description for the component or module pin identification. Frequently, this is due to a failed component shorting ground. This procedure applies to a number of faults so it leaves the determination of specific troubleshooting steps to the technician. However, it provides guidance to create those steps. Use of the machine schematics is required. Note that power for a particular component does not necessarily come directly from the battery. For example, the platform module power and ground circuits use the ground module, but the platform lighting does not. Some components are effectively a separate module, such as the main boom angle sensors and PVG valves. When opening any electrical connection, inspect the connectors for moisture inside the connector, and pins that are loose, damaged or corroded. Several examples are given starting at 1.178 LT FNT STEER LT STG on Pg. 98.

Note	Pretest Instructions	Test	Result	Corrective Action
1.378.1	Find component on schematic and on the machine.	Is the component good? Check the component resistance. Resistances of coils are given in Section 2. Electrical Reference on Pg. 177. Other loads or sensors should be neither short nor open. Also, inspect the connector for pins that are damaged, loose or pushed out, etc.	Pass	Go to step 1.378.3
			Fail	Repair as needed
1.378.2	Find component power contacts.	Is the component power good? Turn on machine and check the harness connector contacts for power. Not all components are powered by 12VDC.	Pass	Go to step 1.377.4
			Fail	Follow power connections back to source checking for power or continuity. Typically, the failure isn't too close to the battery ground terminal because then so many things wouldn't work, this fault would not be detected. Repair as needed

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Note	Pretest Instructions	Test	Result	Corrective Action
1.378.3		Is the signal wire good? Check the signal wire between the component and the signal input/output on the module. Signal lists start with section 2.2 BLAM Module Connector Pinouts on Pg. 215. The information is also on the schematics. There should only be continuity between the component and the proper pin on the module in accordance with the schematic. There should not be shorts between the wire and battery + or - terminals, etc. Isolate harness sections that may have a problem by disconnecting connectors as needed. Be sure to include checking for pins that are damaged, loose or pushed out of the connector.	Pass	Go to step 1.378.4
			Fail	Repair as needed
1.378.4		Are the other wires good? If it does not go to ground, check other wire from the component in question connection to the nearest major component. It should have continuity to the module, swivel, bus or other connector in accordance with the schematic.	Pass	Recheck measurements or try troubleshooting a different fault. If the component and wiring are good, reprogram/replace the associated module.
			Fail	Repair as needed

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SECTION 2. ELECTRICAL REFERENCE

Table 2-1. Limit Switch States

Connector	Switch	Normally Open or Closed	Reference State
X051	Main Boom Transport Angle Prox	1-4 NC, 2-3 NO	2-3 Closed = Transport
X052	Dual Capacity 1	NC	See Table 2-3. Switch States / Boom Length Regions on Pg. 179
X053	Dual Capacity 2	NC	See Table 2-3. Switch States / Boom Length Regions on Pg. 179
X054	Main Boom Transport Length 1	NC	See Table 2-3. Switch States / Boom Length Regions on Pg. 179
X055	Main Boom Transport Length 2	NC	See Table 2-3. Switch States / Boom Length Regions on Pg. 179
X056	Tower Boom Transport Length	21-22 NC, 13-14 NO	21-22 Closed = Transport
X079	Main Lift Pilot Pressure	NO	Closed = Pressure > 200psi
X146	Jib Stow	NC	Open = Stowed (Jib > 70° Right)
X147	Jib Center	NC	Open = Jib Centered ±5°
X204	RF Axle Extension	NC	Closed = Extended
X205	LF Axle Extension	NC	Closed = Extended
X213	Osc Axle Lockout Pressure	NO	Closed = Pressure > 200psi
X216	Drive Orientation	NO	Open = Normal Orientation
X225	LR Axle Extension	NC	Closed = Extended
X226	RR Axle Extension	NC	Closed = Extended

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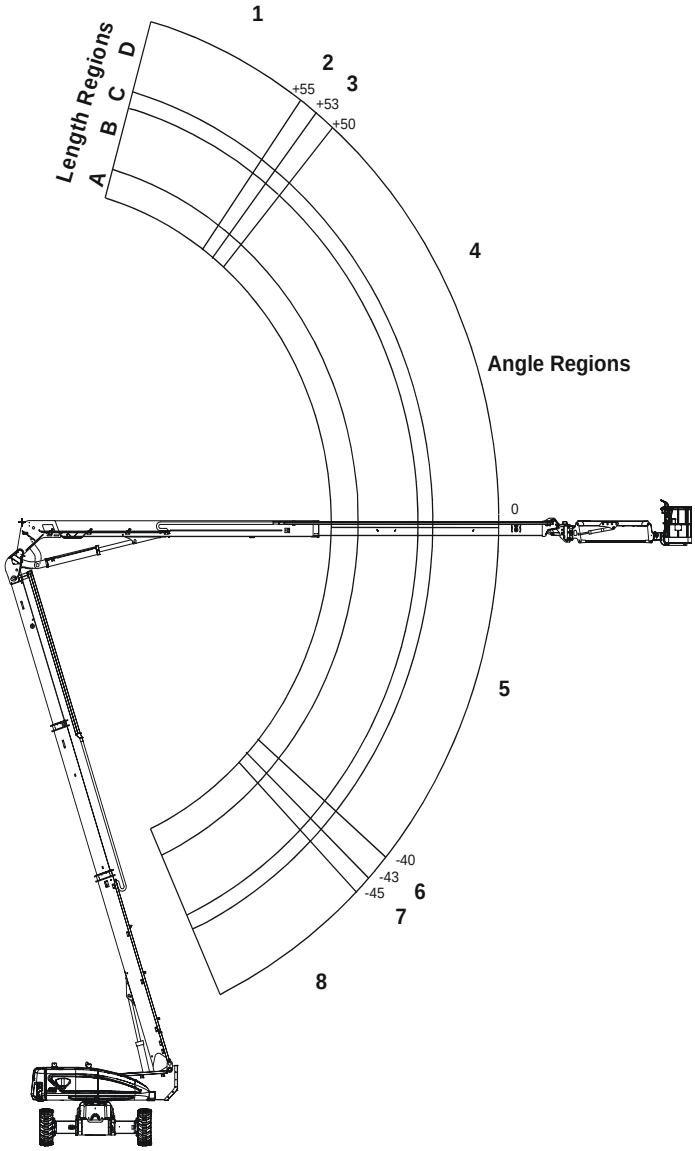


Figure 2-1. Main Boom Angle and Length Zones

Table 2-2. Main Boom Dual Capacity Zones

Functions	A	B	C	D
Main Lift Up	1,2,3,4,5,6,7,8	1,2,3,4,5,6,7,8	1,2,3,4,5,6,7,8	1,2,3,4,8
Main Lift Down	1,2,3,4,5,6,7,8	1,2,3,4,5,6,7,8	1,2,3,4,5,6,7,8	1,5,6,7,8
Main Tele Out	1,2,3,4,5,6,7,8	1,2,3,4,5,6,7,8	1,2,7,8	1,2,7,8
Main Tele In	1,2,3,4,5,6,7,8	1,2,3,4,5,6,7,8	1,2,3,4,5,6,7,8	1,2,3,6,7,8

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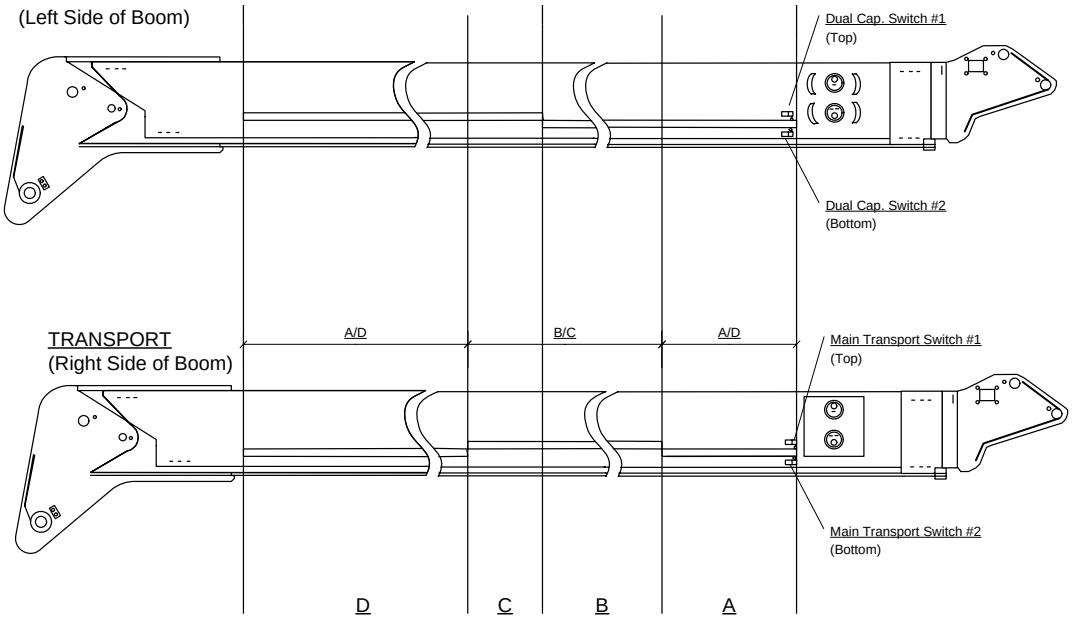


Figure 2-2. Dual Capacity / Transport Switch Mounting

Table 2-3. Switch States / Boom Length Regions

Switch	Off Cam = Switch Closed, On Cam = Switch Open								
Dual Cap. Switch #1	Off Cam	Off Cam	Off Cam	Disagree	On Cam	On Cam	On Cam	Disagree	Disagree
Dual Cap. Switch #2	On Cam	On Cam	On Cam	Disagree	Off Cam	Off Cam	Off Cam	Disagree	Disagree
Control System Conclusion of Dual Cap Switches	B/A	B/A	B/A	Disagree	C/D	C/D	C/D	Disagree	Disagree
Main Transport Switch #1	Off Cam	Disagree	On Cam	On Cam	On Cam	Disagree	Off Cam	Off Cam	Disagree
Main Transport Switch #2	On Cam	Disagree	Off Cam	Off Cam	Off Cam	Disagree	On Cam	On Cam	Disagree
Control System Conclusion of Main Transport Switches	A/D	Disagree	B/C	B/C	B/C	Disagree	A/D	A/D	Disagree
Control System Conclusion of Main Boom Length	A	A/B	B	B/C	C	C/D	D	Switch Fault	Switch Fault

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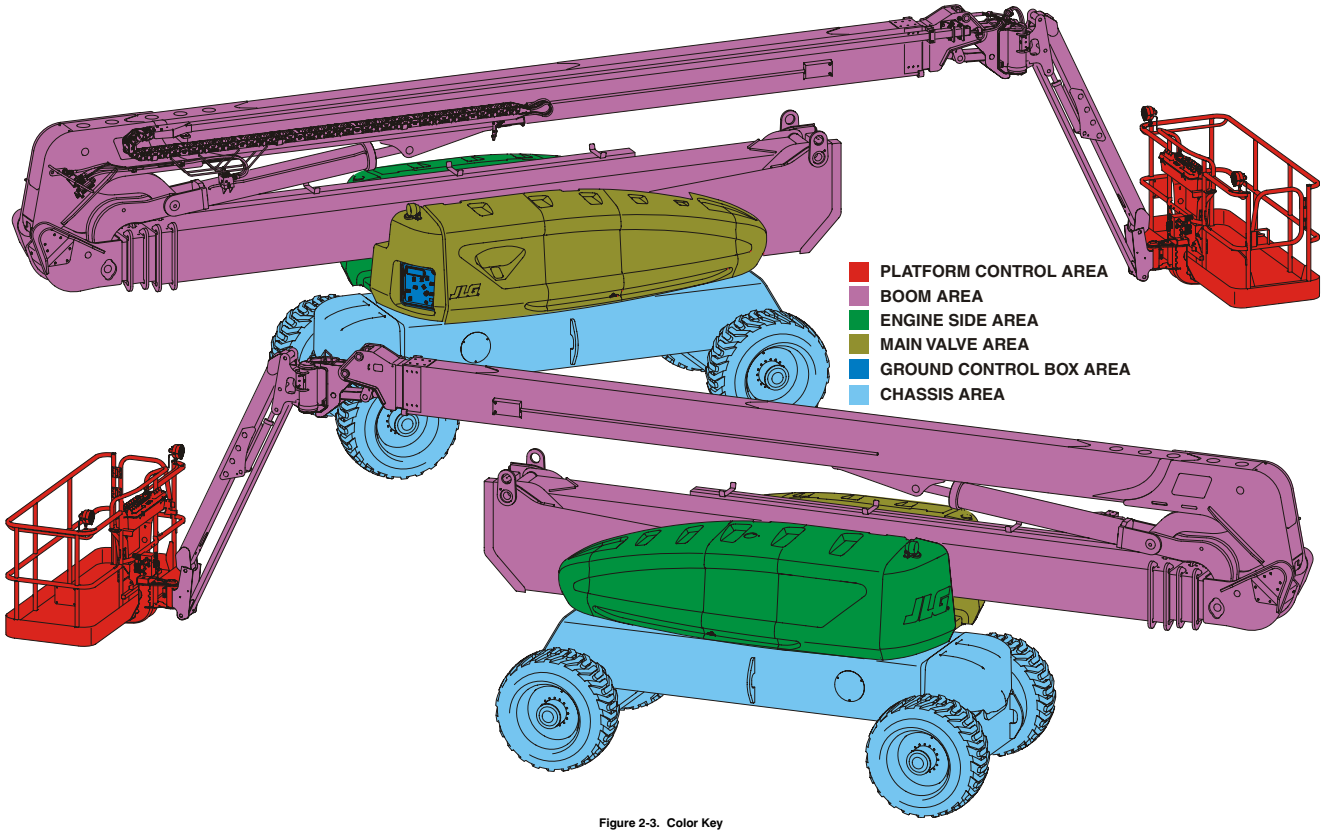


Figure 2-3. Color Key

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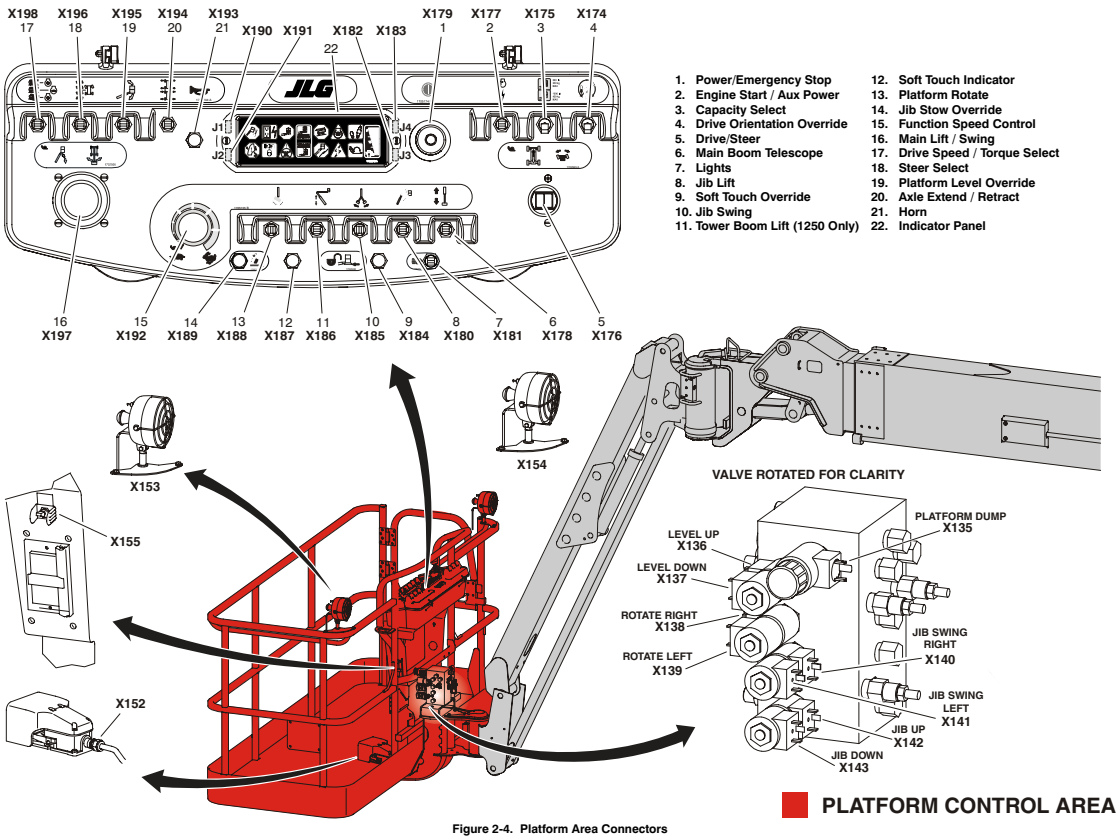
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Table 2-4. Platform Area Solenoids

Connector	Function	Nominal Resistance (Ohms)
X135	Platform Dump	6.4
X136	Level Up	10.1
X137	Level Down	10.1
X138	Rotate Right	10.1
X139	Rotate Left	10.1
X140	Jig Swing Right	10.1
X141	Jib Swing Left	10.1
X142	Jib Up	10.1
X143	Jib Down	10.1

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1. Power/Emergency Stop
2. Engine Start / Aux Power
3. Capacity Select
4. Drive Orientation Override
5. Drive/Steer
6. Main Boom Telescope
7. Lights
8. Jib Lift
9. Soft Touch Override
10. Jib Swing
11. Tower Boom Lift (1250 Only)
12. Soft Touch Indicator
13. Platform Rotate
14. Jib Stow Override
15. Function Speed Control
16. Main Lift / Swing
17. Drive Speed / Torque Select
18. Steer Select
19. Platform Level Override
20. Axle Extend / Retract
21. Horn
22. Indicator Panel

Figure 2-4. Platform Area Connectors

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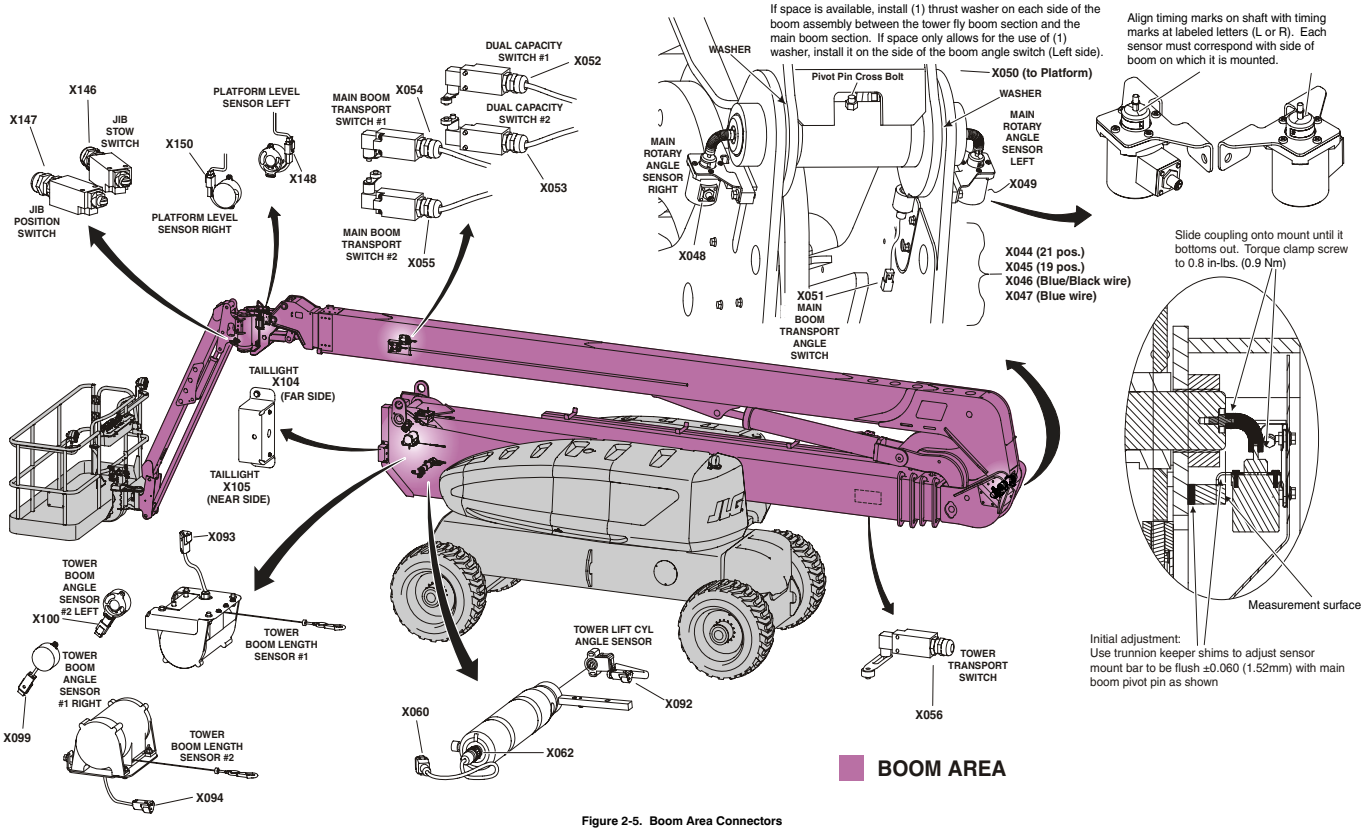


Figure 2-5. Boom Area Connectors

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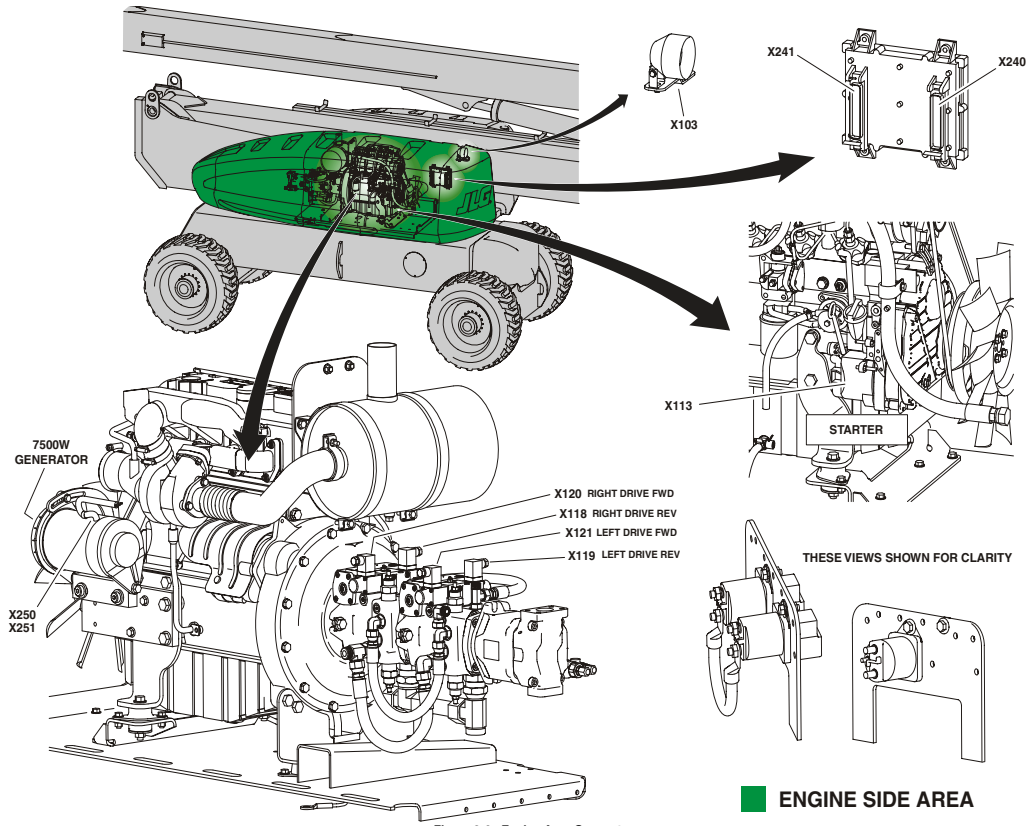


Figure 2-6. Engine Area Connectors

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Table 2-5. Main Valve Area Solenoids

Connector	Function	Nominal Resistance (Ohms)
X068	PVG Enable	7.2
X069	Swing Right	5.2
X070	Swing left	5.2
X071	Main Tele Extend	4.7
X072	Main Tele Proportional	4.7
X073	Main Tele Retract	4.7
X074	Main Dump	7.2
X075	Tower Lift Pilot	8.7
X076	Tower Tele Pilot	8.7
X077	Main Lift Pilot	8.7
X080	Tower Lift Enable	4.8
X081	Tower Tele Enable	4.8
X082	Main Lift Enable	4.8

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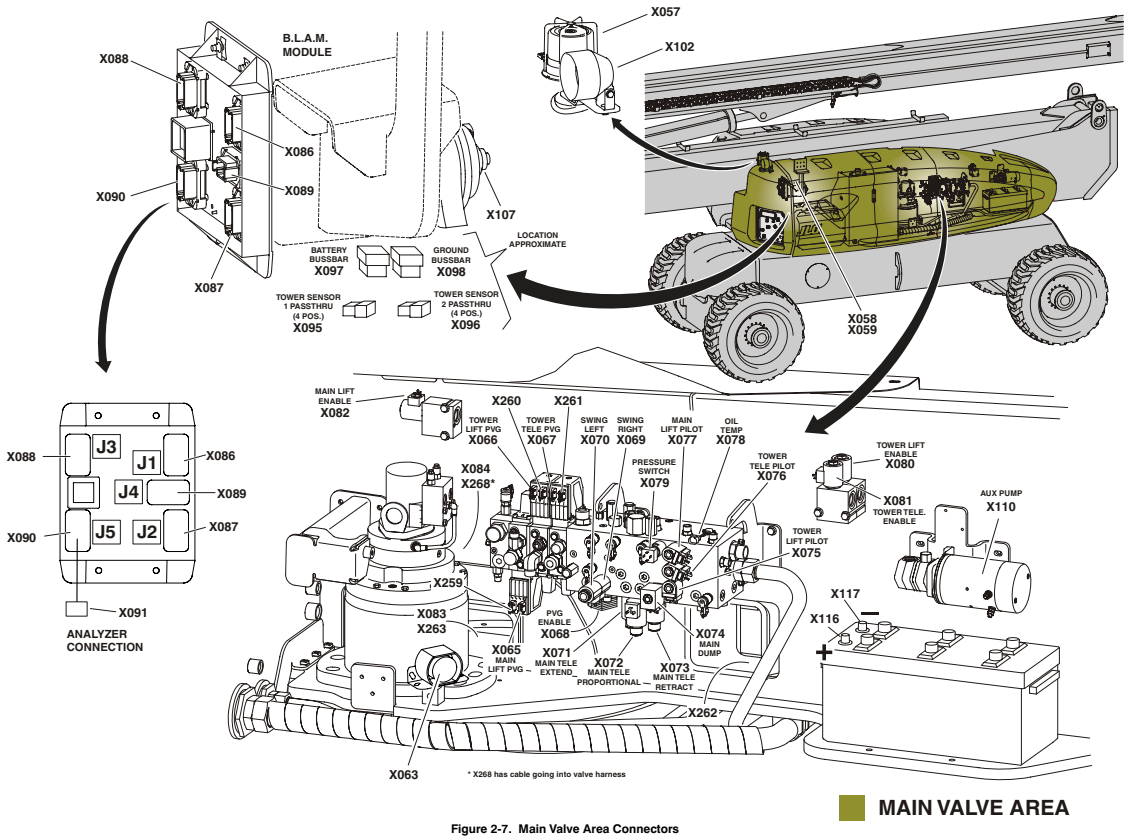


Figure 2-7. Main Valve Area Connectors

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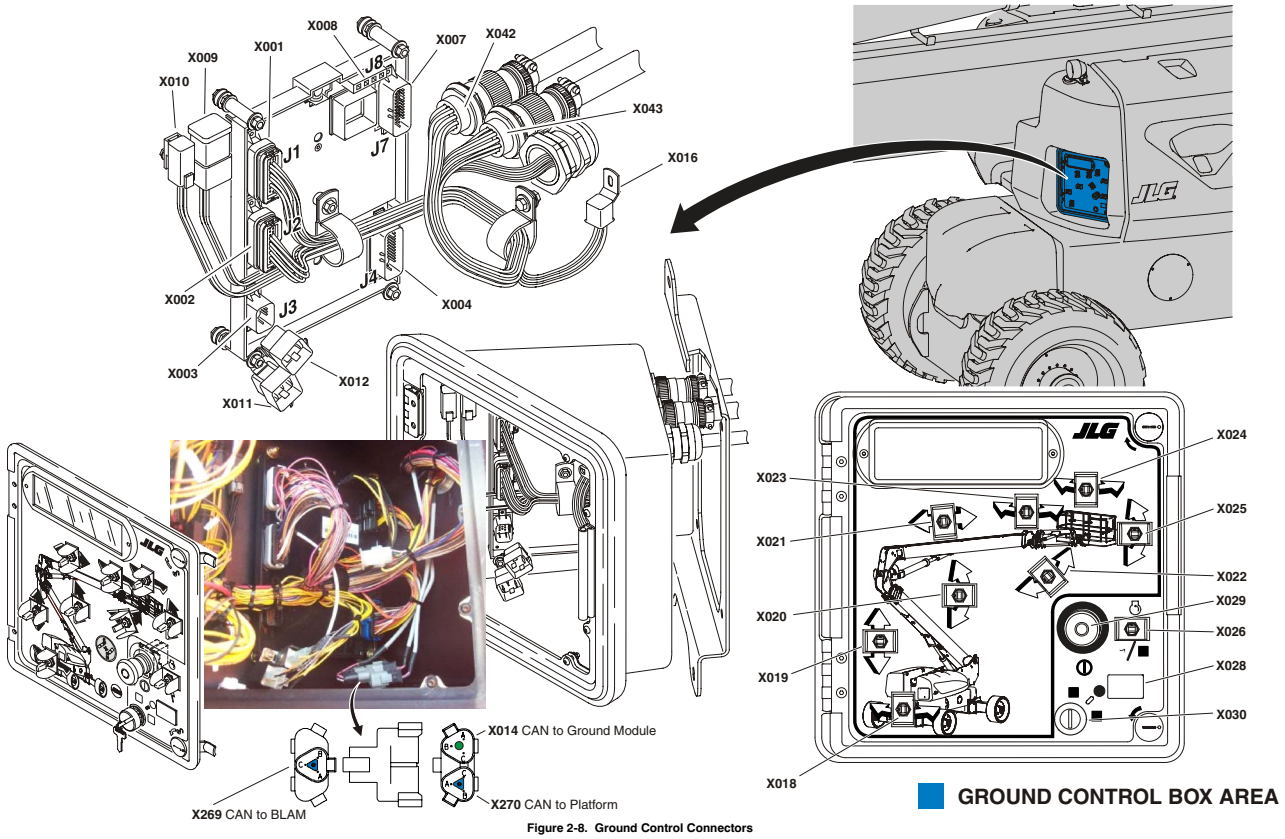


Figure 2-8. Ground Control Connectors

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Table 2-6. Chassis Area Solenoids

Connector	Function	Nominal Resistance (Ohms)
X206	Front Axles Extend	4.9
X207	Front Left Steer Right	4.9
X208	Front Right Steer Right	4.9
X209	Front Axles Retract	4.9
X210	Front Left Steer Left	4.9
X211	Front Right Steer Left	4.9
X212	Axle Lockout Solenoid	6.2
X214	2 Speed Solenoid	6.2
X215	Brake Release Solenoid	6.3
X219	Rear Right Steer Left	4.9
X220	Rear Left Steer left	4.9
X221	Rear Axles Retract	4.9
X222	Rear Right Steer Right	4.9
X223	Rear Left Steer Right	4.9
X224	Rear Axles Extend	4.9

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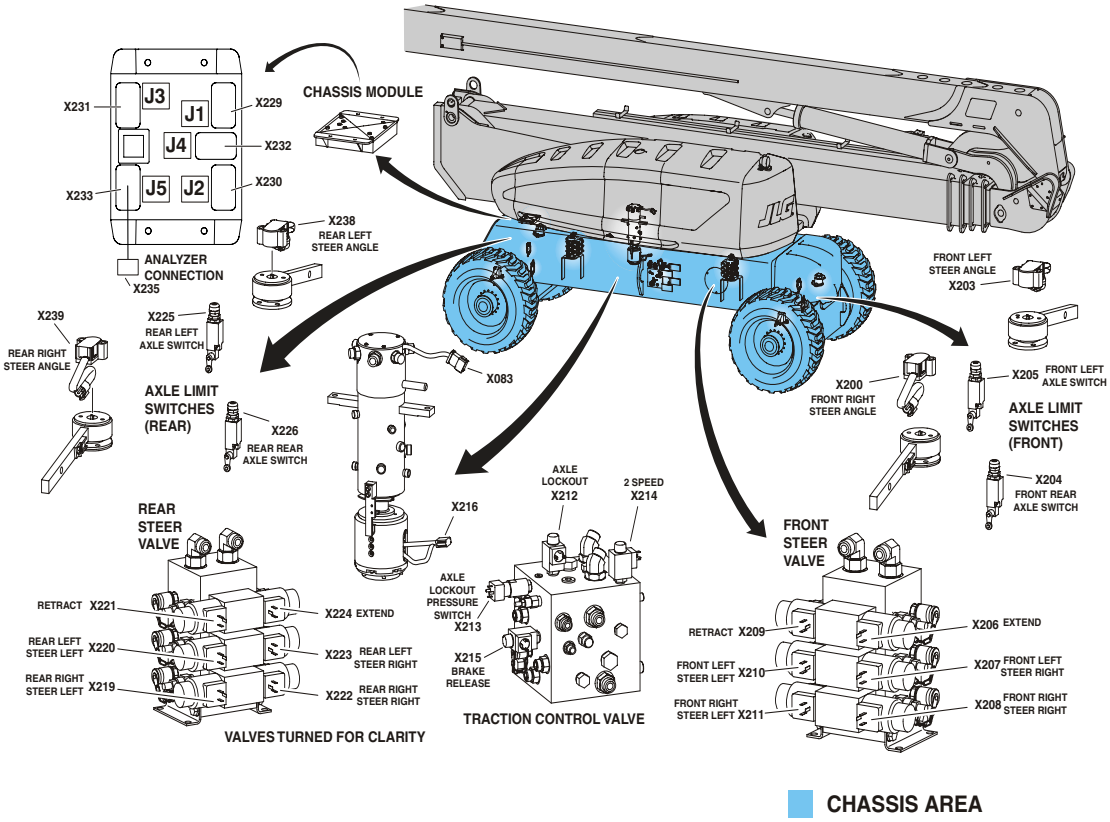


Figure 2-9. Chassis Area Connectors

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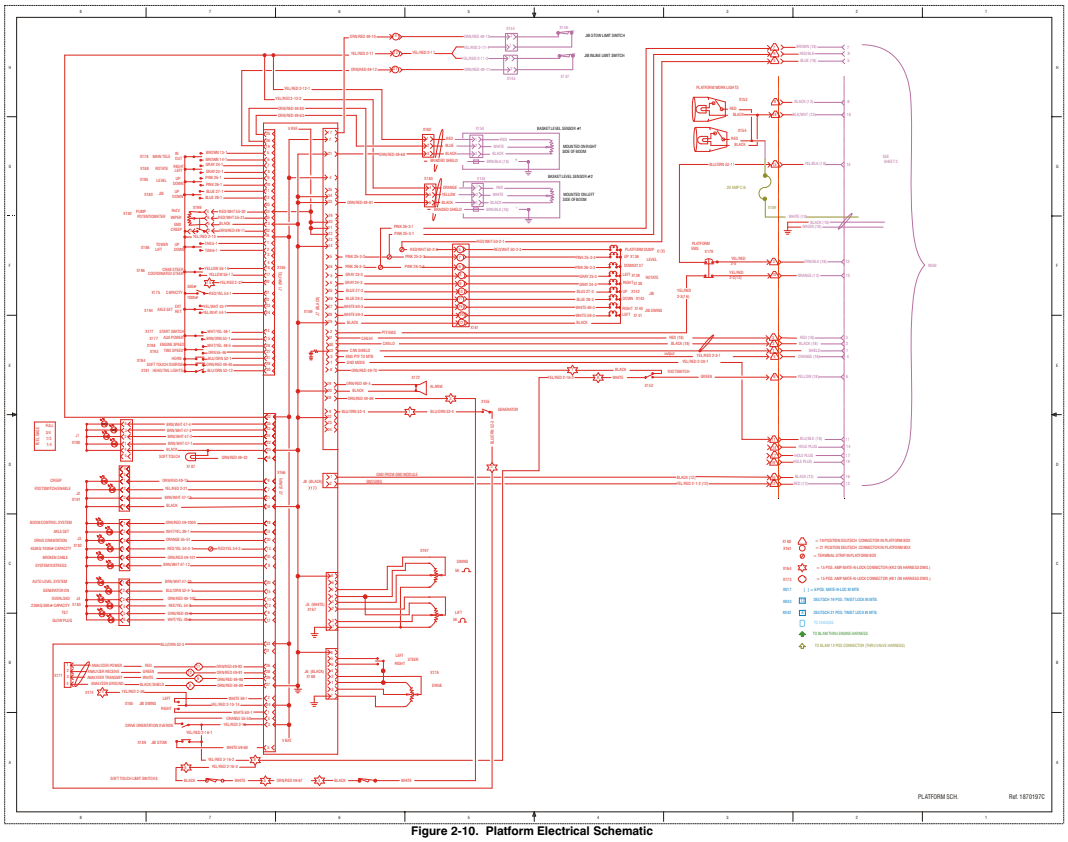


Figure 2-10. Platform Electrical Schematic

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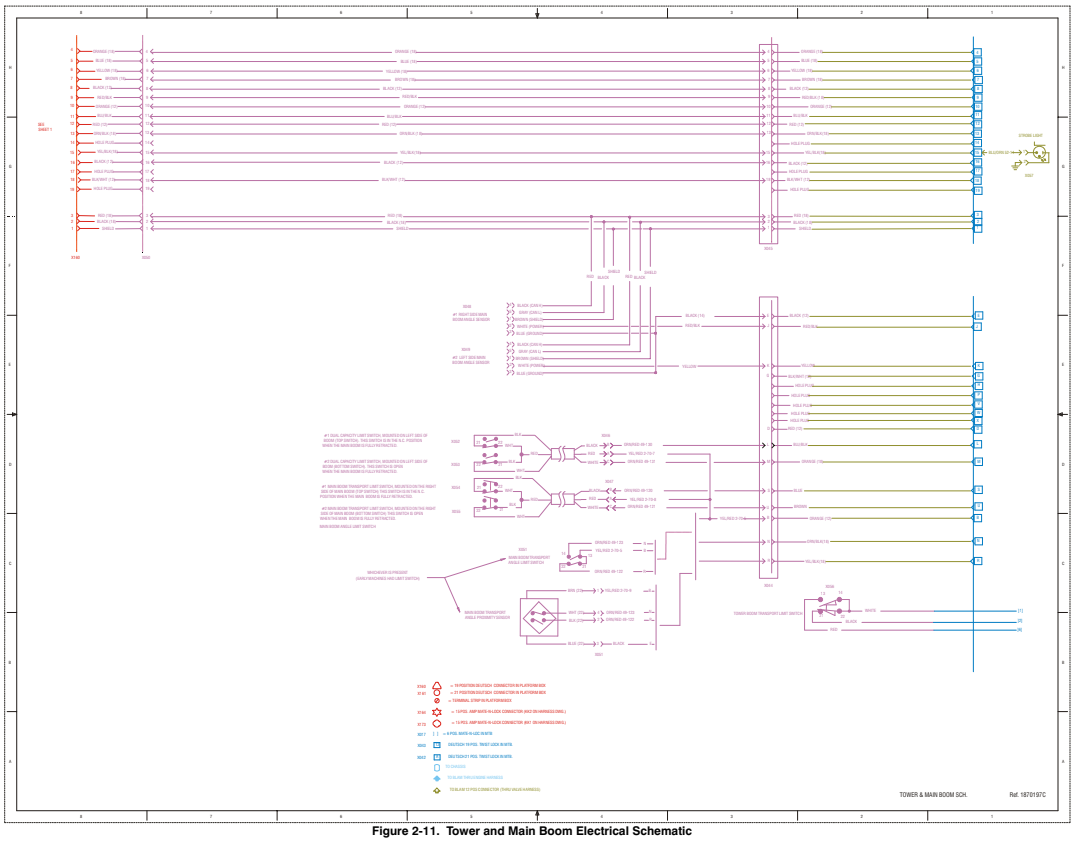


Figure 2-11. Tower and Main Boom Electrical Schematic

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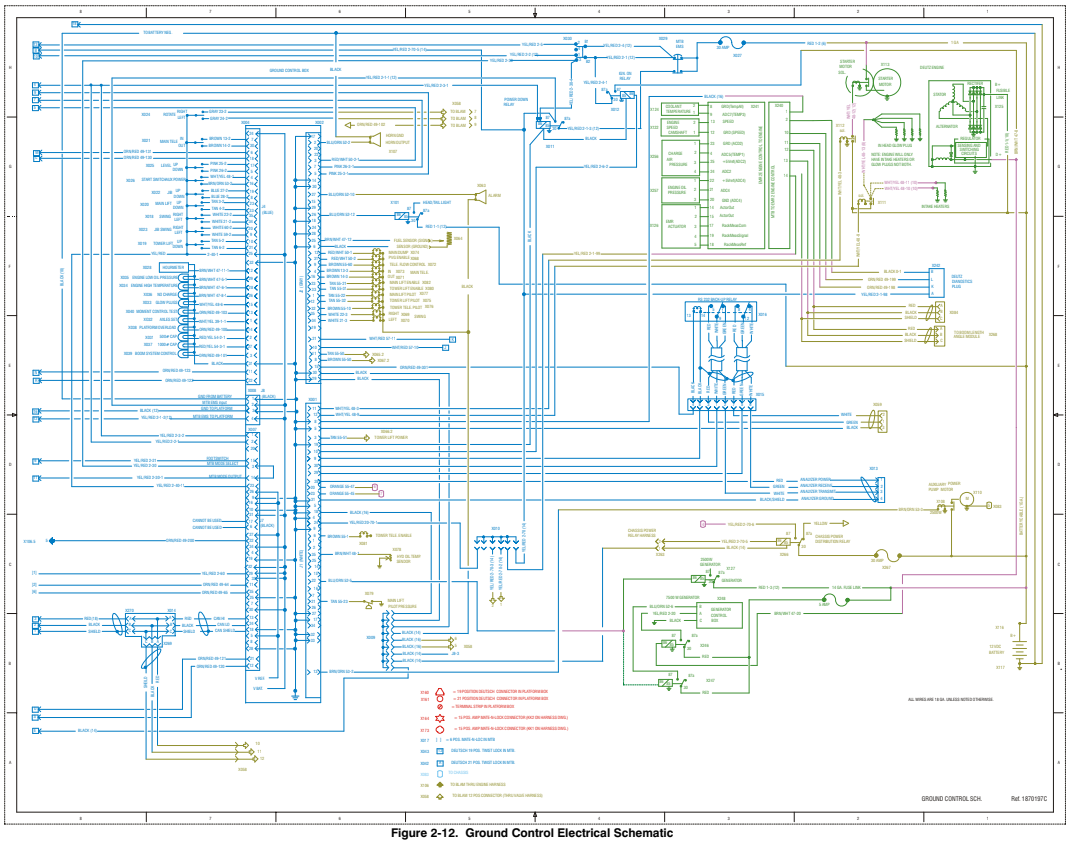


Figure 2-12. Ground Control Electrical Schematic

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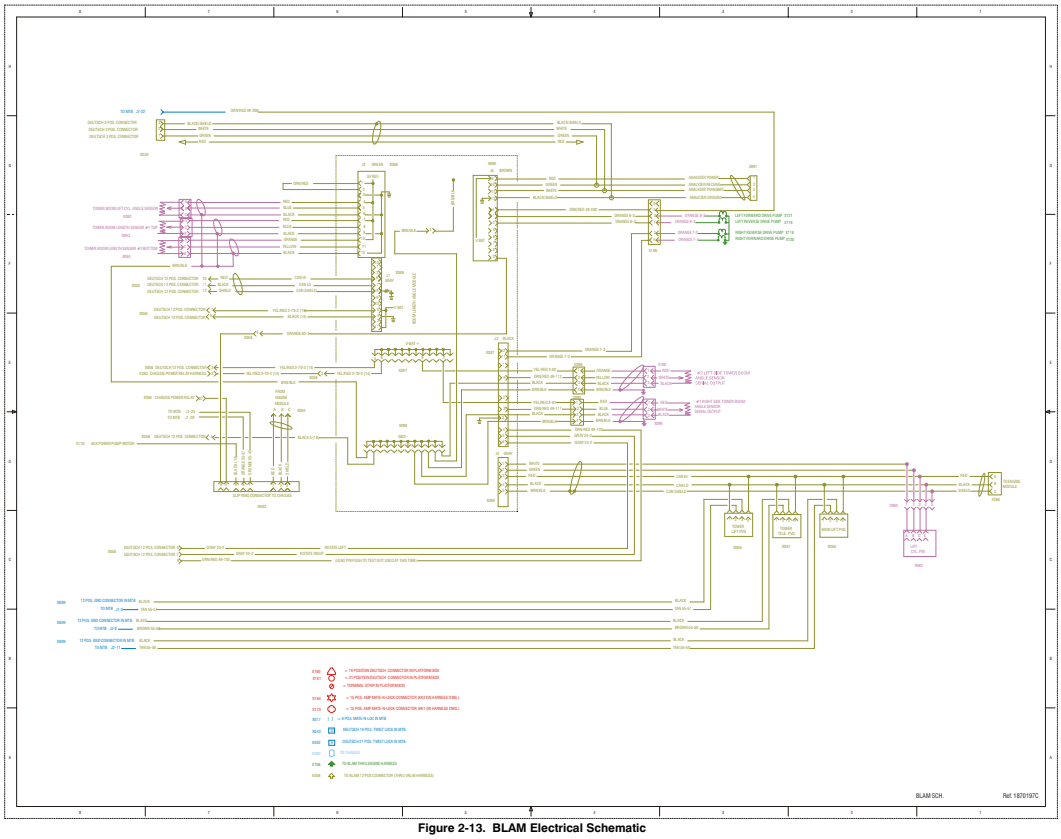


Figure 2-13. BLAM Electrical Schematic

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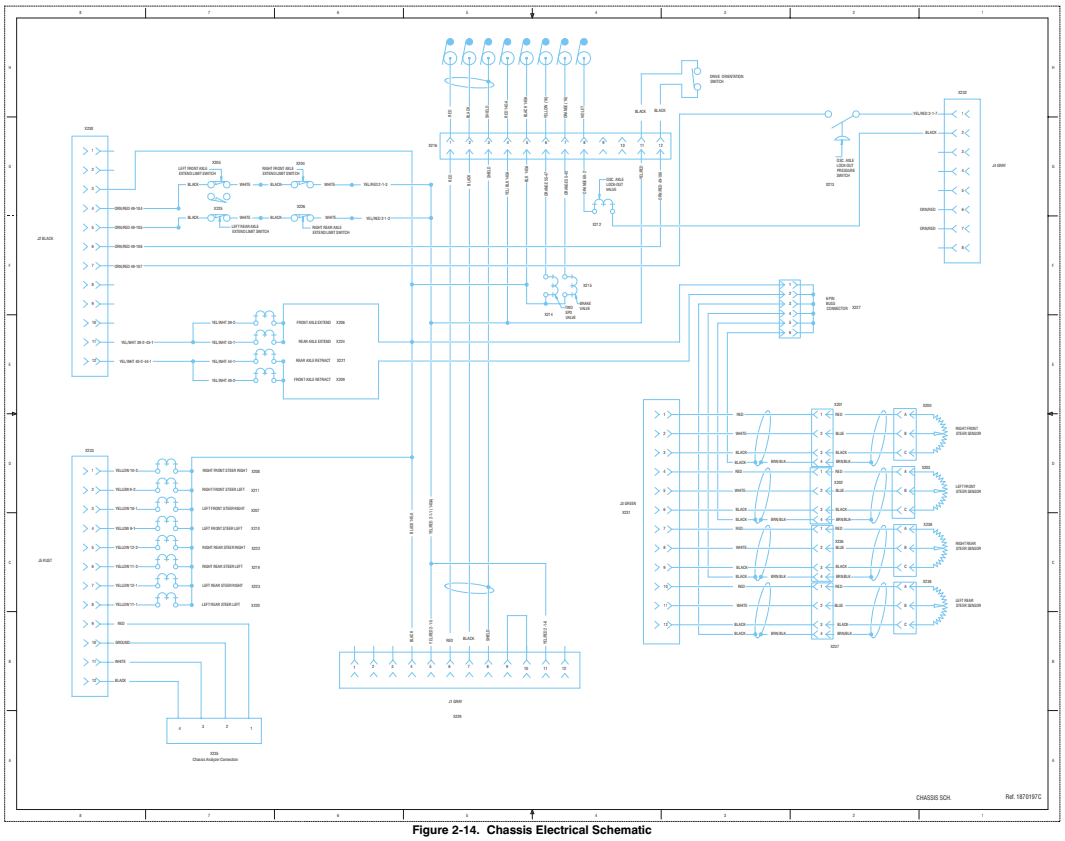


Figure 2-14. Chassis Electrical Schematic

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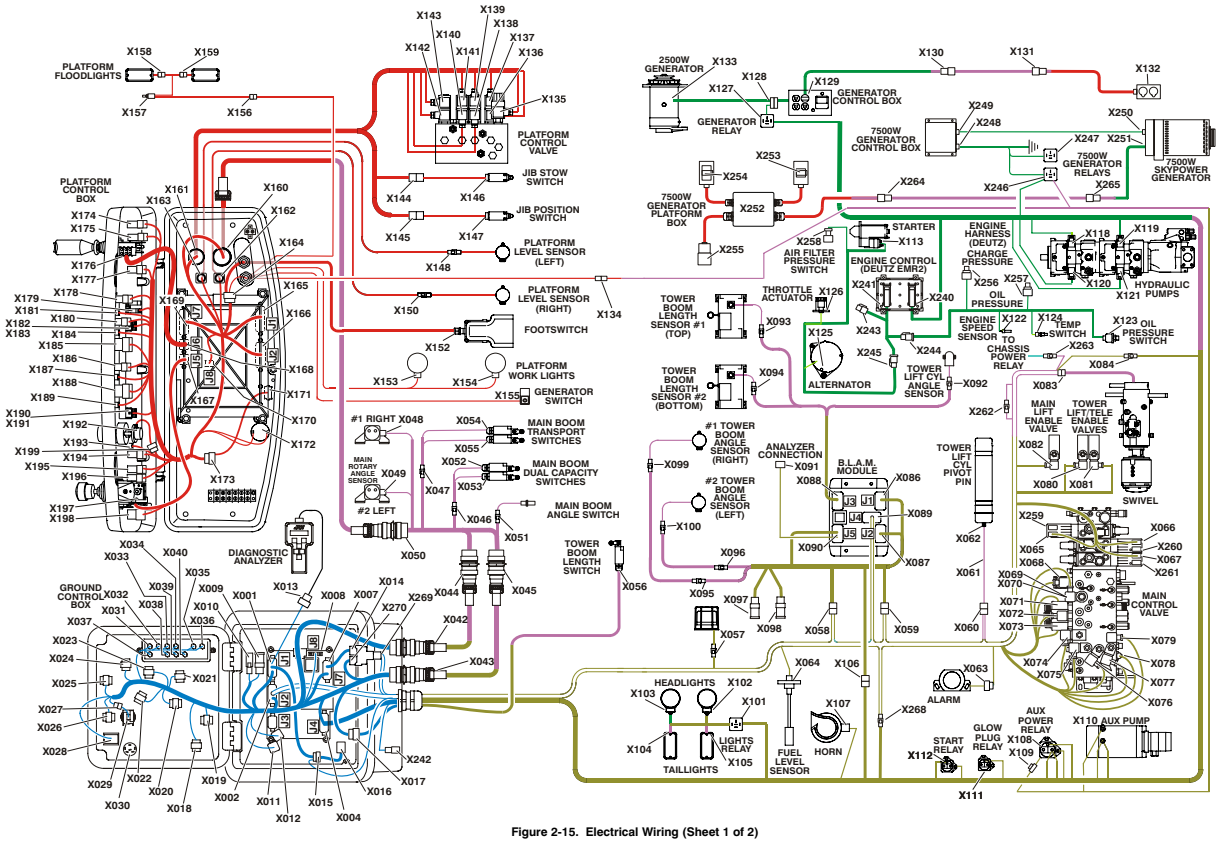


Figure 2-15. Electrical Wiring (Sheet 1 of 2)

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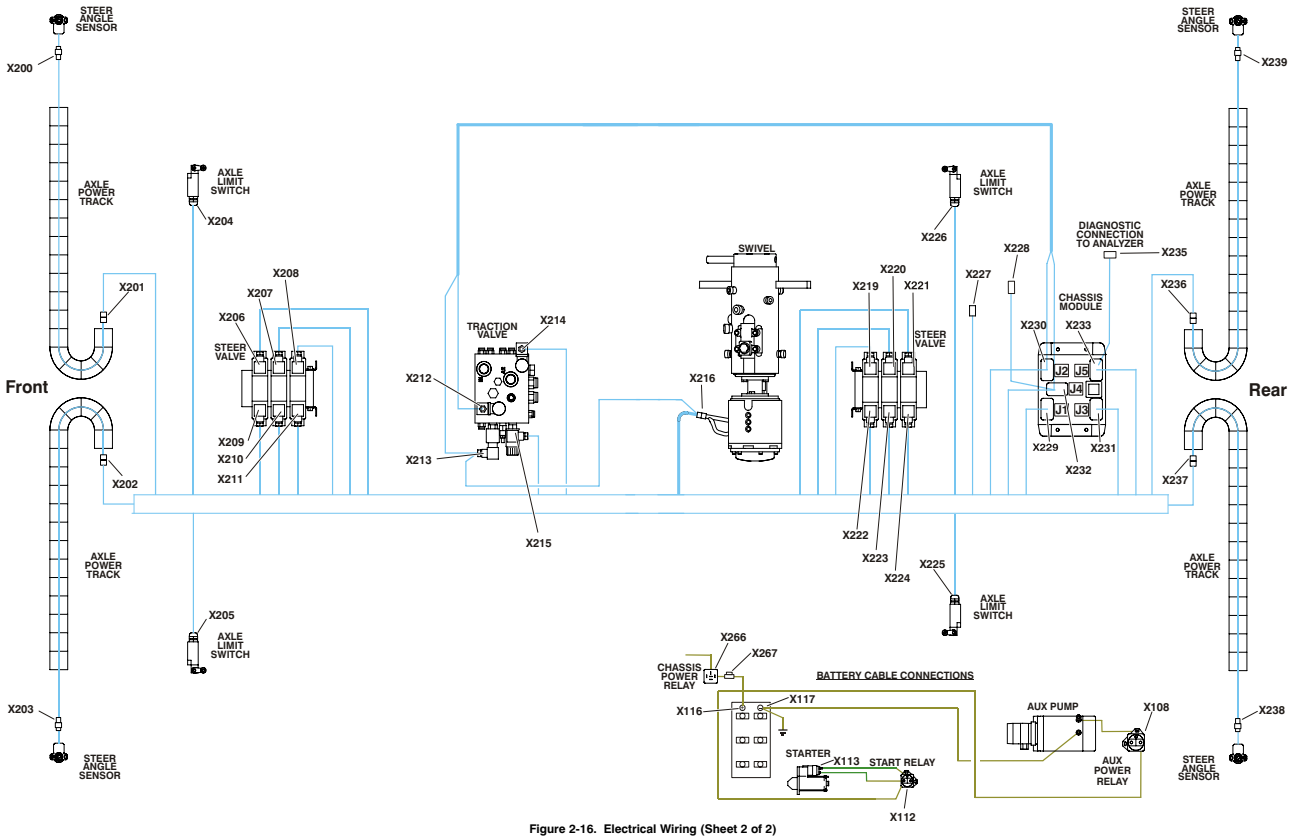


Figure 2-16. Electrical Wiring (Sheet 2 of 2)

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2.1 CONNECTOR INDEX

Table 2-7. Connector Index

ID	Description	End 1 ID	End 2 ID	Schematic	Figures
X001	Ground J1, White/Natural - 35 Position	AMP351P (Black)	--	2-12. (6E)	2-8.
X002	Ground J2, Gray - 35 Position	AMP354P (Gray)	--	2-12. (6G)	2-8.
X003	Not Used	--	--	--	--
X004	Ground J4, Blue - 35 Position	AMP355P (Blue)	--	2-12. (7G)	2-8.
X005	Not Used	--	--	--	--
X006	Not Used	--	--	--	--
X007	Ground J7, Black - 35 Position	AMP351P (Black)	--	2-12. (7D)	2-8.
X008	Ground J8 - 4 Position	MMF04P	--	2-12. (7E)	2-8.
X009	MTB Ground Bus - 12 Position	DT12BP	DT12PBR	2-12. (6B)	2-8.
X010	MTB Power Bus - 6 Position	DT06AP	DT06EP032R	2-12. (6B)	2-8.
X011	Power Down Relay	--	--	2-12. (4H)	2-8.
X012	Ignition On Relay	--	--	2-12. (4H)	2-8.
X013	Ground Analyzer - 4 Position	AMP04R	AMP04P	2-12. (2D)	--
X014	CAN 3way - to Ground Module, Green	DT03P032GP (Green)	--	2-12. (7B)	2-8.
X015	RS232 passthru	DT08AP	DT08AR	2-12. (3E)	--
X016	Ground Panel Relay	--	--	2-12. (3F)	2-8.
X017	Tower Boom Transport Switch passthru	AMP06P	AMP06R	2-11. (1B)	--
X018	Ground Swing Switch	E06P	--	2-12. (7F)	2-8.
X019	Ground Tower Lift Switch	E06P	--	2-12. (7F)	2-8.
X020	Ground Main Lift Switch	E06P	--	2-12. (7G)	2-8.
X021	Ground Main Tele Switch	E06P	--	2-12. (7G)	2-8.
X022	Ground Jib Lift Switch	E06P	--	2-12. (7G)	2-8.
X023	Ground Jib Swing Switch	E06P	--	2-12. (7F)	2-8.
X024	Ground Rotate Switch	E06P	--	2-12. (7G)	2-8.
X025	Ground Level Switch	E06P	--	2-12. (7G)	2-8.
X026	Ground Start Switch	E06P	--	2-12. (7G)	2-8.
X027	Officeholder with Cover	--	--	2-12. (3H)	--
X028	Ground Hourmeter	--	--	2-12. (7F)	2-8.
X029	Ground EMS Switch	--	--	2-12. (3H)	2-8.
X030	Ground Key Switch	--	--	2-12. (4H)	2-8.
X031	500 Capacity Light	PACKARD2LR	--	2-12. (7E)	--
X032	Axle Lock Light	PACKARD2LR	--	2-12. (7E)	--
X033	Glow Plugs Light	PACKARD2LR	--	2-12. (7F)	--
X034	High Engine Temperature Light	PACKARD2LR	--	2-12. (7F)	--
X035	Oil Pressure Light	PACKARD2LR	--	2-12. (7F)	--
X036	Battery Voltage Light	PACKARD2LR	--	2-12. (7F)	--
X037	1000 Capacity Light	PACKARD2LR	--	2-12. (7E)	--
X038	Platform Overload (Euro) Light	PACKARD2LR	--	2-12. (7E)	--
X039	Envelope Light	PACKARD2LR	--	2-12. (7E)	--
X040	Test Light	PACKARD2LR	--	2-12. (7F)	--
X041	Not Used	--	--	--	--
X042	MTB pass thru - 21 Position	DHD21R	DHD21P	2-11. (1D)	2-8.
X043	MTB pass thru - 19 Position	DHD19R	DHD21P	2-11. (1G)	2-8.
X044	Tower Boom passthru - 21 Position	DHD21R	DHD21P	2-11. (3E)	2-5.
X045	Tower Boom passthru - 19 Position	DHD19R	DHD21P	2-11. (3G)	2-5.
X046	Dual Capacity Switch Passthru - 3 Position	DT03P	DT03RD	2-11. (4D)	2-5.

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Table 2-7. Connector Index

ID	Description	End 1 ID	End 2 ID	Schematic	Figures
X047	Main Boom Transport Switch Passthru - 3 Position	DT03R	DT03P	2-11. (4D)	2-5.
X048	Main Rotary Angle Sensor Right - 5 Position	PHEONIX5P	--	2-11. (5F)	2-5.
X049	Main Rotary Angle Sensor Left - 5 Position	PHEONIX5P	--	2-11. (5E)	2-5.
X050	Boom Sensor Passthru - 19 Position	DHD19R	DHD19P	2-10. (2F)	2-5.
X051	Main Boom Angle Switch	DTM04P	--	2-11. (4C)	2-5.
X052	Dual Capacity Switch #1	--	--	2-11. (5D)	2-5.
X053	Dual Capacity Switch #2	--	--	2-11. (5D)	2-5.
X054	Main Boom Transport Switch #1	--	--	2-11. (5D)	2-5.
X055	Main Boom Transport Switch #2	--	--	2-11. (5D)	2-5.
X056	Tower Boom Transport Switch	--	--	2-11. (2B)	2-5.
X057	Strobe Light	AMP02R	--	2-11. (1G)	2-7.
X058	BLAM passthru - 12 Position	DT12AR	DT12AP	2-12. (7A)	2-7.
X059	RS232 Backup passthru	DT03R	--	2-12. (2D)	2-7.
X060	Load Pin Pass Thru - 8 Position (Gray)	DT08AR	DT08AP	2-13. (1C)	2-5.
X061	Not Used	--	--	--	--
X062	Load Pin panel - 6 Position	ANL06P	--	2-13. (1C)	2-5.
X063	Alarm Connector	AMP02P	--	2-12. (5G)	2-7.
X064	Fuel Level Sensor - 2 Position	PACKARD2P	--	2-12. (5F)	--
X065	Main Lift PVG - 4 Position (Black)	AMPPVG4P (Black)	--	2-13. (2C)	2-7.
X066	Tower Lift PVG - 4 Position (Black)	AMPPVG4P (Black)	--	2-13. (3C)	2-7.
X067	Tower Tele PVG - 4 Position (Black)	AMPPVG4P (Black)	--	2-13. (3C)	2-7.
X068	PVG Enable Solenoid	DIN43650P	--	2-12. (6F)	2-7.
X069	Swing Right Solenoid	DIN43650P	--	2-12. (5E)	2-7.
X070	Swing Left Solenoid	DIN43650P	--	2-12. (5E)	2-7.
X071	Main Tele Extend Solenoid	DIN43650P	--	2-12. (5F)	2-7.
X072	Main Tele Proportional Solenoid	DIN43650P	--	2-12. (5F)	2-7.
X073	Main Tele Retract Solenoid	DIN43650P	--	2-12. (5F)	2-7.
X074	Main Dump Solenoid	DIN43650P	--	2-12. (5F)	2-7.
X075	Tower Lift Pilot Solenoid	DIN43650P	--	2-12. (5F)	2-7.
X076	Tower Tele Pilot Solenoid	DIN43650P	--	2-12. (6F)	2-7.
X077	Main Lift Pilot Solenoid	DIN43650P	--	2-12. (6F)	2-7.
X078	Hyd Oil Temp Switch - 2 Position	DT02P	--	2-12. (6C)	2-7.
X079	Pressure Switch	DIN43650P	--	2-12. (6C)	2-7.
X080	Tower Lift Enable Solenoid	DIN43650P	--	2-12. (5F)	2-7.
X081	Tower Tele Enable Solenoid	DIN43650P	--	2-12. (6C)	2-7.
X082	Main Lift Enable Solenoid	DIN43650P	--	2-12. (5F)	2-7.
X083	Swivel - 12 Position (Black)	DT12BP	--	2-13. (7D)	2-7.
X084	Deutz EMR2 Chassis CAN - 3 Position	DT03R	DT03P	2-12. (1F)	2-7.
X085	Not Used	--	--	--	--
X086	BLAM J1 - 12 Position (Gray)	DT12AP	--	2-13. (5F)	2-7.
X087	BLAM J2 - 12 Position (Black)	DT12BP	--	2-13. (5E)	2-7.
X088	BLAM J3 - 12 Position	DT12CP	--	2-13. (6G)	2-7.
X089	BLAM J4 - 8 Position	DT08AP	--	2-13. (5D)	2-7.
X090	BLAM J5 - 12 Position (Green)	DT12DP	--	2-13. (5G)	2-7.
X091	BLAM Analyzer - 4 Position	AMP04R	--	2-13. (3G)	2-7.
X092	Tower Lift Cyl Angle Sensor - 3 Position	DT03P	DT03R	2-13. (7G)	2-5.
X093	Tower Boom Length Sensor 1 (Top) - 3 Position	DT03P	DT03R	2-13. (7F)	2-5.

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Table 2-7. Connector Index

ID	Description	End 1 ID	End 2 ID	Schematic	Figures
X094	Tower Boom Length Sensor 2 (Bottom) - 3 Position	DT03P	DT03R	2-13. (7F)	2-5.
X095	Tower Angle Sensor1 Passthru - 4 Position (Gray)	DT04R	DT04P	2-13. (4E)	2-7.
X096	Tower Angle Sensor2 Passthru - 4 Position (Gray)	DT04P	DT04R	2-13. (4E)	2-7.
X097	12 Pos Batt Busbar	DT12BP	DT12PBR	2-13. (4E)	2-7.
X098	12 Pos Ground Busbar	DT12BP	DT12PBR	2-13. (4C)	2-7.
X099	Tower Boom Angle Sensor #1 (Right)	DTM03P	DTM03R	2-13. (3E)	2-5.
X100	Tower Boom Angle Sensor #2 (Left)	DTM03P	DTM03R	2-13. (3E)	2-5.
X101	Lights Relay	--	--	2-12. (6G)	--
X102	Headlight	--	--	--	2-7.
X103	Headlight	--	--	--	2-6.
X104	Taillight	--	--	--	2-5.
X105	Taillight	--	--	--	2-5.
X106	BLAM Pump Passthru	DT06R	--	2-13. (4G)	--
X107	Horn	--	--	2-12. (6G)	2-7.
X108	Aux Power Relay	--	--	2-12. (1E)	--
X109	Power Relay Fuse	--	--	2-10. (3G)	--
X110	Aux Pump	--	--	2-12. (1D)	2-7.
X111	Glow Plugs Relay	--	--	2-12. (2G)	--
X112	Start Relay	--	--	2-12. (2G)	--
X113	Starter	--	--	2-12. (2H)	2-6.
X114	Not Used	--	--	--	--
X115	Not Used	--	--	--	--
X116	Battery Positive	--	--	2-12. (1B)	2-7.
X117	Battery Negative	--	--	2-12. (1B)	2-7.
X118	Right Side Drive Reverse Solenoid	DIN43650P	--	2-13. (3F)	2-6.
X119	Left Side Drive Reverse Solenoid	DIN43650P	--	2-13. (3F)	2-6.
X120	Right Side Drive Forward Solenoid	DIN43650P	--	2-13. (3F)	2-6.
X121	Left Side Drive Forward Solenoid	DIN43650P	--	2-13. (3F)	2-6.
X122	Engine Speed Sensor - 2 Position	AMPJT826008P	--	2-12. (3G)	--
X123	Engine Oil Pressure Switch	--	--	--	--
X124	Engine Coolant Temp Switch	--	--	2-12. (3H)	--
X125	Engine Alternator	--	--	2-12. (1G)	--
X126	Engine Throttle Actuator	DIN43650P	--	2-12. (3F)	--
X127	Generator Relay	--	--	2-12. (3C)	--
X128	Generator Connector	--	--	--	--
X129	Generator Control Box	--	--	--	--
X130	Generator Extension	--	--	--	--
X131	Generator Extension	--	--	--	--
X132	Generator Outlet	--	--	--	--
X133	Generator	--	--	--	--
X134	Worklight passthru - 3 Position	PACKARD3P	PACKARD3R	--	--
X135	Platform Dump Solenoid	DIN43650P	--	2-10. (4F)	2-4.
X136	Platform Level Up Solenoid	DIN43650PD	--	2-10. (4F)	2-4.
X137	Platform Level Down Solenoid	DIN43650P	--	2-10. (4F)	2-4.
X138	Platform Rotate Right Solenoid	DIN43650P	--	2-10. (4F)	2-4.
X139	Platform Rotate Left Solenoid	DIN43650P	--	2-10. (4F)	2-4.
X140	Platform Jib Swing Right	DIN43650P	--	2-10. (4F)	2-4.

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ID	Description	End 1 ID	End 2 ID	Schematic	Figures
X141	Platform Jib Swing Left	DIN43650P	--	2-10. (4F)	2-4.
X142	Platform Jib Up	DIN43650P	--	2-10. (4F)	2-4.
X143	Platform Jib Down	DIN43650P	--	2-10. (4F)	2-4.
X144	Jib Stow Pass Thru - 2 Position	DT02R	--	2-10. (5H)	--
X145	Jib Limit Switch Pass Thru - 2 Position	DT02R	--	2-10. (5H)	--
X146	Jib Stow Switch	--	--	2-10. (4H)	2-5.
X147	Jib Position Switch	--	--	2-10. (4H)	2-5.
X148	Platform Level Sensor (Left)	DTM03R	DTM03P	2-10. (5G)	2-5.
X149	Not Used	--	--	--	--
X150	Platform Level Sensor (Right)	DTM03R	DTM03P	2-10. (5G)	2-5.
X151	Not Used	--	--	--	--
X152	Footswitch	--	--	2-10. (3E)	2-4.
X153	Platform Worklight	--	--	2-10. (3H)	2-4.
X154	Platform Worklight	--	--	2-10. (3G)	2-4.
X155	Generator Switch	--	--	2-10. (5E)	2-4.
X156	Floodlights passthru - 3 Position	PACKARD3P	PACKARD3R	--	--
X157	Platform Floodlights component	--	--	--	--
X158	Floodlight passthru - 2 Position	AMP02P	AMP02R	--	--
X159	Floodlight passthru - 2 Position	AMP02P	AMP02R	--	--
X160	Platform Control Box Passthru - 19 Position	DHD19R	DHD19P	2-10. (3H)	--
X161	Platform Valve passthru - Deutsch 21 Pin	DHD1821R	DHD1821P	2-10. (5F)	--
X162	Platform Level Passthru #1	--	--	2-10. (5G)	--
X163	Platform Level Passthru #2	--	--	2-10. (5G)	--
X164	Platform passthru - Amp 15 Position	AMP15R	AMP15P	2-10. (5D)	--
X165	Platform J1 Connector - 35 Position (Natural)	AMP352P (Neutral)	--	2-10. (6F)	--
X166	Platform J2 Connector - 35 Position (Blue)	AMP355P (Blue)	--	2-10. (6D)	--
X167	Platform J5 Connector, Male - 8 Position	AMP08NP	--	2-10. (6C)	--
X168	Platform J6 Connector, Female - 8 Position	AMP08BP	--	2-10. (6B)	--
X169	Platform J7 Connector - 35 Position (Black)	AMP351P (Black)	--	2-10. (6F)	--
X170	Platform J8 Connector, Male - 2 Position	MMF02P	--	2-10. (6D)	--
X171	Platform Diagnostics Connector	AMP04R	--	2-10. (8B)	--
X172	Platform Alarm	MMF02P	--	2-10. (5E)	--
X173	Platform Analyzer Pass Thru	AMP15R	AMP15P	2-10. (7B)	--
X174	Drive Orientation Override Switch - 6 Position	E06P	--	2-10. (8B)	2-4.
X175	Platform Capacity Select Switch - 6 Position	E06P	--	2-10. (7F)	2-4.
X176	Controller Harness/Circuit Board Assembly (Drive and Steer)	--	--	2-10. (5B)	2-4.
X177	Platform Engine Start/ Aux Power Switch - 6 Position	E06P	--	2-10. (7E)	2-4.
X178	Platform Main Boom Telescope Switch - 6 Position	E06P	--	2-10. (7G)	2-4.
X179	Platform EMS Switch	--	--	2-10. (3F)	2-4.
X180	Platform Jib Lift Switch - 6 Position	E06P	--	2-10. (7G)	2-4.
X181	Platform Lights Switch	--	--	2-10. (7E)	2-4.
X182	Platform LED J4 - 6 Position	AMP06P	--	2-10. (7C)	2-4.
X183	Platform LED J3 - 6 Position	AMP06P	--	2-10. (7C)	2-4.
X184	Platform Soft Touch Override Switch	--	--	2-10. (7E)	2-4.
X185	Platform Jib Swing Switch - 6 Position	E06P	--	2-10. (7B)	2-4.
X186	Platform Tower Boom Lift Switch - 6 Position	E06P	--	2-10. (7F)	2-4.
X187	Platform Soft Touch Indicator	--	--	2-10. (7D)	2-4.

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ID	Description	End 1 ID	End 2 ID	Schematic	Figures
X188	Platform Rotate Switch - 6 Position	E06P	--	2-10. (7G)	2-4.
X189	Platform Jib Stow Override	--	--	2-10. (7A)	2-4.
X190	Platform LED J1 - 6 Position	AMP06P	--	2-10. (8D)	2-4.
X191	Platform LED J2 - 6 Position	AMP06P	--	2-10. (8D)	2-4.
X192	Speed Control Harness	--	--	2-10. (7G)	2-4.
X193	Platform Horn Switch	--	--	2-10. (7E)	2-4.
X194	Platform Axle Extent/Retract Switch - 6 Position	E06P	--	2-10. (7F)	2-4.
X195	Platform Level Override Switch - 6 Position	E06P	--	2-10. (7G)	2-4.
X196	Platform Steer Select Switch - 6 Position	E06P	--	2-10. (7F)	2-4.
X197	Controller Harness Assembly (Lift and Swing)	--	--	2-10. (5C)	2-4.
X198	Platform Drive Speed / Torque Select Switch - 6 Position	E06P	--	2-10. (7E)	2-4.
X199	Hyd Speed Pot passthru - 6 Position	AMP06P	--	2-10. (7G)	--
X200	Front Right Steer Angle Sensor - 3 Position	DT03P	DT03R	2-14. (2D)	2-9.
X201	Front Right Steer Passthru Connector, Gray - 4 Position	DT04P	DT04R	2-14. (2D)	--
X202	Front Left Steer Passthru Connector, Gray - 4 Position	DT04P	DT04R	2-14. (2D)	--
X203	Front Left Steer Angle Sensor - 3 Position	DT03P	DT03R	2-14. (2D)	2-9.
X204	Front Right Axle Limit Switch	--	--	2-14. (6G)	2-9.
X205	Front Left Axle Limit Switch	--	--	2-14. (7G)	2-9.
X206	Front Axles Extend Solenoid	DIN43650P	--	2-14. (8G)	2-9.
X207	Left Front Steer Right Solenoid	DIN43650P	--	2-14. (7G)	2-9.
X208	Right Front Steer Right Solenoid	DIN43650P	--	2-14. (7D)	2-9.
X209	Front Axles Retract Solenoid	DIN43650P	--	2-14. (7E)	2-9.
X210	Left Front Steer Left Solenoid	DIN43650P	--	2-14. (7E)	2-9.
X211	Right Front Steer Left Solenoid	DIN43650P	--	2-14. (7D)	2-9.
X212	Axle Lockout Solenoid	DIN43650P	--	2-14. (4G)	2-9.
X213	Axle Lockout Pressure Switch	DIN43650P	--	2-14. (2G)	2-9.
X214	2spd Solenoid	DIN43650P	--	2-14. (4F)	2-9.
X215	Brake Release Solenoid	DIN43650P	--	2-14. (4F)	2-9.
X216	Swivel Chassis Connector - 12 Position	DT12BR	DT12BP	2-14. (5G)	2-9.
X217	Not Used	--	--	--	--
X218	Not Used	--	--	--	--
X219	Right Rear Steer Left Solenoid	DIN43650P	--	2-14. (7C)	2-9.
X220	Left Rear Steer Left Solenoid	DIN43650P	--	2-14. (7C)	2-9.
X221	Rear Axles Retract Solenoid	DIN43650P	--	2-14. (7E)	2-9.
X222	Right Rear Steer Right Solenoid	DIN43650P	--	2-14. (7C)	2-9.
X223	Left Rear Steer Right Solenoid	DIN43650P	--	2-14. (7C)	2-9.
X224	Rear Axles Extend Solenoid	DIN43650P	--	2-14. (7E)	2-9.
X225	Left Rear Axle Limit Switch	--	--	2-14. (7G)	2-9.
X226	Right Rear Axle Limit Switch	--	--	2-14. (6G)	2-9.
X227	Ground Bus - 6 Position	DT06AP	--	2-14. (2F)	--
X228	Deleted in Newer revisions - 2 Position	DT02P	--	--	--
X229	Chassis Module J1 Connector, Gray - 12 Position	DT12AP	--	2-14. (5B)	2-9.
X230	Chassis Module J2 Connector, Black - 12 Position	DT12BP	--	2-14. (8G)	2-9.
X231	Chassis Module J3 Connector, Green - 12 Position	DT12CP	--	2-14. (4D)	2-9.
X232	Chassis Module J4 Connector, Gray - 8 Position	DT08AP	--	2-14. (1G)	2-9.
X233	Chassis Module J5 Connector, Brown - 12 Position	DT12DP	--	2-14. (8C)	2-9.
X234	Not Used	--	--	--	--

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ID	Description	End 1 ID	End 2 ID	Schematic	Figures
X235	Chassis Module Diagnostics Connector	AMP04R	--	2-14. (7A)	2-9.
X236	Rear Right Steer Passthru Connector, Gray - 4 Position	DT04P	DT04R	2-14. (2C)	--
X237	Rear Left Steer Passthru Connector, Gray - 4 Position	DT04P	--	2-14. (2C)	--
X238	Rear Left Steer Angle Sensor - 3 Position	DT03P	DT03R	2-14. (2C)	2-9.
X239	Rear Right Steer Angle Sensor - 3 Position	DT03P	DT03R	2-14. (2C)	2-9.
X240	EMR2 ECU Equipment Connector	AMP25RP	--	2-12. (3G)	2-6.
X241	EMR2 ECU Engine Connector	AMP25LP	--	2-12. (3G)	2-6.
X242	EMR2 Engine Diagnostics Connector	ITTC12P	--	2-12. (1F)	--
X243	EMR2 Capped 12 position Plug	DEUTZ12ENGR	--	--	--
X244	EMR2 16 position sensor passthru	DEUTZ16P	DEUTZ16R	--	--
X245	EMR2 12 position passthru	DEUTZ12R	DEUTZ12P	--	--
X246	Skypower Relay	--	--	2-12. (3B)	--
X247	Skypower Relay	--	--	2-12. (3B)	--
X248	Skypower Control Box	--	--	2-12. (3C)	--
X249	Skypower Control Box	--	--	--	--
X250	Skypower Generator	--	--	--	2-6.
X251	Skypower Generator	--	--	--	2-6.
X252	Skypower Distribution Box	--	--	--	--
X253	Skypower Outlet	--	--	--	--
X254	Skypower Outlet	--	--	--	--
X255	Skypower Outlet	--	--	--	--
X256	EMR2 charge air pressure - 4 position	DEUTZE	--	2-12. (3G)	--
X257	EMR2 engine oil pressure	--	--	2-12. (3G)	--
X258	EMR2 air filter pressure switch	DEUTZG	--	--	--
X259	Main Lift PVG unused (Gray)	AMPPVG4GP (Gray)	--	--	2-7.
X260	Tower Lift PVG unused (Gray)	AMPPVG4GP (Gray)	--	--	2-7.
X261	Tower Tele PVG unused (Gray)	AMPPVG4GP (Gray)	--	--	2-7.
X262	Load Pin CAN Pass thru - 3 position	DT03P	DT03R	--	2-7.
X263	Chassis Power - 2 position	DT02P	DT02R	2-12. (4C)	2-7.
X264	Generator Platform Box Pass Thru	--	--	--	--
X265	Generator Platform Box Pass Thru	--	--	--	--
X266	Chassis Power Relay	BOSCH05P	--	2-12. (3C)	--
X267	Chassis Power Fuse	--	--	2-12. (2C)	--
X268	CAN pass thru for EMR2 - 3 position	DT03P	DT03R	2-13. (1D)	2-7.
X269	CAN 3way - to BLAM, Blue	DT03P032BP (Blue)	--	2-12. (7B)	2-8.
X270	CAN 3way - to Platform, Blue	DT03P032BP (Blue)	--	2-12. (7B)	2-8.

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2.2 BLAM MODULE CONNECTOR PINOUTS

Table 2-8. X086 (J1) BLAM Module Pinout

Pin	Function	Type	Range (V)
1	Not Used	Input	--
2	Not Used	Input	--
3	Not Used	Input	--
4	Ground	Ground	0VDC
5	V Bat	Battery	Vbatt
6	CAN HI	Input/Output	Comm
7	CAN LO	Input/Output	Comm
8	CAN Shield	Ground	0VDC
9	CAN Termination Connection	Input/Output	Comm
10	CAN Termination Connection	Input/Output	Comm
11	V Bat	Battery	Vbatt
12	Ground	Ground	0VDC

Table 2-9. X087 (J2) BLAM Module Pinout

Pin	Function	Type	Range (V)
1	Not Used	Input	--
2	Not Used	Input	--
3	Ground	Ground	0VDC
4	Not Used	Input	--
5	Basket Rotate Right	Input	Vbatt
6	Basket Rotate Left	Input	Vbatt
7	Spare Input	Input	--
8	Tower Boom Angle 1	Input/Output	Comm
9	Tower Boom Angle 2	Input/Output	Comm
10	Spare Analog Input	Input	--
11	Right Drive Pump Forward	Output	PWM
12	Right Drive Pump Reverse	Output	PWM

Table 2-10. X088 (J3) BLAM Module Pinout

Pin	Function	Type	Range (V)
1	Reference Voltage	Other Voltage	5VDC
2	Reference Voltage From J3-1	Analog Input	5VDC
3	Ground	Ground	0VDC
4	Reference Voltage	Other Voltage	5VDC
5	Tower Boom Cylinder Angle	Analog Input	5VDC
6	Ground	Ground	0VDC
7	Reference Voltage	Other Voltage	5VDC
8	Tower Boom Length Sensor 1	Analog Input	5VDC
9	Ground	Ground	0VDC
10	Reference Voltage	Other Voltage	5VDC
11	Tower Boom Length Sensor 2	Analog Input	5VDC
12	Ground	Ground	0VDC

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Table 2-11. X089 (J4) BLAM Module Pinout

Pin	Function	Type	Range (V)
1	V Bat	Battery	Vbatt
2	Ground	Ground	0VDC
3	CAN HI	Input/Output	Comm
4	CAN LO	Input/Output	Comm
5	CAN Shield	Ground	0VDC
6	Bootstrap Pin	--	--
7	Not Used	--	--
8	Not Used	--	--

Table 2-12. X090 (J5) BLAM Module Pinout

Pin	Function	Type	Range (V)
1	Left Drive Pump Forward	Output	PWM
2	Left Drive Pump Reverse	Output	PWM
3	Oscillating Axles	Output	PWM
4	Tower Boom Transport Angle	Output	PWM
5	Spare Output	Output	PWM
6	Spare Output	Output	PWM
7	Spare Output	Output	PWM
8	Spare Output	Output	PWM
9	Analyzer Power	Other Voltage	Vbatt
10	RS232 Receive	Input/Output	Comm
11	RS232 Transmit	Input/Output	Comm
12	Ground	Ground	0VDC

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2.3 CHASSIS MODULE CONNECTOR PINOUTS

Table 2-13. X229 (J1) Chassis Module Pinout

Pin	Function	Type	Range (V)
1	Not Used	--	--
2	Not Used	--	--
3	Not Used	--	--
4	Main Ground	Ground	0VDC
5	Main Ignition	Vbatt	Vbatt
6	CAN HI	Input/Output	Comm
7	CAN LOW	Input/Output	Comm
8	CAN Shield	Input/Output	0VDC
9	CAN Terminator (Connected to J1-10)	Input/Output	Comm
10	CAN Terminator (Connected to J1-9)	Input/Output	Comm
11	Ignition	Vbatt	Vbatt
12	Not used	--	--

Table 2-14. X230 (J2) Chassis Module Pinout

Pin	Function	Type	Range (V)
1	Not Used	--	--
2	Not Used	--	--
3	Ground	Ground	0VDC
4	Front Axle Extend Limit Switches	Input	Vbatt
5	Rear Axle Extend Limit Switches	Input	Vbatt
6	Drive Orientation Switch	Input	Vbatt
7	Axle Lockout Pressure Switch	Input	Vbatt
8	Not Used	--	--
9	Not Used	--	--
10	Not Used	--	--
11	Axle Extend	Output	Vbatt
12	Axle Retract	Output	Vbatt

Table 2-15. X231 (J3) Chassis Module Pinout

Pin	Function	Type	Range (V)
1	Reference Voltage	Other Voltage	5VDC
2	Front Right Steer Angle Sensor	Analog Input	0 - 5VDC
3	Ground	Ground	0VDC
4	Reference Voltage	Other Voltage	5VDC
5	Front Left Steer Angle Sensor	Analog Input	0 - 5VDC
6	Ground	Ground	0VDC
7	Reference Voltage	Other Voltage	5VDC
8	Rear Right Steer Angle Sensor	Analog Input	0 - 5VDC
9	Ground	Ground	0VDC
10	Reference Voltage	Other Voltage	5VDC
11	Rear Left Steer Angle Sensor	Analog Input	0 - 5VDC
12	Ground	Ground	0VDC

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Table 2-16. X232 (J4) Chassis Module Pinout

Pin	Function	Type	Range (V)
1	Axle Lockout Pressure Switch Power	Vbatt	Vbatt
2	Axle Lockout Solenoid	Ground	0VDC
3	Not Used	--	--
4	Not Used	--	--
5	Not Used	--	--
6	Not Used	--	--
7	Not Used	--	--
8	Not Used	--	--

Table 2-17. X233 (J5) Chassis Module Pinout

Pin	Function	Type	Range (V)
1	Right Front Steer Right Solenoid	Output	Vbatt
2	Right Front Steer Left Solenoid	Outupt	Vbatt
3	Left Front Steer Right Solenoid	Output	Vbatt
4	Left Front Steer Left Solenoid	Output	Vbatt
5	Right Rear Steer Right Solenoid	Output	Vbatt
6	Right Rear Steer Left Solenoid	Output	Vbatt
7	Left Rear Steer Right Solenoid	Output	Vbatt
8	Left Rear Steer Left Solenoid	Output	Vbatt
9	Analyzer Power	Vbatt	Vbatt
10	Analyzer RS-232 Receive	Input	Comm
11	Analyzer RS-232 Transmit	Output	Comm
12	Analyzer Ground	Ground	0VDC

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2.4 GROUND MODULE CONNECTOR PINOUTS

Table 2-18. X001 (J1) Ground Module Pinout

Pin	Function	Type	Range (V)
1	Throttle Actuator (Diesel Only)	Output	PWM
2	Not Used	Output	--
3	Tower Boom Lift Power	Output	Vbatt
4	Ground	Ground	0VDC
5	Ground	Ground	0VDC
6	Tower Telescope Enable	Output	Vbatt
7	Not Used	Output	--
8	Ground	Ground	0VDC
9	Ground	Ground	0VDC
10	Ignition On Relay	Output	Vbatt
11	Start Solenoid (Diesel Only)	Output	Vbatt
12	Glow Plug (Diesel Only Option)	Output	Vbatt
13	Auxiliary Power	Output	Vbatt
14	Coolant Temp (Diesel Only)	Input	Vbatt
15	Oil Pressure (Diesel Only)	Input	Vbatt
16	Flywheel Speed Pickup (Diesel Only)	Input	Freq
17	Ground	Ground	0VDC
18	Spare Ground	Ground	0VDC
19	Spare Ground	Ground	0VDC
20	Two Speed	Output	Vbatt
21	Main Lift Pilot Pressure Switch	Input	Vbatt
22	Generator/Welder (Option)	Output	Vbatt
23	Parking Brake	Output	Vbatt
24	Constant Battery	Battery	Vbatt
25	RS-485 Hi	Input/Output	Comm
26	RS-485 Lo	Input/Output	Comm
27	Ground	Ground	0VDC
28	Analyzer Power	Other Voltage	9.5VDC
29	Analyzer RS-232 Rx	Input	Comm
30	Analyzer RS-232 Tx	Output	Comm
31	Analyzer Ground	Ground	0VDC
32	Alternator Excitation	Output	--
33	Ground Shield	Ground	0VDC
34	Spare	Input	--
35	Hydraulic Oil Temperature Switch	Input	Vbatt

Table 2-19. X002 (J2) Ground Module Pinout

Pin	Function	Type	Range (V)
1	Main Lift Pilot	Output	Vbatt
2	Horn	Output	Vbatt
3	Platform Control Valve	Output	Vbatt
4	Main Telescope In	Output	Vbatt
5	Basket Level Up Override	Output	Vbatt
6	Ground	Ground	0VDC
7	Basket Level Down Override	Output	Vbatt
8	Tower Telescope Power	Output	PWM

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Table 2-19. X002 (J2) Ground Module Pinout

Pin	Function	Type	Range (V)
9	Main Telescope Flow Control	Output	PWM
10	Main Boom Angle Sensor #1 Power	Output	Vbatt
11	Main Lift Boom Power	Output	PWM
12	Tower Boom Lift Pilot	Output	Vbatt
13	Main Dump	Output	Vbatt
14	Ground	Ground	0VDC
15	RS232 Backup Comm. Enable	Output	Vbatt
16	Main Telescope Out	Output	Vbatt
17	Ground	Ground	Vbatt
18	Spare Pin	Ground	--
19	Spare	Output	--
20	Spare	Output	--
21	Main Boom Angle Sensor #2 Power	Output	PWM
22	spare	Output	--
23	Main Boom Lift Enable	Output	Vbatt
24	Spare	Input	--
25	Fuel Sensor	Input	Vbatt
26	Head/Tail Light	Output	Vbatt
27	Alarm	Output	Vbatt
28	Spare Pin	Ground	--
29	Ground	Ground	0VDC
30	Ground	Ground	0VDC
31	PVG Enable	Output	Vbatt
32	Tower Boom Telescope Pilot	Output	Vbatt
33	Tower Boom Lift Enable	Output	Vbatt
34	Swing Left	Output	PWM
35	Swing Right	Output	PWM

Table 2-20. X004 (J4) Ground Module Pinout

Pin	Function	Type	Range (V)
1	Axles Set Lamp	Output	Vbatt
2	500# Capacity Lamp	Output	Vbatt
3	Boom Control System Lamp	Output	Vbatt
4	Start Switch	Input	Vbatt
5	Basket Level Down	Input	Vbatt
6	Dual Capacity Switch #2 Input	Input	Vbatt
7	Upper Telescope In	Input	Vbatt
8	Jib Down	Input	Vbatt
9	Jib Left	Input	Vbatt
10	Tower Up	Input	Vbatt
11	Main Boom Transport Angle Open	Input	Vbatt
12	Hour Meter	Output	Vbatt
13	BCS Calibrated Lamp	Output	Vbatt
14	Overload Lamp	Output	Vbatt
15	Spare	Output	Vbatt
16	Auxiliary Power	Input	Vbatt
17	Basket Level Up	Input	Vbatt

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Table 2-20. X004 (J4) Ground Module Pinout

Pin	Function	Type	Range (V)
18	Dual Capacity Switch #1 Input	Input	Vbatt
19	Jib Up	Input	Vbatt
20	Jib Right	Input	Vbatt
21	Tower Down	Input	Vbatt
22	Main Boom Transport Angle Closed	Input	Vbatt
23	Main Boom Lift Up	Input	Vbatt
24	V Bat	Battery	Vbatt
25	V Bat	Battery	Vbatt
26	No Charge Lamp	Output	Vbatt
27	1000# Capacity Lamp	Output	Vbatt
28	Engine High Temperature Lamp	Output	Vbatt
29	Engine Low Oil Pressure Lamp	Output	Vbatt
30	Upper Telescope Out	Input	Vbatt
31	Ground	Ground	0VDC
32	Spare Pin	Ground	0VDC
33	Main Boom Lift Down	Input	Vbatt
34	Swing Left	Input	Vbatt
35	Swing Right	Input	Vbatt

Table 2-21. X007 (J7) Ground Module Pinout

Pin	Function	Type	Range (V)
1	Platform EMS	Input	Vbatt
2	Platform Mode	Input	Vbatt
3	Ground Mode	Input	Vbatt
4	Spare	Input	--
5	Reference Voltage	Other Voltage	7VDC
6	CAN Termination	Ground	Comm
7	Spare	Input	--
8	Spare Analog Input 2	Input	--
9	Ground	Ground	0VDC
10	Ground	Ground	0VDC
11	Tower Boom Transport Length Closed	Input	Vbatt
12	Main Boom Transport Length #1 Closed	Input	Vbatt
13	CAN Hi	Input/Output	Comm
14	Ground Mode Out to Platform	Input	Vbatt
15	Footswitch Engage	Input	Vbatt
16	Reference Voltage	Other Voltage	7VDC
17	CAN Termination	Ground	Comm
18	CAN Shield	Ground	0VDC
19	Spare Pin	Ground	--
20	Spare Analog Input 1	Input	--
21	Main Boom Transport Length #2 Open	Input	Vbatt
22	Tower Boom Transport Angle	Input	Vbatt
23	Ground Control Enable	Input	Vbatt
24	CAN Lo	Input/Output	Comm
25	Ground	Ground	0VDC
26	Reference Voltage	Other Voltage	7VDC

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Table 2-21. X007 (J7) Ground Module Pinout

Pin	Function	Type	Range (V)
27	Reference Voltage	Other Voltage	7VDC
28	Ground	Ground	0VDC
29	V Bat	Battery	Vbatt
30	V Bat	Battery	Vbatt
31	V Bat	Battery	Vbatt
32	V Bat	Battery	Vbatt
33	V Bat	Battery	Vbatt
34	V Bat	Battery	Vbatt
35	Tower Boom Transport Length Open	Input	Vbatt

Table 2-22. X008 (J8) Ground Module Pinout

Pin	Function	Type	Range (V)
1	Ground from Battery	Ground	0VDC
2	Ground EMS	Output	Vbatt
3	Ground to Platform	Ground	0VDC
4	Ground EMS Out to Platform	Output	Vbatt

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2.5 PLATFORM MODULE CONNECTOR PINOUTS

Table 2-23. X165 (J1) Platform Module Pinout

Pin	Function	Type	Range (V)
1	Tower Lift Up	Input	Vbatt
2	Tower Lift Down	Input	Vbatt
3	Not Used	--	--
4	Not Used	--	--
5	Main Telescope In	Input	Vbatt
6	Main Telescope Out	Input	Vbatt
7	Basket Rotate Right	Input	Vbatt
8	Basket Rotate Left	Input	Vbatt
9	Basket Level Up	Input	Vbatt
10	Basket Level Down	Input	Vbatt
11	Jib Up	Input	Vbatt
12	Jib Down	Input	Vbatt
13	Pump Potentiometer Return	Ground	0VDC
14	Start Switch	Input	Vbatt
15	Auxiliary Switch	Input	Vbatt
16	Crab Steer Select	Input	Vbatt
17	Coordinated Steer Select	Input	Vbatt
18	Switch Input Battery	Vbatt	Vbatt
19	Inline Limit Switch	Input	Vbatt
20	LSS Platform Overload	Input	Vbatt
21	500/1000 # Capacity Select	Input	Vbatt
22	Not Used	--	--
23	Axle Extend	Input	Vbatt
24	Axle Retract	Input	Vbatt
25	Serial Tilt Sensor Input 1	Input/Output	Comm
26	Serial Tilt Sensor input 2	Input/Output	Comm
27	Two Speed	Input	Vbatt
28	Engine Speed	Input	Vbatt
29	Soft Touch Override Switch	Input	Vbatt
30	Head/Tail Light Switch	Input	Vbatt
31	Horn	Input	Vbatt
32	Creep Switch	Input	Vbatt
33	Not Used	--	--
34	Pump Potentiometer Ref. Voltage	Other Voltage	7VDC
35	Pump Potentiometer	Input	0 - 7 VDC

Table 2-24. X166 (J2) Platform Module Pinout

Pin	Function	Type	Range (V)
1	Jib Right	Input	Vbatt
2	Jib Left	Input	Vbatt
3	Switch Input Battery	Vbatt	Vbatt
4	Drive Orientation Override Switch	Input	Vbatt
5	Basket Stow Switch	Input	Vbatt
6	Tilt Lamp	Output	Vbatt
7	Enable Lamp	Output	Vbatt
8	System Distress/Fault Lamp	Output	Vbatt

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Table 2-24. X166 (J2) Platform Module Pinout

Pin	Function	Type	Range (V)
9	Creep Lamp	Output	Vbatt
10	Not Used	--	--
11	Overload Lamp	Output	Vbatt
12	500# Capacity Lamp	Output	Vbatt
13	1000# Capacity Lamp	Output	Vbatt
14	Axle Set Lamp	Output	Vbatt
15	Generator On Lamp	Output	Vbatt
16	Soft Touch Lamp	Output	Vbatt
17	Glow Plug Lamp	Output	Vbatt
18	Lamp Return	Ground	0VDC
19	Boom Control System Warning Lamp	Output	Vbatt
20	Auto Leveling System Lamp	Output	Vbatt
21	Not Used	--	--
22	Fuel 1/4 Full Lamp	Output	Vbatt
23	Fuel 3/4 Full Lamp	Output	Vbatt
24	Fuel 1/2 Full Lamp	Output	Vbatt
25	Fuel Lamp Return	Output	Vbatt
26	Analyzer PWR	Vbatt	Vbatt
27	Analyzer Ground	Ground	0VDC
28	Analyzer RS232 Receive	Input/Output	Comm
29	Analyzer RS232 Transmit	Input/Output	Comm
30	Drive Orientation Lamp	Output	Vbatt
31	Not Used	--	--
32	Battery	Vbatt	Vbatt
33	Battery	Vbatt	Vbatt
34	Switch Input Battery	Vbatt	Vbatt
35	Fuel Full Lamp	Output	Vbatt

Table 2-25. X167 (J5) Platform Module Pinout

Pin	Function	Type	Range (V)
1	Swing & Lift Joystick Supply	Vref	7VDC
2	Lift Center Tap	Input	0 - 7VDC
3	Lift Signal	Input	0 - 7VDC
4	Swing Signal	Input	0 - 7VDC
5	Swing Center Tap	Input	0 - 7VDC
6	Not Used	--	--
7	Ground	Ground	0VDC
8	Not Used	--	--

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Table 2-26. X168 (J6) Platform Module Pinout

Pin	Function	Type	Range (V)
1	Steer & Drive Joystick Supply	Vref	7VDC
2	Drive Center Tap	Input	0 - 7VDC
3	Drive Signal	Input	0 - 7VDC
4	Not Used	--	--
5	Steer Left	Input	0 - 7VDC
6	Steer Right	Input	0 - 7VDC
7	Ground	Ground	0VDC
8	Not Used	--	--

Table 2-27. X169 (J7) Platform Module Pinout

Pin	Function	Type	Range (V)
1	GND Mode Switch	Input	Vbatt
2	Platform EMS Switch	Input	Vbatt
3	Platform EMS to GND Module	Input	Vbatt
4	Not Used	--	--
5	Rotate Left	Output	PWM
6	Rotate Right	Output	PWM
7	Not Used	--	--
8	Footswitch Disengage	Input	Vbatt
9	Generator On	Input	Vbatt
10	Not used	--	--
11	Not Used	--	--
12	Not Used	--	--
13	Not Used	--	--
14	Not Used	--	--
15	Basket Level Up	Output	PWM
16	Basket Level Down	Output	PWM
17	Jib Block Limit Switch	Input	Vbatt
18	Soft Touch Limit Switch	Input	Vbatt
19	Platform Alarm	Output	Vbatt
20	Platform Alarm Return	Ground	0VDC
21	Primary Tilt Sensor Ground	Ground	0VDC
22	Not used	--	--
23	Not used	--	--
24	Not used	--	--
25	Jib Up	Output	PWM
26	Jib Down	Output	PWM
27	Jib Right	Output	PWM
28	Jib Left	Output	PWM
29	Digital Output Return	Ground	0VDC
30	CAN LO	Input/Output	Comm
31	CAN HI	Input/Output	Comm
32	CAN Shield	Ground	0VDC
33	Secondary Tilt Sensor Ground	Ground	0VDC
34	Not Used	--	--
35	Not Used	--	--

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Table 2-28. X170 (J8) Platform Module Pinout

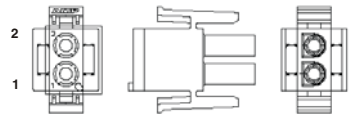
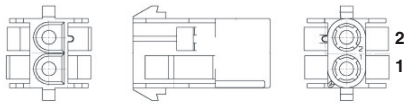
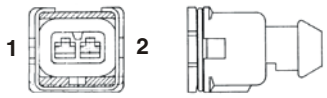
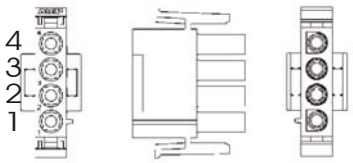
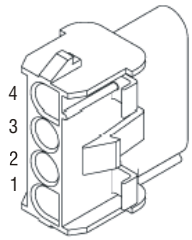
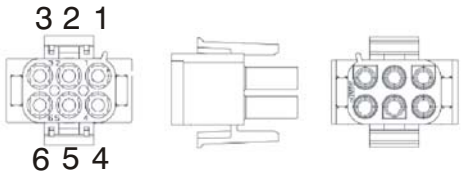
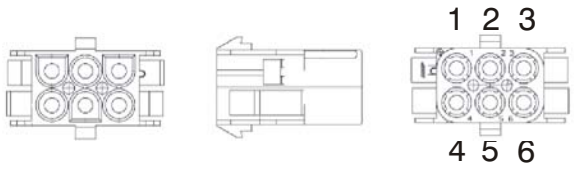
Pin	Function	Type	Range (V)
1	Ground from Ground Module	Ground	0VDC
2	Ground EMS	Ground	0VDC

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2.6 CONNECTOR LOADING DIAGRAMS

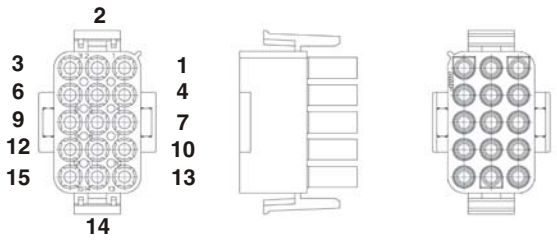
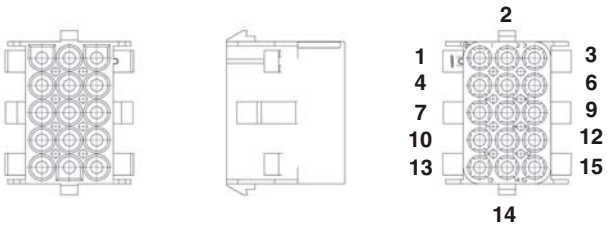
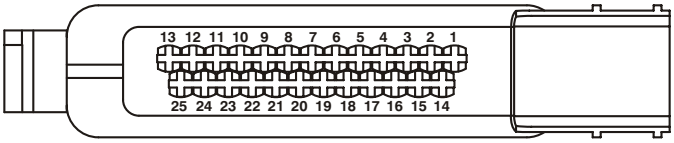
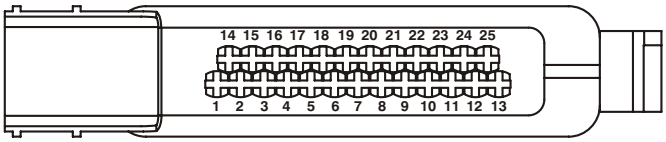
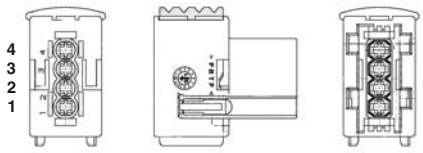
Table 2-29. Connector Loading Diagrams

ID	Description	Diagram
AMP02P	Amp 2 position plug	
AMP02R	Amp 2 position receptacle	
AMPJT826008P	Amp 2 position plug	
AMP04P	Amp 4 position plug	
AMP04R	Amp 4 position receptacle	
AMP06P	Amp 6 position plug	
AMP06R	Amp 6 position receptacle	

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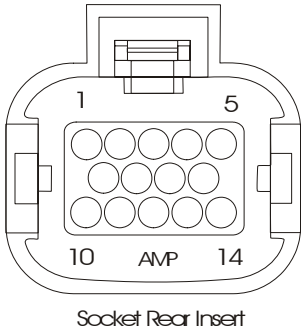
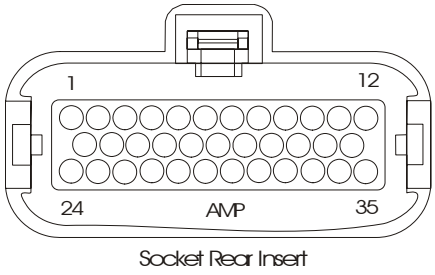
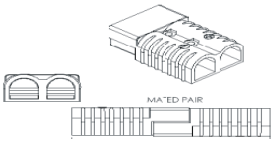
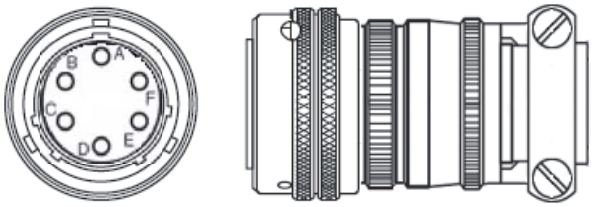
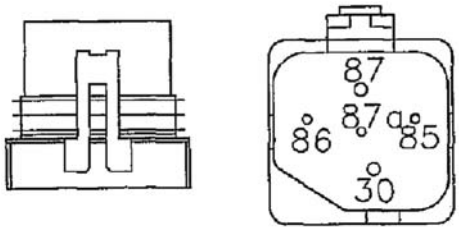
Table 2-29. Connector Loading Diagrams

ID	Description	Diagram
AMP08BP	Amp 8 position black plug	
AMP08NP	Amp 8 position natural plug	
AMP15P	Amp 15 position plug	
AMP15R	Amp 15 position receptacle	
AMP25LP	Amp Rectangular 25 position plug with key for left	
AMP25RP	Amp Rectangular 25 position plug with key for right	
AMPPVG4P (Black) AMPPVG4GP (Gray)	Amp PVG Valve 4 position plug	

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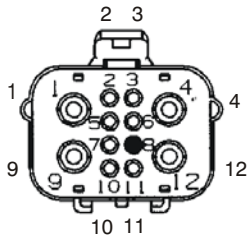
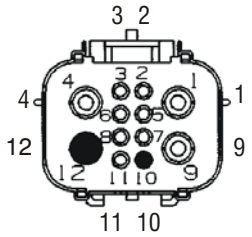
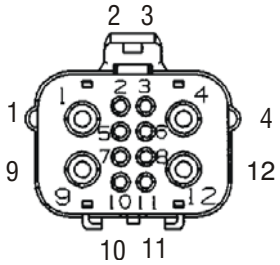
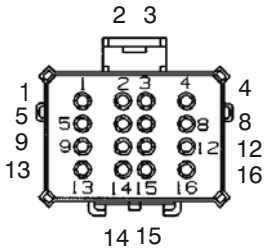
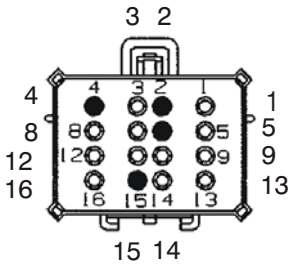
Table 2-29. Connector Loading Diagrams

ID	Description	Diagram
AMP14P	Ampseal 14 position	
AMP351P (Black) AMP352P (Neutral) AMP354P (Gray) AMP355P (Blue)	Ampseal 35 position	
AN350P	Anderson Power Connector	
ANL06P	Amphenol 6 Position Sealed Plug	
BOSCH05P	Bosch Relay Sealed Plug	

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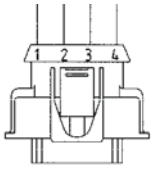
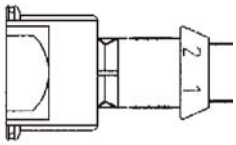
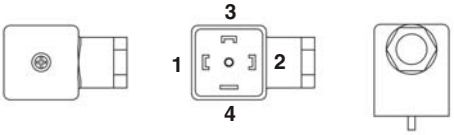
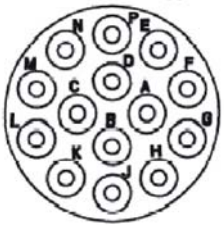
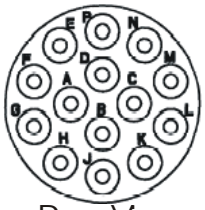
Table 2-29. Connector Loading Diagrams

ID	Description	Diagram
DEUTZ12ENGR	Deutz Supplied 12 position receptacle	
DEUTZ12P	Deutz Supplied 12 position plug	
DEUTZ12R	Deutz Supplied 12 position receptacle	
DEUTZ16P	Deutz Supplied 16 position plug	
DEUTZ16R	Deutz Supplied 16 position receptacle	

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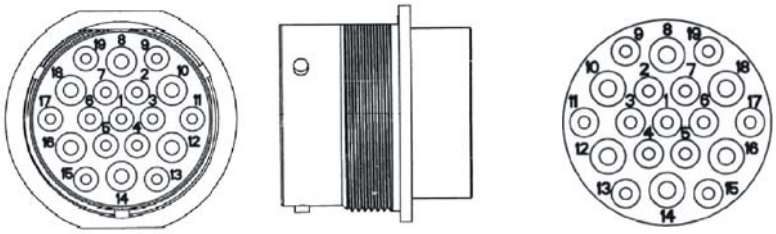
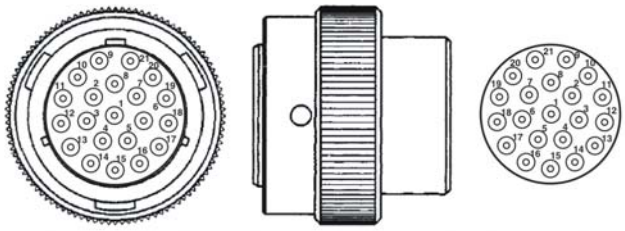
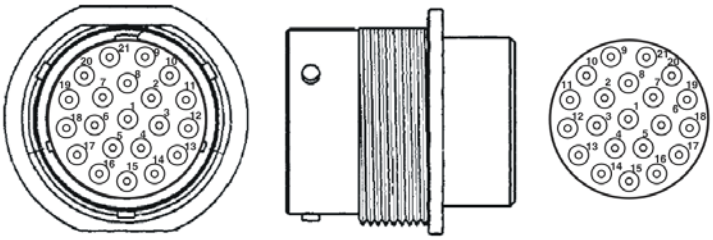
Table 2-29. Connector Loading Diagrams

ID	Description	Diagram
DEUTZE	Deutz Supplied 4 position charge air pressure sensor Plug	
DEUTZG	Deutz Supplied 2 position air filter pressure switch Receptacle	
DIN43650P	Din 43650 4 position plug	
DHD14P	Deutsch 14 position HD series alum. Plug	 Rear View
DHD14R	Deutsch 14 position HD series alum. Receptacle	 Rear View

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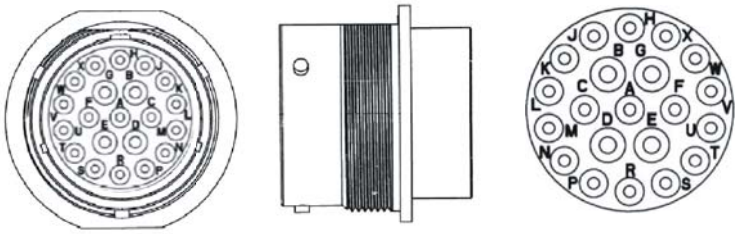
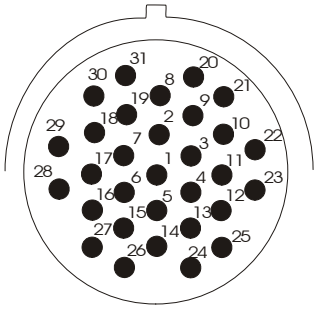
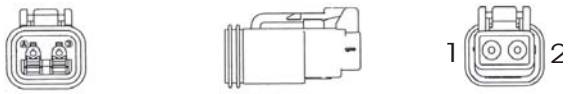
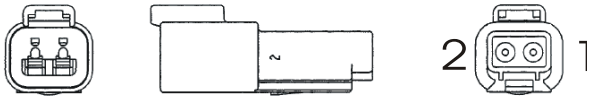
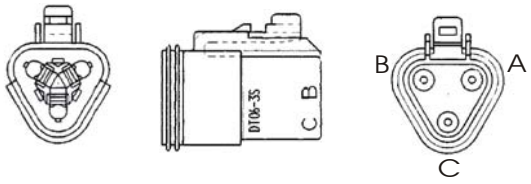
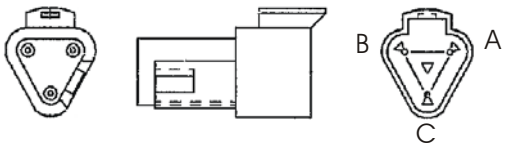
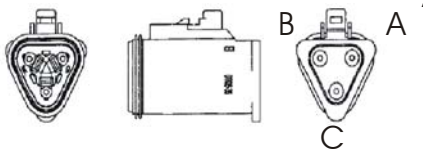
Table 2-29. Connector Loading Diagrams

ID	Description	Diagram
DHD19P	Deutsch 19 position HD series alum. Plug	
DHD19R	Deutsch 19 position HD series alum. Receptacle	
DHD1821P	Deutsch 21 position HD series alum. Plug	
DHD1821R	Deutsch 21 position HD series alum. Receptacle	
DHD21P	Deutsch 21 position HD series alum. Plug	

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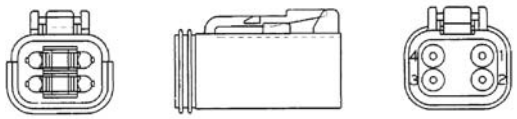
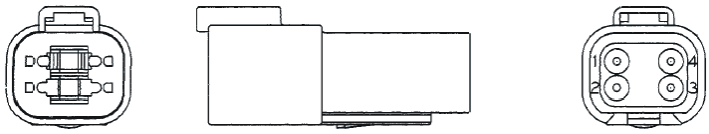
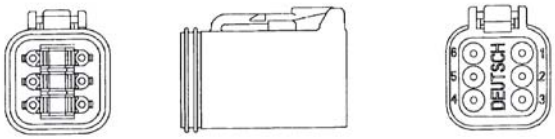
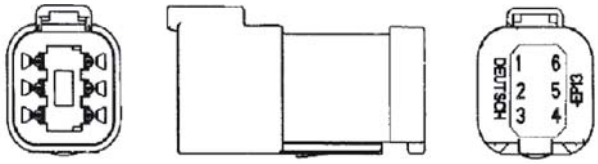
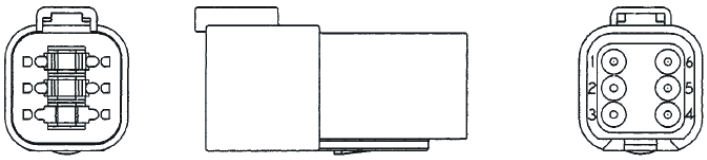
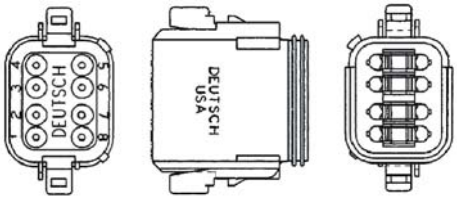
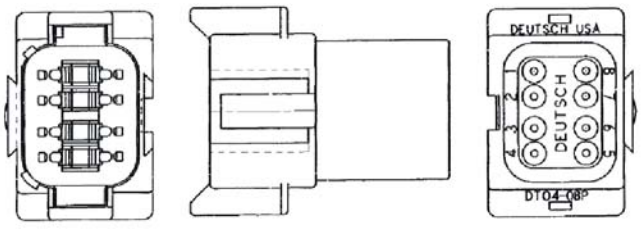
Table 2-29. Connector Loading Diagrams

ID	Description	Diagram
DHD21R	Deutsch 21 position HD series alum. Receptacle	
DHTP31R (receptacle) DHTP31P (plug)	Deutsch HDP 31 position	 Socket Rear Insert
DT02P	Deutsch 2 position DT series plug	
DT02R	Deutsch 2 position DT series receptacle	
DT03P	Deutsch 3 position DT series plug	
DT03R	Deutsch 3 position DT series receptacle	
DT03P032GP (Green) DT03P032BP (Blue)	Deutsch 3 position DT series plug with over-mold adaptor	

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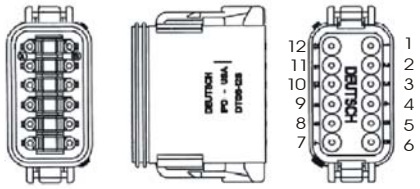
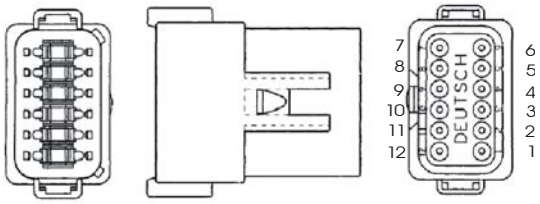
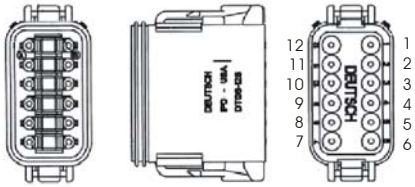
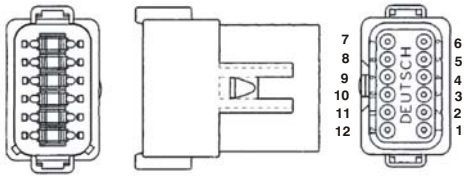
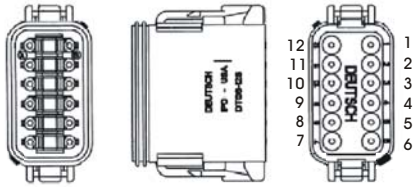
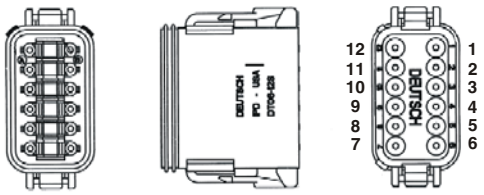
Table 2-29. Connector Loading Diagrams

ID	Description	Diagram
DT04P	Deutsch 4 position DT series plug	
DT04R	Deutsch 4 position DT series receptacle	
DT06AP	Deutsch 6 position DT series plug	
DT06EP032R	Deutsch 6 position bus receptacle	
DT06R	Deutsch 6 position DT series receptacle	
DT08AP	Deutsch 8 position DT series plug with A keys	
DT08AR	Deutsch 8 position DT series receptacle with A keys	

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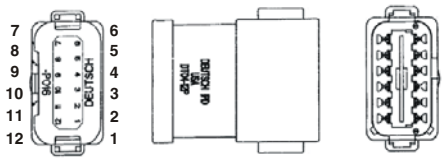
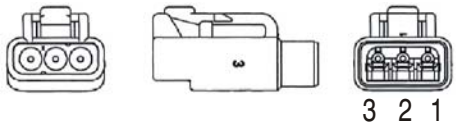
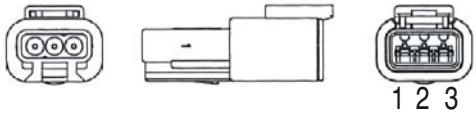
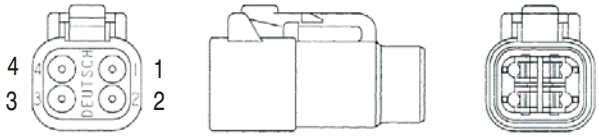
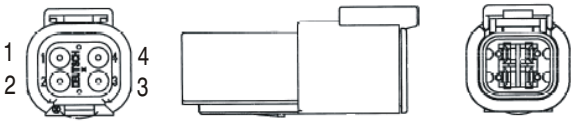
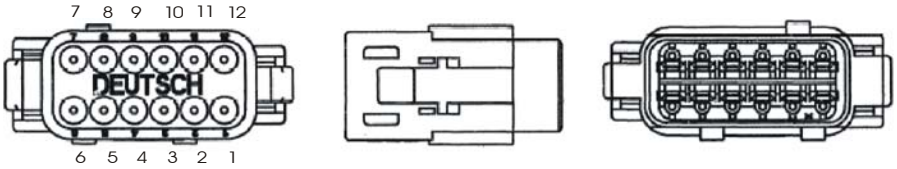
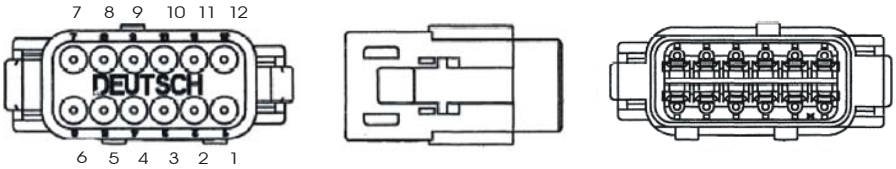
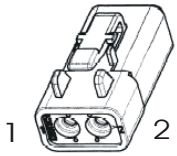
Table 2-29. Connector Loading Diagrams

ID	Description	Diagram
DT12AP	Deutsch 12 position DT series plug with A keys	
DT12AR	Deutsch 12 position DT series receptacle with A keys	
DT12BP	Deutsch 12 position DT series plug with B keys	
DT12BR	Deutsch 12 position DT series receptacle with B keys	
DT12CP	Deutsch 12 position DT series plug with C keys	
DT12DP	Deutsch 12 position DT series plug with D keys	

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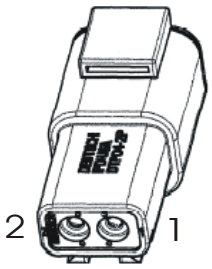
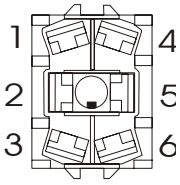
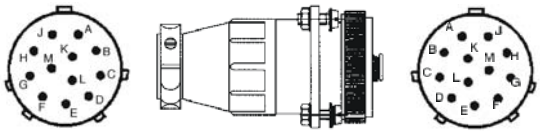
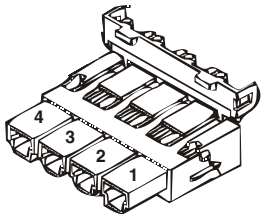
Table 2-29. Connector Loading Diagrams

ID	Description	Diagram
DT12PBR	Deutsch 12 position bus receptacle	
DTM03P	Deutsch 3 position DTM series mini plug	
DTM03R	Deutsch 3 position DTM series mini receptacle	
DTM04P	Deutsch 4 position DTM series mini plug	
DTM04R	Deutsch 4 position DTM series mini receptacle	
DTM12AP	Deutsch 12 position DT series mini plug with A key	
DTM12BP	Deutsch 12 position DT series mini plug with B key	
DTP02P	Deutsch 2 position DTP series plug	

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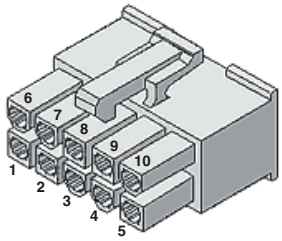
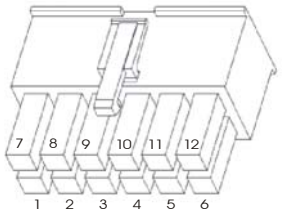
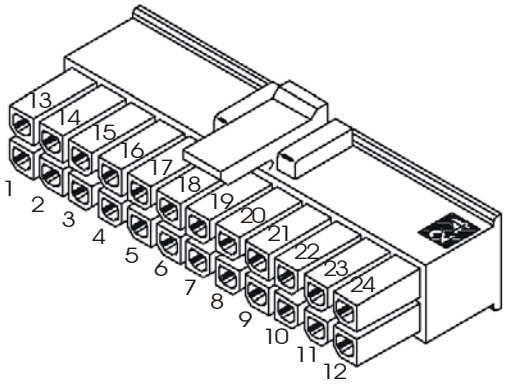
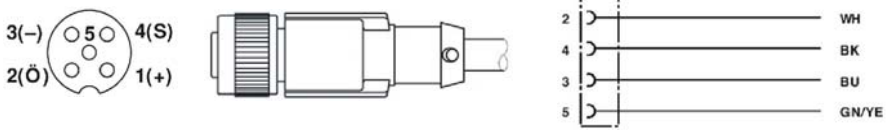
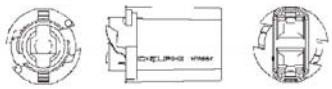
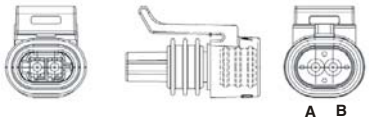
Table 2-29. Connector Loading Diagrams

ID	Description	Diagram
DTP02R	Deutsch 2 position DTP series receptacle	
E06P	Eaton Toggle Switch	
ITTC12P	ITT Cannon 12 position plug	
MMF02P	Molex 2 position plug	
MMF04P	Molex 4 position plug	
MMF08P	Molex Mini Fit 8 position plug	

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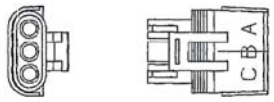
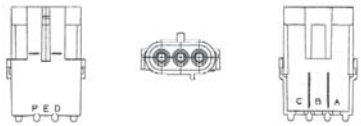
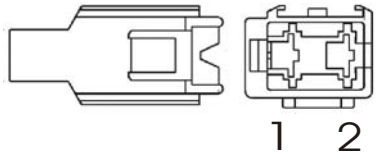
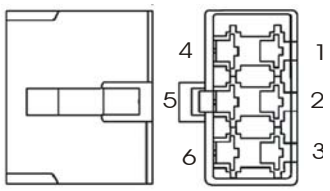
Table 2-29. Connector Loading Diagrams

ID	Description	Diagram
MMF10P	Molex Mini Fit 10 position plug	
MMF12P	Molex Mini Fit 12 position plug	
MMF24P	Molex Mini Fit 24 position plug	
PHEONIX5P	Pheonix 5 position M-12 Plug	
PACKARD2LR	Packard Light Receptacle	
PACKARD2P	Packard 2 position plug	

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Table 2-29. Connector Loading Diagrams

ID	Description	Diagram
PACKARD3P	Packard 3 position receptacle	
PACKARD3R	Packard 3 position receptacle	
SUM02N	Sumitomo 2 position natural	
SUM06N	Sumitomo 6 position natural	

2.7 WORKING WITH AMP CONNECTORS

Applying Silicone Dielectric Compound to AMP Connectors

Silicone Dielectric Compound must be used on the AMP connections for the following reasons:

- To prevent oxidation at the mechanical joint between male and female pins.
- To prevent electrical malfunction caused by low level conductivity between pins when wet.

Use the following procedure to apply Silicone Dielectric Compound to the electrical connectors.

1. To prevent oxidation and low level conductivity, silicone dielectric grease must be packed completely around male and female pins on the inside of the connector after the mating of the housing to the header. This is easily achieved by using a syringe to fill the header with silicone dielectric compound, to a point just above the top of the male pins inside the header. When assembling the housing to the header, it is possible that the housing will become air locked, thus preventing the housing latch from engaging.
2. Pierce one of the unused wire seals to allow the trapped air inside the housing to escape.
3. Install a hole plug into this and/or any unused wire seal that has silicone dielectric compound escaping from it.

Assembly

Check to be sure the wedge lock is in the open, or as-shipped, position (See Figure 2-17. Connector Assembly Figure 1). Proceed as follows:

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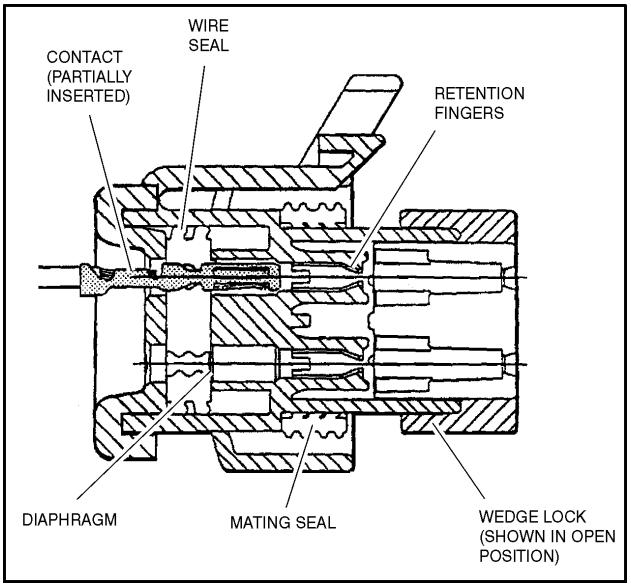


Figure 2-17. Connector Assembly Figure 1

1. To insert a contact, push it straight into the appropriate circuit cavity as far as it will go (See Figure 2-19. Connector Assembly Figure 2).
2. Pull back on the contact wire with a force of 1 or 2 lbs. to be sure the retention fingers are holding the contact (See Figure 2-19. Connector Assembly Figure 2).

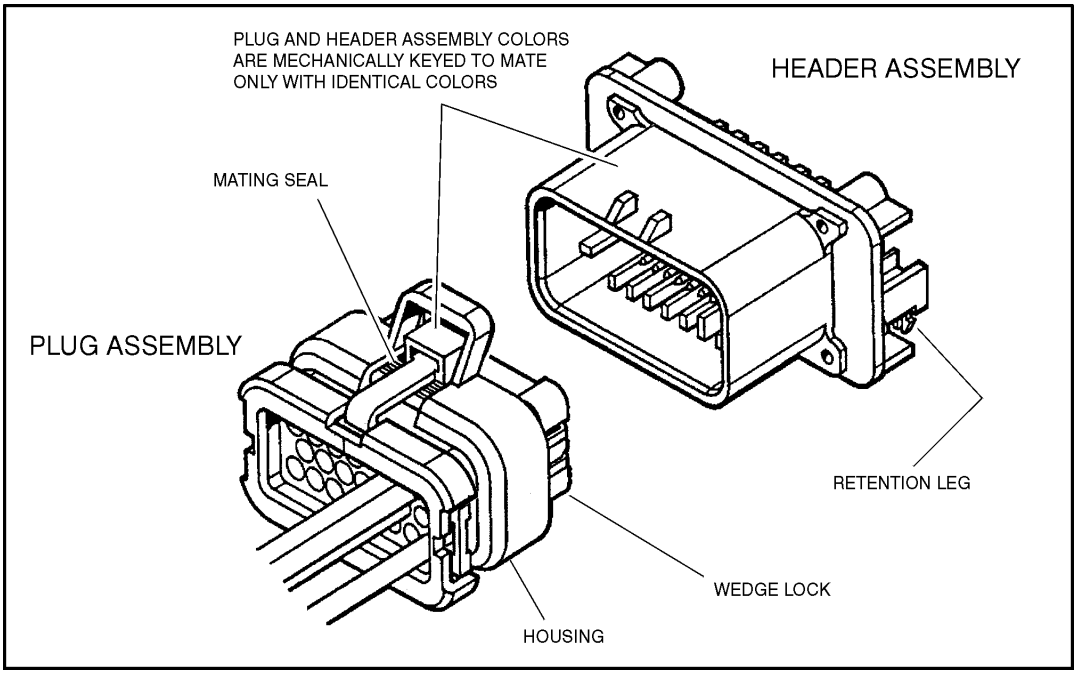


Figure 2-18. AMP Connector

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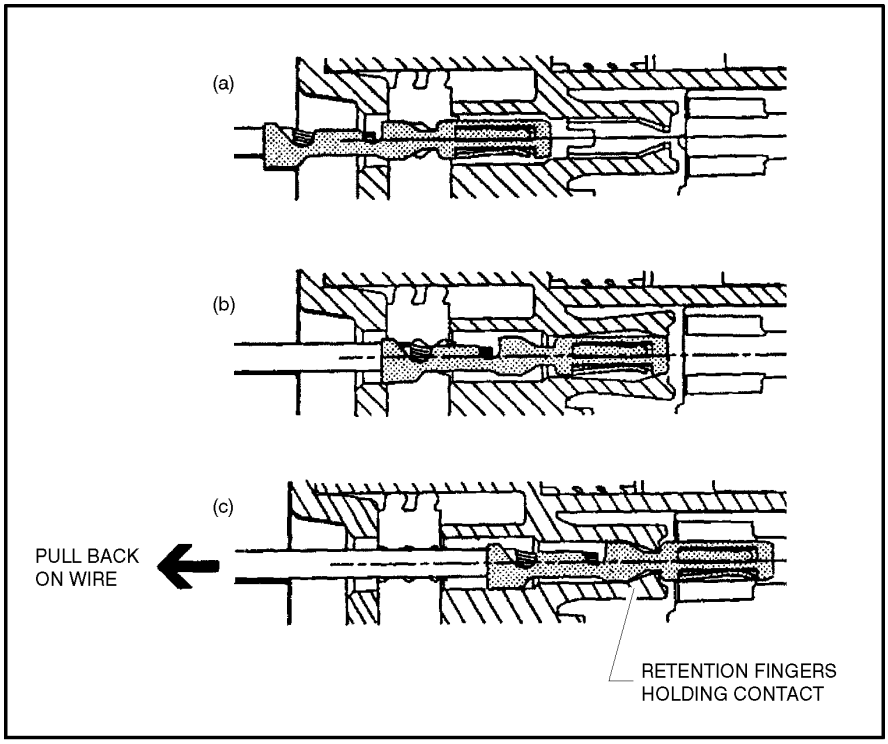


Figure 2-19. Connector Assembly Figure 2

3. After all required contacts have been inserted, the wedge lock must be closed to its locked position. Release the locking latches by squeezing them inward (See Figure 2-20. Connector Assembly Figure 3).

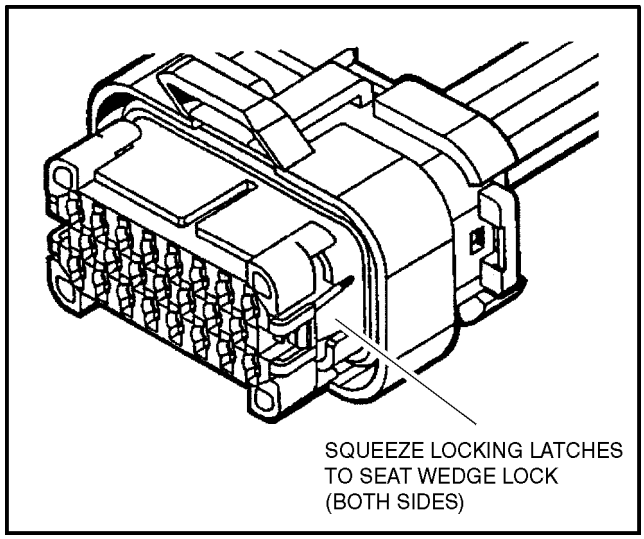


Figure 2-20. Connector Assembly Figure 3

4. Slide the wedge lock into the housing until it is flush with the housing (See Figure 2-21. Connector Assembly Figure 4).

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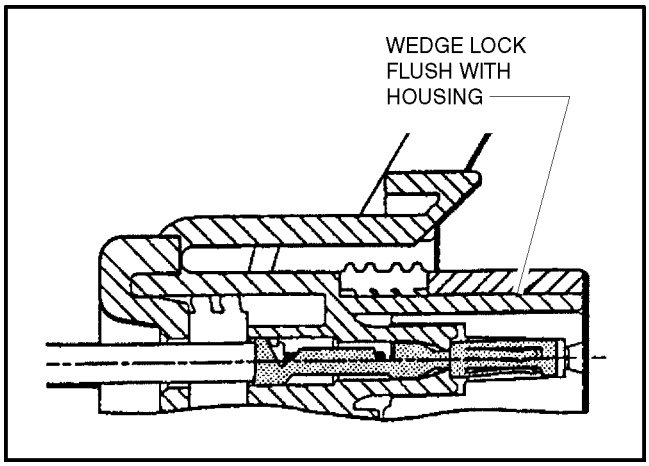


Figure 2-21. Connector Assembly Figure 4

Disassembly

1. Insert a 4.8 mm (3/16”) wide screwdriver blade between the mating seal and one of the red wedge lock tabs.
2. Pry open the wedge lock to the open position.
3. While rotating the wire back and forth over a half turn (1/4 turn in each direction), gently pull the wire until the contact is removed.

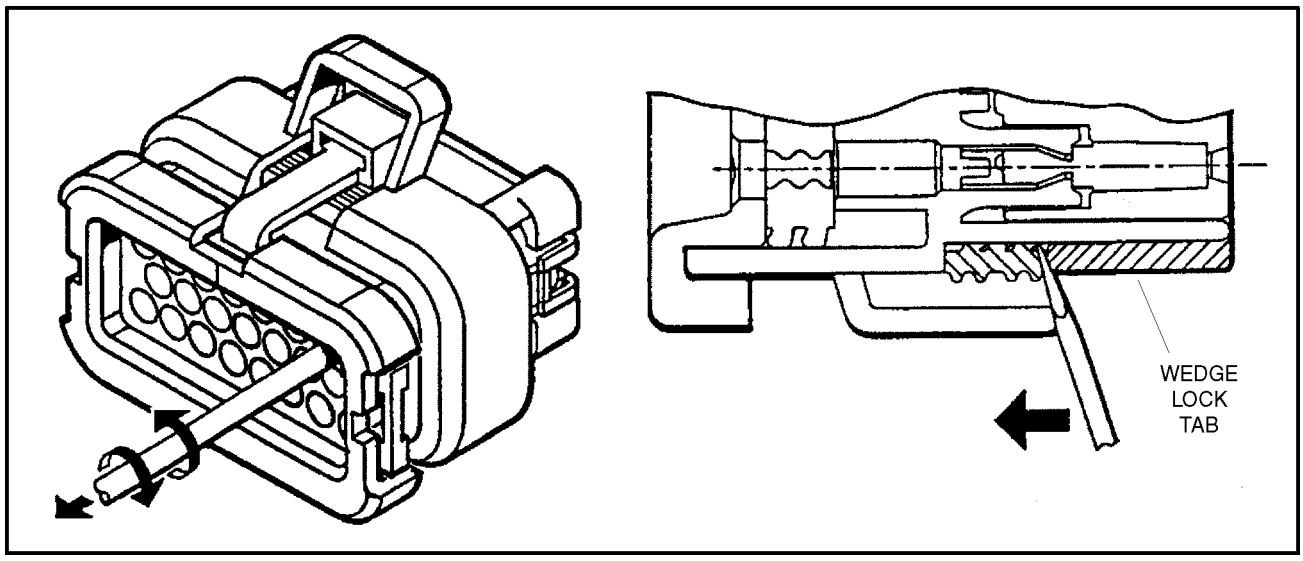


Figure 2-22. Connector Disassembly

NOTE: The wedge lock should never be removed from the housing for insertion or removal of the contacts.

Wedge Lock

The wedge lock has slotted openings in the forward, or mating end. These slots accommodate circuit testing in the field, by using a flat probe such as a pocket knife. DO NOT use a sharp point such as an ice pick.

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Service - Voltage Reading

⚠ CAUTION

DO NOT PIERCE WIRE INSULATION TO TAKE VOLTAGE READINGS.

It has been common practice in electrical troubleshooting to probe wires by piercing the insulation with a sharp point. This practice should be discouraged when dealing with the AMPSEAL plug assembly, or any other sealed connector system. The resulting pinholes in the insulation will allow moisture to invade the system by traveling along the wire strands. This nullifies the effectiveness of the connector seals and could result in system failure.

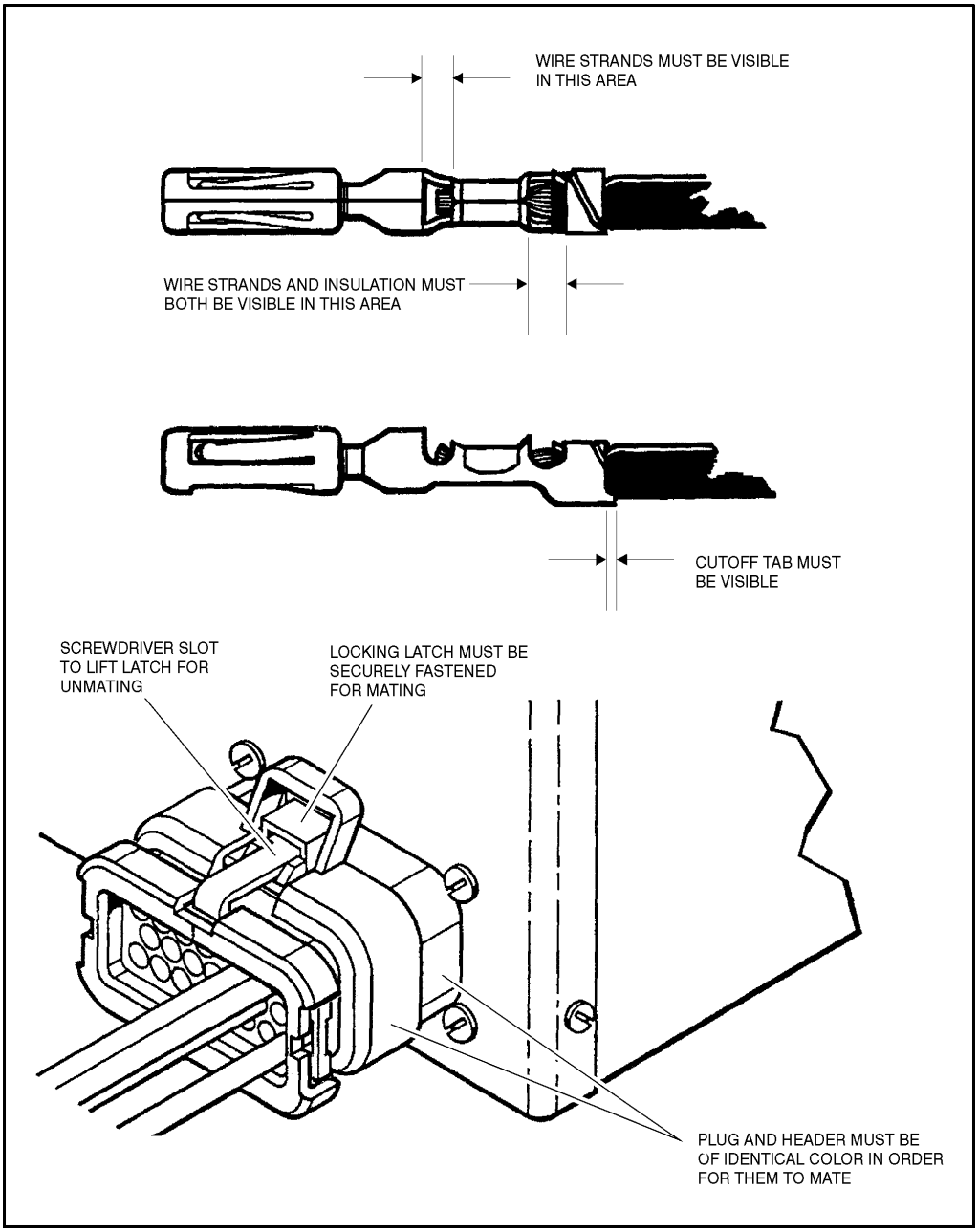


Figure 2-23. Connector Installation

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2.8 WORKING WITH DEUTSCH CONNECTORS

DT/DTP Series Assembly



Figure 2-24. DT/DTP Contact Installation

1. Grasp crimped contact about 25mm behind the contact barrel.
2. Hold connector with rear grommet facing you.
3. Push contact straight into connector grommet until a click is felt. A slight tug will confirm that it is properly locked in place.
4. Once all contacts are in place, insert wedgelock with arrow pointing toward exterior locking mechanism. The wedgelock will snap into place. Rectangular wedges are not oriented. Thy may go in either way.

NOTE: The receptacle is shown - use the same procedure for plug.

DT/DTP Series Disassembly

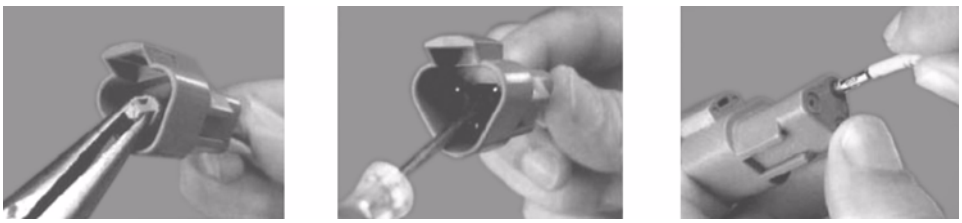


Figure 2-25. DT/DTP Contact Removal

1. Remove wedgelock using needlenose pliers or a hook shaped wire to pull wedge straight out.
2. To remove the contacts, gently pull wire backwards, while at the same time releasing the locking finger by moving it away from the contact with a screwdriver.
3. Hold the rear seal in place, as removing the contact may displace the seal.

HD30/HDP20 Series Assembly



Figure 2-26. HD/HDP Contact Installation

1. Grasp contact about 25mm behind the contact crimp barrel.
2. Hold connector with rear grommet facing you.

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3. Push contact straight into connector grommet until a positive stop is felt. A slight tug will confirm that it is properly locked in place.

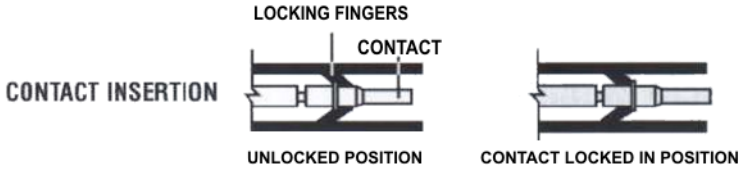


Figure 2-27. HD/HDP Locking Contacts Into Position

NOTE: For unused wire cavities, insert sealing plugs for full environmental sealing

HD30/HDP20 Series Disassembly

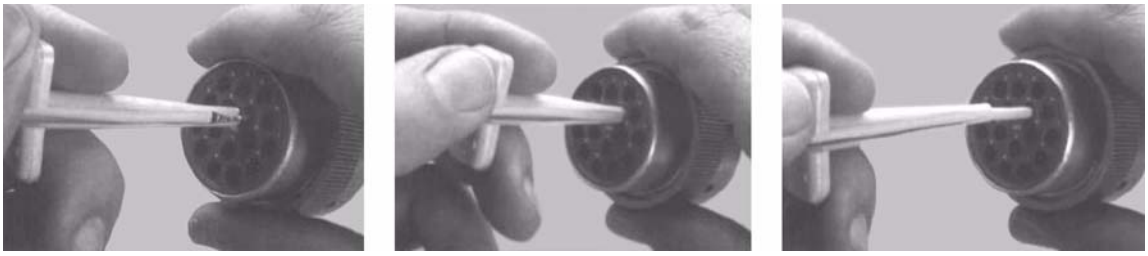


Figure 2-28. HD/HDP Contact Removal

1. With rear insert toward you, snap appropriate size extractor tool over the wire of contact to be removed.
2. Slide tool along into the insert cavity until it engages contact and resistance is felt.
3. Pull contact-wire assembly out of connector.



Figure 2-29. HD/HDP Unlocking Contacts

NOTE: Do Not twist or insert tool at an angle.

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SECTION 3. HYDRAULIC REFERENCE

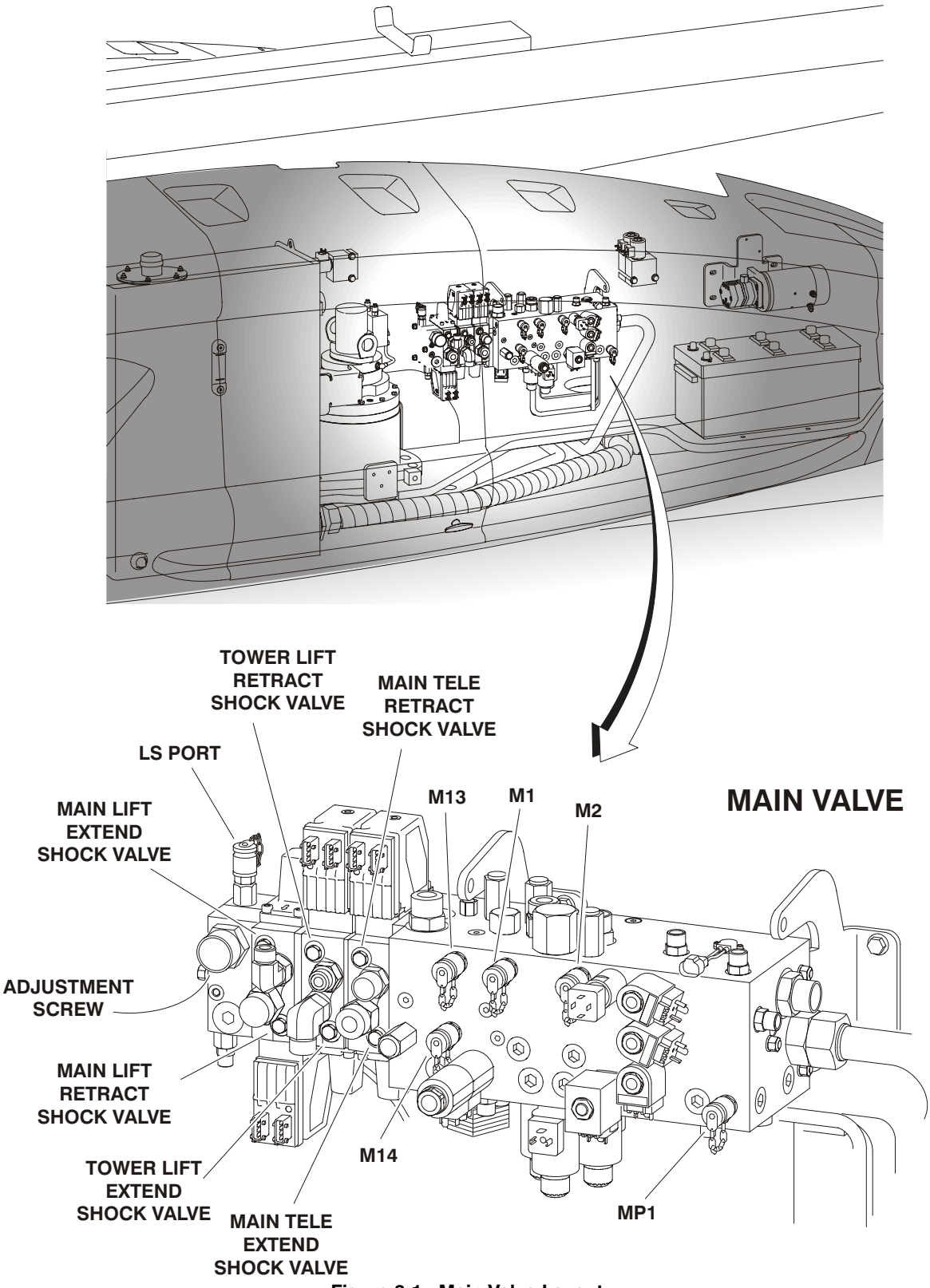


Figure 3-1. Main Valve Layout

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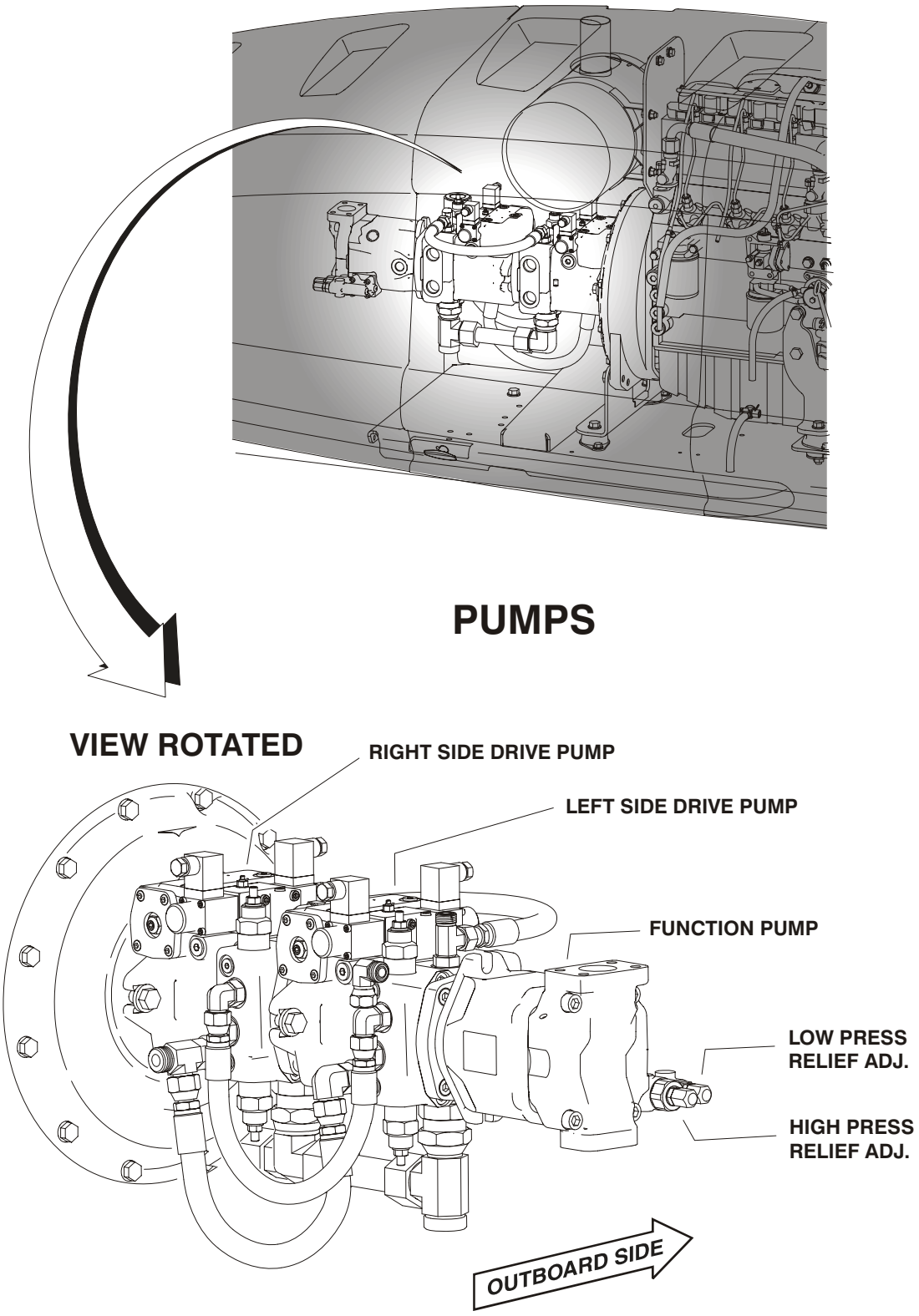


Figure 3-2. Pumps Layout

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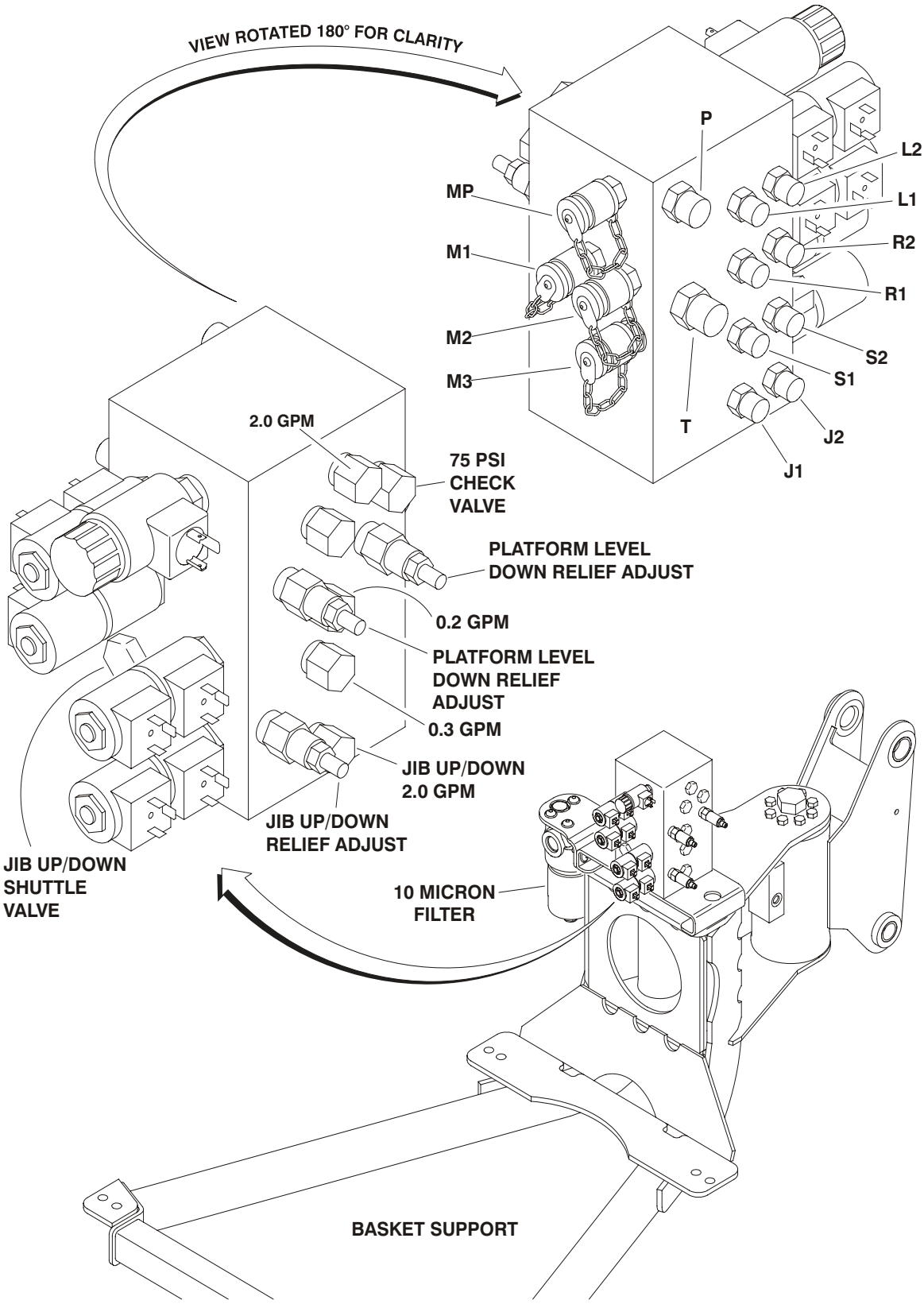


Figure 3-3. Platform Valve Layout

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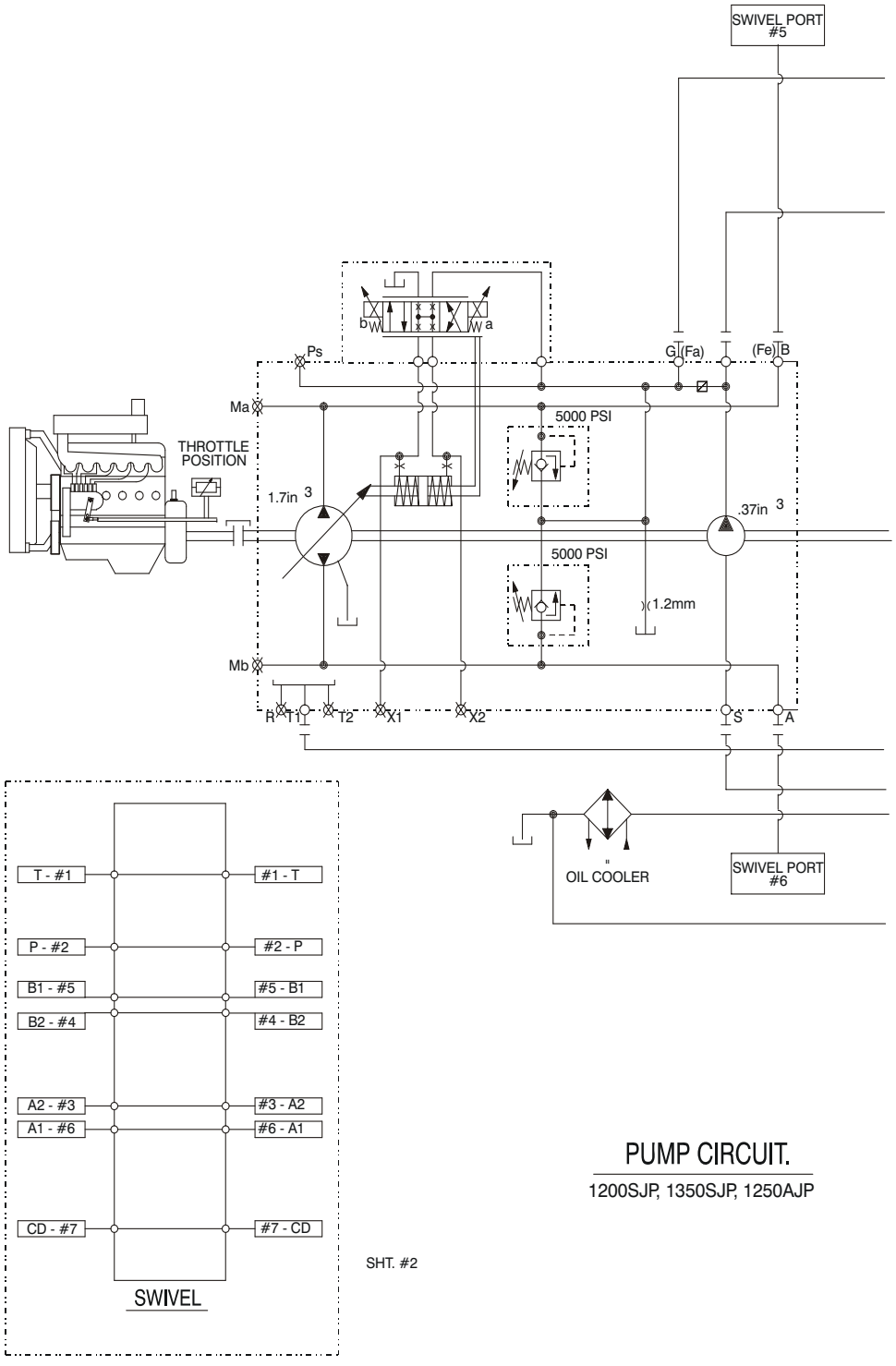


Figure 3-4. Hydraulic Schematic - Pump Circuit - Sheet 1 of 2

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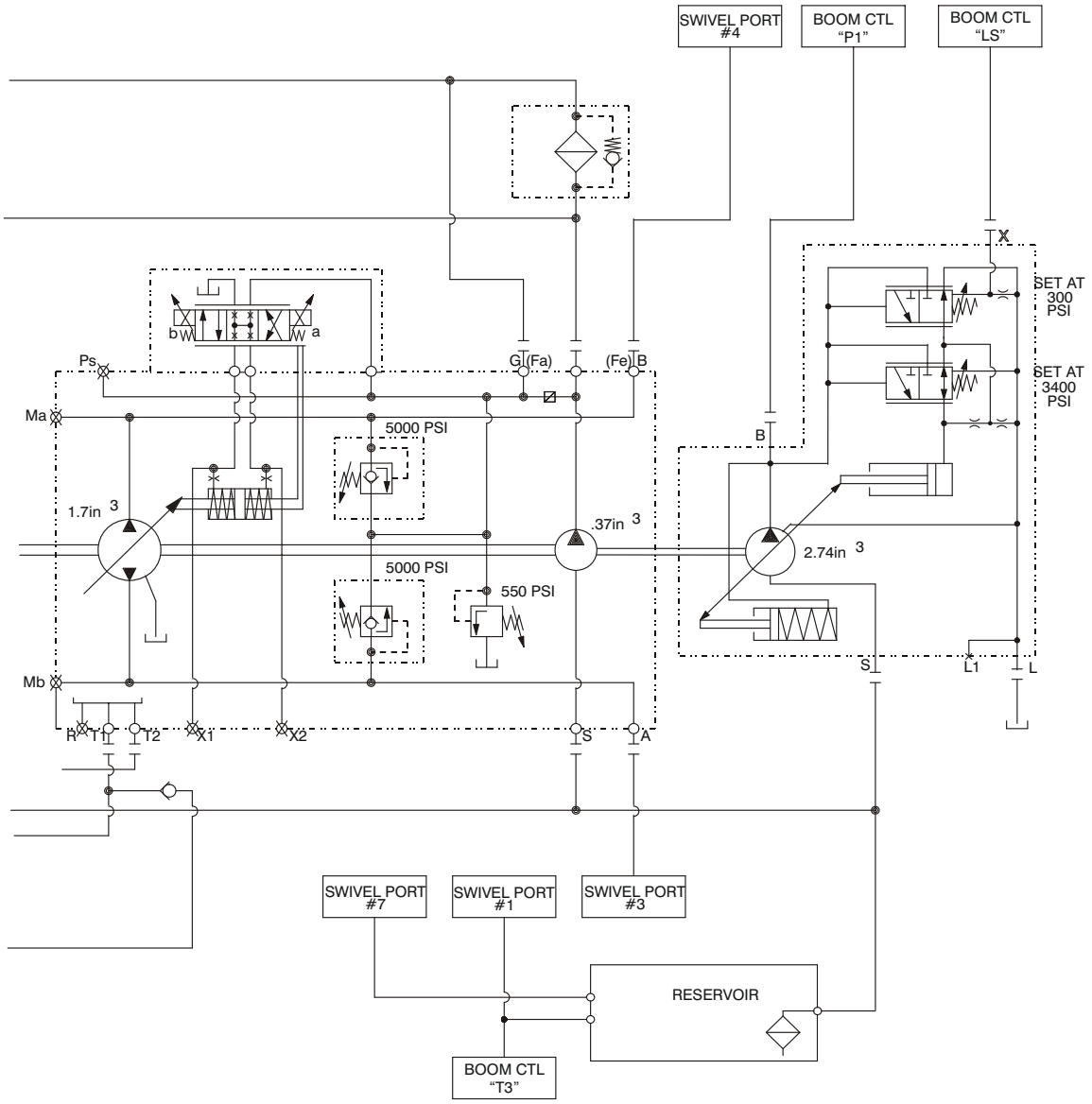


Figure 3-5. Hydraulic Schematic - Pump Circuit - Sheet 2 of 2

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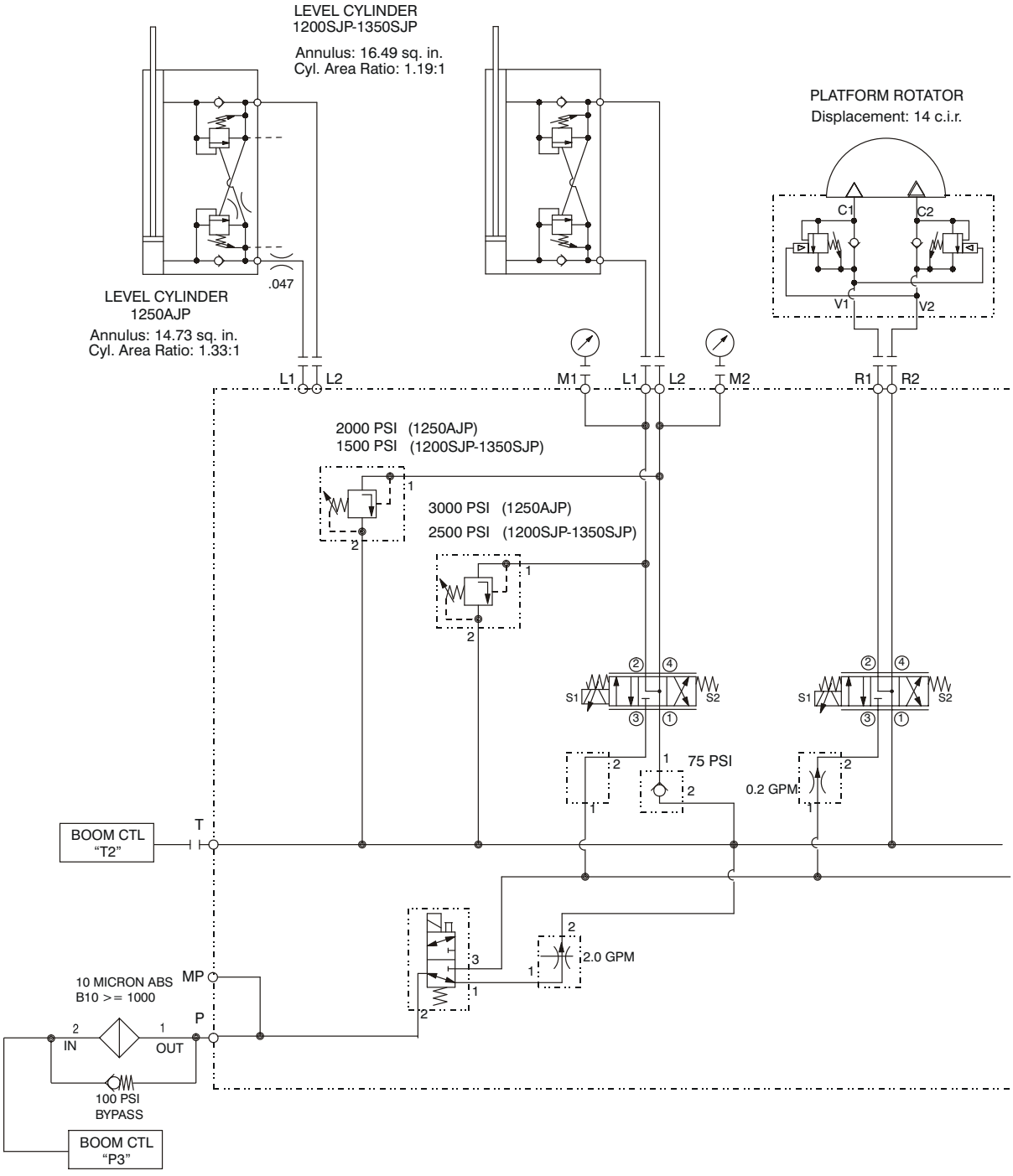


Figure 3-6. Hydraulic Schematic - Platform Control - Sheet 1 of 2

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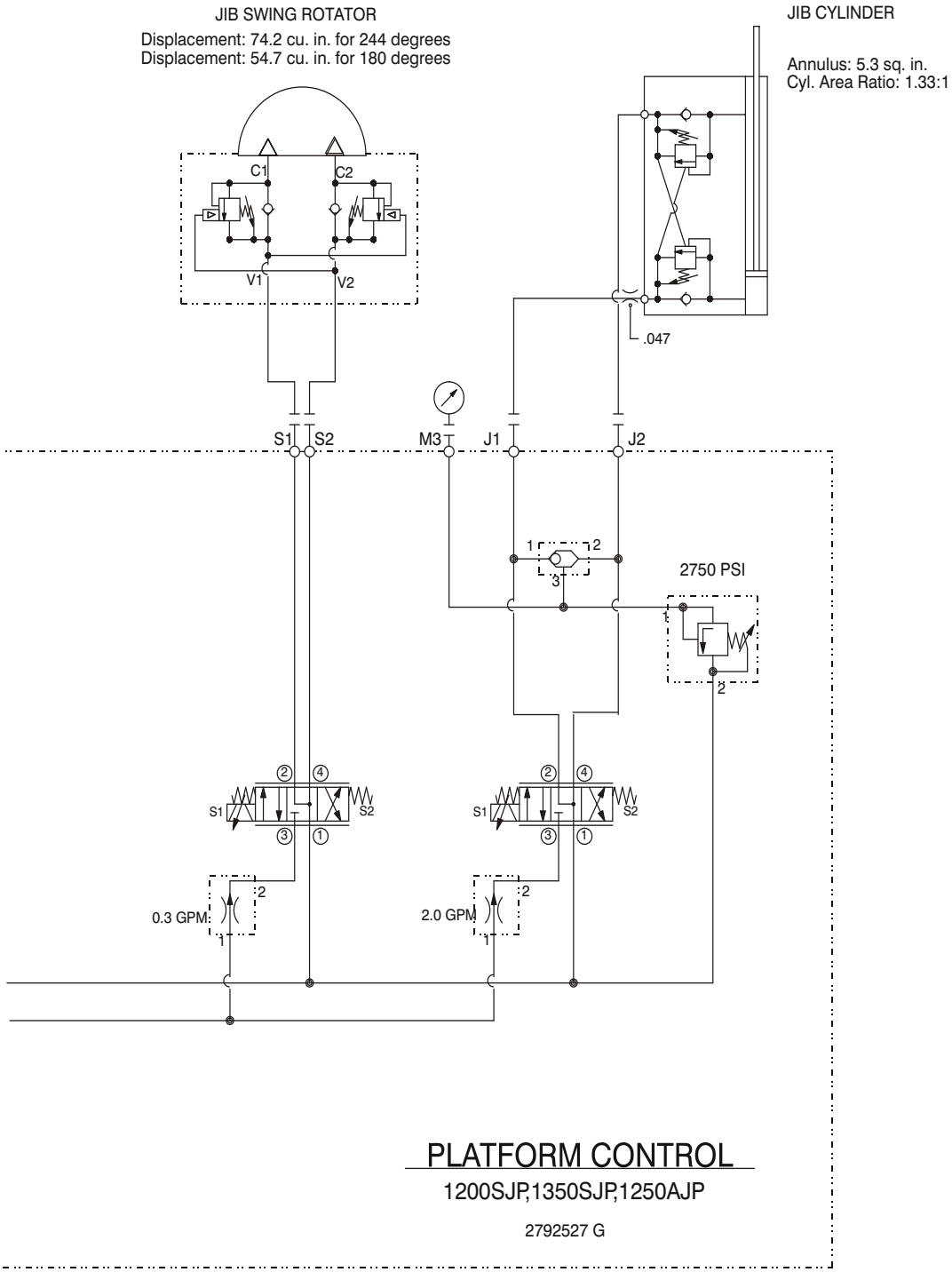


Figure 3-7. Hydraulic Schematic - Platform Control - Sheet 2 of 2

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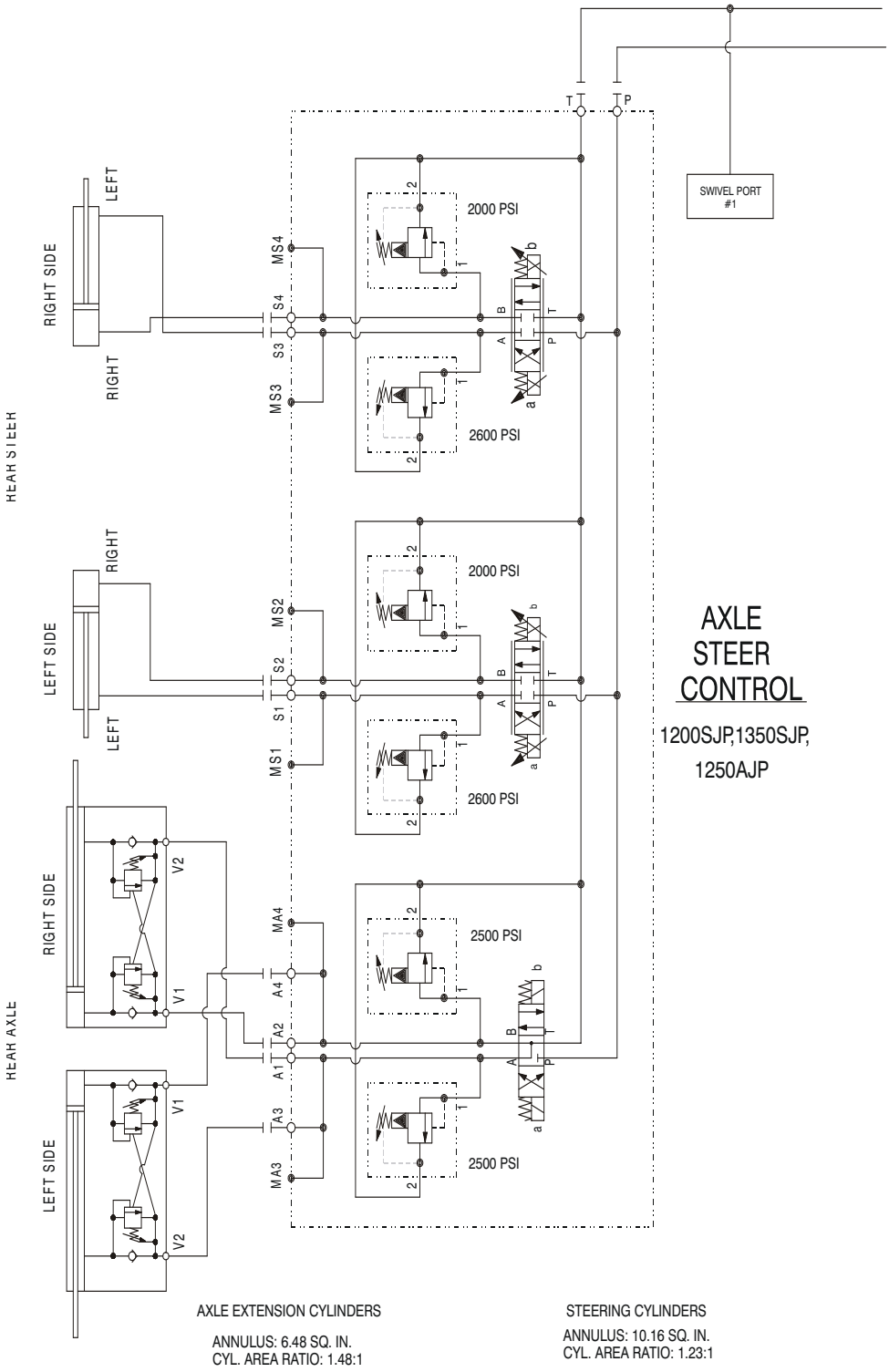


Figure 3-8. Hydraulic Schematic - Axle Steer Control - Sheet 1 of 2

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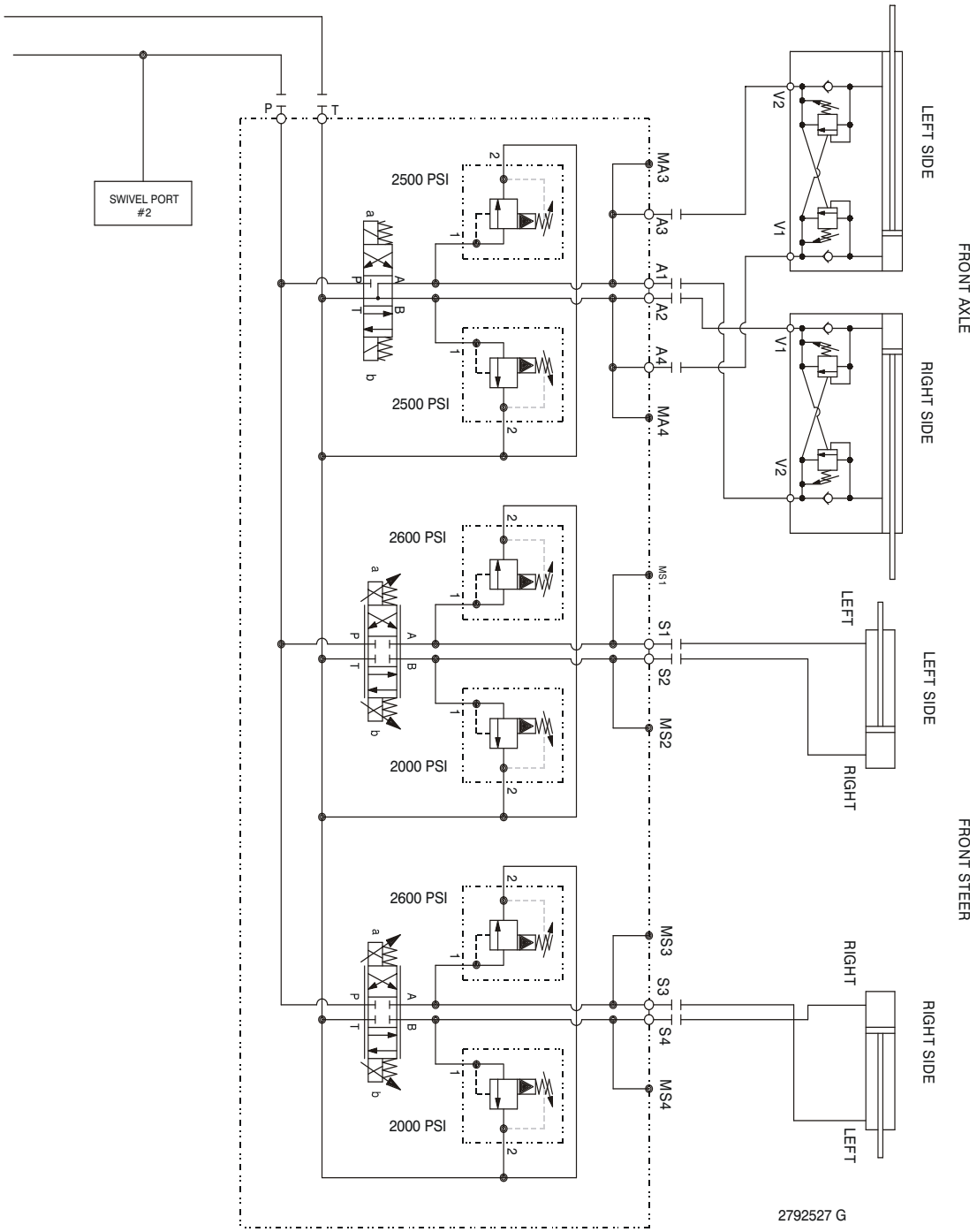
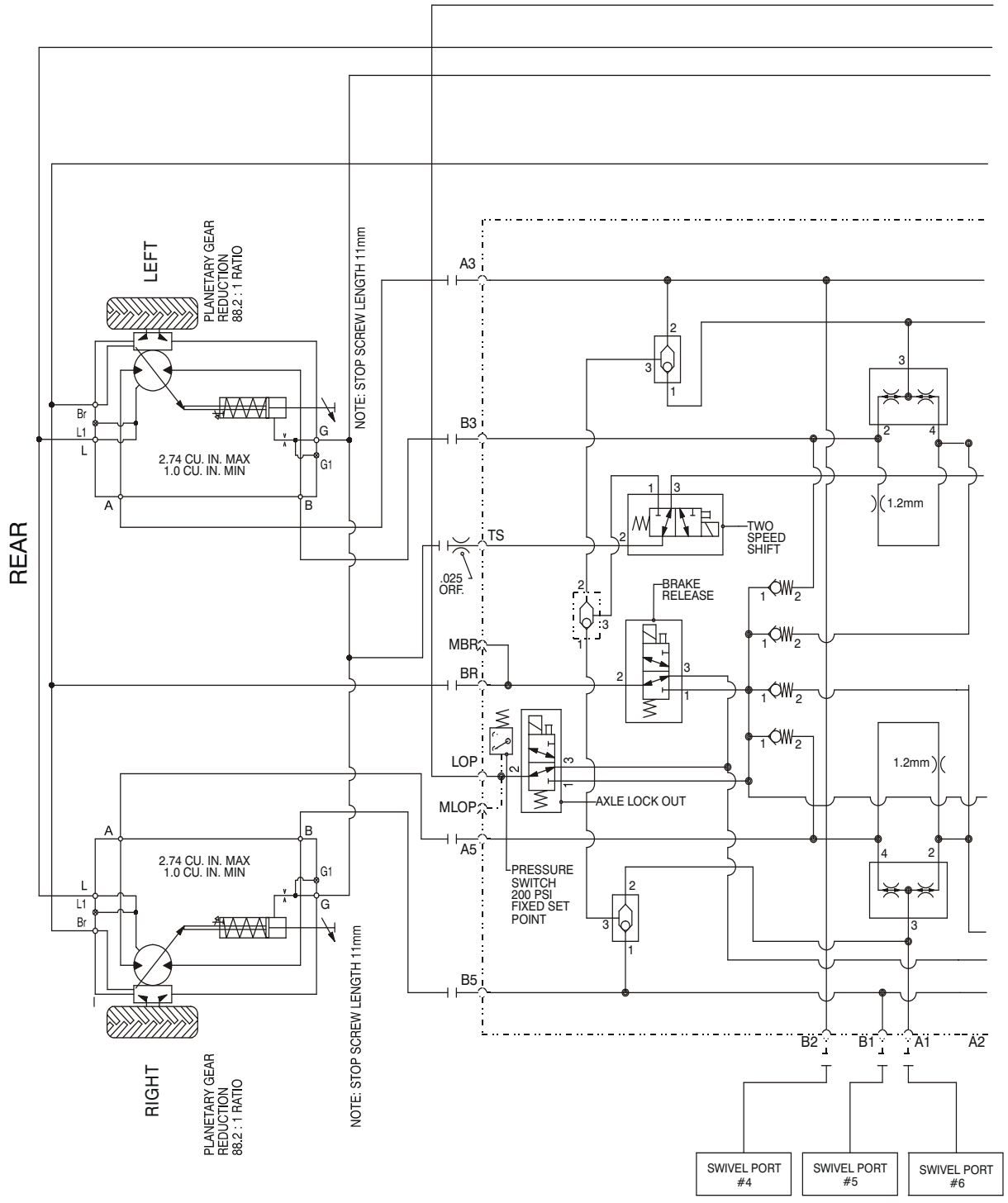


Figure 3-9. Hydraulic Schematic - Axle Steer Control - Sheet 2 of 2

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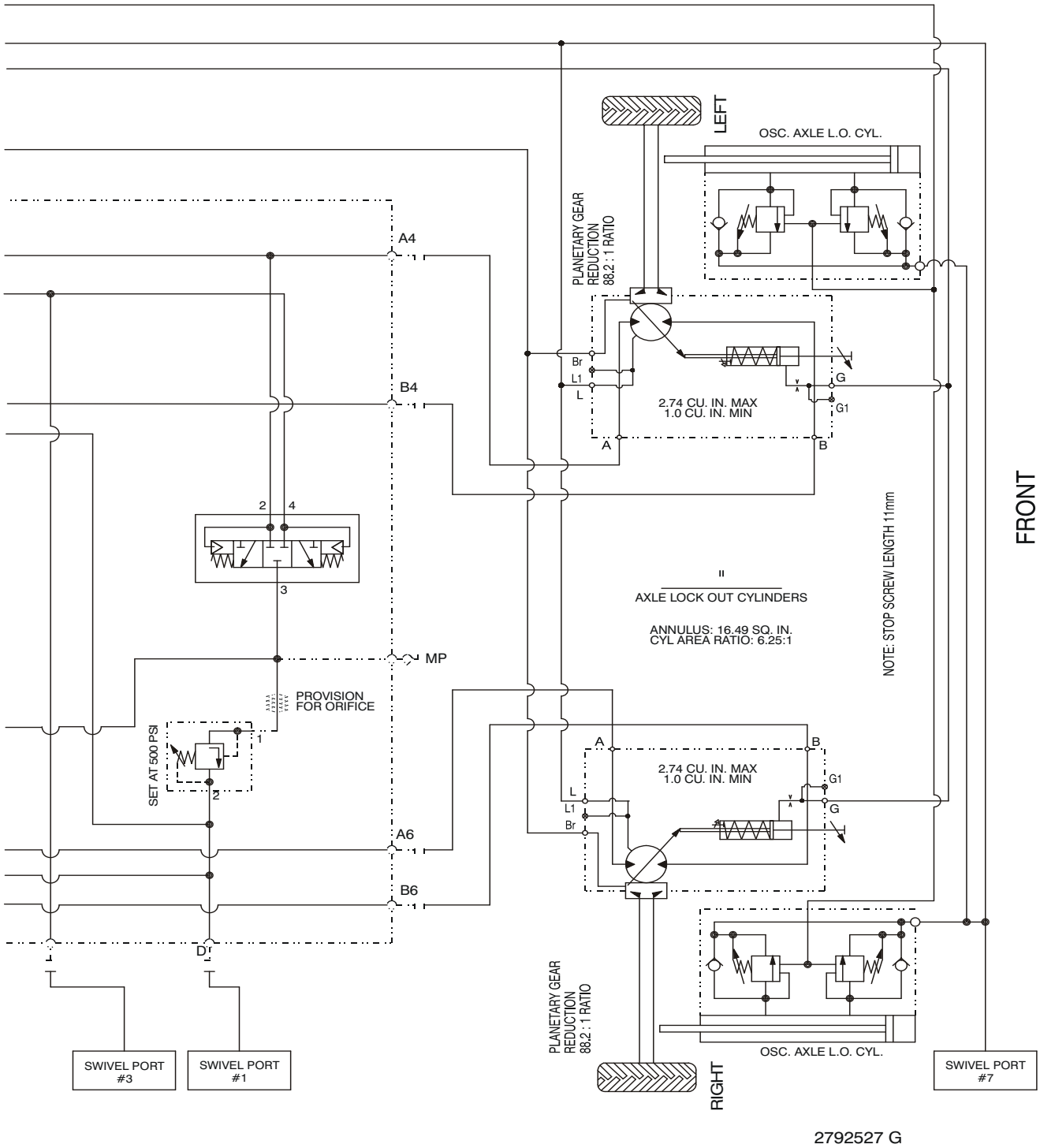
TRACTION CONTROL

1200SJP,1350SJP,1250AJP

Figure 3-10. Hydraulic Schematic - Traction Control - Sheet 1 of 2

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Figure 3-11. Hydraulic Schematic - Traction Control - Sheet 2 of 2

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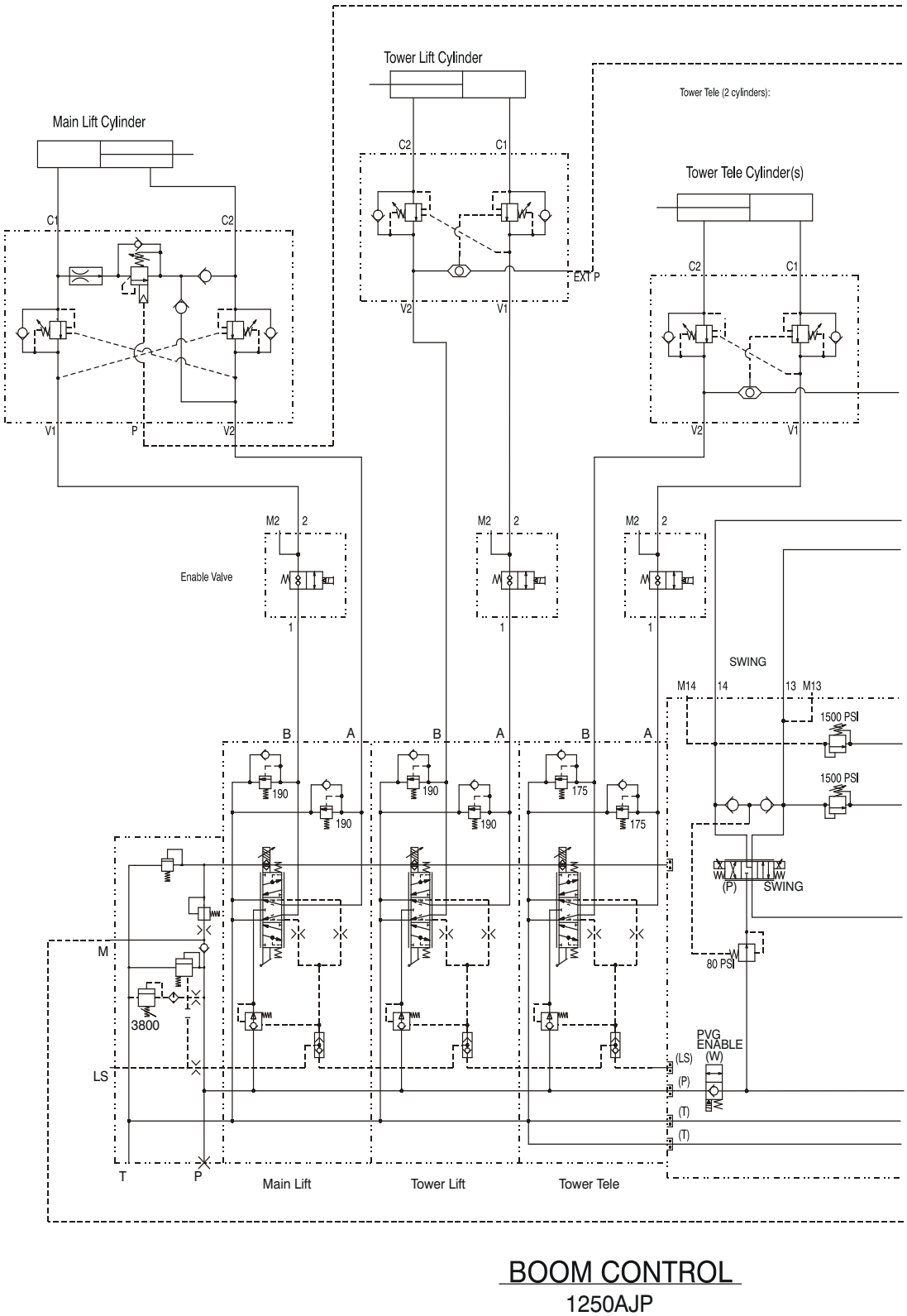


Figure 3-12. Hydraulic Schematic - Boom Control - Sheet 1 of 2

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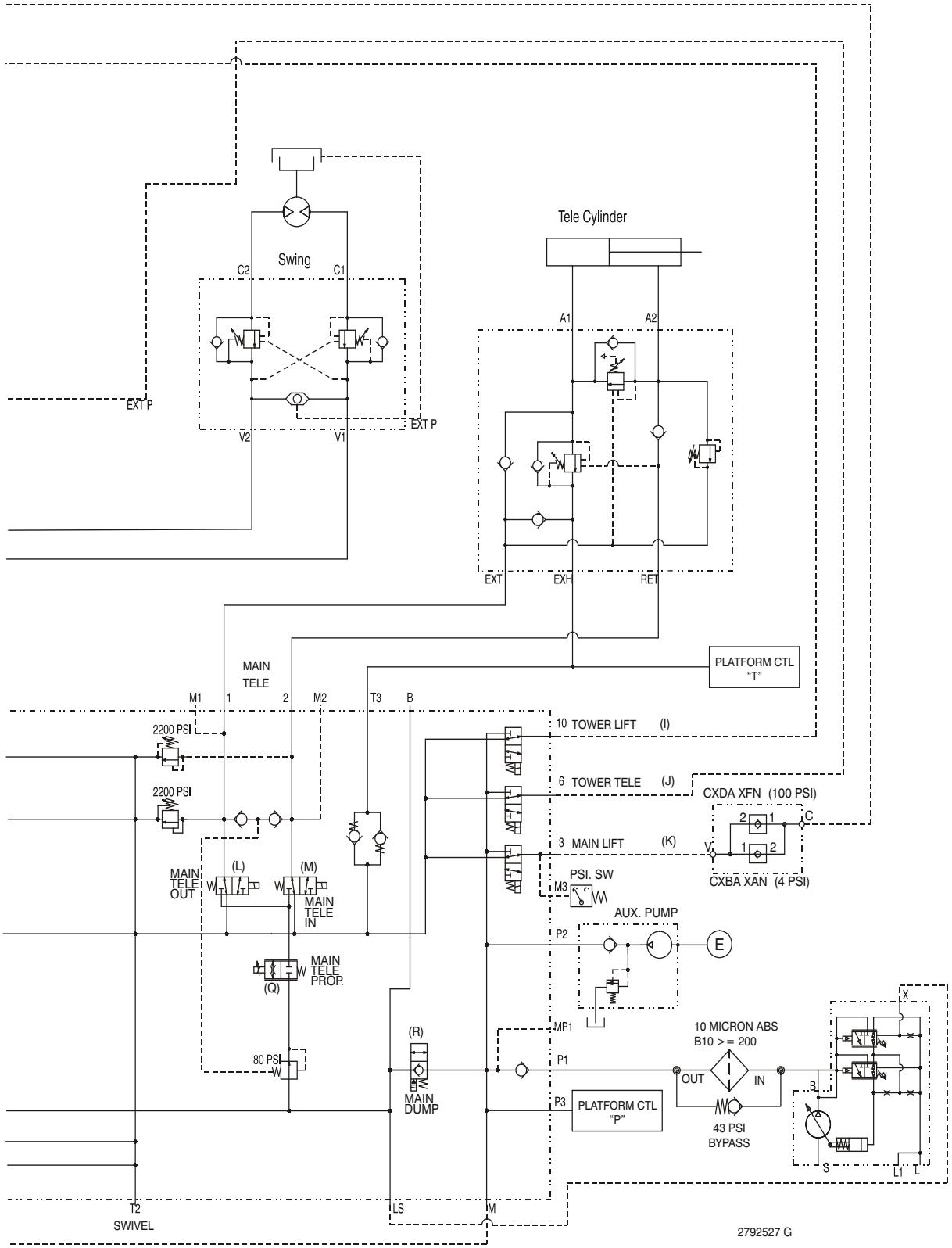


Figure 3-13. Hydraulic Schematic - Boom Control - Sheet 2 of 2

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SECTION 4. JLG ANALYZER

4.1 TO CONNECT THE JLG CONTROL SYSTEM ANALYZER

1. Connect the cable supplied with the analyzer, to the controller module located in the platform box or at the controller module in the ground control box and connect the remaining end of the cable to the analyzer.

NOTE: *The cable has a four pin connector at each end of the cable; the cable cannot be connected backwards.*

2. Power up the Control System by turning the key to the platform or ground position and pulling both emergency stop buttons on.



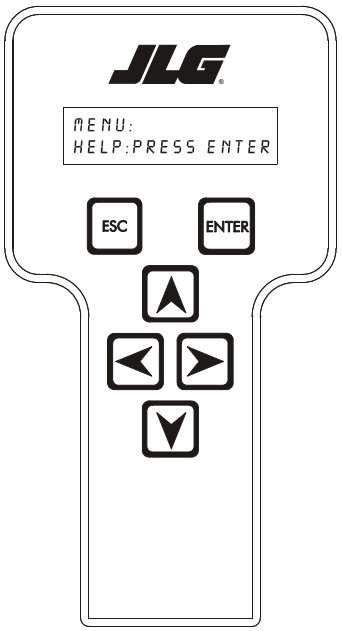
Figure 4-1. Ground Analyzer Connection Point



Figure 4-2. Platform Analyzer Connection Point

4.2 USING THE ANALYZER

With the machine power on and the analyzer connected properly, the analyzer will display the following:



HELP:
PRESS ENTER

At this point, using the **RIGHT** and **LEFT** arrow keys, you can move between the top level menu items. To select a displayed menu item, press **ENTER**. To cancel a selected menu item, press ESC.; then you will be able to scroll using the right and left arrow keys to select a different menu item.

The top level menus are as follows:

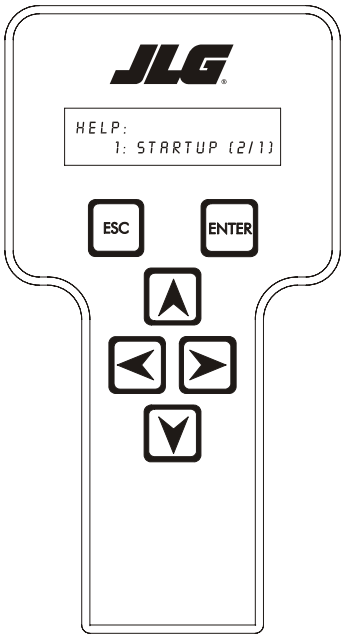
HELP
DIAGNOSTICS
SYSTEM TEST
ACCESS LEVEL
PERSONALITIES
MACHINE SETUP
CALIBRATIONS (view only)

If you press **ENTER**, at the **HELP: PRESS ENTER** display, and a fault is present, the analyzer display will scroll the fault across the screen. If there was no fault detected, the display will read: **HELP: EVERYTHING OK.** If powered up at the ground station, the display will read: **GROUND OK.**

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If **ENTER** is pressed again, the display moves to the following display:



LOGGED HELP
1: POWER CYCLE (0/0)

At this point, the analyzer will display the last fault the system has seen, if any are present. You may scroll through the fault logs to view what the last 25 faults were. Use the right and left arrow keys to scroll through the fault logs. To return to the beginning, press **ESC.** two times. **POWER CYCLE (0/0)** indicates a power up.

When a top level menu is selected, a new set of menu items may be offered: for example:

DRIVE
BOOM
SYSTEM
DATALOG
VERSIONS

Pressing **ENTER** with any of the above displayed menus, will display additional sub-menus within the selected menu. In some cases, such as **DRIVE**, the next level is the parameter or information to be changed. Refer to the flow chart for what menus are available within the top level menus. You may only view the personality settings for selected menus while in access level 2. Remember, you may always cancel a selected menu item by pressing the **ESC.** key.

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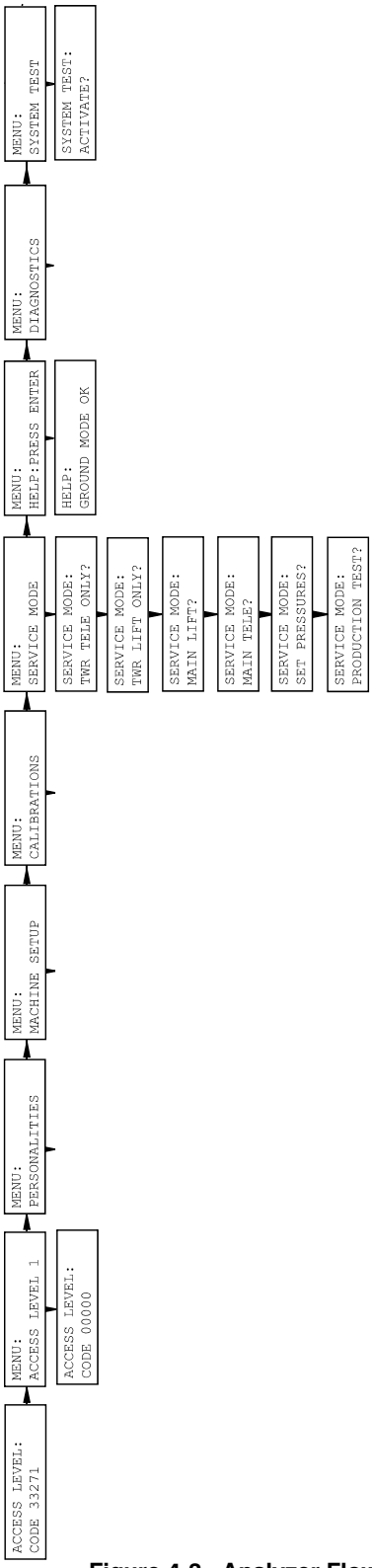


Figure 4-3. Analyzer Flow Chart

NOTE: *The layout shown includes all possible analyzer screens. Please note that some screens may not be available depending upon machine configuration.*

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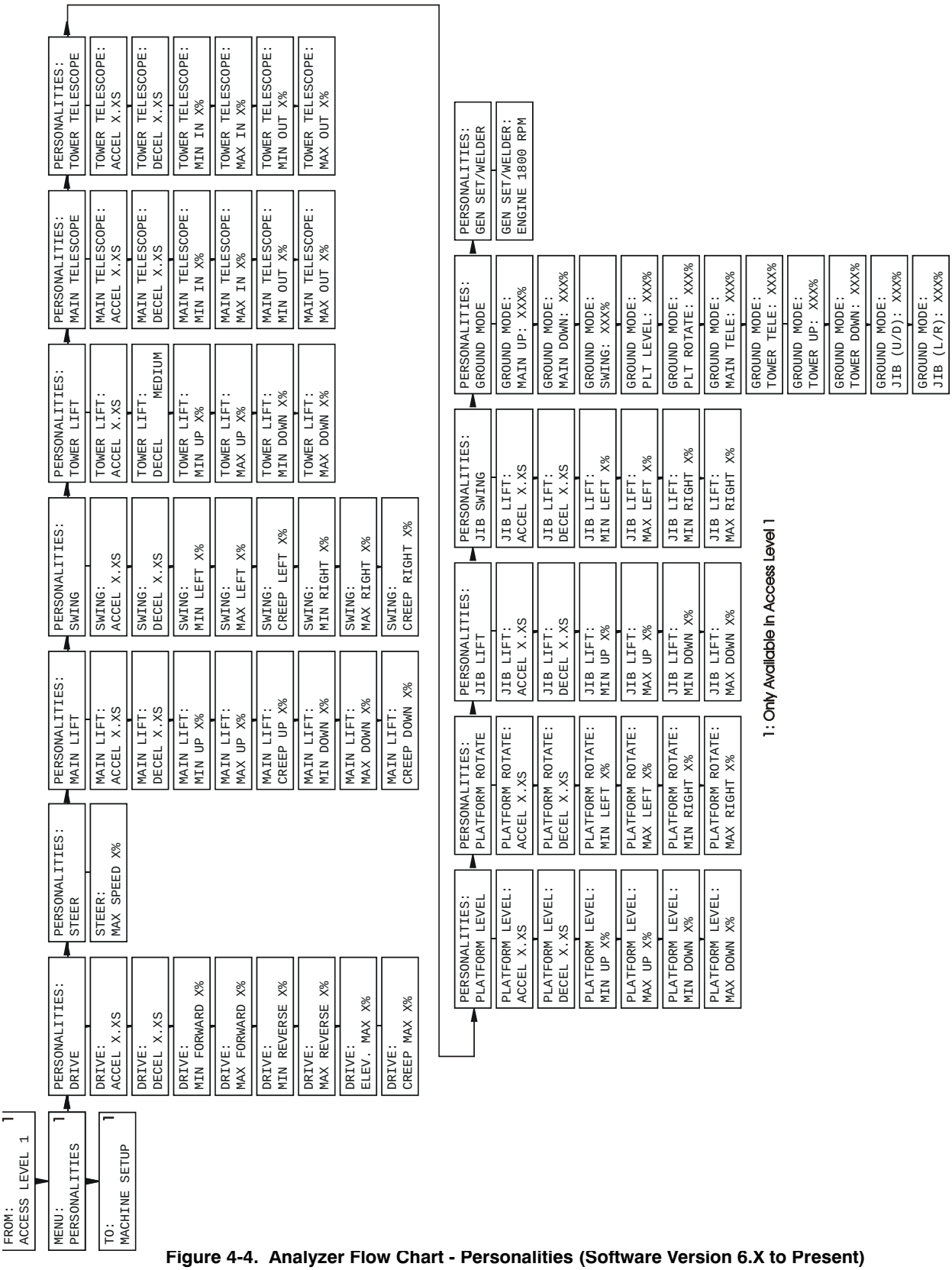


Figure 4-4. Analyzer Flow Chart - Personalities (Software Version 6.X to Present)

NOTE: *The layout shown includes all possible analyzer screens. Please note that some screens may not be available depending upon machine configuration.*

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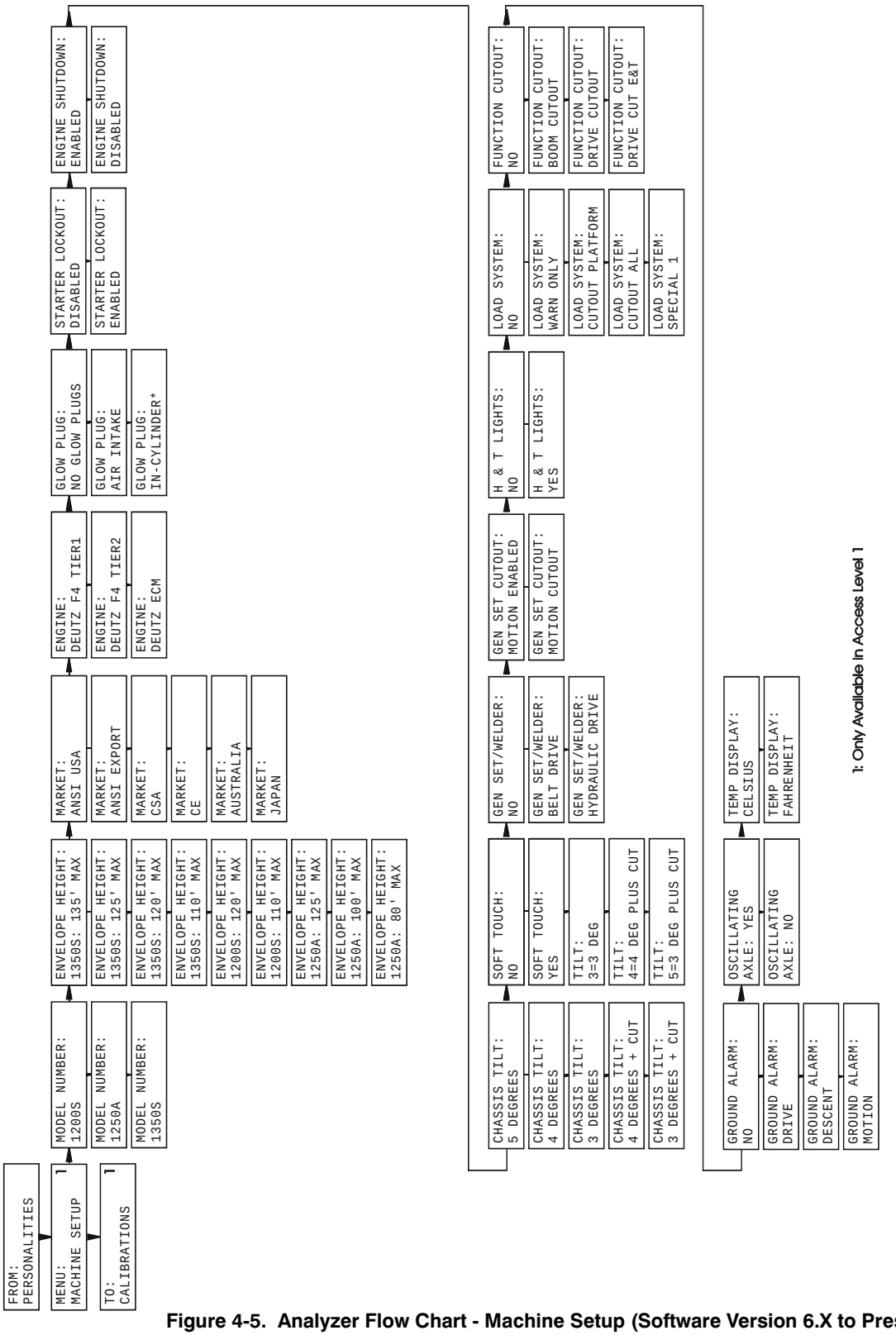


Figure 4-5. Analyzer Flow Chart - Machine Setup (Software Version 6.X to Present)

NOTE: *The layout shown includes all possible analyzer screens. Please note that some screens may not be available depending upon machine configuration.*

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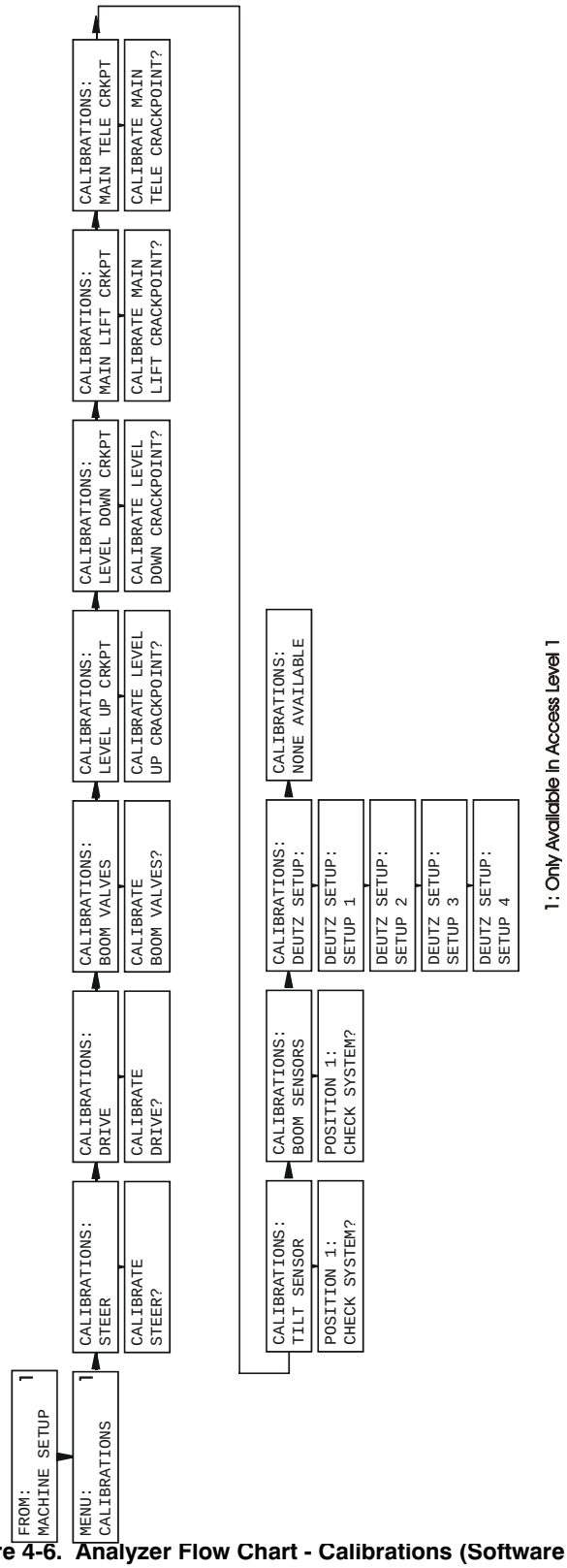


Figure 4-6. Analyzer Flow Chart - Calibrations (Software Version 6.X to Present)

NOTE: *The layout shown includes all possible analyzer screens. Please note that some screens may not be available depending upon machine configuration.*

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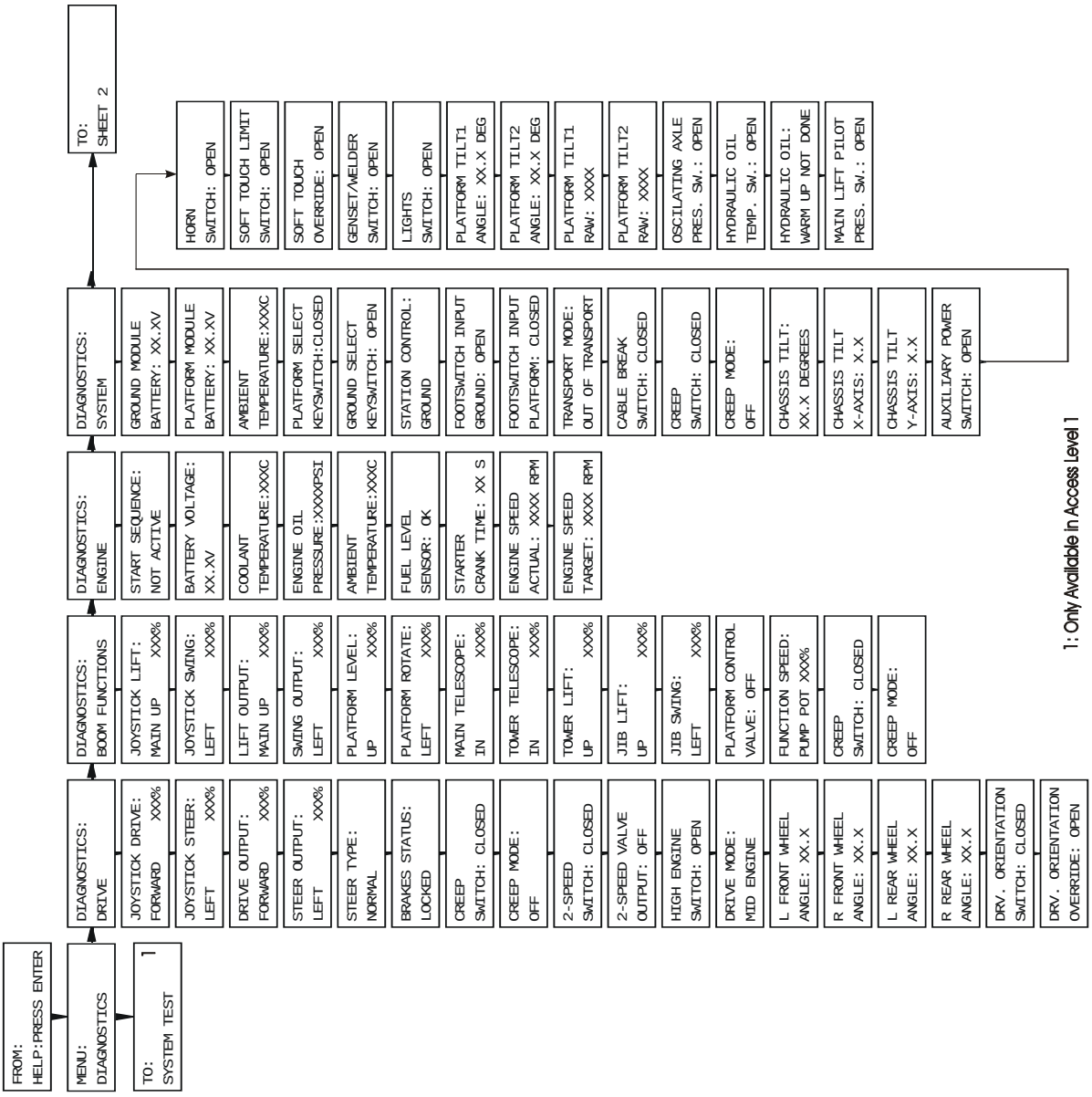


Figure 4-7. Analyzer Flow Chart - Diagnostics (Software Version 6.X to Present) - Sheet 1 of 3

NOTE: *The layout shown includes all possible analyzer screens. Please note that some screens may not be available depending upon machine configuration.*

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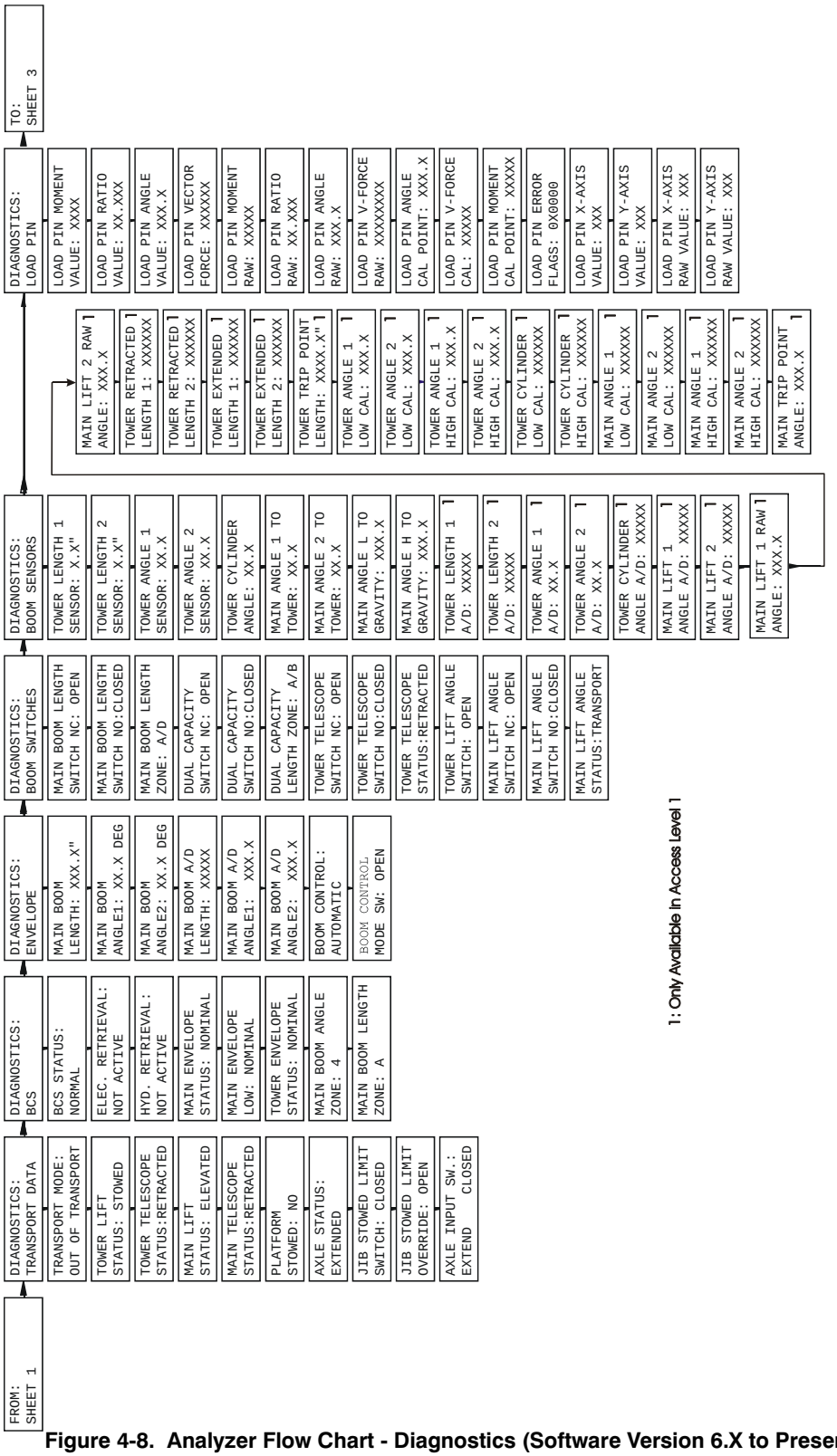


Figure 4-8. Analyzer Flow Chart - Diagnostics (Software Version 6.X to Present) - Sheet 2 of 3

NOTE: *The layout shown includes all possible analyzer screens. Please note that some screens may not be available depending upon machine configuration.*

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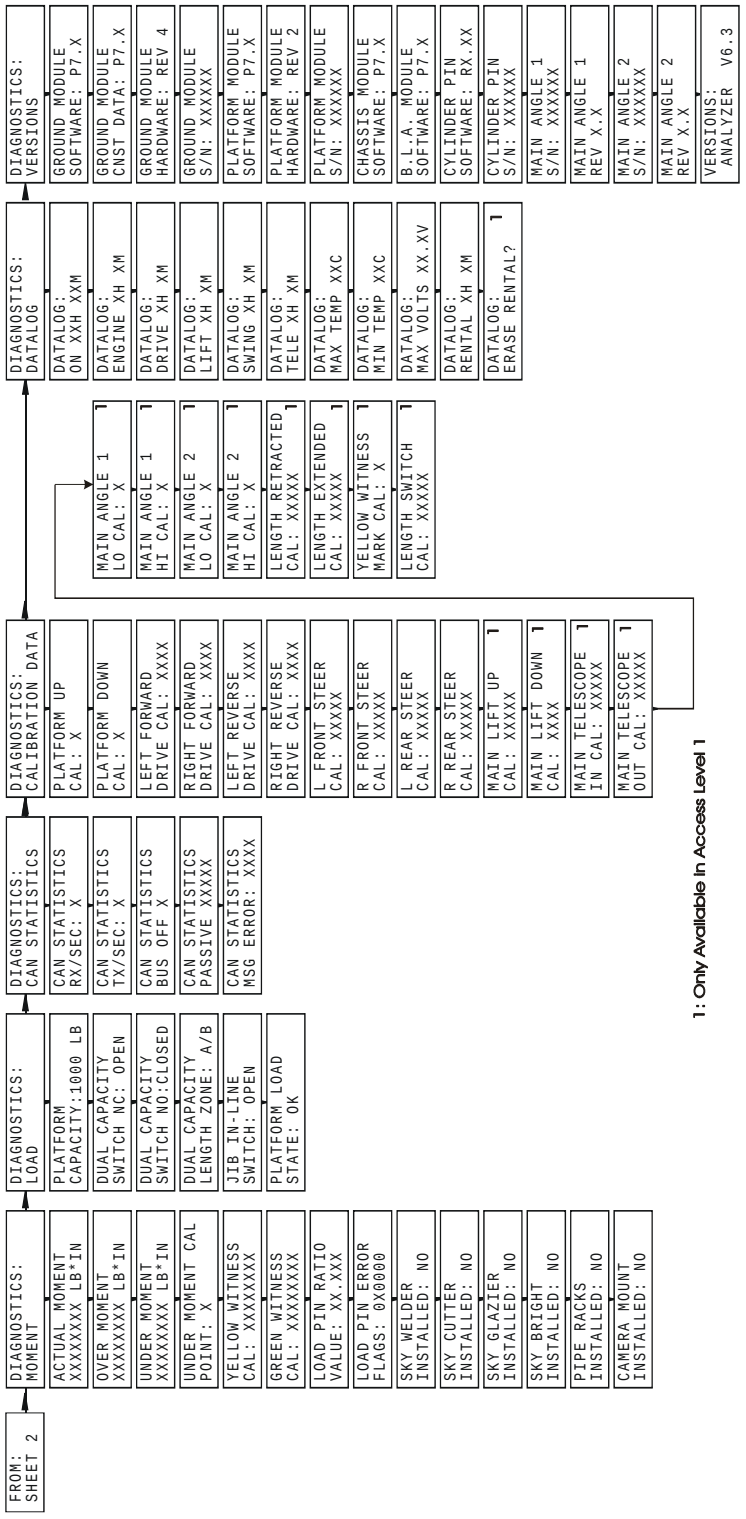


Figure 4-9. Analyzer Flow Chart - Diagnostics(Software Version 6.X to Present) - Sheet 3 of 3

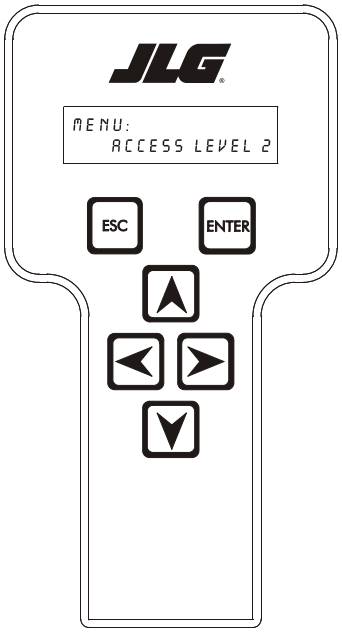
NOTE: *The layout shown includes all possible analyzer screens. Please note that some screens may not be available depending upon machine configuration.*

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4.3 CHANGING THE ACCESS LEVEL OF THE HAND HELD ANALYZER

When the analyzer is first connected, you will be in access level 2 which enables you to only view most settings which cannot be changed until you enter a password to advance to a lower level. This ensures that a setting cannot be accidentally altered. To change the access level, the correct password must be entered. To enter the password, scroll to the **ACCESS LEVEL** menu. For example:



MENU:
ACCESS LEVEL 2

Press **ENTER** to select the **ACCESS LEVEL** menu.

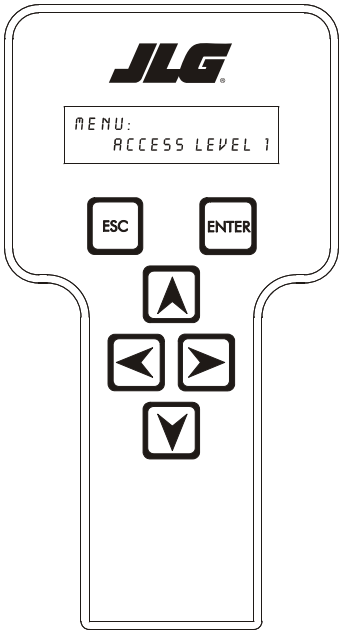
Using the **UP** or **DOWN** arrow keys, enter the first digit of the password, 3.

Then using the **RIGHT** arrow key, position the cursor to the right one space to enter the second digit of the password.

Use the **UP** or **DOWN** arrow key to enter the second digit of the password which is 33271.

Continue using the arrow keys until all the remaining digits of the password is shown.

Once the correct password is displayed, press **ENTER**. The access level should display the following, if the password was entered correctly:



MENU:
ACCESS LEVEL 1

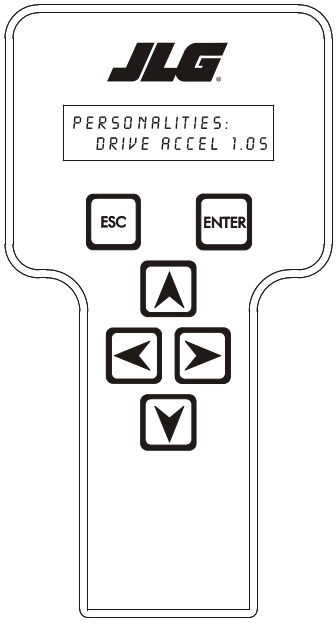
Repeat the above steps if the correct access level is not displayed or you can not adjust the personality settings.

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4.4 ADJUSTING PARAMETERS USING THE HAND HELD ANALYZER

Once you have gained access to level 1, and a personality item is selected, press the UP or DOWN arrow keys to adjust its value, for example:

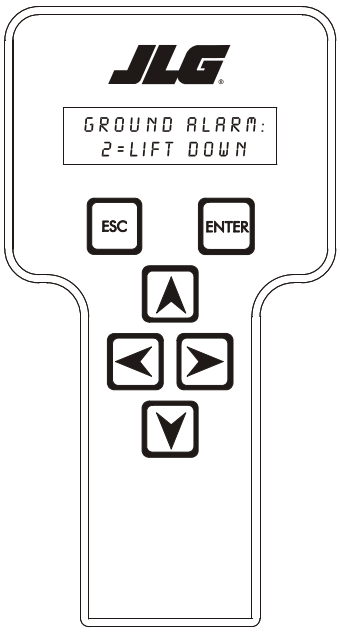


PERSONALITIES:
DRIVE ACCEL 1.0s

There will be a minimum and maximum for the value to ensure efficient operation. The Value will not increase if the **UP** arrow is pressed when at the maximum value nor will the value decrease if the **DOWN** arrow is pressed and the value is at the minimum value for any particular personality. If the value does not change when pressing the up and down arrows, check the access level to ensure you are at access level 1.

4.5 MACHINE SETUP

When a machine digit item is selected, press the UP or DOWN arrow keys to adjust its value, for example:



GROUND ALARM:
2 = LIFT DOWN

The effect of the machine digit value is displayed along with its value. The above display would be selected if the machine was equipped with a ground alarm and you wanted it to sound when lifting down. There are certain settings allowed to install optional features or select the machine model.

When selection the machine model to match the size of the machine, the personality settings will all default to the factory recommended setting.

NOTE: *Refer to Table 4-2. Machine Personality Settings and Speeds on Pg. 277 in this Service Manual for the recommended factory settings.*

NOTE: *Password 33271 will give you access to level 1, which will permit you to change all machine personality settings.*

There is a setting that JLG strongly recommends that you do not change. This setting is so noted below:

ELEVATION CUTBACK

⚠ WARNING

CHANGING THIS SETTING MAY ADVERSELY AFFECT THE PERFORMANCE OF YOUR MACHINE.

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Table 4-1. Machine Configuration Programming Information

Configuration Digit	Number	Description	Default Number
NOTE: *The machine configuration must be completed before any personality settings can be changed. Changing the personality settings first and then changing the model number of the machine configuration will cause the personality settings to return to default*			
MODEL NUMBER: 1	**1**	**1200S**	**1**
	2	1250A	
	3	1350S	
ENVELOPE HEIGHT: 2	**1**	**1350S: 135' MAX**	**5**
	2	1350S: 125' MAX	
	3	1350S: 120' MAX	
	4	1350S: 110' MAX	
	5	**1200S: 120' MAX**	
	6	1200S: 110' MAX	
	7	**1250A: 125' MAX**	
	8	1250A: 100' MAX	
	9	1250A: 80' MAX	
NOTE: *The default settings (bold) will vary depending on the model selection with selection # 5 being the initial default setting.*			
MARKET: 3	**0**	**ANSI USA**	**0**
	1	ANSI EXPORT	
	2	CSA	
	3	CE	
	4	AUSTRALIA	
	5	JAPAN	
ENGINE: 4	1	DEUTZ F4 TIER1: Deutz BF4M1011 Diesel (Tier 1)	**3**
	2	DEUTZ F4 TIER2: Deutz BF4M2011 Diesel (Tier 2)	
	3	**DEUTZ ECM: Engine Control Module**	

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Table 4-1. Machine Configuration Programming Information

Configuration Digit	Number	Description	Default Number
GLOW PLUG: 5	0	NO GLOW PLUGS: No glow plugs installed.	**2**
	1	AIR INTAKE: Glow plugs installed in the air intake on the manifold.	
	2	**IN-CYLINDER: Glow plugs installed in each cylinder.**	
STARTER LOCKOUT: 6	**0**	**DISABLED: Automatic pre-glow time determined by ambient air temperature; engine start can be attempted at any time during pre-glow.**	**0**
	1	ENABLED: Automatic pre-glow time determined by ambient air temperature; engine start is NOT permitted until pre-glow is finished.	
ENGINE SHUTDOWN: 7	0	DISABLED: No engine shutdown.	**1**
	1	**ENABLED: Shutdown engine when coolant temperature is greater than 110 deg. C or the oil pressure is less than 8 PSI.**	
TILT: 8	**1**	**5 DEGREES: Reduces the maximum speed of all boom functions to creep when tilted more than 5 degrees and above elevation; also reduces drive speed to creep.**	**1**
	2	4 DEGREES: Reduces the maximum speed of all boom functions to creep when tilted more than 4 degrees and above elevation; also reduces drive speed to creep.	
	3	3 DEGREES: Reduces the maximum speed of all boom functions to creep when tilted more than 3 degrees and above elevation; also reduces drive speed to creep.	
	4	4 DEGREES + CUT: Reduces the maximum speed of all boom functions to creep when tilted more than 4 degrees and above elevation; also disallows tower lift up, tower telescope out, drive, main telescope out and main lift up.	
	5	3 DEGREES + CUT: Reduces the maximum speed of all boom functions to creep when tilted more than 3 degrees and above elevation; also disallows tower lift up, tower telescope out, drive, main telescope out and main lift up.	
NOTE: *Any of the selections above will light the tilt lamp when a tilted condition occurs and will sound the platform alarm when the machine is also above elevation.*			
SOFT TOUCH: 9	**0**	**NO: No soft touch system installed.**	**0**
	1	YES: Soft touch system installed.	

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Table 4-1. Machine Configuration Programming Information

Configuration Digit	Number	Description	Default Number
GEN SET/WELDER: 10	0	NO: No generator installed.	**1**
	1	**BELT DRIVE: Belt driven setup.**	
	2	HYDRAULIC DRIVE: Hydraulic driven setup.	
GEN SET CUTOUT: 11*	**0**	**MOTION ENABLED: Motion enabled when generator is ON.**	**0**
	1	MOTION CUTOUT: Motion cutout in platform mode only.	
* Only visible if Gen Set / Welder Menu selection is not 0.			
H & T LIGHTS: 12	**0**	**NO: No head and tail lights installed.**	**0**
	1	YES: Head and tail lights installed.	
LOAD SYSTEM: 13*	**0**	**NO: No load sensor installed.**	**0**
	1	WARN ONLY: Functions in creep, overload lamp lit, platform alarm beeps (5 sec ON, 2 sec OFF).	
	2	CUTOUT PLATFORM: All functions cutout, overload lamp lit, platform alarm beeps (5 sec ON, 2 sec OFF).	
	3	CUTOUT ALL: All functions cutout, flash overload light (500mS on, 500mS off), platform alarm beeps (5 sec ON, 2 sec OFF).	
	4	SPECIAL 1: Functions in creep, overload lamp lit, disables main telescope out & main lift up, platform alarm beeps (5 sec ON, 2 sec OFF).	
* Only visible under certain market selections.			
* Certain market selections will limit load system options or alter default setting.			

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Table 4-1. Machine Configuration Programming Information

Configuration Digit	Number	Description	Default Number
FUNCTION CUTOUT: 14*	**0**	**NO: No drive cutout.**	**0**
	1	BOOM CUTOUT: Boom function cutout while driving above elevation.	
	2	DRIVE CUTOUT: Drive cutout above elevation.	
	3	DRIVE CUT E&T: Drive cutout above elevation and tilted.	
* Only visible under certain market selections.			
* Certain market selections will limit function cutout options or alter default setting.			
GROUND ALARM: 15*	**0**	**NO: No ground alarm installed.**	**0**
	1	DRIVE: Travel alarm sounds when the drive function is active (Option).	
	2	DESCENT: Descent alarm sounds when lift down is active (Option).	
	3	MOTION: Motion alarm sounds when any function is active (Option).	
* Certain market selections will alter default setting.			
OSCILLATING AXLE: 16	0	NO: No oscillating axle system installed.	**1**
	1	**YES: Oscillating axle system installed.**	
TEMPERATURE: 17*	0	CELSIUS: Celsius unit selection.	**1**
	1	**FAHRENHEIT: Fahrenheit unit selection.**	
* Certain market selections will alter default setting.			

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NOTE: *Bold Italic Numbers indicate the default setting. Plain text indicates another available selection. Bold, Italic underlined numbers indicate the default when the option is factory installed.*

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	MODEL NUMBER	ENVELOPE HEIGHT	MARKET	ENGINE	GLOW PLUGS			ENGINE SHUTDOWN		TILT					SOFT TOUCH		GEN SET / WELDER			GEN SET CUTOUT		HEAD & TAIL LIGHTS	
ANSI USA	**2**	**7**	**0**	**3**	0	**1**	2	0	**1**	**1**	2	3	4	5	**0**	1	0	**1**	2	**0**	1	**0**	1
ANSI EXPORT	**2**	**7**	**1**	**3**	0	**1**	2	0	**1**	**1**	2	3	4	5	**0**	1	0	**1**	2	**0**	1	**0**	1
CSA	**2**	**7**	**2**	**3**	0	**1**	2	0	**1**	**1**	2	3	4	5	**0**	1	0	**1**	2	**0**	1	**0**	1
CE	**2**	**7**	**3**	**3**	0	**1**	2	0	**1**	**1**	2	3	4	5	**0**	1	0	**1**	2	**0**	1	**0**	1
AUSTRALIA	**2**	**7**	**4**	**3**	0	**1**	2	0	**1**	**1**	2	3	4	5	**0**	1	0	**1**	2	**0**	1	**0**	1
JAPAN	**2**	**7**	**5**	**3**	0	**1**	2	0	**1**	**1**	2	3	4	5	**0**	1	0	**1**	2	**0**	1	**0**	1

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	LOAD SYSTEM					FUNCTION CUTOUT				GROUND ALARM				OSCILLATING AXLE		TEMPERATURE	
ANSI USA	**0**	**X**	**X**	**X**	**X**	**0**	**X**	**X**	**X**	**0**	1	2	3	0	**1**	0	**1**
ANSI EXPORT	**0**	**1**	2	3	4	**0**	1	2	3	**0**	1	2	3	0	**1**	0	**1**
CSA	**0**	**X**	**X**	**X**	**X**	**0**	1	2	3	0	1	2	**3**	0	**1**	**0**	1
CE	0	**X**	2	**3**	**X**	0	**1**	X	X	0	1	2	**3**	0	**1**	**0**	1
AUSTRALIA	**0**	**1**	2	3	4	**0**	1	2	3	**0**	1	2	3	0	**1**	**0**	1
JAPAN	0	**1**	2	3	4	**0**	1	2	3	0	1	2	**3**	0	**1**	**0**	1

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Table 4-2. Machine Personality Settings and Speeds

Submenu (Displayed on Analyzer 1st Line)	Parameter (Displayed on Analyzer 2nd Line)	Description	Range	DEFAULT VALUES	TIME RANGE (SEC) (SEE 4.6 Machine Orientation When Setting Speeds
DRIVE:					
	ACCEL X.Xs	Displays/adjusts drive acceleration	0.1 to 5.0 sec	2.0	
	DECEL X.Xs	Displays/adjusts drive deceleration	0.1 to 3.0 sec	1.3	
	MIN forward XX%	Displays/adjusts minimum forward drive speed	0 to 35%	1	
	MAX forward XXX%	Displays/adjusts maximum forward drive speed	0 to 100%	100	36-38 (see orientation)
	MIN reverse XX%	Displays/adjusts minimum reverse drive speed	0 to 35%	1	
	MAX reverse XXX%	Displays/adjusts maximum reverse drive speed	0 to 100%	100	36-38 (see orientation)
	ELEV. MAX XX%	Displays/adjusts maximum drive speed NOTE: used when elevation cutout switches are limiting maximum speed	0 to 50%	25	93-104 (see orientation)
	CREEP MAX XX%	Displays/adjusts maximum drive speed NOTE: used when creep switch on pump pot is active	0 to 50%	35	79-87 (see orientation)
STEER:					
	max SPEED XXX%	Displays/adjusts maximum steer speed.	0 to 100%	100	
MAIN LIFT:					
	ACCEl X.Xs	Displays/adjusts main lift acceleration	0.1 to 5.0 sec	1.0	
	DECEl X.Xs	Displays/adjusts main lift deceleration	0.1 to 3.0 sec	1.0	
	MIN Up XX%	Displays/adjusts minimum main lift up speed	0 to 60%	1	
	MAX UP XX%	Displays/adjusts maximum main lift up speed	0 to 60%	60	57-69 (see orientation)
	CREEP UP XX%	Displays/adjusts maximum main lift up speed NOTE: used when creep switch on pump pot is active	0 to 65%	35	
	MIN DOWN XX%	Displays/adjusts minimum main lift down speed	0 to 60%	1	
	MAX DOWN XXX%	Displays/adjusts maximum main lift down speed	0 to 60%	60	59-70 (see orientation)
	CREEP DOWN XX%	Displays/adjusts maximum main lift down speed NOTE: used when creep switch on pump pot is active	0 to 75%	35	

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Table 4-2. Machine Personality Settings and Speeds

Submenu (Displayed on Analyzer 1st Line)	Parameter (Displayed on Analyzer 2nd Line)	Description	Range	DEFAULT VALUES	TIME RANGE (SEC) (SEE 4.6 Machine Orientation When Setting Speeds
SWING:					
	ACCEL X.Xs	Displays/adjusts swing acceleration	0.1 to 5.0 sec	2.0	
	DECEL X.Xs	Displays/adjusts swing deceleration	0.1 to 3.0 sec	1.5	
	MIN LEFT XX%	Displays/adjusts minimum swing left speed	0 to 50%	20	
	MAX LEFT XXX%	Displays/adjusts maximum swing left speed	0 to 65%	73	102-146 (see orientation)
	CREEP LEFT XX%	Displays/adjusts maximum swing left speed NOTE: used when creep switch on pump pot is active	0 to 65%	45	
	MIN RIGHT XX%	Displays/adjusts minimum swing right speed	0 to 50%	20	
	MAX RIGHT XXX%	Displays/adjusts maximum swing right speed	0 to 65%	65	102-146 (see orientation)
	CREEP RIGHT XX%	Displays/adjusts maximum swing right speed NOTE: used when creep switch on pump pot is active	0 to 65%	45	
TOWER LIFT:					
	ACCEl X.Xs	Displays/adjusts tower lift acceleration	1.0 to 1.0 sec	1.0	
	DECEISLOW-FAST	Displays/adjusts tower lift deceleration	Slow, Medium, Fast	0.5	
	MIN Up XX%	Displays/adjusts minimum tower lift up speed	1 to 1%	1	
	MAX UP XX%	Displays/adjusts maximum tower lift up speed	60 to 60%	60	90-107 (see orientation)
	MIN DOWN XX%	Displays/adjusts minimum tower lift down speed	1 to 1%	1	
	MAX DOWN XXX%	Displays/adjusts maximum tower lift down speed	60 to 60%	60	94-107 (see orientation)
MAIN TELESCOPE:					
	ACCEL X.Xs	Displays/adjusts main telescope acceleration	0.1 to 5.0 sec	1.5	
	DECEL X.Xs	Displays/adjusts main telescope deceleration	0.1 to 3.0 sec	0.5	
	MIN IN XX%	Displays/adjusts minimum main telescope in speed. Same as Creep speed	0 to 65%	40	
	MAX IN XXX%	Displays/adjusts maximum main telescope in speed	0 to 100%	85	35-54 (see orientation)
	MIN OUT XX%	Displays/adjusts minimum main telescope out speed. Same as Creep speed	0 to 65%	40	
	MAX OUT XXX%	Displays/adjusts maximum main telescope out speed	0 to 100%	85	29-49 (see orientation)

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Table 4-2. Machine Personality Settings and Speeds

Submenu (Displayed on Analyzer 1st Line)	Parameter (Displayed on Analyzer 2nd Line)	Description	Range	DEFAULT VALUES	TIME RANGE (SEC) (SEE 4.6 Machine Orientation When Setting Speeds
TOWER TELESCOPE:					
	ACCEL X.Xs	Displays/adjusts tower telescope acceleration	1.0 to 1.0 sec	1.0	
	DECEL X.Xs	Displays/adjusts tower telescope deceleration	0.5 to 0.5 sec	0.5	
	MIN IN XX%	Displays/adjusts minimum tower telescope in speed. Same as Creep speed	1 to 1%	1	
	MAX IN XXX%	Displays/adjusts maximum tower telescope in speed	60 to 60%	60	
	MIN OUT XX%	Displays/adjusts minimum tower telescope out speed. Same as Creep speed	1 to 1%	1	
	MAX OUT XXX%	Displays/adjusts maximum tower telescope out speed	60 to 60%	60	
BASKET LEVEL:					
	ACCEL X.Xs	Displays/adjusts basket level acceleration	0.1 to 5.0 sec	1.5	
	DECEL X.Xs	Displays/adjusts basket level deceleration	0.1 to 3.0 sec	0.5	
	MIN UP XX%	Displays/adjusts minimum basket level up speed. Same as Creep speed	0 to 65%	40	
	MAX UP XXX%	Displays/adjusts maximum basket level up speed	0 to 100%	70	
	MIN DOWN XX%	Displays/adjusts minimum basket level down speed. Same as Creep speed	0 to 65%	40	
	MAX DOWN XXX%	Displays/adjusts maximum basket level down speed	0 to 100%	70	
BASKET ROTATE:					
	ACCEL X.Xs	Displays/adjusts basket rotate acceleration	0.1 to 5.0 sec	1.0	
	DECEL X.Xs	Displays/adjusts basket rotate deceleration	0.1 to 3.0 sec	0.5	
	MIN LEFT XX%	Displays/adjusts minimum basket rotate left speed. Same as Creep speed	0 to 100%	60	
	MAX LEFT XXX%	Displays/adjusts maximum basket rotate left speed	0 to 100%	60	24-30 (180°)
	MIN RIGHT XX%	Displays/adjusts minimum basket rotate right speed. Same as Creep speed	0 to 100%	60	
	MAX RIGHT XXX%	Displays/adjusts maximum basket rotate right speed	0 to 100%	60	24-30 (180°)
JIB LIFT:					

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Table 4-2. Machine Personality Settings and Speeds

Submenu (Displayed on Analyzer 1st Line)	Parameter (Displayed on Analyzer 2nd Line)	Description	Range	DEFAULT VALUES	TIME RANGE (SEC) (SEE 4.6 Machine Orientation When Setting Speeds
	ACCEL X.Xs	Displays/adjusts jib lift acceleration	0.1 to 5.0 sec	1.5	
	DECEL X.Xs	Displays/adjusts jib lift deceleration	0.1 to 3.0 sec	1.0	
	MIN UP XX%	Displays/adjusts minimum jib up speed. Same as Creep speed	0 to 65%	40	
	MAX UP XXX%	Displays/adjusts maximum jib up speed	0 to 100%	65	30-36
	MIN DOWN XX%	Displays/adjusts minimum jib down speed. Same as Creep speed	0 to 65%	40	
	MAX DOWN XXX%	Displays/adjusts maximum jib down speed	0 to 100%	60	30-36
JIB SWING:					
	ACCEL X.Xs	Displays/adjusts jib swing acceleration	0.1 to 5.0 sec	1.5	
	DECEL X.Xs	Displays/adjusts jib swing deceleration	0.1 to 3.0 sec	0.5	
	MIN LEFT XX%	Displays/adjusts minimum jib left speed. Same as Creep speed	0 to 65%	40	
	MAX LEFT XXX%	Displays/adjusts maximum jib left speed	0 to 100%	70	42-47 (125°)
	MIN RIGHT XX%	Displays/adjusts minimum jib right speed. Same as Creep speed	0 to 65%	40	
	MAX RIGHT XXX%	Displays/adjusts maximum jib right speed	0 to 100%	70	42-47 (125°)
GROUND MODE:					
	m. LIFT UP XXX%	Displays/adjusts fixed main lift up speed	0 to 100%	60	
	m. lift DN XXX%	Displays/adjusts main lift down speed	0 to 100%	60	
	SWING XXX%	Displays/adjusts fixed swing speed	0 to 65%	45	
	BASKET LVL XXX%	Displays/adjusts fixed basket level speed	0 to 100%	75	
	BASKET ROT XXX%	Displays/adjusts fixed basket rotate speed	0 to 100%	75	
	MAIN TELE XXX%	Displays/adjusts fixed main telescope speed	0 to 100%	65	
	TOWER TELE XXX%	Displays/adjusts fixed tower telescope speed Not displayed if TOWER TELE=NO	40 to 40%	40	
	T. LIFT UP XXX%	Displays/adjusts fixed tower lift up speed Not displayed if TOWER LIFT=NO	40 to 40%	40	
	T. LIFT DN XXX%	Displays/adjusts fixed tower lift down speed Not displayed if TOWER LIFT=NO	40 to 40%	40	
	JIB (U/D) XXX%	Displays/adjusts jib lift speed Not displayed if JIB = 0	0 to 100%	60	
	JIB (L/R) XXX%	Displays/adjusts jib swing speed Displayed if JIB = 2	0 to 100%	70	
GEN SET/WELDER:					
	Engine XXXX RPM	Control generator/welder RPM. Not displayed if GEN SET/WELDER = 0	1200-2800	1800	

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Table 4-2. Machine Personality Settings and Speeds

Submenu (Displayed on Analyzer 1st Line)	Parameter (Displayed on Analyzer 2nd Line)	Description	Range	DEFAULT VALUES	TIME RANGE (SEC) (SEE 4.6 Machine Orientation When Setting Speeds
NOTE: *Personality settings can be adjusted anywhere within the adjustment range in order to achieve optimum machine performance.* *Stop watch should start when the function is activated.Not with the controller or switch.* *Unless noted, function speeds should be measured from platform.* *Platform speed knob must be at full speed (fully clockwise).* *All test should be done with the oil temp above 100° F (38° C).*					

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4.6 MACHINE ORIENTATION WHEN SETTING SPEEDS

MAIN BOOM LIFT UP: From platform control, lowest elevation up to maximum elevation, main boom retracted, tower boom on boom rest.

MAIN BOOM LIFT DOWN: From platform control, maximum elevation down to minimum elevation, main boom retracted, tower boom on boom rest.

TOWER BOOM LIFT UP: From platform control, lowest elevation up to maximum elevation, main boom retracted and horizontal.

TOWER BOOM LIFT DOWN: From platform control, maximum elevation down to minimum elevation, main boom retracted and horizontal.

SWING RIGHT (Max): 360 Degrees, from platform control, main boom retracted, tower boom on boom rest.

SWING LEFT (Max): 360 Degrees, from platform control, main boom retracted, tower boom on boom rest.

MAIN BOOM TELESCOPE OUT: from platform control, main boom horizontal, tower boom on boom rest, 500 lb. capacity selected, jib swing centered.

MAIN BOOM TELESCOPE IN: from platform control, boom horizontal, tower boom on boom rest, 500 lb. capacity selected, jib swing centered.

DRIVE FORWARD (Max): high speed - low torque setting, drive 200 ft. front wheels to front wheels. Timed after machine has obtained maximum speed.

DRIVE REVERSE (Max): high speed - low torque setting, drive 200 ft. front wheels to front wheels. Timed after machine has obtained maximum speed.

DRIVE FORWARD (Creep Max): high torque - low speed setting, platform speed knob at full creep

DRIVE REVERSE (Creep Max): high torque - low speed setting, platform speed knob at full creep

DRIVE FORWARD (Elevated Max - Boom Beyond Transport): high speed - low torque setting, platform speed knob out of creep, Lift boom above transport, drive forward 50 ft.

DRIVE REVERSE (Elevated Max - Boom Beyond Transport): high speed - low torque setting, platform speed knob out of creep, Lift boom above transport, drive backward 50 ft.

Test Notes

1. Personality settings can be adjusted anywhere within the adjustment range in order to achieve optimum machine performance
2. Stop watch should start when the function is activated.Not with the controller or switch.
3. Unless noted, function speeds should be measured from platform.
4. Platform speed knob must be at full speed (fully clockwise).
5. All test should be done with the oil temp above 100° F (38° C).

4.7 SYSTEM TEST

The Control System Incorporates a built-in system test to check the system components and functions. To use this function, use the following procedures.

Test from the Platform

1. Position the Platform/Ground select switch to the Platform position.



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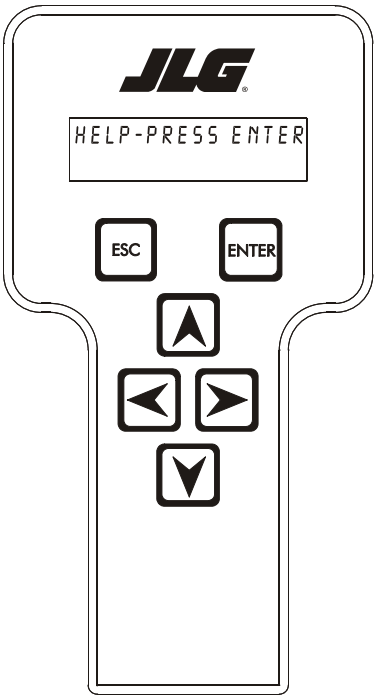
2. Plug the analyzer into the connector at the base of the platform control box.



3. Pull out the Emergency Stop switch and Start the engine.



4. The analyzer screen should read:



5. Use the arrow button to reach SYSTEM TEST. Hit Enter. The analyzer will prompt you asking if you want to activate the system test; hit Enter again to activate.

6. Follow the flow path in Figure 4-10. System Test Flow Chart - Platform Tests on Pg. 284 and go through the component tests. Hit the ESC key during any part of the test to return to the main menu without completing all tests or wait until all tests are complete. During the TEST ALL INPUTS sequence, the analyzer allows control switches to be operated and shows if they are closed (CL) or open (OP).

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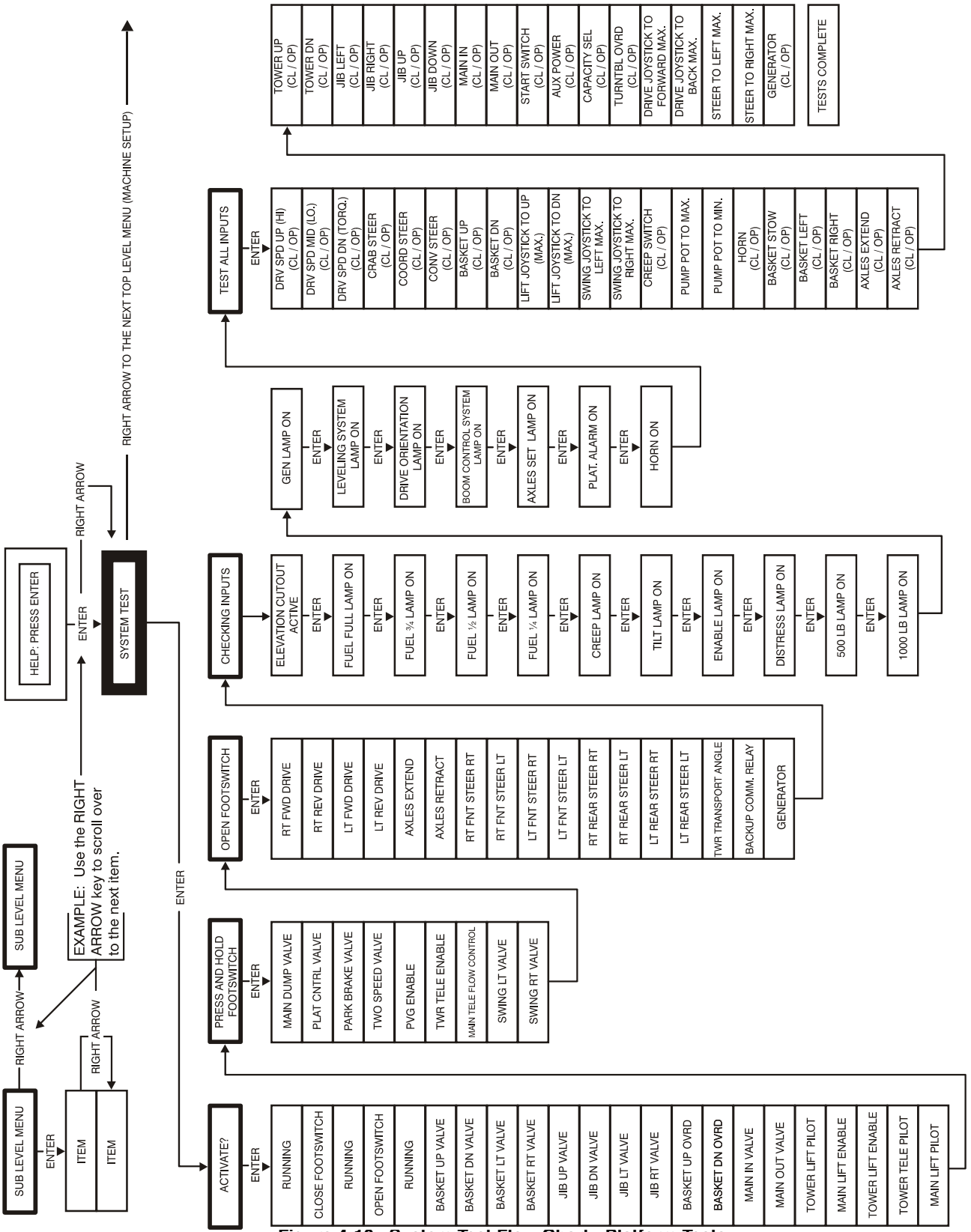


Figure 4-10. System Test Flow Chart - Platform Tests

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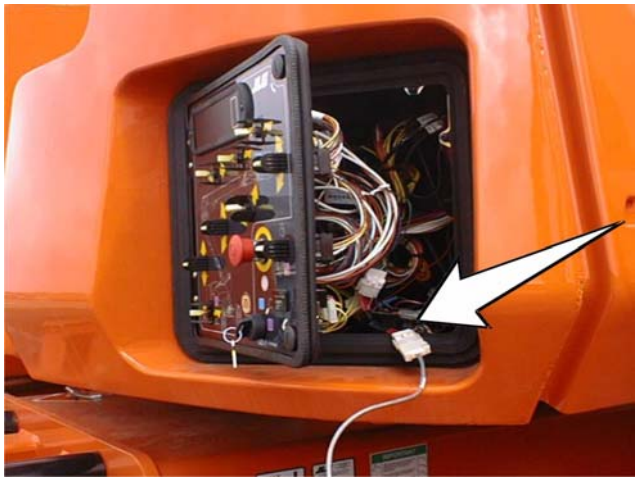
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Test from the Ground Station

1. Position the Platform/Ground select switch to the Ground position.



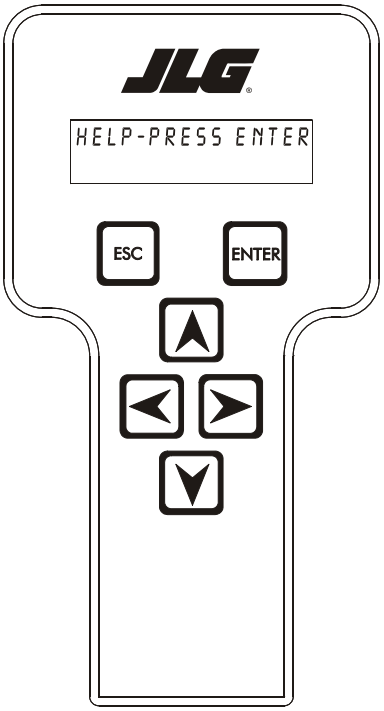
2. Plug the analyzer into the connector inside the Ground control box.



3. Pull out the Emergency Stop switch. and Start the engine.



4. The analyzer screen should read:



5. Use the arrow button to reach SYSTEM TEST. Hit Enter. The analyzer will prompt you asking if you want to activate the system test; hit Enter again to activate.

6. Follow the flow path in Figure 4-11. System Test Flow Chart - Ground Station Tests on Pg. 286 and go through the component tests. Hit the ESC key during any part of the test to return to the main menu without completing all tests or wait until all tests are complete. During the TEST ALL INPUTS sequence, the analyzer allows control switches to be operated and shows if they are closed (CL) or open (OP).

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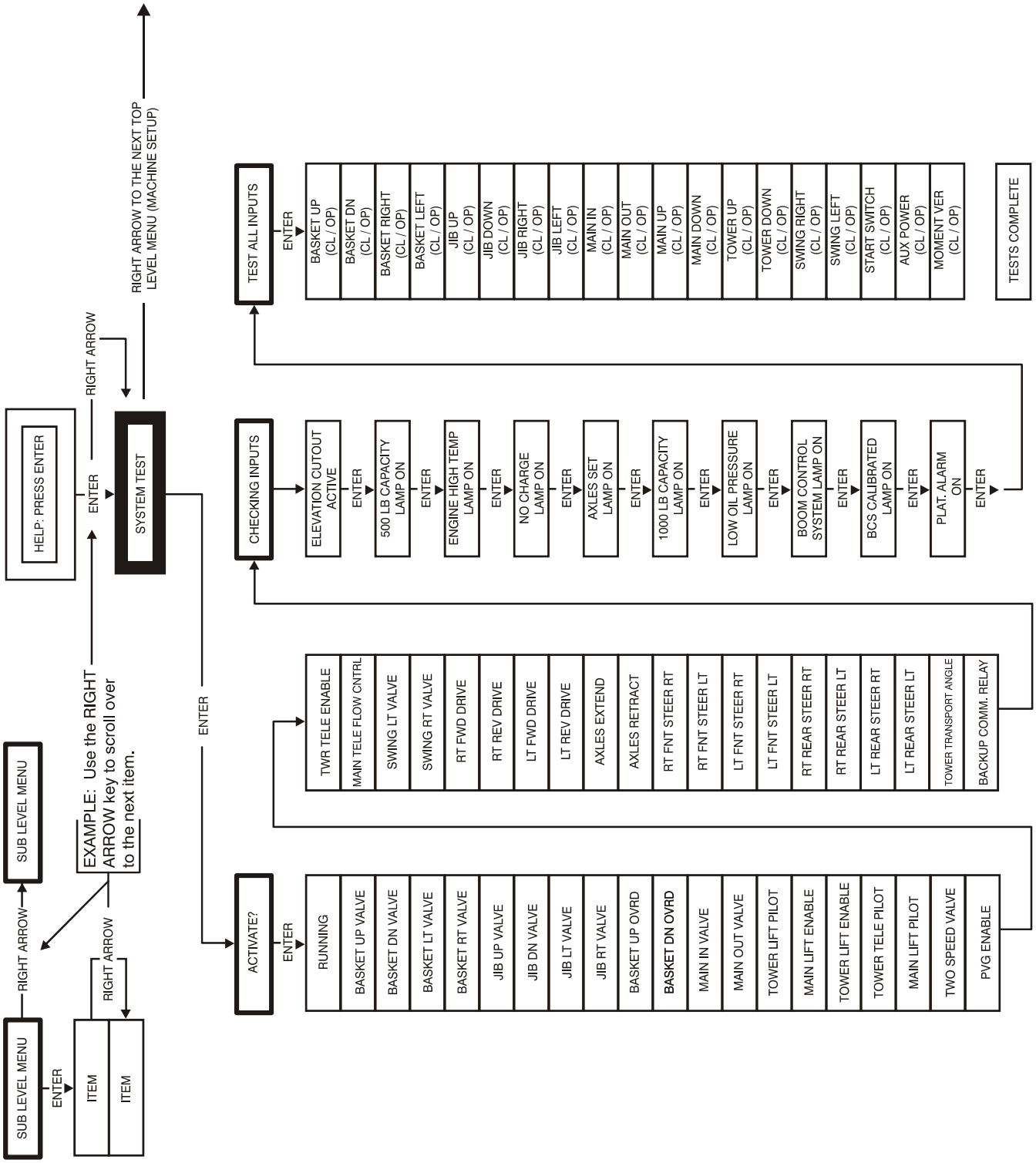


Figure 4-11. System Test Flow Chart - Ground Station Tests

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Table 4-3. System Test Messages

Message Displayed on Analyzer	Message Displayed on Analyzer	Description
RUNNING		Initial display when system test is run; certain "critical" checks are made. Problems that can be reported include below messages.
	ONLY 1 ANALYZER!	Do not connect two Analyzers while running the system test.
	BATTERY TOO LOW	The system test cannot run with battery voltage below minimum (9 V).
	BATTERY TOO HIGH	The system test cannot run with battery voltage above maximum. (16 V).
	CHECK CAN WIRING	The system test cannot run in platform mode unless data is being received from the platform and ground modules. The system test cannot run in ground mode unless data is being received from the platform module.
	CHECK SPEED	There is an open- or short- circuit in the speed encoder wiring. Check speed encoder.
	BAD GROUND MODULE	An internal problem was detected in the ground module.
	HIGH TILT ANGLE	The vehicle is very tilted (19.3°), or the tilt sensor has been damaged. Check tilt sensor.
	HOT ENGINE	The engine temperature exceeds 100×C. This is only a warning.
	BAD I/O PORTS	The controller detected a problem with its internal circuits at switch on. If other problems are also detected, the controller may need replacing.
	SUSPECT EEPROM	The controller detected a problem with its EEPROM stored personality settings at switch on. Check and, if necessary correct, all personality settings.
	OPEN FSW	In platform mode, the footswitch must be open at the start of the test.
	CLOSE FSW	In platform mode, the footswitch must be closed when this message is displayed; the footswitch MUST BE KEPT CLOSED during the valve & contactor tests.
	BAD FSW	The two footswitch signals are not changing together, probably because one is open-circuit. One footswitch signal ("FSW1") is routed to the power module, the other ("FSW2") is routed to the platform module. Check footswitch and wiring.
TESTING VALVES		Indicates that the valve test is beginning. Each valve is alternately energized and de-energized; checks are made for open- and short- circuit valve coils. NOTE: In platform mode, the footswitch must be closed. NOTE: Tower lift valves are not tested if TOWER LIFT=NO. Tower telescope valves are not tested if TOWER TELE=NO. Jib valves are not tested if JIB = NO. Extendable axle valves are not tested if EXT AXLES=NO. Four wheel steer valves are not tested if 4WS=NO. NOTE: Left/right jib valves are not tested unless JIB = SIDESWING. Problems that can be reported include below messages.
	CANT TEST VALVES	There is a wiring problem, which prevents the valve test from functioning correctly. Check valve wiring. Check ground alarm & hour meter wiring.
	XXXXXXX S/C	The named valve is drawing too much current so is presumed to be short-circuited. Check valve wiring.
	XXXXXXX O/C	The named valve is drawing too little current so is presumed to be open-circuit. Check valve wiring.

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Table 4-3. System Test Messages

Message Displayed on Analyzer	Message Displayed on Analyzer	Description
CHECKING INPUTS		Indicates that the inputs test is beginning. Every input is checked to ensure that it is in its "normal" position; function switches should be open, cutout switches should be closed, joysticks should be in neutral. In platform mode any non-neutral platform switch or joystick is reported; any active cutouts are reported. In ground mode any non-neutral ground switches is reported; any active cut-outs are reported. NOTE: Switches, which are not in use (due to the settings of machine digits), are not checked. NOTE: The pump pot is checked only for a wire-off condition; it can be at any demand from creep to maximum. Problems that can be reported include below messages.
	CHECK XXXXXXX	The named switch is not in its "normal" position. Check switch & wiring.
	CHECK XXXXXXX JOY	The named joystick appears to be faulty. Check joystick.
TESTING LAMPS		Indicates that the lamps test is beginning. Each lamp is energized in turn; a prompt asks for confirmation that the lamp is lit. ENTER must be pressed or clicked to continue the test. NOTE: Lamps, which are not in use (due to the settings of machine digits), are not checked. NOTE: Platform Lamps are only tested in platform mode. NOTE: The GM overload lamp and 500# capacity lamp are not tested. NOTE: Head and tail lamps are tested in both platform and ground mode if enabled by a machine digit.
TESTING ALARMS		Indicates that the alarms test is beginning. Each alarm is energized in turn; a prompt asks for confirmation that the alarm is sounding. ENTER must be pressed or clicked to continue the test. NOTE: The platform alarm and the horn are only tested in platform mode. NOTE: The ground alarm is not tested if GROUND ALARM = NO.
TEST ALL INPUTS?		Prompts whether to check every operator input. If ESC is pressed or clicked, the system test ends. If ENTER is pressed or clicked, each operator input is prompted for in turn. In platform mode every platform switch and joystick is tested. In ground mode every ground switch is tested. NOTE: Tower lift switches are not tested if TOWER LIFT=NO. Tower telescope switches are not tested if TOWER TELE=NO. Jib switches are not tested if JIB = NO. Extendable axle switches are not tested if EXT AXLES=NO. Four wheel steer switches are not tested if 4WS=NO. NOTE: Left/right jib switches are not tested unless JIB = SIDESWING. Prompts displayed during the operator input test below messages.
	CLOSE XXXXXXX	The named switch should be closed.
	OPEN XXXXXXX	The named switch should be opened.
	XXXXXXX XXXXXXX TO MAX	The named joystick should be pushed to its full extent in the named direction.
	XXXXXXX XXXXXXX TO MIN	The named joystick should be returned to neutral from the named direction.
	PUMP POT TO MAX	The pump pot should be turned to maximum.
	PUMP POT TO MIN	The pump pot should be turned to minimum.
	MULTIPLE CLOSURE	More than one operator input is closed; if only one has been operated, there could be a short between two inputs.
TESTS COMPLETE		Indicates that the system test is complete. Any problems reported should have been noted and should now be rectified. Press ESC/CANCEL to return to the RUN SYSTEM TEST Analyzer menu.

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SECTION 5. CALIBRATIONS

5.1 CALIBRATION INSTRUCTIONS

This machine incorporates a variety of sensors and a high degree of function interaction. For safety and proper machine functionality, the calibration procedures must be repeated for any control module replacement, system calibration related fault, or removal or replacement of any sensors, valves, coils, motors, or pumps. The chart below lists the calibrations required and potential reasons for recalibration.

All calibration procedures are menu driven through the use of the standard JLG analyzer. With the exception of steering calibration, no external tools are required to complete the calibration procedures. The user is prompted to exercise the machine in a specific order to use the machines physical properties to consistently establish sensor response and the interaction of valves, pumps, and motors. Steering calibration also uses the analyzer and is performed on one side of the machine at a time requiring the use of a string or other means to determine when the tires are in line with each other. With the exception of the load control calibration, all calibrations are accessed by connecting the analyzer into the control system inside the main terminal box or on the bottom of the platform control box. Calibration of the platform load sensing system is accessed by connecting the analyzer directly into the LSS module.

Table 5-1. Calibrations Listed by Symptom

Symptom	Calibration
Boom control system inaccuracy	Boom Sensors
Drive lugs engine	Drive
Drive pulls to one side	Drive
Load control inaccuracy	Platform Load Sensing
Platform leveling erratic	Platform Level Crack Point
Speed control for slow speed is poor	Drive
Tilt indication inaccuracy	Chassis Tilt
Wheel misaligned persistently	Steering

Table 5-2. Calibrations Listed by Service Action

Service Action	Calibration
BLAM removal	Boom Sensors
BLAM replacement	Boom Sensors Drive
Chassis Module replacement	Steering
Drive pump/coil replacement	Drive
LSS module replacement	Platform Load Sensing
Ground Module removal	Boom Sensors Chassis Tilt

Table 5-2. Calibrations Listed by Service Action

Service Action	Calibration
Ground Module replacement	Boom Sensors Chassis Tilt Drive Platform Level Crack Point Steering
Load cell removal or replacement	Platform Load Sensing
Load pin removal or replacement	Boom Sensors
Main boom angle sensor removal or replacement	Boom Sensors
Main lift valve/control module replacement	Boom Valve
Main terminal box removal or replacement	Chassis Tilt
Platform level valve/coil replacement	Platform Level Crack Point
Platform module replacement	Platform Level Crack Point
Steer Angle Sensor replacement	Steering
Tower boom angle sensor removal or replacement	Boom Sensors
Tower boom length sensor removal or replacement	Boom Sensors
Tower lift cylinder angle sensor removal or replacement	Boom Sensors
Tower lift valve/control module replacement	Boom Valve
Tower telescope valve/control module replacement	Boom Valve

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5.2 CALIBRATING STEER

When calibrating steering, each individual wheel must be calibrated in order to make the tire and wheel parallel with the frame. Two methods to help ensure proper calibration are the use of a carpenter's square to square the spindle to the axle or aligning the two wheels on one side using a stretched string.





1. Position the Platform/Ground select switch to the Platform position.



2. Plug the analyzer into the connector at the base of the platform control box.



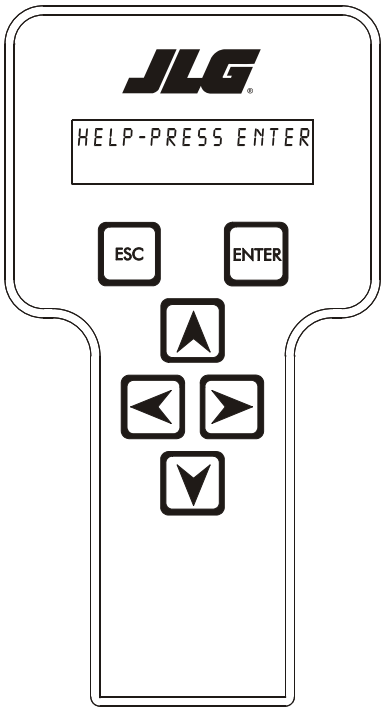
3. Pull out the Emergency Stop switch and Start the engine.



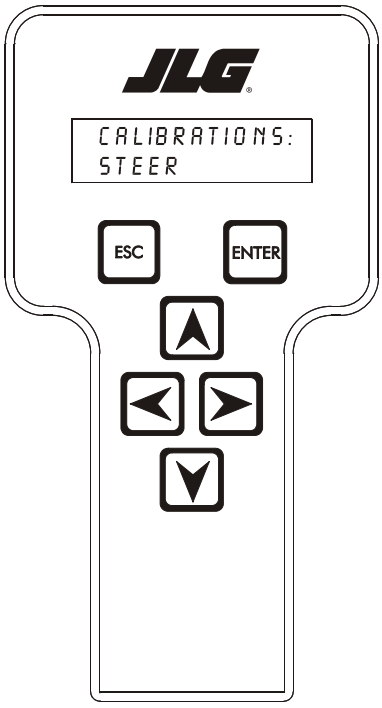
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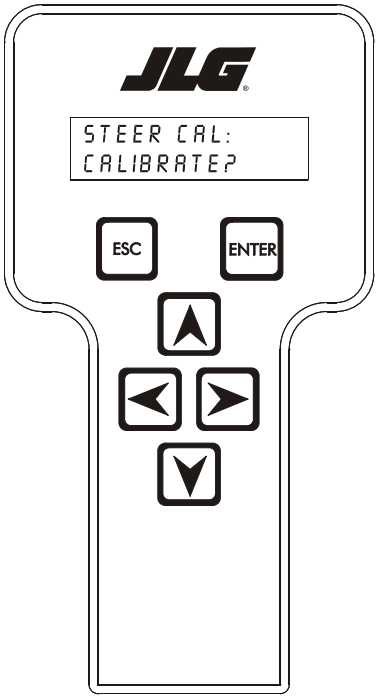
4. The analyzer screen should read:



5. Use the arrow button to reach ACCESS LEVEL 2. Hit Enter.
6. Enter the Access Code, 33271.
7. Use the right Arrow key to reach CALIBRATIONS. Hit Enter.
8. Use the arrow keys to reach Steer. The screen will read:



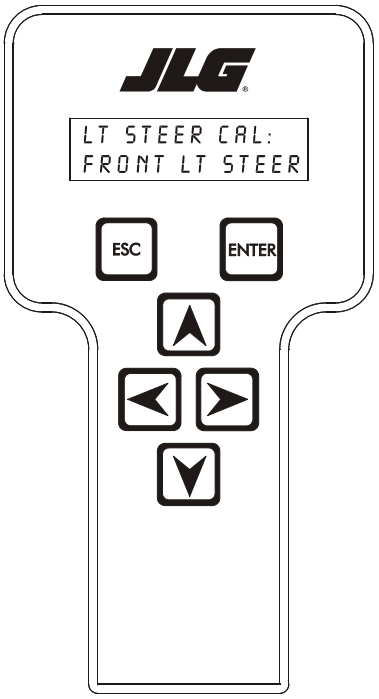
9. Hit Enter. The screen will read:



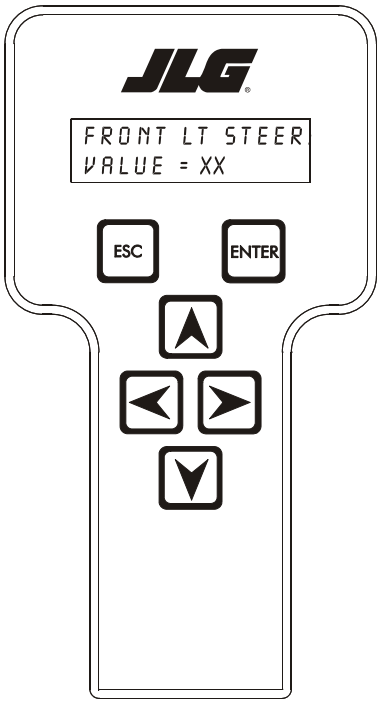
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10. Hit Enter. The screen will read:

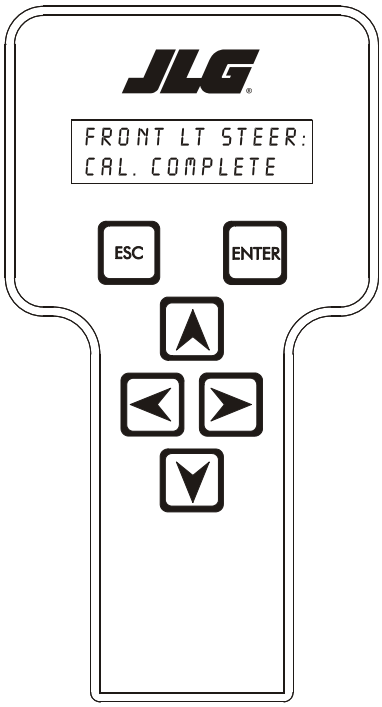


11. Hit Enter again. The screen will read:



12. Activate the steer control until the tire and wheel are straight in relationship with the chassis, then leave off the control. The display will read FRT LEFT = and show the numeric calibration value for that wheel.

13. Hit Enter. The screen will read:



14. Repeat steps 10 thru 12 for left rear steer.

15. Left Rear Steer Calibration will be followed by Right Forward Steer Calibration which will be followed by Right Rear Steer Calibration.

16. After completing all the Steer Calibrations, hit ESC twice to go back to CALIBRATIONS.

5.3 CALIBRATING DRIVE

1. Position the Platform/Ground select switch to the Platform position.



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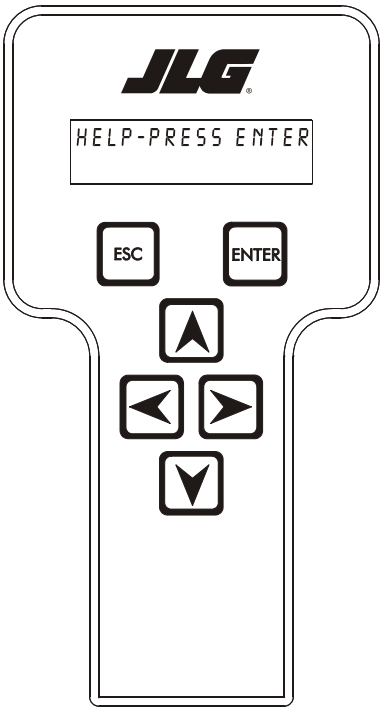
2. Plug the analyzer into the connector at the base of the platform control box.



3. Pull out the Emergency Stop switch and Start the engine.



4. The analyzer screen should read:

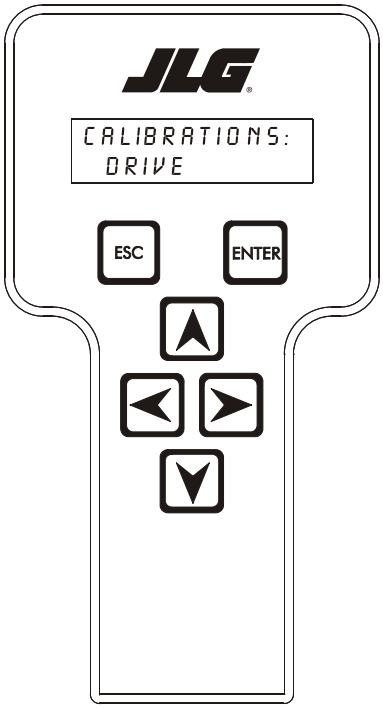


5. Use the arrow button to reach ACCESS LEVEL 2. Hit Enter.
6. Enter the Access Code, 33271.
7. Use the right Arrow key to reach CALIBRATIONS. Hit Enter.

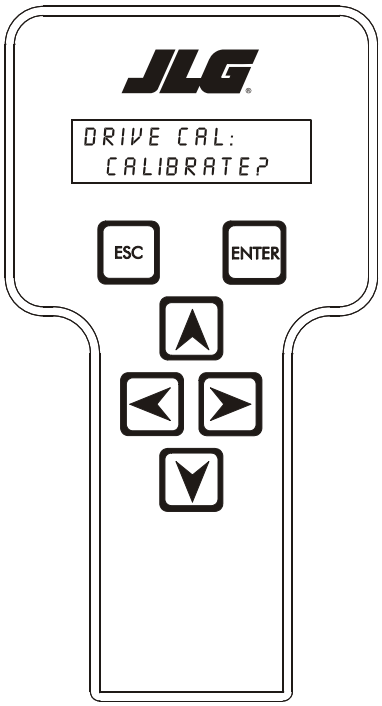
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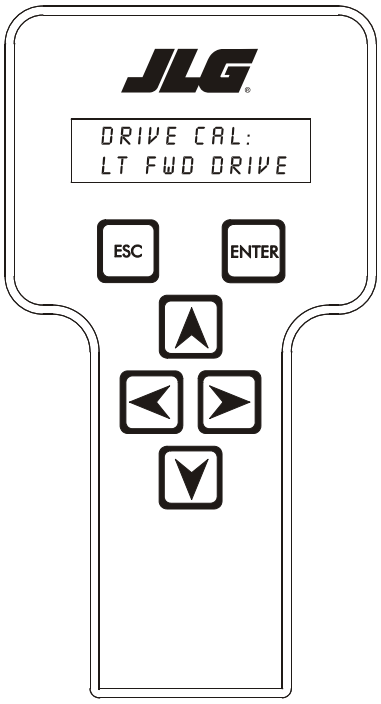
8. Use the arrow keys to reach DRIVE.



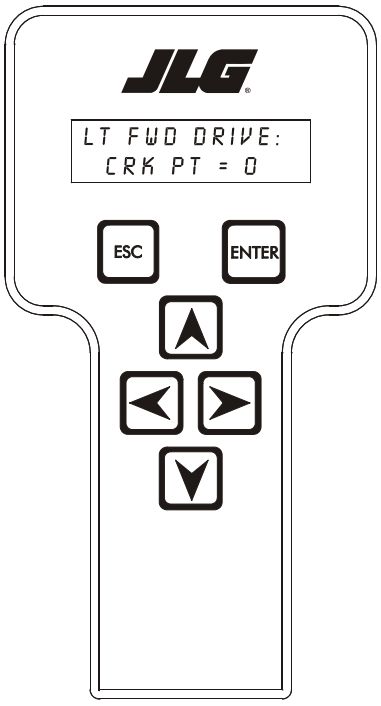
9. Hit Enter. The screen will read:



10. Hit Enter again. The screen will read:



11. Hit Enter again. The screen will read:

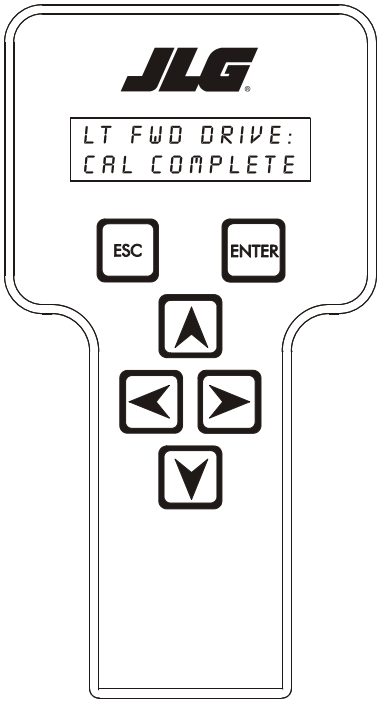


12. Activate the Drive Joystick forward full stroke until the machine just begins to move, then leave off the joystick immediately. The display will read CRK PT = and show the numeric crack point value.

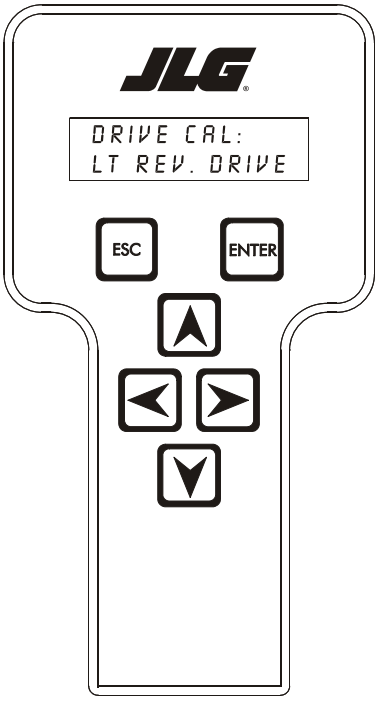
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13. Hit Enter. The number displayed will be the value that the crack point is set to. The screen will show:



14. Hit Enter. The screen will read:



15. Repeat steps 10 thru 12 for left reverse drive.

16. Left Reverse Drive Calibration will be followed by Right Forward Drive Calibration which will be followed by Right Reverse Calibration.

17. After completing all the Drive Calibrations, hit ESC twice to go back to CALIBRATIONS.

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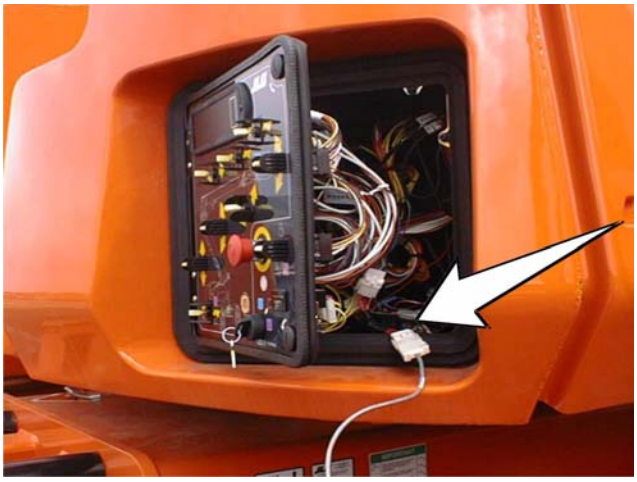
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5.4 CALIBRATING BOOM VALVES

1. Position the Platform/Ground select switch to the Ground position.

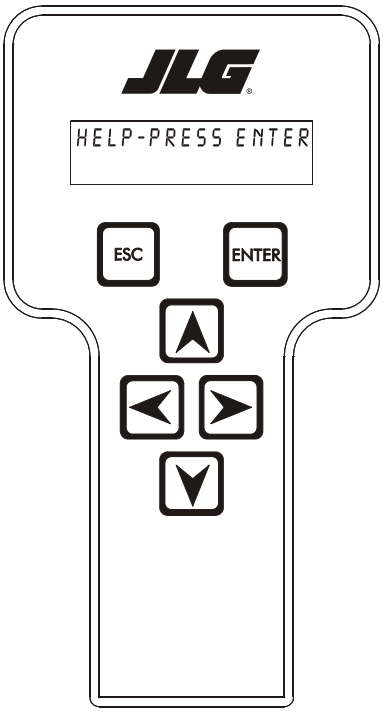


2. Plug the analyzer into the connector inside the Ground control box.



3. Pull out the Emergency Stop switch.

4. The analyzer screen should read:

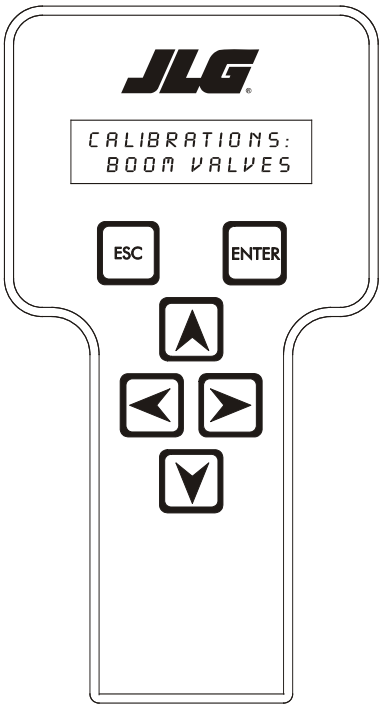


5. Use the arrow button to reach ACCESS LEVEL 2. Hit Enter.

6. Enter the Access Code, 33271.

7. Use the arrow keys to reach CALIBRATIONS. Hit Enter.

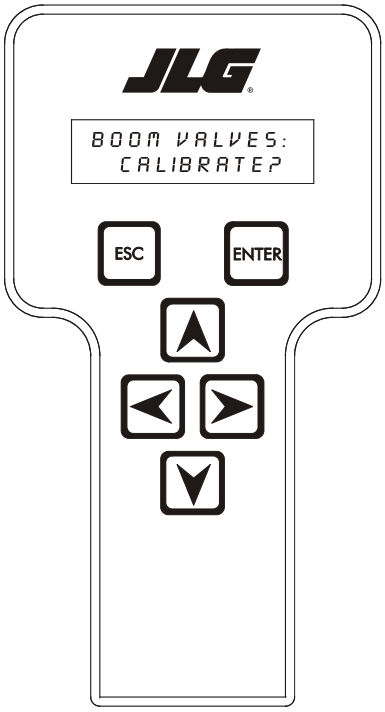
8. Use the arrow keys to reach Boom Valves. The screen will read:



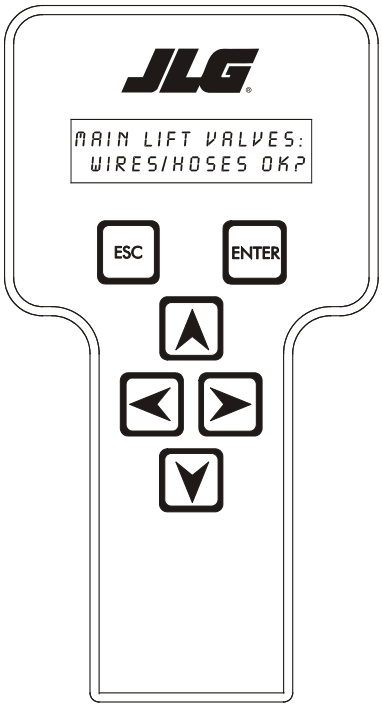
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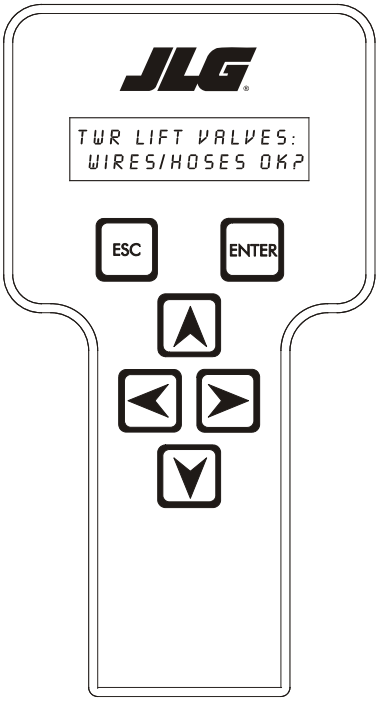
9. Hit Enter. The screen will read:



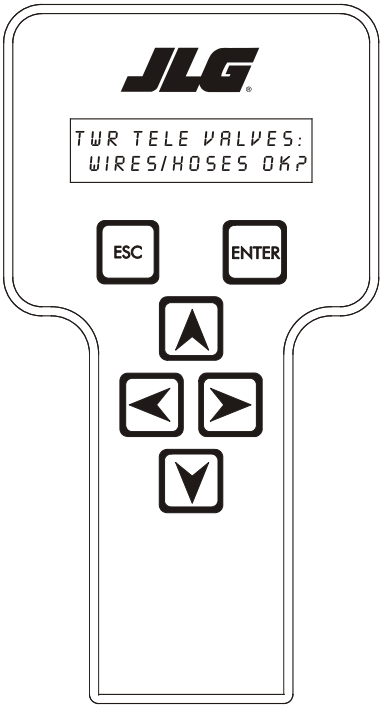
10. Hit Enter. The screen will read:



11. If the main lift wiring and hosing is properly installed and not damaged, hit enter. The screen will read:



12. If the tower lift wiring and hosing is properly installed and not damaged, hit enter. The screen will read:

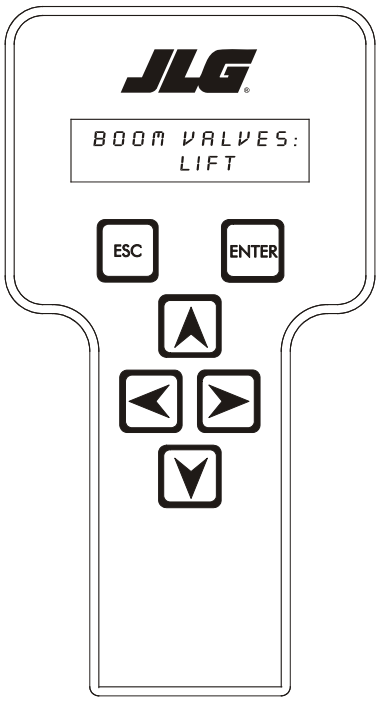


13. If the tower telescope wiring and hosing is properly installed and not damaged, hit enter. The screen will

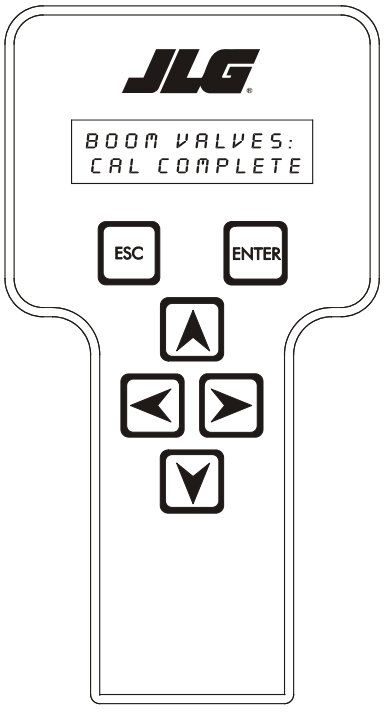
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read:



14. The control system will next calibrate the LIFT, TWR LIFT, and TWR TELE valves. This can be confirmed by watching the LED's on the respective valves as they are being calibrated. When the valves are calibrated, the screen will read:



NOTE: *It may take several minutes per valve section for the calibration procedure.*

15. After completing Boom Valve Calibration, hit ESC twice to go back to CALIBRATIONS.

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5.5 ELECTRONIC PLATFORM LEVELING

Platform Leveling Fault Warning

If a fault occurs in the platform leveling system the following will occur:

1. Automatic platform leveling will stop (except when there is a fault in only one sensor automatic leveling will remain active as the control system will use the other sensor to control leveling)
2. The level fault lamp will flash
3. The audible alarm will sound
4. All functions will default to creep speed if the platform is out of the transport position.

To reset the fault the emergency stop switch should be recycled.

IMPORTANT

IF THE FAULT PERSISTS BRING THE PLATFORM TO THE GROUND POSITION, SWITCH THE MACHINE OFF AND CONTACT A QUALIFIED SERVICE REPRESENTATIVE TO INVESTIGATE THE FAULT.

Fault Response

ERROR RESPONSE

If basket level varies from the current setpoint by ± 5.5° for more than 1.5 seconds when the platform is not in the transport position, the following events will occur:

1. The platform dump valve will be disabled (level, rotate and jib functions disabled).
2. The level system fault lamp will flash (to indicate that the leveling function has been lost).
3. The platform alarm will sound.
4. A system fault will be logged.
5. All function speeds (lift, swing, telescope and drive) will be placed in creep mode (except when the platform is in the transport position see below).

When the unit is in the transport position and driving and the current setpoint varies by ± 5.5° for more than 8 seconds the events 1,2,3 & 4 above will occur. (note function speeds will operate normally). Cycling the EMS will clear the fault and allow the operator to operate the machine as a new level setpoint is taken.

VALVE DRIVER ERRORS

There are three possible level valve driver errors, short to battery, short to ground, and open circuit.

1. In the case of a short to ground or an open circuit, the platform valve cannot be turned on and the following will occur:
   a. All interactions with platform leveling shall cease
   b. The Electronic Leveling System Fault Lamp shall flash (to indicate that the leveling function has been lost).
   c. The platform alarm will sound.
   d. A system fault will be logged.
   e. All function speeds (lift, swing, telescope and drive) will be placed in creep mode (except when the platform is in the transport position).
2. In the case of a short to battery on one of the platform leveling valves, the valve cannot be turned off and the following will occur:
   a. The platform dump valve will be turned off to prevent unintended tilting of the platform.
   b. All interactions with platform leveling shall cease.
   c. The Electronic Leveling System Fault Lamp shall flash (to indicate that the leveling function has been lost).
   d. The platform alarm will sound.
   e. A system fault will be logged.
   f. All function speeds (lift, swing, telescope and drive) will be placed in creep mode (except when the platform is in the transport position)
3. In the case of a short to battery on the platform dump valve, the valve cannot be turned off. The controllability of the platform leveling function will be impaired and the following will occur:
   a. All interactions with platform leveling shall cease.
   b. The Electronic Leveling System Fault Lamp shall flash (to indicate that the leveling function has been lost).
   c. The platform alarm will sound.
   d. A system fault will be logged.
   e. All function speeds (lift, swing, telescope and drive) will be placed in creep mode (except when the platform is in the transport position).

Lift, swing, drive and telescope will continue to operate

In each of the cases above it shall be necessary to recycle the EMS to clear the fault. Operable functions shall be in the creep mode except while below elevation.

TILT SENSOR ERRORS

If the secondary tilt sensor is faulty, the control system will continue to utilize information from the primary sensor.

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If the primary sensor is faulty, the control system will switch to the backup sensor for control.

In both cases above the following will occur:

1. The Electronic Leveling System Fault Lamp will flash (to indicate that there is a leveling fault).
2. The platform alarm will sound.
3. A system fault will be logged.
4. All function speeds (lift, swing, telescope, jib and drive) will be placed in creep mode (except when the platform is in the transport position).
5. Automatic leveling remains active.

Lift, swing, drive and telescope will continue to operate.

In each of the cases above it will be necessary to re-cycle the EMS to clear the fault. Operable functions shall be in the creep mode except while below elevation.

When both sensors appear to be working but have measurements that disagree by ±5.5° The following will occur:

1. All interactions with platform leveling shall cease.
2. The Electronic Leveling System Fault Lamp shall flash (to indicate that the leveling function has been lost).
3. The platform alarm will sound.
4. A system fault will be logged.
5. All function speeds (lift, swing, telescope and drive) will be placed in creep mode (except when the platform is in the transport position)

At this point, the operator must use the level up and down toggle switch to manually level during descent. It shall be necessary to re-cycle the EMS to clear the fault.

CAN Errors

The Ground Module has two direct outputs dedicated to overriding the Platform Module's control of the leveling valves. The Ground Module "Platform Level Up/Down" outputs are used to control the platform level up and down valves.

When in ground mode, if the Ground Module reads a platform leveling switch command, the switch command is communicated over CAN to the Platform Module where it is handled normally.

If Ground Module determines that CAN communication is inoperable, it turns on the platform control valve and the appropriate platform leveling override outputs while the switch is engaged.

If the Platform Module is still running when CAN is down nothing will operate when in platform mode. When the operator switches to ground mode, the platform will not control any of its valve outputs and a CAN error message is signaled.

Additional Platform and Jib Valves

The high side drivers for the platform left and right and the jib up and down valves are be located in the Platform Module and are proportional. Flow through the valves is individually controllable. The individually controlled duty cycle will be the same as would otherwise have been commanded to the flow control valve.

Only one platform or jib function is allowed at one time to limit the amount of current draw, minimizing the voltage drop on the supply to the Platform Module.

The function is enabled first shall remain active until it is released. Any other function commanded while another function is active is ignored.

Platform Leveling Calibration Procedure

STEP 1: SETTING THE PLATFORM VALVE MINIMUMS

1. Put machine into "Ground Mode".
2. Start machine and plug in Analyzer.
3. Go to the "Access Level 2" screen.
4. Enter "33271" to get into Access Level 1 mode.
5. Go to the "Personalities" menu and adjust the following personalities. Refer to the Personality Ranges/Defaults table in Section 6 - JLG Control System for proper setting values.

   Basket Level Up Min
   Basket Level Up Max
   Basket Level Down Max
   Jib Up Min
   Jib Down Min
6. Recycle EMS.

STEP 2: CALIBRATING THE PLATFORM LEVEL SENSORS

1. Put machine into "Ground Mode".
2. Start machine and plug in Analyzer.
3. Manually level the platform with the switch on the MTB.
4. Go to the "Access Level 2" screen.
5. Enter "33271" to get into Access Level 1 mode.
6. Go to the "Calibrations" menu and hit ENTER.
7. Use RIGHT ARROW go to "Plat. Leveling" screen.
8. Hit ENTER. "Calibrate?" prompt should appear.
9. Hit ENTER again to calibrate level sensors.
10. When calibration has been successful "Cal. Complete" should appear.
11. Cycle power to the machine.

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STEP 3: BLEEDING THE PLATFORM VALVES

1. Put machine into “Ground Mode”.
2. Start machine and plug in Analyzer.
3. Go to the “Access Level 2” screen.
4. Enter “33271” to get into Access Level 1 mode.
5. Go to the “Personalities” menu.
6. Using the left arrow button, go to the “Ground Mode” menu.
7. Hit ENTER.
8. Using the UP/DOWN arrows, adjust the following personalities to 100%.

   Basket Rotate
   Basket Level
   Jib U/D (if configured)

   Start up the machine and exercise each above platform function (from the ground) eight (8) to ten (10) times for 5 seconds in each direction.
9. Return the personality settings back to the values as shown in the Personality Ranges/Defaults table in Section 6 - JLG Control System.
10. Recycle EMS.

STEP 4: CALIBRATING THE PLATFORM LEVEL UP AND DOWN VALVE CRACKPOINTS

1. Put machine into “Ground Mode”.
2. Start machine and plug in Analyzer.
3. Go to the “Access Level 2” screen.
4. Enter “33271” to get into Access Level 1 mode.
5. Go to the “Calibrations” menu and hit ENTER.
6. Go to the “Basket U Crkpt” Screen. Hit ENTER.
7. “Calibrate?” prompt should appear. Hit ENTER again.
8. You will hear engine go to 1800 rpm.
9. Using UP ARROW, increase the value until you see the basket up movement.
10. Hit ENTER again. “Cal. Complete” message should appear
11. Engine should again return to idle.
12. Hit ESC should return to “Basket U Crkpt” screen.
13. Hit RIGHT ARROWto get to the “Basket D Crkpt” screen. Hit ENTER.
14. “Calibrate?” prompt should appear. Hit ENTER again.
15. You will hear engine go to 1800 rpm.

Using DOWN ARROW, decrease the value until you see the basket down movement.

Hit ENTER again. “Cal. Complete” message should appear

Engine should again return to idle.

Hit ESC to exit.

Cycle power to the machine.

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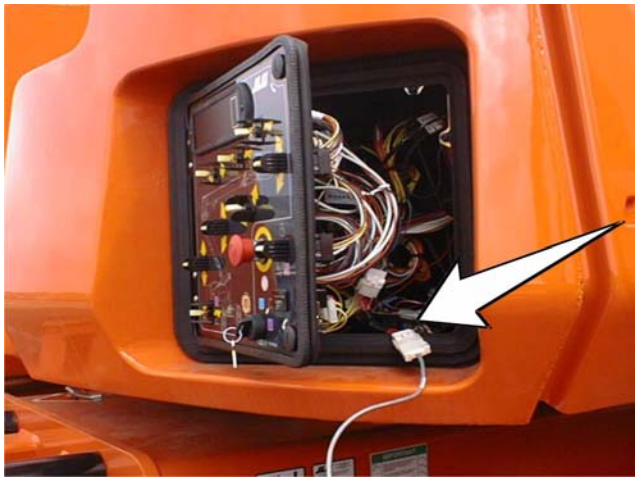
5.6 CALIBRATING PLATFORM LEVEL

STEP 1: SETTING THE PLATFORM VALVE MINIMUMS

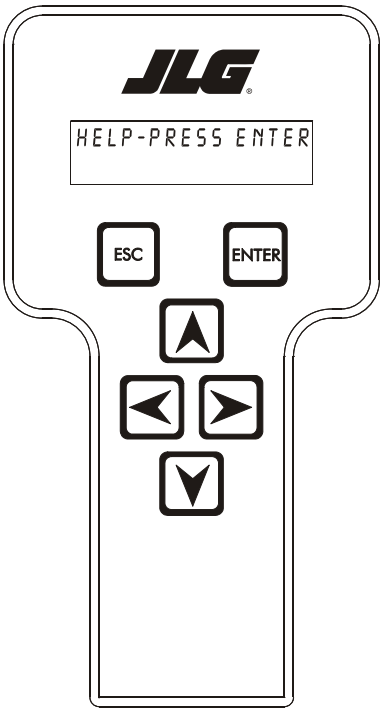
1. Position the Platform/Ground select switch to the Ground position.



2. Plug the analyzer into the connector inside the Ground control box.



3. Pull out the Emergency Stop switch and start the engine.
4. The analyzer screen should read:



5. Use the arrow button to reach ACCESS LEVEL 2. Hit Enter.
6. Enter the Access Code, 33271.
7. Use the arrow button to reach PERSONALITIES adjust the following personalities. Refer to the Personality Ranges/Defaults table for proper setting values.

   Basket Level Up Min
   Basket Level Up Max
   Basket Level Down Max
   Jib Up Min
   Jib Down Min

8. Recycle EMS.

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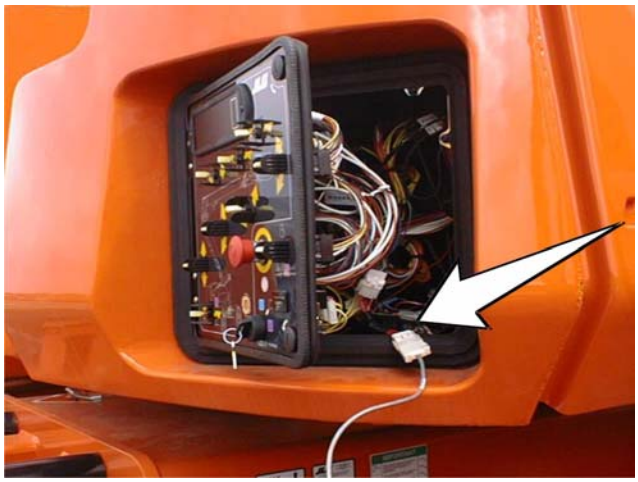
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STEP 2: CALIBRATING THE PLATFORM LEVEL SENSORS

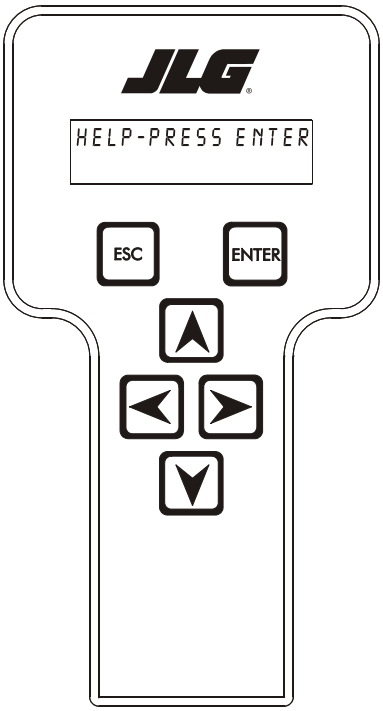
1. Position the Platform/Ground select switch to the Ground position.



2. Plug the analyzer into the connector inside the Ground control box.



3. Pull out the Emergency Stop switch and start the engine.
4. Manually level the platform with the switch on the Main Terminal Box.
5. The analyzer screen should read:

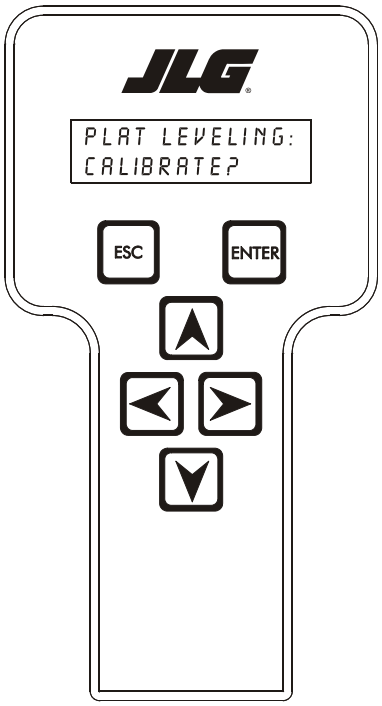


6. Use the arrow button to reach ACCESS LEVEL 2. Hit Enter.
7. Enter the Access Code, 33271.
8. Use the arrow button to reach CALIBRATIONS menu and hit ENTER.
9. Use right arrow go to PLAT. LEVELING screen.

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10. Hit ENTER. The screen should read:



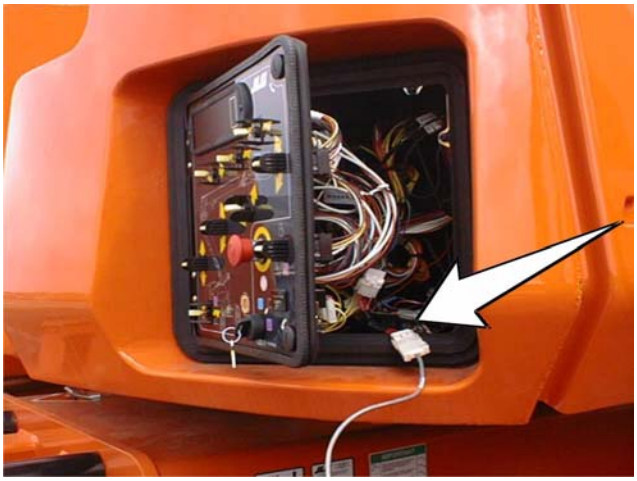
11. Hit ENTER again to calibrate level sensors.
12. When calibration has been successful CAL. COMPLETE should appear.
13. Cycle power to the machine.

STEP 3: BLEEDING THE PLATFORM VALVES

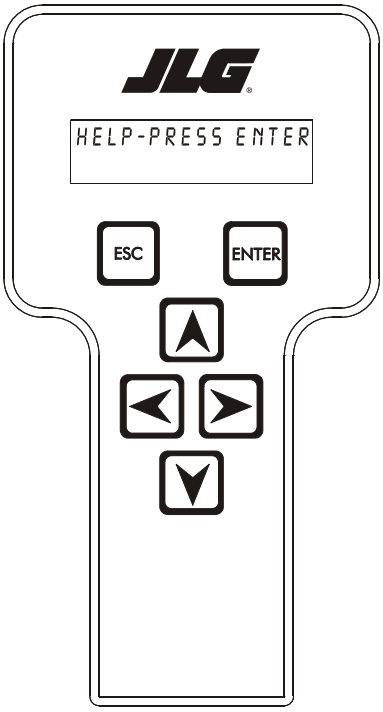
1. Position the Platform/Ground select switch to the Ground position.



2. Plug the analyzer into the connector inside the Ground control box.



3. Pull out the Emergency Stop switch and start the engine.
4. The analyzer screen should read:



5. Use the arrow button to reach ACCESS LEVEL 2. Hit Enter.
6. Enter the Access Code, 33271.
7. Go to the PERSONALITIES menu.
8. Using the left arrow button, go to the GROUND MODE menu.
9. Hit ENTER.
10. Using the UP/DOWN arrows, adjust the following personalities to 100%.

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Basket Rotate
Basket Level
Jib U/D (if configured)

Start up the machine and exercise each above platform function (from the ground) eight (8) to ten (10) times for 5 seconds in each direction.

11. Return the personality settings back to the values as shown in the Personality Ranges/Defaults table in Section 6 - JLG Control System.

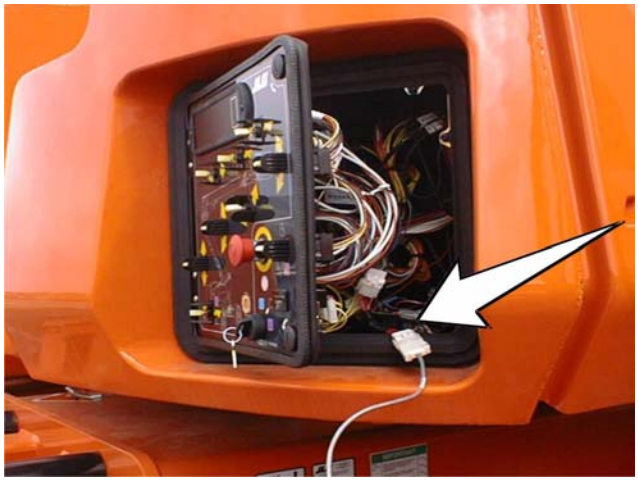
12. Recycle EMS.

STEP 4: CALIBRATING THE PLATFORM LEVEL UP AND DOWN VALVE CRACKPOINTS

1. Position the Platform/Ground select switch to the Ground position.

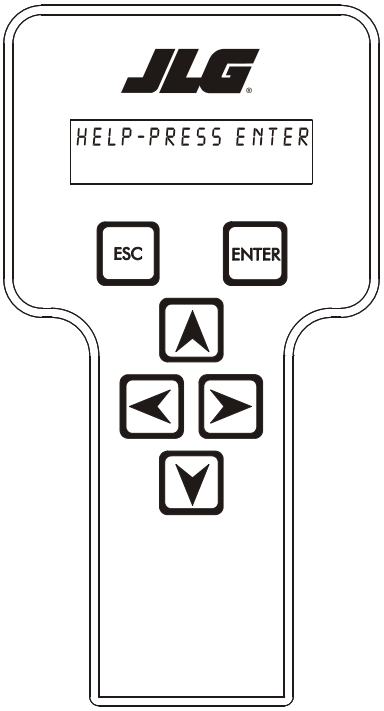


2. Plug the analyzer into the connector inside the Ground control box.



3. Pull out the Emergency Stop switch and start the engine.

4. The analyzer screen should read:



5. Use the arrow button to reach ACCESS LEVEL 2. Hit Enter.

6. Enter the Access Code, 33271.

7. Go to the CALIBRATIONS menu and hit ENTER.

8. Go to the BASKET U CRKPT Screen. Hit ENTER.

9. CALIBRATE? prompt should appear. Hit ENTER again.

10. You will hear engine go to 1800 rpm.

11. Using UP ARROW, increase the value until you see the basket up movement.

12. Hit ENTER again. CAL. COMPLETE message should appear

13. Engine should again return to idle.

14. Hit ESC should return to BASKET U CRKPT screen.

15. Hit RIGHT ARROW to get to the “BASKET D CRKPT” screen. Hit ENTER.

16. CALIBRATE? prompt should appear. Hit ENTER again.

17. You will hear engine go to 1800 rpm.

Using DOWN ARROW, decrease the value until you see the basket down movement.

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Hit ENTER again. CAL. COMPLETE message should appear

Engine should again return to idle.

Hit ESC to exit.

Cycle power to the machine.

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5.7 CALIBRATING TILT SENSOR

IMPORTANT

A NEW TILT MODULE WILL ACT AS IF IT IS TILTED ALL OF THE TIME UNTIL THE FOLLOWING PROCEDURE IS PERFORMED.

⚠ WARNING

DO NOT CALIBRATE THE LEVEL SENSOR EXCEPT ON A LEVEL SURFACE.

1. Use the following procedure to calibrate the tilt sensor.

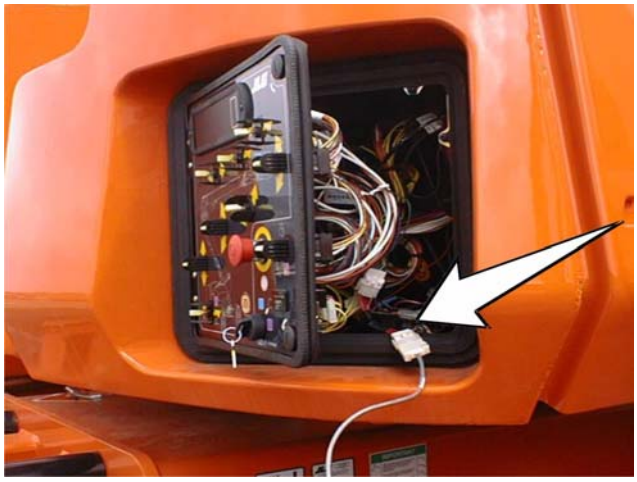
   Before the tilt sensor can be calibrated, the following conditions must be met:

   a. Steering previously calibrated.
   b. Axles extended.
   c. Wheels straight.
   d. Turntable centered.
   e. Boom fully retracted.
   f. Boom angle is less than 45°.
   g. Machine on firm, level ground.

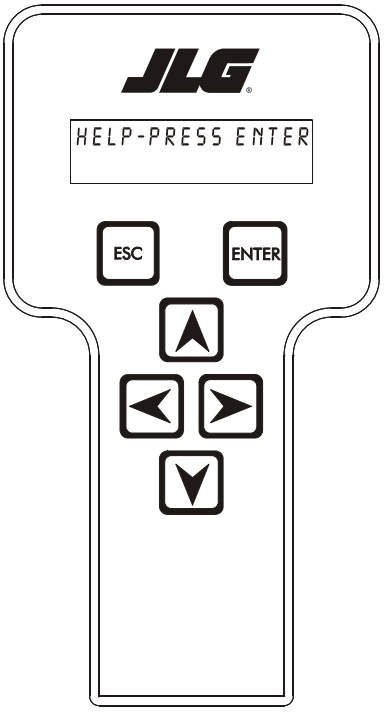
2. Position the Platform/Ground select switch to the Ground position.



3. Plug the analyzer into the connector inside the Ground control box.



4. Pull out the Emergency Stop switch and start the engine.
5. The analyzer screen should read:

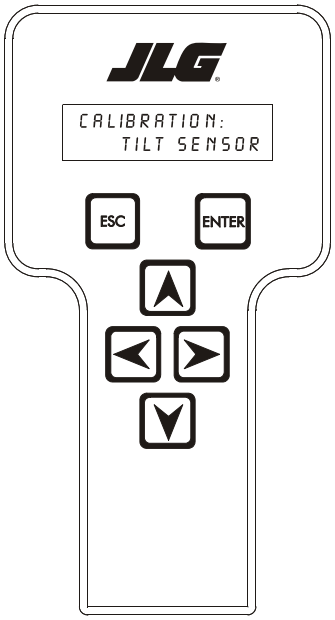


6. Use the arrow button to reach ACCESS LEVEL 2. Hit Enter.
7. Enter the Access Code, 33271.
8. Use the right Arrow key to reach CALIBRATIONS. Hit Enter.

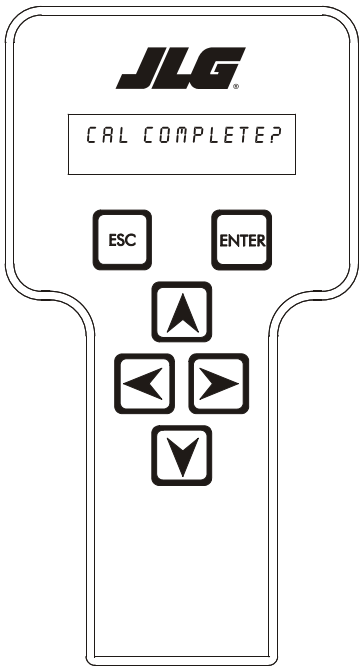
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9. Use the arrow keys to reach the TILT SENSOR. The screen should read:



10. Press ENTER.
11. When prompted, swing turntable 180° to opposite end of chassis.
12. Press ENTER. The screen should read:



13. Upon completing swing calibration, swing turntable 180° back to the stowed position.
14. Hit ESC twice to go back to CALIBRATIONS.

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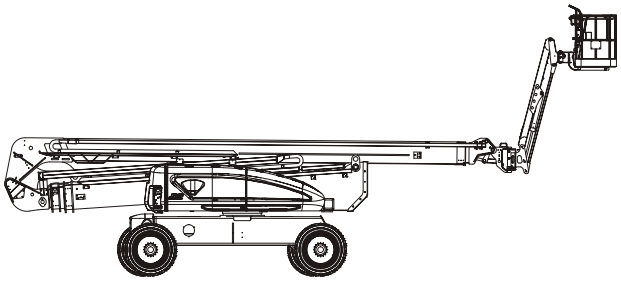
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5.8 BOOM SENSOR CALIBRATION

Step 1 - Position 1

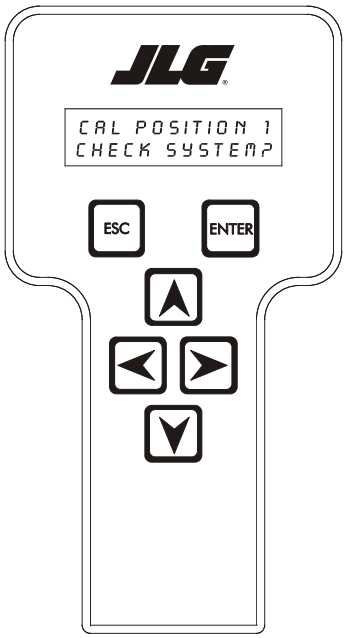
(Initial Position – Booms Stowed With Jib Lifted To Max Angle)

With both tower and main booms stowed, lift the jib up to maximum angle as shown below.



The control system will prompt and check for initial conditions.

The analyzer will read:



To begin calibration of the boom sensors, the following conditions must first be met:

- Steering and tilt previously calibrated
- Axles extended
- Wheels straight
- Platform unloaded and booms clean
- Jib raised
- Jib swing centered
- Platform level and centered
- Turntable centered in the normal driving direction
- Tower boom retracted and lowered
- Main boom retracted and lowered
- Level ground (must be under 1.5°). Visible through DIAGNOSTICS ? SYSTEM ? CHASSIS TILT: XX.X DEGREES.
- Ground mode selected

After these conditions are met, follow all sub-sections below in sequence to properly calibrate all boom sensors.

Potential System Check Failure Messages as displayed on the JLG Analyzer:

- BLAM CAN LOST - communications to BLAM module lost
- CAN BUS FAULTY - the system is reporting CAN bus issues. Visible through DIAGNOSTICS ? CAN STATISTICS ? BUS OFF (or MSG ERR)
- MN LFT VLV FAULT - there is a fault being reported on the main lift valve
- TW LFT VLV FAULT - there is a fault being reported on the tower lift valve
- TW TEL VLV FAULT - there is a fault being reported on the tower tele valve
- LOAD PIN FAULT - communications to load pin lost
- MAIN ANGL1 FAULT - main angle #1 (right side) is not communicating on the CAN bus. This could be a power issue or communications (CAN) issue.
- MAIN ANGL2 FAULT - main angle #2 (left side) is not communicating on the CAN bus. This could be a power issue or communications (CAN) issue.
- TWR ANGL1 FAULT - invalid data received from the right (#1) tower angle sensor
- TWR ANGL2 FAULT - invalid data received from the left (#2) tower angle sensor
- CYL ANGL FAULT - invalid raw data received from the tower lift cylinder angle.
- TWR LEN1 FAULT - raw top (#1) length sensor A/D counts are unknown by the ground module. This value is sent out from the BLAM module.
- TWR LEN2 FAULT - raw bottom (#2) length sensor A/D counts are unknown by the ground module. This value is sent out from the BLAM module.
- EXTEND AXLES - one or more axle switches not closed. Visible through DIAGNOSTICS ? TRANSPORT DATA ? AXLE STATUS: XXX (EXTENDED or RETRACTED)
- CENTER WHEELS - one or more wheels steered beyond 10° of straight. Visible through DIAGNOSTICS ? DRIVE ? L FRONT WHEEL ANGLE: XX.X (similar for other wheels)
- TWR IN - tower boom transport length switch must be indicating retracted. Visible through DIAGNOSTICS ?

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TRANSPORT DATA ? TOWER TELESCOPE STATUS: XXX (RETRACTED or EXTENDED). For the tower boom to be retracted the twr transport switch closed must be closed (DIAGNOSTICS ? BOOM SWITCHES ? TOWER TELESCOPE SWITCH NC: XX (CLOSED or OPEN)) and the twr transport switch open must be opened (DIAGNOSTICS ? BOOM SWITCHES ? TOWER TELESCOPE SWITCH NC: XX (CLOSED or OPEN)). Raw top (#1) length sensor A/D counts must be less than 1388 counts. Visible through ACCESS LEVEL 1 ? DIAGNOSTICS ? BOOM SENSORS ? TOWER LENGTH 1 A/D: XXXXX. Raw bottom (#2) length sensor A/D counts must be less than 1698 counts. Visible through ACCESS LEVEL 1 ? DIAGNOSTICS ? BOOM SENSORS ? TOWER LENGTH 2 A/D: XXXXX.

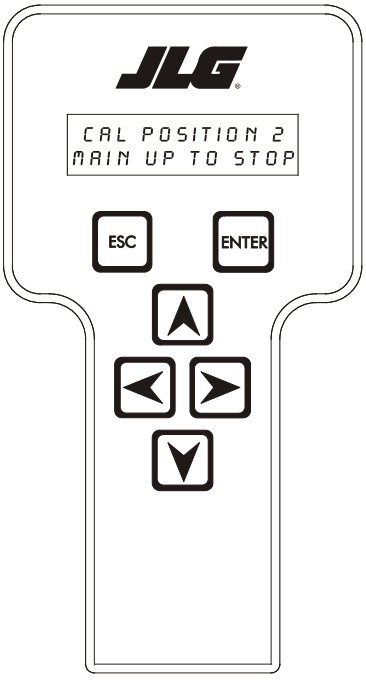
- MAIN DOWN - main boom transport angle switches must be indicating below elevation. Visible through DIAGNOSTICS ? TRANSPORT DATA ? TRANSPORT MODE: XXX (OUT OF TRANSPORT or TRANSPORT). For the main boom to be below elevation the main transport angle switch closed must be closed (DIAGNOSTICS ? BOOM SWITCHES ? MAIN LIFT ANGLE SWITCH NC: XXX (CLOSED or OPEN)) and the main transport angle switch open must be opened (DIAGNOSTICS ? BOOM SWITCHES ? MAIN LIFT ANGLE SWITCH NO: XXX (CLOSED or OPEN)).
- TOWER DOWN - raw tower lift cylinder angle A/D counts higher than 11385. Visible through ACCESS LEVEL 1 ? DIAGNOSTICS ? BOOM SENSORS ? TOWER CYLINDER ANGLE A/D: XXXXX.
- RETRACT MAIN - control system must recognize the main boom to be in length zone A. Visible through DIAGNOSTICS ? BCS ? MAIN BOOM LENGTH ZONE: X (A, B, C, or D). For the main boom to be considered in length zone A the main transport length normally open switch must be open (DIAGNOSTICS ? BOOM SWITCHES ? MAIN BOOM LENGTH SWITCH NO: XX (CLOSED or OPEN)) and the main transport length normally closed switch must be closed (DIAGNOSTICS ? BOOM SWITCHES ? MAIN BOOM LENGTH SWITCH NC: XX (CLOSED or OPEN)). Also, the normally closed Dual capacity switch must be closed (DIAGNOSTICS ? BOOM SWITCHES ? DUAL CAPACITY SWITCH NC (CLOSED or OPEN)) and the normally open Dual capacity switch must be opened (DIAGNOSTICS ? BOOM SWITCHES ? DUAL CAPACITY SWITCH NO (CLOSED or OPEN)).
- ALIGN TURNTABLE - drive orientation switch must be in the closed state. Visible through DIAGNOSTICS ? DRIVE ? DRV. ORIENTATION SWITCH: XX (CLOSED or OPEN)
- CENTER JIB SWING - jib centered switch must be in the closed state. Visible through DIAGNOSTICS ? LOAD ? JIB IN-LINE SWITCH: XX (CLOSED or OPEN)
- LEVEL MACHINE - chassis tilt reading must be less than 1.5°. Visible through DIAGNOSTICS ? SYSTEM ? CHASSIS TILT: XX.X DEGREES.
- CAL STEERING - control system requires a valid steering calibration prior to boom sensors calibration
- CAL TILT SENSOR - control system requires a valid chassis tilt calibration prior to boom sensors calibration
- SELECT GRND MODE - must calibrate in ground mode
- REMOVE DONGLE - the system detects that a Dongle is attached. The dongle must be removed prior to boom sensors calibration

Potential Calibration Failure Messages:

- MAIN ANGL1 FAULT - main angle sensor #1 (right) raw value is not between 5° and 25°. Visible through ACCESS LEVEL 1 ? DIAGNOSTICS ? BOOM SENSORS ? MAIN LIFT 1 RAW ANGLE: XXX.X.
- MAIN ANGL2 FAULT - main angle sensor #2 (left) raw value is not between 155° and 175°. Visible through ACCESS LEVEL 1 ? DIAGNOSTICS ? BOOM SENSORS ? MAIN LIFT 2 RAW ANGLE: XXX.X.
- TWR LEN1 FAULT - Raw top (#1) length sensor A/D counts must be between 1388 counts and 410 counts. Visible through ACCESS LEVEL 1 ? DIAGNOSTICS ? BOOM SENSORS ? TOWER LENGTH 1 A/D: XXXXX.
- TWR LEN2 FAULT - Raw bottom (#2) length sensor A/D counts must be between 1698 counts and 720 counts. Visible through ACCESS LEVEL 1 ? DIAGNOSTICS ? BOOM SENSORS ? TOWER LENGTH 2 A/D: XXXXX.
- CYL ANGL FAULT - the tower cylinder angle A/D counts must be between 4721 counts and 11385 counts. Visible through ACCESS LEVEL 1 ? DIAGNOSTICS ? BOOM SENSORS ? TOWER CYLINDER ANGLE A/D: XXXXX.

Step 2 - Position 2

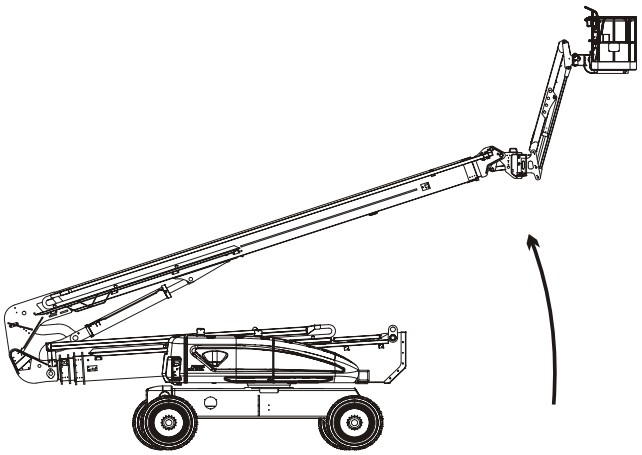
The analyzer will read:



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Lift Main Boom To Stop - Control System Will Stop At Main Boom Angle Limit Switch Trip Point - Approx 15° Above Tower

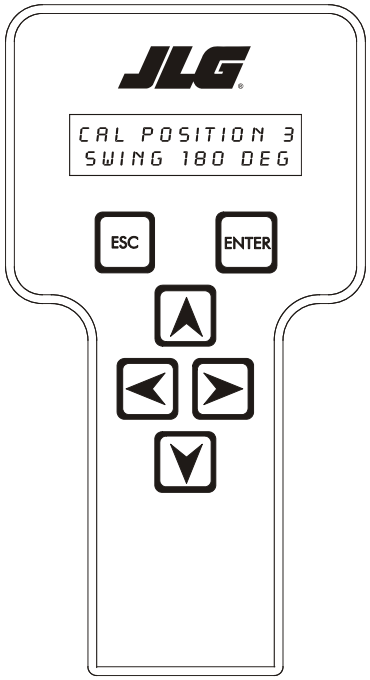


Potential Calibration Failure Messages:

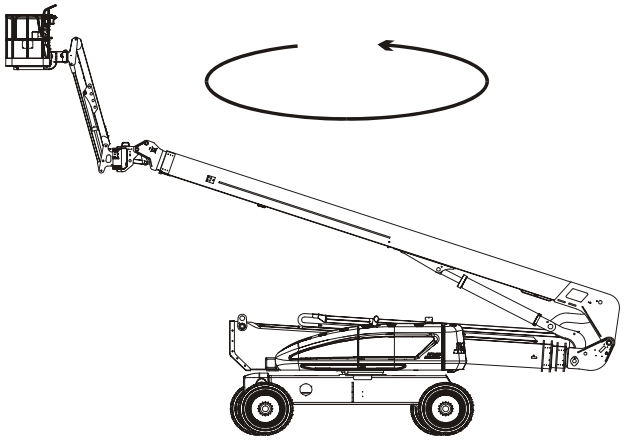
- TWR NOT IN - control system detected movement of tower telescope during main lift movement (length sensor 1 read more than 80 counts of movement during main lift)
- TWR NOT DWN - control system detected movement of tower lift during main lift movement (tower cylinder angle sensor read more than 80 counts of movement during main lift)
- MAIN ANGL FAULT - control system did not detect change in state of main boom transport angle switch before raw main boom angle sensors reached 30° relative to tower.
- MAIN UP TO STOP - the transport angle switch has not changed states. Visible through DIAGNOSTICS ? BOOM SWITCHES ? MAIN LIFT ANGLE SWITCH NC: XX (CLOSED or OPEN) and DIAGNOSTICS ? BOOM SWITCHES ? MAIN LIFT ANGLE SWITCH NO: XX (CLOSED or OPEN).

Step 3 - Position 3

The analyzer will read:



Swing turntable 180° - Technician must center turntable over opposite end of chassis



Potential Calibration Failure Messages:

- DRIVE ORNT SW - control system must detect change in state of the drive orientation switch. Visible through DIAGNOSTICS ? DRIVE ? DRV. ORIENTATION SWITCH: XX (CLOSED or OPEN)
- TWR ANGL1 FAILED - the raw tower boom angle #1(right) must be between -46.7° and -26.7°. Visible through ACCESS LEVEL 1 ? DIAGNOSTICS ? BOOM SENSORS ? TOWER ANGLE 1 A/D: XX.X.
- TWR ANGL2 FAILED - the raw tower boom angle #2 (left) must be between -46.7° and -26.7°. Visible through

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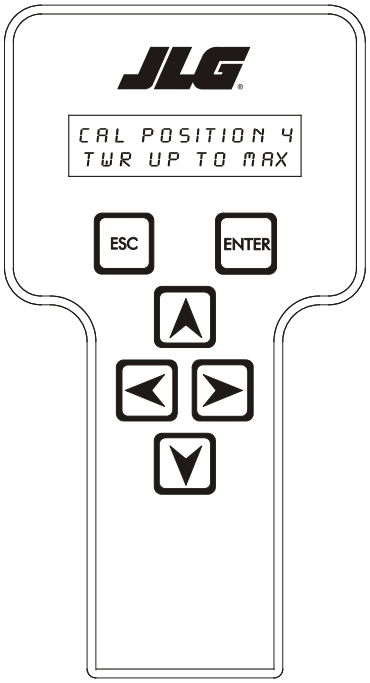
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ACCESS LEVEL 1 ? DIAGNOSTICS ? BOOM SENSORS ? TOWER ANGLE 2 A/D: XX.X.

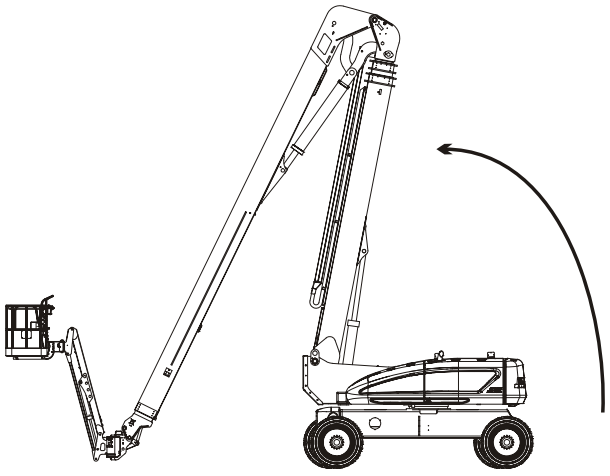
- TILT CAL FAULT - control system detected ground slope of more than 1.75° using current calibration data regardless of initial chassis tilt reading

Step 4 - Position 4

The analyzer will read:



Lift tower to max angle (approx 79°)

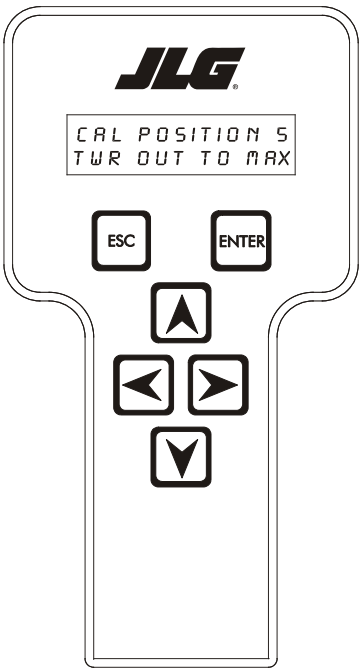


Potential Calibration Failure Messages:

- CYLINDER ANGL FAULT - raw tower lift cylinder angle sensor A/D counts not between 22871 and 29535. Visible through ACCESS LEVEL 1 ? DIAGNOSTICS ? BOOM SENSORS ? TOWER CYLINDER ANGLE A/D: XXXXX.
- TWR ANGL1 FAILED - the raw tower boom angle #1 (right) must be between 36.3° and 56.3°. Visible through ACCESS LEVEL 1 ? DIAGNOSTICS ? BOOM SENSORS ? TOWER ANGLE 1 A/D: XX.X.
- TWR ANGL2 FAILED - the raw tower boom angle #2 (left) must be between 36.3° and 56.3°. Visible through DIAGNOSTICS ? BOOM SENSORS ? TOWER ANGLE 2 A/D: XX.X.

Step 5 - Position 5

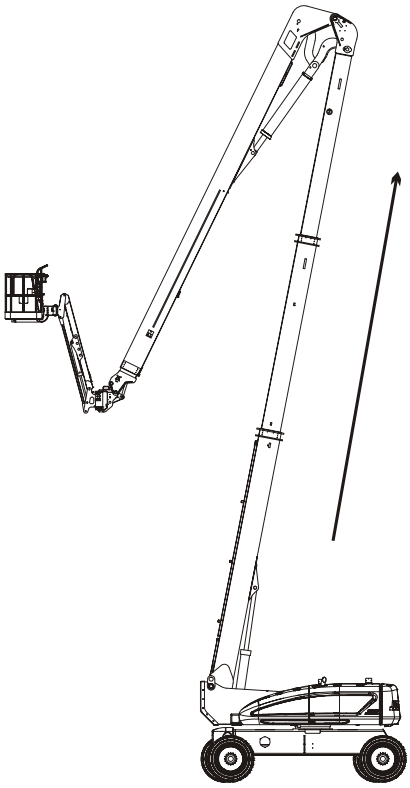
The analyzer will read:



Telescope tower out to max length

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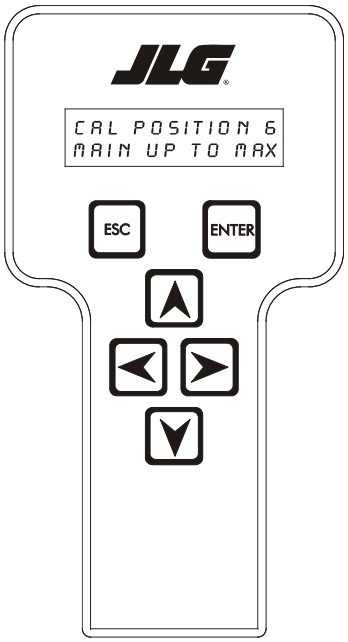


Potential Calibration Failure Messages:

- TWR NOT UP - control system detected movement of tower lift cylinder angle sensor during tower telescope movement (tower cylinder angle sensor read more than 665 counts during tower telescope). Visible through ACCESS LEVEL 1 ? DIAGNOSTICS ? BOOM SENSORS ? TOWER CYLINDER ANGLE A/D: XXXXX.
- TWR LEN FAULT - control system did not detect change in state of tower transport length switch within 1 to 7 inches (2.5 to 17.8 cm) of movement using raw length sensor data.
- TWR LEN1 FAULT - raw top (#1) length sensor A/D counts not between 28267 and 29245. Visible through ACCESS LEVEL 1 ? DIAGNOSTICS ? BOOM SENSORS ? TOWER LENGTH 1 A/D: XXXXX.
- TWR LEN2 FAULT - raw bottom (#2) length sensor A/D counts not between 28577 and 29555. Visible through ACCESS LEVEL 1 ? DIAGNOSTICS ? BOOM SENSORS ? TOWER LENGTH 2 A/D: XXXXX.
- TWR L SW FAULT - control system did not detect change in state of tower transport length switch within tower length readings of 303.9" and 308.9" (771.9 and 784.6 cm)

Step 6 - Position 6

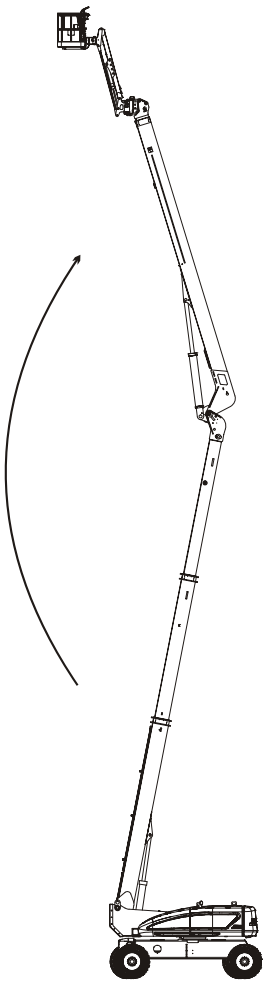
The analyzer will read:



Lift main boom to max angle

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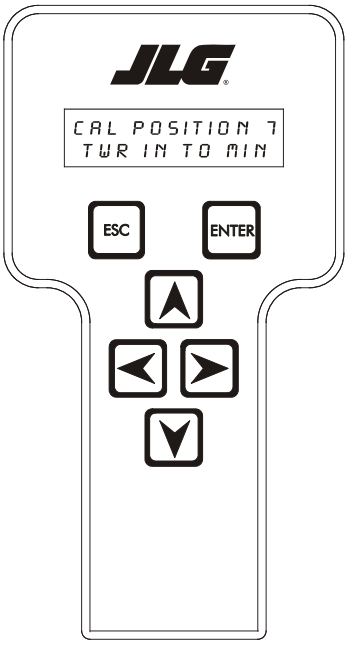


Potential Calibration Failure Messages:

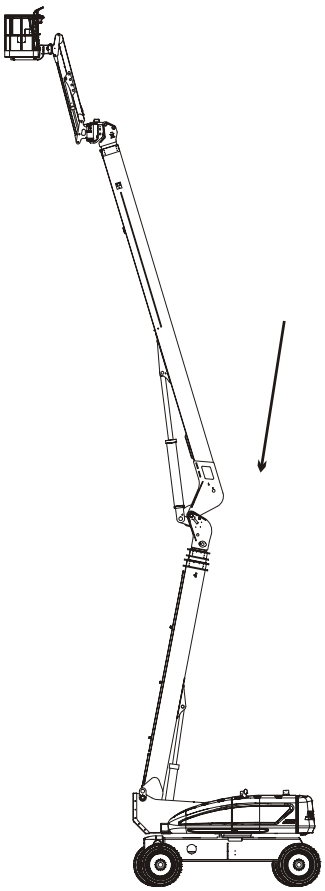
- TWR NOT OUT - control system detected movement of tower length sensor during main lift movement (more than 80 counts)
- MAIN ANGL1 FAULT - right side (#1) sensor not reading raw values between 155° and 175°. Visible through ACCESS LEVEL 1 ? DIAGNOSTICS ? BOOM SENSORS ? MAIN LIFT 1 RAW ANGLE: XXX.X.
- MAIN ANGL2 FAULT - left side (#2) sensor not reading raw values between 5° and 25°. Visible through ACCESS LEVEL 1 ? DIAGNOSTICS ? BOOM SENSORS ? MAIN LIFT 2 RAW ANGLE: XXX.X.
- MAIN A SW FAULT - control system did not detect change in state of main boom transport angle switch within main boom angle sensor readings of 12.8° and 18.8°. Visible through DIAGNOSTICS ? BOOM SENSORS ? MAIN ANGLE 1 TO TWR XX.X.

Step 7 - Position 7

The analyzer will read:



Telescope tower in to min length



Potential Calibration Failure Messages:

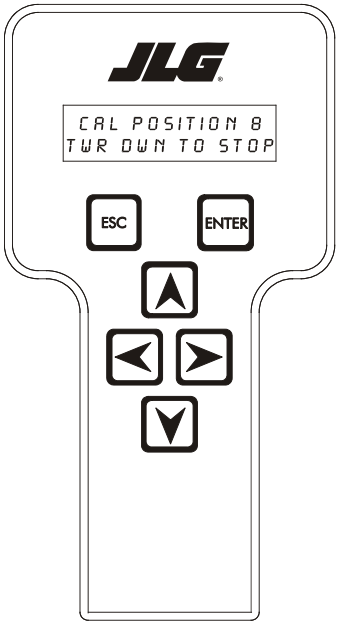
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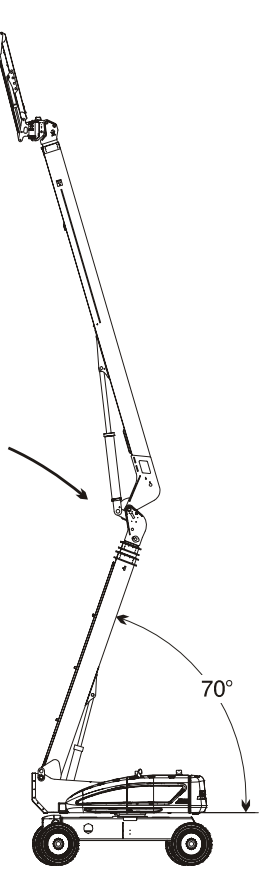
- MAIN NOT UP - control system detected movement of main boom angle sensor during tower telescope movement (more than 80 counts)
- TWR IN TO MIN - tower length sensor not reading between 304.9" and 305.9" (774.4 and 776.9 cm) when ENTER is pressed. Visible through DIAGNOSTICS ? BOOM SENSORS ? TOWER LENGTH 1 SENSOR: X.X". Control system will allow additional attempts to retract tower.

Step 8 - Position 8

The analyzer will read:



Lift tower down to stop – control system will stop at cylinder angle reading of 74.6° (approx 70° tower angle)



Potential Calibration Failure Messages:

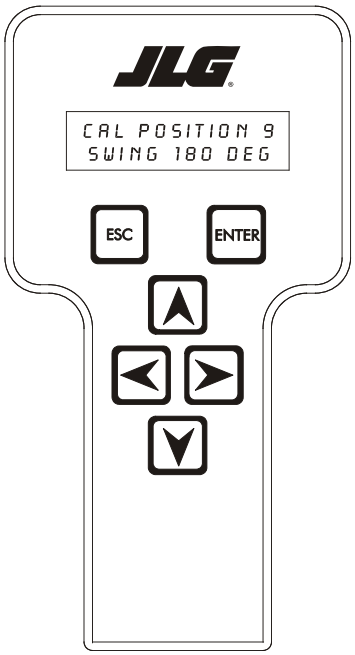
- TOWER TOO LOW - control system detected tower angle less than 66° (visible through DIAGNOSTICS ? BOOM SENSORS ? MAIN ANGLE L TO GRAVITY: XXX.X) without stopping between tower lift cylinder angle readings of 74.1° to 75.1° (visible through DIAGNOSTICS ? BOOM SENSORS ? TOWER CYLINDER ANGLE: XX.X).
- TWR UP TO STOP - tower lift cylinder angle sensor not reading between 74.1° and 75.1° when ENTER is pressed. Control system will allow additional attempts to correct tower angle.
- TOWER DOWN TO STOP - tower lift cylinder angle sensor not reading between 74.1° and 75.1° when ENTER is pressed. Control system will allow additional attempts to correct tower angle.
- LOAD PIN FAULT - load pin corrected angle not between -10.0° and 10.0°. Visible through DIAGNOSTICS ? LOAD PIN ? LOAD PIN ANGLE VALUE: XXX.X.

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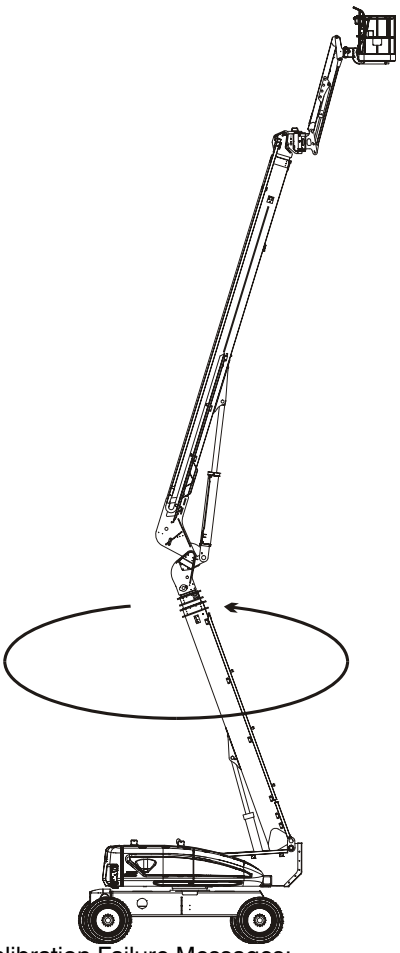
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Step 9 - Position 9

The analyzer will read:



Swing turntable 180° - Technician must center turntable over original end of chassis



Potential Calibration Failure Messages:

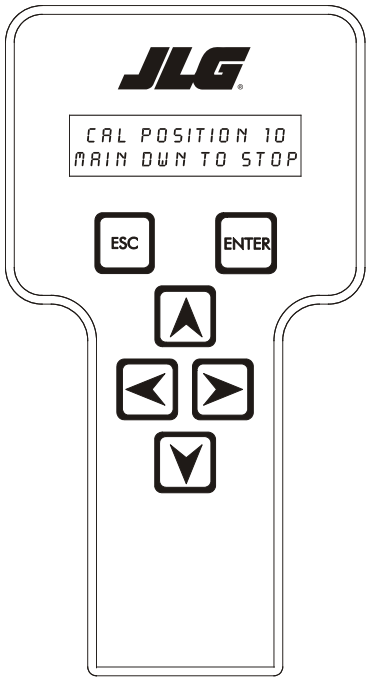
- DRIVE ORNT SW - control system must detect change in state of the drive orientation switch. Visible through DIAGNOSTICS ? DRIVE ? DRV. ORIENTATION SWITCH: XX (CLOSED or OPEN)
- LOAD PIN FAULT - load pin resultant force (V-FORCE. on analyzer) not within 18,140 and 44,140 or load pin cal moment not between 445,000 and 1,577,000. Visible through DIAGNOSTICS ? LOAD PIN ? LOAD PIN MOMENT VALUE: XXXX.

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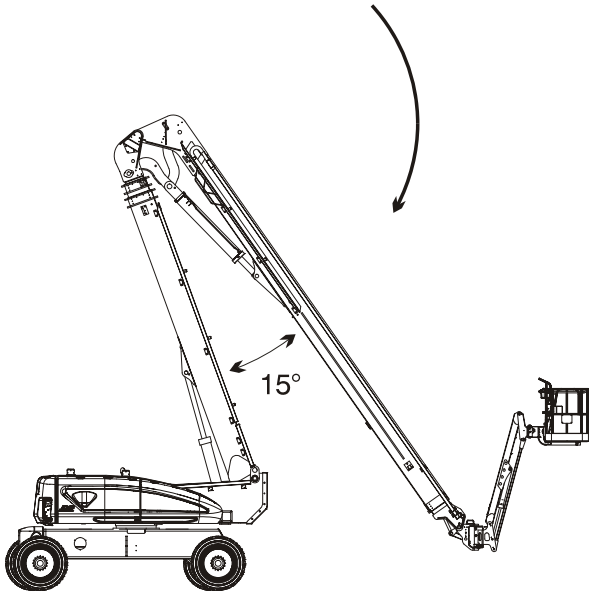
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Step 10 - Position 10

The analyzer will read:



Lift main down to stop – control system will stop when main boom is 15° above tower

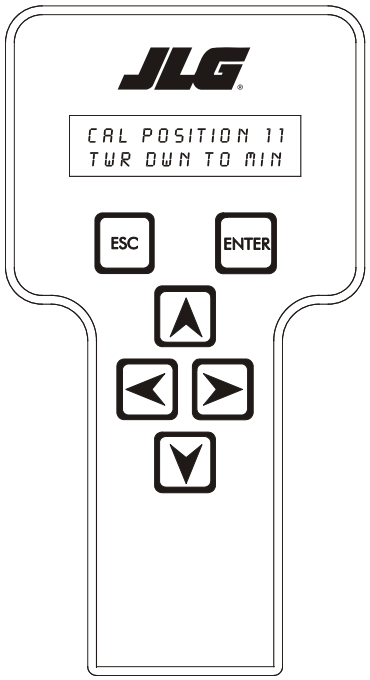


Potential Calibration Failure Messages:

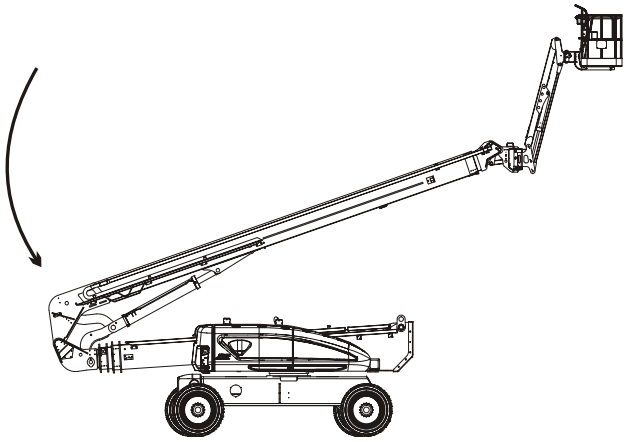
- MAIN UP TO STOP – main boom angle sensor not reading between 12.0° and 18.0° when ENTER is pressed. Control system will allow additional attempts to correct main boom angle.
- MAIN DWN TO STOP - main boom angle sensor not reading between 12.0° and 18.0° when ENTER is pressed. Control system will allow additional attempts to correct main boom angle.

Step 11 - Position 11

The analyzer will read:



Lift tower down to min angle



Potential Calibration Failure Messages:

- TWR NOT DOWN - tower cylinder angle sensor reads more than 5.9° when ENTER is pressed. Visible through DIAGNOSTICS ? BOOM SENSORS ? TOWER CYLINDER ANGLE: XX.X. Control system will allow additional attempts to correct tower angle.

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SECTION 6. MULTIMETER BASICS

6.1 INTRODUCTION

A wide variety of multimeters or Volt Ohm Meters (VOM) can be used for troubleshooting your equipment. A digital meter with reasonable accuracy (within 7%) is recommended for the measurements in these procedures. This section shows diagrams of a common, digital VOM configured for several different circuit measurements. Instructions for your VOM may vary. Please consult the meter operator's manual for more information.

Grounding

"Grounding the meter" means to take the black lead (which is connected to the COM (common) or negative port) and touch it to a good path to the negative side of the voltage source.

Backprobing

To "backprobe" means to take the measurement by accessing a connector's contact on the same side as the wires, the back of the connector. Readings can be done while maintaining circuit continuity this way. If the connector is the sealed type, great care must be taken to avoid damaging the seal around the wire. It is best to use probes or probe tips specifically designed for this technique, especially on sealed connectors. Whenever possible insert probes into the side of the connector such that the test also checks both terminals of the connection. It is possible to inspect a connection within a closed connector by backprobing both sides of a connector terminal and measuring resistance. Do this after giving each wire a gentle pull to ensure the wires are still attached to the contact and contacts are seated in the connector.

Min/Max

Use of the "Min/Max" recording feature of some meters can help when taking measurements of intermittent conditions while alone. For example, you can read the voltage applied to a solenoid when it is only operational while a switch, far from the solenoid and meter, is held down.

Polarity

Getting a negative voltage or current reading when expecting a positive reading frequently means the leads are reversed. Check what reading is expected, the location of the signal and that the leads are connected to the device under test correctly. Also check that the lead on the "COM" port goes to the ground or negative side of the signal and the lead on the other port goes to the positive side of the signal.

Scale

M = Mega = 1,000,000 * (Displayed Number)

k = kilo = 1,000 * (Displayed Number)

m = milli = (Displayed Number) / 1,000

μ = micro = (Displayed Number) / 1,000,000

Example: 1.2 kΩ = 1200 Ω
Example: 50 mA = 0.05 A

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Voltage Measurement

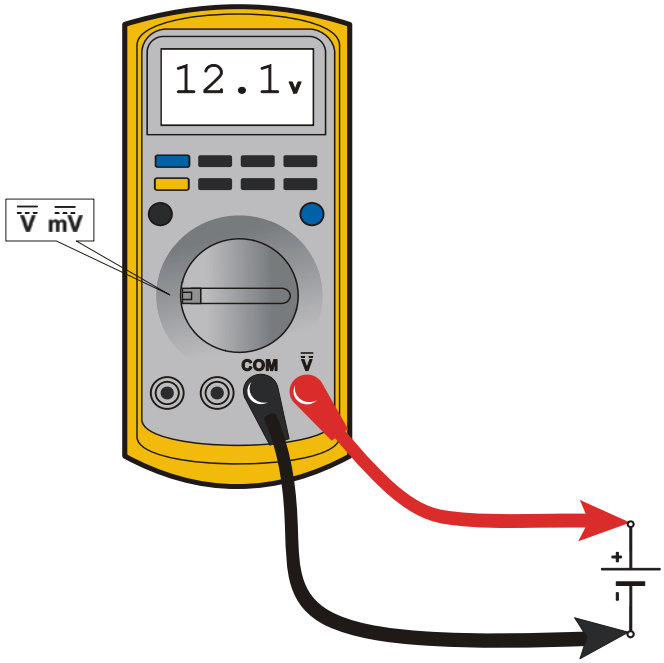


Figure 6-1. Voltage Measurement (DC)

- If meter is not auto ranging, set it to the correct range (See multimeter's operation manual)
- Use firm contact with meter leads

Resistance Measurement

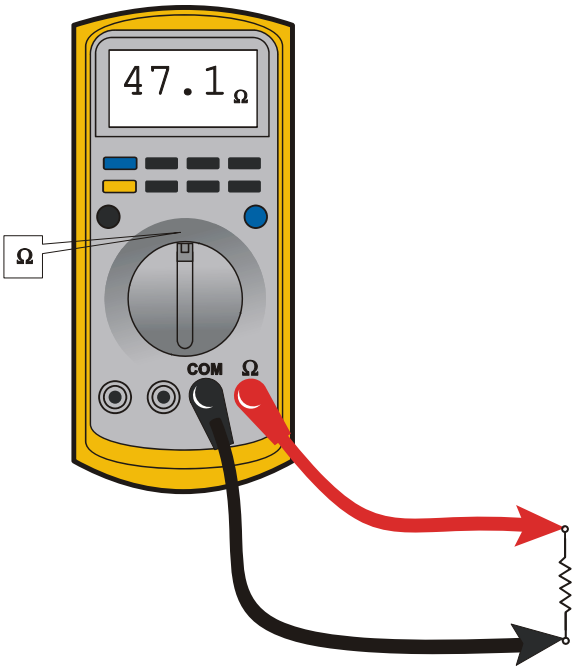


Figure 6-2. Resistance Measurement

- First test meter and leads by touching leads together. Resistance should read a short circuit (very low resistance)
- Circuit power must be turned OFF before testing resistance
- Disconnect component from circuit before testing
- If meter is not auto ranging, set it to the correct range (See multimeter's operation manual)
- Use firm contact with meter leads

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Current Measurement

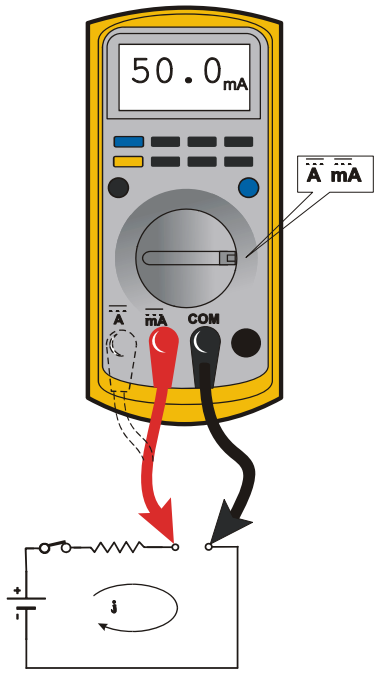


Figure 6-3. Current Measurement (DC)

- Set up the meter for the expected current range
- Be sure to connect the meter leads to the correct jacks for the current range you have selected
- If meter is not auto ranging, set it to the correct range (See multi meter's operation manual)
- Use firm contact with meter leads

Continuity Measurement

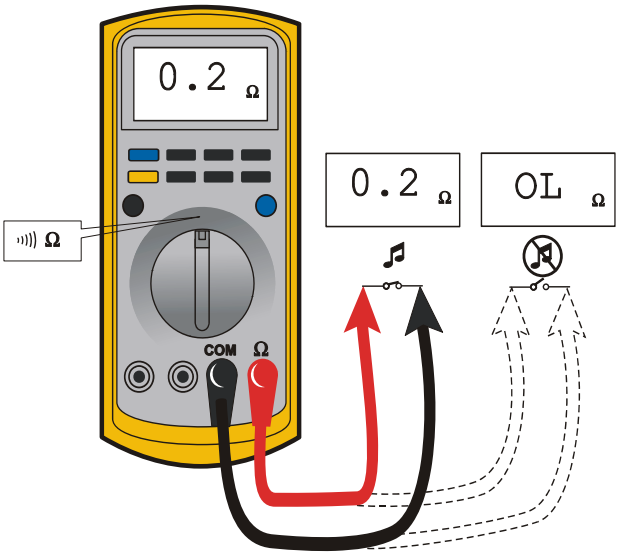


Figure 6-4. Continuity Measurement

- Some meters require a separate button press to enable audible continuity testing
- Circuit power must be turned OFF before testing continuity
- Disconnect component from circuit before testing
- Use firm contact with meter leads
- First test meter and leads by touching leads together. Meter should produce an audible alarm, indicating continuity

6.2 CONTINUITY MEASUREMENT OVER LONG DISTANCES

When trying to determine continuity of a harness or wire, longer than the reach of standard instrument leads, is possible to perform the check without excessively long leads. Using the other wires in the harness one can determine the condition of a particular wire in the harness.

Requirements:

- Harness with at least three separate wires including the wire under test.
- These wires must be able to be isolated from other wires, etc.
- Jumper or method to connect contacts on one side of harness.
- Meter that can measure resistance or continuity.

Procedure

Test multimeter leads resistance. Subtract this value from the measured resistance of the wires to get a more accurate measurement. In the example below, the meter tested at 1.4Ω.

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Consult the circuit schematic to determine which wires to use in addition to wire under test, here called wire #1 and wire #2, and how to isolate these wires. These wires should appear in the same connectors as the wire under test or are within reach of the jumper.

Disconnect all connections associated with the wire under test and the two additional wires. If harness is not completely isolated disconnect battery terminals also, as a precaution. In the example, X160 and X050, which are 83' apart, will be disconnected.

Measure continuity between all three wires, the wire under test, wire #1 and wire #2. These should be open. If not, repair the shorted wires or replace the harness.

On one side, jumper from contact of wire #1 and wire #2.

Measure continuity between wire #1 and wire #2. If there is continuity, both wires are good and can be used for this test. If there is not continuity, either wire could be bad. Check connections and measurement setup. Redo measurement. If still no continuity, repair wires or consult schematic for other wires to use for test.

Jumper from wire under test to wire #1.

Measure continuity. If there is continuity, the wire under test is good. See Figure 6-6. Example Continuity Test Setup on Pg. 323 for a typical measurement. In the example, the wire under test is good. Resistance of a wire increases as the length increases and as the diameter decreases.

One can find the continuity of two wires, here #1 and #2, at once by following steps 1 through . If there is a problem the third wire is used to troubleshoot the other wires. To find the problem, start at step 1 and use the entire procedure.



Figure 6-5. Example Circuit Schematic

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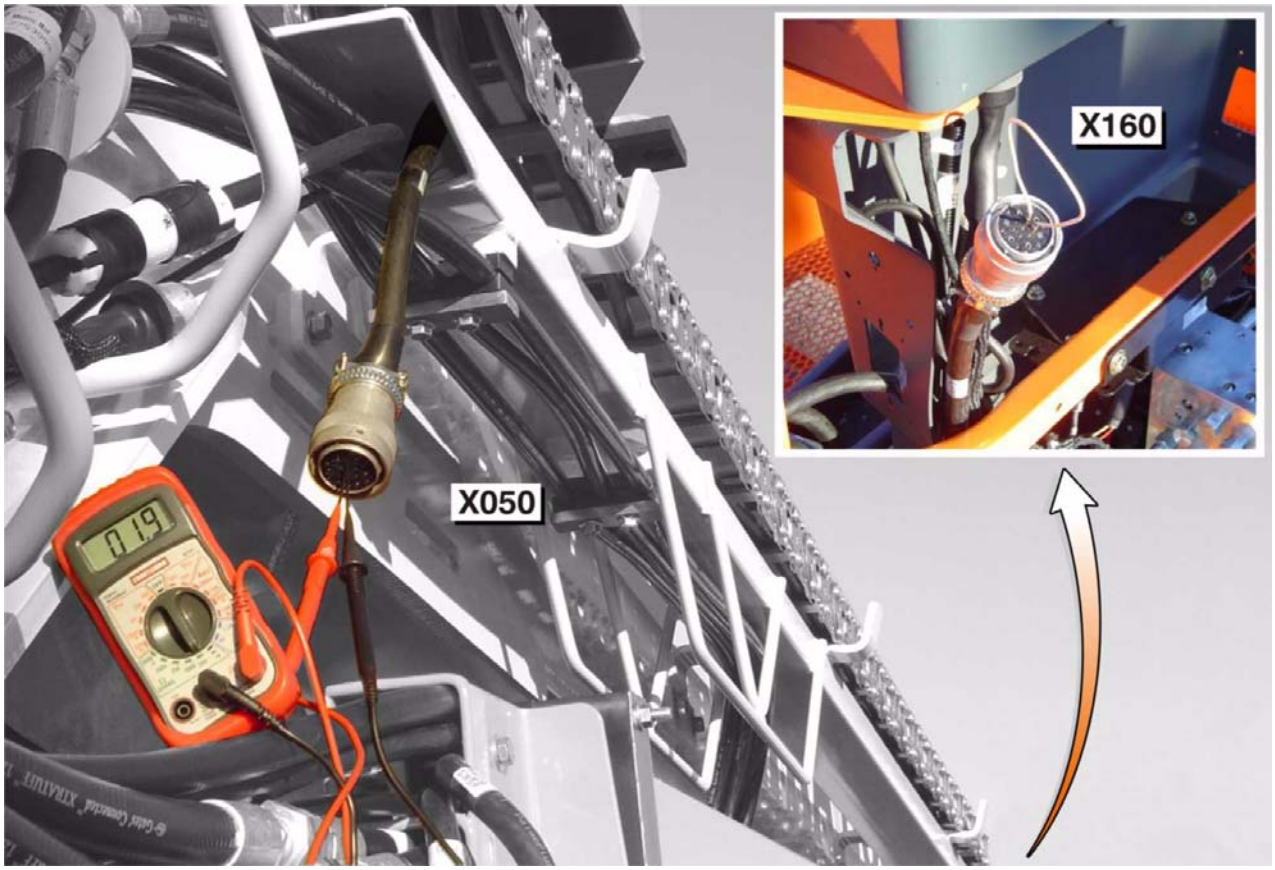


Figure 6-6. Example Continuity Test Setup

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PROPOSITION 65 WARNING

- **Battery posts, terminals and related accessories contain lead and lead compounds, chemicals known to the State of California to cause cancer and reproductive harm.**
- **Batteries also contain other chemicals known to the State of California to cause cancer.**
- **Wash hands after handling.**

⚠ WARNING: ⚠

The engine exhaust from this product contains chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm.

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