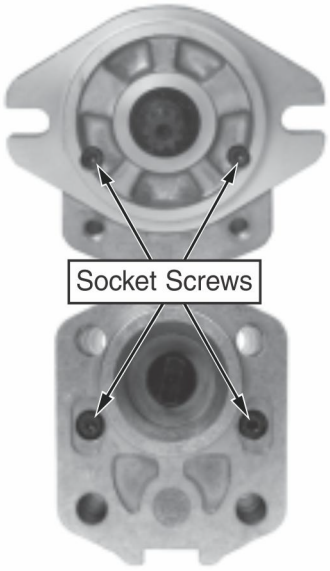
3. Remove socket head capscrews. (03 Flange or Multiple Pump Stages Only).

Using a 4 mm internal hex wrench, loosen and remove the two small socket screws placed in the center of the cover. Repeat the same operation for the corresponding screws on the rear flange.

06 Flange (first stage of multiple pump)



03 Flange

4. Remove front flange.

Place the pump on the table and slowly remove the front flange.

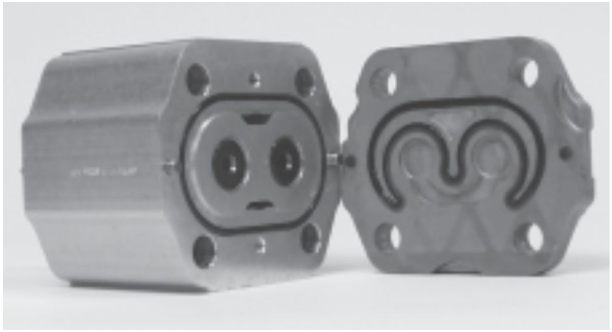
Be careful not to damage the shaft seal when removing the flange. Avoid contact of the shaft seal lips with key-way edges (in tapered and parallel shafts) or splined shaft teeth.

Inspect the front flange and seal area.

Clean with shop solvent, dry, and set aside.

5. Remove rear cover.

Remover rear cover. Clean with shop solvent, dry, and set aside. Visually inspect rear cover and seal area.



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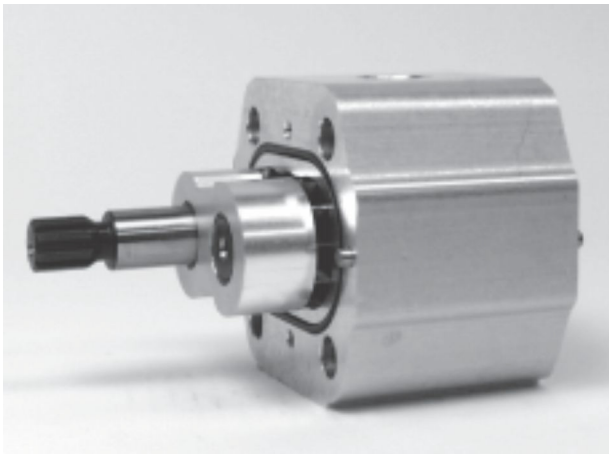
6. Remove bearing blocks and gears.

Place the pump on its side and carefully remove the bearing block and gear set. To accomplish this, hold the pump body and push with your fingers on the rear bearing block.

Mark the relative positions of the gear mesh (drive gear tooth to idler gear tooth) and the bearing blocks to the body so they can be reassembled in the same position.

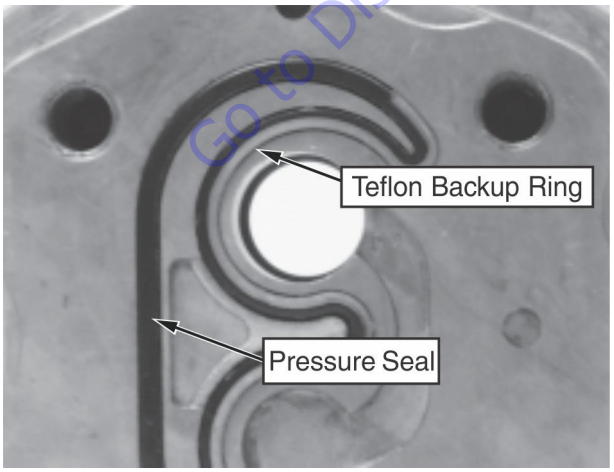


7. Remove pressure seals.

Check the seal quality. Replacement is recommended whenever there are burrs, evidence of extrusion, or marks caused by overheating. If the seals need to be replaced, carefully remove them from the flange cover, beginning with the backup ring and then the pressure seal.

Do not use tools with sharp edges to remove the seals, as damage to the cover can result.

After removal, dispose of damaged seals.

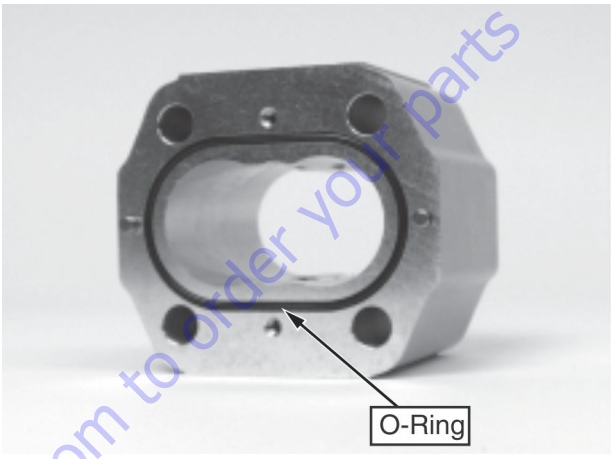


8. Remove Outer O-Ring Seal

Check the quality of this seal. If necessary, replace it. Follow the same removal recommenda?tions given in step 7.

After removal, discard the damaged seal.

Do not use tools with sharp edges to remove the seals, as damage to the cover can result.



9. Remove the snap ring.

Place the flange on the work surface. Using internal snap ring pliers, remove the snap ring.

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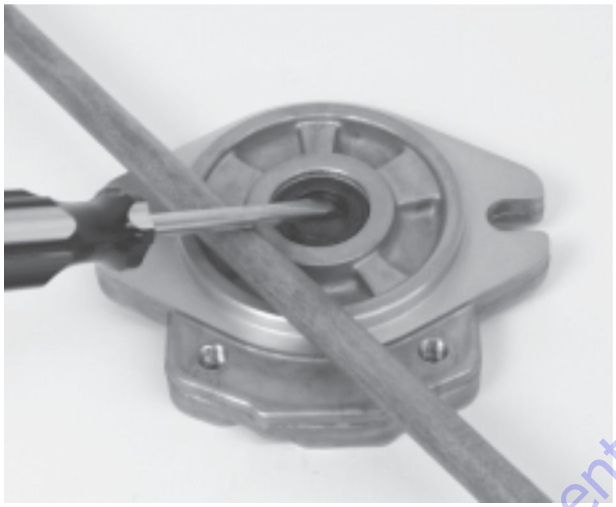
10. Remove the shaft seal.

Check the shaft seal quality and remove if necessary.

To remove, pry the bottom of the shaft seal and force it out while rotating the flange to lift it out evenly.

Do not use the flange pilot to gain leverage, damage may result. Use a plastic rod or wooden dowel as a fulcrum.

After removal, dispose of damaged seal.



Assembly

1. Prepare the seals.

Have the entire seal kit available.

Lightly coat all seals with seal grease. The grease is needed to adhere the seals to their grooves.

Do not install dry seals.

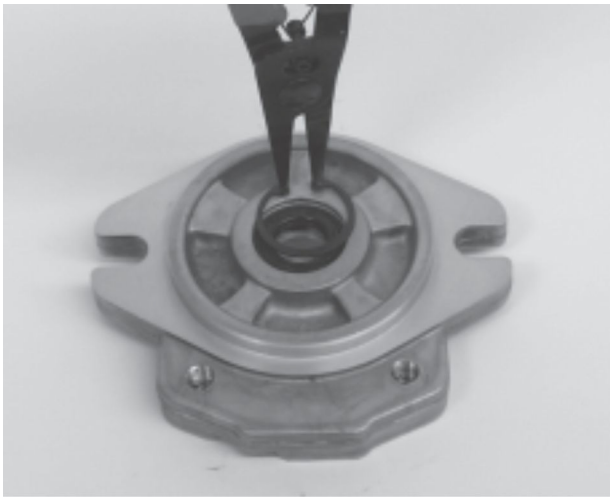
2. Install shaft seal into front flange.

Prepare the flange and shaft seal by lightly lubricating with grease.

Seat the seal in the flange by hand. Then, using the shaft seal installation tool, press the seal until the tool stops on the flange. This will insure the seal is inserted to the proper depth.

3. Install snap ring.

Install the snap ring using internal snap ring pliers. Ensure the snap ring fits securely in its groove. This is necessary to retain the shaft seal.



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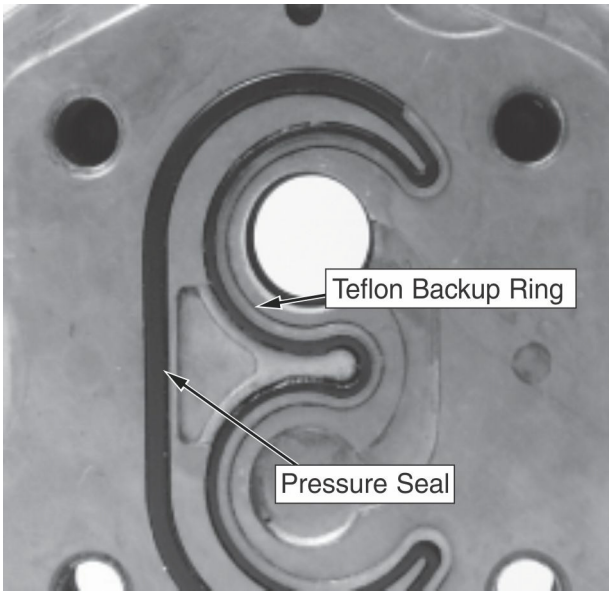
4. Install pressure seals.

   Prepare the pressure seals by lightly lubricating them with grease.

   Install pressure seals into the grooves on the front flange and rear cover. Then install the teflon backup ring.

   Ensure that the seals are located in the grooves, as shown.



5. Prepare the body.

   Clean the body.

   Inspect the internal and mating surfaces. Ensure the surfaces are free of burrs and scratches. Check both the bearing block mating surface and the cut-in path. The cut-in path should be no deeper than 0.1 mm (0.004 in).

6. Install outer seal.

   Prepare the outer seal by lightly lubricating with grease.

   Install outer seals in the grooves on both sides of the body.

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7. Prepare the gears.

⚠ CAUTION

THE GEAR SURFACES ARE SUPER-FINISHED. RESIDUE ON HANDS AND FINGERS MAY BE CORROSIVE TO THIS SURFACE. DO NOT TOUCH.

Carefully clean the two gears. If the gears are new, wash them with shop solvent to remove any anticorrosive grease on the surfaces.

Inspect the journals and the flat faces on the top and bottom of the gears. Ensure these surfaces are free from burrs or scratches. If scratches or burrs are found, clean them with a flat stone and/or very fine emery paper. Rewash the gears after this operation.

8. Prepare the bearing blocks.

Clean the two bearing blocks.

Inspect the flat surfaces of the bearing blocks for burrs or scratches on the edges. If necessary, remove burrs with very fine emery paper. Then rewash the bearings.

Inspect the DU bushings for wear. There should be no bronze showing.

Using clean hydraulic oil, lubricate the internal and external surfaces of the bearing blocks.

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9. Assemble the bearing blocks and gears.

Lubricate the journals and the gear faces.

Assemble the bearing blocks and gears. Ensure that the recessed bearing faces are installed adjacent to the gear faces. Align all assembly marks made during disassembly. Ensure the front and rear bearing blocks occupy the same location with respect to the housing as before disassembly. Ensure that the relative position of the gear mesh is maintained as before disassembly. Misalignment of the gear teeth may increase operating noise.

10. Install the gear block assembly.

Install the bearing block and gear assembly into the body cavity. Align the assembly marks to ensure that the gear block assembly is installed with the same orientation as before disassembly.

11. Clean the mating surfaces.

Remove any excess lubrication and grease from the mating surfaces of the pump body. Ensure that these surfaces are dry and free of contamination before moving on to the next step.

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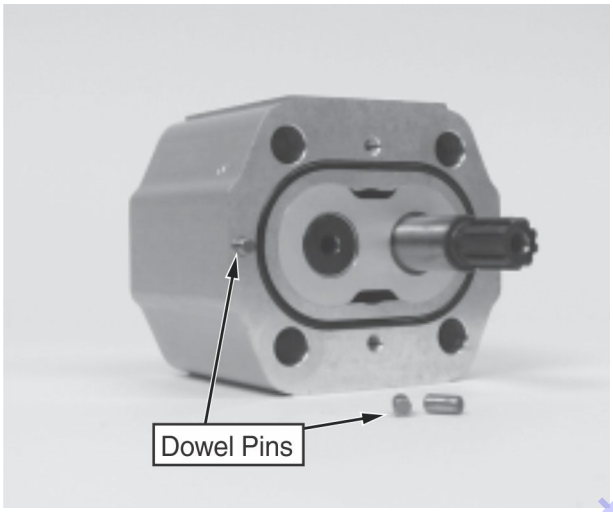
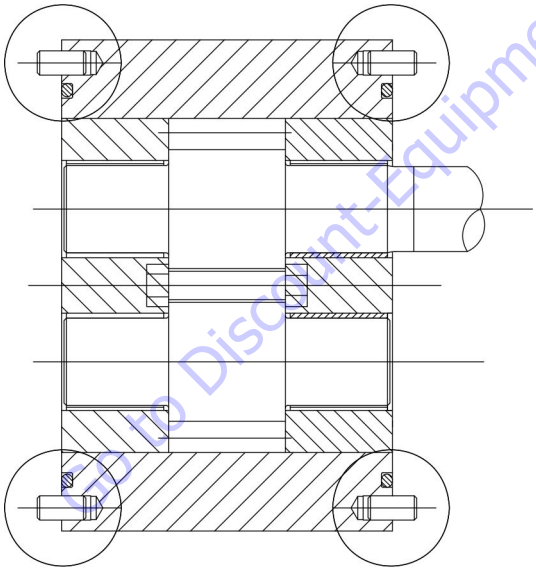
12. Install the dowel pins.

Install four 5 mm dowel pins into the proper cavities on both sides of the body (refer to the illustration). Swab the pins with assembly grease or petroleum jelly to retain them during assembly.

Do not install dowel pins to the rear cover or flange, as one of them may drop inside the pump during assembly.

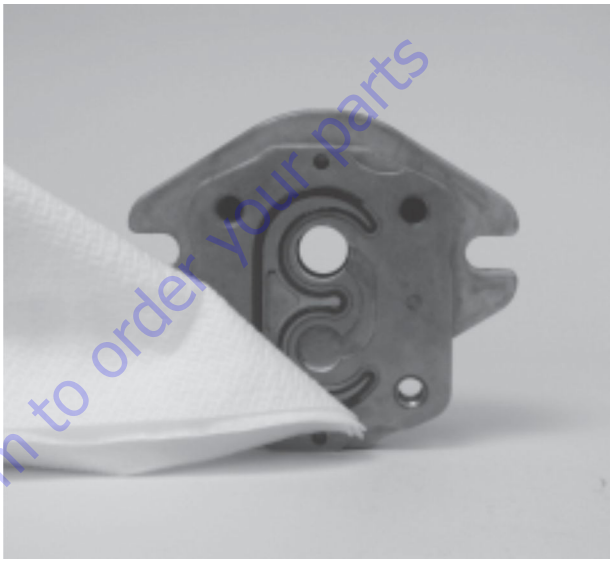




13. Clean the mating surfaces.

Remove any excess lubrication and grease from the mating surfaces of the front flange and rear cover. Ensure that these surfaces are dry and free of contamination before moving on to the next step.

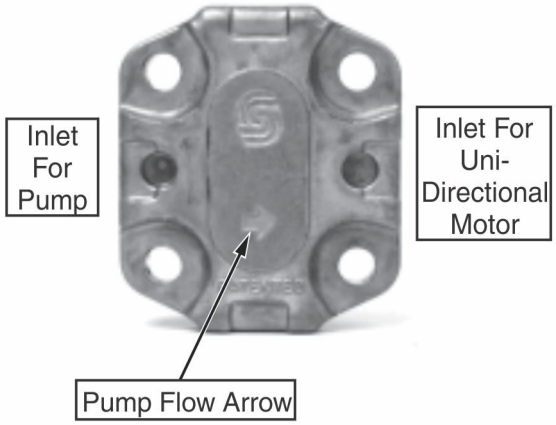
Ensure the pressure seals are seated properly after this operation.



14. Install Rear Cover.

Mount the cover on the body. Ensure the arrow on the back is oriented properly. The arrow should be In the same direction as the flow.

Ensure that all the pressure seals stay in place during this operation.



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15. Prepare pump for front flange assembly.

Place the pump with the rear cover downwards.

Ensure that the assembly marks on the bearing block / body are properly aligned.

16. Install the front flange.

Install a protective sleeve over the shaft. The sleeve is used to protect the shaft seal from damage by the shaft splines / keyway during front flange assembly.

Install the flange onto the body, then remove the protective sleeve.

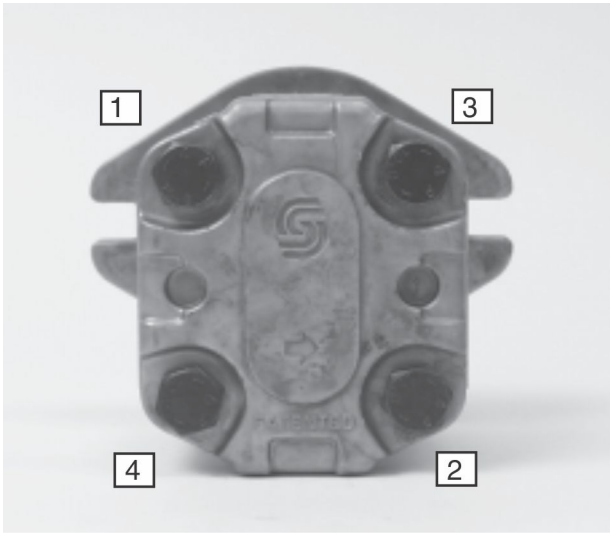
Ensure that the seals remain seated in their grooves during this operation.

17. Torque sequence.

When assembling units with 01 flange and short coupled tandems, wash the capscrews and apply Medium Strength Threadlocking Compound or equivalent thread lock compound to the threads before assembly.

Install capscrews. While observing the torque sequence shown, pre tighten the capscrews. Then, using a torque wrench, tighten them to the proper torque.

Torque 44-54 Nm (32-40 ft.lbs.).



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18. Install socket head capscrews. (03 flange and first stage of multiple).

Using a 4 mm internal hex wrench, install the socket head capscrews to the front flange and rear cover.

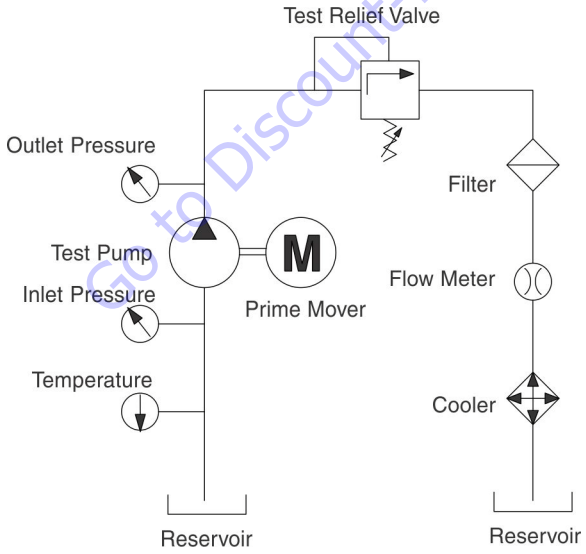
Torque 2.5-3.4 Nm (22-30 ft.lbs.).

If used, install new o-ring to flange pilot.

19. Testing

After pump has been disassembled and reassembled, it is suggested that the pump be run in and tested on an appropriate test stand. This is done to verify the volumetric efficiency and the integrity of the unit.

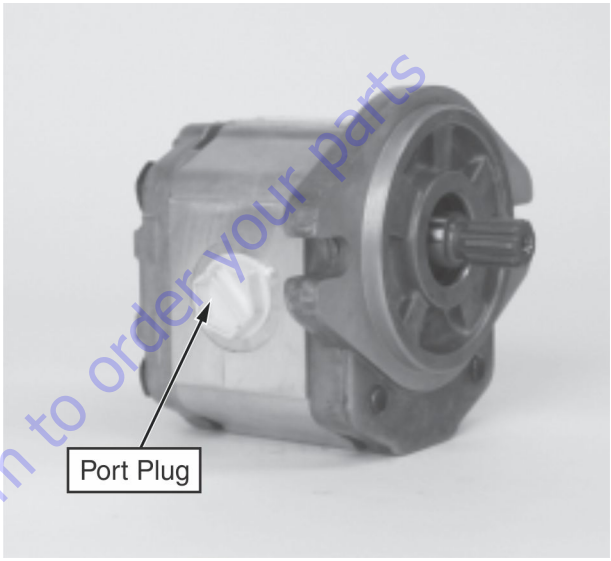
Test specifications and procedure are given in Testing the Pump.



20. Prepare the unit for shipment or storage.

Clean the exterior of the pump and install the following:

- **a.** Port Plugs
- **b.** Key (CI and CO shafts)
- **c.** Shaft protective cap (CI and CO shafts)
- **d.** Nut and washer (CO shaft)



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Trouble Shooting

Table 5-49. Troubleshooting

Low or No Flow From Gear Pump		
Item	Description	Action
1. Check oil level in reservoir.	Description Insufficient oil to supply gear pump.	Fill reservoir to proper level.
2. Check input spline condition.	Input shaft broken or stripped.	Repair or replace gear pump.
3. Check pressure at pump inlet. Recommended inlet pressure: 0.8 to 3.0 bar absolute. 0.6 Minimum at cold start.	Clogged suction filter or inlet screen.	Replace filter or clean suction screen.
4. Check condition of gear faces and bearing blocks.	Scored bearing block and gear faces will reduce pump efficiency.	Repair or replace gear pump.
5. Check bushings.	Overpressure of gear pump will cause idler gear bushing to fail.	Repair or replace gear pump.
Excessive Noise		
Item	Description	Action
1. Check oil level in reservoir.	Excessive air will cause cavitation sound.	Fill reservoir to proper level .
2. Check inlet line for leaks.	Excessive air will cause cavitation sound.	Repair inlet line.
3. Check pressure at pump inlet. Recommended inlet pressure: 0.8 to 3.0 bar absolute. 0.6 Minimum at cold start.	Lower than normal inlet pressure causes excessive pump noise.	Return inlet pressure to recommended levels.
External Leakage		
Item	Description	Action
1. Check for pinched o-rings or backup ring seal.	Pinched seal will allow leakage.	Replace pinched seal.
2. Check pressure seals.	Damage to pressure seals is typically caused by reduced stack-up in the pump assembly. This may be due to under-torqued assembly fasteners, or more commonly is attributed to excessive wear on the bearing blocks. Reduced stack-up will affect seal efficiency possibly to the point of seal extrusion.	Inspect condition of bearing blocks. If they are found to be worn, repair or replace the pump. If bearing blocks are not worn, replace pressure seals and re-torque pump assembly fasteners.

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5.11 DRIVE & FUNCTION PUMP START UP PROCEDURES

Start-Up Procedure

The 1200/1350 Boom Lift utilizes a Triple Combination Pump coupled to the Deutz diesel engine. The pumps are connected in-line to each other as follows:

1. The front hydrostatic transmission pump, or drive pump, is coupled directly to the diesel engine and provides oil flow to operate the machine's right side wheels.
2. The middle hydrostatic transmission pump, or drive pump, is coupled to the back of the front pump and provides oil flow to operate the machine's left side wheels.
3. The third or rear pump is the function pump. It is coupled to the back of the middle pump and provides oil flow to operate the boom, axle, steer and platform functions.

The transmission pumps share some common connections. Each pumps charge oil suction ports are connected by steel tubing, the charge pumps discharge oil flows are connected and flow to a common charge pump inline oil filter, cleaned & filtered oil flows back to the transmission pumps "G" ports. The pumps case drain ports are connected (T1 & T2), oil flow from the middle pumps T1 port also provides flows to the oil cooler. The charge pumps oil pressure is regulated by a single boost oil pressure relief valve installed in the middle pump. The front pump has an orifice cartridge (0.047" diameter) installed in place of a charge oil pressure relief cartridge. This insures that only one valve controls charge pressure & provides an amount of charge oil flow to the front pump's case to insure flushing & removal of hot oil.

Each pump has its own separate electrical proportional directional control valve to control oil flow and direction. The signals or command values to each pump are similar except when steering. During steering and propel of the machine the pump supplying oil to the "inside turning radius" has a command less than the pump supplying oil flow to the "outside turning radius" pump.

"Posi-Traction" control, front to rear on a given side of the machine, is accomplished by a flow divider/combiner cartridge installed in the Traction Control Manifold. There is a flow divider/combiner for each side. Each flow divider/combiner also has a "bleed orifice" to limit the amount of flow splitting or combining.

The middle transmission pump also supplies oil to a hot oil flushing valve cartridge, #120, in the Traction Control Manifold. This cartridge provides a means to obtain brake release oil pressure. The brake release pressure is controlled by a pressure relief valve cartridge # 130 and a solenoid operated brake release directional control cartridge, #170, also located in the Traction Control Manifold. This is important to note as the brake release oil pressure must be set 25 psi (1.7 bar) below the boost oil pressure relief valve. If the brake release pressure is set too low, brake drag and pump control will be affected. If set too high, damage to the wheel drive parking brakes could result. Prior to start, connect appropriate pressure gauges to the unit.

FOR THE START-UP OF NEW OR OVERHAULED INSTALLATIONS:

1. Insure all electrical checks have been performed & the machine is set up correctly with the JLG Analyzer.
2. Insure the machine has all four wheels jacked & blocked off the ground per JLG procedures.
3. Insure the triple pump assembly is installed and connected correctly per the hydraulic circuit diagram.
4. Disconnect the electrical connector from the diesel's throttle actuator, to prevent engine start.
5. Crank the engine until charge pressure reaches 50 psi or more.
6. Re-connect throttle actuator electrical connector and start engine. Allow engine to run at idle speed only for at least 5 minutes. This will allow the hydrostatic system to filled.
7. Listen for any abnormal noises.
8. Check for oil leaks.
9. Check charge pressure (500 psi +50psi, - 0 psi [34.4 bar +3.4 bar, - 0 bar]). Pressure can be measured a pump ports Ma & Mb or by "teeing" into the inlet for the charge oil filter. Charge pressure is checked with the joystick in neutral. A 0-1000 psi (0-70 bar) pressure gauge must be used. (If pressure gauges were installed in Ma & Mb to check charge pressure, disconnect the gauges installed in Ma & Mb, as they will be damaged if loop pressure rises above 1000 psi [34.4 bar].)

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10. Operate the drive system in the "turtle mode", forward and reverse.
11. De-aerate the system by bleeding fluid from the Ma & Mb ports.
12. Switch the drive mode speed control from "turtle" to "rabbit". Gradually increase drive speed forward & reverse, still with no load - wheels off the ground.
13. With the joystick in neutral, check for creep in neutral. If evident, most likely dirt is present in the proportional pump control, an incorrect electrical signal is present on the pump's electrical control(s) or the control was not centered properly when overhauled. See service manual for centering instructions.
14. Check that the controls are connected so that the transmissions operate in the correct direction related to control input.
15. Continue to monitor all pressure gauges & correct any irregularities.
16. Remove the brake coil (leaving the electrical connection intact) from the brake release solenoid cartridge located on the Traction Manifold. This disables the machine's ability to release the brakes! Stroke the transmission pumps slightly (less than 20%) and check the setting of the high pressure cross port relief valves. Setting should be 5000 psi +50 psi, - 0 psi (344.7 bar +3.4 bar, -0 bar). Install 0-6000 psi (0 - 415 bar) gauges on Pump ports Ma & Mb.
17. Check oil level & temperature.
18. Remove and inspect charge pressure oil filter, replace with new element.
19. Operate the transmission under no load conditions for about 15 minutes to stabilize the temperature and remove any residual air from the fluid.
20. Set the machine back on the ground. Operate the transmissions under full and normal conditions.
21. Erratic operation may indicate there is still air trapped in the system. By working the pump controls forward and reverse the remaining air can be eliminated. The system is free of air when all functions can be operated smoothly and when the oil in the reservoir is no longer aerated. (Usually less than one hour of operation)

NOTE: *If the transmissions do not perform correctly after following the pre-start & start-up procedures, refer to the relevant sections of the trouble-shooting procedures.*

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5.12 HYDRAULIC SCHEMATICS

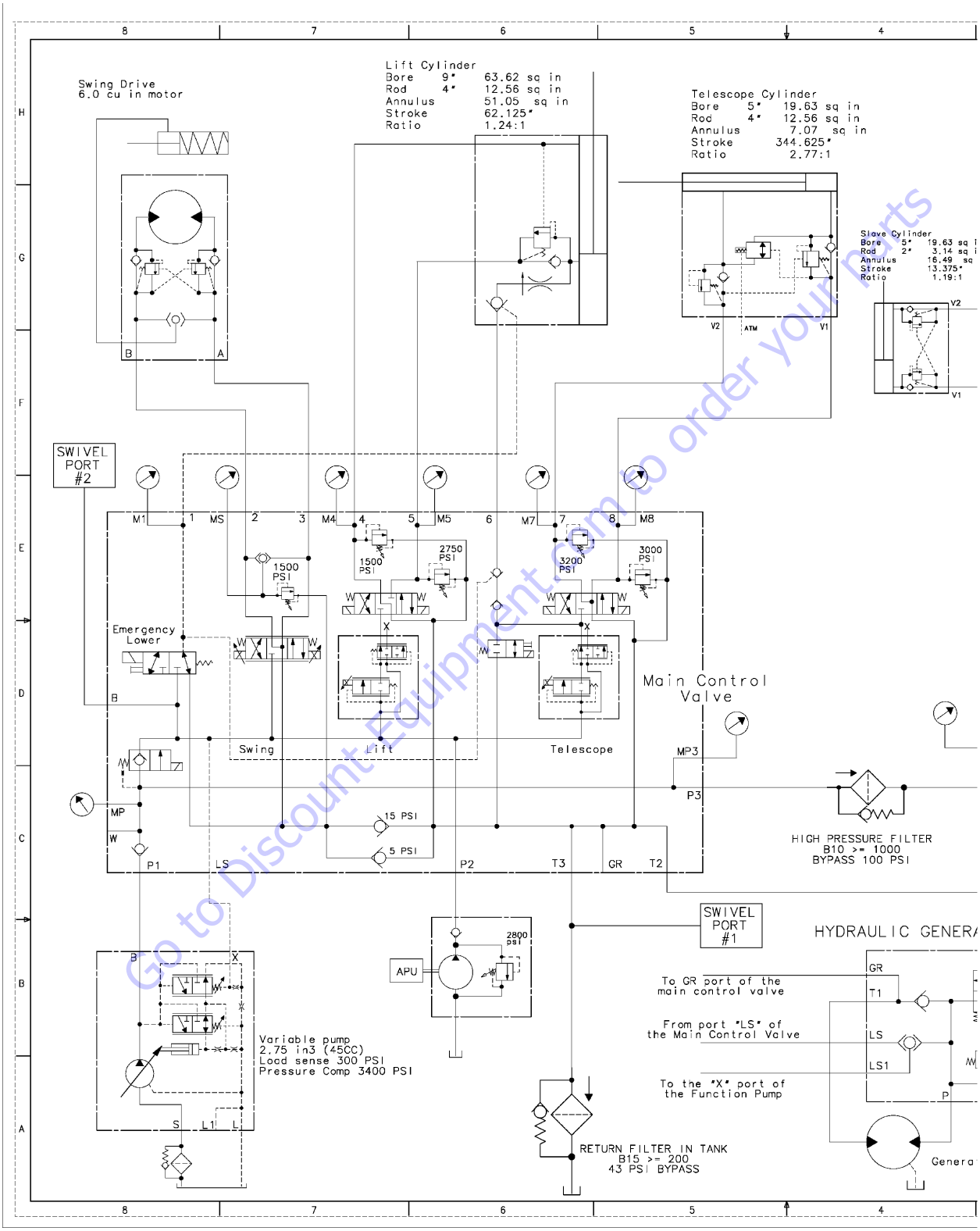

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Figure 5-79. Hydraulic Schematic - Boom Functions - Sheet 1 of 2

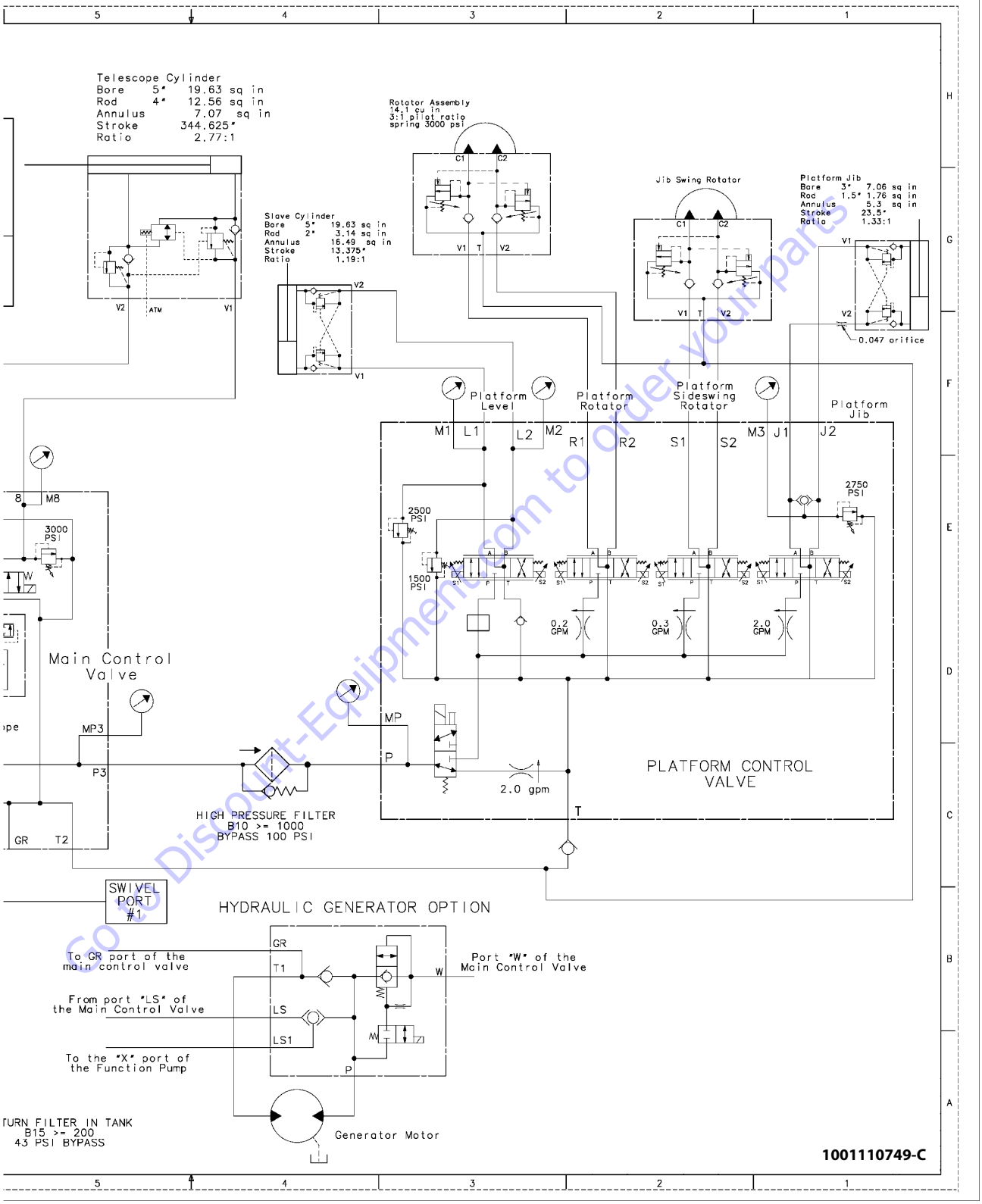

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Figure 5-80. Hydraulic Schematic - Boom Functions - Sheet 2 of 2

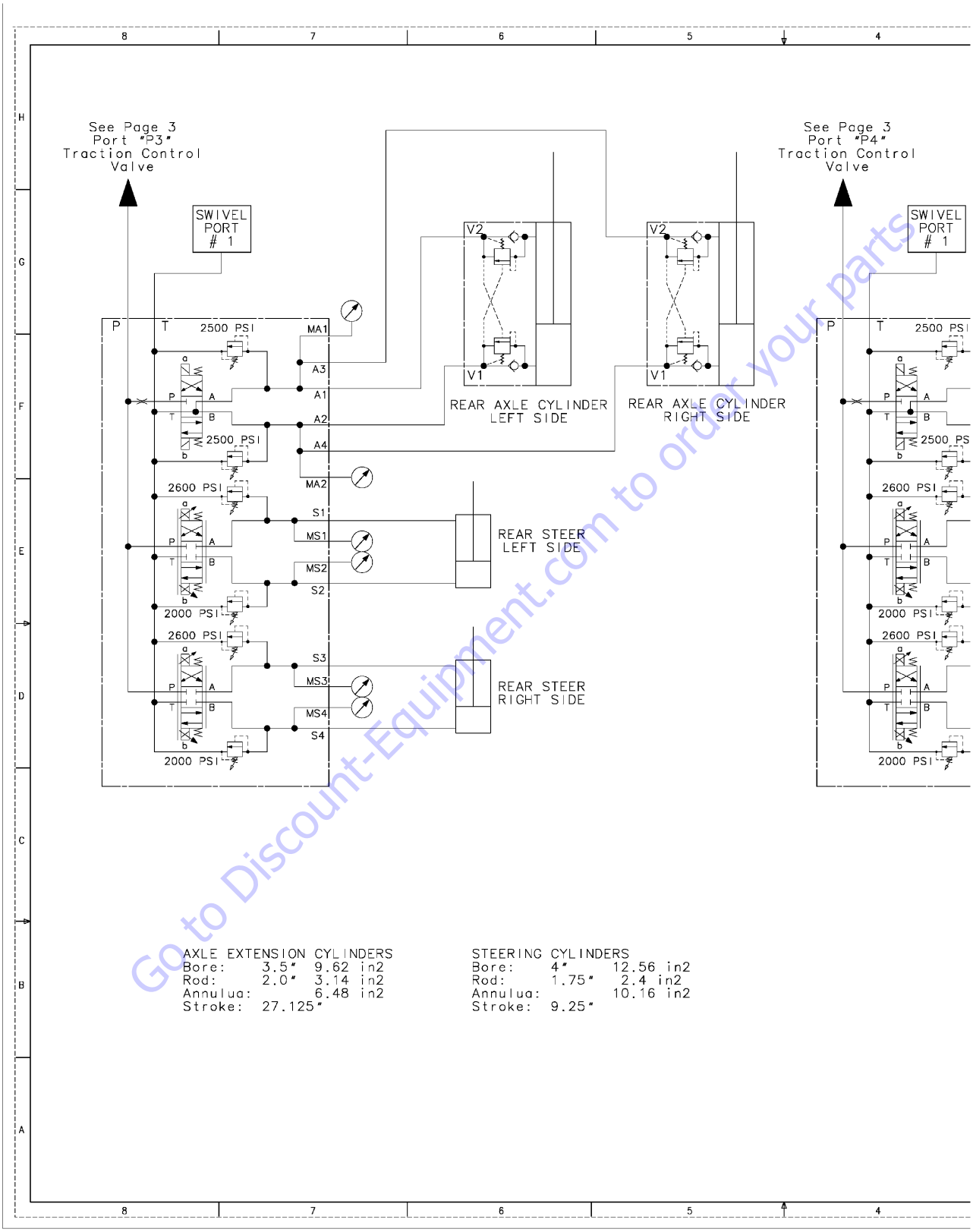

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Figure 5-81. Hydraulic Schematic - Axle/Steer Control - Sheet 1 of 2

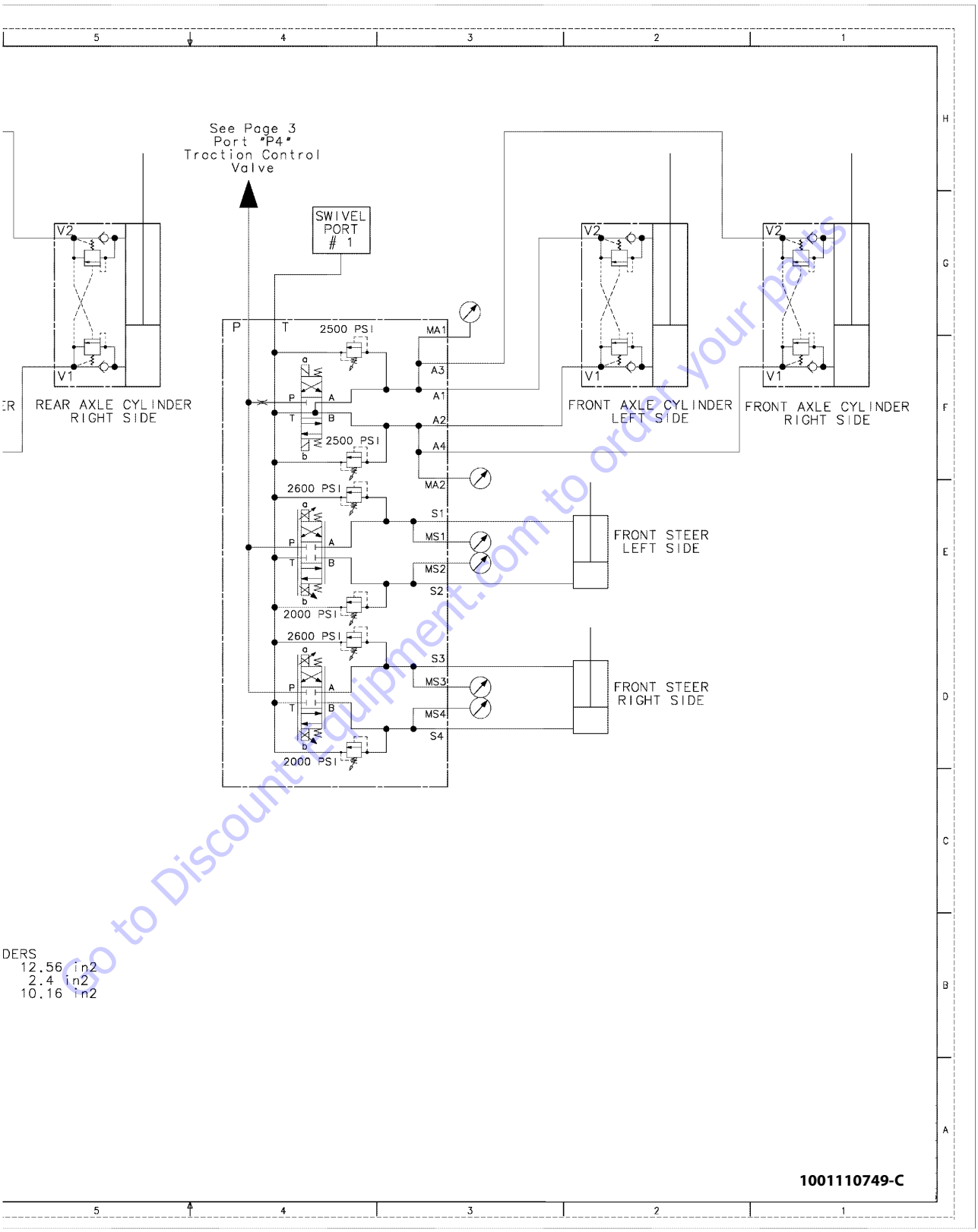

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Figure 5-82. Hydraulic Schematic - Axle/Steer Control - Sheet 2 of 2

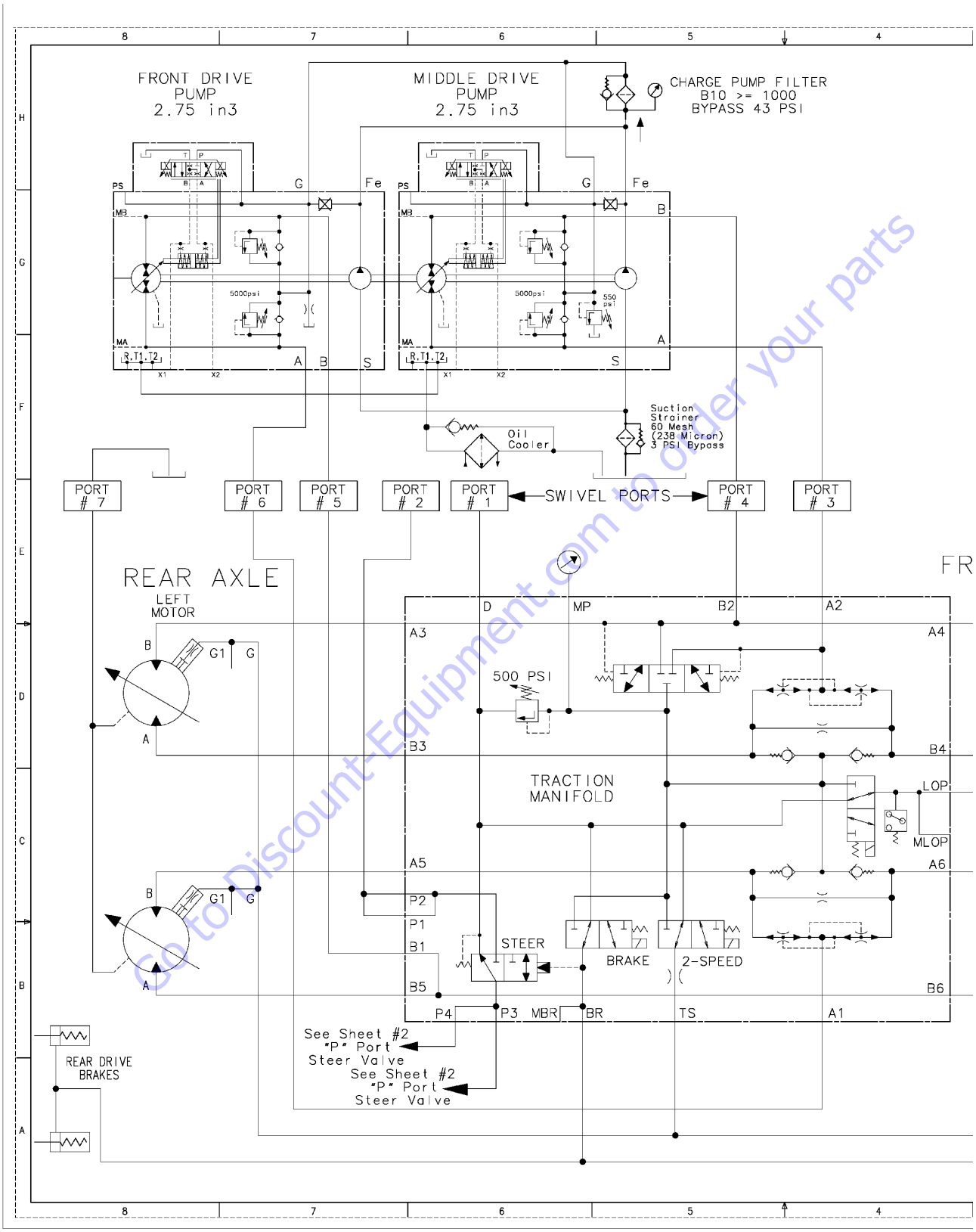

Figure 5-83. Hydraulic Schematic - Drive System Bosch/Rexroth Pumps - Sheet 1 of 2

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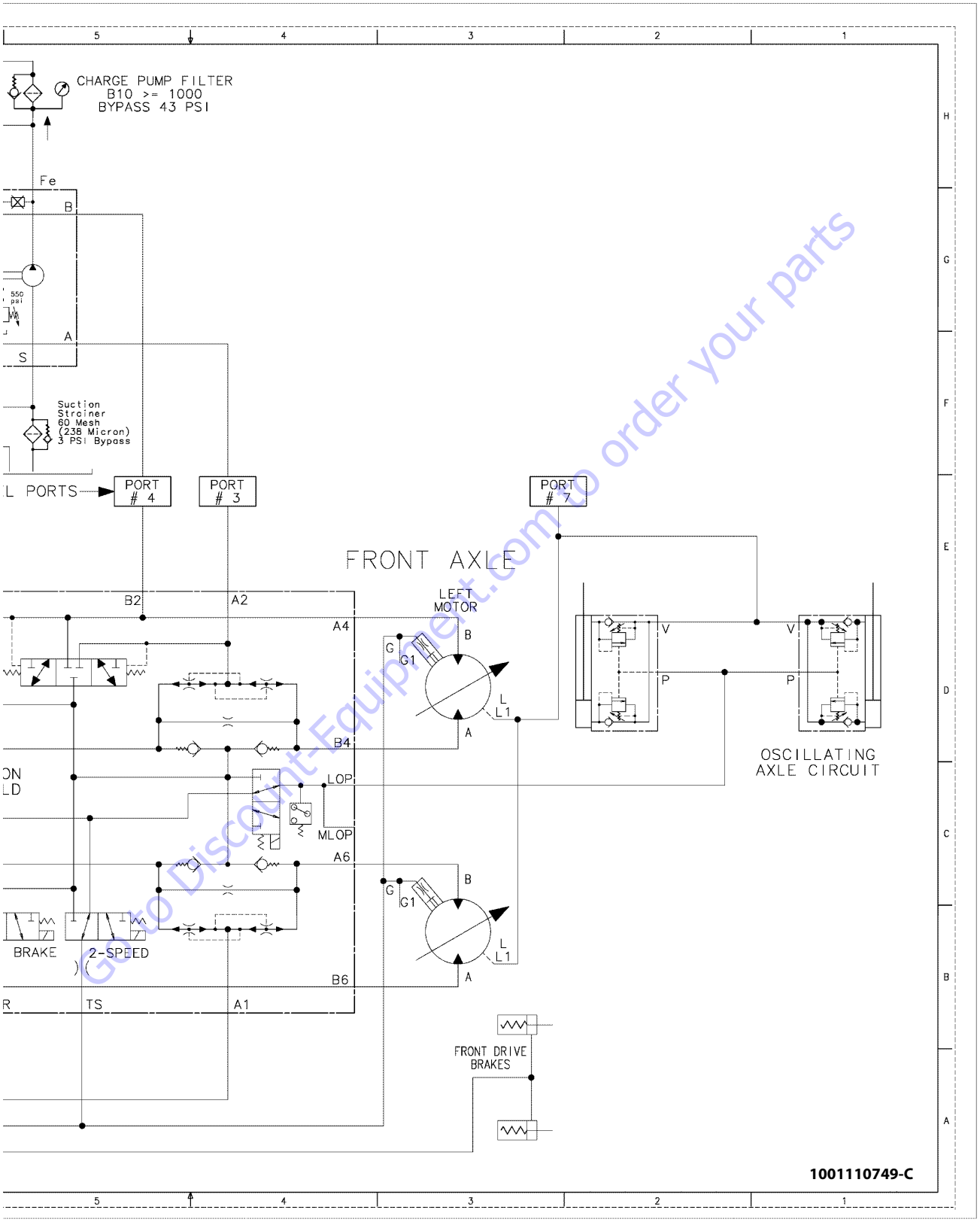

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Figure 5-84. Hydraulic Schematic - Drive System Bosch/Rexroth Pumps - Sheet 2 of 2

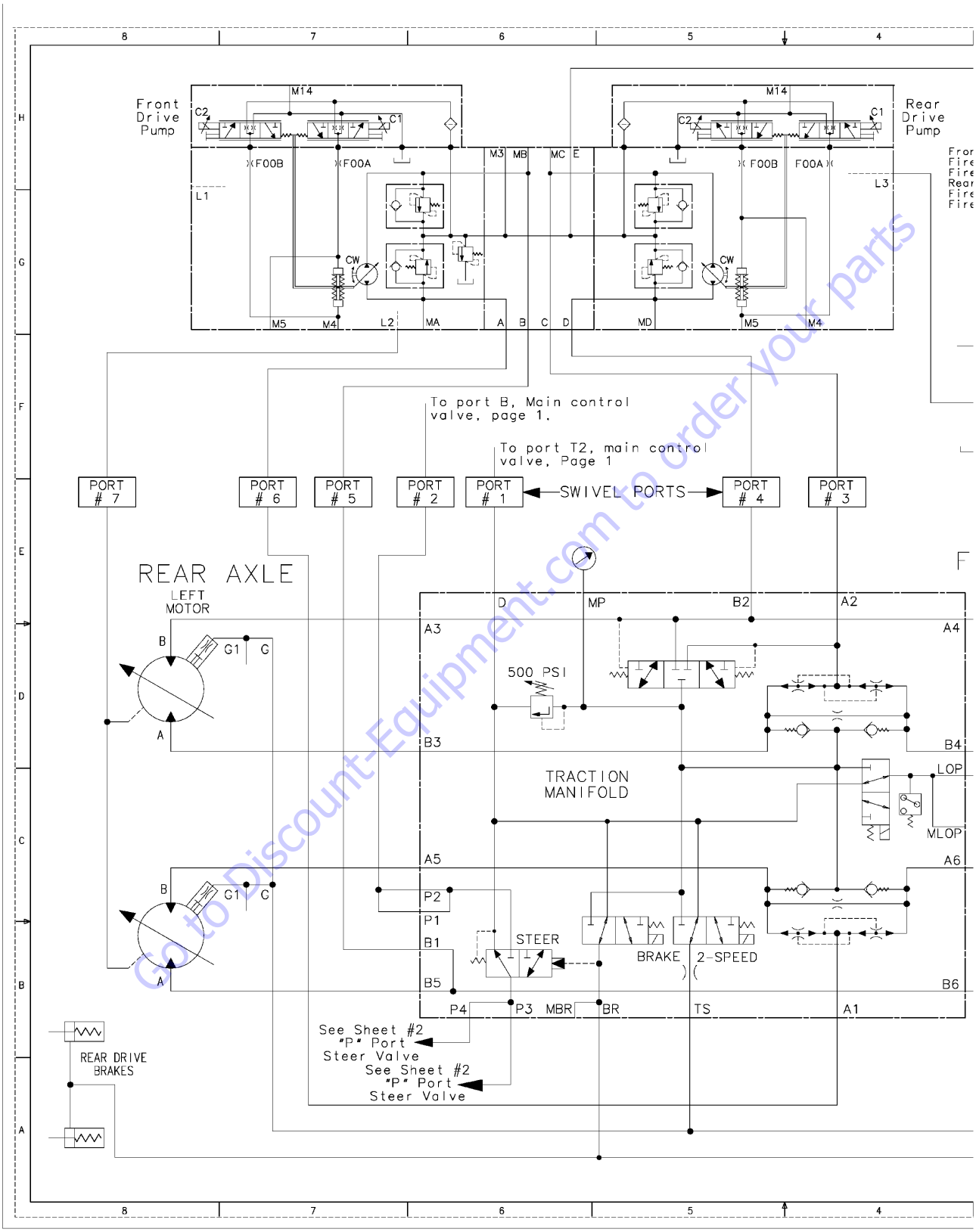

Figure 5-85. Hydraulic Schematic - Drive System Sauer/Danfoss Pumps - Sheet 1 of 2

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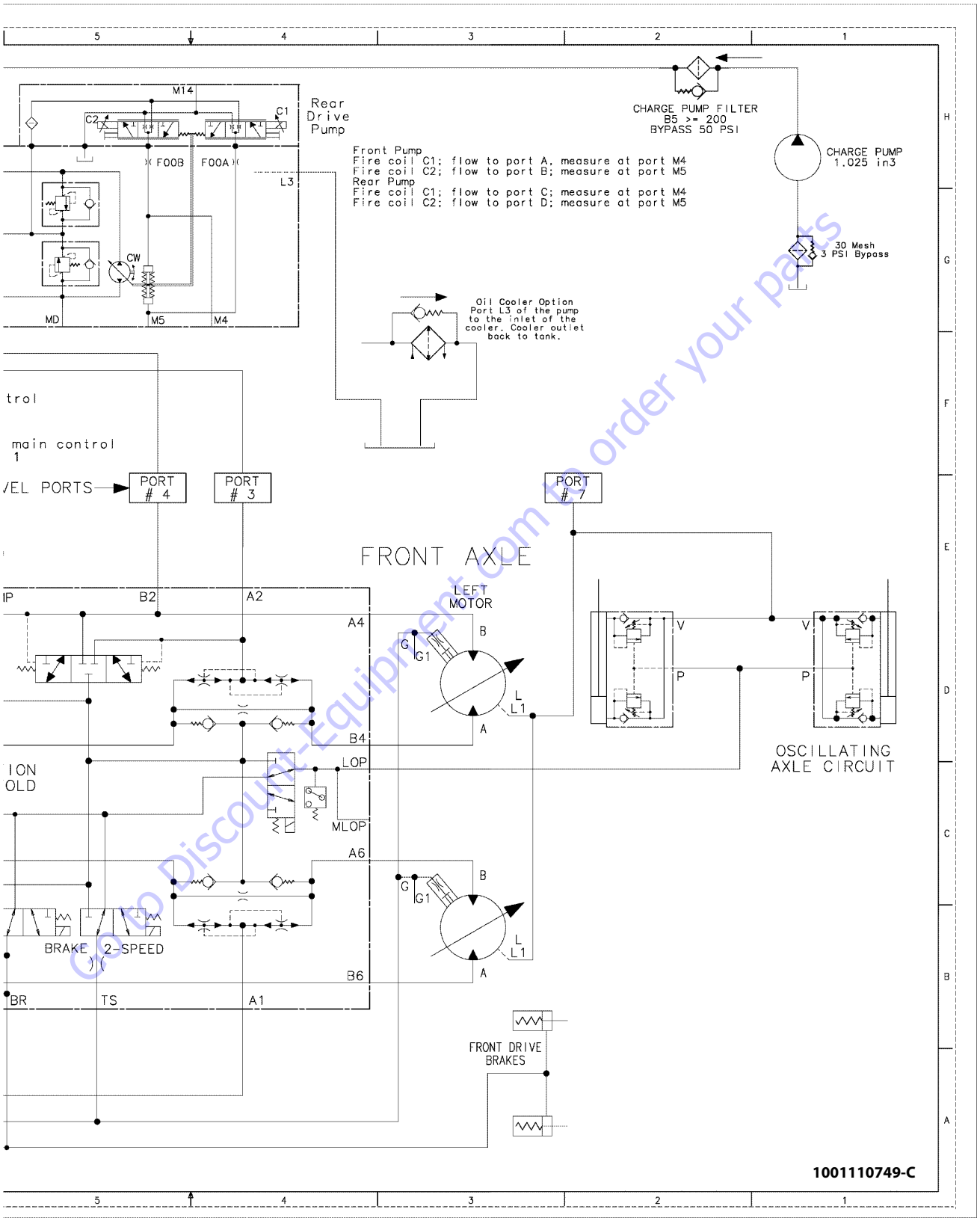

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Figure 5-86. Hydraulic Schematic - Drive System Sauer/Danfoss Pumps - Sheet 2 of 2

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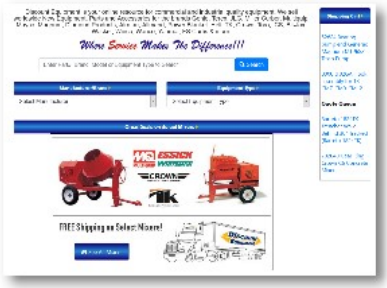

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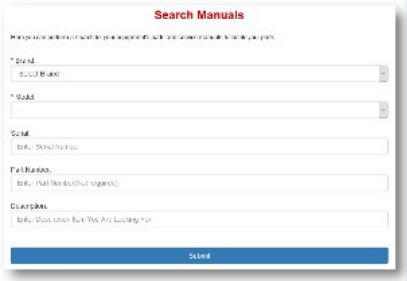

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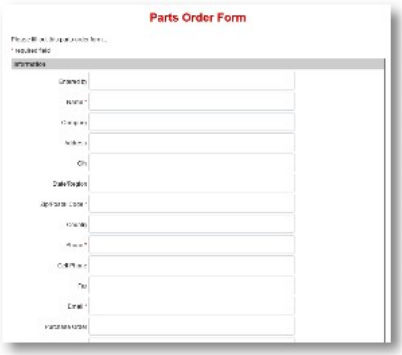

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SECTION 6. JLG CONTROL SYSTEM

6.1 INTRODUCTION

NOTICE

WHEN INSTALLING ANY NEW MODULE CONTROLLER ON THE MACHINE, IT WILL BE NECESSARY TO PROGRAM THE CONTROLLER FOR THE PROPER MACHINE CONFIGURATION, INCLUDING OPTIONS AND PROPERLY CALIBRATE THE TILT SENSOR.

NOTICE

IT IS A GOOD PRACTICE TO AVOID PRESSURE-WASHING ELECTRICAL/ELECTRONIC COMPONENTS. SHOULD PRESSURE-WASHING BE UTILIZED TO WASH AREAS CONTAINING ELECTRICAL/ELECTRONIC COMPONENTS, JLG INDUSTRIES, INC. RECOMMENDS A MAXIMUM PRESSURE OF 750 PSI (52 BAR) AT A MINIMUM DISTANCE OF 12 INCHES (30.5 CM) AWAY FROM THESE COMPONENTS. IF ELECTRICAL/ELECTRONIC COMPONENTS ARE SPRAYED, SPRAYING MUST NOT BE DIRECT AND BE FOR BRIEF TIME PERIODS TO AVOID HEAVY SATURATION.

The JLG designed Control System is a 12 volt based control unit installed on the boom lift.

The JLG Control System has reduced the need for exposed terminal strips, diodes and trimpots and provides simplicity in viewing and adjusting the various personality settings for smooth control of: acceleration, deceleration, creep, min speed, and max.-speed for all boom, drive, and steering functions.

The main lift, swing, and drive are controlled by individual joysticks, with steering being controlled by a rocker switch built into the top the drive joystick. To activate Drive, Lift, and Swing simply pull up on the slide lock location on the joystick and move the handle into the direction desired.

The control system will control the voltage output to the valves and pump, as programmed for smooth operation and maximum cycle time. Ground control speeds for all boom functions can also be programmed into the control system.

The JLG Control System controller has a built in LED to indicate any faults. The system stores recent faults which may be accessed for troubleshooting. Optional equipment includes a soft touch system, head and tail lights, and ground alarm. These options may be added later but must be programmed into the control system when installed.

The Control System may be accessed utilizing a custom designed, hand held analyzer (Analyzer Kit, JLG part no. 2901443) which will display two lines of information at a time, by scrolling through the program.

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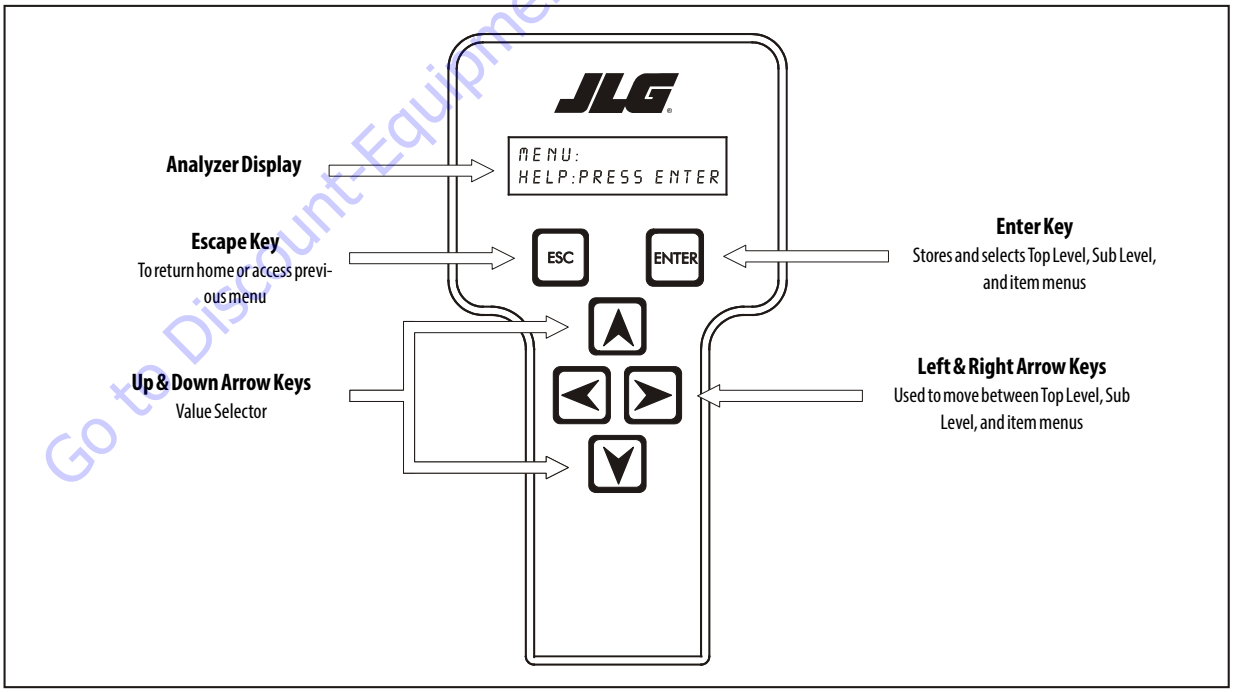

Figure 6-1. Hand Held Analyzer

6.2 CANBUS COMMUNICATIONS

CANbus: CAN (Control Area Network) is a two wire differential serial link between the Platform Module, Ground Module, Boom Length Angle Module and the Chassis Module providing bi-directional communications.

Two-wire: One wire (red) is driven high (5v) and the other low (black) (0v) to send a signal; both wires "float" (2.5v) when no signal is being sent.

Differential: Any electrical line noise can affect the high or the low wires but never both, so communications is not corrupted.

Serial Link: Messages are being sent bit by bit along the wires; the high bus speed allow all modules to be constantly updated around 20 times per second. Typical traffic is 300 - 500 messages per second.

A complete CANbus circuit is approximately 60 ohms, which can be verified at the "T" fitting inside the ground station or below the BLAM. Each individual circuit from the modules is approximately 120 ohms.

The GROUND MODULE is the master system controller. Most functions are dispatched and coordinated from this module, all other system modules (PLATFORM, BLAM L CHASSIS) handle sub-tasks. All characterized information (values) are stored into the ground module (i.e., Personalities or Calibrations).

Interlocks: Any device that sends an electrical input. (For an example a limit switch, proximity switch, etc;)

Platform Level: The GROUND MODULE stores the default values and handles interlocks. The PLATFORM MODULE reads the sensors mounted on the platform assembly and controls the Level Up / Down valves to maintain setpoint sent from the GROUND MODULE.

Steer: The GROUND MODULE stores crack points, sends desired drive direction, sends steering mode and sends axle extend / retract commands. The PLATFORM MODULE reports the steering switch position to the GROUND MODULE. The CHASSIS MODULE modulates each steer left / right valve to maintain commanded wheel position.

Drive: The GROUND MODULE stores crack points, sends commands for each drive pump to the BLAM. (Command is computed from drive joystick input, interlocks, wheel angle, etc). BLAM maintains proper current for the drive pumps by modulating PWM outputs.

Lift, Tele, & Swing: The GROUND MODULE stores default values, handles interlocks and calibration information. Lift, Telescope and Swing commands are dependent upon interlocks through out the machine. Boom angle, length and swing are controlled by the GROUND MODULE. The BLAM monitors and communicates (CANbus) to the GROUND MODULE boom angle and boom length via two angle sensors, a length sensor and a load moment pin.

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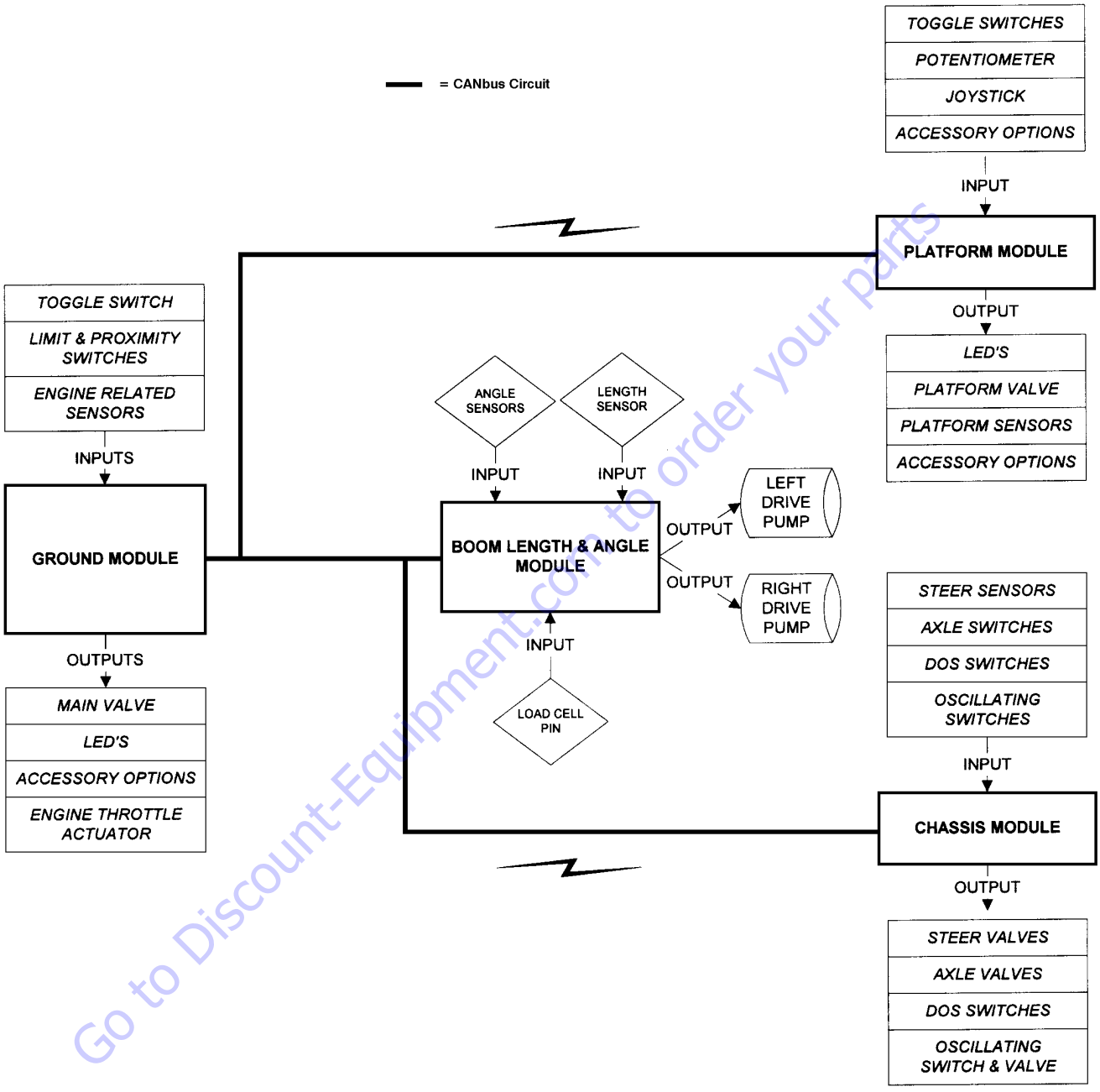

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Figure 6-2. Control System Block Diagram

6.3 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 re-calibration. All calibration procedures are menu driven through the use of the standard 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.

Table 6-1. Calibration Instructions

Calibration Procedure	Reasons for Re-calibration
Steering Calibration	Ground module replacement Chassis module replacement Steer sensor removal or replacement Persistent wheel misalignment
Drive Calibration	Ground module replacement BLAM module replacement Drive pump/coil replacement Drive pulls to one side Drive lugs engine Poor slow speed control
Platform Leveling Calibration	Ground module replacement Platform module replacement Platform level sensor removal or replacement Platform level sensor calibration fault
Platform Level Crack Point Calibration	Platform module replacement Ground module replacement Platform level valve/coil replacement Erratic platform leveling
Lift Crack Point Calibration	Ground module replacement Lift proportional valve/coil replacement Erratic controlled arc operation Erratic controlled boom angle operation
Telescope Crack Point Calibration	Ground module replacement Telescope proportional valve replacement Erratic controlled arc operation Erratic controlled boom angle operation
Chassis Tilt Calibration	Ground module removal or replacement Main terminal box removal or replacement Tilt indication inaccuracy
Boom Sensors Calibration	Ground module removal or replacement BLAM module removal or replacement Boom angle sensor removal or replacement Boom length sensor removal or replacement Moment pin removal or replacement Boom angle sensor calibration fault Boom length sensor calibration fault Moment pin fault Failed BCS functional check Boom control system inaccuracies Installing or removing approved accessories Changing Platform Size

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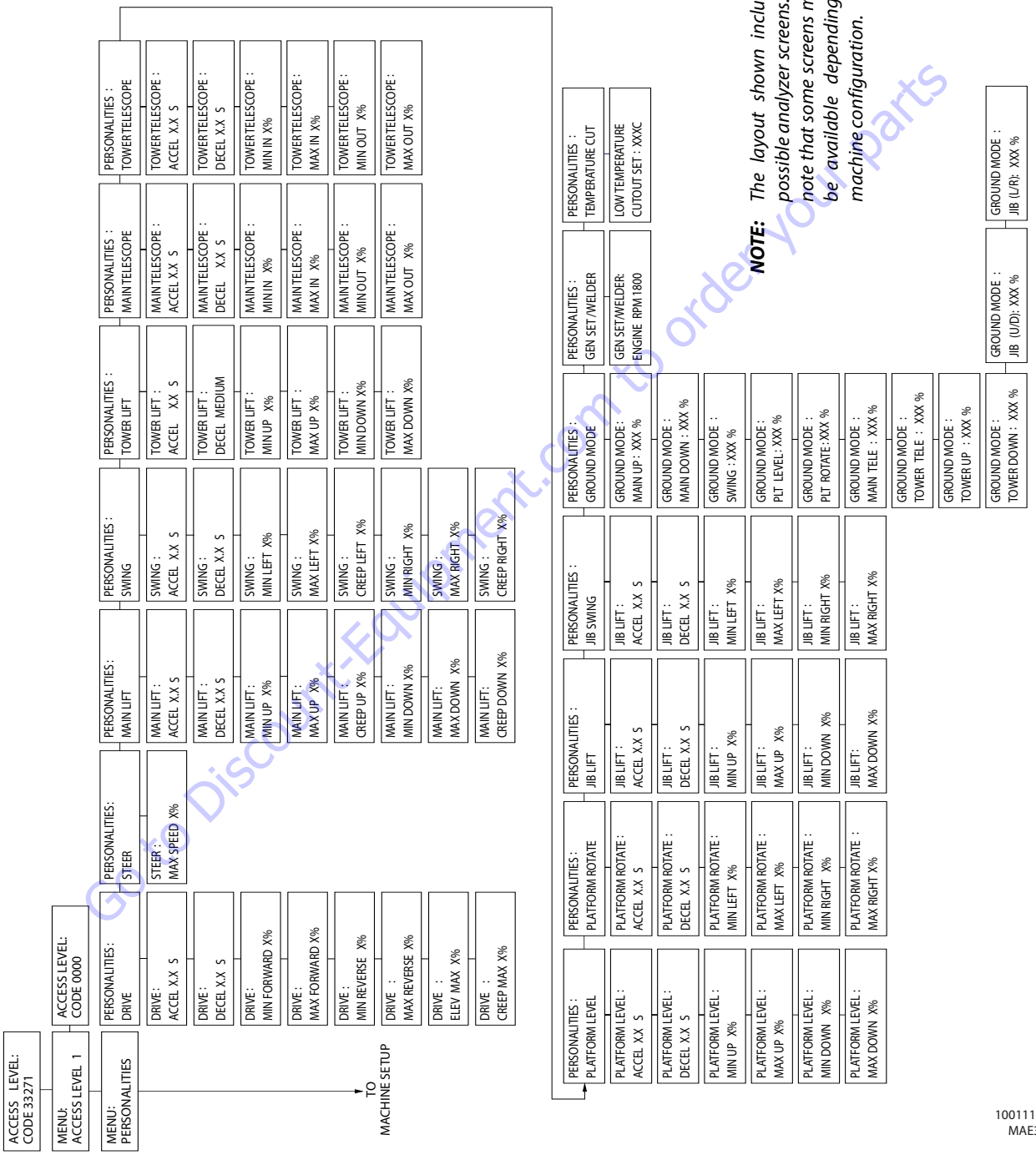

1001110093-T
MAE35170T

Figure 6-3. Analyzer Flow Chart - Personalities (Software Version P7.33) - Sheet 1 of 6

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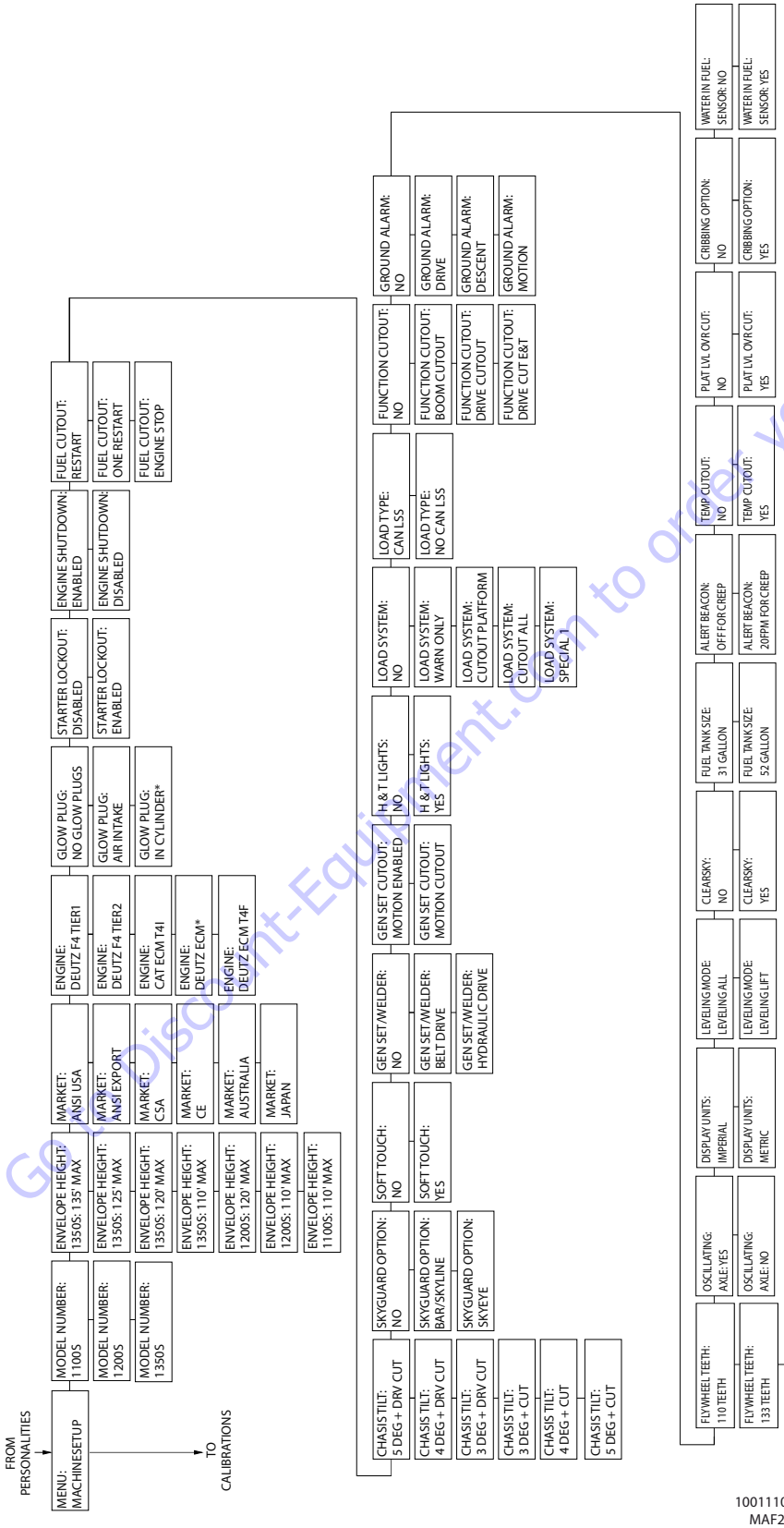

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NOTE: *The layout shown includes all possible analyzer screens. Please note that some screens may not be available depending upon machine configuration.*

Figure 6-4. Analyzer Flow Chart - Machine Setup (Software Version P7.33) - Sheet 2 of 6

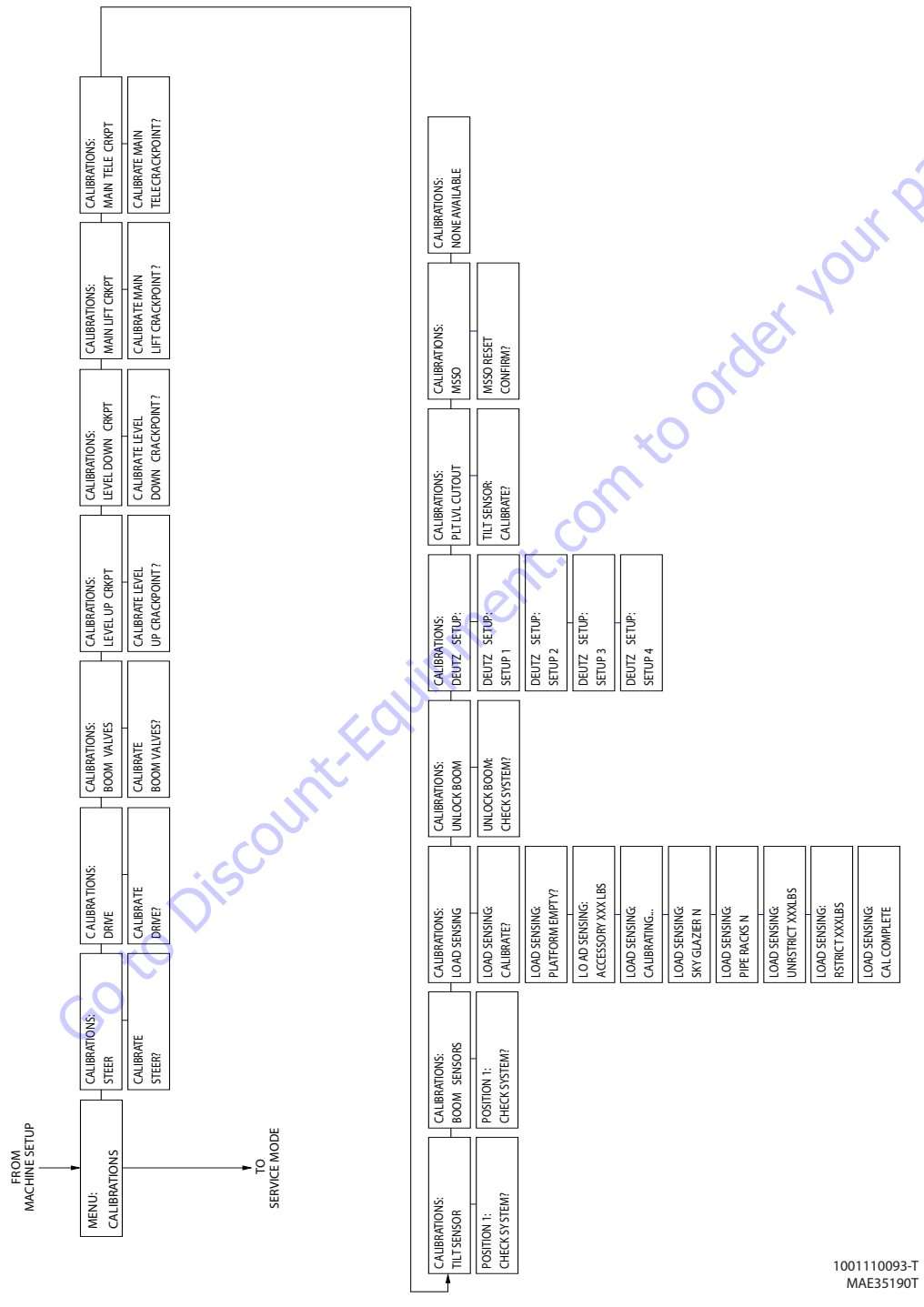

Figure 6-5. Analyzer Flow Chart - Calibrations (Software Version P7.33) - Sheet 3 of 6

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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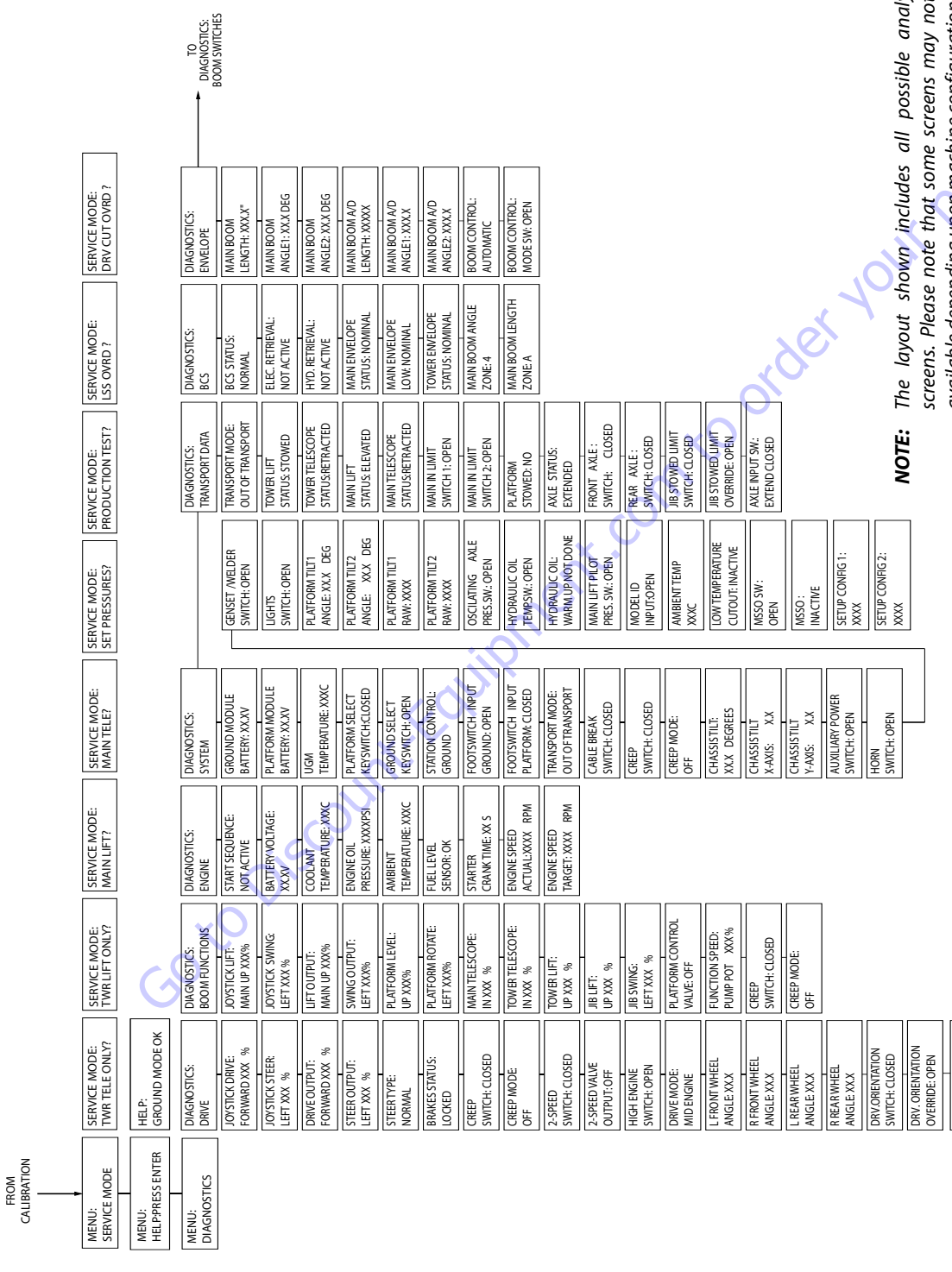

NOTE: *The layout shown includes all possible analyzer screens. Please note that some screens may not be available depending upon machine configuration.*

Figure 6-6. Analyzer Flow Chart - Diagnostics (Software Version P7.33) - Sheet 4 of 6

1001110093-T
MAF26920T

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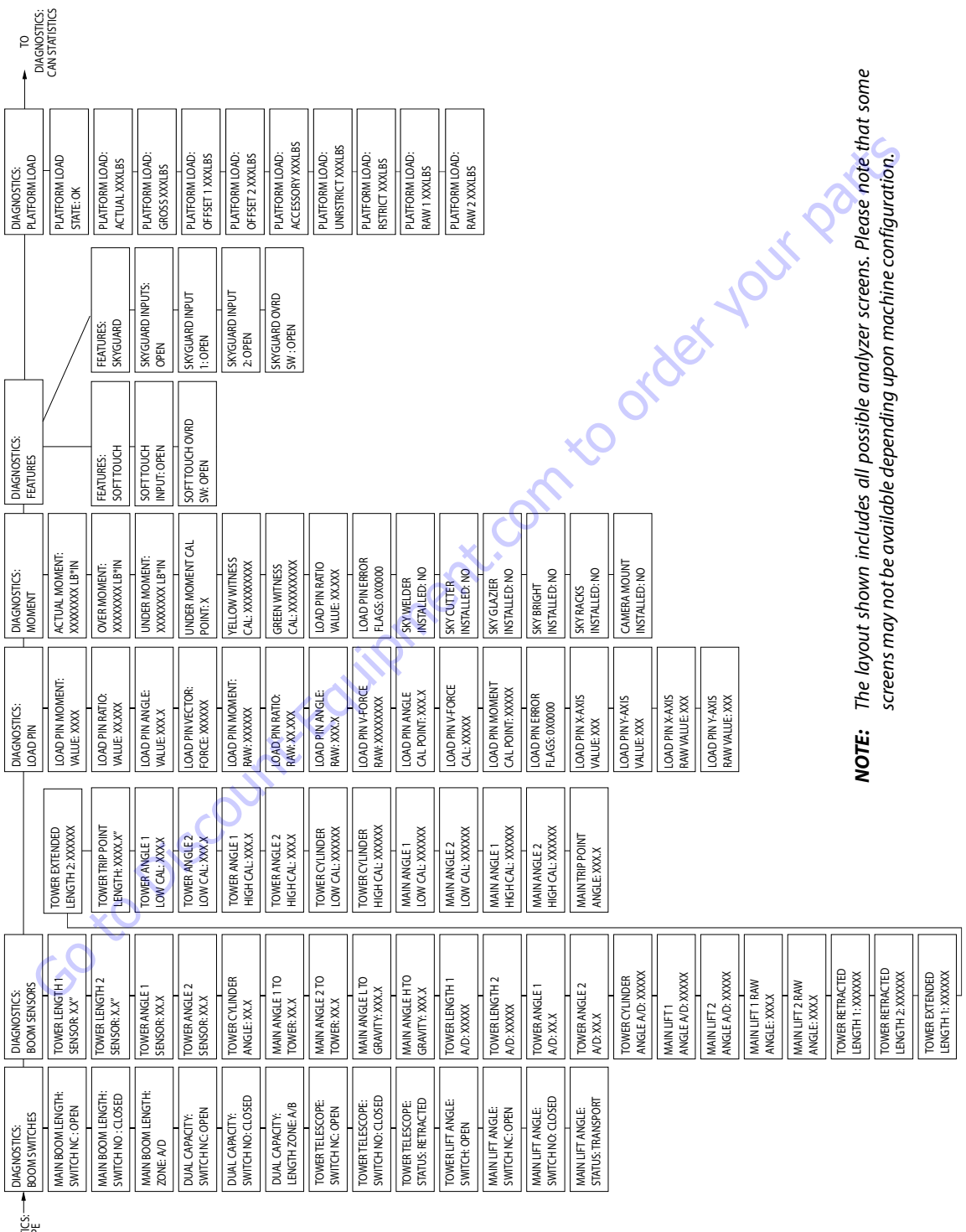

NOTE: *The layout shown includes all possible analyzer screens. Please note that some screens may not be available depending upon machine configuration.*

Figure 6-7. Analyzer Flow Chart - Diagnostics (Software Version P7.33) - - Sheet 5 of 6

1001110093-T
MAF26930T

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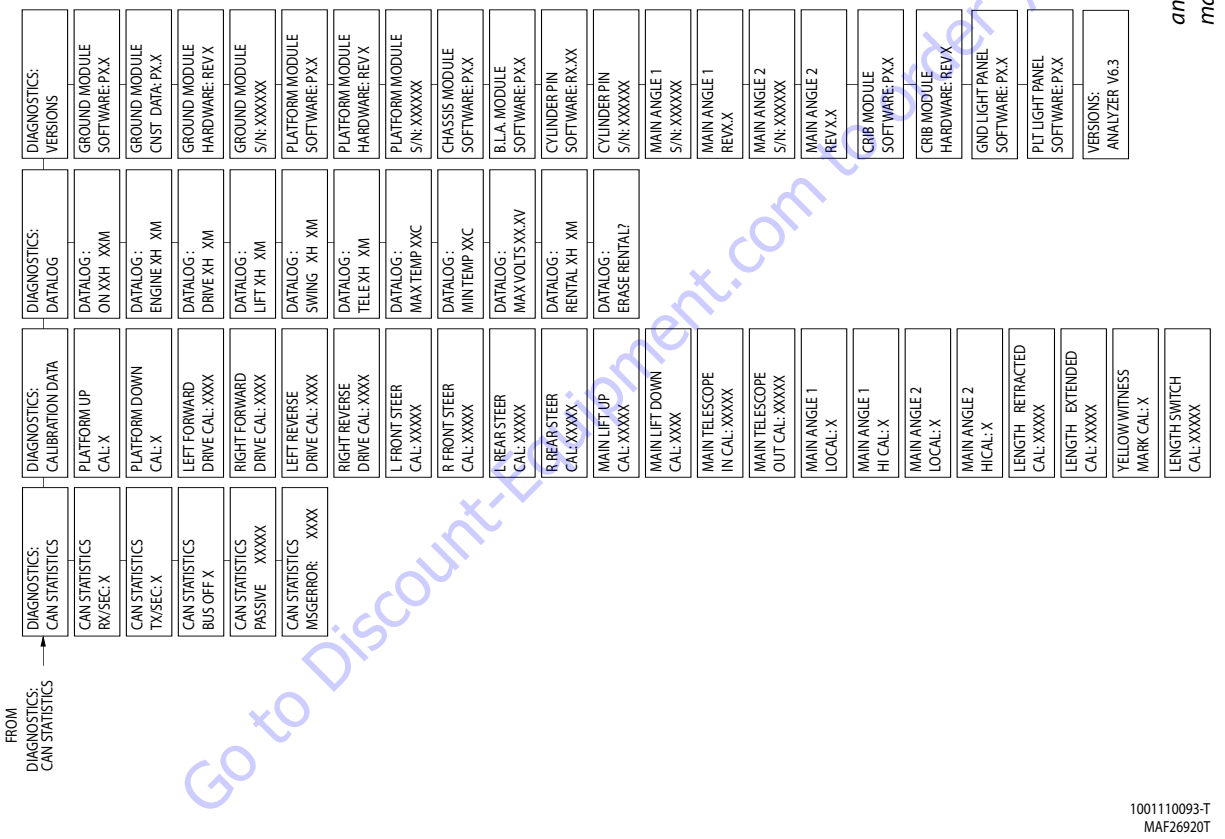

NOTE: *The layout shown includes all possible analyzer screens. Please note that some screens may not be available depending upon machine configuration.*

Figure 6-8. Analyzer Flow Chart - Diagnostics (Software Version P7.33) - - Sheet 6 of 6

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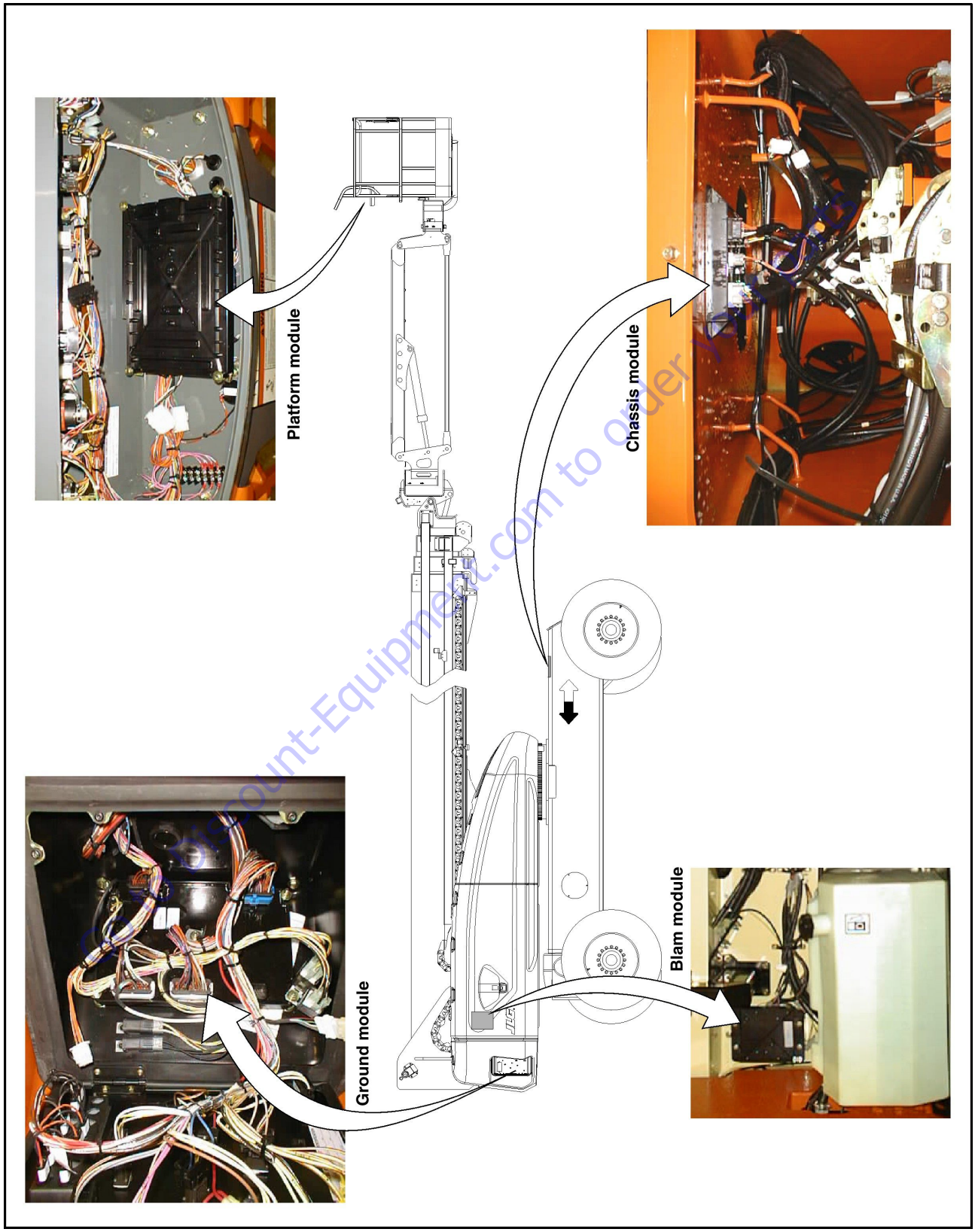

Figure 6-9. Control Module Location

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PLATFORM CONNECTION

GROUND CONTROL CONNECTION

Figure 6-10. Analyzer Connecting Points

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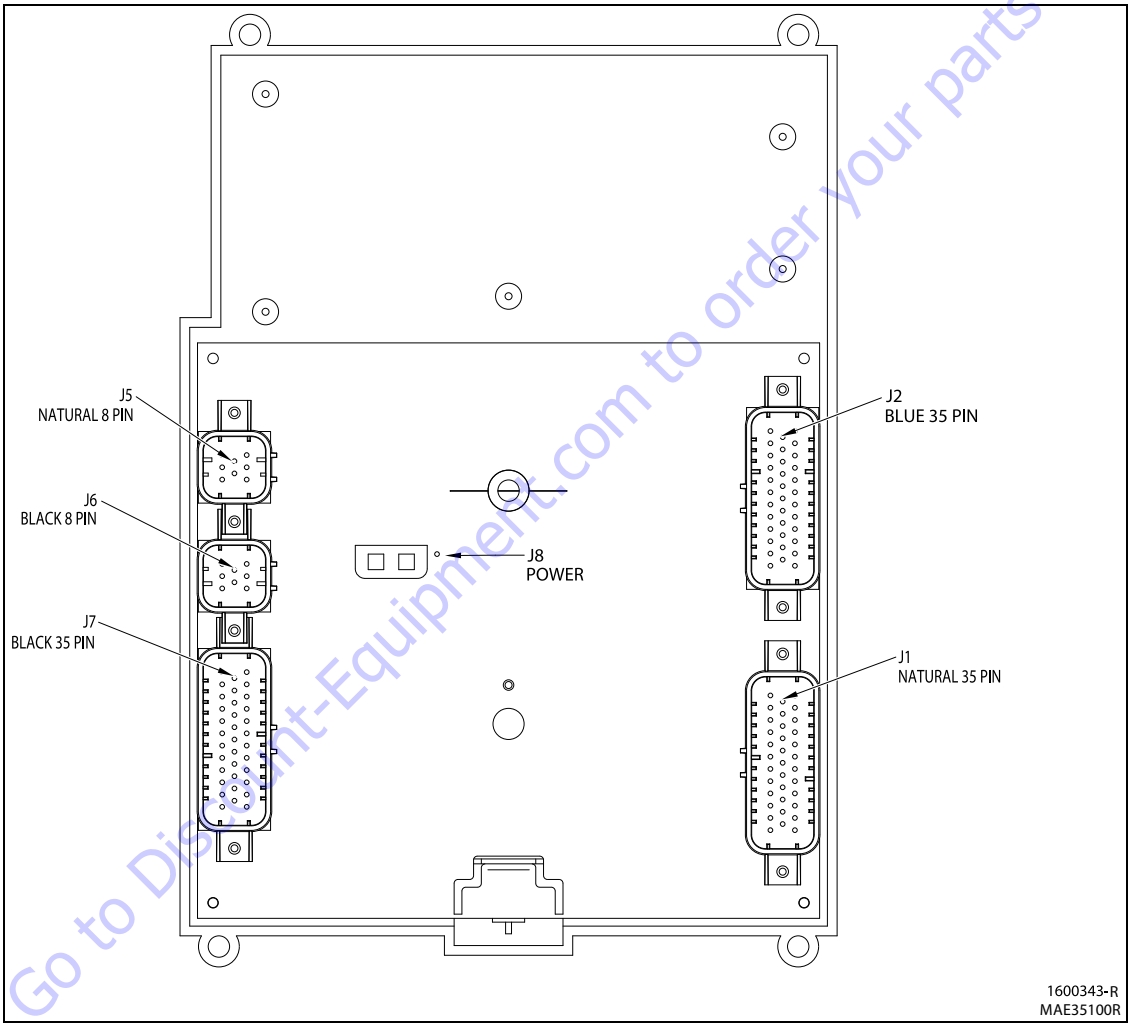

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Figure 6-11. Platform Control Module

CONNECTOR	PIN	ASSIGNMENT	FUNCTION
J1NATURAL	1	TOWER LIFT UP	HS DIGITAL INPUT
	2	TOWER LIFT DOWN	HS DIGITAL INPUT
	3	TOWER TELESC OPEIN	HS DIGITAL INPUT
	4	TOWER TELESCOPE OUT	HS DIGITAL INPUT
	5	MAIN TELESCOPE IN	HS DIGITAL INPUT
	6	MAIN TELESCOPEOUT	HS DIGITAL INPUT
	7	PLATFORM ROTATE RIGHT	HS DIGITAL INPUT
	8	PLATFORM ROTATE LEFT	HS DIGITAL INPUT
	9	PLATFORM LEVEL UP	HS DIGITAL INPUT
	10	PLATFORM LEVEL DOWN	HS DIGITAL INPUT
	11	JIB UP	HS DIGITAL INPUT
	12	JIB DOWN	HS DIGITAL INPUT
	13	SPEED PUMP POTENTIOMETER GROUND	GROUND
	14	ENGINE START	HS DIGITAL INPUT
	15	AUXILIARY POWER	HS DIGITAL INPUT
	16	CRAB STEER SELECT	HS DIGITAL INPUT
	17	COORDINATED STEER SELECT	HS DIGITAL INPUT
	18	SWITCH POWER	BATTERY VOLTAGE
	19	JIB 1000LB ENABLE	HS DIGITAL INPUT
	20	EIM PLATFORMOVER LOAD	HS DIGITAL INPUT
	21	500/1000LB.CAPACITY SELECT	HS DIGITAL INPUT
	22	DRIVE ORIENTATION SYSTEM FEATURE ENABLE	HS DIGITAL INPUT
	23	SPARE PIN	HS DIGITAL INPUT
	24	SPARE PIN	HS DIGITAL INPUT
	25	LEVEL SENSOR1 SIGNAL	HS DIGITAL INPUT
	26	LEVEL SENSOR2 SIGNAL	HS DIGITAL INPUT
	27	TWO SPEED VALVE(HIGH ENGINE)	HS DIGITAL INPUT
	28	TORQUEMODE	HS DIGITAL INPUT
	29	SOFTTOUCH OVERRIDE	HS DIGITAL INPUT
	30	HEAD/TAILLIGHT	HS DIGITAL INPUT
	31	HORN	HS DIGITAL INPUT
	32	CREEPMODE	HS DIGITAL INPUT
	33	DUAL-FUELSELECT	HS DIGITAL INPUT
	34	SPEED PUMP POTENTIOMETER REFERENCE VOLTAGE	+7REFERENCE VOLTAGE
	35	SPEED PUMPPOTENTIOMETER	ANALOG INPUT

CONNECTOR	PIN	ASSIGNMENT	FUNCTION
J2BLUE	1	SPARE PIN	HS DIGITAL INPUT
	2	SPARE PIN	HS DIGITAL INPUT
	3	BATTERY VOLTAGE	BATTERY VOLTAGE
	4	DRIVE ORIENTATION SYSTEM OVERRIDE SWITCH	HS DIGITAL INPUT
	5	PLATFORM STOWED	HS DIGITAL INPUT
	6	CHASSIS TILTED INDICATOR	LAMP OUTPUT
	7	FUNCTION ENABLE INDICATOR	LAMP OUTPUT
	8	VEHICLE SYSTEM DISTRESS INDICATOR	LAMP OUTPUT
	9	CREEP SPEED INDICATOR	LAMP OUTPUT
	10	BROKEN CABLE INDICATOR	LAMP OUTPUT
	11	PLATFORM OVERLOADED INDICATOR	LAMP OUTPUT
	12	500LB CAPACITY INDICATOR	LAMP OUTPUT
	13	1000LB CAPACITY INDICATOR	LAMP OUTPUT
	14	DRIVE ORIENTATION SYSTEM INDICATOR	LAMP OUTPUT
	15	GENERATOR ON INDICATOR	LAMP OUTPUT
	16	SOFT TOUCHT RIGGERED INDICATOR	LAMP OUTPUT
	17	GLOW PLUG ENGAGED INDICATOR	LAMP OUTPUT
	18	LAMP RETURN	GROUND
	19	SPARE PIN	LAMP OUTPUT
	20	UPRIGHTTILTED INDICATOR	LAMP OUTPUT
	21	LOW FUEL INDICATOR	LAMP OUTPUT
	22	1/4 FUEL LEVEL INDICATOR	LAMP OUTPUT
	23	3/4 FUEL LEVEL INDICATOR	LAMP OUTPUT
	24	1/2 FUEL LEVEL INDICATOR	LAMP OUTPUT
	25	FUEL LEVEL INDICATORS RETURN	GROUND
	26	ANALYZER POWER	ANALYZER POWER
	27	ANALYZER GROUND	ANALYZER GROUND
	28	ANALYZER RX	ANALYZER RX
	29	ANALYZER TX	ANALYZER TX
	30	SPARE PIN	LAMP OUTPUT
	31	SPARE PIN	DIGITAL OUTPUT
	32	BATTERY VOLTAGE	BATTERY VOLTAGE
	33	BATTERY VOLTAGE	BATTERY VOLTAGE
	34	SWITCH POWER	BATTERY VOLTAGE
	35	FULL FUEL LEVEL INDICATOR	LAMP OUTPUT

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CONNECTOR	PIN	ASSIGNMENT	FUNCTION
J5 NATURAL	1	LIFT/SWINGJOYSTICKSUPPLYVOLTAGE	SUPPLYVOLTAGE
	2	LIFTCENTERTAP	ANALOGINPUT
	3	LIFTSIGNAL	ANALOGINPUT
	4	SWINGSIGNAL	ANALOGINPUT
	5	SWINGCENTERTAP	ANALOGINPUT
	6	NOTCONNECTED	ANALOGINPUT
	7	LIFT/SWINGJOYSTICKRETURN	GROUND
	8	SPAREPIN	BLANK

CONNECTOR	PIN	ASSIGNMENT	FUNCTION
J6 BLACK	1	DRIVE/STEERJOYSTICKSUPPLYVOLTAGE	SUPPLYVOLTAGE
	2	DRIVECENTERTAP	ANALOGINPUT
	3	DRIVESIGNAL	ANALOGINPUT
	4	STEERSIGNAL	ANALOGINPUT
	5	STEERLEFT	ANALOGINPUT
	6	STEERRIGHT	ANALOGINPUT
	7	DRIVE/STEERJOYSTICKRETURN	GROUND
	8	SPAREPIN	BLANK

CONNECTOR	PIN	ASSIGNMENT	FUNCTION
J8	1	MODULEGROUND	GROUND
	2	MODULEPOWER	BATTERYVOLTAGE

CONNECTOR	PIN	ASSIGNMENT	FUNCTION
J7 BLACK	1	GROUND MODE	GROUND MODE
	2	PLATFORM EMS	PLATFORM EMS
	3	PLATFORM EMS TO GROUND MODULE	PLATFORM MODE
	4	FOOT SWITCH (FUNCTION ENABLE SWITCH)POWER	BATTERY VOLTAGE
	5	PLATFORM ROTAT ELEFT	ME DIGITAL OUTPUT
	6	PLATFORM ROTATE RIGHT	ME DIGITAL OUTPUT
	7	SOFTTOUCH LIMITSWITCH POWER	BATTERY VOLTAGE
	8	FOOT SWITCH SIGNAL	DIGITAL INPUT
	9	GENERATOR ON SIGNAL	DIGITAL INPUT
	10	+7 REFERENCE VOLTAGE	+7 REFERENCE VOLTAGE
	11	SPARE PIN	+5V REFERENCE VOLTAGE
	12	SPARE PIN	+5V REFERENCE VOLTAGE
	13	SPARE PIN	ANALOG INPUT
	14	GROUND RETURN	GROUND
	15	PLATFORMLEVEL UP	HS DIGITAL OUTPUT
	16	PLATFORMLEVEL DOWN	HS DIGITAL OUTPUT
	17	JIB BLOCK LIMIT SWITCH	HS DIGITAL INPUT
	18	SOFT TOUCH LIMIT SWITCH	HS DIGITAL INPUT
	19	PLATFORM ALARM	LAMPOUTPUT
	20	ALARM RETURN	GROUND
	21	SPARE PIN	GROUND (PTC) 0.2 A
	22	SPARE PIN	GROUND (PTC) 0.2 A
	23	SPARE PIN	ANALOG INPUT
	24	SPARE PIN	DIGITAL OUTPUT
	25	JIB UP	ME DIGITAL OUTPUT
	26	JIB DOWN	ME DIGITAL OUTPUT
	27	JIB RIGHT	ME DIGITAL OUTPUT
	28	JIB LEFT	ME DIGITAL OUTPUT
	29	GROUND RETURN	GROUND
	30	CAN LOW	CAN LOW
	31	CAN HIGH	CAN HIGH
	32	CAN SHIELD	CAN SHIELD
	33	SPARE PIN	GROUND (PTC) 0.2 A
	34	SPARE PIN	GROUND (PTC) 0.2 A
	35	SPARE PIN	ANALOG INPUT

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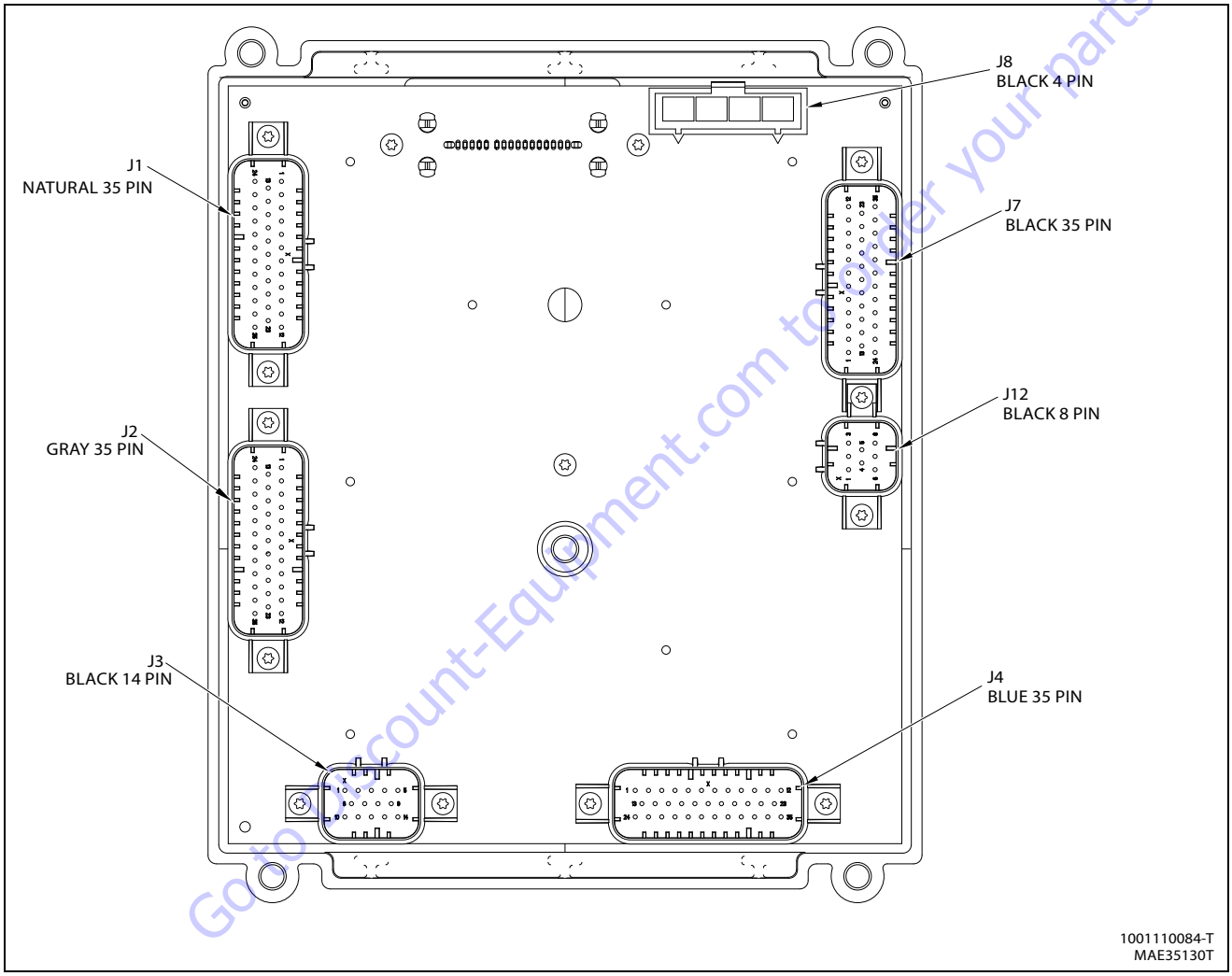

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Figure 6-12. Ground control module

Connector	Pin	Function	Type	
J1 (Natural)	1	THROTTLE ACTUATOR (DIESELONLY)	DIGITAL	OUTPUT
	2	SPARE (LPNOTUSED)	DIGITAL	OUTPUT
	3	TOWER BOOM LIFT POWER	DIGITAL	OUTPUT
	4	GROUND	GROUND	INPUT
	5	GROUND	GROUND	INPUT
	6	TOWER TELESCOPE ENABLE	DIGITAL	OUTPUT
	7	SPARE (LPNOTUSED)	DIGITAL	OUTPUT
	8	GROUND	GROUND	INPUT
	9	GROUND	GROUND	INPUT
	10	IGNITION ON RELAY	DIGITAL	OUTPUT
	11	START SOLENOID (DIESELONLY)	DIGITAL	OUTPUT
	12	GLOW PLUG (DIESELONLYOPTION)	DIGITAL	OUTPUT
	13	AUXILIARY POWER	DIGITAL	OUTPUT
	14	COOLAN TTEMP (DIESELONLY)	ANALOG	INPUT
	15	OIL PRESSURE (DIESELONLY)	ANALOG	INPUT
	16	FLY WHEEL SPEED PICKUP(DIESELONLY)	FREQUENCY	INPUT
	17	GROUND	GROUND	INPUT
	18	SPARE GROUND	GROUND	INPUT
	19	SPARE GROUND	GROUND	INPUT
	20	TWO SPEED	DIGITAL	OUTPUT
	21	MAIN LIFT PILOT PRESSURE SWITCH	DIGITAL	INPUT
	22	GENERATOR/WELDER(OPTION)	DIGITAL	OUTPUT
	23	PARKING BRAKE	DIGITAL	OUTPUT
	24	CONSTANT BATTERY	N/C	N/C
	25	RS-485HI	SERIAL	I/O
	26	RS-485LO	SERIAL	I/O
	27	GROUND	GROUND	INPUT
	28	ANALYZER POWER	VOLTAGE	OUTPUT
	29	ANALYZER RS-232Rx	SERIAL	INPUT
	30	ANALYZER RS-232Tx	SERIAL	OUTPUT
	31	ANALYZER GROUND	GROUND	INPUT
	32	ALTERNATOR EXCITATION	DIGITAL	OUTPUT
	33	GROUND SHIELD	GROUND	INPUT
	34	SPARE	DIGITAL	INPUT
	35	HYDRAULIC OIL TEMPERATURE SWITCH	DIGITAL	INPUT

Connector	Pin	Function	Type	
J3 (Black)	1	SPARE VAVLE RETURN 1	GROUND	INPUT
	2	SPARE VAVLE RETURN 2	GROUND	INPUT
	3	GROUND	GROUND	INPUT
	4	SPARE VAVLE RETURN 4	GROUND	INPUT
	5	SPARE VAVLE RETURN 5	GROUND	INPUT
	6	SPARE VAVLE RETURN 6	GROUND	INPUT
	7	VBAT	VBAT	OUTPUT
	8	SPARE HS DIGITALIN(FREQ.CAPABLE)	DIGITAL	INPUT
	9	ALTERNATOR EXCITATION INPUT	DIGITAL	INPUT
	10	SPARE HS SWITCH INPUT (MODELINPUTFOR1100S)	DIGITAL	INPUT
	11	SPARE LS DIGITAL INPUT	DIGITAL	INPUT
	12	ANALOG REF.VOLTAGE	VOLTAGE	OUTPUT
	13	SPARE ANALOG INPUT 8	ANALOG	INPUT
	14	SPARE VALVE RETURN 3	GROUND	INPUT

Connector	Pin	Function	Type	
J12 (Black)	1	FREQUENCY INPUT 2	FREQUENCY	INPUT
	2	FREQUENCY INPUT 2 RETURN	FREQUENCY	INPUT
	3	CAN 2H	SERIAL	I/O
	4	CAN 2L	SERIAL	I/O
	5	CAN 2SHIELD	GROUND	INPUT
	6	CAN2 TERMINATOR	TERM	I/O
	7	CAN2 TERMINATOR	TERM	I/O
	8	SPARE LS DIGITAL INPUT	DIGITAL	INPUT

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Connector	Pin	Function	Type	
J2 (Gray)	1	MAIN LIFT PILOT	DIGITAL	OUTPUT
	2	HORN	DIGITAL	OUTPUT
	3	PLATFORM CONTROL VALVE	DIGITAL	OUTPUT
	4	UPPER TELESCOPE IN	DIGITAL	OUTPUT
	5	BASKET LEVEL UP OVERRIDE	DIGITAL	OUTPUT
	6	GROUND	GROUND	INPUT
	7	BASKET LEVEL DOWN OVERRIDE	DIGITAL	OUTPUT
	8	TOWER TELESCOPE POWER	DIGITAL	OUTPUT
	9	TELESCOPEF LOW CONTROL	DIGITAL	OUTPUT
	10	LIFT PILOT	DIGITAL	OUTPUT
	11	UPPER LIFT UP	DIGITAL	OUTPUT
	12	LIFT DOWN AUXILIARY	DIGITAL	OUTPUT
	13	MAIN DUMP	DIGITAL	OUTPUT
	14	GROUND	GROUND	INPUT
	15	NOT CONNECTEDRS232 BACKUP COMM.ENABLE	DIGITAL	OUTPUT
	16	UPPER TELESCOPE OUT	DIGITAL	OUTPUT
	17	GROUND	GROUND	INPUT
	18	SPARE PIN	GROUND	INPUT
	19	LIFT FLOW CONTROL	DIGITAL	OUTPUT
	20	SPARE OUTPUT	DIGITAL	OUTPUT
	21	MAIN BOOM ANGLE SENSOR#2 POWER	DIGITAL	OUTPUT
	22	UPPER LIFT DOWN	DIGITAL	OUTPUT
	23	MAIN BOOM LIFTENABLE	DIGITAL	OUTPUT
	24	TOWER CYLINDER TYPE	DIGITAL	INPUT
	25	FUEL SENSOR	ANALOG	INPUT
	26	HEAD/TAILLIGHT	DIGITAL	OUTPUT
	27	ALARM	DIGITAL	OUTPUT
	28	SPAREPIN	GROUND	INPUT
	29	GROUND	GROUND	INPUT
	30	GROUND	GROUND	INPUT
	31	PVGENABLE	DIGITAL	OUTPUT
	32	TOWER BOOM TELESCOPEPILOT	DIGITAL	OUTPUT
	33	TOWER BOOM LIFT ENABLE	DIGITAL	OUTPUT
	34	SWING LEFT	DIGITAL	OUTPUT
	35	SWING RIGHT	DIGITAL	OUTPUT

Connector	Pin	Function	Type	
J4 (Blue)	1	AXLES SET LAMP	DIGITAL	OUTPUT
	2	500# CAPACITY LAMP	DIGITAL	OUTPUT
	3	BOOM CONTROL SYSTEM LAMP	DIGITAL	OUTPUT
	4	START SWITCH	DIGITAL	INPUT
	5	BASKET LEVEL DOWN	DIGITAL	INPUT
	6	BASKET LEVEL DOWN	DIGITAL	INPUT
	7	UPPER TELESC OPEIN	DIGITAL	INPUT
	8	JIB DOWN	DIGITAL	INPUT
	9	JIB LEFT	DIGITAL	INPUT
	10	TOWER UP	DIGITAL	INPUT
	11	MAIN TOWER TRANSPORT ANGLE OPEN	DIGITAL	INPUT
	12	HOUR METER	DIGITAL	OUTPUT
	13	BCS CALIBRATED LAMP	DIGITAL	OUTPUT
	14	OVERLOAD LAMP	DIGITAL	OUTPUT
	15	SPARE	DIGITAL	OUTPUT
	16	AUXILIARY POWER	DIGITAL	INPUT
	17	BASKET LEVEL UP	DIGITAL	INPUT
	18	BASKET ROTATE RIGHT	DIGITAL	INPUT
	19	JIB UP	DIGITAL	INPUT
	20	JIB RIGHT	DIGITAL	INPUT
	21	TOWER DOWN	DIGITAL	INPUT
	22	MAIN BOOM TRANSPORTANGLECLOSED	DIGITAL	INPUT
	23	UPPER LIFT UP	DIGITAL	INPUT
	24	V BAT	VBAT	OUTPUT
	25	V BAT	VBAT	OUTPUT
	26	NO CHARGE LAMP	DIGITAL	OUTPUT
	27	1000#CAPACITY LAMP	DIGITAL	OUTPUT
	28	ENGINE HIGH TEMPERATURE LENGTH	DIGITAL	OUTPUT
	29	ENGINE LOW OIL PRESSURE LAMP	DIGITAL	OUTPUT
	30	UPPER TELESCOPE OUT	DIGITAL	INPUT
	31	GROUND	GROUND	INPUT
	32	SPAREPIN	GROUND	INPUT
	33	UPPER LIFT DOWN	DIGITAL	INPUT
	34	SWING LEFT	DIGITAL	INPUT
	35	SWING RIGHT	DIGITAL	INPUT

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Connector	Pin	Function	Type	
J7 (Black)	1	PLATFORM EMS	DIGITAL	INPUT
	2	PLATFORM MODE	DIGITAL	INPUT
	3	GROUND MODE	DIGITAL	INPUT
	4	TOWER CYLINDER PRESSURE	ANALOG	INPUT
	5	REFERENCE VOLTAGE	VOLTAGE	OUTPUT
	6	CAN TERMINATION	TERM	I/O
	7	SPARE	ANALOG	INPUT
	8	SPARE ANALOGINPUT 2	ANALOG	INPUT
	9	GROUND	GROUND	INPUT
	10	GROUND	GROUND	INPUT
	11	BOOM RETRACTED CLOSED	DIGITAL	INPUT
	12	BROKEN CABLE SWITCH		INPUT
	13	CANHI	SERIAL	I/O
	14	GROUND MODEOUT TO PLATFORM	DIGITAL	INPUT
	15	FOOT SWITCH ENGAGE	DIGITAL	INPUT
	16	REFERENCE VOLTAGE	VOLTAGE	OUTPUT
	17	CAN TERMINATION	TERM	I/O
	18	CANSHEILD	GROUND	INPUT
	19	SPARE PIN	GROUND	INPUT
	20	SPARE ANA LOGINPUT 1	ANALOG	INPUT
	21	PUSH TO TEST	DIGITAL	INPUT
	22	TOWER BOOMTRANSPORTANGLE	DIGITAL	INPUT
	23	GROUND CONTROLE NABLE	DIGITAL	INPUT
	24	CAN LO	SERIAL	I/O
	25	GROUND	GROUND	INPUT
	26	REFERENCE VOLTAGE	VOLTAGE	OUTPUT
	27	REFERENCE VOLTAGE	VOLTAGE	OUTPUT
	28	GROUND(RESERVEDFORCRIBBINGOPTION)	GROUND	INPUT
	29	V BAT	VBAT	OUTPUT
	30	V BAT	VBAT	OUTPUT
	31	V BAT	VBAT	OUTPUT
	32	V BAT	VBAT	OUTPUT
	33	V BAT(RESERVEDFORCRIBBINGOPTION)	VBAT	OUTPUT
	34	CLEARSKY POWER(VBAT)	VBAT	OUTPUT
	35	BOOM RETRACT OPEN	DIGITAL	INPUT

Connector	Pin	Function	Type	
J8 (Black)	1	GROUND FROM BATTERY	GROUND	INPUT
	2	GROUND EMS	GROUND	INPUT
	3	GROUND TO PLATFORM	GROUND	OUTPUT
	4	GROUND EMS OUT TO PLATFORM	GROUND	OUTPUT

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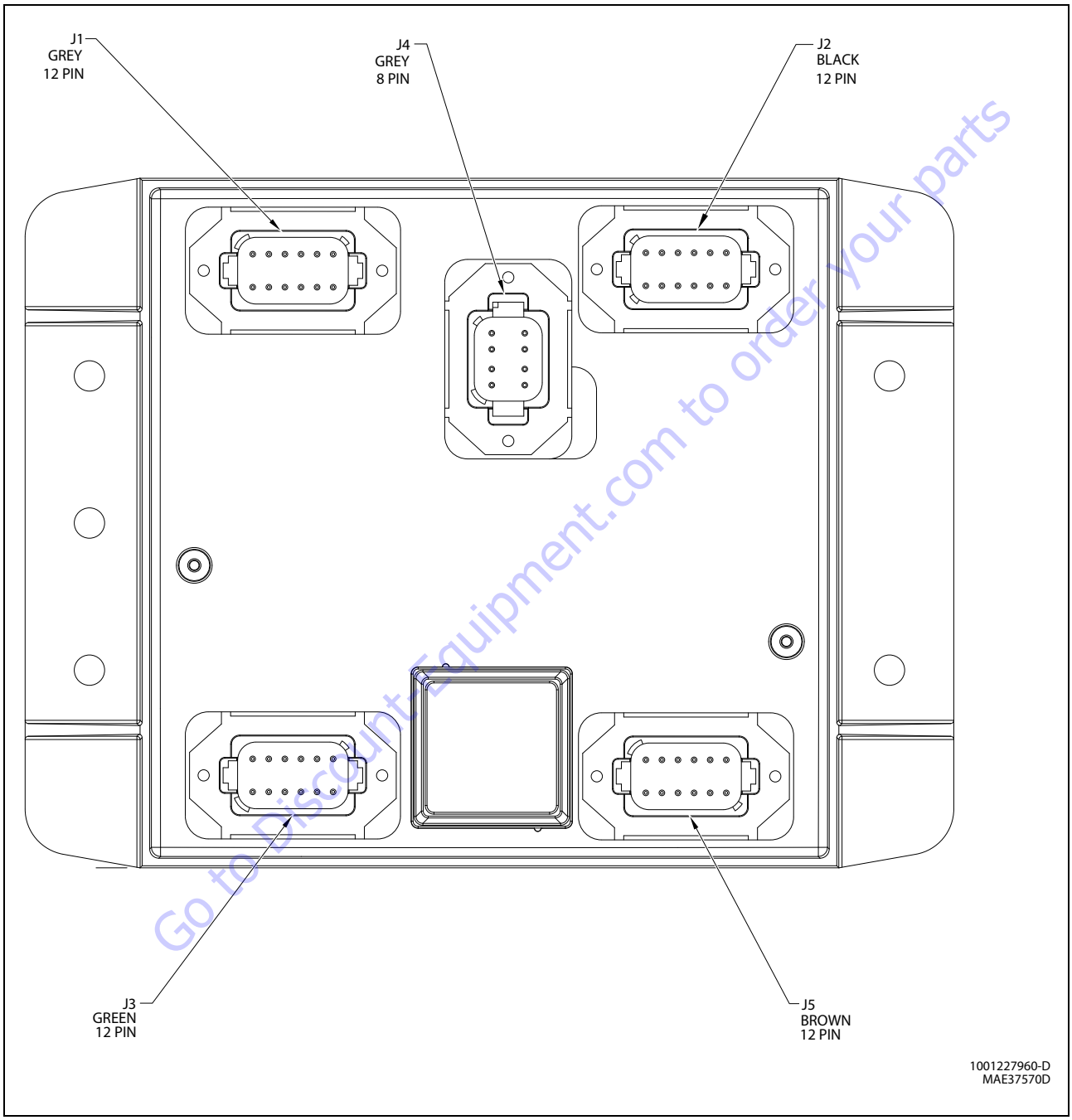

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Figure 6-13. BLAM Controller

Connector	Pin	Function			Type	
		1100/1200/1350	1250	1500		
J1(Grey)	1	PowerFeedThrutoJ2-1	PowerFeedThrutoJ2-1	PowerFeedThrutoJ2-1	Power	I/O
	2	PowerFeedThrutoJ2-2	PowerFeedThrutoJ2-2	PowerFeedThrutoJ2-2	Power	I/O
	3	SignalFeedThrutoJ2-4	SignalFeedThrutoJ2-4	SignalFeedThrutoJ2-4	Digital	Input
	4	Master Ground Connect	Master Ground Connect	Master Ground Connect	Power	Input
	5	Master Ignition Connect	Master Ignition Connect	Master Ignition Connect	Power	Input
	6	CAN bus High	CAN bus High	CAN bus High	Serial	I/O
	7	CAN bus Low	CAN bus Low	CAN bus Low	Serial	I/O
	8	CAN bus Shield	CAN bus Shield	CAN bus Shield	Serial	I/O
	9	CAN bus Terminator	CAN bus Terminator	CAN bus Terminator	Serial	I/O
	10	CAN bus Terminator	CAN bus Terminator	CAN bus Terminator	Serial	I/O
	11	Ignition	Ignition	Ignition	Power	Output
	12	Ground	Ground	Ground	Power	Output
J2(Black)	1	PowerFeedThrutoJ1-1	PowerFeedThrutoJ1-1	PowerFeedThrutoJ1-1	Power	I/O
	2	PowerFeedThrutoJ1-2	PowerFeedThrutoJ1-2	PowerFeedThrutoJ1-2	Power	I/O
	3	Ground	Ground	Ground	Power	Output
	4	Spare Input	Load Pin Push toTest	Spare Input	Digital	Input
	5	Spare Input	Platform Rotate Right	Spare Input	Digital	Input
	6	Spare Input	Platform Rotate Left	Spare Input	Digital	Input
	7	Spare Input	Spare Input	Spare Input	Digital	Input
	8	MainBoomAng1(Gravity)	TowerBoomAng1(Gravity)	MainBoomAng1(Gravity)	Digital	Input
	9	MainBoomAng2(Gravity)	TowerBoomAng2(Gravity)	MainBoomAng2(Gravity)	Digital	Input
	10	Spare Analog Input	Spare Analog	Spare Analog	Analog	Input
	11	Right Drive Pump Forward	Right Drive Pump Forward	Right Drive Pump Forward	Digital	Output
	12	Right Drive Pump Reverse	Right Drive Pump Reverse	Right Drive Pump Reverse	Digital	Output
J3(Green)	1	+5VAnalogReference	+5VAnalogReference	+5VAnalogReference	Power	Output
	2	RefVoltagefromJ3-1	RefVoltagefromJ3-1	RefVoltagefromJ3-1	Analog	Input
	3	Ground	Ground	Ground	Power	Output
	4	+5VAnalogReference	+5VAnalogReference	+5VAnalogReference	Power	Output
	5	Spare Analog Input	Tower Boom Cylinder Angle	MainCylAngle#1(Absolute)	Analog	Input
	6	Ground	Ground	Ground	Power	Output
	7	+5VAnalogReference	+5VAnalogReference	+5VAnalogReference	Power	Output
	8	Boom Length Sensor	TowerBoomLengthSnsr#1	Boom Length Sensor	Analog	Input
	9	Ground	Ground	Ground	Power	Output
	10	+5VAnalogReference	+5VAnalogReference	+5VAnalogReference	Power	Output
	11	Spare Analog Input	TowerBoomLengthSnsr#2	MainCylAngle#2(Absolute)	Analog	Input
	12	Ground	Ground	Ground	Power	Output

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6.4 TO CONNECT THE JLG CONTROL SYSTEM ANALYZER

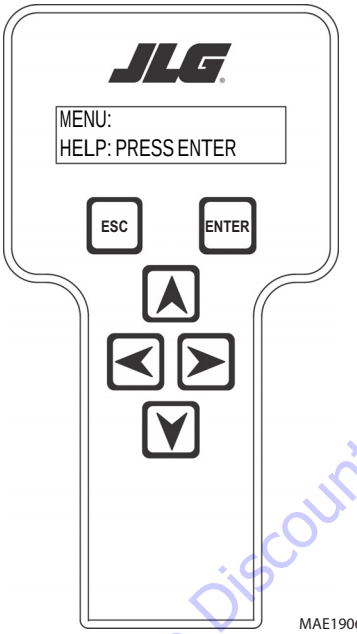
1. Connect the cable supplied with the analyzer, to the controller module located in the platform box or at the controller module in the ground control box and connect the remaining end of the cable to the analyzer.

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.

6.5 USING THE ANALYZER

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



HELP:
PRESS ENTER

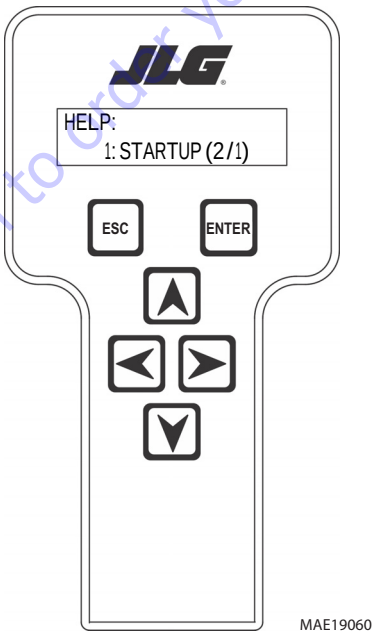
At this point, using the **RIGHT** and **LEFT** arrow keys, you can move between the top level menu items. To select a displayed menu item, press **ENTER**. To cancel a selected menu item, press ESC.; then you will be able to scroll using the right and left arrow keys to select a different menu item.

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.**

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.

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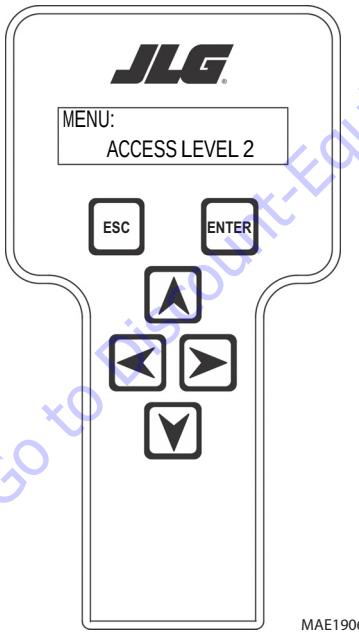
When a top level menu is selected, a new set of menu items may be offered: for example:

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.

6.6 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.

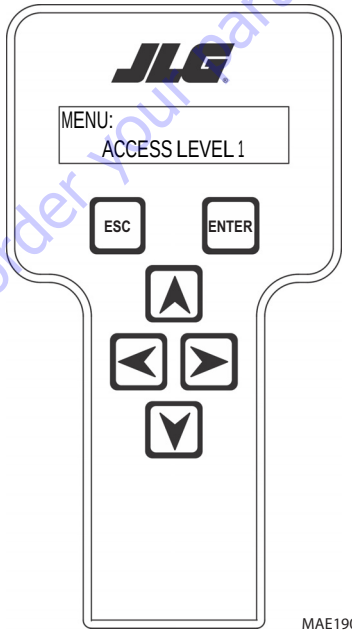
Using the **UP** or **DOWN** arrow keys, enter the first digit of the password, 3.

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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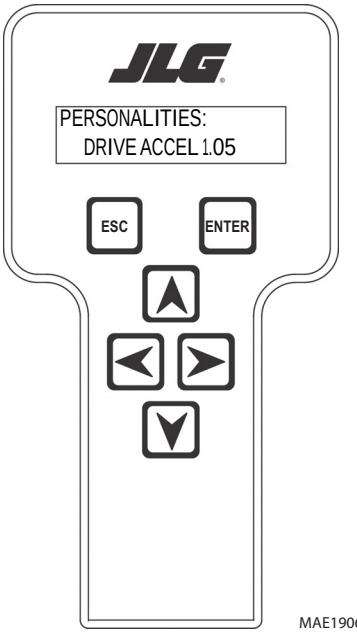
6.7 ADJUSTING PARAMETERS USING THE HAND HELD ANALYZER

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:

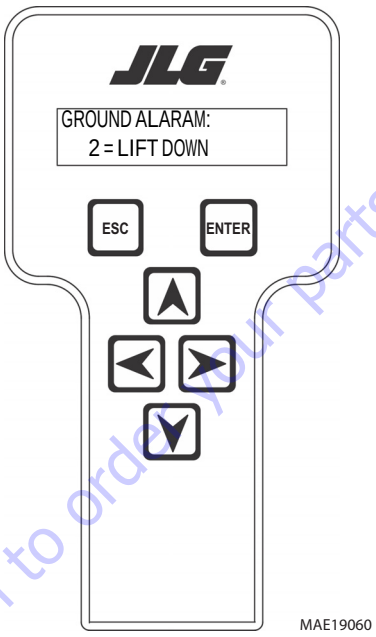


PERSONALITIES:
DRIVE ACCEL 1.0s

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.

6.8 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 6-5, Personality Ranges/Defaults, and 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

NOTICE

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

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Table 6-2. Machine Configuration Programming Information - Version P7.33

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 values.*			
MODEL NUMBER: 1	**1** 2	**1200S** 1350S	**1**
ENVELOPE HEIGHT: 2	1 2 3 4 **5** 6	1350S: 135' MAX 1350S: 125' MAX 1350S: 120' MAX 1350S: 110' MAX **1200S: 120' MAX** 1200S: 110' MAX	 **5**
Note: The default settings (bold) will vary depending on the model selection with selection # 5 being the initial default setting.			
MARKET: 3	**0** 1 2 3 4 5 6	**ANSI USA** ANSI EXPORT CSA CE AUSTRALIA JAPAN GB	**0**
ENGINE: 4	1 2 **3** 4 5	DEUTZ F4 TIER1: Deutz BF4M1011 Diesel (Tier 1) DEUTZ F4 TIER2: Deutz BF4M2011 Diesel (Tier 2) **DEUTZ ECM: Engine Control Module** CAT ECM: Engine Control Module DEUTZ ECM T4F: Engine Control Module (Tier 4 Final)	 **3**
GLOW PLUG: 5*	0 1 **2**	NO GLOW PLUGS: No glow plugs installed. AIR INTAKE: Glow plugs installed in the air intake on the manifold. **IN-CYLINDER: Glow plugs installed in each cylinder.**	 **2**
* Only visible when certain Engine Setup are selected.			

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Table 6-2. Machine Configuration Programming Information - Version P7.33

Configuration Digit	Number	Description	Default Number
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.	
* Only visible when certain Engine Setup and Glow Plug options are selected.			
ENGINE SHUTDOWN: 7*	0	DISABLED: No engine shutdown.	
	1	**ENABLED: Shutdown engine when coolant temperature is greater than 110 deg. C or the oil pressure is less than 8 PSI.**	**1**
* Only visible when Engine Setup is DEUTZ F4 Tier 1 or Tier 2.			
FUEL CUTOUT: 8*	**0**	**RESTART: Engine allowed to be restarted multiple times when very low fuel level is reached**	**0**
	1	ONE RESTART: Engine allowed to be restarted once for 2 minutes when very low fuel level is reached.	
	2	ENGINE STOP: Engine not able to restart when very low fuel level is reached.	
* This menu item is only visible if non dual fuel engines are selected.			
CHASSIS TILT: 9	**0**	**5 DEGREES + DRV CUT: Reduces the maximum speed of all boom functions to creep when tilted more than 5 degrees and above elevation; also cuts out drive**	**0**
	1	4 DEGREES + DRV CUT: Reduces the maximum speed of all boom functions to creep when tilted more than 4 degrees and above elevation; also cuts out drive	
	2	3 DEGREES + DRV CUT: Reduces the maximum speed of all boom functions to creep when tilted more than 3 degrees and above elevation; also cuts out drive	
	3	5 DEGREES + CUT: Reduces the maximum speed of all boom functions to creep when tilted more than 5 degrees and above elevation; also disallows tower lift up, tower telescope out, drive, main telescope out and main lift up.	
	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.			

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Table 6-2. Machine Configuration Programming Information - Version P7.33

Configuration Digit	Number	Description	Default Number
JIB: 10	0 1 **2**	NO: No Jib installed. YES: Jib installed. **SIDESWING: Jib with Sideswing installed**	 **2**
4WS: 11	0 **1**	NO: 2WS mode enabled. **YES: 4WS mode enabled.**	 **1**
DRIVE: 12	0 **1**	2WD drive mode enabled. **4WD drive mode enabled.**	 **1**
SOFT TOUCH: 13	**0** 1	**NO: Soft touch is disabled.** 4WD drive mode enabled.	**0**
SKYGUARD OPTION: 14	0 **1** 2	No SkyGuard is disabled. **BAR/SKYLINE: SkyGuard Bar or SkyLine installed and enabled** SKYEYE - SkyEye installed and enabled	 **1**
GEN SET/WELDER: 15	0 **1** 2	NO: No generator installed. **BELT DRIVE: Belt driven setup.** HYDRAULIC DRIVE: Hydraulic driven setup.	 **1**
GEN SET CUTOUT: 16*	**0** 1	**MOTION ENABLED: Motion enabled when generator is ON.** MOTION CUTOUT: Motion cutout in platform mode only.	**0**
* Only visible if Gen Set / Welder Menu selection is not 0.			
H & T LIGHTS: 17	**0** 1	**NO: No head and tail lights installed.** YES: Head and tail lights installed.	**0**

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Table 6-2. Machine Configuration Programming Information - Version P7.33

Configuration Digit	Number	Description	Default Number
LOAD SYSTEM: 18*	0	NO: No load sensor installed.	
	1	**CUTOUT PLATFORM: All functions cutout, overload lamp lit, platform alarm beeps (5 sec ON, 2 sec OFF).**	**1**
	2	CUTOUT ALL: All functions cutout, flash overload light, 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.			
LOAD TYPE: 19	0	NON CAN LSS: Non CAN based LSS installed	
	1	**CAN LSS: CAN based LSS is installed.**	**1**
FUNCTION CUTOUT: 20*	**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: 21*	0	NO: No ground alarm installed.	
	1	DRIVE: Travel alarm sounds when the drive function is active.	
	2	DESCENT: Descent alarm sounds when lift down is active.	
	3	**MOTION: Motion alarm sounds when any function is active.**	**3**
* Certain market selections will alter default setting.			
FLYWHEEL TEETH: 22*	**0**	**110 TEETH - The engine is configured to calculate speed using 110 teeth**	**0**
	1	133 TEETH - The engine is configured to calculate speed using 133 teeth	
	2	112 TEETH - The engine is configured to calculate speed using 112 teeth.	
* Only visible when Engine Setup is DEUTZ F4 Tier 1 or Tier 2.			
OSCILLATING AXLE: 23	0	NO: No oscillating axle system installed.	
	1	**YES: Oscillating axle system installed.**	**1**

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Table 6-2. Machine Configuration Programming Information - Version P7.33

Configuration Digit	Number	Description	Default Number
DISPLAY UNITS: 24*	**0** 1	**IMPERIAL: DEG F, PSI, LBS.** METRIC: DEG C, KPA, KGS.	**0**
* Certain market selections will alter default setting.			
LEVELING MODE: 25	0 **1**	LIFT: Platform leveling during lift only. **ALL: Platform leveling during all functions.**	 **1**
CLEARSKY: 26	**0** 1	**NO: ClearSky Telematics system not installed.** YES: ClearSky Telematics system installed	**0**
FUEL TANK: 27	**0** 1 2	**31 Gallon Fuel Tank** 52 Gallon Fuel Tank 45 Gallon Fuel Tank	**0**
ALERT BEACON: 28	**0** 1	**OFF FOR CREEP** 20FPS FOR CREEP	**0**
TEMP CUTOUT: 29*	**0** 1	**NO: Temp Cutout is Disabled** YES: Temp Cutout is Enabled	**0**
* Only visible under certain market selections.			
PLAT LVL OVR CUT: 30	**0** 1	**NO: Platform Level Override will always be functional** YES: Platform Level Override will only be functional when In Transport	**0**
CRIBBING: 31*	**0** 1	**NO: Cribbing Option is disabled.** YES: Cribbing Option is enabled.	**0**
* Only visible under certain market selections.			
WATER IN FUEL SENSOR: 32*	**0** 1	**NO: The Water In Fuel Sensor option is not installed.** YES: The Water in Fuel Sensor option is installed.	**0**
* Only visible under certain market selections.			

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Table 6-2. Machine Configuration Programming Information - Version P7.33

Configuration Digit	Number	Description	Default Number
ALARM/HORN: 33*	0	COMBINED: The horn and alarm is one device installed	
	1	**SEPARATE: The horn and alarm are two separate devices installed**	**1**
* Only visible under certain market selections.			

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Table 6-3. Machine Configuration Programming Settings - Version P7.33

1200SJP	ANSI USA	ANSI Export	CSA	CE	Australia	Japan	GB
Model Number	**1**	**1**	**1**	**1**	**1**	**1**	**1**
Envelope Height	**5**	**5**	**5**	**5**	**5**	**5**	**5**
Market	**0**	**1**	**2**	**3**	**4**	**5**	**6**
Engine	**3**	**3**	**3**	**3**	**3**	**3**	**3**
Glow Plug	0	0	0	0	0	0	0
	1	1	1	1	1	1	1
	2	**2**	**2**	**2**	**2**	**2**	**2**
Starter Lockout	**0**	**0**	**0**	**0**	**0**	**0**	**0**
	1	1	1	1	1	1	1
Engine Shutdown	0	0	0	0	0	0	0
	1	**1**	**1**	**1**	**1**	**1**	**1**
Fuel Cutout	**0**	**0**	**0**	**0**	**0**	**0**	**0**
	1	1	1	1	1	1	1
	2	2	2	2	2	2	2
Chassis Tilt	**0**	**0**	**0**	**0**	**0**	**0**	**0**
	1	1	1	1	1	1	1
	2	2	2	2	2	2	2
	3	3	3	3	3	3	3
	4	4	4	4	4	4	4
	5	5	5	5	5	5	5
Jib	0	0	0	0	0	0	0
	1	1	1	1	1	1	1
	2	**2**	**2**	**2**	**2**	**2**	**2**
4 Wheel Steer	0	0	0	0	0	0	0
	1	**1**	**1**	**1**	**1**	**1**	**1**
Drive	0	0	0	0	0	0	0
	1	**1**	**1**	**1**	**1**	**1**	**1**
Soft Touch	**0**	**0**	**0**	**0**	**0**	**0**	**0**
	1	1	1	1	1	1	1
Skyguard Option	0	0	0	0	0	0	0
	1	**1**	**1**	**1**	**1**	**1**	**1**
	2	2	2	2	2	2	2
Gen Set / Welder	0	0	0	0	0	0	0
	1	**1**	**1**	**1**	**1**	**1**	**1**
	2	2	2	2	2	2	2
Gen Set Cutout	**0**	**0**	**0**	**0**	**0**	**0**	**0**
	1	1	1	1	1	1	1
Head & Tail lights	**0**	**0**	**0**	**0**	**0**	**0**	**0**
	1	1	1	1	1	1	1

Table 6-3. Machine Configuration Programming Settings - Version P7.33

1200SJP	ANSI USA	ANSI Export	CSA	CE	Australia	Japan	GB
Load System	X	0	X	X	X	X	X
	1	**1**	**1**	X	**1**	**1**	X
	2	2	2	**2**	X	2	**2**
Load Type	0	0	0	0	0	0	0
	1	**1**	**1**	**1**	**1**	**1**	**1**
Function Cutout	**0**	**0**	**0**	0	**0**	**0**	0
	X	1	1	**1**	1	1	**1**
	X	2	2	X	2	2	X
	X	3	3	X	3	3	X
Ground Alarm	0	0	0	0	0	0	0
	1	1	1	1	1	1	1
	2	2	2	2	2	2	2
	3	**3**	**3**	**3**	**3**	**3**	**3**
Flywheel Teeth	**0**	**0**	**0**	**0**	**0**	**0**	**0**
	1	1	1	1	1	1	1
	2	2	2	2	2	2	2
Oscillating Axle	0	0	0	0	0	0	0
	1	**1**	**1**	**1**	**1**	**1**	**1**
Display Units	**0**	**0**	0	0	0	0	0
	1	1	**1**	**1**	**1**	**1**	**1**
Leveling Mode	0	0	0	0	0	0	0
	1	**1**	**1**	**1**	**1**	**1**	**1**
ClearSky	**0**	**0**	**0**	**0**	**0**	**0**	**0**
	1	1	1	1	1	1	1
Fuel Tank	**0**	**0**	**0**	**0**	**0**	**0**	**0**
	1	1	1	1	1	1	1
	X	X	X	X	X	X	X
Alert Beacon	**0**	**0**	**0**	**0**	0	**0**	**0**
	1	1	1	1	**1**	1	1
Temperature Cutout	**0**	**0**	**0**	**0**	**0**	**0**	**0**
	X	1	X	1	X	X	1
Platform Level Over Cutout	**0**	**0**	**0**	**0**	**0**	**0**	**0**
	1	1	1	1	1	1	1
Cribbing	**0**	**0**	**0**	**0**	**0**	**0**	**0**
	1	1	1	X	X	1	1
Water In Level Sensor	**0**	**0**	**0**	**0**	**0**	**0**	**0**
	1	1	1	1	1	1	**1**
Alarm/Horn	X	X	X	X	X	X	X
	1	**1**	**1**	**1**	**1**	**1**	**1**

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Table 6-3. Machine Configuration Programming Settings - Version P7.33

1200SJP	ANSI USA	ANSI Export	CSA	CE	Australia	Japan	GB

NOTE: ***BOLD BLUE*** *text indicates the default setting. Plain text indicates another available selection. SHADED CELLS indicate hidden menu or selection.*

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Table 6-4. Machine Configuration Programming Settings - Version P7.33

1350SJP	ANSI USA	ANSI Export	CSA	CE	Australia	Japan	GB
Model Number	**3**	**3**	**3**	**3**	**3**	**3**	**3**
Envelope Height	**1**	**1**	**1**	**1**	**1**	**1**	**1**
Market	**0**	**1**	**2**	**3**	**4**	**5**	**6**
Engine	**3**	**3**	**3**	**3**	**3**	**3**	**3**
Glow Plug	0	0	0	0	0	0	0
	1	1	1	1	1	1	1
	2	**2**	**2**	**2**	**2**	**2**	**2**
Starter Lockout	**0**	**0**	**0**	**0**	**0**	**0**	**0**
	1	1	1	1	1	1	1
Engine Shutdown	0	0	0	0	0	0	0
	1	**1**	**1**	**1**	**1**	**1**	**1**
Fuel Cutout	**0**	**0**	**0**	**0**	**0**	**0**	**0**
	1	1	1	1	1	1	1
	2	2	2	2	2	2	2
Chassis Tilt	**0**	**0**	**0**	**0**	**0**	**0**	**0**
	1	1	1	1	1	1	1
	2	2	2	2	2	2	2
	3	3	3	3	3	3	3
	4	4	4	4	4	4	4
	5	5	5	5	5	5	5
Jib	0	0	0	0	0	0	0
	1	1	1	1	1	1	1
	2	**2**	**2**	**2**	**2**	**2**	**2**
4 Wheel Steer	0	0	0	0	0	0	0
	1	**1**	**1**	**1**	**1**	**1**	**1**
Drive Type	0	0	0	0	0	0	0
	1	**1**	**1**	**1**	**1**	**1**	**1**
Soft Touch	**0**	**0**	**0**	**0**	**0**	**0**	**0**
	1	1	1	1	1	1	1

Table 6-4. Machine Configuration Programming Settings - Version P7.33

1350SJP	ANSI USA	ANSI Export	CSA	CE	Australia	Japan	GB
Skyguard Option	0	0	0	0	0	0	0
	1	**1**	**1**	**1**	**1**	**1**	**1**
	2	2	2	2	2	2	2
Gen Set / Welder	0	0	0	0	0	0	0
	1	**1**	**1**	**1**	**1**	**1**	**1**
	2	2	2	2	2	2	2
Gen Set Cutout	**0**	**0**	**0**	**0**	**0**	**0**	**0**
	1	1	1	1	1	1	1
Head & Taillights	**0**	**0**	**0**	**0**	**0**	**0**	**0**
	1	1	1	1	1	1	1
Load System	X	0	X	X	X	X	X
	1	**1**	**1**	X	**1**	**1**	X
	2	2	2	**2**	X	2	**2**
Load Type	0	0	0	0	0	0	0
	1	**1**	**1**	**1**	**1**	**1**	**1**
Function Cutout	**0**	**0**	**0**	0	**0**	**0**	0
	X	1	1	**1**	1	1	**1**
	X	2	2	X	2	2	X
	X	3	3	X	3	3	X
Ground Alarm	0	0	0	0	0	0	0
	1	1	1	1	1	1	1
	2	2	2	2	2	2	2
	3	**3**	**3**	**3**	**3**	**3**	**3**
Fly Wheel Teeth	**0**	**0**	**0**	**0**	**0**	**0**	**0**
	1	1	1	1	1	1	1
	2	2	2	2	2	2	2
Oscillating Axle	0	0	0	0	0	0	0
	1	**1**	**1**	**1**	**1**	**1**	**1**
Display Units	**0**	**0**	0	0	0	0	0
	1	1	**1**	**1**	**1**	**1**	**1**
Leveling Mode	0	0	0	0	0	0	0
	1	**1**	**1**	**1**	**1**	**1**	**1**
ClearSky	**0**	**0**	**0**	**0**	**0**	**0**	**0**
	1	1	1	1	1	1	1
Fuel Tank	**0**	**0**	**0**	**0**	**0**	**0**	**0**
	1	1	1	1	1	1	1
	X	X	X	X	X	X	X
Alert Beacon	**0**	**0**	**0**	**0**	0	**0**	**0**
	1	1	1	1	**1**	1	1

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Table 6-4. Machine Configuration Programming Settings - Version P7.33

1350SJP	ANSI USA	ANSI Export	CSA	CE	Australia	Japan	GB
Temperature Cutout	**0**	**0**	**0**	**0**	**0**	**0**	**0**
	X	1	X	1	X	X	1
Platform Level Over Cutout	**0**	**0**	**0**	**0**	**0**	**0**	**0**
	1	1	1	1	1	1	1
Cribbing	**0**	**0**	**0**	**0**	**0**	**0**	**0**
	1	1	1	X	X	1	1
Water In Fuel Sensor	**0**	**0**	**0**	**0**	**0**	**0**	0
	1	1	1	1	1	1	**1**
ALARM/HORN	X	X	X	X	X	X	X
	1	**1**	**1**	**1**	**1**	**1**	**1**

NOTE: ***BOLD BLUE*** *text indicates the default setting. Plain text indicates another available selection. SHADED CELLS indicate hidden menu or selection.*

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6.9 MACHINE PERSONALITY SETTINGS/FUNCTION SPEEDS

NOTE: *Personality settings can be adjusted within the adjustment range in order to achieve optimum machine performance.*

Table 6-5. Personality Ranges/Defaults

SUBMENU (DISPLAYED ON ANALYZER 1st LINE)	PARAMETER (DISPLAYED ON ANALYZER 2ND LINE)	DESCRIPTION	RANGE	DEFAULT VALUES		TIME RANGE (SEC) (SEE SECTION 6.10 FOR MACHINE ORIENTATION WHEN SETTING SPEEDS)	
				1200	1350	1200S	1350S
DRIVE:	ACCEL X.Xs	Displays/adjusts drive acceleration	0.1 to 5.0 sec	2.0	2.0		
	DECEL X.Xs	Displays/adjusts drive deceleration	0.1 to 3.0 sec	1.3	1.3		
	MIN forward XX%	Displays/adjusts minimum forward drive speed	0 to 35%	1	1		
	MAX forward XXX%	Displays/adjusts maximum forward drive speed	0 to 100%	100	100	44-48	44-48
	MIN reverse XX%	Displays/adjusts minimum reverse drive speed	0 to 35%	1	1		
	MAX reverse XXX%	Displays/adjusts maximum reverse drive speed	0 to 100%	100	100		
	ELEV. MAX XX%	Displays/adjusts maximum drive speed NOTE: used when elevation cutout switches are limiting maximum speed	0 to 50%	25	25	93-104	93-104
	CREEP MAX XX%	Displays/adjusts maximum drive speed NOTE: used when creep switch on pump pot is active	0 to 50%	35	35	79-87	79-87
STEER:	max SPEED XXX%	Displays/adjusts maximum steer speed.	0 to 100%	100	100		
MAIN LIFT:	ACCEL X.Xs	Displays/adjusts main lift acceleration	0.1 to 5.0 sec	1.0	1.0		
	DECEL X.Xs	Displays/adjusts main lift deceleration	0.1 to 3.0 sec	1.0	1.0		
	MIN Up XX%	Displays/adjusts minimum main lift up speed	0 to 60%	20	20		
	MAX UP XX%	Displays/adjusts maximum main lift up speed	0 to 100%	50	50	75-100	75-100
	MIN DOWN XX%	Displays/adjusts minimum main lift down speed	0 to 60%	10	10		
	MAX DOWN XXX%	Displays/adjusts maximum main lift down speed	0 to 100%	50	50	85-110	85-110
	CREEP UP XX%	Displays/adjusts maximum main lift up speed NOTE: used when creep switch on pump pot is active	0 to 65%	50	50		
	CREEP DOWN XX%	Displays/adjusts maximum main lift down speed NOTE: used when creep switch on pump pot is active	0 to 75%	45	45		

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Table 6-5. Personality Ranges/Defaults

SUBMENU (DISPLAYED ON ANALYZER 1st LINE)	PARAMETER (DISPLAYED ON ANALYZER 2ND LINE)	DESCRIPTION	RANGE	DEFAULT VALUES		TIME RANGE (SEC) (SEE SECTION 6.10 FOR MACHINE ORIENTATION WHEN SETTING SPEEDS)	
				1200	1350	1200S	1350S
SWING:	ACCEL X.Xs	Displays/adjusts swing acceleration	0.1 to 5.0 sec	2.0	2.0		
	DECEL X.Xs	Displays/adjusts swing deceleration	0.1 to 3.0 sec	1.5	1.5		
	MIN LEFT XX%	Displays/adjusts minimum swing left speed	0 to 50%	40	40		
	MAX LEFT XXX%	Displays/adjusts maximum swing left speed	0 to 100%	65	65	115-125	115-125
	MIN RIGHT XX%	Displays/adjusts minimum swing right speed	0 to 50%	40	40		
	MAX RIGHT XXX%	Displays/adjusts maximum swing right speed	0 to 100%	65	65	115-125	115-125
	CREEP LEFT XX%	Displays/adjusts maximum swing left speed NOTE: used when creep switch on pump pot is active	0 to 65%	50	50		
	CREEP RIGHT XX%	Displays/adjusts maximum swing right speed NOTE: used when creep switch on pump pot is active	0 to 65%	50	50		
MAIN TELESCOPE:	ACCEL X.Xs	Displays/adjusts main telescope acceleration	0.1 to 5.0 sec	1.5	1.5		
	DECEL X.Xs	Displays/adjusts main telescope deceleration	0.1 to 3.0 sec	1.0	1.0		
	MIN IN XX%	Displays/adjusts minimum main telescope in speed. Same as Creep speed	0 to 65%	15	15		
	MAX IN XXX%	Displays/adjusts maximum main telescope in speed	0 to 100%	65	65	58-68	65-75
	MIN OUT XX%	Displays/adjusts minimum main telescope out speed. Same as Creep speed	0 to 65%	15	15		
	MAX OUT XXX%	Displays/adjusts maximum main telescope out speed	0 to 100%	60	60	45-55	50-60
BASKET LEVEL:	ACCEL X.Xs	Displays/adjusts basket level acceleration	0.1 to 5.0 sec	1.5	1.5		
	DECEL X.Xs	Displays/adjusts basket level deceleration	0.1 to 3.0 sec	0.5	0.5		
	MIN UP XX%	Displays/adjusts minimum basket level up speed. Same as Creep speed	0 to 65%	40	40		
	MAX UP XXX%	Displays/adjusts maximum basket level up speed	0 to 100%	70	70		
	MIN DOWN XX%	Displays/adjusts minimum basket level down speed. Same as Creep speed	0 to 65%	40	40		
	MAX DOWN XXX%	Displays/adjusts maximum basket level down speed	0 to 100%	70	70		

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Table 6-5. Personality Ranges/Defaults

SUBMENU (DISPLAYED ON ANALYZER 1st LINE)	PARAMETER (DISPLAYED ON ANALYZER 2ND LINE)	DESCRIPTION	RANGE	DEFAULT VALUES		TIME RANGE (SEC) (SEE SECTION 6.10 FOR MACHINE ORIENTATION WHEN SETTING SPEEDS)	
				1200	1350	1200S	1350S
BASKET ROTATE:	ACCEL X.Xs	Displays/adjusts basket rotate acceleration	0.1 to 5.0 sec	1.0	1.0		
	DECEL X.Xs	Displays/adjusts basket rotate deceleration	0.1 to 3.0 sec	0.5	0.5		
	MIN LEFT XX%	Displays/adjusts minimum basket rotate left speed. Same as Creep speed	0 to 100%	60	60		
	MAX LEFT XXX%	Displays/adjusts maximum basket rotate left speed	0 to 100%	60	60	24-30 (180°)	24-30 (180°)
	MIN RIGHT XX%	Displays/adjusts minimum basket rotate right speed. Same as Creep speed	0 to 100%	60	60		
	MAX RIGHT XXX%	Displays/adjusts maximum basket rotate right speed	0 to 100%	60	60	24-30 (180°)	24-30 (180°)
JIB LIFT:	ACCEL X.Xs	Displays/adjusts jib lift acceleration	0.1 to 5.0 sec	1.5	1.5		
	DECEL X.Xs	Displays/adjusts jib lift deceleration	0.1 to 3.0 sec	1.0	1.0		
	MIN UP XX%	Displays/adjusts minimum jib up speed. Same as Creep speed	0 to 65%	40	40		
	MAX UP XXX%	Displays/adjusts maximum jib up speed	0 to 100%	65	65	30-36	30-36
	MIN DOWN XX%	Displays/adjusts minimum jib down speed. Same as Creep speed	0 to 65%	40	40		
	MAX DOWN XXX%	Displays/adjusts maximum jib down speed	0 to 100%	60	60	30-36	30-36
JIB SWING:	ACCEL X.Xs	Displays/adjusts jib swing acceleration	0.1 to 5.0 sec	1.5	1.5		
	DECEL X.Xs	Displays/adjusts jib swing deceleration	0.1 to 3.0 sec	0.5	0.5		
	MIN LEFT XX%	Displays/adjusts minimum jib left speed. Same as Creep speed	0 to 65%	40	40		
	MAX LEFT XXX%	Displays/adjusts maximum jib left speed	0 to 100%	70	70	60-68 (180°)	60-68 (180°)
	MIN RIGHT XX%	Displays/adjusts minimum jib right speed. Same as Creep speed	0 to 65%	40	40		
	MAX RIGHT XXX%	Displays/adjusts maximum jib right speed	0 to 100%	70	70	60-68 (180°)	60-68 (180°)

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Table 6-5. Personality Ranges/Defaults

SUBMENU (DISPLAYED ON ANALYZER 1st LINE)	PARAMETER (DISPLAYED ON ANALYZER 2ND LINE)	DESCRIPTION	RANGE	DEFAULT VALUES		TIME RANGE (SEC) (SEE SECTION 6.10 FOR MACHINE ORIENTATION WHEN SETTING SPEEDS)	
				1200	1350	1200S	1350S
GROUND MODE:	U. LIFT UP XXX%	Displays/adjusts fixed main lift up speed	0 to 100%	60	60		
	U. LIFT DN XXX%	Displays/adjusts main lift down speed	0 to 100%	60	60		
	SWING XXX%	Displays/adjusts fixed swing speed	0 to 100%	60	60		
	BASKET LVL XXX%	Displays/adjusts fixed basket level speed	0 to 100%	75	75		
	BASKET ROT XXX%	Displays/adjusts fixed basket rotate speed	0 to 100%	75	75		
	MAIN TELE XXX%	Displays/adjusts fixed main telescope speed	0 to 100%	60	60		
	TOWER TELE XXX%	Displays/adjusts fixed tower telescope speed Not displayed if TOWER TELE=NO	0 to 100%	100	100		
	T. LIFT UP XXX%	Displays/adjusts fixed tower lift up speed Not displayed if TOWER LIFT=NO	0 to 100%	100	100		
	T. LIFT DN XXX%	Displays/adjusts fixed tower lift down speed Not displayed if TOWER LIFT=NO	0 to 100%	100	100		
	JIB (U/D) XXX%	Displays/adjusts jib lift speed Not displayed if JIB = 0	0 to 100%	60	60		
	JIB (L/R) XXX%	Displays/adjusts jib swing speed Displayed if JIB = 2	0 to 100%	70	70		
GEN SET/WELDER:	ENGINE XXXX RPM	Control generator/welder RPM. Not displayed if GEN SET/WELDER = 0	1200-2800	1800	1800		

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6.10 MACHINE ORIENTATION WHEN SETTING FUNCTION SPEEDS

Lift Up: From platform control, lowest elevation up to maximum elevation, boom retracted.

Lift Down: From platform control, maximum elevation down to minimum elevation, boom retracted.

Swing Right (Max): 360 Degrees, from platform control, boom approximately 45° elevation, boom retracted.

Swing Left (Max): 360 Degrees, from platform control, boom approximately 45° elevation, boom retracted.

Telescope Out: From platform control, boom horizontal, 500 lb (230 kg) capacity selected.

Telescope In: From platform control, boom horizontal, 500 lb (230 kg) capacity selected.

Drive Forward (Max): Test should be done on a smooth level surface. High Speed - Low Torque setting, drive 200 ft. (61 m) front wheels to front wheels. Timed after machine has obtained maximum speed.

Drive Reverse (Max): Test should be done on a smooth level surface. High Speed - Low Torque setting, drive 200 ft. (61 m) front wheels to front wheels. Timed after machine has obtained maximum speed.

Drive Forward (Creep Max): Test should be done on a smooth level surface. High Torque - Low Speed setting, platform speed knob at full creep.

Drive Reverse (Creep Max): Test should be done on a smooth level surface. High Torque - Low Speed setting, platform speed knob at full creep.

Drive Forward (Elevated Max - Boom Beyond Transport): Test should be done on a smooth level surface. High speed - Low Torque setting, platform speed knob out of creep, Lift boom above transport, drive forward 50 ft. (15.2 m).

Drive Reverse (Elevated Max - Boom Beyond Transport): Test should be done on a smooth level surface. High speed - Low Torque setting, platform speed knob out of creep, Lift boom above transport, drive forward 50 ft. (15.2 m).

Test Notes

1. Personality settings can be adjusted anywhere within the adjustment range in order to achieve optimum machine performance.
2. Stop watch should be started when the function is activated.
3. Unless noted, all speed tests are run from the platform. These speeds do not reflect the ground control operation.
4. The platform speed knob control must be at full speed (turned clockwise completely).
5. Function speeds may vary due to cold, thick hydraulic oil. Test should be run with the oil temperature above 100° F (38° C).

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6.11 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.

2. Plug the analyzer into the connector at the base of the platform control box.

3. Before proceeding, ensure that the switches on the platform console are in the following positions:
   a. Drive speed switch is in the Middle position. (Turtle Icon)
   b. 4WS switch is in the Middle position. (2WS mode)
   c. Capacity select switch in the 1000 lb (450 kg) mode.
   d. Function speed potentiometer out of creep mode switch.
   e. Generator (if equipped) switched to the off position.
   f. Head and Tail lights (if equipped) switched to the off position.

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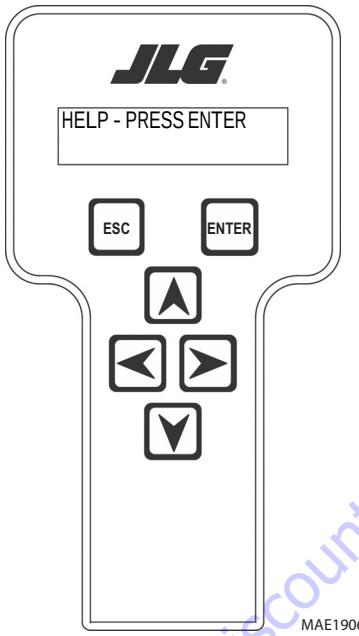
4. Pull out the Emergency Stop switch and Start the engine.

5. The analyzer screen should read:



6. 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.

7. Follow the flow path in Figure , System Test Flow Chart - Platform Tests 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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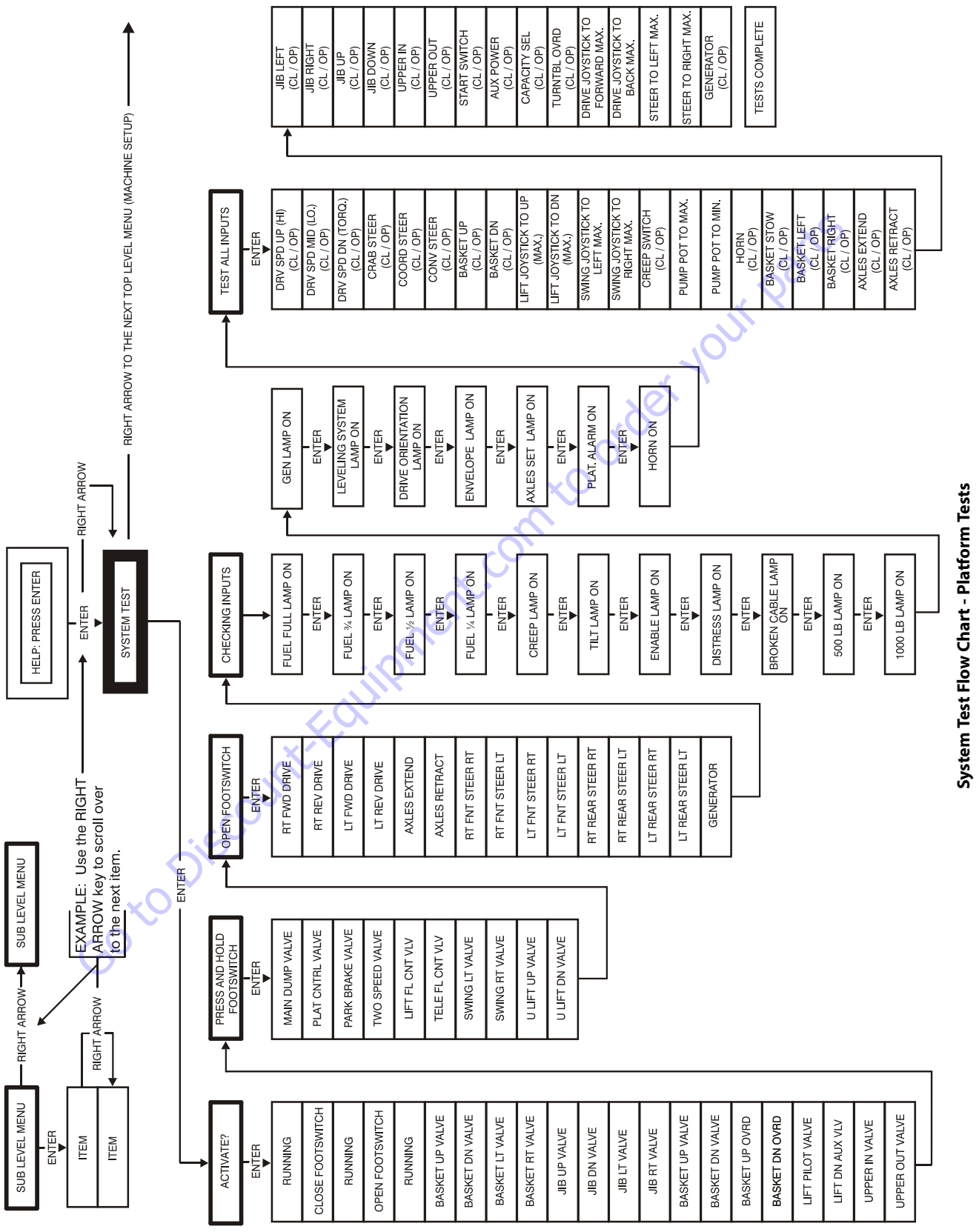

System Test Flow Chart - Platform Tests

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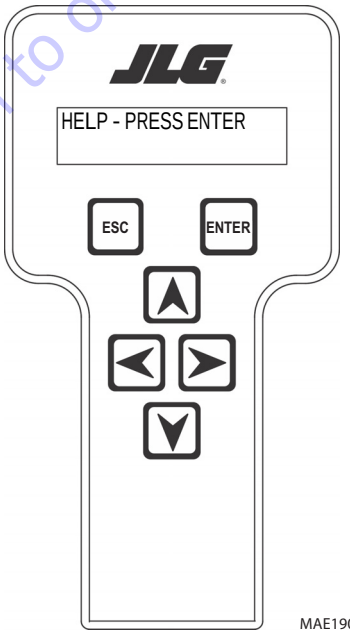
Test from the Ground Station

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 6-14., System Test Flow Chart - Ground Station Tests 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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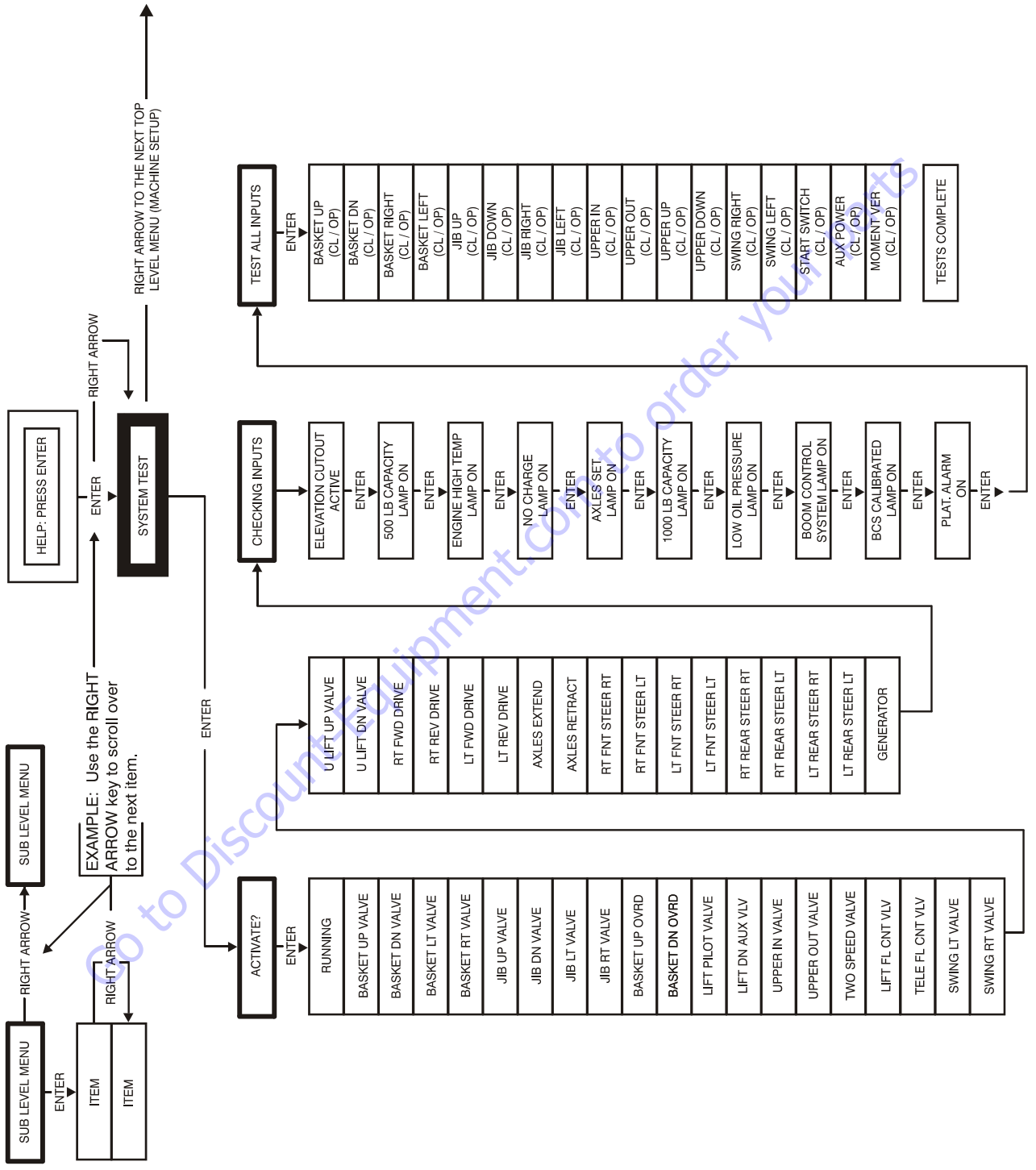

Figure 6-14. System Test Flow Chart - Ground Station Tests

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Table 6-6. 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.

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Table 6-6. System Test Messages

Message Displayed on Analyzer	Message Displayed on Analyzer	Description
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.
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 cutouts 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.

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Table 6-6. System Test Messages

Message Displayed on Analyzer	Message Displayed on Analyzer	Description
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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Table 6-7. Machine Diagnostics Parameters

Diagnostics Submenu (Displayed on Analyzer 1st Line)	Parameter (Displayed on Analyzer 2nd Line)	Parameter Value (Displayed on Analyzer 2nd Line)	Description
DRIVE:			
	DRIVE	FOR/REV XXX%	Displays drive joystick direction & demand
	STEER	RIGHT/LEFT XXX%	Displays steer switch direction & demand
	4WS	NORMAL/COOR/CRAB	Displays status of four wheel steer input (Displayed if 4WS = 1)
	BRAKES	LOCKED/RELEASED	Displays brake control system status
	CREEP	ACTIVE/NOT ACTIVE	Displays pump pot creep switch status
	CRP MODE	ACTIVE/NOT ACT	Displays creep mode status
	QPRX1	ACTIVE/NOT ACTIVE	Displays status of Q-Prox sensor in drive joystick (Displayed if JOYSTICK TYPE = 1)
	QPRX2	ACTIVE/NOT ACTIVE	Displays status of Q-Prox sensor in drive joystick (Displayed if JOYSTICK TYPE = 1)
	TWO SPEED	OP/CL	Displays status of two speed switch input if selected model has two speed.
	2 speed mode	ON/OFF	Displays status of two speed valve if selected model has two speed
	high engine	OP/CL	Displays status of high engine switch
	LT F ANG	XX.X	Displays status of left front steer angle (Displayed if MODEL NUMBER = 7 or 8)
	RT F ANG	XX.X	Displays status of right front steer angle (Displayed if MODEL NUMBER = 7 or 8)
	LT R ANG	XX.X	Displays status of left rear steer angle (Displayed if MODEL NUMBER = 7 or 8)
	RT R ANG	XX.X	Displays status of right rear steer angle (Displayed if MODEL NUMBER = 7 or 8)
	DOS LIM sw	OP/CL	Displays status of Drive Orientation System limit switch. (Displayed if MODEL NUMBER = 7 or 8)
	DOS O/R sw	OP/CL	Displays status of Drive Orientation Limit System override switch. (Displayed if MODEL NUMBER = 7 or 8)

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Table 6-7. Machine Diagnostics Parameters

Diagnostics Submenu (Displayed on Analyzer 1st Line)	Parameter (Displayed on Analyzer 2nd Line)	Parameter Value (Displayed on Analyzer 2nd Line)	Description
BOOM:			
	U LIFT	UP/DOWN XXX%	Displays main lift joystick direction & demand
	SWING	RIGHT/LEFT XXX%	Displays swing joystick direction & demand
	QPRX1	ACTIVE/NOT ACTIVE	Displays status of Q-Prox sensor in lift/swing joystick (Displayed if JOYSTICK TYPE = 1)
	QPRX2	ACTIVE/NOT ACTIVE	Displays status of Q-Prox sensor in lift/swing joystick (Displayed if JOYSTICK TYPE = 1)
	LEVEL	UP/DOWN XXX%	Displays basket level switch direction & demand. NOTE: demand is controlled by the pump pot
	ROT.	RIGHT/LEFT XXX%	Displays basket rotate switch direction & demand. NOTE: demand is controlled by the pump pot
	U TELE	IN/OUT XXX%	Displays main telescope switch direction & demand. NOTE: demand is controlled by the pump pot
	T TELE	IN/OUT XXX%	Displays tower telescope switch direction & demand. NOTE: demand is controlled by the pump pot Not displayed if TOWER TELE=NO (machine digit = 0)
	T LIFT	UP/DOWN XXX%	Displays tower lift switch direction & demand. NOTE: demand is controlled by the pump pot Not displayed if TOWER LIFT=NO (machine digit = 0)
	JIB	UP/DOWN XXX%	Displays jib lift switch direction & demand. NOTE: demand is controlled by the pump pot Not displayed if JIB = NO (machine digit = 0)
	JIB	RIGHT/LEFT XXX%	Displays jib swing switch direction & demand. NOTE: demand is controlled by the pump pot Displayed if JIB = SIDESWING (machine digit = 2)
	JIB INLINE	OP/CL	Displays status of jib inline limit switch. Displayed on models equipped with the Jib Stow System
	JIB LIMIT	OP/CL	Displays status of jib right limit switch. Displayed on models equipped with the Jib Stow System
	JIB LIM OVRD	OP/CL	Displays status of jib limit override switch. Displayed on models equipped with the Jib Stow System
	PCV	ON/OFF	Displays status of Platform Control Valve. Displayed on models equipped with Electronic Platform Leveling.
	PUMP POT	XXX%	Displays pump pot demand. Not displayed if MODEL = 601 (machine digit = 4)
	CREEP	ACTIVE/NOT ACTIVE	Displays pump pot creep switch status
	CRP MODE	ACTIVE/NOT ACT	Displays creep mode status

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Table 6-7. Machine Diagnostics Parameters

Diagnostics Submenu (Displayed on Analyzer 1st Line)	Parameter (Displayed on Analyzer 2nd Line)	Parameter Value (Displayed on Analyzer 2nd Line)	Description
ENGINE:			
	START	ACTIVE/NOT ACTIVE	Displays status of the engine start circuit
	AIR FILTER	OP/CL	Displays measured status of air filter by-pass switch. (Not displayed if MODEL NUMBER = 7 or 8)
	BATTERY	XX.XV	Displays measured battery voltage
	COOLANT	XXXC	Displays measured coolant temperature
	OIL PRS	LOW / OK or XXPSI	Displays measured oil pressure
	FUEL SELECT	GAS/LP	Displays status of fuel select switch. (Displayed if MODEL NUMBER = 2)
	AMB. TEMP	XXXC	Displays measured ambient air temperature
	FUEL LEVEL	¼ / ½ / ¾ / FULL or LOW / OK	Displays measured fuel level
	XXXx rpm		Engine RPM

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Table 6-7. Machine Diagnostics Parameters

Diagnostics Submenu (Displayed on Analyzer 1st Line)	Parameter (Displayed on Analyzer 2nd Line)	Parameter Value (Displayed on Analyzer 2nd Line)	Description
SYSTEM:			
	GM BATTERY	XX.XV	Ground module battery voltage
	PM BATTERY	XX.XV	Platform module battery voltage
	AMB. TEMP	XXXC	Ambient temperature
	FSW1	OP/CL	Displays footswitch status. NOTE: FSW1 is wired to the ground module.
	FSW2	OP/CL	Displays footswitch status. NOTE: FSW2 is wired to the platform module.
	ABOVE ELEV.	OP/CL/YES/NO	Displays above elevation cutout switch status or above angle status
	LEN SW 1	OP/CL	Displays status of boom length retracted limit switch (Displayed if MODEL NUMBER = 7 or 8)
	LEN SW 2	OP/CL	Displays status of boom length retracted limit switch (Displayed if MODEL NUMBER = 7 or 8)
	RETRACTED	YES/NO	Displays status of boom length retracted (Displayed if MODEL NUMBER = 7 or 8)
	TRANSPORT	YES/NO	Displays status of transport position
	U LIFT CUTOUT	OP/CL	Displays status of boom length retracted limit switch (Displayed if MODEL NUMBER = 6)
	T LIFT PROX	OP/CL	Displays status of tower lift proximity switch (Displayed if TOWER PROX SWITCHES = 1)
	T TELE PROX	OP/CL	Displays status of tower telescope proximity switch (Displayed if TOWER PROX SWITCHES = 1)
	BR CABLE CUT.	OP/CL	Displays status of broken cable switch (Displayed if BROKEN CABLE SWITCH = 1)
	CREEP	ACTIVE/NOT ACTIVE	Displays pump pot creep switch status. Not displayed if MODEL = 601 (machine digit = 4)
	CRP MODE	ACTIVE/NOT ACT	Displays creep mode status
	SUPER CREEP	ON/OFF	Displays super creep mode status (Displayed if MODEL NUMBER = 7 or 8)
	TILT	XX.X DEG	Displays measured vehicle tilt. (Displayed if internal tilt sensor is configured)
	LO TILTED -	NO/YES	Displays status of lo tilt input. (Displayed if external tilt sensor is configured)

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Table 6-7. Machine Diagnostics Parameters

Diagnostics Submenu (Displayed on Analyzer 1st Line)	Parameter (Displayed on Analyzer 2nd Line)	Parameter Value (Displayed on Analyzer 2nd Line)	Description
	HI TILTED -	NO/YES	Displays status of hi tilt input. (Displayed if external tilt sensor is configured)
	AUX POWER	OP/CL	Displays the status of the auxiliary power switch input
	HORN	OP/CL	Displays the status of the horn input
	R FILTER	OP/CL	Displays the status of the return hydraulic filter by-pass switch. Displayed ONLY if MODEL = 600 (Configuration digit = 3)
	C FILTER	OP/CL	Displays measured status of charge pump filter bypass switch. Displayed ONLY if MODEL = 600 (Configuration digit = 3)
	JIB BLOCK	OP/CL	Displays jib block limit switch status. Not displayed if associated configuration digit = 0
	BASKET STOWD	YES/NO	Displays status of basket stowed mode. (Displayed if MODEL NUMBER = 7 or 8)
	SOFT LIMIT	OP/CL	Displays status of soft touch limit switch. Not displayed if associated configuration digit = 0
	SOFT O/R	OP/CL	Displays status of soft touch override switch. Not displayed if associated configuration digit = 0
	GEN SET/WELDER	OP/CL	Displays generator/welder switch input status. Not displayed if associated configuration digit = 0
	LIGHTS	OP/CL	Displays head and tail light switch input status. Not displayed if associated configuration digit = 0
	BSK TILT1	XX.X	Displays indicated platform tilt angle. Displayed on models equipped with Electronic Platform Leveling.
	BSK TILT2	XX.X	Displays indicated platform tilt angle. Displayed on models equipped with Electronic Platform Leveling.
	AXLE RET SW	OP/CL	Displays status of axle extension user switches. (Displayed if MODEL NUMBER = 7 or 8)
	AXLE EXT SW	OP/CL	Displays status of axle retraction user switches. (Displayed if MODEL NUMBER = 7 or 8)
	AXLE LIM SW	RET/EXT	Displays status of axle extension limit switches. (Displayed if MODEL NUMBER = 7 or 8)
	DOS LIM SW	OP/CL	Displays status of Drive Orientation System Limit Switch. (Displayed if MODEL NUMBER = 7 or 8)
	DOS O/R SW	OP/CL	Displays status of Drive Orientation System Override switch. (Displayed if MODEL NUMBER = 7 or 8)
	CAPACITY SW	500/1000	Displays status of capacity selection switch. (Displayed if MODEL NUMBER = 7 or 8)

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Table 6-7. Machine Diagnostics Parameters

Diagnostics Submenu (Displayed on Analyzer 1st Line)	Parameter (Displayed on Analyzer 2nd Line)	Parameter Value (Displayed on Analyzer 2nd Line)	Description
	OSC AXLE P SW	OP/CL	Displays status of oscillating axle pressure switch. (Displayed if OSCILLATING AXLE = 1)
	SKY WELDER	YES/NO	Displays the status of Sky Welder selected during boom sensor calibration. (Displayed if MODEL NUMBER = 7 or 8)
	SKY CUTTER	YES/NO	Displays the status of Sky Cutter selected during boom sensor calibration. (Displayed if MODEL NUMBER = 7 or 8)
	SKY GLAZIER	YES/NO	Displays the status of Sky Glazier selected during boom sensor calibration. (Displayed if MODEL NUMBER = 7 or 8)
	SKY BRIGHT	YES/NO	Displays the status of Sky Bright selected during boom sensor calibration. (Displayed if MODEL NUMBER = 7 or 8)
	PIPE RACKS	YES/NO	Displays the status of Pipe Racks selected during boom sensor calibration. (Displayed if MODEL NUMBER = 7 or 8)
	CAMERA MOUNT	YES/NO	Displays the status of Camera Mount selected during boom sensor calibration. (Displayed if MODEL NUMBER = 7 or 8)
LOAD:			Not displayed if LOAD=NO, LENGTH=NO, and ANGLE=NO (machine digits = 0)
	LENGTH	OP/CL	Displays measured length, NOTE: Not displayed if MODEL NUMBER = 7 or 8
	ANGLE	OP/CL	Displays measured angle, NOTE: Not displayed if MODEL NUMBER = 7 or 8
	WEIGHT	XXXX%	Percentage of maximum calibrated weight on the platform. An uncalibrated load cell will read 1000% Displayed if LOAD is not 0 and LOAD TYPE is 0.
		OK/OVERLOADED	Displayed if LOAD is not 0 and LOAD TYPE is 1.

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Table 6-7. Machine Diagnostics Parameters

Diagnostics Submenu (Displayed on Analyzer 1st Line)	Parameter (Displayed on Analyzer 2nd Line)	Parameter Value (Displayed on Analyzer 2nd Line)	Description
MOMENT:			Displayed if MODEL NUMBER = 7 or 8
	(LB-IN) ACTUAL	XXXXXXXX	Displays current moment value
	(LB-IN) OVER	XXXXXXXX	Displays current over moment setpoint.
	(LB-IN) UNDER	XXXXXXXX	Displays current under moment setpoint.
	CAL PT UNDER	XXXXXXXX	Displays the under moment value recorded during boom sensor calibration.
	CAL PT WIT YEL	XXXXXXXX	Displays the yellow witness mark moment value recorded during boom sensor calibration.
	CAL PT WIT GRN	XXXXXXXX	Displays the green witness mark moment value recorded during boom sensor calibration.
	CYL PIN RATIO	X.XXX	Displays the current cylinder moment pin ratio of X and Y forces.
	PIN E FLAGS	0xXXXX	Displays the current error flag status of the cylinder moment pin.
	SKY WELDER	YES/NO	Displays the status of Sky Welder selected during boom sensor calibration. (Displayed if MODEL NUMBER = 7 or 8)
	SKY CUTTER	YES/NO	Displays the status of Sky Cutter selected during boom sensor calibration. (Displayed if MODEL NUMBER = 7 or 8)
	SKY GLAZIER	YES/NO	Displays the status of Sky Glazier selected during boom sensor calibration. (Displayed if MODEL NUMBER = 7 or 8)
	SKY BRIGHT	YES/NO	Displays the status of Sky Bright selected during boom sensor calibration. (Displayed if MODEL NUMBER = 7 or 8)
	PIPE RACKS	YES/NO	Displays the status of Pipe Racks selected during boom sensor calibration. (Displayed if MODEL NUMBER = 7 or 8)
	CAMERA MOUNT	YES/NO	Displays the status of Camera Mount selected during boom sensor calibration. (Displayed if MODEL NUMBER = 7 or 8)

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Table 6-7. Machine Diagnostics Parameters

Diagnostics Submenu (Displayed on Analyzer 1st Line)	Parameter (Displayed on Analyzer 2nd Line)	Parameter Value (Displayed on Analyzer 2nd Line)	Description
ENVELOPE:			Displayed if MODEL NUMBER = 7 or 8
	LENGTH	XXXX.X	Displays the current indicated boom length in inches.
	ANGLE 1	XX.X	Displays the current indicated boom angle 1 in degrees.
	ANGLE 2	XX.X	Displays the current indicated boom angle 2 in degrees.
	A/D LNGTH	XXXXX	Displays the current indicated boom length in A/D counts.
	A/D ANG1	XXXXX	Displays the current indicated boom angle 1 in A/D counts or raw angle if calibrated.
	A/D ANG2	XXXXX	Displays the current indicated boom angle 2 in A/D counts or raw angel if calibrated.
CAN STATISTICS:			CAN Statistics as detected by the Ground Module
	RX/SEC	XXX	Displays the number of received messages per second
	TX/SEC	XXX	Displays the number of transmitted messages per second
	BUS OFF	XX	Displays the number of bus off occurrences
	PASSIVE	XX	Displays the number of bus passive occurrences

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Table 6-7. Machine Diagnostics Parameters

Diagnostics Submenu (Displayed on Analyzer 1st Line)	Parameter (Displayed on Analyzer 2nd Line)	Parameter Value (Displayed on Analyzer 2nd Line)	Description
CALIBRATION DATA			
	BASKET UP	XXX	Displays the basket up calibration point
	BASKET DOWN	XXX	Displays the basket down calibration point
	L FWD DRIVE	XXX	Displays the left forward drive calibration point
	R FWD DRIVE	XXX	Displays the right forward drive calibration point
	L REV DRIVE	XXX	Displays the left reverse drive calibration point
	R REV DRIVE	XXX	Displays the right reverse drive calibration point
	F LT STEER	XXX	Displays the forward left steer calibration point
	F RT STEER	XXX	Displays the forward right steer calibration point
	R LT STEER	XXX	Displays the reverse left steer calibration point
	R RT STEER	XXX	Displays the reverse right steer calibration point
	U LIFT UP	XXX	Displays the main lift up calibration point
	U LIFT DOWN	XXX	Displays the main lift down calibration point
	U TELE IN	XXX	Displays the main telescope in calibration point
	U TELE OUT	XXX	Displays the main telescope out calibration point
	BM ANG 1 LO	XXX	Displays the boom angle 1 low calibration point
	BM ANG 1 HI	XXX	Displays the boom angle 1 high calibration point
	BM ANG 2 LO	XXX	Displays the boom angle 2 low calibration point
	BM ANG 2 HI	XXX	Displays the boom angle 2 high calibration point
	LEN RETRACT	XXX	Displays the length sensor retracted calibration point
	LEN EXTEND	XXXXX	Displays the length sensor extended calibration point
	LEN WIT	XXXXX	Displays the witness mark calibration point
	LEN SWITCH	XXXX	Displays the length switch calibration point

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Table 6-7. Machine Diagnostics Parameters

Diagnostics Submenu (Displayed on Analyzer 1st Line)	Parameter (Displayed on Analyzer 2nd Line)	Parameter Value (Displayed on Analyzer 2nd Line)	Description
DATALOG:			
	ON	XXXXhXXm	Displays total controller on (EMS) time
	ENGINE	XXXXhXXm	Display engine run time
	DRIVE	XXXXhXXm	Displays total controller drive operation time
	LIFT	XXXXhXXm	Displays total controller lift operation time
	SWING	XXXXhXXm	Displays total controller swing operation time
	TELE	XXXXhXXm	Displays total controller telescope operation time
	MAX TEMP	XXC	Displays maximum measured ambient temp.
	MIN TEMP	XXC	Displays minimum measured ambient temp.
	MAX VOLTS	XX.XV	Displays maximum measured battery voltage
	RENTAL	XXXXhXXm	Displays total controller operation time. NOTE: can be reset
	ERASE RENTAL?		Not available at Access Level 2. ENTER resets rental data log time to zero.
VERSIONS:			
	GM SW	PX.X	Displays ground module software version
	GM HW REV	XXXX	Displays ground module hardware revision
	GM SN	XXXXXX	Displays ground module serial number
	PM SW	PX.X	Displays platform module software version
	PM HW REV	XXXX	Displays platform module hardware revision
	PM SN	XXXXXX	Displays platform module serial number
	CM SW	PX.X	Displays chassis module software version
	BM SW	PX.X	Displays BLAM module software version
	CPIN SW		Displayed if cylinder moment load pin transmits software version.
	CPIN SN		Displayed if cylinder moment load pin transmits serial number.
	ANALYZER	VX.XXXX	Displays Analyzer software version

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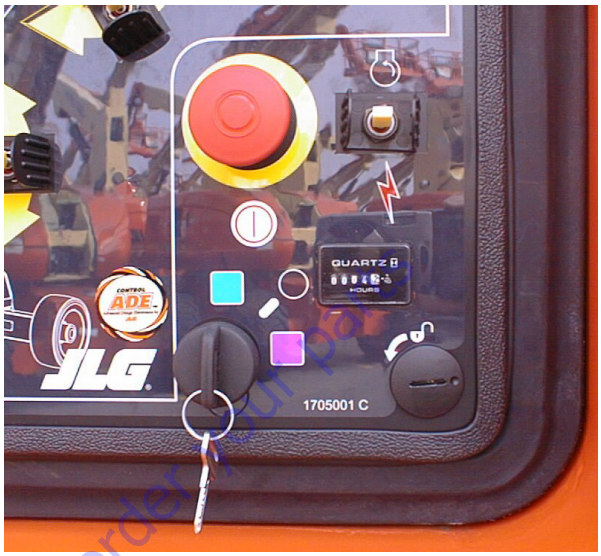
6.12 CALIBRATING STEER

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.

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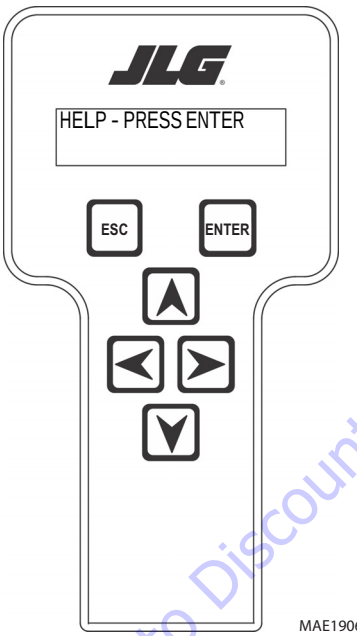
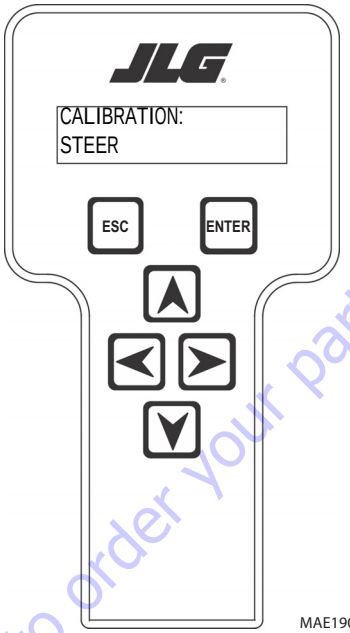
3. Pull out the Emergency Stop switch and Start the engine.

4. The analyzer screen should read:



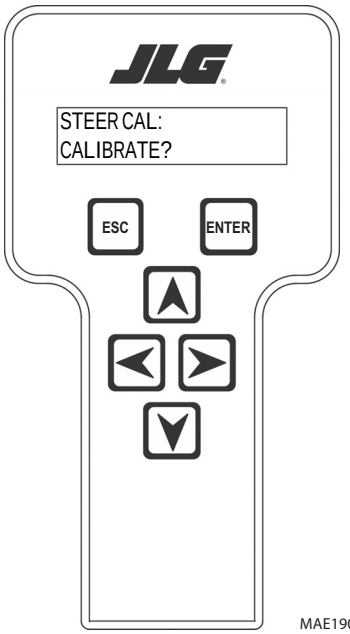
MAE19060

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:



MAE19060

9. Hit Enter. The screen will read:



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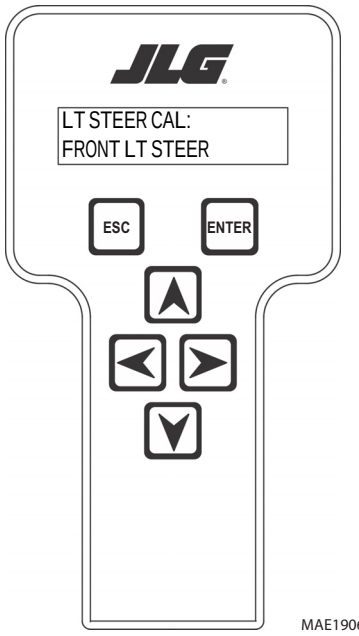
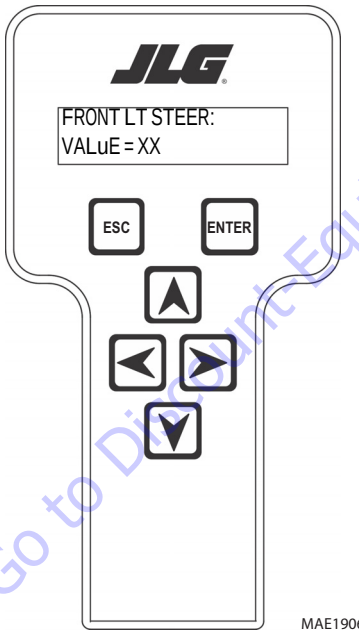
10. Hit Enter. The screen will read:

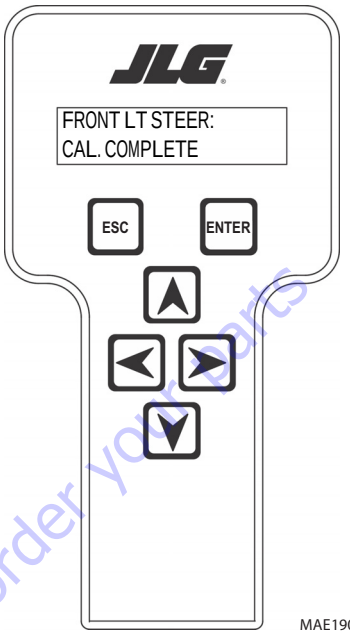


11. Hit Enter again. The screen will read:



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.

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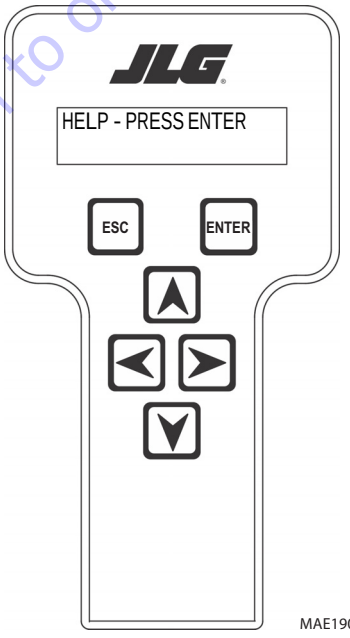
6.13 CALIBRATING DRIVE

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.

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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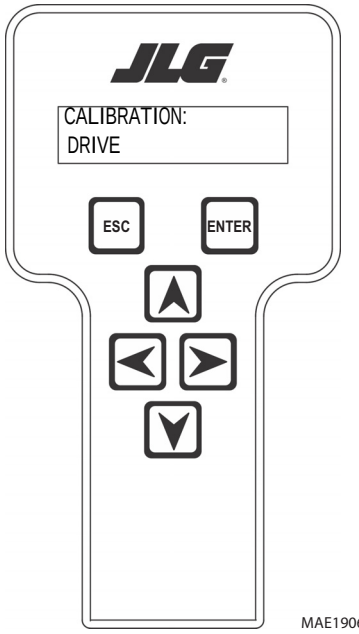
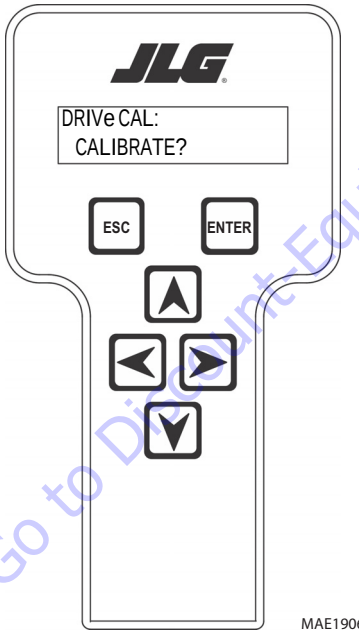
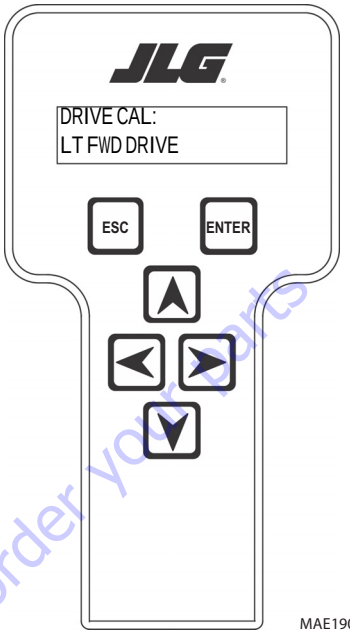
8. Use the arrow keys to reach DRIVE.



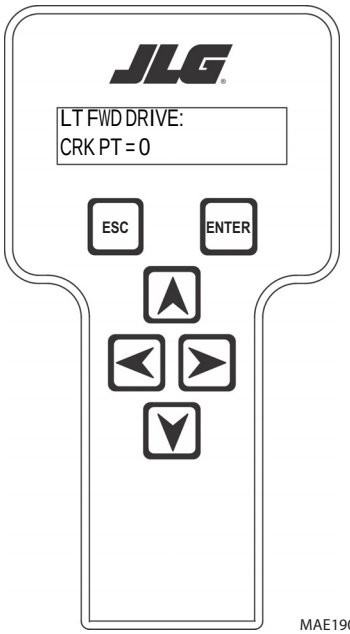
9. Hit Enter. The screen will read:



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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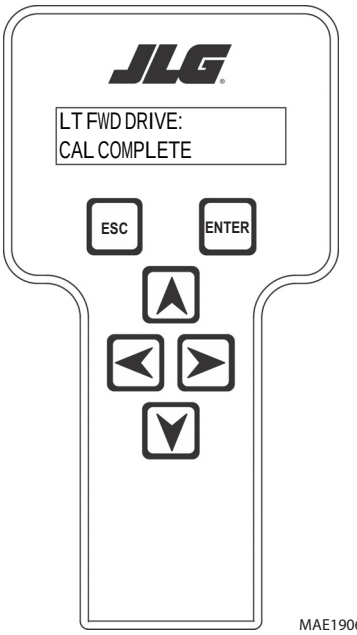
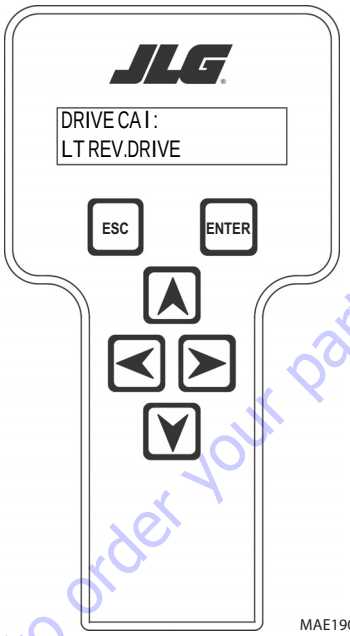
13. Hit Enter. The number displayed will be the value that the crack point is set to. The screen will show:



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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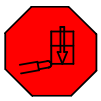
6.14 LSS SYSTEM

The JLG-designed Load Sensing System (LSS) measures platform load via a sensor mounted in the platform support structure.

If the actual platform load exceeds the selected Rated Load, the following will occur:

1. The Overload Visual Warning Indicator will flash at the selected control position (platform or ground).



2. The Platform and Ground Alarms will sound 5 seconds On, and 2 seconds Off.
3. All normal movement will be prevented from the platform control position (optional - ground control functions may be prevented).
4. Further movement is permitted by:
   - **a.** Removing the excess platform load until actual platform load is less than Rated Load.
   - **b.** Operation of the overriding emergency system (Auxiliary Power Unit).
   - **c.** By an authorized person at the ground control position (optional - ground control functions may be prevented).
5. The Load Sensing System MUST be calibrated when one or more of the following conditions occur:
   - a. LSS Sensor removal or replacement
   - b. Addition or removal of certain platform mounted accessories. (Refer to Calibration)
   - c. Platform is removed, replaced, repaired or shows evidence of impact.

NOTICE

THE LOAD SENSING SYSTEM REQUIRES PERIODIC FUNCTION VERIFICATION NOT TO EXCEED 6 MONTHS FROM PREVIOUS VERIFICATION. REFER TO TESTING & EVALUATION.

All calibration procedures are menu driven through the use of a JLG Analyzer.

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Diagnostic Menu

The Diagnostic Menu is another troubleshooting tool for the Load Sensing System. Sensor and status information is presented in real-time for the technician. Several sub-menus exist to organize the data.

To access the Diagnostic Menu, use the LEFT and RIGHT Arrow keys to select DIAGNOSTICS from the Top Level Menu. Press the ENTER key to view the menu.

Press the LEFT and RIGHT Arrow keys to view the displays and select the various sub-menus. To access a sub-menu, press the ENTER key. Once in a sub-menu, press the LEFT and RIGHT Arrow keys to view the various displays (just like a Top Level menu). To exit a sub-menu, press the ESC key.

Table 6-8, Diagnostic Menu Descriptions details the structure of the Diagnostic Menu, and describes the meaning of each piece of information presented.

Table 6-8. Diagnostic Menu Descriptions

Diagnostics Menu (Displayed on Analyzer 1st Line)	Parameter (Displayed on Analyzer 2nd Line)	Parameter Value (Displayed on Analyzer 2nd Line)	Description
PLATFORM LOAD	STATE:	OK / OVERLOAD	LSS Status.
PLATFORM LOAD	ACTUAL:	XXX.X KG	Calibrated weight of the platform. ??? if Platform Load is Unhealthy**.
PLATFORM LOAD (service*)	GROSS:	XXX.X KG	Gross weight of the platform. ??? if both Cells are Unhealthy**.
PLATFORM LOAD (service*)	OFFSET 1:	XXX.X KG	Stored offset weight of Cell 1. ??? if LSS is not calibrated.
PLATFORM LOAD (service*)	OFFSET 2:	XXX.X KG	Stored offset weight of Cell 1. ??? if LSS is not calibrated.
PLATFORM LOAD (service*)	ACCESSORY	XXX.X KG	Stored accessory weight. ??? if LSS is not calibrated.
PLATFORM LOAD (service*)	UNRESTRICT	XXX.X KG	UGM will set Unrestricted Rated Load as defined by Machine Configuration.
PLATFORM LOAD (service*)	RESTRICT	XXX.X KG	UGM will set Restricted Rated Load as defined by Machine Configuration.
PLATFORM LOAD (service*)	RAW 1:	XXX.X KG	Gross value from Cell 1. ??? if Unhealthy**.
PLATFORM LOAD (service*)	RAW 2:	XXX.X KG	Gross value from Cell 2. ??? if Unhealthy**.
* Indicates only visible in service view mode ** Typically indicates a DTC is active			

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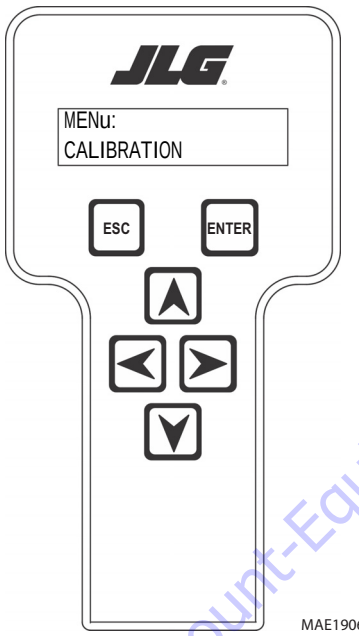
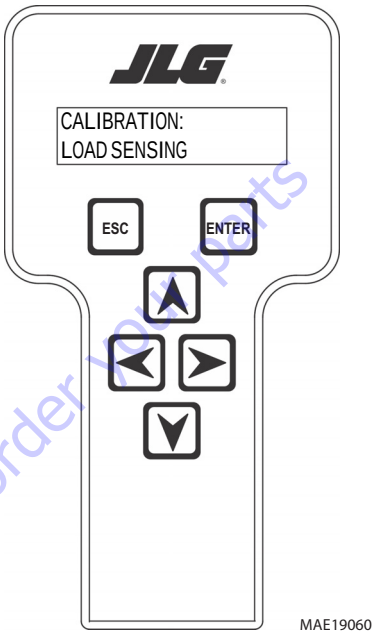
Calibration Procedure

1. Remove everything from the platform, except permanently fixed JLG Accessories, to allow the Load Sensing System to record its' weight during calibration. This includes all tools, debris, and customer-installed devices.
2. Plug the JLG Analyzer into the Machine at the Ground Station and enter Service Access Password 33271.
3. The platform should be approximately level for calibration. Level the platform from ground control (if necessary) to within +/- 5°.
4. To access the Calibration Menu, use the LEFT and RIGHT Arrow keys to select CALIBRATION from the Top Level Menu. The screen will read:

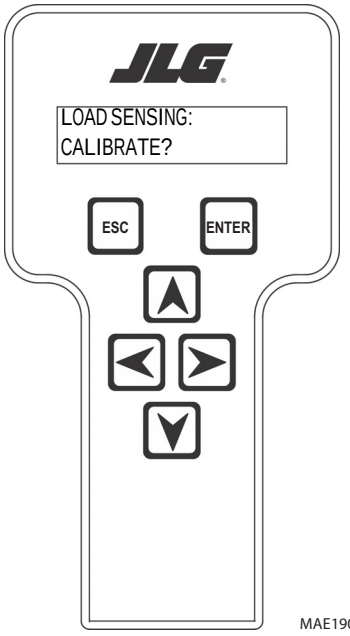


NOTE: *The Calibration Menu is not available in OPERATOR ACCESS.*

5. Press the ENTER key (ENTER) to view the menu. Upon entry to the Calibration Menu, the JLG Control System will link to the Analyzer and the screen will read:



6. Press Enter (ENTER). The Screen will read:



NOTE: *Calibration will auto fail if LSS DTC's are active (443, 444, 4479, 4480, 663, 821, 822, 823, 824, 8218, 8222 -> 8238, 991, 992, 993, 994 or 99285).*

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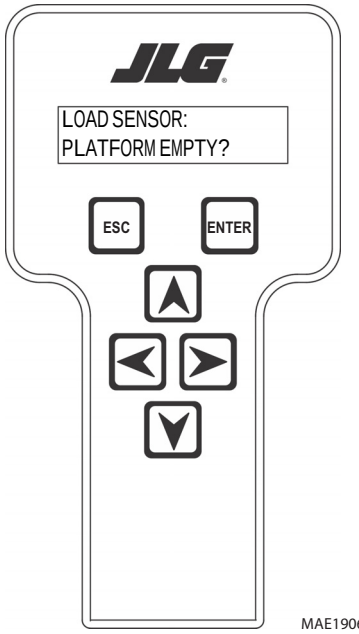
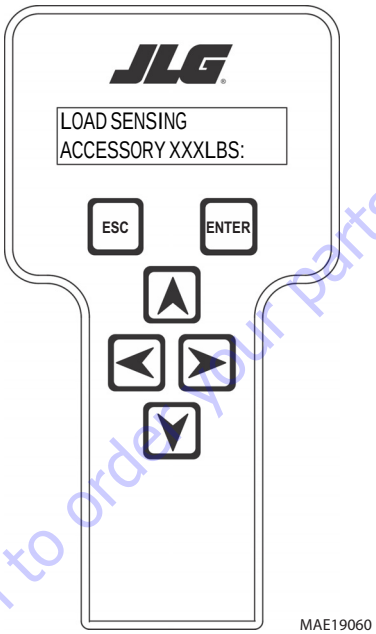
Pressing the ESC key [ESC] after starting calibration and before calibration is complete will display the CAL FAILED message. This will not disturb the prior calibration information.

7. Press ENTER [ENTER]. The analyzer screen will read:



8. If the platform is empty, press ENTER [ENTER]. The screen will read:



NOTE: *Accessory weight will reset to 0 lbs. each time the machine is re-calibrated and will need to be re-entered.*

NOTE: *The Accessory weight will be temporarily stored in the Control System until calibration has been completed successfully.*

Refer to Table 6-9, Accessory Weights. Use the up and down analyzer keys to enter the accessory weight(s) (in

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lbs). When all the accessory weights are entered, press ENTER (ENTER). The screen will read:

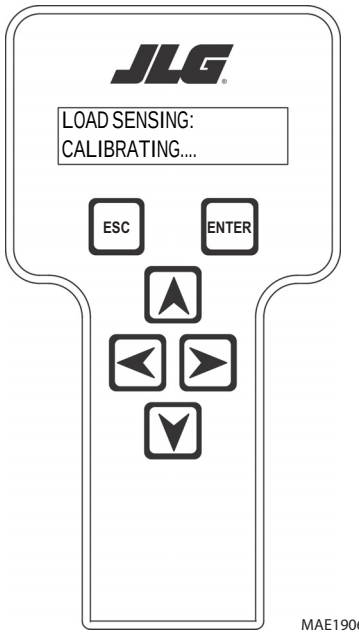


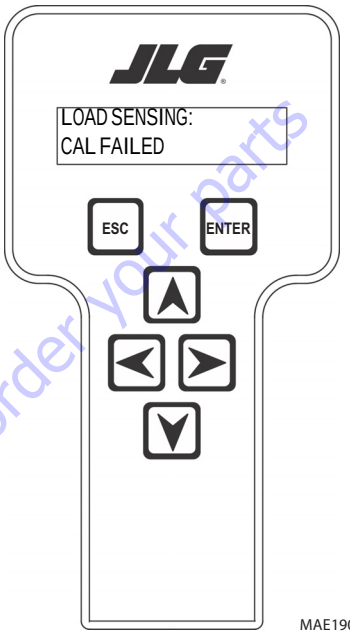
Table 6-9. Accessory Weights

Accessory	Weight
SkyWelder (stick welder)	70 lb (32 kg)
SkyWelder Prep	Prep only = 15 lb (7 kg) Full install = 70 lb (32 kg)
SkyCutter (plasma cutter)	70 lb (32 kg)
SkCutter / SkyWelder Combo	140 lb (64 kg)
Fire Extinguisher	45 lb (20 kg)
Overhead Soft Touch	80 lb (36 kg)
Work Surface	20 lb (9 kg)

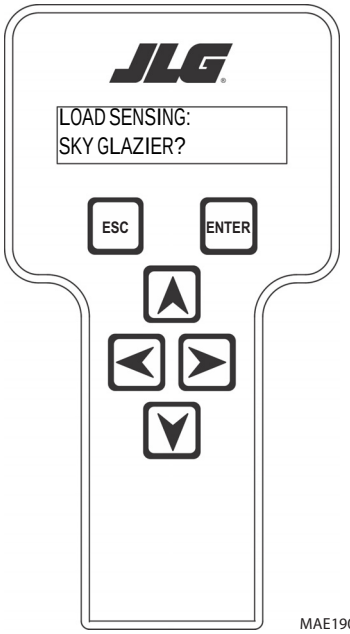
NOTE: *Not all Accessories are available on every JLG model. Some Accessory combinations are prohibited due to excessive weight and/or load restriction. If any installed JLG Accessories are labeled with weight decals but are not listed in the table above, include their weight when entering the ACC WEIGHT value.*

9. The control system will calculate the load cell readings and ensure it is greater than 130 lb (59 kg), but less than 575 lb (261 kg).

If the platform weight is not within the allowed range, the calibration attempt will be unsuccessful and the Analyzer will show the following:



10. Press ENTER (ENTER). The control system will ask for installed accessories. The screen will show the following:



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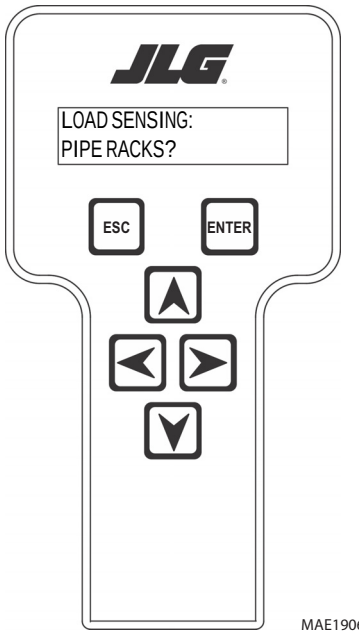
11. Use the analyzer keys to select N for no or Y for yes. Press ENTER (ENTER). The screen will read:



12. Use the analyzer keys to select N for no or Y for yes. Press ENTER (ENTER). The control system will default to an estimate of unrestricted capacity, which can be adjusted if necessary. Refer to Table 6-10, SkyGlazier Capacity Reductions and Table 6-11, Pipe Rack Capacity Reductions.The screen will read:

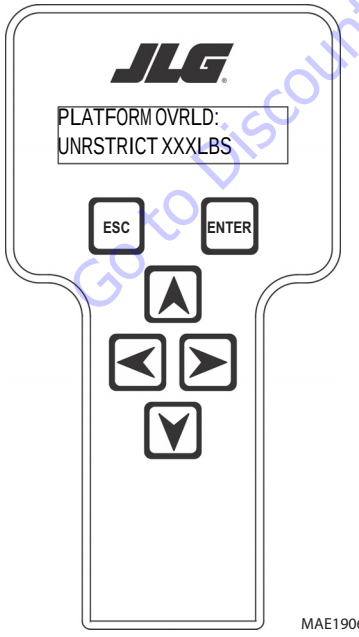


Table 6-10. SkyGlazier Capacity Reductions

Capacity	PLATFORM OVRLD	PLATFORM OVRLD RESTRICT
500 lb (227 kg)	400 lb (181 kg)	n/a
550 lb (250 kg)	400 lb (181 kg)	n/a
600 lb (272 kg)	400 lb (181 kg)	n/a
750 lb (340 kg)	n/a	590 lb (268 kg)
1000 lb (454 kg)	n/a	750 lb (340 kg)
Note: If both SkyGlazier and Pipe Racks are configured, capacity will be the lower of the two values.		

Table 6-11. Pipe Rack Capacity Reductions

Capacity	PLATFORM OVRLD	PLATFORM OVRLD RESTRICT
500 lb (227 kg)	400 lb (181 kg)	n/a
550 lb (250 kg)	450 lb (204 kg)	n/a
600 lb (272 kg)	500 lb (227 kg)	n/a
750 lb (340 kg)	n/a	650 lb (295 kg)
1000 lb (454 kg)	n/a	900 lb (408 kg)
Note: If both SkyGlazier and Pipe Racks are configured, capacity will be the lower of the two values.		

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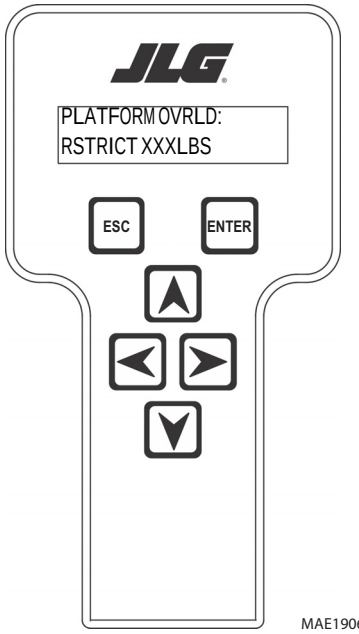
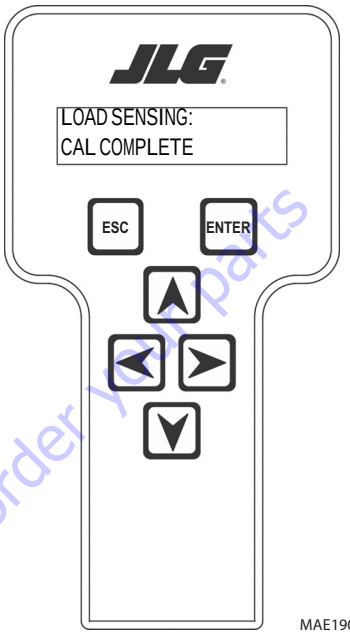
13. Press ENTER 

. The following screen will be displayed for restricted capacity, which can be adjusted if necessary. Refer to Table 6-10, SkyGlazier Capacity Reductions and Table 6-11, Pipe Rack Capacity Reductions.



14. Press ENTER 

. If calibration is successful, the screen will read:



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Testing & Evaluation

Refer to Troubleshooting if the Load Sensing System fails to meet these guidelines.

1. Connect the JLG Analyzer.
2. Level the Platform. The platform should be approximately level for analysis, or the guidelines below will not be applicable. Level the platform from Ground Control (if necessary) to within ±5 degrees.
3. Observe the Empty Platform Weight. Proceed to the DIAGNOSTICS, PLTLOAD sub-menu and observe the measured platform load. All tools, debris, and customer-installed devices shall be removed during evaluation. Ideally, the PLTLOAD should be zero but can vary ±15 lb (± 7kg). Further, the reading should be stable and should not vary by more than ±2 lb (±1kg) (unless there is heavy influence from wind or vibration).
4. Use the Technician's Weight to Evaluate. The technician should enter the platform and record the PLTLOAD reading while standing in the center of the platform.
5. Confirm Control System Warnings and Interlocks. Using the keyswitch, select Platform Mode and power-up. Start the vehicle's engine and ensure that all controls are functional and the Load Sensing System's Overload Visual and Audible Warnings are not active. Simulate an Overload by unplugging the Shear Beam Load Cell. The Overload Visual Warning should flash, and the Audible Warning (at Platform and Ground) should sound for 5 seconds On, and 2 seconds Off. With the engine running, all control should be prevented. Cycle the Platform EMS to stop the engine and then power-up again. The Overload Visual and Audible Warning should continue. Confirm that controls are responsive when using the Auxiliary Power Unit for emergency movement. Reconnect the Load Cell. The Overload Visual and Audible Warnings should cease and normal control function should return. Switch the vehicle's keyswitch to Ground Mode and repeat the above procedure. The Overload Visual Warning at the Ground Controls should flash, and the Audible Warning (at Platform and Ground) should sound for 5 seconds On, 2 seconds Off. However, the controls should remain functional when using the engine and the Auxiliary Power Unit (if the Control System's MACHINE SETUP, LOAD is set to "2=CUTOUT PLT". If set to "3=CUTOUT ALL", then Ground Controls will be prevented when using the engine as in the platform).
6. Confirm Control System Capacity Indication (optional for vehicles with Dual Capacity Ratings). For vehicles equipped with a Capacity Select switch on the Platform Console Box, it is necessary to examine an additional interface between the Load Sensing System and the Control System. Using the keyswitch, select Platform Mode and power-up. If necessary, put the boom in the transport position (completely stowed) and center the Jib Plus (if equipped). Place the Capacity Select switch in the unrestricted position and ensure that the proper indicator illuminates on the Platform Console Box. Plug the JLG Analyzer into the Analyzer connection and proceed to the DIAGNOSTICS, SYSTEM submenu. Ensure that the CAPACITY displays indicate OFF. Place the Capacity Select switch in the unrestricted position (if so equipped) and ensure that the proper indicator illuminates on the Platform Console Box (but does not flash). For vehicles with unrestricted capacity, ensure that the unrestricted CAPACITY display indicates ON but the restricted CAPACITY indicates OFF. For vehicles with restricted capacity, ensure that the unrestricted CAPACITY display indicates OFF but the restricted CAPACITY indicates ON.
7. Confirm Load Sensing System Performance with Calibrated Weights. Operate the vehicle from Ground Control and place the boom in the transport position (fully stowed) for safety. Plug the JLG Analyzer into the control system connection and proceed to the DIAGNOSTICS, PLTLOAD display. Place 500 lb (230kg) in the platform and ensure that PLTLOAD is with ±5% of the actual weight. For Dual Capacity vehicles, do the same for the alternate capacity (unrestricted or restricted).

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Troubleshooting

The following tables are furnished to provide possible resolutions for common difficulties. Difficulties are classified as General, Calibration, Measurement Performance, and Host System Functionality.

Table 6-12. LSS Troubleshooting Chart

Difficulty	Possible Resolution
Empty Platform Weight (DIAGNOSTICS, PLATFORM LOAD) is not within ±15 lb (±7kg) of zero. or Platform Load readings (DIAGNOTICS, PLTLOAD) are unstable by more than ±2 lb (±1kg) (without the influence of vibration or wind). or There are large variations in Platform Load (DIAGNOSTICS, PLTLOAD) based on the location of the load. Tolerance to variations is 20 lb for an evaluation using the technician's weight, and ±5% of Rated Load when using calibrated weights.	The LSS System is unable to properly measure the platform weight. 1. The Load Cell is not properly plugged into the LSS Harness. It is possible poor electrical contact is made. 2. Wiring leading to the Load Cell is damaged. Carefully inspect sensor wiring where it passes through cable clamps for signs of damage. Inspect wiring where damage to the channel is apparent. 3. The Load Cell was not assembled properly during installation. Examine the sensor's reading using the JLG Analyzer. Proceed to the DIAGNOSTICS, CELL, LOAD displays and determine if the readings are reasonable. It is often helpful to apply slight downward pressure above the sensor and observe that its output increases (increasing force measurement; decreasing means the sensor is mounted upside-down). 4. The Load Cell is contaminated by debris or moisture. Examine the sensor's reading using the JLG Analyzer. Proceed to the DIAGNOSTICS, CELL, LOAD displays and determine if the readings are reasonable and stable (not changing by more than ±2 lb (±1kg) (without the influence of vibration or wind). Lack of measurement stability is a key indication of contamination. Unplug the connector and inspect for dirt or moisture. Look carefully into the female connector on the sensor's cordset for evidence of contamination. Debris should be brushed away with a soft bristle brush (do not introduce any cleaners as they will leave conductive residue). Moisture should be allowed to evaporate or accelerated with a heat-gun (use low heat and be carefully to not melt connector materials). Moisture intrusion into the molded portion of the connector (capillary action into the wire bundle) or the Shear Beam Load Cell itself will require replacement of the sensor. 5. The Load Cell has been mechanically damaged. If the Load Cell is physically deformed or has damage to the cover it should be replaced immediately. It is also possible to have invisible mechanical damage resulting from an extreme overload (>6000 lb [>2722kg]).
The Visual and Audible Overload Warnings fail to sound when platform is loaded beyond Rated Load, or when simulated by unplugging the Load Cell. Controls remain functional at Platform and Ground Control positions.	The Control System is failing to regard the overload signal from the LSS System, or the signal is shorted. 1. The Load Sensing System must be enabled within the Control System. Plug the JLG Analyzer into the Control System, enter the Access Level 1 password (33271), and examine the MACHINE SETUP, LOAD sub-menu. The selection "2=CUTOUT PLT" should be displayed (platform controls prevented during overload, ground controls remain operational). In country- or customer-specific circumstance, the selection "3=CUTOUT ALL" is used (platform and ground controls prevented during overload).
The Ground Audible Warning fails to sound, but the Platform Audible Warning sounds properly.	The Ground Alarm is missing or improperly installed. Verify that the device is mounted. Verify wiring from the Main Terminal Box and Ground Module.
Controls remain functional at the Ground Control position during an overload, or when simulated by unplugging the Load Cell. The Controls at the Platform Control position are prevented when using the engine, but not when using the Auxiliary Power Unit.	The JLG Control System is configured to prevent platform controls only in the event of overload. Alternately, the Host Control System can be configured to prevent ground and platform controls for country- or customer-specific circumstances. Using the JLG Analyzer, enter the Access Level 1 password (33271). Proceed to the MACHINE SETUP, LOAD sub-menu. Set this parameter to "2=CUTOUT PLT" to prevent platform controls in the event of overload. Set this parameter to "3=CUTOUT ALL" to prevent platform and ground controls in the event of overload.

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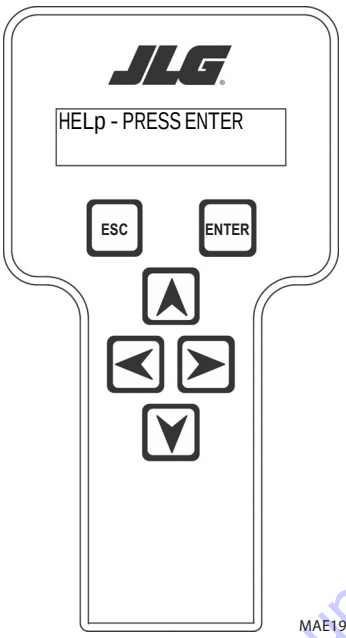
6.15 RESETTING THE MSSO SYSTEM

1. Use the following procedure to reset the MSSO system.
2. Position the Platform/Ground select switch to the desired position.
3. Plug the analyzer into the connector coming from the ground control module or from the platform console.

NOTE: *If performing the procedure from the platform console, the Emergency Stop switch on the ground console must also be pulled out.*

4. Pull out the Emergency Stop switch.
5. The analyzer screen should read:



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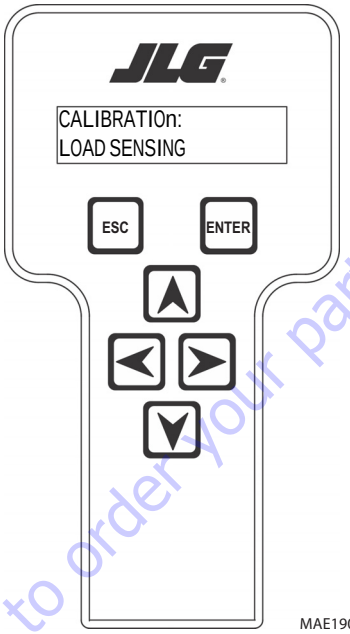
6. Use the arrow button to reach OPERATOR ACCESS. Press Enter 

.
7. Enter the Access Code, 33271.
8. Use the right Arrow key to reach MENU: CALIBRATIONS. Press Enter 

.
9. Use the arrow keys to reach the LOAD SENSING menu. The screen should read:



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10. Press ENTER 

.
11. Use the Down 
arrow to reach MSSO RESET.

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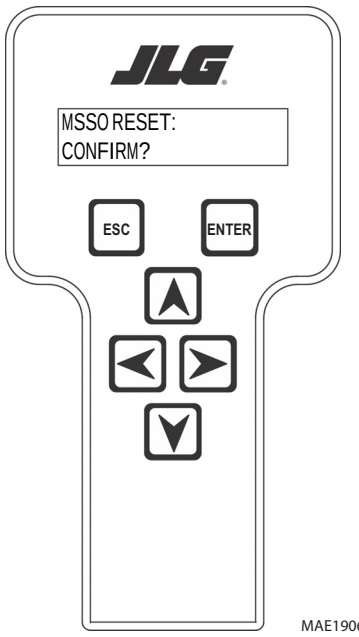
12. Press Enter [ENTER]. The screen will read:



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13. Press Enter [ENTER]. The JLG Control System will reset an active 873 DTC and the MSSO System will be reset. Press Escape [ESC] to return to the CALIBRATIONS menu.

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6.16 ELECTRONIC PLATFORM LEVELING

Platform Leveling Fault Warning

The JLG Control System takes a snapshot of the two sensor values and records the difference once on each power up. The Control system allows a ±5 degree difference from those values. For example, if Sensor 1 is at 5 degrees and Sensor 2 is at 11 degrees, the difference is 6 degrees and the DTC is triggered when the sensors are 1 degree (or less) apart or 11 degrees (or more) apart.

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 (extended more than 12" [51 cm] 1350SJP; 24" [60.9 cm] 1200SJP, or elevated above the horizontal position).

To reset the fault the emergency stop switch should be recycled.

NOTICE

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 re-cycle the EMS to clear the fault. Operable functions shall be in the creep mode except while below elevation.

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TILT SENSOR ERRORS

If the secondary tilt sensor is faulty, the control system will continue to utilize information from the primary sensor.

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 ±5.5º 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.

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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.

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.

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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 ARROW to 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 UP 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.

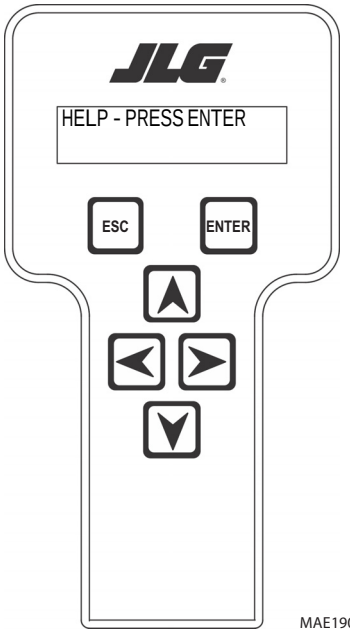
6.17 CALIBRATING PLATFORM LEVEL

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.

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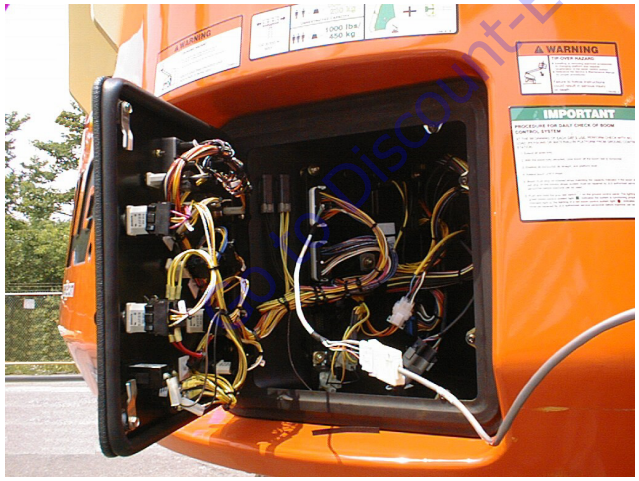
7. Use the arrow button to reach PERSONALITIES adjust the following personalities. Refer to the Personality Ranges/Defaults table for proper setting values.
   Basket Level Up Min
   Basket Level Up Max
   Basket Level Down Max
   Jib Up Min
   Jib Down Min
8. Recycle EMS.

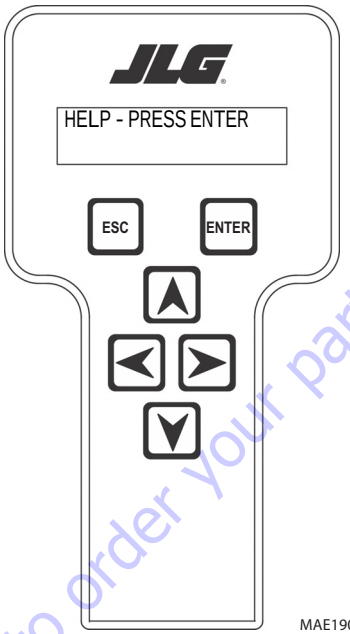
Step 2: Calibrating The Platform Level Sensors

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:



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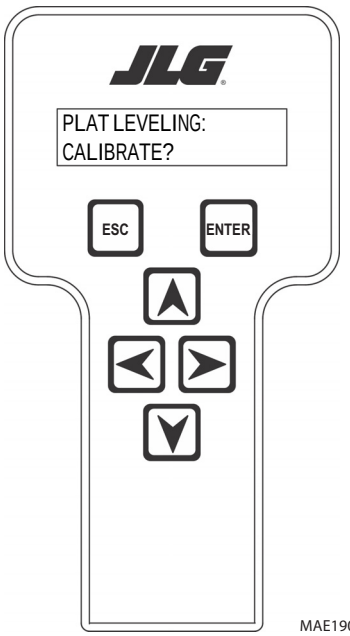
6. Use the arrow button to reach ACCESS LEVEL 2. Hit Enter.
7. Enter the Access Code, 33271.
8. Use the arrow button to reach CALIBRATIONS menu and hit ENTER.
9. Use right arrow go to PLAT. LEVELING screen.
10. Hit ENTER. The screen should read:



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11. Hit ENTER again to calibrate level sensors.

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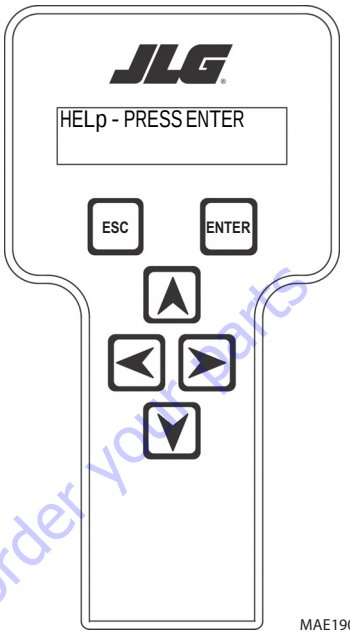
12. When calibration has been successful CAL. COMPLETE should appear.
13. Cycle power to the machine.

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%.

    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.

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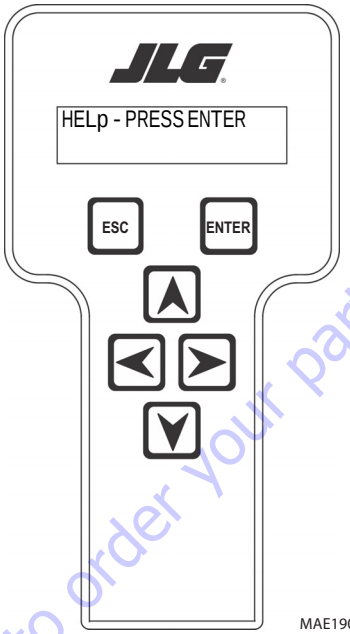
Step 4: Calibrating The Platform Level Up And Down Valve Crackpoints

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 UP ARROW, increase 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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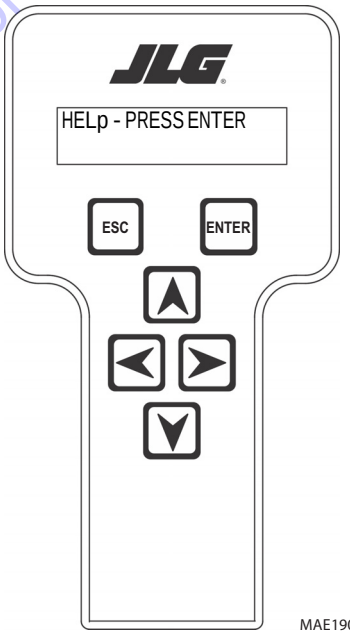
6.18 CALIBRATING LIFT CRACK POINT

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.

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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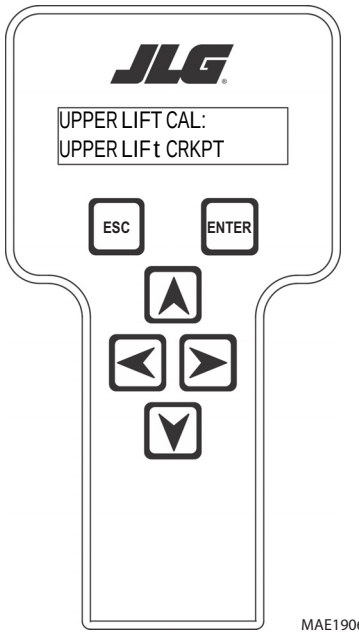
8. Use the arrow keys to reach Upper Lift Crack Point (UPPER LIFT CRKPT). The screen will read:



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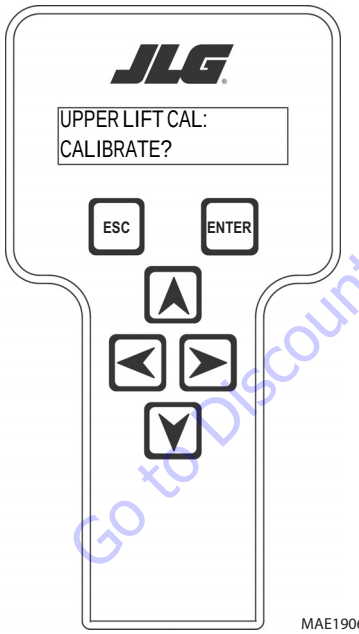
9. Hit enter. The screen will read:



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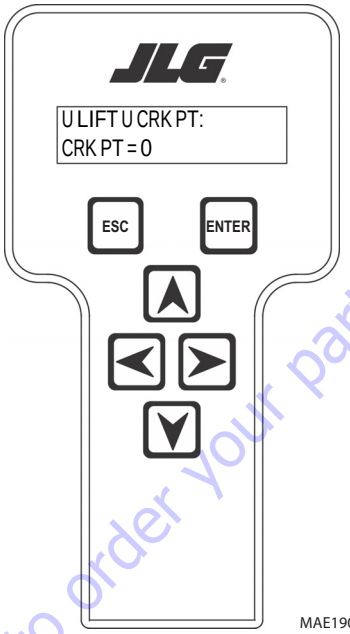
10. Hit Enter. The screen will read:



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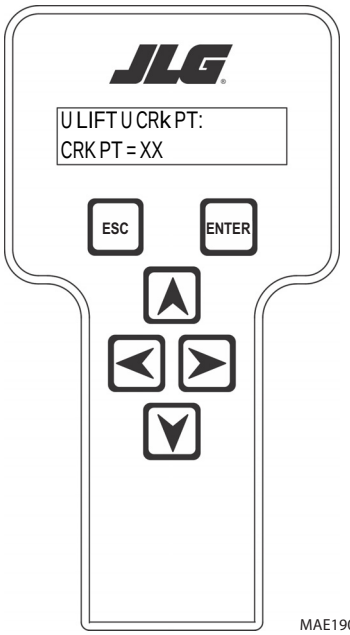
11. Hit Enter again. The screen will read:



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12. Activate the Lift Up function by fully stroking the joystick until the boom starts to move, then leave off immediately. The display will read CRK PT = and show the numeric crack point value.

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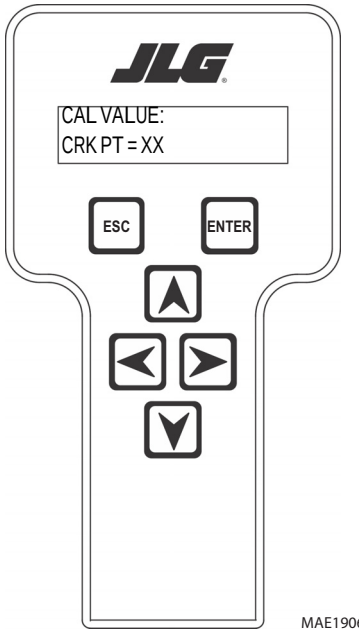
13. Hit enter. The number displayed will be the value that the crack point is set to. The screen will show:



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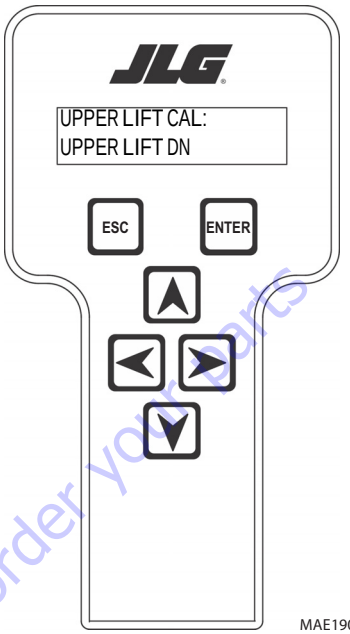
14. Hit Enter. The screen will read:



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15. Repeat steps 10 thru 12 for the Lift Down function.

16. After completing all the Tele Calibrations, hit ESC twice to go back to CALIBRATIONS.

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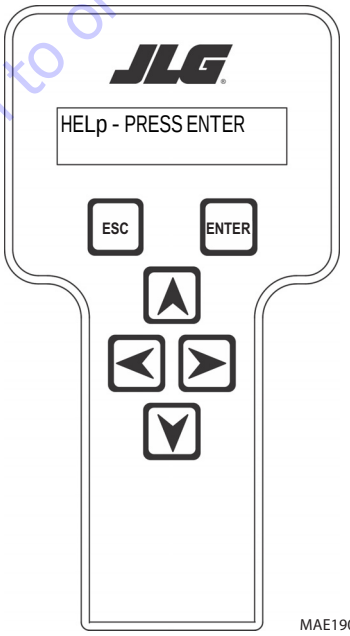
6.19 CALIBRATING TELESCOPE CRACK POINT

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.

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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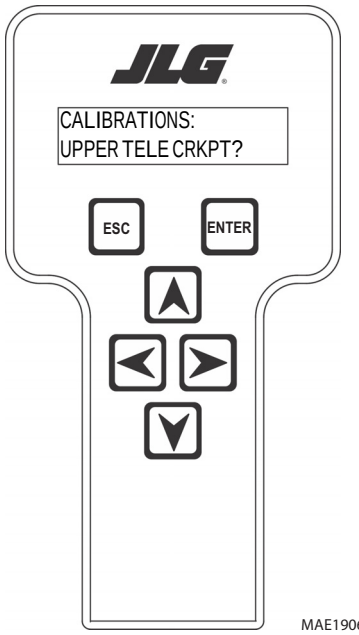
8. Use the arrow keys to reach Upper Telescope Crack Point (UPPER TELE CRKPT). The screen will read:



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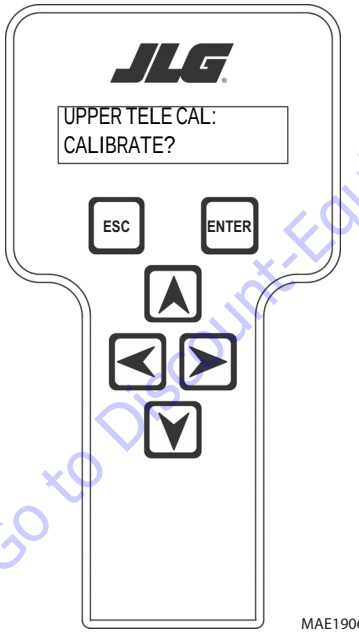
9. Hit Enter. The screen will read:



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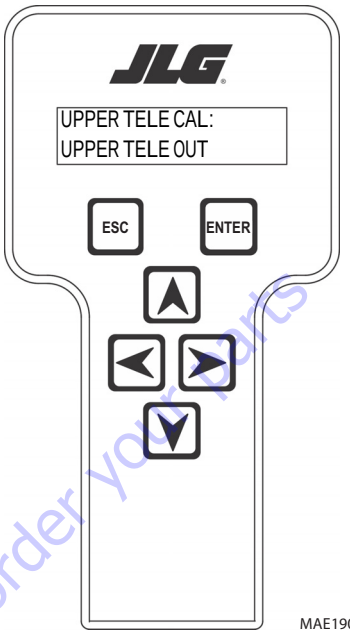
10. Hit Enter. The screen will read:



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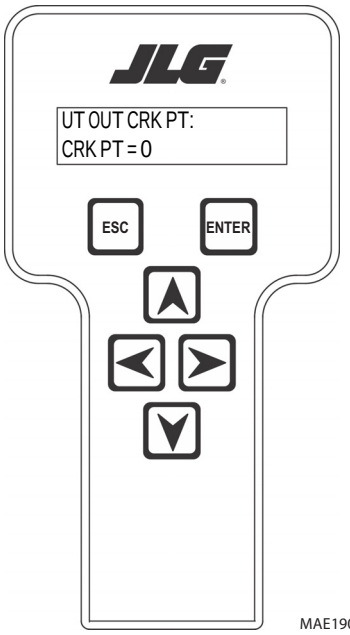
11. Hit enter again. The screen will read:



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12. Activate the Tele Out function until the boom starts to move, then leave off immediately. The display will read CRK PT = and show the numeric crack point value.

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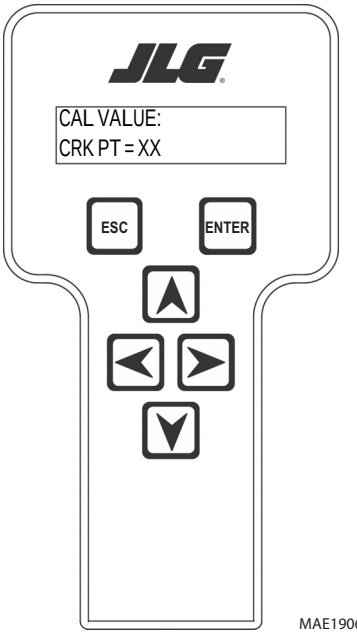
13. Hit enter. The number displayed will be the value that the crack point is set to. The screen will show:



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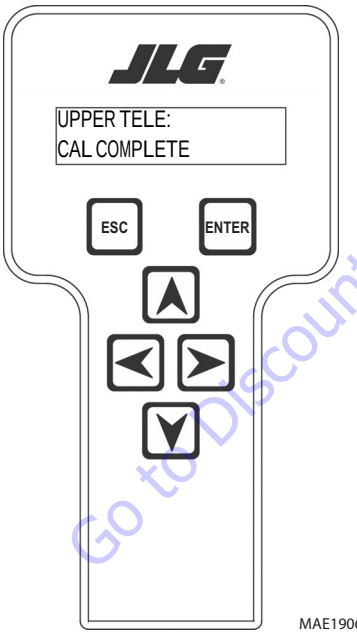
14. Hit Enter. The screen will read:



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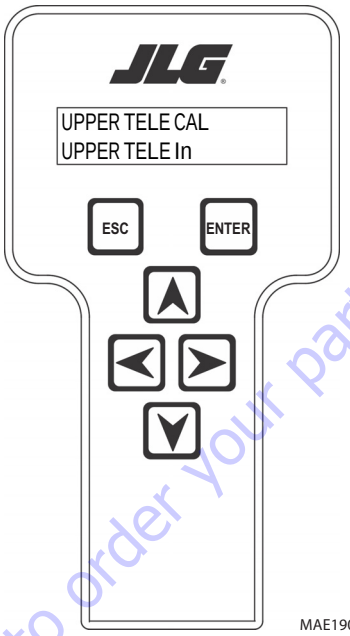
15. Hit Enter. The screen will read:



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16. Repeat steps 10 thru 12 for the Tele In function.

17. After completing all the Tele Calibrations, hit ESC twice to go back to CALIBRATIONS.

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6.20 CALIBRATING TILT SENSOR

NOTICE

A NEW TILT MODULE WILL ACT AS IF IT IS TILTED ALL OF THE TIME UNTIL THE FOLLOWING PROCEDURE IS PERFORMED.

⚠ WARNING

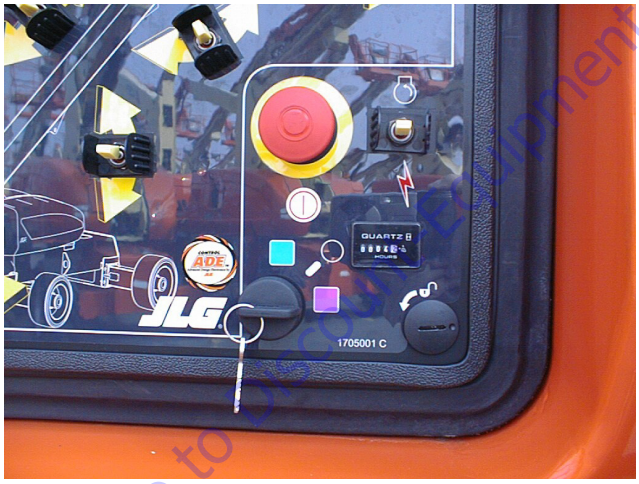
DO NOT CALIBRATE THE LEVEL SENSOR EXCEPT ON A LEVEL SURFACE.

1. Use the following procedure to calibrate the tilt sensor.

   Before the tilt sensor can be calibrated, the following conditions must be met:

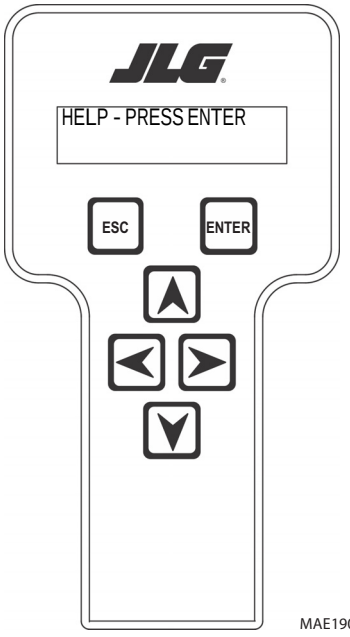
   a. Steering previously calibrated.
   b. Axles extended.
   c. Wheels straight.
   d. Turntable centered.
   e. Boom fully retracted.
   f. Boom angle is less than 45°.
   g. Machine on firm, level ground.

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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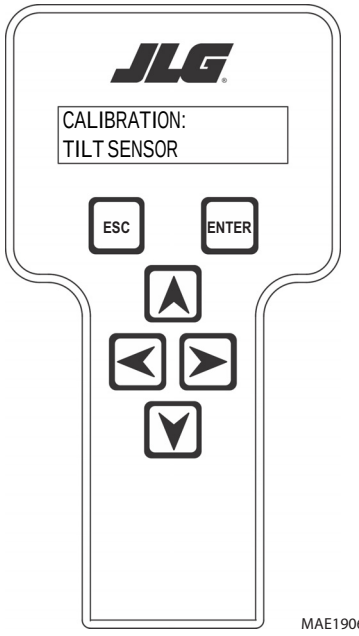
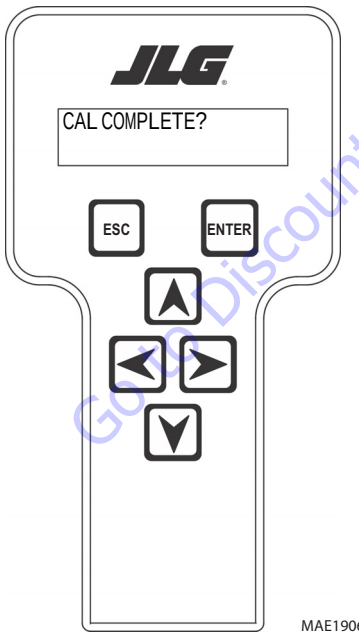
9. Use the arrow keys to reach the TILT SENSOR. The screen should read:



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.

6.21 CALIBRATING THE BOOM SENSORS

NOTICE

DURING THE BOOM SENSOR CALIBRATION PROCEDURE, IT IS NORMAL FOR THE REAR WHEEL TO LIFT FROM THE GROUND APPROXIMATELY 1 INCH (2.5 CM). IF THE WHEEL RAISES APPRECIABLY MORE THAN THIS (I.E. 4 INCHES [10 CM] OR MORE), CHECK THE AXLE OSCILLATION SYSTEM FOR PROPER OPERATION OR THE NEED FOR BLEEDING, THEN PROCEED WITH THE BOOM SENSOR CALIBRATION PROCEDURE.

Use the following step-by-step procedure to calibrate the boom sensors.

1. Before the boom sensors can be calibrated, the following conditions must be met:
   a. Steering, telescope crack points, and tilt previously calibrated
   b. Axles Extended
   c. Wheels Straight
   d. Platform Unloaded
   e. Jib Horizontal
   f. Jib Swing Centered
   g. Platform Level
   h. Platform Centered
   i. Turntable Centered
   j. Boom Fully Retracted
   k. Level Ground (within 1.5°)

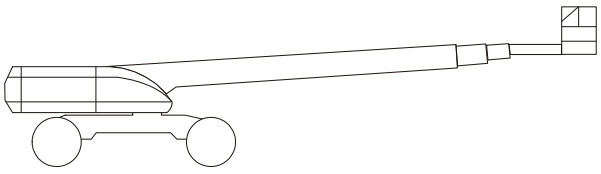


Figure 6-15. Boom Sensor Calibration Position 1

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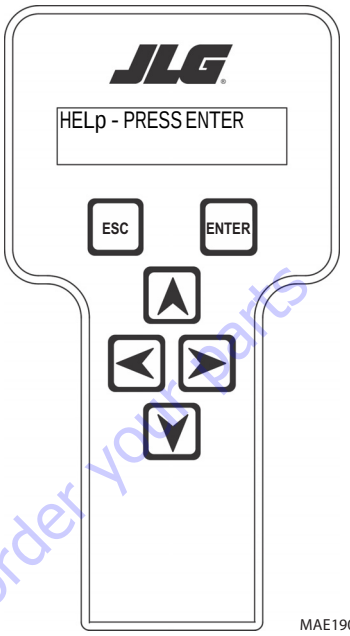
2. Position the Platform/Ground select switch to the Ground position.

3. Plug the analyzer into the connector inside the Ground control box.

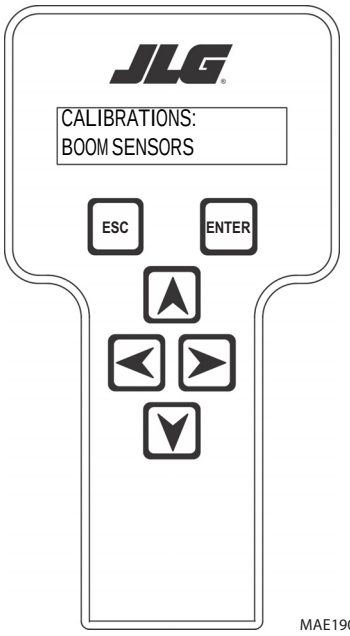
4. Pull out the Emergency Stop switch and start the engine.

5. The analyzer screen should read:



MAE19060

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.
9. Use the arrow keys to reach BOOM SENSORS. The screen should read:



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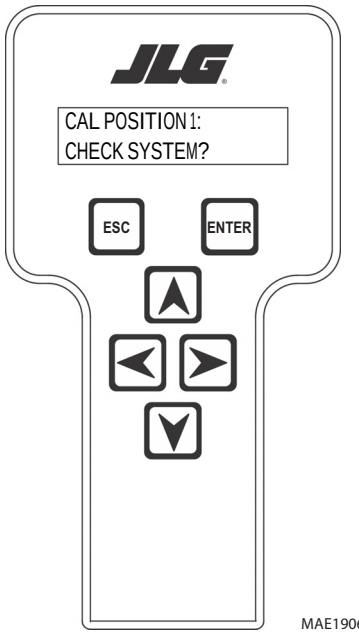
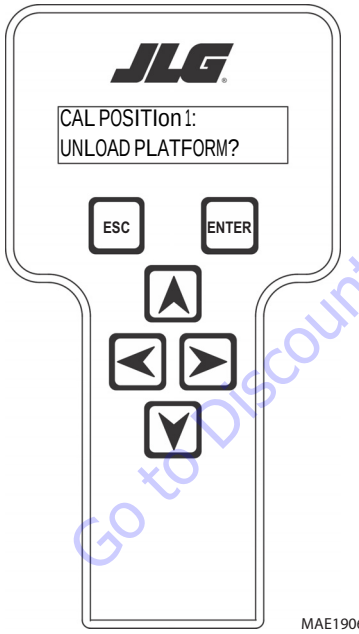
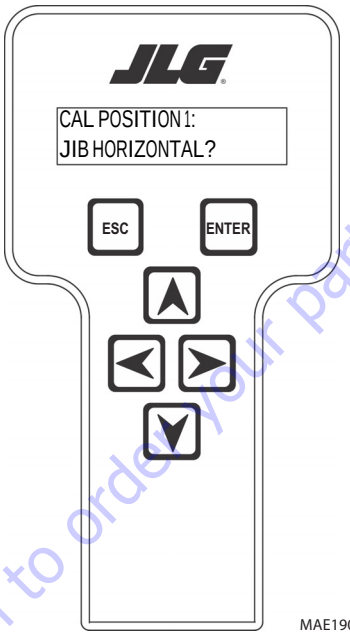
10. Hit Enter. The screen will read:



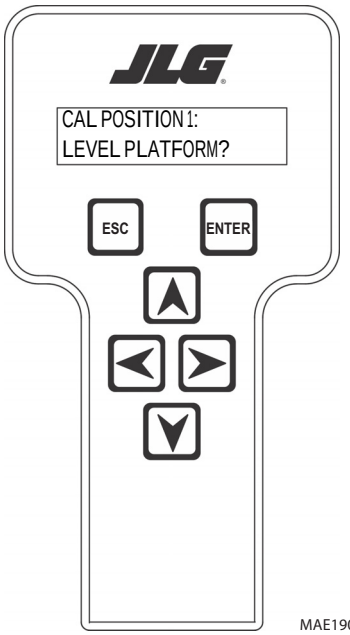
11. After verifying all the conditions listed in step 1 are met, hit Enter. The screen will read:



12. After verifying all load (personnel or material) is removed from the platform, hit Enter. The screen will read:



13. After visually verifying that the jib is horizontal, hit Enter. The screen will read:



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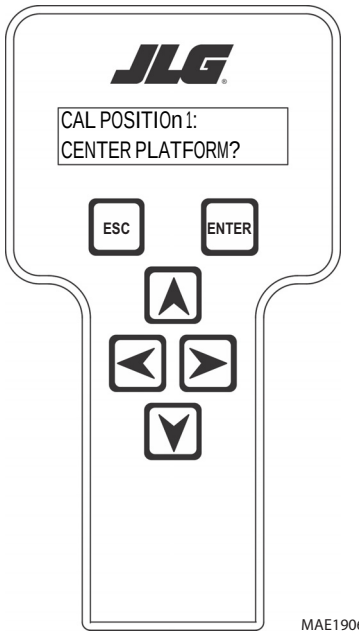
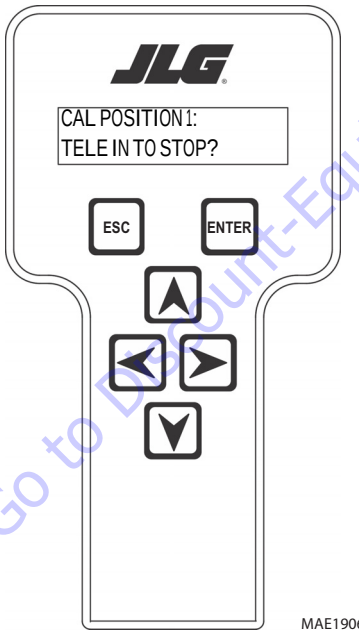
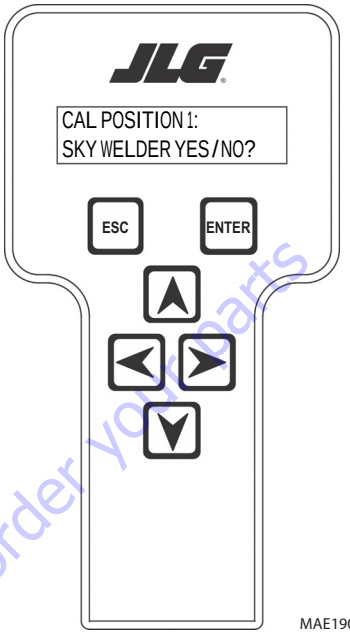
14. After visually verifying the platform is level, hit Enter. The screen will read:



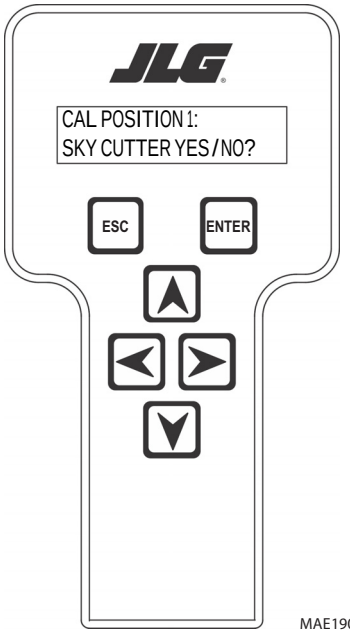
15. After visually verifying the platform is centered, hit Enter. The screen will read:



16. After operating telescope in to verify the boom is fully retracted, hit Enter. The screen will read:



17. Use the up/down arrows to select YES if the accessory is installed, NO if it is not installed and hit enter. The screen will read:



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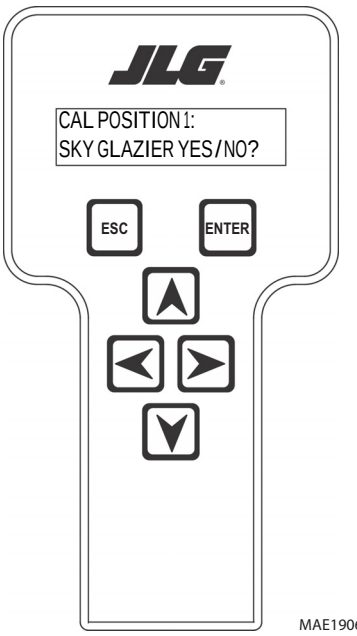
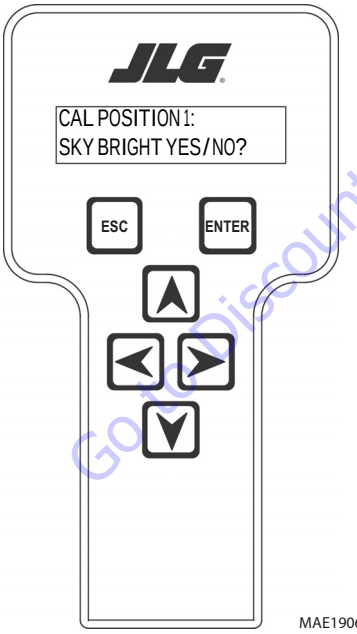
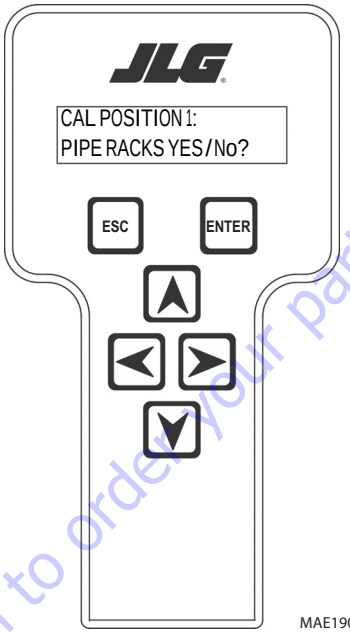
18. Use the up/down arrows to select YES if the accessory is installed, NO if it is not installed and hit enter. The screen will read:



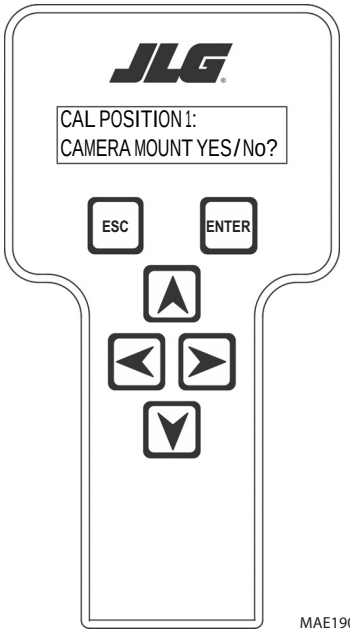
19. Use the up/down arrows to select YES if the accessory is installed, NO if it is not installed and hit enter. The screen will read:



20. Use the up/down arrows to select YES if the accessory is installed, NO if it is not installed and hit enter. The screen will read:



21. Use the up/down arrows to select YES if the accessory is installed, NO if it is not installed and hit enter. The screen will read:



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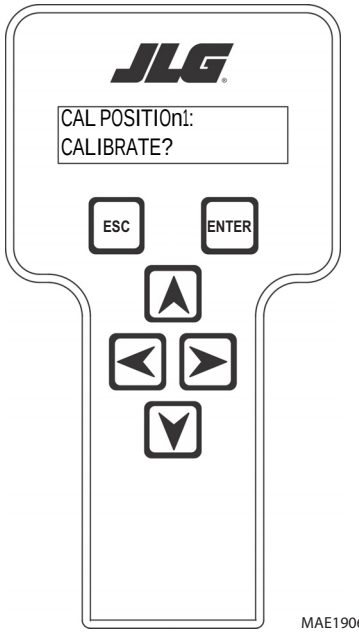
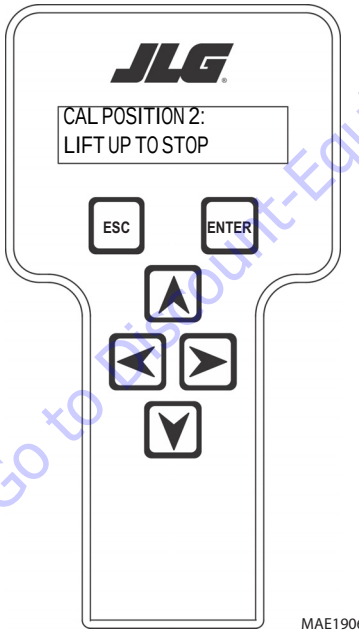
22. Use the up/down arrows to select yes if the accessory is installed, no if it is not installed and hit Enter. The screen will read:



23. After making sure the machine is in Calibration Position 1, hit Enter. The screen will read:



24. Lift up to stop (full stroke of cylinder) for Calibration Position 2. When the machine is in that position, hit Enter.

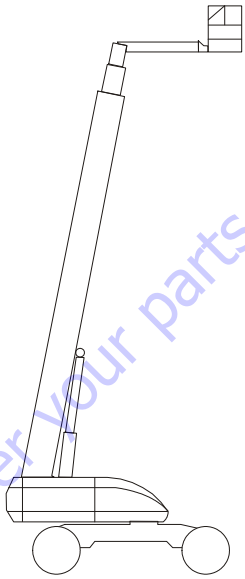
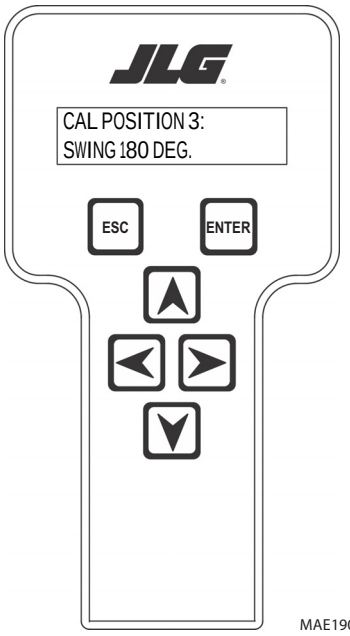


Figure 6-16. Boom Sensor Calibration Position 2

The screen will read:



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25. Swing 180 degrees (centered over opposite end of chassis) for Calibration Position 3.

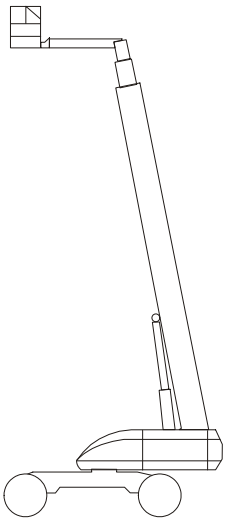
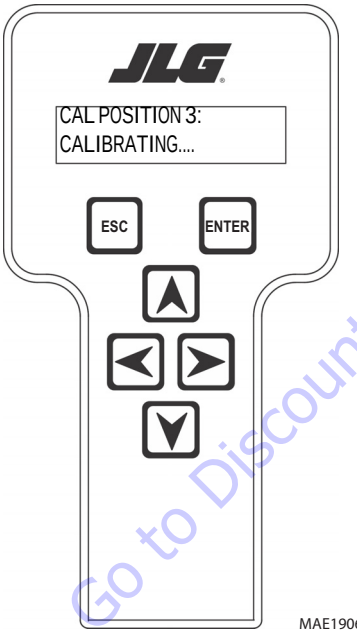
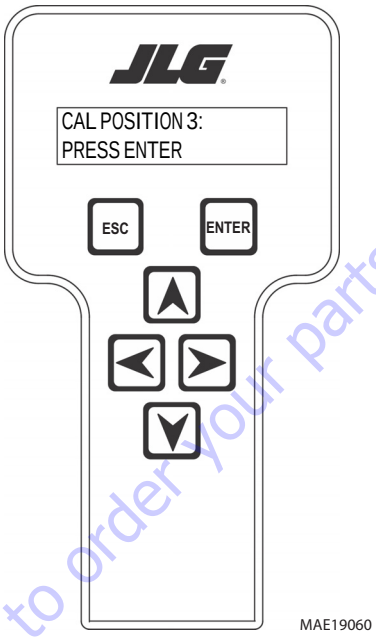


Figure 6-17. Boom Sensor Calibration Position 3

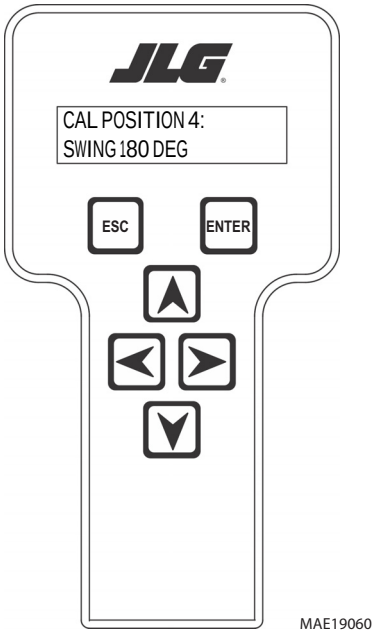
When the machine is in the proper position, hit Enter. The screen will read:



When Position 3 calibrating is complete the screen will read:



26. Press Enter. The screen will read:



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Swing the machine back 180 degrees (centered over original end of chassis) for Calibration Position 4.

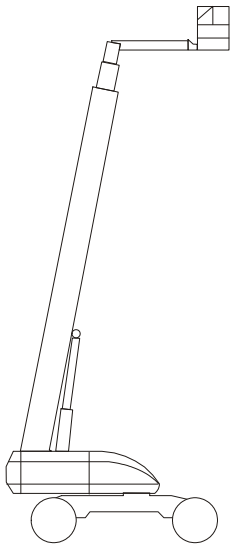
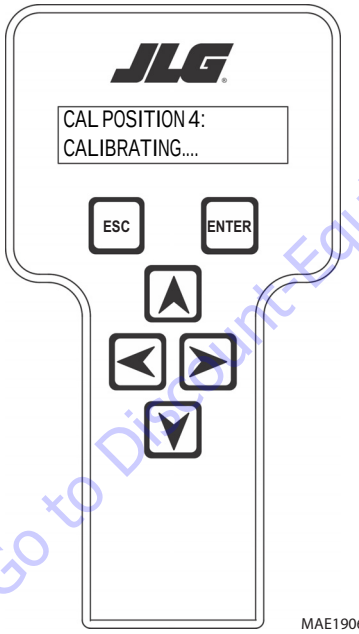
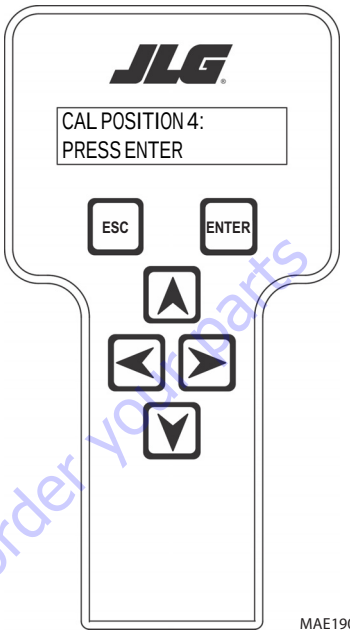


Figure 6-18. Boom Sensor Calibration Position 4

When the machine is in the proper position, hit Enter. The screen will read:



When Position 4 calibrating is complete, the screen will read:



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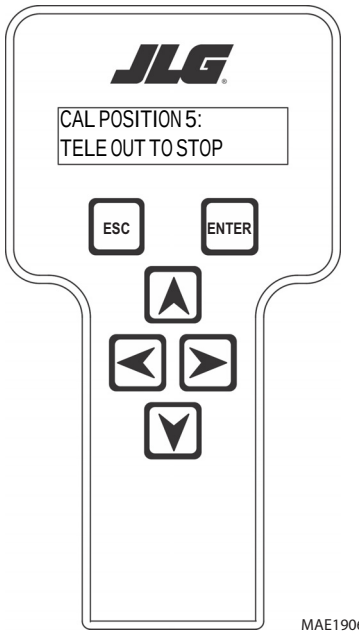
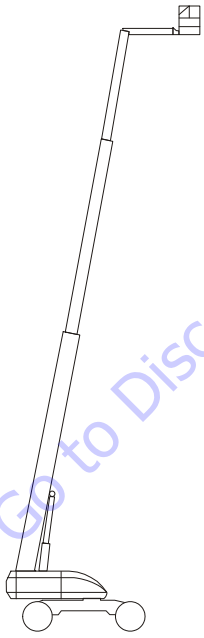
27. Press Enter. The screen will read:



Telescope out to stop (boom must be fully extended) for Calibration Position 5.



When the machine is in the proper position, hit Enter. The screen will read:

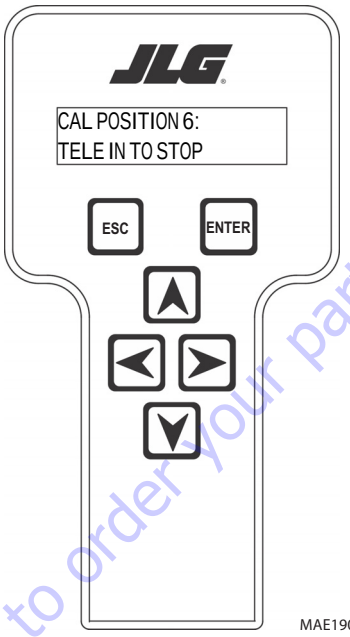


Figure 6-19. Boom Sensor Calibration Position 5

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28. Retract to stop (boom must be fully retracted) for Calibration Position 6.

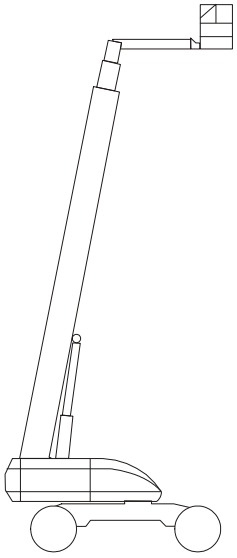
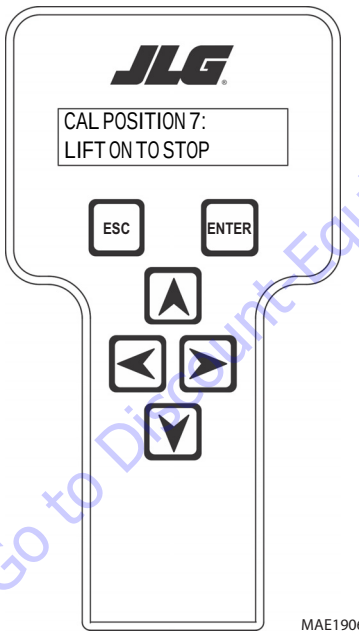


Figure 6-20. Boom Sensor Calibration Position 6

When the machine is in the proper position, hit Enter. The screen will read:



29. Lift down to stop (boom must be on boom rest) for Calibration Position 7.

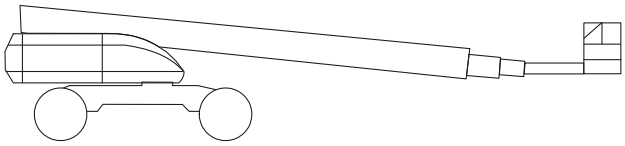
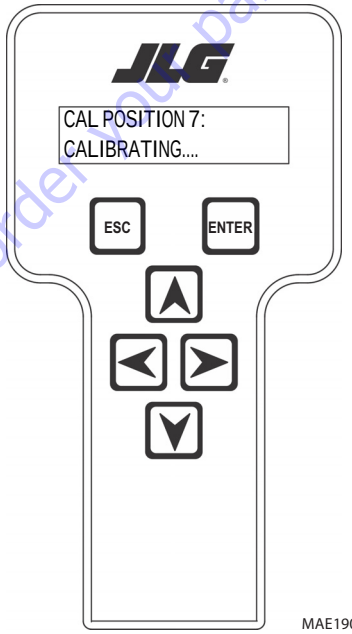


Figure 6-21. Boom Sensor Calibration Position 7

When the machine is in the proper position, hit Enter. The screen will read as follows:



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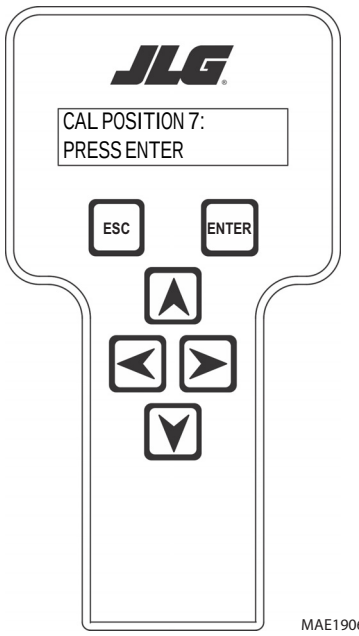
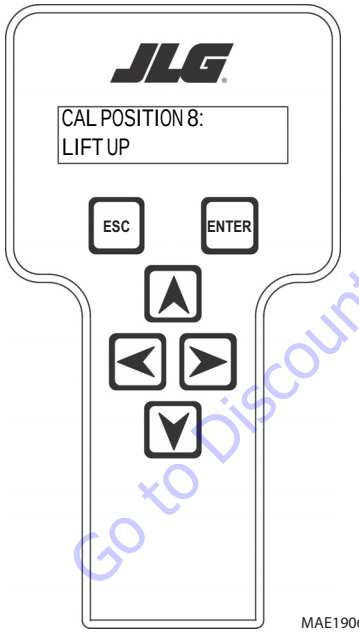
When Position 7 Calibrating is complete, the screen will read:



Press Enter. The screen will read:



30. Lift until the function stops (controller will stop at 5 degrees above horizontal) for Calibration Position 8.

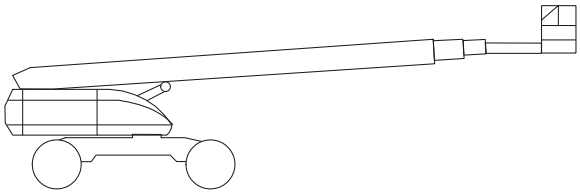
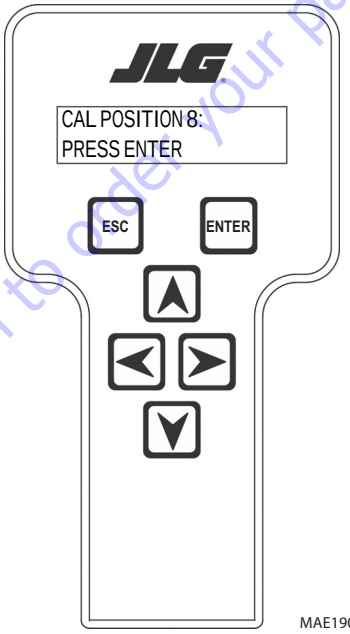


Figure 6-22. Boom Sensor Calibration Position 8

When the machine is in the proper position, hit Enter. The screen will read:



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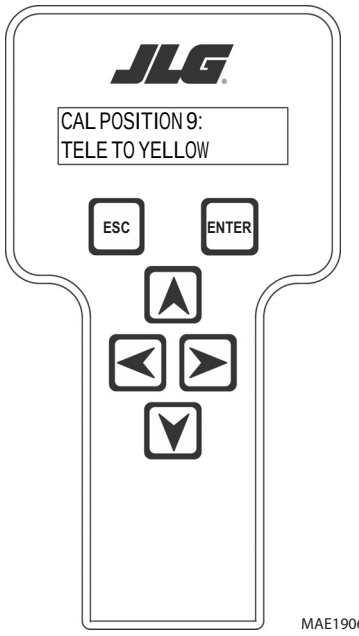
Press Enter. The screen will read:



31. Telescope to the yellow witness mark (controller will be close - operator must position the pointer to center line on decal within 0.25" [6 mm]) for Calibration Position 9.

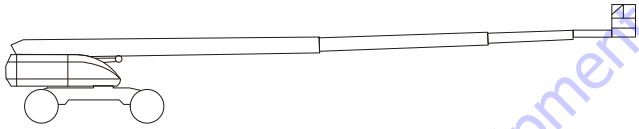
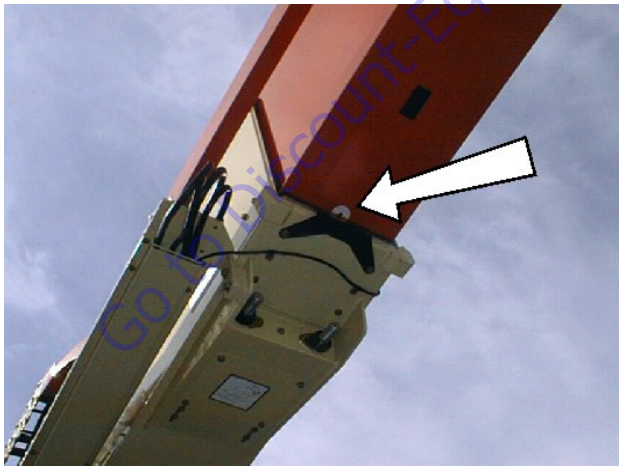
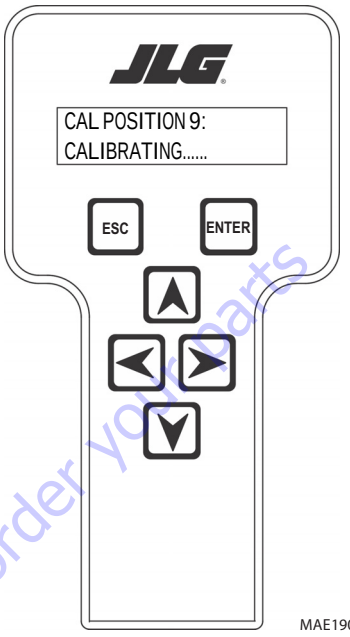


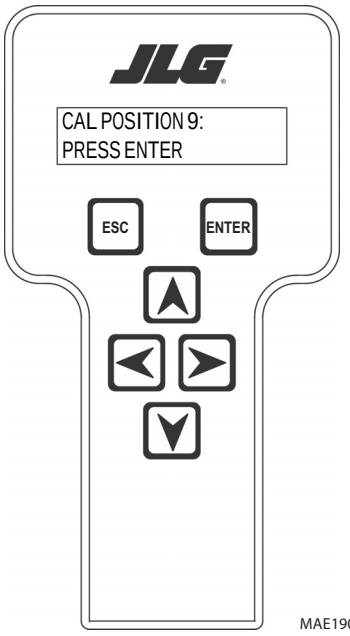
Figure 6-23. Boom Sensor Calibration Position 9



When the boom is in the proper position, hit Enter. The screen will read:



When Position 9 calibrating is complete, the screen will read:



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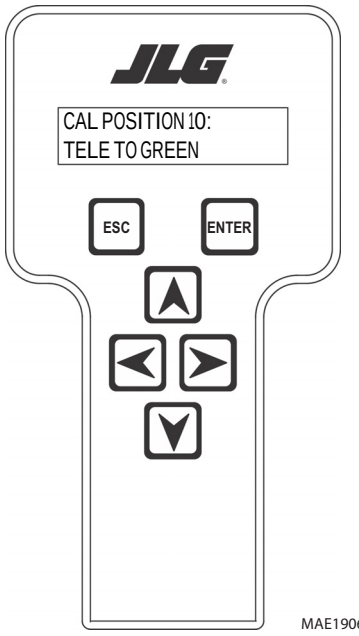
Press Enter. The screen will read:



32. Telescope in to green witness mark (controller will find the position - operator must visually verify the position).

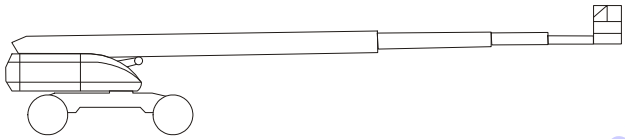
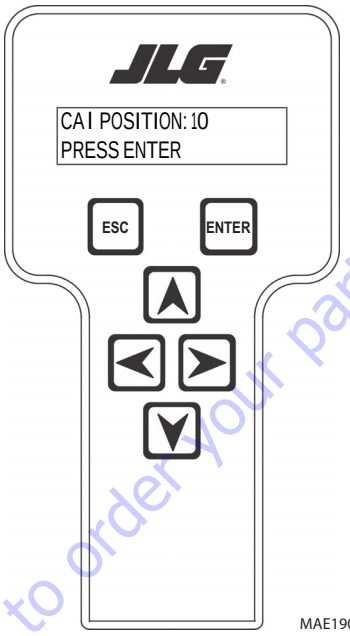
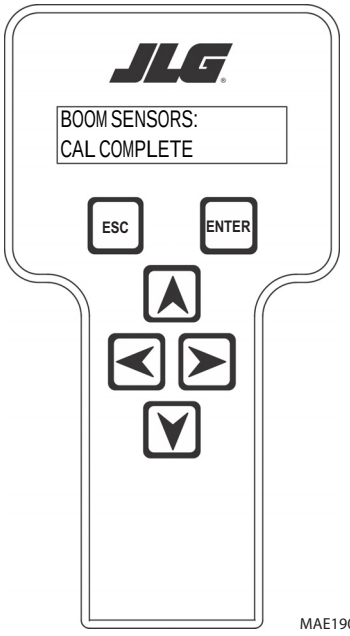


Figure 6-24. Boom Sensor Calibration Position 10

When the boom is in the proper position, the screen will read:



Press Enter. The screen will read:



33. After completing all the Boom Sensors Calibrations, hit ESC twice to go back to Calibrations.

34. Cycle the emergency stop switch.

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Boom Control System Check Procedure

Perform the following check with no load (personnel or material) in the platform from the ground control station.

1. With the boom fully retracted, raise the boom off the boom rest to horizontal.
2. Position the jib horizontal, jib straight, and platform level.
3. Extend the boom until it stops.
4. Boom must stop on colored stripe matching the capacity indicator. If the boom does not stop on the correct stripe, the system must be repaired by JLG authorized Service Personnel before the machine can be used.
5. Push and hold the gray Boom Control System Test Button on the ground control panel. The lighting of the green Boom Control System Calibrated indicator indicates the system is functioning properly. No indicator light or the lighting of the red Boom Control System Warning indicator indicates the system must be repaired by JLG authorized Service Personnel before the machine can be used.

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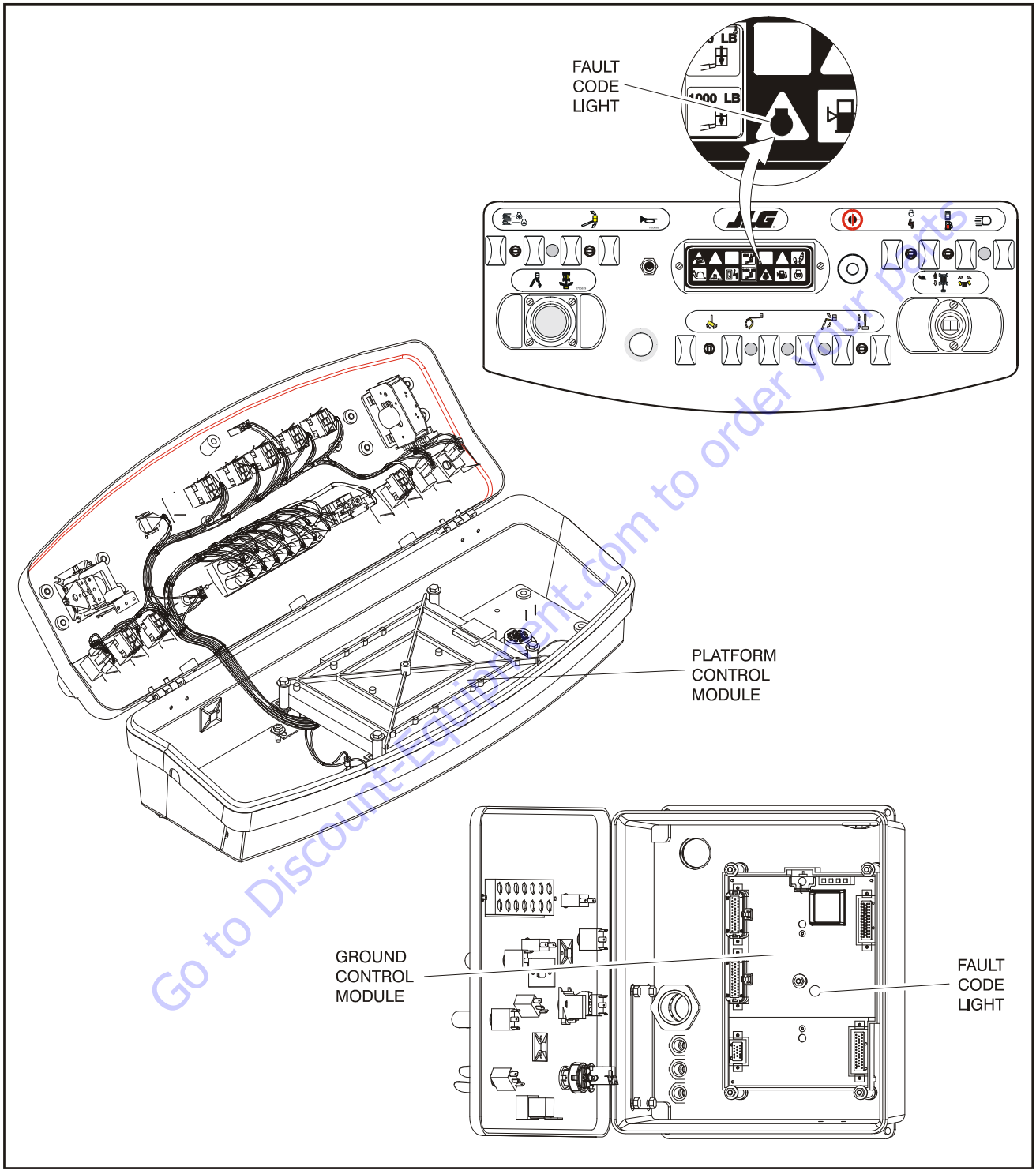

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Figure 6-25. Fault Code Light Location

Table 6-13. Diagnostic Trouble Code Chart

DTC	Flash Code	Sequence	Fault Message	Fault Description	Check
001	0	1	EVERYTHING OK	The normal help message in Platform Mode.	
002	0	2	GROUND MODE OK	The normal help message in Ground Mode.	
0010	0	10	RUNNING AT CUTBACK - OUT OF TRANSPORT POSITION	Drive speed is limited to "ELEVATED MAX" while the vehicle is out of transport position.	
000	**0**	**0**	**<<< HELP COMMENT >>>**		
0011	0	11	FSW OPEN	A drive / boom function was selected with the Footswitch open.	
0012	0	12	RUNNING AT CREEP - CREEP SWITCH OPEN	All functions at creep while the Creep Switch is open.	
0013	0	13	RUNNING AT CREEP - TILTED AND ABOVE ELEVATION	All functions at creep while the Platform is elevated and the Chassis is tilted.	
0014	0	14	CHASSIS TILT SENSOR OUT OF RANGE	The Chassis is tilted > 19 degrees for more then 4 seconds.	- Not reported during power-up.
0015	0	15	LOAD SENSOR READING UNDER WEIGHT	LSS has been calibrated and the UGM has determined that the load sensing system reading is less than -50lbs for 2 seconds. If the load sensing system determines that the reading is greater than -50lbs for 5 seconds this fault will no longer be annunciated. No control system interlocks present when DTC is active.	Ensure platform is not resting on the ground or is not leveled at an extreme negative angle. Re-calibrate the load sensing system if the above items are not a factor.
0016	0	16	ENVELOPE ENCROACHED - HYDRAULICS SUSPENDED	There is an envelope violation.	- Envelope control system equipped vehicle only.
0017	0	17	OVER MOMENT - HYDRAULICS SUSPENDED	There is an over moment violation.	- Envelope control system equipped vehicle only.
0018	0	18	UNDER MOMENT - HYDRAULICS SUSPENDED	There is an under moment violation.	- Envelope control system equipped vehicle only.
0019	0	19	MAIN ENVELOPE ENCROACHED - HYDRAULICS SUSPENDED	There is a main envelope violation.	- Main envelope system equipped vehicle only.
0020	0	20	TOWER ENVELOPE ENCROACHED - HYDRAULICS SUSPENDED	There is a tower envelope violation.	- Tower envelope system equipped vehicle only.
210	**2**	**1**	**<<< POWER-UP >>>**		
211	2	1	POWER CYCLE	The normal help message is issued at each power cycle.	
212	2	1	KEYSWITCH FAULTY	Both Platform and Ground modes are selected simultaneously.	

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Table 6-13. Diagnostic Trouble Code Chart

DTC	Flash Code	Sequence	Fault Message	Fault Description	Check
213	2	1	FSW FAULTY	Both Footswitches are closed for more then one second.	
220	**2**	**2**	**<<< PLATFORM CONTROLS >>>**		
227	2	2	STEER SWITCHES FAULTY	Both Steer Left and Steer Right inputs are closed simultaneously.	
2211	2	2	FSW INTERLOCK TRIPPED	The Footswitch was closed for more then seven seconds.	- Can be reported during power-up.
2212	2	2	DRIVE LOCKED - JOYSTICK MOVED BEFORE FOOTSWITCH	A drive function was selected with Footswitch open.	- Can be reported during power-up.
2213	2	2	STEER LOCKED - SELECTED BEFORE FOOTSWITCH	A steer function was selected with Footswitch open.	
2215	2	2	D/S JOY. OUT OF RANGE LOW	The D/S Joystick reference voltage is low.	- Resistive joysticks, these faults do not occur.
2216	2	2	D/S JOY. OUT OF RANGE HIGH	The D/S Joystick reference voltage is > 8.1V.	- Resistive joysticks. - If the reference voltage is > 7.7V then the reference voltage is out of tolerance of a short to battery has occurred.
2217	2	2	D/S JOY. CENTER TAP BAD	The D/S Joystick center tap voltage is < 3.08V or > 3.83V.	- Resistive joysticks. - There is a +/- .1V range. around these values due to resistor tolerances
2218	2	2	L/S JOY. OUT OF RANGE LOW	The L/S Joystick reference voltage is low.	- Resistive joysticks, these faults do not occur.
2219	2	2	L/S JOY. OUT OF RANGE HIGH	The L/S Joystick reference voltage is > 8.1V.	- Resistive joysticks. - If the reference voltage is > 7.7V then the reference voltage is out of tolerance of a short to battery has occurred.
2220	2	2	L/S JOY. CENTER TAP BAD	The L/S Joystick center tap voltage is < 3.08V or > 3.83V.	- Resistive joysticks. - There is a +/- .1V range. around these values due to resistor tolerances
2221	2	2	LIFT/SWING LOCKED - JOYSTICK MOVED BEFORE FOOTSWITCH	A lift / swing function was selected with Footswitch open.	
2222	2	2	WAITING FOR FSW TO BE OPEN	The Footswitch was closed during Platform selection.	- Can be reported during power-up.
2223	2	2	FUNCTION SWITCHES LOCKED - SELECTED BEFORE ENABLE	A boom function was selected with Footswitch open.	
2224	2	2	FOOTSWITCH SELECTED BEFORE START	The Footswitch was closed during engine start.	
230	**2**	**3**	**<<< GROUND CONTROLS >>>**		
234	2	3	FUNCTION SWITCHES FAULTY - CHECK DIAGNOSTICS/BOOM	A boom function has both directions selected together.	
235	2	3	FUNCTION SWITCHES LOCKED - SELECTED BEFORE AUX POWER	A boom function was selected before aux power.	

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Table 6-13. Diagnostic Trouble Code Chart

DTC	Flash Code	Sequence	Fault Message	Fault Description	Check
236	2	3	FUNCTION SWITCHES LOCKED - SELECTED BEFORE START SWITCH	A boom function was selected before engine start.	
237	2	3	START SWITCH LOCKED - SELECTED BEFORE KEYSWITCH	The Start Switch was closed during power-up.	
250	**2**	**5**	**<<< FUNCTION PREVENTED >>>**		
259	2	5	MODEL CHANGED - HYDRAULICS SUSPENDED - CYCLE EMS	The model selection has been changed.	
2513	2	5	GENERATOR MOTION CUTOUT ACTIVE	Driving is not possible while the vehicle generator is running AND is configured to prevent drive.	
2514	2	5	BOOM PREVENTED - DRIVE SELECTED	Boom functions are not possible while the vehicle is being driven AND is configured to not allow simultaneous drive & boom operation.	
2515	2	5	DRIVE PREVENTED - BOOM SELECTED	Driving is not possible while the vehicle above elevation AND is configured to prevent drive while above elevation.	
2516	2	5	DRIVE PREVENTED - ABOVE ELEVATION	Driving is not possible while Boom functions are selected AND is configured to not allow simultaneous drive & boom operation.	
2517	2	5	DRIVE PREVENTED - TILTED & ABOVE ELEVATION	Driving is not possible while the vehicle is tilted and above elevation AND is configured to prevent drive while tilted and above elevation.	
2521	2	5	JIB SWING PREVENTED - IN 1000# MODE	JIB Swing is not possible while the vehicle is in 1000 LB Mode.	
2522	2	5	CAN DONGLE ATTACHED - HYDRAULICS NOT RESTRICTED	CAN Dongle attached. Very limited restrictions for all hydraulics systems.	
2523	2	5	BACKUP BLAM COMMUNICATIONS ACTIVE	RS232 serial backup communications link to the BLAM is active.	
2524	2	5	DISCONNECT ANALYZER AND CYCLE EMS TO PERFORM BOOM RETRIEVAL	RS232 serial backup communications link to the BLAM is needed but an analyzer is connected.	
2587	2	5	RUNNING AT CREEP - PLATFORM LEVELED UNDER	The control system has determined that the platform is leveled under and is being considered to be in a loading/unloading position. Boom, Tower, and Level Override functions will operate at creep speed.	

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Table 6-13. Diagnostic Trouble Code Chart

DTC	Flash Code	Sequence	Fault Message	Fault Description	Check
330	**3**	**3**	**<<< GROUND OUTPUT DRIVER >>>**		
331	3	3	BRAKE - SHORT TO BATTERY	There is a Short to Battery to the Brake Valve.	
332	3	3	BRAKE - OPEN CIRCUIT	There is an Open Circuit to the Brake Valve.	
3311	3	3	GROUND ALARM - SHORT TO BATTERY	There is a Short to Battery to the Ground Alarm.	- Ground Alarm equipped vehicles only.
3316	3	3	RIGHT FORWARD DRIVE PUMP - SHORT TO GROUND	There is a Short to Ground to the Right Forward Drive Valve.	- Chassis Module equipped vehicles only.
3317	3	3	RIGHT FORWARD DRIVE PUMP - OPEN CIRCUIT	There is an Open Circuit to the Right Forward Drive Valve.	- Chassis Module equipped vehicles only.
3318	3	3	RIGHT FORWARD DRIVE PUMP - SHORT TO BATTERY	There is a Short to Battery to the Right Forward Drive Valve.	- Chassis Module equipped vehicles only.
3320	3	3	RIGHT REVERSE DRIVE PUMP - SHORT TO GROUND	There is a Short to Ground to the Right Reverse Drive Valve.	- Chassis Module equipped vehicles only.
3321	3	3	RIGHT REVERSE DRIVE PUMP - OPEN CIRCUIT	There is an Open Circuit to the Right Reverse Drive Valve.	- Chassis Module equipped vehicles only.
3322	3	3	RIGHT REVERSE DRIVE PUMP - SHORT TO BATTERY	There is a Short to Battery to the Right Reverse Drive Valve.	- Chassis Module equipped vehicles only.
3324	3	3	LEFT FORWARD DRIVE PUMP - SHORT TO GROUND	There is a Short to Ground to the Left Forward Drive Valve.	- Chassis Module equipped vehicles only.
3325	3	3	LEFT FORWARD DRIVE PUMP - OPEN CIRCUIT	There is an Open Circuit to the Left Forward Drive Valve.	- Chassis Module equipped vehicles only.
3326	3	3	LEFT FORWARD DRIVE PUMP - SHORT TO BATTERY	There is a Short to Battery to the Left Forward Drive Valve.	- Chassis Module equipped vehicles only.
3328	3	3	LEFT REVERSE DRIVE PUMP - SHORT TO GROUND	There is a Short to Ground to the Left Reverse Drive Valve.	- Chassis Module equipped vehicles only.
3329	3	3	LEFT REVERSE DRIVE PUMP - OPEN CIRCUIT	There is an Open Circuit to the Left Reverse Drive Valve.	- Chassis Module equipped vehicles only.
3330	3	3	LEFT REVERSE DRIVE PUMP - SHORT TO BATTERY	There is a Short to Battery to the Left Reverse Drive Valve.	- Chassis Module equipped vehicles only.
3336	3	3	ALTERNATOR/ECM POWER - SHORT TO GROUND	There is a Short to Ground to the Alternator/ECM.	
3338	3	3	ALTERNATOR POWER - OPEN CIRCUIT	There is an Open Circuit to the Alternator.	

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Table 6-13. Diagnostic Trouble Code Chart

DTC	Flash Code	Sequence	Fault Message	Fault Description	Check
3339	3	3	ALTERNATOR POWER - SHORT TO BATTERY	There is a Short to Battery to the Alternator	
3340	3	3	AUX POWER - SHORT TO GROUND	There is a Short to Ground to the Auxiliary Power Pump Relay.	
3341	3	3	AUX POWER - OPEN CIRCUIT	There is an Open Circuit to the Auxiliary Power Pump Relay.	
3342	3	3	AUX POWER - SHORT TO BATTERY	There is a Short to Battery to the Auxiliary Power Pump Relay.	
3343	3	3	COLD START ADVANCE SOLENOID - SHORT TO GROUND	There is a Short to Ground to the Cold Start Advance Solenoid.	- CAT engines only.
3344	3	3	COLD START ADVANCE SOLENOID - OPEN CIRCUIT	There is an Open Circuit to the Cold Start Advance Solenoid.	- CAT engines only.
3345	3	3	COLD START ADVANCE SOLENOID - SHORT TO BATTERY	There is a Short to Battery to the Cold Start Advance Solenoid.	- CAT engines only.
3349	3	3	ELECTRIC PUMP - SHORT TO GROUND	There is a Short to Ground to the Pump Relay.	- CAT engines only.
3350	3	3	ELECTRIC PUMP - OPEN CIRCUIT	There is an Open Circuit to the Pump Relay.	- CAT engines only.
3351	3	3	ELECTRIC PUMP - SHORT TO BATTERY	There is a Short to Battery to the Pump Relay.	- CAT engines only.
3358	3	3	MAIN DUMP VALVE - SHORT TO GROUND	There is a Short to Ground to the Main Dump Valve.	
3359	3	3	MAIN DUMP VALVE - OPEN CIRCUIT	There is an Open Circuit to the Main Dump Valve.	
3360	3	3	MAIN DUMP VALVE - SHORT TO BATTERY	There is a Short to Battery to the Main Dump Valve.	
3361	3	3	BRAKE - SHORT TO GROUND	There is a Short to Ground to the Brake Valve.	
3362	3	3	START SOLENOID - SHORT TO GROUND	There is a Short to Ground to the Start Relay.	- Diesel engines only.
3363	3	3	START SOLENOID - OPEN CIRCUIT	There is an Open Circuit to the Start Relay.	- Diesel engines only.
3364	3	3	START SOLENOID - SHORT TO BATTERY	There is a Short to Battery to the Start Relay.	- Diesel engines only.
3368	3	3	TWO SPEED VALVE - SHORT TO GROUND	There is a Short to Ground to the Two Speed Valve.	
3369	3	3	TWO SPEED VALVE - OPEN CIRCUIT	There is an Open Circuit to the Two Speed Valve.	
3370	3	3	TWO SPEED VALVE - SHORT TO BATTERY	There is a Short to Battery to the Two Speed Valve.	
3371	3	3	GROUND ALARM - SHORT TO GROUND	There is a Short to Ground to the Ground Alarm.	- Ground Alarm equipped vehicles only.

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Table 6-13. Diagnostic Trouble Code Chart

DTC	Flash Code	Sequence	Fault Message	Fault Description	Check
3372	3	3	GROUND ALARM - OPEN CIRCUIT	There is an Open Circuit to the Ground Alarm.	- Ground Alarm equipped vehicles only.
3373	3	3	GEN SET/WELDER - SHORT TO GROUND	There is a Short to Ground to the Generator Relay.	- Generator / Welder equipped vehicles only.
3374	3	3	GEN SET/WELDER - OPEN CIRCUIT	There is an Open Circuit to the Generator Relay.	- Generator / Welder equipped vehicles only.
3375	3	3	GEN SET/WELDER - SHORT TO BATTERY	There is a Short to Battery to the Generator Relay.	- Generator / Welder equipped vehicles only.
3376	3	3	HEAD TAIL LIGHT - SHORT TO GROUND	There is a Short to Ground to the Head Light Relay.	- Head Light equipped vehicles only.
3377	3	3	HEAD TAIL LIGHT - OPEN CIRCUIT	There is an Open Circuit to the Head Light Relay.	- Head Light equipped vehicles only.
3378	3	3	HEAD TAIL LIGHT - SHORT TO BATTERY	There is a Short to Battery to the Head Light Relay.	- Head Light equipped vehicles only.
3379	3	3	HOUR METER - SHORT TO GROUND	There is a Short to Ground to the Hour Meter.	
3380	3	3	HOUR METER - OPEN CIRCUIT	There is an Open Circuit to the Hour Meter.	- Can be reported during power-up.
3381	3	3	HOUR METER - SHORT TO BATTERY	There is a Short to Battery to the Hour Meter.	
3385	3	3	PLATFORM LEVEL UP OVERRIDE VALVE - SHORT TO GROUND	There is a Short to Ground to the Platform Level Up Override Valve.	- Electronic leveling system equipped vehicles only.
3386	3	3	PLATFORM LEVEL UP OVERRIDE VALVE - OPEN CIRCUIT	There is an Open Circuit to the Platform Level Up Override Valve.	- Electronic leveling system equipped vehicles only.
3387	3	3	PLATFORM LEVEL UP OVERRIDE VALVE - SHORT TO BATTERY	There is a Short to Battery to the Platform Level Up Override Valve.	- Electronic leveling system equipped vehicles only.
3391	3	3	PLATFORM LEVEL DOWN OVERRIDE VALVE - SHORT TO GROUND	There is a Short to Ground to the Platform Level Down Override Valve.	- Electronic leveling system equipped vehicles only.
3392	3	3	PLATFORM LEVEL DOWN OVERRIDE VALVE - OPEN CIRCUIT	There is an Open Circuit to the Platform Level Down Override Valve.	- Electronic leveling system equipped vehicles only.
3393	3	3	PLATFORM LEVEL DOWN OVERRIDE VALVE - SHORT TO BATTERY	There is a Short to Battery to the Platform Level Down Override Valve.	- Electronic leveling system equipped vehicles only.
3394	3	3	PLATFORM ROTATE LEFT VALVE - SHORT TO GROUND	There is a Short to Ground to the Platform Rotate Left Valve.	
3395	3	3	PLATFORM ROTATE LEFT VALVE - OPEN CIRCUIT	There is an Open Circuit to the Platform Rotate Left Valve.	
3396	3	3	PLATFORM ROTATE LEFT VALVE - SHORT TO BATTERY	There is a Short to Battery to the Platform Rotate Left Valve.	

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Table 6-13. Diagnostic Trouble Code Chart

DTC	Flash Code	Sequence	Fault Message	Fault Description	Check
3397	3	3	PLATFORM ROTATE RIGHT VALVE - SHORT TO GROUND	There is a Short to Ground to the Platform Rotate Right Valve.	
3398	3	3	PLATFORM ROTATE RIGHT VALVE - OPEN CIRCUIT	There is an Open Circuit to the Platform Rotate Right Valve.	
3399	3	3	PLATFORM ROTATE RIGHT VALVE - SHORT TO BATTERY	There is a Short to Battery to the Platform Rotate Right Valve.	
33100	3	3	JIB LIFT UP VALVE - SHORT TO GROUND	There is a Short to Ground to the JIB Lift Up Valve.	
33101	3	3	JIB LIFT UP VALVE - OPEN CIRCUIT	There is an Open Circuit to the JIB Lift Up Valve.	
33102	3	3	JIB LIFT UP VALVE - SHORT TO BATTERY	There is a Short to Battery to the JIB Lift Up Valve.	
33103	3	3	JIB LIFT DOWN VALVE - SHORT TO GROUND	There is a Short to Ground to the JIB Lift Down Valve.	
33104	3	3	JIB LIFT DOWN VALVE - OPEN CIRCUIT	There is an Open Circuit to the JIB Lift Down Valve.	
33105	3	3	JIB LIFT DOWN VALVE - SHORT TO BATTERY	There is a Short to Battery to the JIB Lift Down Valve.	
33118	3	3	SWING RIGHT VALVE - SHORT TO GROUND	There is a Short to Ground to the Swing Right Valve.	
33119	3	3	SWING RIGHT VALVE - OPEN CIRCUIT	There is an Open Circuit to the Swing Right Valve.	
33120	3	3	MAIN TELESCOPE IN VALVE - SHORT TO BATTERY	There is a Short to Battery to the Main Telescope In Valve.	
33121	3	3	SWING RIGHT VALVE - SHORT TO BATTERY	There is a Short to Battery to the Swing Right Valve.	
33122	3	3	SWING LEFT VALVE - SHORT TO GROUND	There is a Short to Ground to the Swing Left Valve.	
33123	3	3	MAIN TELESCOPE OUT VALVE - SHORT TO BATTERY	There is a Short to Battery to the Main Telescope Out Valve.	
33130	3	3	THROTTLE ACTUATOR - SHORT TO GROUND	There is a Short to Ground to the Throttle Actuator.	
33131	3	3	THROTTLE ACTUATOR - OPEN CIRCUIT	There is an Open Circuit to the Throttle Actuator.	
33132	3	3	THROTTLE ACTUATOR - SHORT TO BATTERY	There is a Short to Battery to the Throttle Actuator.	
33133	3	3	PLATFORM CONTROL VALVE - SHORT TO GROUND	There is a Short to Ground to the Platform Control Valve.	- Electronic leveling system equipped vehicles only.
33134	3	3	PLATFORM CONTROL VALVE - OPEN CIRCUIT	There is an Open Circuit to the Platform Control Valve.	- Electronic leveling system equipped vehicles only.

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Table 6-13. Diagnostic Trouble Code Chart

DTC	Flash Code	Sequence	Fault Message	Fault Description	Check
33135	3	3	PLATFORM CONTROL VALVE - SHORT TO BATTERY	There is a Short to Battery to the Platform Control Valve.	- Electronic leveling system equipped vehicles only.
33136	3	3	MAIN LIFT APU VALVE - SHORT TO GROUND	There is a Short to Ground to the Main Lift APU Valve.	- 1250AJP only.
33137	3	3	MAIN LIFT APU VALVE - OPEN CIRCUIT	There is an Open Circuit to the Main Lift APU Valve.	- 1250AJP only.
33138	3	3	MAIN LIFT APU VALVE - SHORT TO BATTERY	There is a Short to Battery to the Main Lift APU Valve.	- 1250AJP only.
33139	3	3	MAIN LIFT PILOT - PRESSURE FAILURE	The Main Lift Pilot has a Pressure Failure.	- 1250AJP only.
33140	3	3	MAIN LIFT PILOT - NO PRESSURE	The Main Lift Pilot has No Pressure.	- 1250AJP only.
33141	3	3	MAIN LIFT PILOT - PRESSURE SWITCH FAILURE	The Main Lift Pilot has a Pressure Switch Failure.	- 1250AJP only.
33142	3	3	TOWER LIFT APU VALVE - STUCK OPEN	The Tower Lift APU Valve is Stuck Open	- 1250AJP only.
33143	3	3	TOWER LIFT ENABLE VALVE - STUCK OPEN	The Tower Lift Enable Valve is Stuck Open	- 1250AJP only.
33144	3	3	TOWER LIFT ENABLE VALVE - SHORT TO GROUND	There is a Short to Ground to the Tower Lift Enable Valve.	- 1250AJP only.
33145	3	3	TOWER LIFT ENABLE VALVE - OPEN CIRCUIT	There is an Open Circuit to the Tower Lift Enable Valve.	- 1250AJP only.
33146	3	3	TOWER LIFT ENABLE VALVE - SHORT TO BATTERY	There is a Short to Battery to the Tower Lift Enable Valve.	- 1250AJP only.
33147	3	3	TOWER TELESCOPE APU VALVE - SHORT TO GROUND	There is a Short to Ground to the Tower Telescope APU Valve.	- 1250AJP only.
33148	3	3	TOWER TELESCOPE APU VALVE - OPEN CIRCUIT	There is an Open Circuit to the Tower Telescope APU Valve.	- 1250AJP only.
33149	3	3	TOWER TELESCOPE APU VALVE - SHORT TO BATTERY	There is a Short to Battery to the Tower Telescope APU Valve.	- 1250AJP only.
33150	3	3	LIFT PILOT VALVE - SHORT TO GROUND	There is a Short to Ground to the Lift Pilot Valve.	- Gravity Lift Down equipped vehicles only.
33151	3	3	LIFT PILOT VALVE - OPEN CIRCUIT	There is an Open Circuit to the Lift Pilot Valve.	- Gravity Lift Down equipped vehicles only.
33152	3	3	LIFT PILOT VALVE - SHORT TO BATTERY	There is a Short to Battery to the Lift Pilot Valve.	- Gravity Lift Down equipped vehicles only.
33153	3	3	LIFT DOWN AUX VALVE - SHORT TO GROUND	There is a Short to Ground to the Lift Down Auxiliary Valve.	- Gravity Lift Down equipped vehicles only.

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Table 6-13. Diagnostic Trouble Code Chart

DTC	Flash Code	Sequence	Fault Message	Fault Description	Check
33154	3	3	LIFT DOWN AUX VALVE - OPEN CIRCUIT	There is an Open Circuit to the Lift Down Auxiliary Valve.	- Gravity Lift Down equipped vehicles only.
33155	3	3	LIFT DOWN AUX VALVE - SHORT TO BATTERY	There is a Short to Battery to the Lift Down Auxiliary Valve.	- Gravity Lift Down equipped vehicles only.
33156	3	3	TOWER LIFT APU VALVE - SHORT TO GROUND	There is a Short to Ground to the Tower Lift APU Valve.	- 1250AJP only.
33157	3	3	TOWER LIFT APU VALVE - OPEN CIRCUIT	There is an Open Circuit to the Tower Lift APU Valve.	- 1250AJP only.
33158	3	3	TOWER LIFT APU VALVE - SHORT TO BATTERY	There is a Short to Battery to the Tower Lift APU Valve.	- 1250AJP only.
33159	3	3	MAIN LIFT ENABLE VALVE - SHORT TO GROUND	There is a Short to Ground to the Main Lift Enable Valve.	- 1250AJP only.
33160	3	3	MAIN LIFT ENABLE VALVE - OPEN CIRCUIT	There is an Open Circuit to the Main Lift Enable Valve.	- 1250AJP only.
33161	3	3	MAIN LIFT ENABLE VALVE - SHORT TO BATTERY	There is a Short to Battery to the Main Lift Enable Valve.	- 1250AJP only.
33162	3	3	TOWER TELESCOPE APU VALVE - STUCK OPEN	The Tower Telescope APU Valve is Stuck Open	- 1250AJP only.
33163	3	3	TOWER TELESCOPE ENABLE VALVE - STUCK OPEN	The Tower Telescope Enable Valve is Stuck Open	- 1250AJP only.
33164	3	3	TOWER TELESCOPE ENABLE VALVE - SHORT TO GROUND	There is a Short to Ground to the Tower Telescope APU Valve.	- 1250AJP only.
33165	3	3	TOWER TELESCOPE ENABLE VALVE - OPEN CIRCUIT	There is an Open Circuit to the Tower Telescope APU Valve.	- 1250AJP only.
33166	3	3	TOWER TELESCOPE ENABLE VALVE - SHORT TO BATTERY	There is a Short to Battery to the Tower Telescope APU Valve.	- 1250AJP only.
33167	3	3	PVG ENABLE VALVE - SHORT TO GROUND	There is a Short to Ground to the PVG Valve.	- 1250AJP only.
33168	3	3	PVG ENABLE VALVE - OPEN CIRCUIT	There is an Open Circuit to the PVG Valve.	- 1250AJP only.
33169	3	3	PVG ENABLE VALVE - SHORT TO BATTERY	There is a Short to Battery to the PVG Valve.	- 1250AJP only.
33173	3	3	RESTRICTED TO TRANSPORT - AXLE LOCKOUT VALVE - SHORT TO BATTERY OR OPEN CIRCUIT	There is a Short to Battery or an Open Circuit to the Axle Lockout Valve.	
33174	3	3	RESTRICTED TO TRANSPORT - BRAKE - SHORT TO BATTERY OR OPEN CIRCUIT	There is a Short to Battery or an Open Circuit to the Brake.	

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Table 6-13. Diagnostic Trouble Code Chart

DTC	Flash Code	Sequence	Fault Message	Fault Description	Check
33175	3	3	JIB ROTATE LEFT VALVE - OPEN CIRCUIT	There is an Open Circuit to the JIB Rotate Left Valve.	
33176	3	3	JIB ROTATE LEFT VALVE - SHORT TO BATTERY	There is a Short to Battery to the JIB Rotate Left Valve.	
33177	3	3	JIB ROTATE LEFT VALVE - SHORT TO GROUND	There is a Short to Ground to the JIB Rotate Left Valve.	
33178	3	3	JIB ROTATE RIGHT VALVE - OPEN CIRCUIT	There is an Open Circuit to the JIB Rotate Right Valve.	
33179	3	3	JIB ROTATE RIGHT VALVE - SHORT TO BATTERY	There is a Short to Battery to the JIB Rotate Right Valve.	
33180	3	3	JIB ROTATE RIGHT VALVE - SHORT TO GROUND	There is a Short to Ground to the JIB Rotate Right Valve.	
33181	3	3	MAIN LIFT UP VALVE - OPEN CIRCUIT	There is an Open Circuit to the Main Lift Up Valve.	
33183	3	3	MAIN LIFT UP VALVE - SHORT TO GROUND	There is a Short to Ground to the Main Lift Up Valve.	
33184	3	3	MAIN LIFT DOWN VALVE - OPEN CIRCUIT	There is an Open Circuit to the Main Lift Down Valve.	
33185	3	3	MAIN LIFT DOWN VALVE - SHORT TO GROUND	There is a Short to Ground to the Main Lift Down Valve.	
33186	3	3	MAIN TELESCOPE OUT VALVE - OPEN CIRCUIT	There is an Open Circuit to the Main Telescope Out Valve.	
33188	3	3	MAIN TELESCOPE OUT VALVE - SHORT TO GROUND	There is a Short to Ground to the Main Telescope Out Valve.	
33189	3	3	MAIN TELESCOPE IN VALVE - OPEN CIRCUIT	There is an Open Circuit to the Main Telescope In Valve.	
33190	3	3	MAIN TELESCOPE IN VALVE - SHORT TO GROUND	There is a Short to Ground to the Main Telescope In Valve.	
33207	3	3	HORN - OPEN CIRCUIT	There is an Open Circuit to the Horn.	
33208	3	3	HORN - SHORT TO BATTERY	There is a Short to Battery to the Horn.	
33209	3	3	HORN - SHORT TO GROUND	There is a Short to Ground to the Horn.	
33279	3	3	GLOWPLUG - OPEN CIRCUIT	There is an Open Circuit to the Glow Plugs.	- Glowplugs equipped vehicles only.
33280	3	3	GLOWPLUG - SHORT TO BATTERY	There is a Short to Battery to the Glow Plugs.	- Glowplugs equipped vehicles only.
33281	3	3	GLOWPLUG - SHORT TO GROUND	There is a Short to Ground to the Glow Plugs.	- Glowplugs equipped vehicles only.
33295	3	3	SWING LEFT VALVE - OPEN CIRCUIT	There is an Open Circuit to the Swing Left Valve.	

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Table 6-13. Diagnostic Trouble Code Chart

DTC	Flash Code	Sequence	Fault Message	Fault Description	Check
33306	3	3	SWING LEFT VALVE - SHORT TO BATTERY	There is a Short to Battery to the Swing Left Valve.	
33307	3	3	MAIN TELESCOPE FLOW CONTROL VALVE - SHORT TO GROUND	There is a Short to Ground to the Main Telescope Flow Control Valve.	
33308	3	3	MAIN TELESCOPE FLOW CONTROL VALVE - OPEN CIRCUIT	There is an Open Circuit to the Main Telescope Flow Control Valve.	
33309	3	3	MAIN TELESCOPE FLOW CONTROL VALVE - SHORT TO BATTERY	There is a Short to Battery to the Main Telescope Flow Control Valve.	
33310	3	3	MAIN LIFT DOWN VALVE - SHORT TO BATTERY	There is a Short to Battery to the Main Lift Down Valve.	
33311	3	3	MAIN LIFT FLOW CONTROL VALVE - SHORT TO GROUND	There is a Short to Ground to the Main Lift Flow Control Valve.	
33312	3	3	MAIN LIFT FLOW CONTROL VALVE - OPEN CIRCUIT	There is an Open Circuit to the Main Lift Flow Control Valve.	
33313	3	3	MAIN LIFT FLOW CONTROL VALVE - SHORT TO BATTERY	There is a Short to Battery to the Main Lift Flow Control Valve.	
33329	3	3	MAIN LIFT UP VALVE - SHORT TO BATTERY	There is a Short to Battery to the Main Lift Up Valve.	
340	**3**	**4**	**<<< PLATFORM OUTPUT DRIVER >>>**		
343	3	4	PLATFORM LEVEL UP VALVE - SHORT TO GROUND	There is a Short to Ground to the Platform Level Up Valve.	
344	3	4	PLATFORM LEVEL UP VALVE - SHORT TO BATTERY OR OPEN CIRCUIT	There is a Short to Battery or an Open Circuit to the Platform Level Up Valve.	- Electronic leveling system equipped vehicles only.
347	3	4	PLATFORM LEVEL DOWN VALVE - SHORT TO GROUND	There is a Short to Ground to the Platform Level Down Valve.	
348	3	4	PLATFORM LEVEL DOWN VALVE - SHORT TO BATTERY OR OPEN CIRCUIT	There is a Short to Battery or an Open Circuit to the Platform Level Down Valve.	- Electronic leveling system equipped vehicles only.
430	**4**	**3**	**<<< ENGINE >>>**		
431	4	3	FUEL SENSOR SHORT TO BATTERY	The Fuel Sensor reading is > 4.3V.	
432	4	3	FUEL SENSOR SHORT TO GROUND	The Fuel Sensor reading is < 0.2V.	
433	4	3	OIL PRESSURE SHORT TO BATTERY	The Oil Pressure Sensor reading is > 6.6V.	- Deutz engine only.

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Table 6-13. Diagnostic Trouble Code Chart

DTC	Flash Code	Sequence	Fault Message	Fault Description	Check
434	4	3	OIL PRESSURE SHORT TO GROUND	The Oil Pressure Sensor reading is < 0.1V for more then 5 seconds.	- Deutz engine only. - Not reported during engine start.
435	4	3	COOLANT TEMPERATURE SHORT TO GROUND	The Coolant Temperature Sensor reading is < 0.1V.	- Deutz engine only.
437	4	3	ENGINE TROUBLE CODE	Displays engine SPN FMI code.	
438	4	3	HIGH ENGINE TEMP	(Ford engine only) The engine temperature is > 117 C. (Deutz engine only) The engine temperature is > 130 C.	- Ford / Deutz engine only.
439	4	3	AIR FILTER BYPASSED	The Air Filter is clogged.	
4310	4	3	NO ALTERNATOR OUTPUT	Battery voltage is < 11.5 volts for more then 15 seconds after engine start.	
4311	4	3	LOW OIL PRESSURE	(Ford engine only) The ECM has reported a low oil pressure fault. (Deutz engine only) Oil pressure is < 8 PSI for more then 10 seconds after engine start.	- Ford / Deutz engine only.
4313	4	3	THROTTLE ACTUATOR FAILURE	The engine RPM is > XXX for more then XX seconds.	
4314	4	3	WRONG ENGINE SELECTED - ECM DETECTED	A ECM was detected with a non-ECM type engine selected.	
4322	4	3	LOSS OF ENGINE SPEED SENSOR	The engine RPM sensor indicates 0 RPM AND the Oil Pressure Sensor indicates > 8 PSI for three seconds.	- Diesel engine only.
4323	4	3	SPEED SENSOR READING INVALID SPEED	The engine RPM sensor indicates > 4000 RPM.	- Diesel engine only.
4375	4	3	WATER IN FUEL	The engine has shut down because an unacceptable amount of water has been detected in the fuel or there is an issue with the water in fuel sensor. If operating in platform mode, platform alarm will sound continuously and low fuel indicator will flash. If operating in ground mode, the ground alarm will sound	Water in fuel filter for water or in fuel or water in fuel sensor.

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Table 6-13. Diagnostic Trouble Code Chart

DTC	Flash Code	Sequence	Fault Message	Fault Description	Check
4376	4	3	FUNCTIONS PREVENTED - ENGINE OIL WARM UP ACTIVE	Engine Oil Warm Up is active because the engine was started when the engine coolant was less than 32 deg F. Engine Oil Warm Up will remain active until the engine coolant is greater than 32 deg F or the engine has been running for 60s and the engine coolant is less than 32 deg F. Machine functions will be prevented until Engine Oil Warm Up is complete.	
440	**4**	**4**	**<<< BATTERY SUPPLY >>>**		
441	4	4	BATTERY VOLTAGE TOO LOW - SYSTEM SHUTDOWN	Battery voltage is < 9V.	
442	4	4	BATTERY VOLTAGE TOO HIGH - SYSTEM SHUTDOWN	Battery voltage is > 16V.	
443	4	4	LSS BATTERY VOLTAGE TOO HIGH	The load sensor has determined that its supply voltage is too high (> 16V). The machine will assume the platform is overloaded.	Check for issue with sensor supply voltage.
444	4	4	LSS BATTERY VOLTAGE TOO LOW	The load sensor has determined that its supply voltage is too low (> 8V). The machine will assume the platform is overloaded.	Check for issue with sensor supply voltage.
445	4	4	BATTERY VOLTAGE LOW	Battery voltage is < 11V for more then 5 seconds.	
4479	4	4	LSS BATTERY VOLTAGE - INITIALIZATION ERROR	The shear beam is reporting a Sensor Supply Voltage Initialization Error The machine will assume the platform is overloaded. This fault, once annunciated is latched within a given key cycle.	Possible sensor hardware issue.
4480	4	4	LSS BATTERY VOLTAGE - NOT CALIBRATED	The shear beam is reporting a Sensor Supply Voltage calibration error. The machine will assume the platform is overloaded. This fault, once annunciated is latched within a given key cycle.	Possible sensor hardware issue.

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Table 6-13. Diagnostic Trouble Code Chart

DTC	Flash Code	Sequence	Fault Message	Fault Description	Check
450	**4**	**5**	**<<< CAN CONTROLLED VALVES >>>**		
451	4	5	MAIN LIFT PVG VALVE - INTERNAL FAULT	The Main Lift PVG Valve has an internal fault.	- 1250AJP only.
452	4	5	TOWER LIFT PVG VALVE - INTERNAL FAULT	The Tower Lift PVG Valve has an internal fault.	- 1250AJP only.
453	4	5	TOWER TELESCOPE PVG VALVE - INTERNAL FAULT	The Tower Telescope PVG Valve has an internal fault.	- 1250AJP only.
454	4	5	MAIN LIFT PVG VALVE - HIGH VOLTAGE	The Main Lift PVG Valve supply voltage is high.	- 1250AJP only.
455	4	5	TOWER LIFT PVG VALVE - HIGH VOLTAGE	The Tower Lift PVG Valve supply voltage is high.	- 1250AJP only.
456	4	5	TOWER TELESCOPE PVG VALVE - HIGH VOLTAGE	The Tower Telescope PVG Valve supply voltage is high.	- 1250AJP only.
457	4	5	MAIN LIFT PVG VALVE - LOW VOLTAGE	The Main Lift PVG Valve supply voltage is low.	- 1250AJP only.
458	4	5	TOWER LIFT PVG VALVE - LOW VOLTAGE	The Tower Lift PVG Valve supply voltage is low.	- 1250AJP only.
459	4	5	TOWER TELESCOPE PVG VALVE - LOW VOLTAGE	The Tower Telescope PVG Valve supply voltage is low.	- 1250AJP only.
4510	4	5	MAIN LIFT PVG VALVE - STUCK NEUTRAL	The Main Lift PVG Valve is stuck in its neutral position.	- 1250AJP only.
4511	4	5	TOWER LIFT PVG VALVE - STUCK NEUTRAL	The Tower Lift PVG Valve is stuck in its neutral position.	- 1250AJP only.
4512	4	5	TOWER TELESCOPE PVG VALVE - STUCK NEUTRAL	The Tower Telescope PVG Valve is stuck in its neutral position.	- 1250AJP only.
4513	4	5	MAIN LIFT PVG VALVE - STUCK EXTENDED	The Main Lift PVG Valve is stuck in its extended position.	- 1250AJP only.
4514	4	5	TOWER LIFT PVG VALVE - STUCK EXTENDED	The Tower Lift PVG Valve is stuck in its extended position.	- 1250AJP only.
4515	4	5	TOWER TELESCOPE PVG VALVE - STUCK EXTENDED	The Tower Telescope PVG Valve is stuck in its extended position.	- 1250AJP only.
4516	4	5	MAIN LIFT PVG VALVE - STUCK RETRACTED	The Main Lift PVG Valve is stuck in its retracted position.	- 1250AJP only.
4517	4	5	TOWER LIFT PVG VALVE - STUCK RETRACTED	The Tower Lift PVG Valve is stuck in its retracted position.	- 1250AJP only.
4518	4	5	TOWER TELESCOPE PVG VALVE - STUCK RETRACTED	The Tower Telescope PVG Valve is stuck in its retracted position.	- 1250AJP only.
4519	4	5	MAIN LIFT PVG VALVE - OBSTRUCTED	The Main Lift PVG Valve is obstructed	- 1250AJP only.
4520	4	5	TOWER LIFT PVG VALVE - OBSTRUCTED	The Tower Lift PVG Valve is obstructed	- 1250AJP only.
4521	4	5	TOWER TELESCOPE PVG VALVE - OBSTRUCTED	The Tower Telescope PVG Valve is obstructed	- 1250AJP only.
4522	4	5	MAIN LIFT PVG VALVE - COMMAND IMPROPER	The Main Lift PVG Valve command is improper.	- 1250AJP only.
4523	4	5	TOWER LIFT PVG VALVE - COMMAND IMPROPER	The Tower Lift PVG Valve command is improper.	- 1250AJP only.

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Table 6-13. Diagnostic Trouble Code Chart

DTC	Flash Code	Sequence	Fault Message	Fault Description	Check
4524	4	5	TOWER TELESCOPE PVG VALVE - COMMAND IMPROPER	The Tower Telescope PVG Valve command is improper.	- 1250AJP only.
4525	4	5	MAIN LIFT PVG VALVE - TIMEOUT	The Main Lift PVG Valve has timed out.	- 1250AJP only.
4526	4	5	TOWER LIFT PVG VALVE - TIMEOUT	The Tower Lift PVG Valve has timed out.	- 1250AJP only.
4527	4	5	TOWER TELESCOPE PVG VALVE - TIMEOUT	The Tower Telescope PVG Valve has timed out.	- 1250AJP only.
4528	4	5	MAIN LIFT PVG VALVE - SETUP FAULT	The Main Lift PVG Valve has a setup fault.	- 1250AJP only.
4529	4	5	TOWER LIFT PVG VALVE - SETUP FAULT	The Tower Lift PVG Valve has a setup fault.	- 1250AJP only.
4530	4	5	TOWER TELESCOPE PVG VALVE - SETUP FAULT	The Tower Telescope PVG Valve has a setup fault.	- 1250AJP only.
4531	4	5	MAIN LIFT PVG VALVE - SENT UNRECOGNIZED FAULT	The Main Lift PVG Valve has an unrecognized fault.	- 1250AJP only.
4532	4	5	TOWER LIFT PVG VALVE - SENT UNRECOGNIZED FAULT	The Tower Lift PVG Valve has an unrecognized fault.	- 1250AJP only.
4533	4	5	TOWER TELESCOPE PVG VALVE - SENT UNRECOGNIZED FAULT	The Tower Telescope PVG Valve has an unrecognized fault.	- 1250AJP only.
4534	4	5	MAIN LIFT PVG VALVE - PARAMETERS INCORRECT	The Main Lift PVG Valve parameters are incorrect.	- 1250AJP only.
4535	4	5	TOWER LIFT PVG VALVE - PARAMETERS INCORRECT	The Tower Lift PVG Valve parameters are incorrect.	- 1250AJP only.
4536	4	5	TOWER TELESCOPE PVG VALVE - PARAMETERS INCORRECT	The Tower Telescope PVG Valve parameters are incorrect.	- 1250AJP only.
4537	4	5	MAIN LIFT PVG VALVE - LOCATION IMPROPER	The Main Lift PVG Valve is in the wrong location.	- 1250AJP only.
4538	4	5	TOWER LIFT PVG VALVE - LOCATION IMPROPER	The Tower Lift PVG Valve is in the wrong location.	- 1250AJP only.
4539	4	5	TOWER TELESCOPE PVG VALVE - LOCATION IMPROPER	The Tower Telescope PVG Valve is in the wrong location.	- 1250AJP only.
4540	4	5	MAIN LIFT PVG VALVE - WIRING INCORRECT	The Main Lift PVG Valve has incorrect wiring.	- 1250AJP only.
4541	4	5	TOWER LIFT PVG VALVE - WIRING INCORRECT	The Tower Lift PVG Valve has incorrect wiring.	- 1250AJP only.
4542	4	5	TOWER TELESCOPE PVG VALVE - WIRING INCORRECT	The Tower Telescope PVG Valve has incorrect wiring.	- 1250AJP only.
4543	4	5	MAIN LIFT PVG VALVE - SPOOL CANNOT REACH NEUTRAL	X	- 1250AJP only.
4544	4	5	TOWER LIFT PVG VALVE - SPOOL CANNOT REACH NEUTRAL	X	- 1250AJP only.
4545	4	5	TOWER TELESCOPE PVG VALVE - SPOOL CANNOT REACH NEUTRAL	X	- 1250AJP only.

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Table 6-13. Diagnostic Trouble Code Chart

DTC	Flash Code	Sequence	Fault Message	Fault Description	Check
660	**6**	**6**	**<<< COMMUNICATION >>>**		
662	6	6	CANBUS FAILURE - PLATFORM MODULE	Platform Module CAN communication lost.	
663	6	6	CANBUS FAILURE - LOAD SENSING SYSTEM MODULE	The control system has lost communication with the load sensing system load pin. The machine will assume the platform is overloaded.	Check wiring to load sensor.
666	6	6	CANBUS FAILURE - ENGINE CONTROLLER	Engine Control Module CAN communication lost.	- ECM equipped engine only.
667	6	6	CANBUS FAILURE - MAIN LIFT PVG	Main Lift PVG CAN communication lost.	- 1250AJP only.
668	6	6	CANBUS FAILURE - TOWER LIFT PVG	Tower Lift PVG CAN communication lost.	- 1250AJP only.
669	6	6	CANBUS FAILURE - TOWER TELESCOPE PVG	Tower Telescope PVG CAN communication lost.	- 1250AJP only.
6610	6	6	CANBUS FAILURE - BLAM	BLAM CAN communication lost.	- BLAM equipped vehicles only.
6611	6	6	CANBUS FAILURE - CHASSIS MODULE	Engine Control Module CAN communication lost.	- ECM equipped engine only.
6612	6	6	CANBUS FAILURE - CYLINDER LOAD PIN	Cylinder Load Pin CAN communication lost.	- Cylinder Load Pin equipped engine only.
6613	6	6	CANBUS FAILURE - EXCESSIVE CANBUS ERRORS	There has been > 500 Bus Off errors or >500 Bus Passive Errors.	
6614	6	6	CANBUS FAILURE - MAIN ANGLE SENSOR #1	Angle Sensor #1 CAN communication lost.	- 1250AJP only.
6615	6	6	CANBUS FAILURE - MAIN ANGLE SENSOR #2	Angle Sensor #2 CAN communication lost.	- 1250AJP only.
6622	6	6	CANBUS FAILURE - TCU MODULE	Machine Setup/ Telematics=YES, No device heartbeat for 30 sec	
6623	6	6	CANBUS FAILURE - GATEWAY MODULE	Machine Setup/ Telematics=YES, No device heartbeat for 30 sec	
6629	6	6	CANBUS FAILURE - TELEMATICS CANBUS LOADING TOO HIGH	X	-Telematics only
680	**6**	**8**	**<<< TELEMATICS >>>**		
681	6	8	REMOTE CONTRACT MANAGEMENT OVERRIDE - ALL FUNCTIONS IN CREEP	X	-Telematics only
810	**8**	**1**	**<<< TILT SENSOR >>>**		
813	8	1	CHASSIS TILT SENSOR NOT CALIBRATED	The Chassis Tilt Sensor has not been calibrated.	
815	8	1	CHASSIS TILT SENSOR DISAGREEMENT	X	

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Table 6-13. Diagnostic Trouble Code Chart

DTC	Flash Code	Sequence	Fault Message	Fault Description	Check
820	**8**	**2**	**<<< PLATFORM LOAD SENSE >>>**		
8211	8	2	LSS READING UNDER WEIGHT	LSS has been calibrated and the UGM has determined that the load sensing system reading is underweight while a period of time while operating drive or boom lift up at speeds greater than creep OR the UGM has determined that the load sensing system reading is less than -1.5 x Gross Platform Weight. The machine will assume the platform is overloaded. This fault, once annunciated is latched within a given key cycle.	Ensure platform is not resting on the ground or is not leveled at an extreme negative angle. Re-calibrate the load sensing system if the above items are not a factor.
8218	8	2	LSS SENSOR DISAGREEMENT	The control system has determined that the difference between the calculated load for sensor 1 and sensor 2 differ by more than 50lbs OR the internal strain gauge sensor 1 gross platform weight reading and the internal strain gauge sensor 2 gross platform weight reading differ by more than 200lbs. If the platform is not considered to be overloaded boom functions will be restricted to creep. This fault, once annunciated is latched within a given key cycle.	Attempt to re-calibrate the load sensing system. Possible sensor hardware issue.
822	8	2	LSS CELL #2 ERROR822822		
8222	8	2	LSS STRAIN GAUGE 1 - STAGNANT	The control system has determined that the strain gauge 1 reading in the load sensor is stagnant (not changing). If the platform is not considered to be overloaded boom functions will be restricted to creep.. If DTC 8223 is active in combination with DTC 8222 the machine will assume the platform is overloaded. This fault, once annunciated is latched within a given key cycle.	Possible sensor hardware issue.

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Table 6-13. Diagnostic Trouble Code Chart

DTC	Flash Code	Sequence	Fault Message	Fault Description	Check
8223	8	2	LSS STRAIN GAUGE 2 - STAGNANT	The control system has determined that the strain gauge 2 reading in the load sensor is stagnant (not changing). If the platform is not considered to be overloaded boom functions will be restricted to creep. If DTC 8222 is active in combination with DTC 8223 the machine will assume the platform is overloaded. This fault, once annunciated is latched within a given key cycle.	Possible sensor hardware issue.
8224	8	2	LSS STRAIN GAUGE 1 - OUT OF RANGE LOW	The shear beam is reporting an out of range low issue with the strain gauge 1 reading. If the platform is not overloaded the machine will be placed in to creep. If DTC 8225 is also active the machine will assume the platform is overloaded. This fault, once annunciated is latched within a given key cycle.	Possible sensor hardware issue.
8225	8	2	LSS STRAIN GAUGE 2 - OUT OF RANGE LOW	The shear beam is reporting an out of range low issue with the strain gauge 2 reading. If the platform is not overloaded the machine will be placed in to creep. If DTC 8224 is also active the machine will assume the platform is overloaded. This fault, once annunciated is latched within a given key cycle.	Possible sensor hardware issue.

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Table 6-13. Diagnostic Trouble Code Chart

DTC	Flash Code	Sequence	Fault Message	Fault Description	Check
8228	8	2	LSS STRAIN GAUGE 1 - INITIALIZATION ERROR	The shear beam is reporting an initialization issue with the strain gauge 1 sensor. If the platform is not overloaded the machine will be placed in to creep. If DTC 8229 is also active the machine will assume the platform is overloaded. This fault, once annunciated is latched within a given key cycle.	Possible sensor hardware issue.
8229	8	2	LSS STRAIN GAUGE 2 - INITIALIZATION ERROR	The shear beam is reporting an initialization issue with the strain gauge 2 sensor. If the platform is not overloaded the machine will be placed in to creep. If DTC 8228 is also active the machine will assume the platform is overloaded. This fault, once annunciated is latched within a given key cycle.	Possible sensor hardware issue.
8230	8	2	LSS STRAIN GAUGE 1 - NOT CALIBRATED	The shear beam is reporting a calibration issue with the strain gauge 1 sensor. If the platform is not overloaded the machine will be placed in to creep. If DTC 8231 is also active the machine will assume the platform is overloaded. This fault, once annunciated is latched within a given key cycle.	Possible sensor hardware issue.
823	8	2	LSS CELL #3 ERROR823823		

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Table 6-13. Diagnostic Trouble Code Chart

DTC	Flash Code	Sequence	Fault Message	Fault Description	Check
8231	8	2	LSS STRAIN GAUGE 2 - NOT CALIBRATED	The shear beam is reporting a calibration issue with the strain gauge 2 sensor. If the platform is not overloaded the machine will be placed in to creep. If DTC 8230 is also active the machine will assume the platform is overloaded. This fault, once annunciated is latched within a given key cycle.	Possible sensor hardware issue.
8226	8	2	LSS STRAIN GAUGE 1 - OUT OF RANGE HIGH	The shear beam is reporting an out of range high issue with the strain gauge 1 reading. If the platform is not overloaded the machine will be placed in to creep. If DTC 8227 is also active the machine will assume the platform is overloaded. This fault, once annunciated is latched within a given key cycle.	Possible sensor hardware issue.
8227	8	2	LSS STRAIN GAUGE 2 - OUT OF RANGE HIGH	The shear beam is reporting an out of range high issue with the strain gauge 2 reading. If the platform is not overloaded the machine will be placed in to creep. If DTC 8226 is also active the machine will assume the platform is overloaded. This fault, once annunciated is latched within a given key cycle.	Possible sensor hardware issue.

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Table 6-13. Diagnostic Trouble Code Chart

DTC	Flash Code	Sequence	Fault Message	Fault Description	Check
8232	8	2	LSS STRAIN GAUGE 1 - SENSOR DEFECT	The shear beam is reporting a sensor defect issue with the strain gauge 1 sensor. If the platform is not overloaded the machine will be placed in to creep. If DTC 8233 is also active the machine will assume the platform is overloaded. This fault, once annunciated is latched within a given key cycle.	Possible sensor hardware issue.
8233	8	2	LSS STRAIN GAUGE 2 - SENSOR DEFECT	The shear beam is reporting a sensor defect issue with the strain gauge 2 sensor. If the platform is not overloaded the machine will be placed in to creep. If DTC 8232 is also active the machine will assume the platform is overloaded. This fault, once annunciated is latched within a given key cycle.	Possible sensor hardware issue.
8234	8	2	LSS STRAIN GAUGE 1 - NOT INSTALLED	The shear beam is reporting a not installed issue with the strain gauge 1 sensor. If the platform is not overloaded the machine will be placed in to creep. If DTC 8235 is also active the machine will assume the platform is overloaded. This fault, once annunciated is latched within a given key cycle.	Possible sensor hardware issue.

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Table 6-13. Diagnostic Trouble Code Chart

DTC	Flash Code	Sequence	Fault Message	Fault Description	Check
8235	8	2	LSS STRAIN GAUGE 2 - NOT INSTALLED	The shear beam is reporting a not installed issue with the strain gauge 2 sensor. If the platform is not overloaded the machine will be placed in to creep. If DTC 8234 is also active the machine will assume the platform is overloaded. This fault, once annunciated is latched within a given key cycle.	Possible sensor hardware issue.
8236	8	2	LSS NOT DETECTING CHANGE	The control system has determined that the load sensor reading has not deviated by more than 1lb for 5s while operating drive or boom functions at greater than creep speed. This fault, once annunciated is latched within a given key cycle.	Possible sensor hardware issue.
8237	8	2	LSS STRAIN GAUGE 1 - A/D DEFECT	The shear beam is reporting an internal issue with the strain gauge 1 sensor. If the platform is not overloaded the machine will be placed in to creep. If DTC 8238 is also active the machine will assume the platform is overloaded. This fault, once annunciated is latched within a given key cycle.	Possible sensor hardware issue.
8238	8	2	LSS STRAIN GAUGE 2 - A/D DEFECT	The shear beam is reporting an internal issue with the strain gauge 2 sensor. If the platform is not overloaded the machine will be placed in to creep. If DTC 8237 is also active the machine will assume the platform is overloaded. This fault, once annunciated is latched within a given key cycle.	Possible sensor hardware issue.
824	8	2	LSS CELL #4 ERROR824824		

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Table 6-13. Diagnostic Trouble Code Chart

DTC	Flash Code	Sequence	Fault Message	Fault Description	Check
825	8	2	LSS HAS NOT BEEN CALIBRATED	The load sensing system is configured but has not been calibrated. The machine will assume the platform is overloaded.	Calibrate the load sensing system.
826	8	2	RUNNING AT CREEP - PLATFORM OVERLOADED	All functions at creep, the Load Sensing System indicates the Platform is overloaded AND is configured to warn only while the Platform is overloaded.	
827	8	2	DRIVE & BOOM PREVENTED - PLATFORM OVERLOADED	Driving and boom functions are not possible while the Load Sensing System indicates the Platform is overloaded AND is configured to prevent drive and boom functions while the Platform is overloaded.	
828	8	2	LIFT UP & TELE OUT PREVENTED - PLATFORM OVERLOADED	Lift up and telescope out are not possible while the Load Sensing System indicates the Platform is overloaded AND is configured to prevent Lift up and telescope out while the Platform is overloaded.	
830	**8**	**3**	**<<< PLATFORM LEVELING >>>**		
831	8	3	PLATFORM LEVELING OVERRIDE ON	Platform Leveling forced on with Access Level 0 selection.	
832	8	3	PLATFORM LEVELING OVERRIDE OFF	Platform Leveling forced off with Access Level 0 selection.	
833	8	3	PLATFORM LEVEL UP CRACKPOINT - NOT CALIBRATED	The Platform Level Up Valve Crackpoint has not been calibrated.	- Electronic leveling system equipped vehicles only.
834	8	3	PLATFORM LEVEL DOWN CRACKPOINT - NOT CALIBRATED	The Platform Level Down Valve Crackpoint has not been calibrated.	- Electronic leveling system equipped vehicles only.
837	8	3	PLATFORM LEVEL SENSOR #1 - SHORT TO BATTERY	There is a Short to Battery to the Platform Level Sensor #1.	- Electronic leveling system equipped vehicles only.
838	8	3	PLATFORM LEVEL SENSOR #1 - SHORT TO GROUND OR OPEN CIRCUIT	There is a Short to Ground or an Open Circuit to the Platform Level Sensor #1.	- Electronic leveling system equipped vehicles only.
8311	8	3	PLATFORM LEVEL SENSOR #2 - SHORT TO BATTERY	There is a Short to Battery to the Platform Level Sensor #2.	- Electronic leveling system equipped vehicles only.
8312	8	3	PLATFORM LEVEL SENSOR #2 - SHORT TO GROUND OR OPEN CIRCUIT	There is a Short to Ground or an Open Circuit to the Platform Level Sensor #2.	- Electronic leveling system equipped vehicles only.

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Table 6-13. Diagnostic Trouble Code Chart

DTC	Flash Code	Sequence	Fault Message	Fault Description	Check
8313	8	3	PLATFORM LEVEL SENSOR #1 - REFERENCE VOLTAGE OUT OF RANGE	Platform Level Sensor #1 reverence voltage is outside acceptable range (4.9 to 5.1 volts).	- Electronic leveling system equipped vehicles only.
8314	8	3	PLATFORM LEVEL SENSOR #2 - REFERENCE VOLTAGE OUT OF RANGE	Platform Level Sensor #2 reverence voltage is outside acceptable range (4.9 to 5.1 volts).	- Electronic leveling system equipped vehicles only.
8315	8	3	PLATFORM LEVELING SENSOR - DISAGREEMENT	The Control System reads the sensor values at power-up. The fault is triggered when there is a ±5 degree difference from the initial reading.	- Electronic leveling system equipped vehicles only.
8316	8	3	PLATFORM LEVEL SENSOR #1 - COMMUNICATIONS LOST	Platform Level Sensor #1 serial communication lost.	- 1200S and 1350S only.
8317	8	3	PLATFORM LEVEL SENSOR #2 - COMMUNICATIONS LOST	Platform Level Sensor #2 serial communication lost.	- 1200S and 1350S only.
8318	8	3	PLATFORM LEVELING SYSTEM TIMEOUT	The Platform was unable to maintain desired level within range for the allotted time.	
840	**8**	**4**	**<<< ENVELOPE >>>**		
841	8	4	BOOM ANGLE SENSOR DISAGREEMENT	There is a disagreement between the Boom Angle Sensors.	- Envelope Control equipped vehicles only.
842	8	4	BOOM LENGTH SWITCH FAILED	The Boom Length Switches are reporting the same state.	- Envelope Control equipped vehicles only.
843	8	4	BOOM LENGTH SWITCH/SENSOR DISAGREEMENT	There is a disagreement between the Boom Length Switch and the Boom Length Sensor.	- Envelope Control equipped vehicles only.
844	8	4	BOOM LENGTH SENSOR NOT DETECTING LENGTH CHANGE	The Boom Length Sensor is not changing during a boom telescope command.	- Envelope Control equipped vehicles only.
845	8	4	BOOM LENGTH SENSOR - OUT OF RANGE HIGH	Boom Length Sensor out of range high.	- Envelope Control equipped vehicles only. -1200/1350 only
846	8	4	BOOM LENGTH SENSOR - OUT OF RANGE LOW	Boom Length Sensor out of range low.	- Envelope Control equipped vehicles only. -1200/1350 only
847	8	4	BOOM LENGTH SENSOR - VALUE OUT OF RANGE HIGH	Boom Length out of range high.	- Envelope Control equipped vehicles only. -1200/1350 only
848	8	4	BOOM LENGTH SENSOR - VALUE OUT OF RANGE LOW	Boom Length out of range low.	- Envelope Control equipped vehicles only. -1200/1350 only

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Table 6-13. Diagnostic Trouble Code Chart

DTC	Flash Code	Sequence	Fault Message	Fault Description	Check
849	8	4	BOOM ANGLE SENSOR #1 - COMMUNICATIONS FAULT	Boom Angle Sensor #1 communications lost.	- Envelope Control equipped vehicles only.
8410	8	4	BOOM ANGLE SENSOR #2 - COMMUNICATIONS FAULT	Boom Angle Sensor #2 communications lost.	- Envelope Control equipped vehicles only.
8411	8	4	BOOM ANGLE SENSOR #1 - INVALID ANGLE	Boom Angle Sensor #1 out of range.	- Envelope Control equipped vehicles only.
8412	8	4	BOOM ANGLE SENSOR #2 - INVALID ANGLE	Boom Angle Sensor #2 out of range.	- Envelope Control equipped vehicles only.
8413	8	4	WRONG TELESCOPE RESPONSE	Boom telescope is moving in the opposite direction of the command.	- Envelope Control equipped vehicles only.
8414	8	4	WRONG LIFT RESPONSE	Boom lift is moving in the opposite direction of the command.	- Envelope Control equipped vehicles only.
8415	8	4	TOWER ANGLE SENSOR DISAGREEMENT	There is a disagreement between the Tower Angle Sensors.	- Envelope Control equipped vehicles only. -1250

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Table 6-13. Diagnostic Trouble Code Chart

DTC	Flash Code	Sequence	Fault Message	Fault Description	Check
84151	8	4	TOWER LENGTH SENSOR 1 FAULTY	There are three ways (a, b, c) that these faults can be set: (a) If the length sensor voltage changes more than 0.0168 volts within 40 milliseconds a counter for the respective length sensor shall be incremented to aid service in diagnosing bad sensor performance. The counter below shall be incremented anytime the description above is met. It is cleared/reset by a power cycle TwrLenSnsr(1/2)FaultCounter_PowerCycle > 30 (b) The counter below shall be incremented every time TwrLenSnsr(1/2)FaultCounter_PowerCycle (described above) reached its threshold. This value is stored in EEPROM in order to track the history of the issue. (A successful Boom Sensor Calibration will reset this counter – this is reflected in the boom sensor calibration document) TwrLenSnsr(1/2)FaultCounter_EEPROM > 3 (c) The fault counter below shall be incremented every time the trigger condition described in section (a) is observed during certain steps during Boom Sensor Calibration (please see that document section for further details) TwrLenSnsr(1/2)FaultCounter_BmSnsrCal > 20 If (a) or (b) or (c) are met (fault triggered) the machine will be put into Electrical Retrieval Fault, once triggered, is maintained within a given key-cycle Machine will be trapped in transport	Check Hardware, Wiring

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Table 6-13. Diagnostic Trouble Code Chart

DTC	Flash Code	Sequence	Fault Message	Fault Description	Check
84152	8	4	TOWER LENGTH SENSOR 2 FAULTY	There are three ways (a, b, c) that these faults can be set: (a) If the length sensor voltage changes more than 0.0168 volts within 40 milliseconds a counter for the respective length sensor shall be incremented to aid service in diagnosing bad sensor performance. The counter below shall be incremented anytime the description above is met. It is cleared/reset by a power cycle TwrLenSnsr(1/2)FaultCounter_PowerCycle > 30 (b) The counter below shall be incremented every time TwrLenSnsr(1/2)FaultCounter_PowerCycle (described above) reached its threshold. This value is stored in EEPROM in order to track the history of the issue. (A successful Boom Sensor Calibration will reset this counter – this is reflected in the boom sensor calibration document) TwrLenSnsr(1/2)FaultCounter_EEPROM > 3 (c) The fault counter below shall be incremented every time the trigger condition described in section (a) is observed during certain steps during Boom Sensor Calibration (please see that document section for further details) TwrLenSnsr(1/2)FaultCounter_BmSnsrCal > 20 If (a) or (b) or (c) are met (fault triggered) the machine will be put into Electrical Retrieval Fault, once triggered, is maintained within a given key-cycle Machine will be trapped in transport	Check Hardware, Wiring

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Table 6-13. Diagnostic Trouble Code Chart

DTC	Flash Code	Sequence	Fault Message	Fault Description	Check
84153	8	4	BOOM LENGTH SENSOR 1 FAULTY	There are three ways (a, b, c) that these faults can be set: (a) If the length sensor voltage changes more than 0.0168 volts within 40 milliseconds a counter for the respective length sensor shall be incremented to aid service in diagnosing bad sensor performance. The counter below shall be incremented anytime the description above is met. It is cleared/reset by a power cycle BmLenSnsr(1/2)FaultCounter_PowerCycle > 30 (b) The counter below shall be incremented every time BmLenSnsr(1/2)FaultCounter_PowerCycle (described above) reached its threshold. This value is stored in EEPROM in order to track the history of the issue. (A successful Boom Sensor Calibration will reset this counter – this is reflected in the boom sensor calibration document) BmLenSnsr(1/2)FaultCounter_EEPROM > 3 (c) The fault counter below shall be incremented every time the trigger condition described in section (a) is observed during certain steps during Boom Sensor Calibration (please see that document section for further details) BmLenSnsr(1/2)FaultCounter_BmSnsrCal > 20 If (a) or (b) or (c) are met (fault triggered) the machine will be put into Electrical Retrieval Fault, once triggered, is maintained within a given key-cycle Machine will be trapped in transport	Check wiring and hardware

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Table 6-13. Diagnostic Trouble Code Chart

DTC	Flash Code	Sequence	Fault Message	Fault Description	Check
84154	8	4	BOOM LENGTH SENSOR 2 FAULTY	There are three ways (a, b, c) that these faults can be set: (a) If the length sensor voltage changes more than 0.0168 volts within 40 milliseconds a counter for the respective length sensor shall be incremented to aid service in diagnosing bad sensor performance. The counter below shall be incremented anytime the description above is met. It is cleared/reset by a power cycle BmLenSnsr(1/2)FaultCounter_PowerCycle > 30 (b) The counter below shall be incremented every time BmLenSnsr(1/2)FaultCounter_PowerCycle (described above) reached its threshold. This value is stored in EEPROM in order to track the history of the issue. (A successful Boom Sensor Calibration will reset this counter – this is reflected in the boom sensor calibration document) BmLenSnsr(1/2)FaultCounter_EEPROM > 3 (c) The fault counter below shall be incremented every time the trigger condition described in section (a) is observed during certain steps during Boom Sensor Calibration (please see that document section for further details) BmLenSnsr(1/2)FaultCounter_BmSnsrCal > 20 If (a) or (b) or (c) are met (fault triggered) the machine will be put into Electrical Retrieval Fault, once triggered, is maintained within a given key-cycle Machine will be trapped in transport	Check wiring and hardware

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Table 6-13. Diagnostic Trouble Code Chart

DTC	Flash Code	Sequence	Fault Message	Fault Description	Check
8416	8	4	TOWER LENGTH SENSOR DISAGREEMENT	There is a disagreement between the Tower Length Sensors.	- Envelope Control equipped vehicles only. -1250
8417	8	4	MAIN ANGLE SENSOR DISAGREEMENT	There is a disagreement between the Main Boom Angle Sensors.	- Envelope Control equipped vehicles only. -1250
8418	8	4	TOWER LENGTH SENSOR #1 - OUT OF RANGE HIGH	Tower Boom Angle Sensor #1 out of range high.	- Envelope Control equipped vehicles only. -1250
8419	8	4	TOWER LENGTH SENSOR #1 - OUT OF RANGE LOW	Tower Boom Angle Sensor #1 out of range low.	- Envelope Control equipped vehicles only. -1250
8420	8	4	TOWER LENGTH SENSOR #2 - OUT OF RANGE HIGH	Tower Boom Angle Sensor #2 out of range high.	- Envelope Control equipped vehicles only. -1250
8421	8	4	TOWER LENGTH SENSOR #2 - OUT OF RANGE LOW	Tower Boom Angle Sensor #2 out of range low.	- Envelope Control equipped vehicles only. -1250
8422	8	4	TOWER LENGTH SENSOR - NOT DETECTING LENGTH CHANGE	The Tower Length Sensor is not changing during a tower telescope command.	- Envelope Control equipped vehicles only. -1250
8423	8	4	TOWER LENGTH MOVEMENT WITHOUT COMMAND	The Tower Length Sensor is changing without a tower telescope command.	- Envelope Control equipped vehicles only. -1250
8424	8	4	TOWER LENGTH SENSOR #1 - OUT OF RANGE HIGH	Tower Boom Angle Sensor #1 out of range high.	- Envelope Control equipped vehicles only. -1250
8425	8	4	TOWER LENGTH SENSOR #1 - OUT OF RANGE LOW	Tower Boom Angle Sensor #1 out of range low.	- Envelope Control equipped vehicles only. -1250
8426	8	4	TOWER LENGTH SENSOR #2 - OUT OF RANGE HIGH	Tower Boom Angle Sensor #2 out of range high.	- Envelope Control equipped vehicles only. -1250
8427	8	4	TOWER LENGTH SENSOR #2 - OUT OF RANGE LOW	Tower Boom Angle Sensor #2 out of range low.	- Envelope Control equipped vehicles only. -1250
8428	8	4	TOWER ANGLE SENSOR #1 - INVALID ANGLE	Tower Boom Angle Sensor #1 out of range.	- Envelope Control equipped vehicles only. -1250
8429	8	4	TOWER ANGLE SENSOR #2 - INVALID ANGLE	Tower Boom Angle Sensor #2 out of range.	- Envelope Control equipped vehicles only. -1250
8430	8	4	TOWER ANGLE SENSOR #1 - INVALID MODEL	Wrong Tower Boom Angle Sensor #1 installed.	- Envelope Control equipped vehicles only. - 1250AJP Only - Must be a Rieker Sensor, not a Spectron Sensor.

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Table 6-13. Diagnostic Trouble Code Chart

DTC	Flash Code	Sequence	Fault Message	Fault Description	Check
8431	8	4	TOWER ANGLE SENSOR #2 - INVALID MODEL	Wrong Tower Boom Angle Sensor #2 installed.	- Envelope Control equipped vehicles only. - 1250AJP Only - Must be a Rieker Sensor, not a Spectron Sensor.
8432	8	4	MAIN ANGLE SENSOR #1 - INVALID ANGLE	Main Boom Angle Sensor #1 out of range.	- Envelope Control equipped vehicles only. -1250
8433	8	4	MAIN ANGLE SENSOR #2 - INVALID ANGLE	Main Boom Angle Sensor #2 out of range.	- Envelope Control equipped vehicles only. -1250
8434	8	4	MAIN ANGLE SENSOR - NOT DETECTING ANGLE CHANGE	The Main Boom Angle Sensor is not changing during a main lift command.	- Envelope Control equipped vehicles only. -1250
8435	8	4	MAIN ANGLE MOVEMENT WITHOUT CMD	The Main Boom Angle Sensor is changing without a main lift command.	- Envelope Control equipped vehicles only. -1250
8436	8	4	WRONG TOWER TELESCOPE RESPONSE	Tower telescope is moving in the opposite direction of the command.	- Envelope Control equipped vehicles only. -1250
8437	8	4	WRONG TOWER LIFT RESPONSE	Tower lift is moving in the opposite direction of the command.	- Envelope Control equipped vehicles only. -1250
8438	8	4	TOWER CYLINDER ANGLE SENSOR - OUT OF RANGE HIGH	The Tower Cylinder Angle Sensor is < 4721 A/D counts.	- Envelope Control equipped vehicles only. -1250
8439	8	4	TOWER CYLINDER ANGLE SENSOR - OUT OF RANGE LOW	The Tower Cylinder Angle Sensor is > 29535 A/D counts.	- Envelope Control equipped vehicles only. -1250
8440	8	4	TOWER CYLINDER ANGLE SENSOR - NOT DETECTING CHANGE	The Tower Cylinder Angle Sensor is not changing during a tower lift command.	- Envelope Control equipped vehicles only. -1250
8441	8	4	TOWER CYLINDER ANGLE MOVEMENT WITHOUT COMMAND	The Tower Cylinder Angle Sensor is changing without a tower lift command.	- Envelope Control equipped vehicles only. -1250
8442	8	4	MAIN TRANSPORT ANGLE SWITCH FAILED	The Main Boom Angle Switch is bad.	- Envelope Control equipped vehicles only. -1250
8443	8	4	TWR TRANSPORT SWITCH DISAGREEMENT	There is a disagreement between the Tower Boom Length Switch and the Tower Length Sensor.	- Envelope Control equipped vehicles only. -1250
8444	8	4	TRANSPORT DUAL CAPACITY SWITCHES BAD	Both the Dual Capacity Switch and the Transport Switch are bad.	- Envelope Control equipped vehicles only. -1250
8445	8	4	TRANSPORT DUAL CAPACITY BAD TRANSITION	The Dual Capacity Switch and the Transport Switch changed state out of order.	- Envelope Control equipped vehicles only. -1250

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Table 6-13. Diagnostic Trouble Code Chart

DTC	Flash Code	Sequence	Fault Message	Fault Description	Check
8446	8	4	MAIN TRANSPORT LENGTH SWITCH DISAGREEMENT	There is a disagreement between the Main Boom Transport Length Switches.	- Envelope Control equipped vehicles only. -1250
8447	8	4	MAIN DUAL CAPACITY LENGTH SWITCH DISAGREEMENT	There is a disagreement between the Main Boom Dual Capacity Length Switches.	- Envelope Control equipped vehicles only. -1250
8448	8	4	MAIN TRANSPORT ANGLE SWITCH/SENSOR DISAGREEMENT	There is a disagreement between the Main Boom Angle Switch and the Main Boom Angle Sensor.	- Envelope Control equipped vehicles only. -1250
8449	8	4	TOWER CYLINDER ANGLE SWITCH/SENSOR DISAGREEMENT	There is a disagreement between the Tower Boom Angle Switch and the Tower Cylinder Angle Sensor.	- Envelope Control equipped vehicles only. -1250
8450	8	4	NEW MAIN ANGLE SENSOR #1 DETECTED	A new Main Angle Sensor 1 has been detected.	-1250
8451	8	4	NEW MAIN ANGLE SENSOR #2 DETECTED	A new Main Angle Sensor 2 has been detected.	-1250
8452	8	4	TOWER LENGTH SWITCH/SENSOR DISAGREEMENT	There is a disagreement between the Tower Length Switch and the Tower Length Sensor.	- Envelope Control equipped vehicles only. -1250
8453	8	4	WRONG MAIN TELE RESPONSE	Main telescope is moving in the opposite direction of the command.	- Envelope Control equipped vehicles only. -1250
8454	8	4	WRONG MAIN LIFT RESPONSE	Main lift is moving in the opposite direction of the command.	- Envelope Control equipped vehicles only. -1250
8482	8	4	TOWER ENVELOPE MASSIVELY ENCROACHED	X	
8483	8	4	TOWER ENVELOPE MULTIPLE ENCROACHMENTS	X	
8484	8	4	BCS VIOLATION - BOOM LOCKED	X	
8485	8	4	BCS - HYDRAULIC RETRIEVAL ACTIVE	X	
8486	8	4	BCS - ELECTRICAL RETRIEVAL ACTIVE	X	
8487	8	4	BCS - MULTIPLE FAILURES ACTIVE	X	
850	**8**	**5**	**<<< MOMENT / LOAD PINS >>>**		
851	8	5	MOMENT PIN - HORIZONTAL FORCE OUT OF RANGE	The Moment Pin horizontal force is out of range.	
852	8	5	MOMENT PIN - VERTICAL FORCE OUT OF RANGE	The Moment Pin vertical force is out of range.	
853	8	5	LOAD PIN - HORIZONTAL FORCE OUT OF RANGE	The Load Pin horizontal force is out of range.	-1250
854	8	5	LOAD PIN - VERTICAL FORCE OUT OF RANGE	The Load Pin vertical force is out of range.	-1250
855	8	5	MOMENT PIN - SENSOR FAULT	The Moment Pin has reported a fault.	
856	8	5	LOAD PIN - SENSOR FAULT	The Load Pin has reported a fault.	-1250

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Table 6-13. Diagnostic Trouble Code Chart

DTC	Flash Code	Sequence	Fault Message	Fault Description	Check
857	8	5	NEW MOMENT PIN DETECTED	A new Moment Pin has been detected.	
858	8	5	NEW LOAD PIN DETECTED	A new Load Pin has been detected.	-1250
859	8	5	LOAD PIN/TOWER LIFT CYLINDER ANGLE DISAGREEMENT	There is a disagreement between the Load Pin and the Tower Lift cylinder Angle.	-1250
8510	8	5	LOAD PIN - FORCE VALUES NOT CHANGING	The Load Pin is not changing.	-1250
8511	8	5	LOAD PIN - FORCE TOO LOW OVER TOWER ANGLE CHANGE	X	-1250
8512	8	5	LOAD PIN - FORCE TOO LOW OVER MAIN ANGLE CHANGE	X	-1250
8513	8	5	LOAD PIN - FORCE TOO LOW OVER MAIN LENGTH TRANSITION	X	-1250
860	**8**	**6**	**<<< STEERING / AXLE >>>**		
861	8	6	RESTRICTED TO TRANSPORT - OSCILLATING AXLE PRESSURE SWITCH DISAGREEMENT	The Oscillating Axle Pressure Switch indicates pressure while not driving or does not indicate pressure while driving and restricted to transport.	- Electrically released Oscillated Axles equipped vehicles only.
862	8	6	AXLE EXTEND VALVE - SHORT TO BATTERY OR OPEN CIRCUIT	There is a Short to Battery or an Open Circuit to the Axle Extend Valve.	
863	8	6	AXLE EXTEND VALVE - SHORT TO GROUND	There is a Short to Ground to the Axle Extend Valve.	
864	8	6	AXLE RETRACT VALVE - SHORT TO BATTERY OR OPEN CIRCUIT	There is a Short to Battery or an Open Circuit to the Axle Retract Valve.	
865	8	6	AXLE RETRACT VALVE - SHORT TO GROUND	There is a Short to Ground to the Axle Retract Valve.	
866	8	6	RIGHT FRONT STEER RIGHT VALVE - SHORT TO BATTERY OR OPEN CIRCUIT	There is a Short to Battery or an Open Circuit to the Right Front Steer Right Valve.	
867	8	6	RIGHT FRONT STEER RIGHT VALVE - SHORT TO GROUND	There is a Short to Ground to the Right Front Steer Right Valve.	
868	8	6	RIGHT FRONT STEER LEFT VALVE - SHORT TO BATTERY OR OPEN CIRCUIT	There is a Short to Battery or an Open Circuit to the Right Front Steer Left Valve.	
869	8	6	RIGHT FRONT STEER LEFT VALVE - SHORT TO GROUND	There is a Short to Ground to the Right Front Steer Left Valve.	
8610	8	6	LEFT FRONT STEER RIGHT VALVE - SHORT TO BATTERY OR OPEN CIRCUIT	There is a Short to Battery or an Open Circuit to the Left Front Steer Right Valve.	
8611	8	6	LEFT FRONT STEER RIGHT VALVE - SHORT TO GROUND	There is a Short to Ground to the Left Front Steer Right Valve.	
8612	8	6	LEFT FRONT STEER LEFT VALVE - SHORT TO BATTERY OR OPEN CIRCUIT	There is a Short to Battery or an Open Circuit to the Left Front Steer Left Valve.	
8613	8	6	LEFT FRONT STEER LEFT VALVE - SHORT TO GROUND	There is a Short to Ground to the Left Front Steer Left Valve.	

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Table 6-13. Diagnostic Trouble Code Chart

DTC	Flash Code	Sequence	Fault Message	Fault Description	Check
8614	8	6	RIGHT REAR STEER RIGHT VALVE - SHORT TO BATTERY OR OPEN CIRCUIT	There is a Short to Battery or an Open Circuit to the Right Rear Steer Right Valve.	
8615	8	6	RIGHT REAR STEER RIGHT VALVE - SHORT TO GROUND	There is a Short to Ground to the Right Rear Steer Right Valve.	
8616	8	6	RIGHT REAR STEER LEFT VALVE - SHORT TO BATTERY OR OPEN CIRCUIT	There is a Short to Battery or an Open Circuit to the Right Rear Steer Left Valve.	
8617	8	6	RIGHT REAR STEER LEFT VALVE - SHORT TO GROUND	There is a Short to Ground to the Right Rear Steer Left Valve.	
8618	8	6	LEFT REAR STEER RIGHT VALVE - SHORT TO BATTERY OR OPEN CIRCUIT	There is a Short to Battery or an Open Circuit to the Left Rear Steer Right Valve.	
8619	8	6	LEFT REAR STEER RIGHT VALVE - SHORT TO GROUND	There is a Short to Ground to the Left Rear Steer Right Valve.	
8620	8	6	LEFT REAR STEER LEFT VALVE - SHORT TO BATTERY OR OPEN CIRCUIT	There is a Short to Battery or an Open Circuit to the Left Rear Steer Left Valve.	
8621	8	6	LEFT REAR STEER LEFT VALVE - SHORT TO GROUND	There is a Short to Ground to the Left Rear Steer Left Valve.	
8622	8	6	FRONT RIGHT STEER SENSOR - DECOUPLED	The Front Right Steer Sensor has become decoupled.	
8623	8	6	FRONT LEFT STEER SENSOR - DECOUPLED	The Front Left Steer Sensor has become decoupled.	
8624	8	6	REAR RIGHT STEER SENSOR - DECOUPLED	The Rear Right Steer Sensor has become decoupled.	
8625	8	6	REAR LEFT STEER SENSOR - DECOUPLED	The Rear Left Steer Sensor has become decoupled.	
8626	8	6	FRONT LEFT STEER SENSOR - NOT RESPONDING	The Front Right Steer Sensor is not responding to steer commands.	
8627	8	6	FRONT RIGHT STEER SENSOR - NOT RESPONDING	The Front Left Steer Sensor is not responding to steer commands.	
8628	8	6	REAR LEFT STEER SENSOR - NOT RESPONDING	The Rear Right Steer Sensor is not responding to steer commands.	
8629	8	6	REAR RIGHT STEER SENSOR - NOT RESPONDING	The Rear Left Steer Sensor is not responding to steer commands.	
8630	8	6	FRONT RIGHT STEER SENSOR - SHORT TO GROUND OR OPEN CIRCUIT	There is a Short to Ground or an Open Circuit to the Front Right Steer Sensor.	
8631	8	6	FRONT RIGHT STEER SENSOR - SHORT TO BATTERY	There is a Short to Battery to the Front Right Steer Sensor.	
8632	8	6	FRONT LEFT STEER SENSOR - SHORT TO GROUND OR OPEN CIRCUIT	There is a Short to Ground or an Open Circuit to the Front Left Steer Sensor.	
8633	8	6	FRONT LEFT STEER SENSOR - SHORT TO BATTERY	There is a Short to Battery to the Front Left Steer Sensor.	

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Table 6-13. Diagnostic Trouble Code Chart

DTC	Flash Code	Sequence	Fault Message	Fault Description	Check
8634	8	6	REAR RIGHT STEER SENSOR - SHORT TO GROUND OR OPEN CIRCUIT	There is a Short to Ground or an Open Circuit to the Rear Right Steer Sensor.	
8635	8	6	REAR RIGHT STEER SENSOR - SHORT TO BATTERY	There is a Short to Battery to the Rear Right Steer Sensor.	
8636	8	6	REAR LEFT STEER SENSOR - SHORT TO GROUND OR OPEN CIRCUIT	There is a Short to Ground or an Open Circuit to the Rear Left Steer Sensor.	
8637	8	6	REAR LEFT STEER SENSOR - SHORT TO BATTERY	There is a Short to Battery to the Rear Left Steer Sensor.	
8651	8	6	ENGINE SHUTDOWN - AXLE LOCKOUT VALVE FAULT	Engine Start is prevented while there is an Oscillating Axle fault and vehicle is out of transport position	
876	87	6	WIRE ROPE SERVICE REQUIRED	MACHINE SETUP → CABLE SWITCH = YES; Wire Rope Service = Enabled	
990	**99**	**9**	**<<< HARDWARE >>>**		
998	9	9	EEPROM FAILURE - CHECK ALL SETTINGS	The Ground Module has reported an EEPROM failure.	
9910	9	9	FUNCTIONS LOCKED OUT - PLATFORM MODULE SOFTWARE VERSION IMPROPER	The Platform Module software version is not compatible with the rest of the system.	
9914	9	9	PLATFORM MODULE SOFTWARE UPDATE REQUIRED	The Platform Module software requires an updated.	
9915	9	9	CHASSIS TILT SENSOR NOT GAIN CALIBRATED	The Chassis Tilt Sensor gain calibration has been lost.	
9916	9	9	CHASSIS TILT SENSOR GAIN OUT OF RANGE	The Chassis Tilt Sensor gain calibration has become corrupted.	
9917	9	9	HIGH RESOLUTION A2D FAILURE - INTERRUPT LOST	The Platform Module has reported that its ADS1213 chip has stopped asserting its interrupt.	
9918	9	9	HIGH RESOLUTION A2D FAILURE - REINIT LIMIT	The Platform Module has reported that its ADS1213 chip had to be reset 3 or more times.	
9919	9	9	GROUND SENSOR REF VOLTAGE OUT OF RANGE	The Ground Module has reported that its sensor reference voltage is outside acceptable range.	- Not reported during power-up.
9920	9	9	PLATFORM SENSOR REF VOLTAGE OUT OF RANGE	The Platform Module has reported that its sensor reference voltage is outside acceptable range.	- Not reported during power-up.

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Table 6-13. Diagnostic Trouble Code Chart

DTC	Flash Code	Sequence	Fault Message	Fault Description	Check
9921	9	9	GROUND MODULE FAILURE - HIGH SIDE DRIVER CUTOUT FAULTY	The Ground Module has reported that its high side driver cutout failed.	
9922	9	9	PLATFORM MODULE FAILURE - HWFS CODE 1	The Platform Module has reported that the V(Low) FET has failed.	
9923	9	9	GROUND MODULE FAILURE - HWFS CODE 1	The Ground Module has reported that the V(Low) FET has failed.	
9925	9	9	FUNCTIONS LOCKED OUT - CHASSIS MODULE SOFTWARE VERSION IMPROPER	The Chassis Module software version is not compatible with the rest of the system.	
9926	9	9	FUNCTIONS LOCKED OUT - BLAM MODULE SOFTWARE VERSION IMPROPER	The BLAM software version is not compatible with the rest of the system.	
9927	9	9	GROUND MODULE CONSTANT DATA UPDATE REQUIRED	The Ground Module constant data requires an updated.	
9928	9	9	ENVELOPE CONTROL DISABLED	Envelope Control has been disabled by the user from Access Level 0.	- Envelope Control equipped vehicles only.
99285	9	9	LSS - FACTORY CALIBRATION ERROR	The load sensor is reporting a factor calibration issue (internal error) The machine will assume the platform is overloaded. This fault, once annunciated is latched within a given key cycle.	Possible sensor hardware issue.
9929	9	9	MOMENT CONTROL DISABLED	Moment Control has been disabled by the user from Access Level 0.	- Envelope Control equipped vehicles only.
9930	9	9	STEER SENSORS NOT CALIBRATED	The Steer Sensors have not been calibrated.	- Chassis Module equipped vehicles only.
9931	9	9	BOOM SENSORS NOT CALIBRATED	The Boom Sensors have not been calibrated.	- BLAM equipped vehicles only.
9932	9	9	LIFT CRACKPOINTS NOT CALIBRATED	The Lift Valves have not been calibrated.	- 1200S and 1350S only.
9933	9	9	TELESCOPE CRACKPOINTS NOT CALIBRATED	The Telescope Valves have not been calibrated.	- 1200S and 1350S only.
9934	9	9	DRIVE CRACKPOINTS NOT CALIBRATED	The Drive Valves have not been calibrated.	- 1200S and 1350S only.
9935	9	9	BLAM SENSOR SUPPLY OUT OF RANGE HIGH	The Boom Angle Sensors supply voltage is high.	- BLAM equipped vehicles only.
9936	9	9	BLAM SENSOR SUPPLY OUT OF RANGE LOW	The Boom Angle Sensors supply voltage is low.	- BLAM equipped vehicles only.
9937	9	9	LENGTH SENSOR REF VOLTAGE HIGH	The Boom Length Sensors supply voltage is high.	

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Table 6-13. Diagnostic Trouble Code Chart

DTC	Flash Code	Sequence	Fault Message	Fault Description	Check
9938	9	9	LENGTH SENSOR REF VOLTAGE LOW	The Boom Length Sensors supply voltage is low.	
9939	9	9	BLAM HIGH RES A/D FAILURE	The BLAM high resolution analog to digital converter has failed.	- BLAM equipped vehicles only.
9940	9	9	CHASSIS SENSOR SUPPLY OUT OF RANGE HIGH	The Chassis Sensors supply voltage is high.	
9941	9	9	CHASSIS SENSOR SUPPLY OUT OF RANGE LOW	The Chassis Sensors supply voltage is low.	
9942	9	9	BLAM BACKUP COMMUNICATIONS LINK FAULTY	The BLAM backup communications link test was activated at startup, but no communication connection established/maintained.	- BLAM equipped vehicles only. -1250
9943	9	9	BLAM BACKUP COMMUNICATIONS LOST - HYDRAULICS SUSPENDED	The BLAM backup communications link was activated, but no communication connection established/maintained.	- BLAM equipped vehicles only. -1250
9944	9	9	CURRENT FEEDBACK GAINS OUT OF RANGE	The factory set current feedback gains are out of range.	
9945	9	9	CURRENT FEEDBACK CALIBRATION CHECKSUM INCORRECT	The factory set current feedback checksum is not correct.	
9975	9	9	LOAD PIN NOT CALIBRATED	The Load Pin has not been calibrated.	-1250
9979	9	9	FUNCTIONS LOCKED OUT - GROUND MODULE SOFTWARE VERSION IMPROPER	Temporary fault for the telematics project. The model needs to be a 600S or 1350S if not this fault will be generated and Platform controls will be prevented. This fault was to insure that the software will only work for these two models.	

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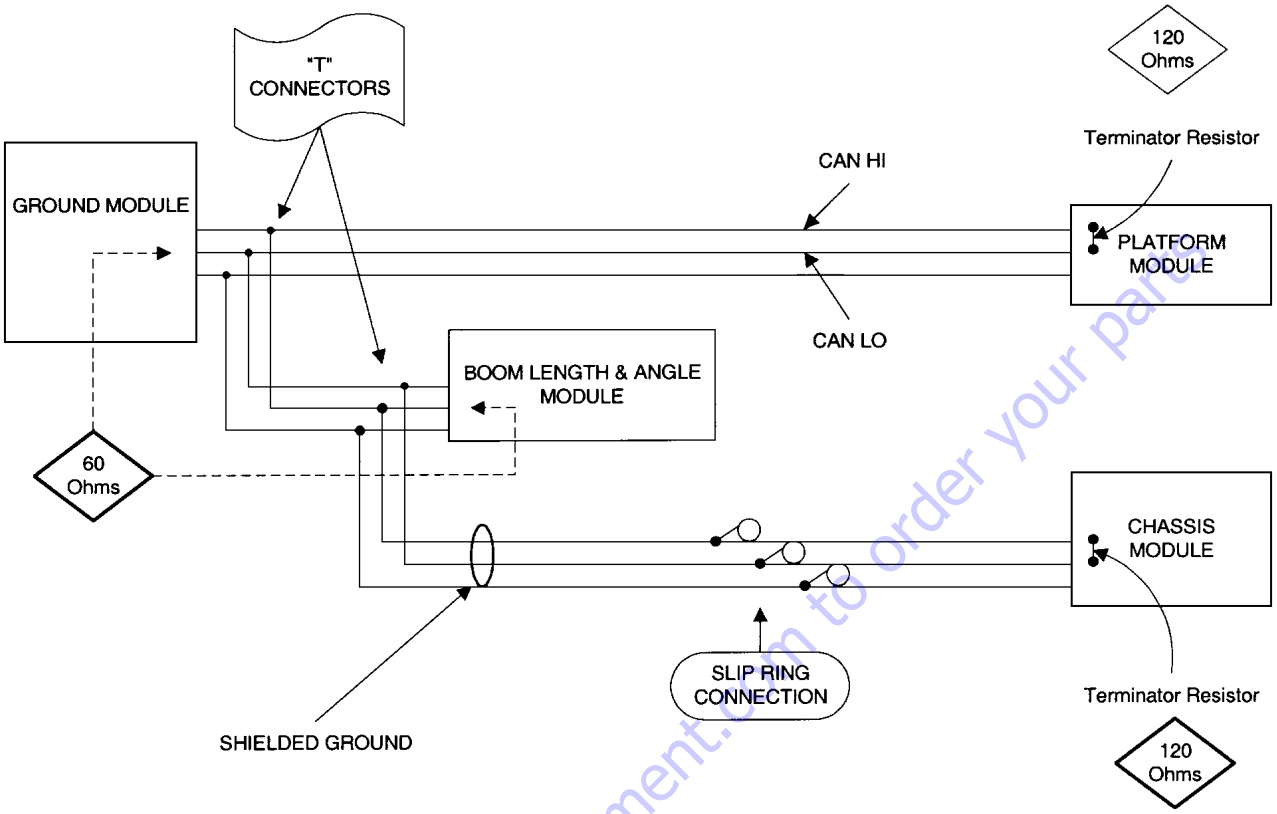

Figure 6-26. CANbus Connections Diagram

6.22 CANBUS TROUBLESHOOTING

The PLATFORM MODULE and the CHASSIS MODULE have "Terminator Resistors" located inside the modules, these resistors squelch high speed signal reflections in the CANbus transmission lines. The value of the terminators is determined by wire properties, this includes the type of insulation and geometry, combined to determine the perfect value for bus termination. Improper values or missing terminators allow bus ringing. A complete CANbus circuit (wired in parallel) is approximately 60 Ohms at the "T" fitting inside the Ground Station or at the Boom Length & Angle Module. Each individual circuit from their respective Module should read approximately 120 Ohm. For CANbus connections, refer to Figure 6-26., Figure 6-27., Figure 6-28., Figure 6-29., Figure 6-30., and Figure 6-31.

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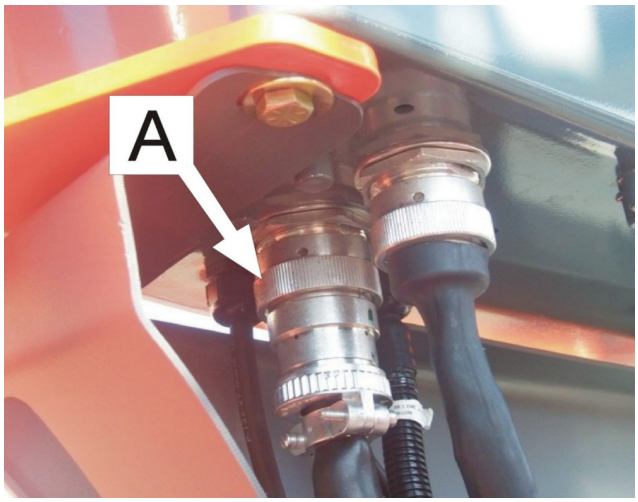

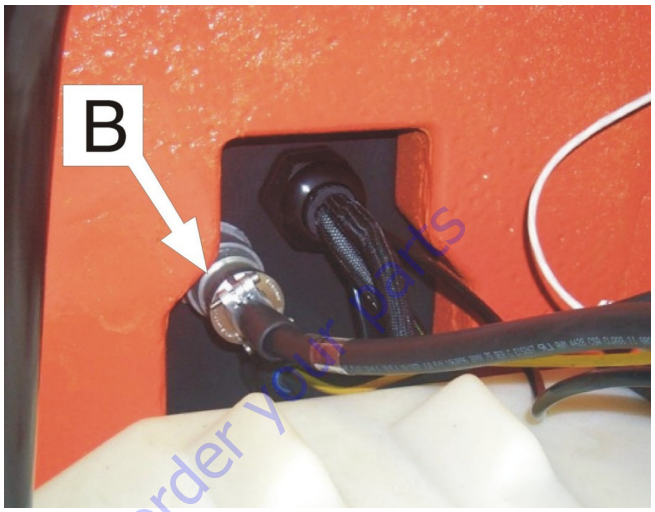

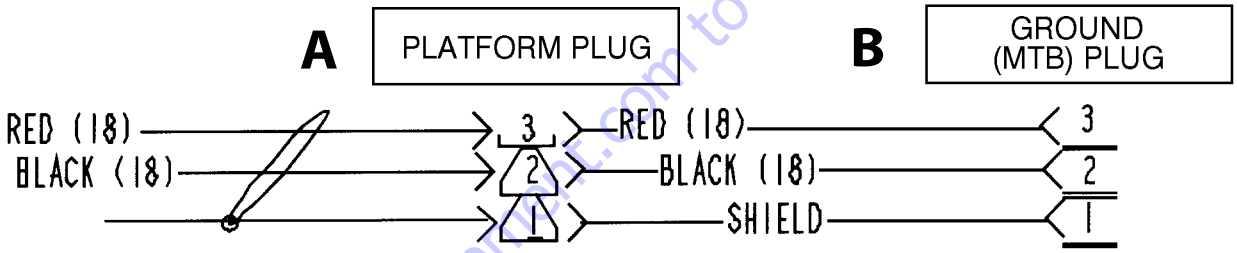

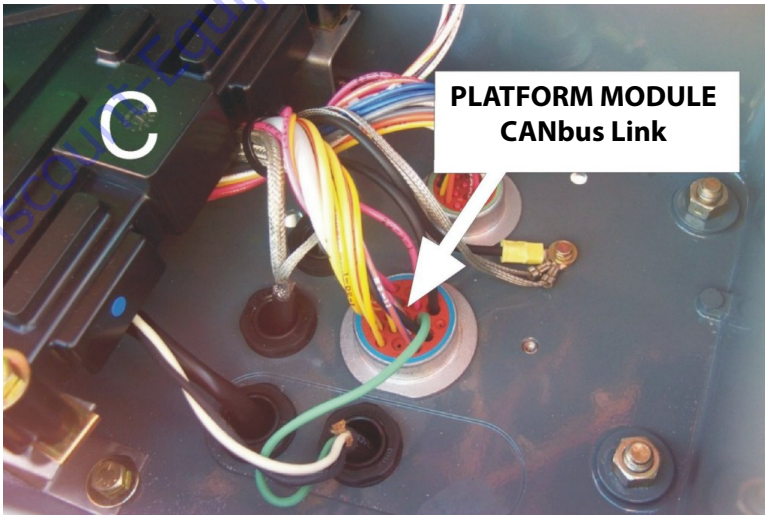

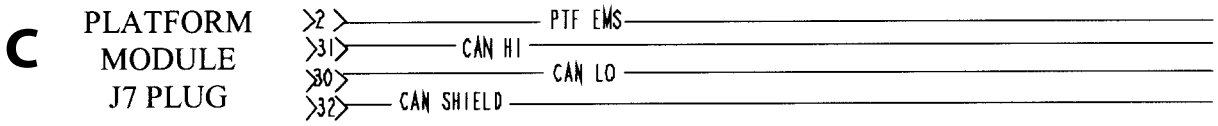

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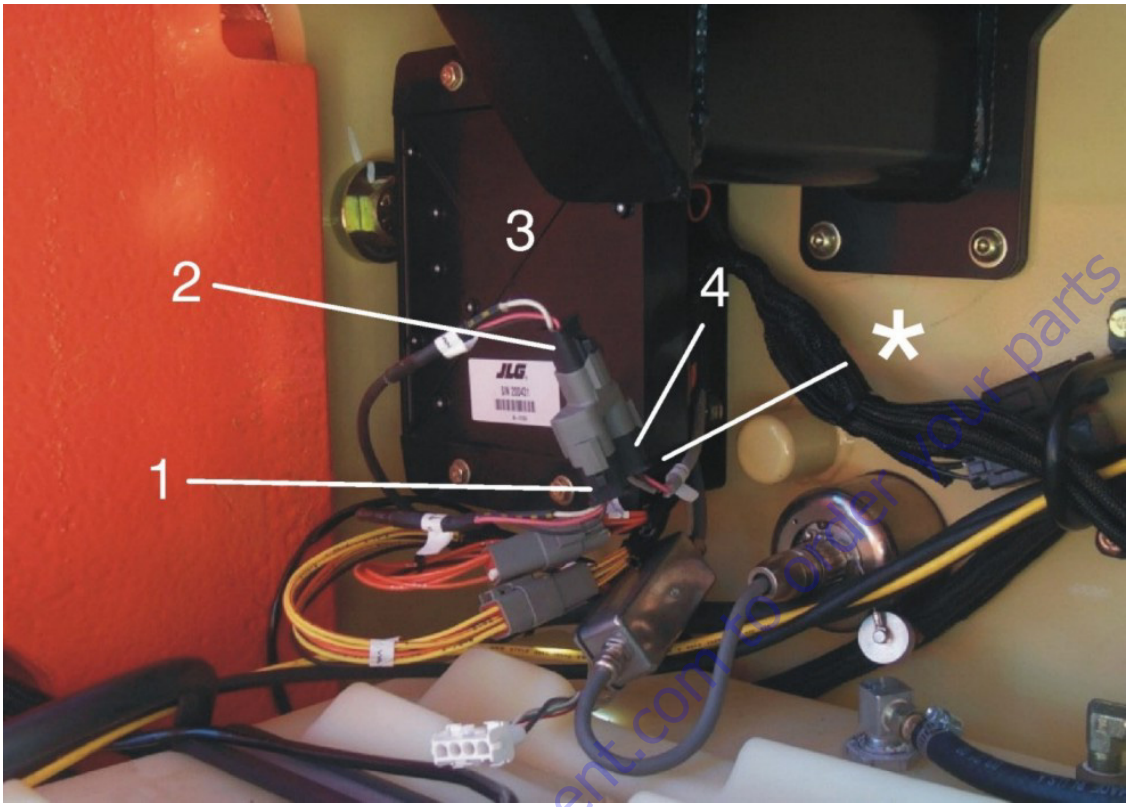
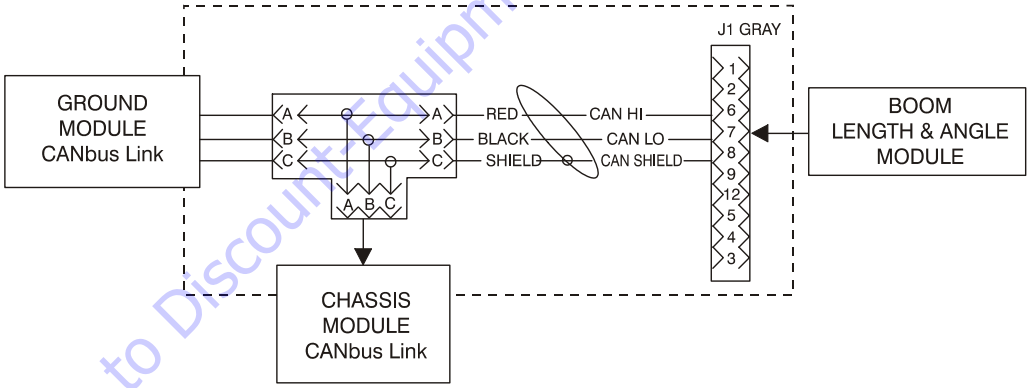
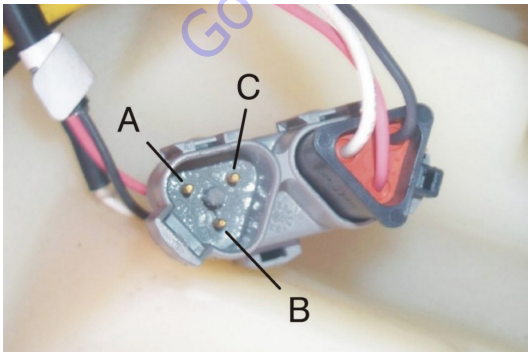
Figure 6-27. CANbus Connections - Sheet 1 of 5







1. Chassis Module CANbus Link
2. Ground Module CANbus Link
3. Boom Length & Angle Module
4. BLAM J1 (Gray) Plug

* Remove BLAM J1 Plug and measure the A & B pin of the T fitting. This should measure approximately 60 Ohms for a complete CANbus Circuit.

Figure 6-28. CANbus Connections - Sheet 2 of 5

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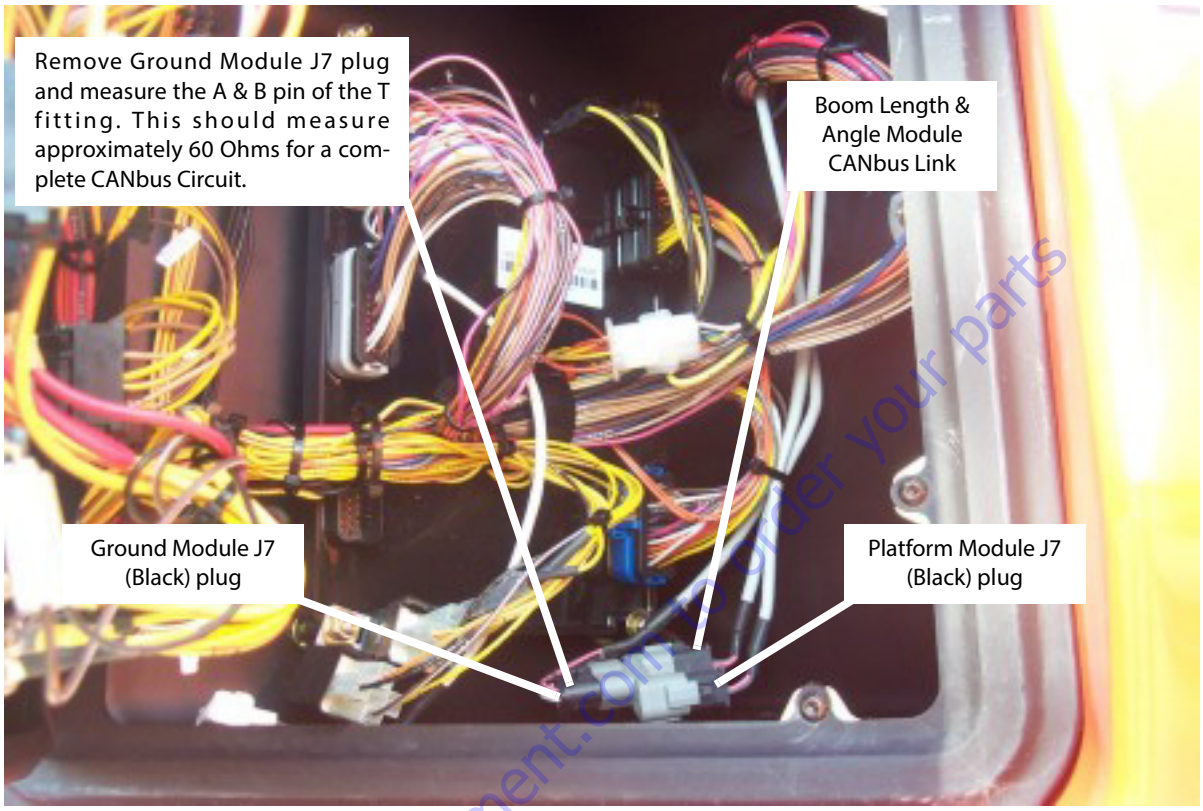

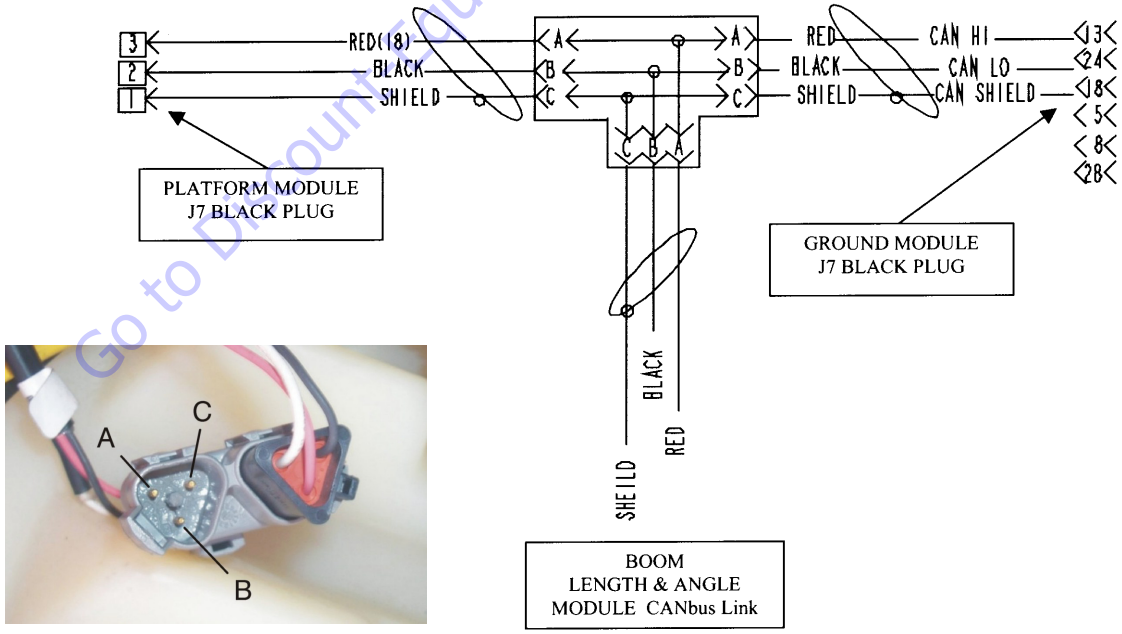

Figure 6-29. CANbus Connections - Sheet 3 of 5

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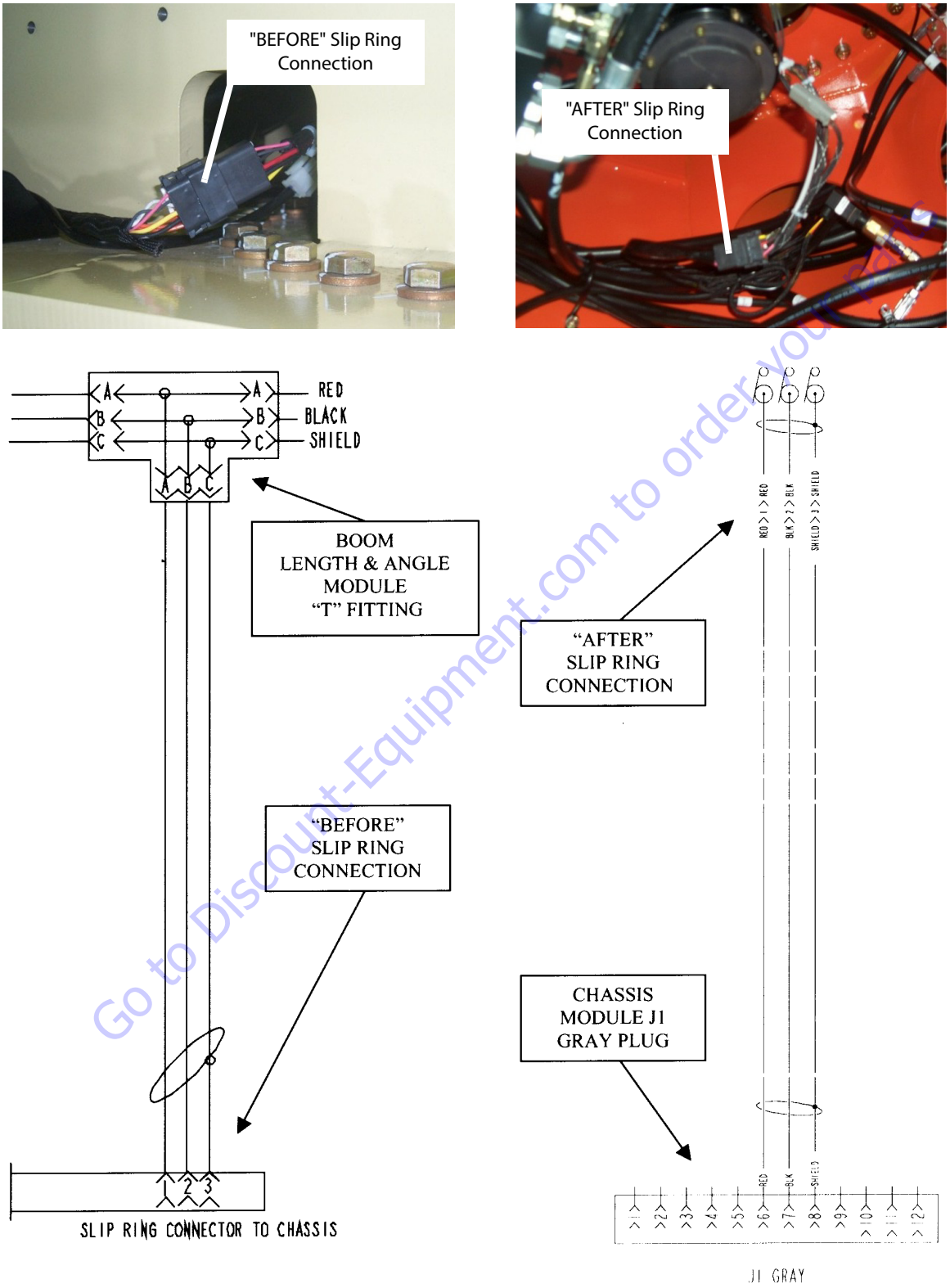

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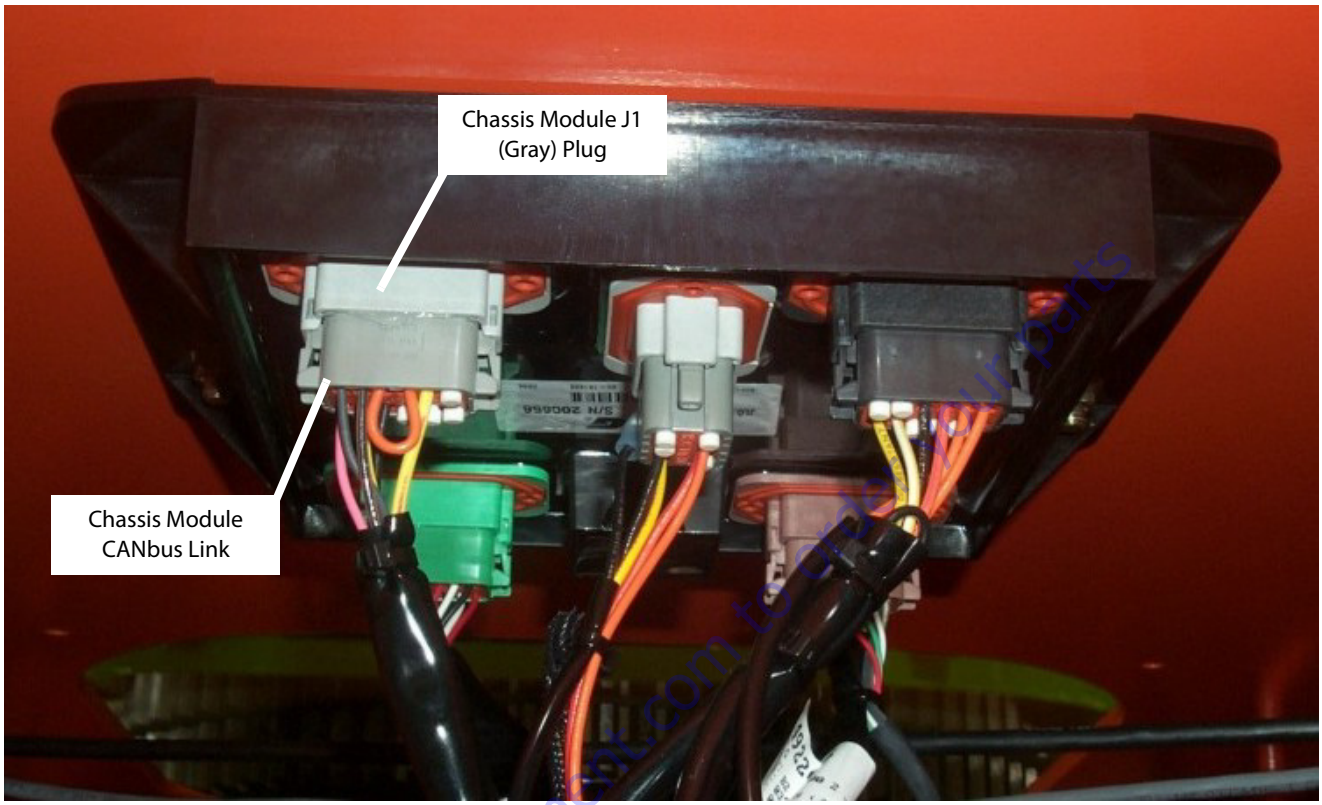
Figure 6-30. CANbus Connections - Sheet 4 of 5



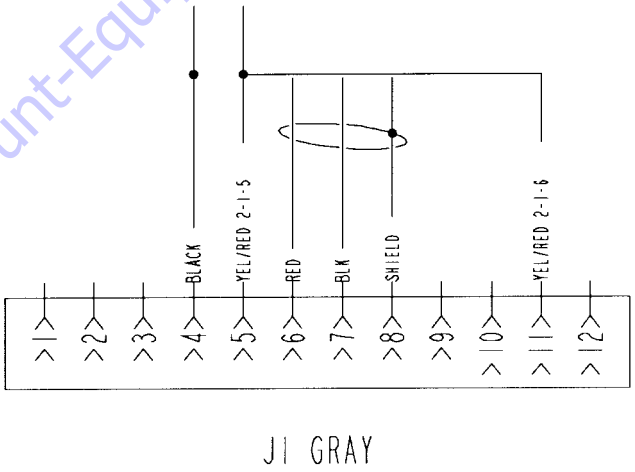


Figure 6-31. CANbus Connections - Sheet 5 of 5

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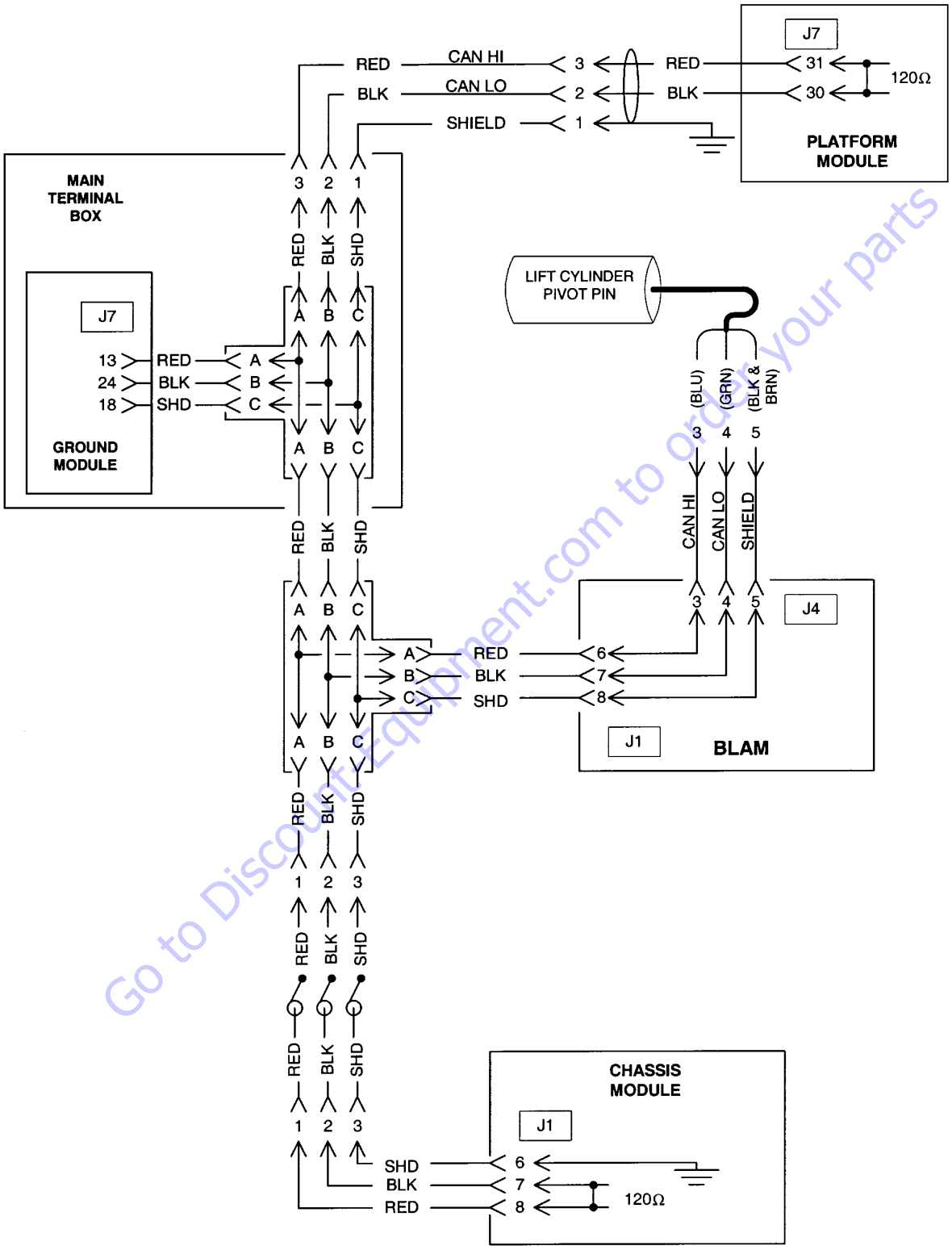

Figure 6-32. CANbus Circuit

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CANbus Communication Failure

If a problem in the CANbus system is suspected, use the following step-by-step procedure to verify which part of the CANbus communication system has failed.

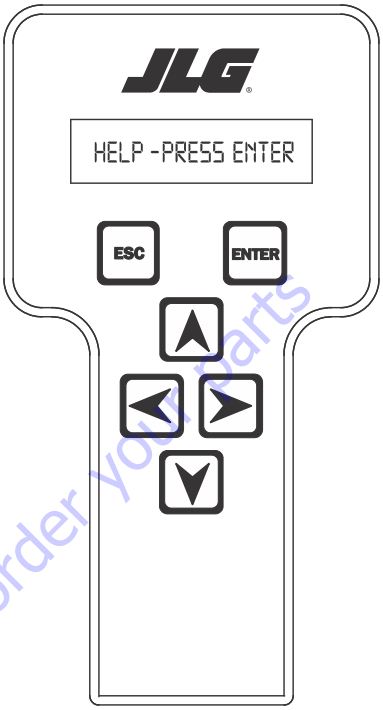
CANBUS LINK FROM THE PLATFORM MODULE LOST

1. Position the Platform/Ground select switch to the Ground position.

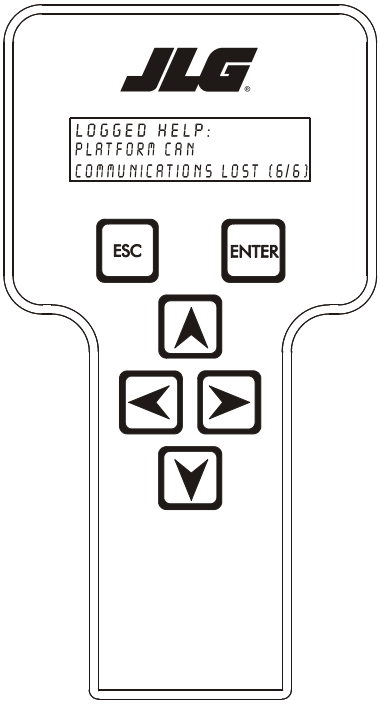
2. Plug the analyzer into the connector inside the Ground control box.

3. Pull out the Emergency Stop switch.

4. The analyzer screen should read:



5. Press enter twice to reach Logged Help. The screen will read:



6. Hit ESC to get back to the HELP screen and then use the arrow button to reach VERSIONS. Hit Enter.

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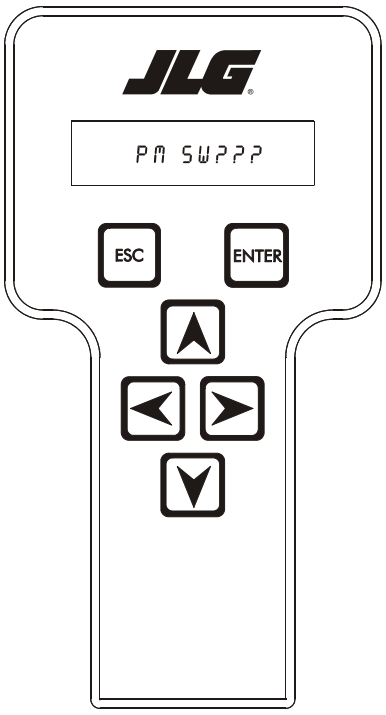
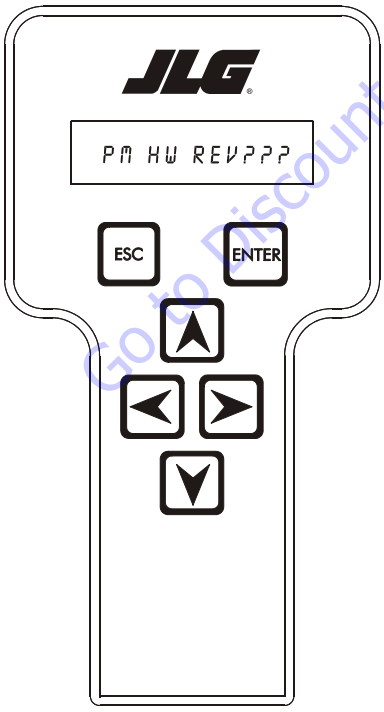
7. If the CANbus link from the platform module is lost, you will see the Ground Module SW version, Ground Module HW version, Ground Module SN, BM SW version, Chassis SW version, Platform Module SN, but you will not see the Platform Module SW version or the Platform Module HW version. The Analyzer screen will read:



8. Hit the right arrow button once. The screen will read:



TROUBLESHOOTING: PLATFORM CAN COMMUNICATIONS LOST

NOTE: *PLATFORM CAN COMMUNICATIONS LOST (6/6) (Help Fault Code 6-6) basically means all communication linked to the Platform Module is lost. This does not mean that the Platform Module Link only is affected, this means the communication link between the Platform Module down to the Chassis Module has been broken, therefore all Canbus links have to be checked. Remember this link is wired in parallel, so the Ground Module has lost all MSA communication.*

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Table 6-14. Troubleshooting: Platform Can Communications Lost

STEP	ACTION REQUIRED	SPEC	YES	NO
1	Install the Analyzer at the ground station, scroll to the "Diagnostics" sub level menu, press "enter" then scroll to the "Versions" menu item press "enter" and view the screen, reference the Diagnostics / Version Chart to assist you in determining which module has lost it's communication link. In some cases the module that shows up with a question may be defective if all other CANbus links check OK.	See Diagnostics / Version Chart	See step 2	See step 2
2	Disconnect the Ground Module J7 deutsche plug connection at the "T" fitting inside of the ground control station. Perform an ohms check at the "A" and "B" pins of the "T" fitting. Inspect the shield wire "C" for shorts.	Approximately 60 ohms.	CANbus circuit is complete. Platform Module suspected defective	Reconnect plug and go to step 3
3	Make sure the CANbus link wires are installed correctly at the Platform Module.	See Electrical Schematic in Section 7	Go to step 4	Wire per Electrical Schematic
4	Disconnect the platform cannon plug and ground cannon plug that holds the CANbus link. Red (3) Black (2) and Shield (1) perform a continuity test.	Continuity	Reconnect plug and go to step 5	Repair or replace platform harness.
5	Disconnect the deutsche plug connection from the Platform Module at the "T" fitting inside of the ground station. Perform an ohms check at the "A" and "B" sockets of the deutsche plug. Inspect the shield wire "C" for shorts.	Approximately 120 ohms.	Reconnect plug and go to step 6	Suspected defective Platform Module.
6	Inspect the Platform Module harness connection at the ground cannon plug and at the "T"' fitting inside of the ground control station.	Continuity	Reconnect harness and go to step 7	Repair or replace harness inside the ground control station.
7	Disconnect the deutsche plug connection from the Boom Length & Angle Module at the "T' fitting inside of the ground station. Perform an ohms check at the "A" and "B" sockets of the deutsche plug. Inspect the shield wire "C" for shorts.	Approximately 120 ohms	Reconnect plug and go to step 8	Verify step 7, inspect the BLAM to Ground Module harness connection s at both "T" fitting connections for proper continuity and correct wiring per Electrical schematic.
8	Disconnect all deutsche plug connections at the "T" fitting in the ground station and the BLAM, perform a continuity test on all "A" "B" and "C" pins use the singular end of the fitting and cross probe the corresponding letters of the other two connections.	Continuity (NO OHM VALUES)	Reconnect all deutsche plugs at the "T" fitting and go to step 9	Replace defective "T" fitting plug.
9	Disconnect the Chassis Module deutsche plug at the "T' fitting below the Boom Length & Angle Module. Perform an ohms check at the "A" and "B" sockets of the deutsche plug. Inspect the shield wire "C" for shorts.	Approximately 120 ohms	Reconnect deutsche plug and go to step 10	Inspect the harness from the "T" fitting at the BLAM to the Chassis Module plug connection at the battery. Assure proper continuity and correct wiring per Electrical Schematic.

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Table 6-14. Troubleshooting: Platform Can Communications Lost

STEP	ACTION REQUIRED	SPEC	YES	NO
10	Disconnect the Chassis Module connection at the right side of the battery at the turntable lock pin. Perform an ohms check at the #1 and #2 connections of the plug. Inspect shield wire #3 for possible short.	Approximately 120 ohms	Reconnect plug and go to step 11	Inspect the harness from the slip ring connections at the top and bottom plug connections of the swivel. Assure proper continuity and correct wiring per Electrical Schematic.
11	Disconnect the Chassis Module connection below the swivel under the machine. Perform an ohms check at the #1 and #2 connections of the plug that is routed to the Chassis Module. Inspect shield wire #3 for possible short.	Approximately 120 ohms	Reconnect plug and go to step 12	Inspect the harness from the bottom of the swivel into the Chassis Module. Assure proper continuity and wiring r schematic 1870149A.
12	Make sure the Chassis Module CANbus link wires are installed correctly at the plug near the battery, the plug below the swivel and 31 plug at the Chassis Module.	Electrical Schematic	Stop	Replace the Chassis Module.

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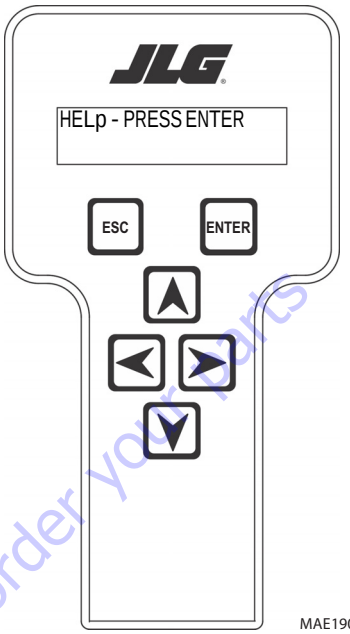
CANBUS LINK FROM THE GROUND MODULE LOST

1. Position the Platform/Ground select switch to the Ground position.

2. Plug the analyzer into the connector inside the Ground control box.

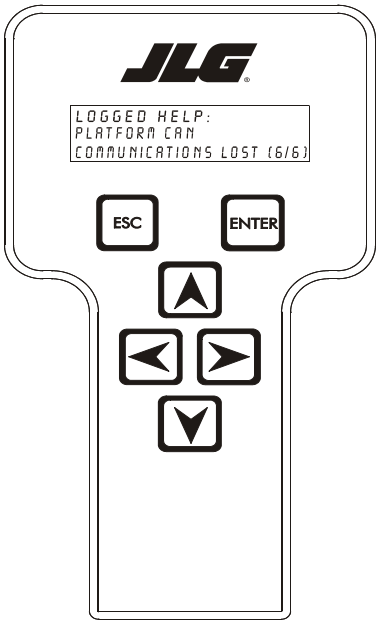
3. Pull out the Emergency Stop switch.

4. The analyzer screen should read:



MAE19060

5. Press enter twice to reach Logged Help. The screen will read:



6. Hit ESC to get back to the HELP screen and then use the arrow button to reach VERSIONS. Hit Enter.

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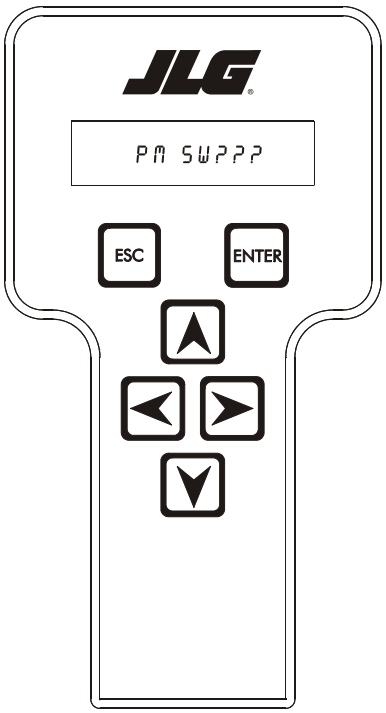
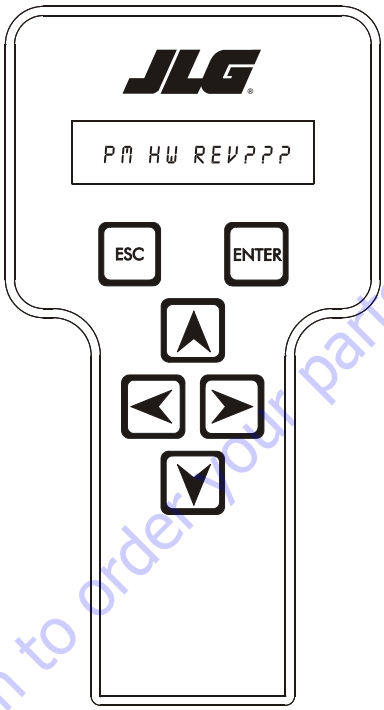
7. If the CANbus link from the ground module is lost, you will see the Ground Module SW version, Ground Module HW version, Ground Module SN, BM SW version, Chassis SW version, Platform Module SN, but you will not see the Platform Module SW version or the Platform Module HW version. The Analyzer screen will read:



8. Hit the right arrow button once. The screen will read:



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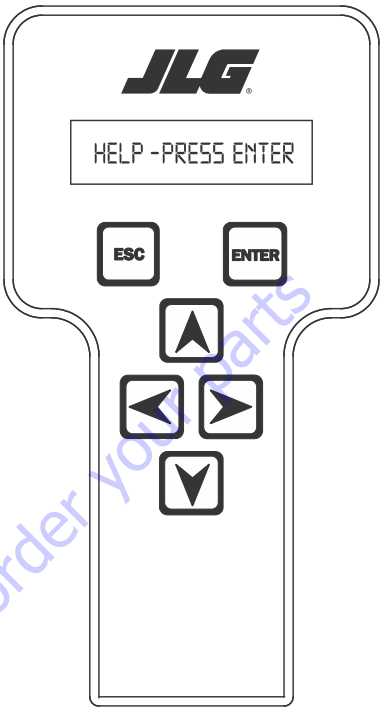
CANBUS LINK FROM THE BOOM LENGTH & ANGLE MODULE (BLAM) LOST

1. Position the Platform/Ground select switch to the Ground position.

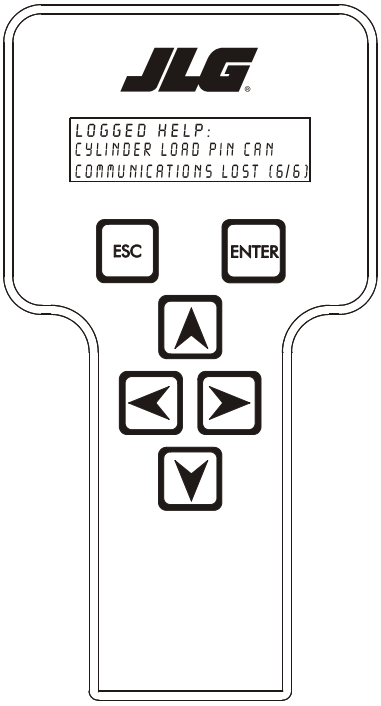
2. Plug the analyzer into the connector inside the Ground control box.

3. Pull out the Emergency Stop switch.

4. The analyzer screen should read:



5. Press enter twice to reach Logged Help. The screen will read:



6. Hit ESC to get back to the HELP screen and then use the arrow button to reach VERSIONS. Hit Enter.

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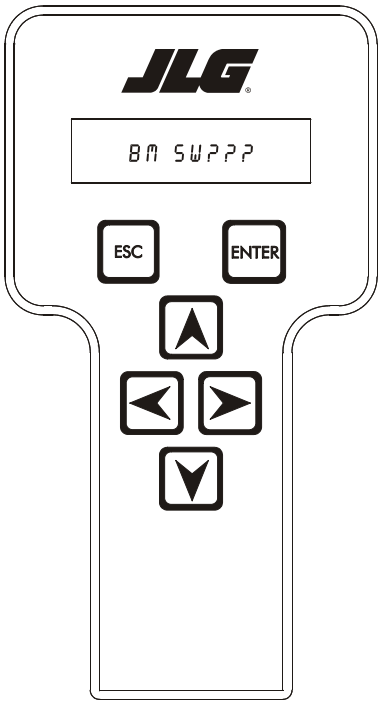
7. If the CANbus link from the Boom Length & Angle Module is lost, you will see the Platform Module SW version, Platform Module HW Rev, Platform Module SN, Ground Module SW version, Ground Module HW Revision, Ground Module SN, Chassis SW version, but you will not see the Boom Length & Angle Module SW revision. The Analyzer screen will read:



TROUBLESHOOTING: BLAM CAN COMMUNICATIONS LOST

NOTE: *BLAM CAN COMMUNICATIONS LOST (6/6) (Help Fault Code 6-6) basically means all communication linked from the Ground Module to the Boom Length &: Angle Module is lost. This also includes the lift cylinder load moment pin as well.*

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Table 6-15. Troubleshooting: BLAM Can Communications Lost

STEP	ACTION REQUIRED	SPEC	YES	NO
1	Install the Analyzer at the ground station, scroll to the "Diagnostics" sub level menu, press "enter" then scroll to the "Versions" menu item press "enter" and view the screen, reference the Diagnostics / Version Chart to assist you in determining which module has lost it's communication link. In some cases the module that shows up with a question may be defective if all other CANbus links check OK.	See Diagnostics / Version Chart	See step 2	See step 2
2	Disconnect the BLAM **J1** deutsche plug connection at the "T" fitting just above the fuel tank. Perform an ohms check at the "A" and "B" pins of the "T" fitting. Inspect the shield wire "C" for possible short.	Approximately 60 ohms.	CANbus circuit is complete. BLAM suspected defective.	Reconnect plug and go to step 3
3	Disconnect the Ground Module deutsche plug from "T" fitting at the BLAM above the fuel tank. Perform an ohm check at the "A" and "B" sockets of the deutsche plug. Inspect the shield wire "C " for possible short.	Approximately 120 Ohms	Reconnect harness and go to step 4	Repair or replace the Ground Module to BLAM harness.
4	Verify the CANbus link signal wires are installed correctly at the 'T" fitting at the Ground Module.	Electrical Schematic	Reconnect plug and go to step 5	Wire per Electrical Schematic
5	Verify the lift cylinder load moment harness has good continuity and wired correctly at the J4 plug on the BLAM.	Continuity	Reconnect plug and go to step 6	Repair or replace Chassis Module harness.
6	Disconnect the Chassis Module plug connection at the battery and perform an ohm check at the #1 and #2 socket of the deutsche plug. Inspect the shield wire #3 for possible short.	Approximately I 20 Ohms	Reconnect plug and stop	Inspect harness and connections to the Chassis Module.

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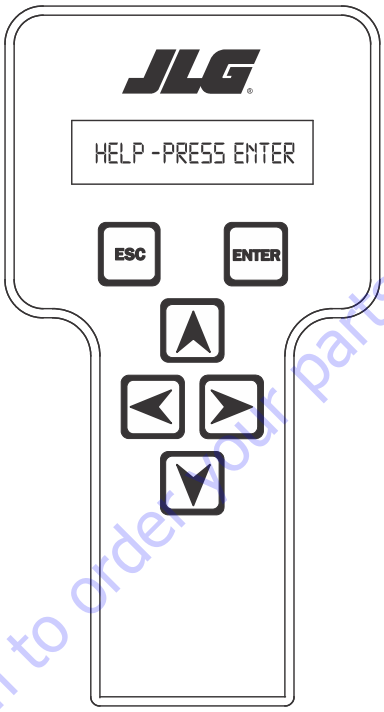
CANBUS LINK FROM THE CHASSIS MODULE LOST

1. Position the Platform/Ground select switch to the Ground position.

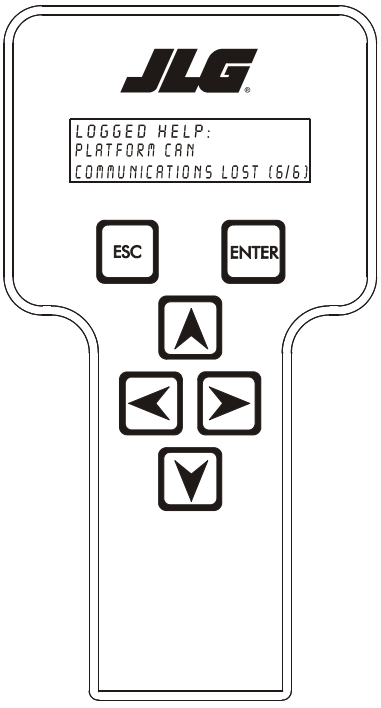
2. Plug the analyzer into the connector inside the Ground control box.

3. Pull out the Emergency Stop switch.

4. The analyzer screen should read:



5. Press enter twice to reach Logged Help. The screen will read:



6. Hit ESC to get back to the HELP screen and then use the arrow button to reach VERSIONS. Hit Enter.

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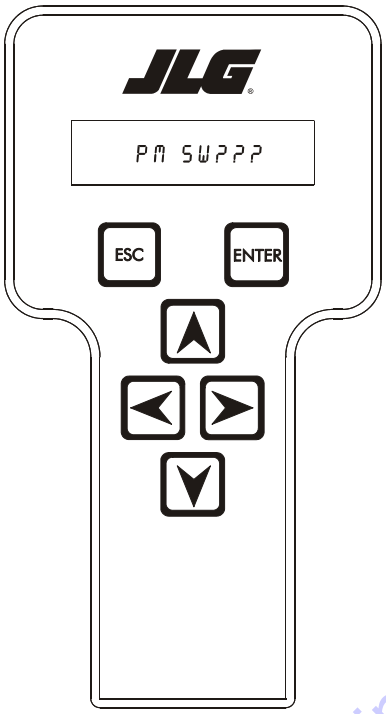
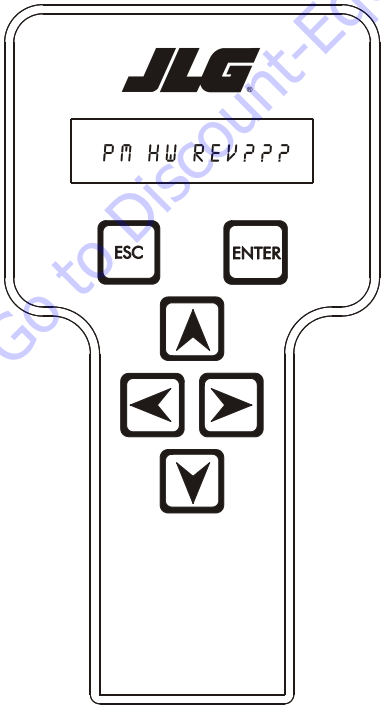
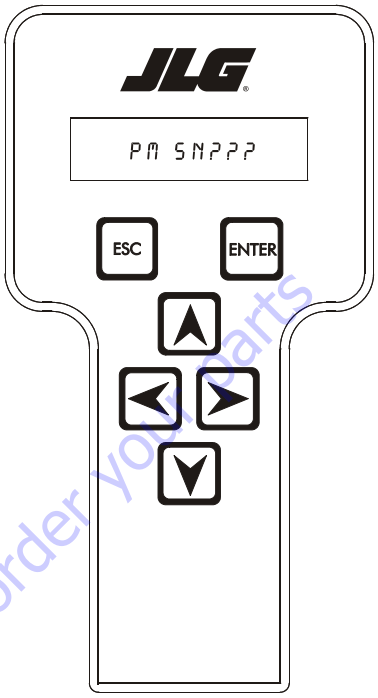
7. If the CANbus link from the Chassis Module is lost, you will NOT see the Platform Module SW version, Platform Module HW rev, Platform Module SN, Chassis SW version, Boom Length & Angle Module SW version, but you WILL see the Ground Module SW version, Ground Module HW rev, and the Ground Module SN. The analyzer screen will read:



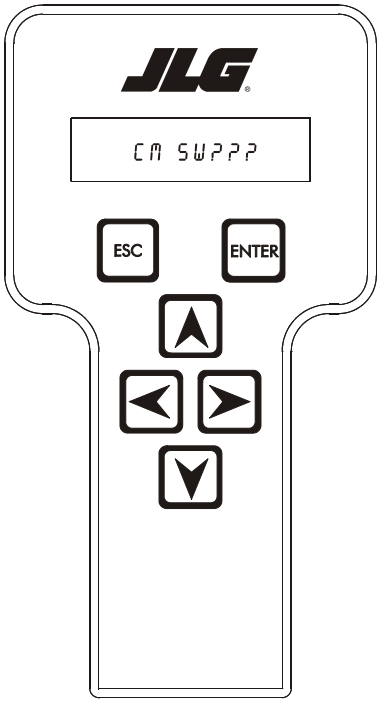
8. Hit the right arrow button once. The screen will read:



9. Hit the right arrow button once. The screen will read:



10. Hit the right arrow button once. The screen will read:



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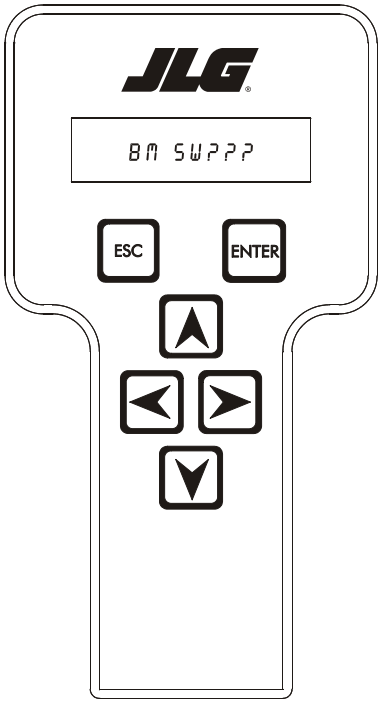
11. Hit the right arrow button once. The screen will read:



TROUBLESHOOTING: CHASSIS CAN COMMUNICATIONS LOST

NOTE: *CHASSIS CAN COMMUNICATIONS LOST (6/6) (Help Fault Code 6-6) basically means all communication linked from the Ground Module to the Chassis Module is lost.*

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Table 6-16. Troubleshooting: Chassis Can Communications Lost

STEP	ACTION REQUIRED	SPEC	YES	NO
1	Install the Analyzer at the ground station, scroll to the "Diagnostics" sub level menu, press "enter" then scroll to the "Versions" menu item press "enter" and view the screen, reference the Diagnostics / Version Chart to assist you in determining which module has lost it's communication link. In some cases the module that shows up with a question may be defective if all other CANbus links check OK.	See Diagnostics / Version Chart	See step 2	See step 2
2	Disconnect the BLAM J1 deutsche plug connection at the "T" fitting just above the fuel tank. Perform an ohms check at the "A" and "B" pins of the "T" fitting. Inspect the shield wire "C" for possible short.	Approximately 60 ohms.	CANbus circuit is complete. Chassis Module suspected defective.	Reconnect plug and go to step 3
3	Disconnect the Chassis Module communication harness from the BLAM "T" fitting and Chassis Module plug connection at the battery. Perform a continuity test.	Continuity	Reconnect harness and go to step 4	Repair or replace BLAM and Chassis Module harness.
4	Verify the CANbus link signal wires are installed correctly at the Chassis Module plug connection at the battery and at the plug below the swivel.	Electrical Schematic	Reconnect plug and go to step 6	Wire per Electrical Schematic
5	Verify continuity at the Chassis Module harness from the plug connection at the battery down to the plug connection below the swivel.	Continuity	Reconnect plug and go to step 6	Repair or replace Chassis Module harness.
6	Disconnect the Chassis Module plug connection below the swivel and perform an ohms check at the #1 and #2 of the plug. Inspect the shield wire #3 plug connection for possible short.	Approximately 120 Ohms	Stop	Replace Chassis Module

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Load Moment Pin Troubleshooting

The following Troubleshooting Charts outline diagnostic measures to be taken to diagnose problems within the Load Moment Pin portion of the JLG Control System. If necessary, refer to Section 4 for information concerning replacement of the Load Moment Pin.

Table 6-17. Load Moment Pin Troubleshooting: Can Communications Lost

STEP	FAULT CODE/SYMPTOM	REPAIR	YES	NO
1	6/6 CYLINDER LOAD PIN CAN COMMUNICATIONS LOST	Check for correct and tight wire connections at the deutsch and phoenix connectors of the Load Sensing Pin harness and perform a continuity check.	Go to step 2	Replace harness. (4922826)
2		Check for loose pins in the potting of the Boom Length & Angle Module J4 connection.	Replace the BLAM & Perform the Boom Sensor calibration process.	Go to step 3
3		Inspect the CANbus link "T" fitting connections at the BLAM & Ground Module. Are the fittings dry?	Go to step 4	Replace "T" fitting connector. (4460945)
4		Inspect the CANbus link "T" fitting connections at the BLAM & Ground Module. Perform a continuity check.	Go to step 5	Replace "T" fitting connector. (4460945)
5		Check the J1 and J4 plug connections on the BLAM, make sure the notched plugs line up with the plug sockets correctly.	Go to step 6	Position plug correctly.
6		Use the Analyzer, scroll – + to the DIAGNOSTICS menu, press ENTER, then scroll to the MOMENT menu, and press ENTER, check to see if Actual / Over / Under moment values are registering on the screen display.	Go to step 6	Replace the load moment pin. & Perform the Boom Sensor calibration process.
7		If they are, refer to Figure 6-33., Moment Chart for comparable values, if the values are not close, try boom sensor calibration to see if the values come within the chart.	If the problem still exists, verify steps 1-7 again before contacting the JLG Service Dept.	Replace the load moment pin. & Perform the Boom Sensor calibration process.

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Table 6-18. Load Moment Pin Troubleshooting: Moment Pin Horizontal Force Out of Range

STEP	FAULT CODE/SYMPTOM	REPAIR	YES	NO
1	8/6 MOMENT PIN HORIZONTAL FORCE OUT OF RANGE The horizontal force is out of allowed range.	Check to see if the platform is overloaded in the vertical position. Check the rated capacity requirement.	Remove excess weight	Go to step 2
2		Check to see if any additional accessories have been added to the platform without proper calibration.	Perform the Boom Sensor calibration process.	Go to step 3
3		Perform the BCS daily check procedure to make sure the boom sections are stopping correctly at the witness marks matching their capacity selection.	Go to step 4	Perform the Boom Sensor calibration process.
4		Inspect the job the machine is performing, making sure that there is no additional force applied when the boom sections are in the horizontal position. Also consider weather conditions (Wind).	Go to step 5	Position machine correctly.
5		Use the Analyzer, scroll to the DIAGNOSTICS menu, press ENTER, then scroll to the MOMENT menu, and press ENTER, check to see if Actual / Over / Under moment values are registering on the screen display.	Go to step 6	Replace the load moment pin. & Perform the Boom Sensor calibration process.
6		If they are, refer to Figure 6-33., Moment Chart for comparable values, if the values are not close, try boom sensor calibration to see if the values come within the chart.	If the problem still exists, verify steps 1-6 again before contacting the JLG Service Dept.	Replace the load moment pin. & Perform the Boom Sensor calibration process.

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Table 6-19. Load Moment Pin Troubleshooting: Moment Pin Vertical Force Out of Range

STEP	FAULT CODE/SYMPTOM	REPAIR	YES	NO
1	8/6 MOMENT PIN VERTICAL FORCE OUT OF RANGE The vertical force is out of allowed range.	Check to see if the platform is overloaded in the vertical position. Check the rated capacity requirement.	Remove excess weight	Go to step 2
2		Check to see if any additional accessories have been added to the platform without proper calibration.	Perform the Boom Sensor calibration process.	Go to step 3
3		Perform the BCS daily check procedure to make sure the boom sections are stopping correctly at the witness marks matching their capacity selection.	Go to step 4	Perform the Boom Sensor calibration process.
4		Inspect the job the machine is performing, making sure that there is no additional force applied when the boom sections are in the horizontal position. Also consider weather conditions (Wind).	Go to step 5	Position machine correctly.
5		Use the Analyzer, scroll to the DIAGNOSTICS menu, press ENTER, then scroll to the MOMENT menu, and press ENTER, check to see if Actual / Over / Under moment values are registering on the screen display.	Go to step 6	Replace the load moment pin. & Perform the Boom Sensor calibration process.
6		If they are, refer to Figure 6-33., Moment Chart for comparable values, if the values are not close, try boom sensor calibration to see if the values come within the chart.	If the problem still exists, verify steps 1-6 again before contacting the JLG Service Dept.	Replace the load moment pin. & Perform the Boom Sensor calibration process.

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Table 6-20. Load Moment Pin Troubleshooting: Moment Pin Sensor Fault

STEP	FAULT CODE/SYMPTOM	REPAIR	YES	NO
1	8/6 MOMENT PIN SENSOR FAULT The moment pin has reported a fault flag	Use the Analyzer, scroll to the DIAGNOSTICS menu, press ENTER, then scroll to the MOMENT menu, and press ENTER, check to see if PIN E FLAGS has any numbers on the screen display.	Replace load moment pin & Perform the Boom Sensor calibration process	Contact JLG Service Dept.

Table 6-21. Load Moment Pin Troubleshooting: New Moment Pin Detected Fault

STEP	FAULT CODE/SYMPTOM	REPAIR	YES	NO
1	8/6 NEW MOMENT PIN DETECTED FAULT A moment pin was detected on the system different from the one used to calibrate the machine.	Perform the Boom Sensor calibration process to accept the new load moment pin.	Verify BCS check and review all faults prior to contacting JLG Service Dept.	Contact JLG Service Dept.

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MOMENT CHART

THE FOLLOWING READINGS WERE TAKEN FROM A NEWLY MANUFACTURED MACHINE MODEL 1200SJP, POSITIONED ON LEVEL TERRAIN (<1.5 DEGREE), 75 DEGREE TEMPERATURE AND NO WIND. THE CAPACITY SELECTOR SWITCH WAS POSITIONED ON 500 LB. WITH NO WEIGHT INSIDE THE PLATFORM OR ACCESSORY EQUIPPED! A/D ANGLE AND A/D LENGTH ARE ANALOG DIGITAL CONVERTED COUNTS, THESE COUNTS ARE A MATHEMATICAL FIGURE EQUAL TO VOLTAGE BEING SENSED AT THE GROUND MODULE FROM THE ANGLE SENSORS AND LENGTH SENSOR. WEATHER, TERRAIN AND AGE OF THE MACHINE WILL AFFECT THE FOLLOWING READINGS, KEEP IN MIND THESE READINGS WILL FLUXUATE WHEN VIEWING ON THE ANALYZER SCREEN. TO READ MOMENT VALUES YOU MUST SCROLL BACK TO THE ENVELOPE SUB LEVEL MENU TO VIEW THE BOOM ANGLES, THEN PRESS ESCAPE AND SCROLL TO THE MOMENT SUB LEVEL MENU TO VIEW ACTUAL, OVER, UNDER AND CYLINDER PIN RATIO.

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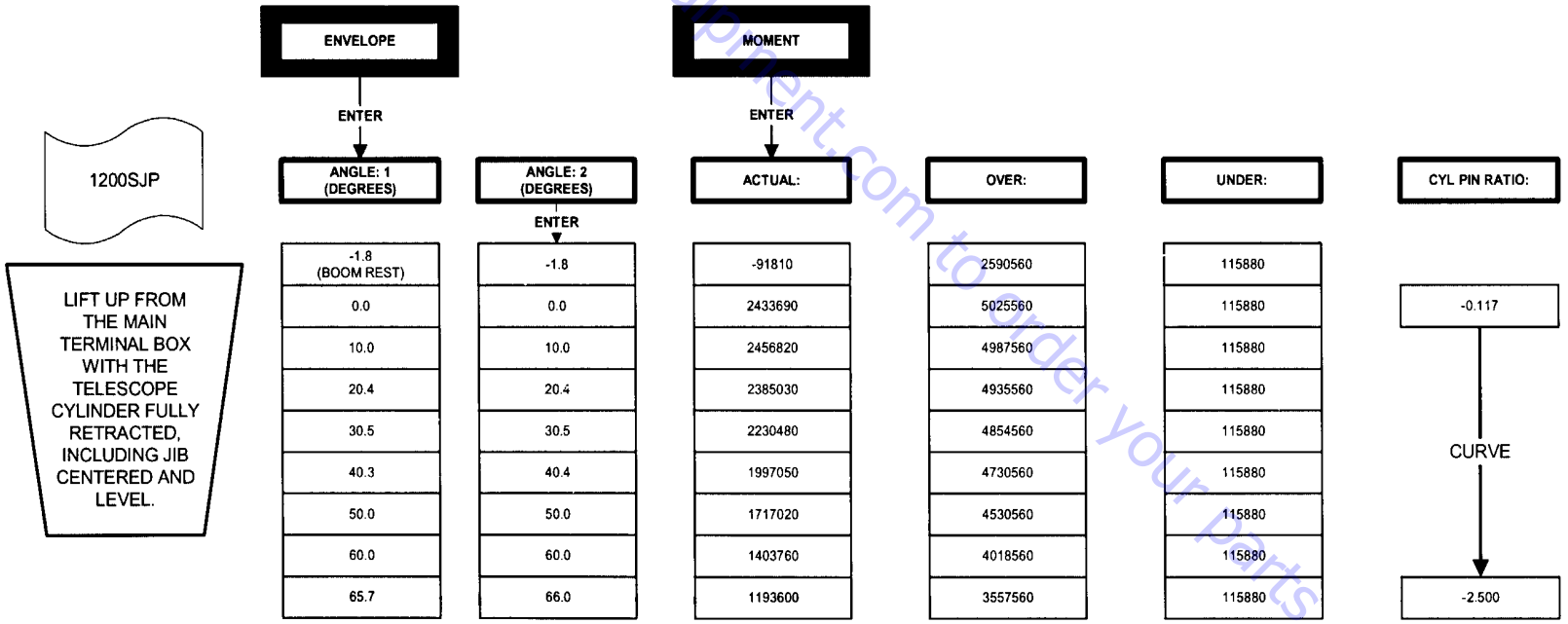

Figure 6-33. Moment Chart

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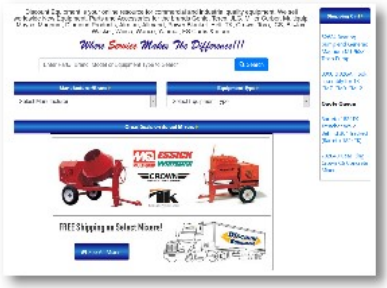

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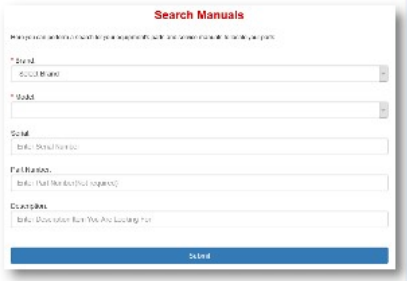

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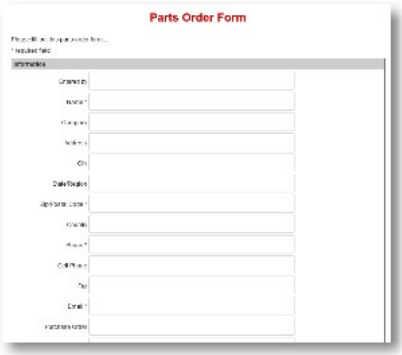

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SECTION 7. BASIC ELECTRICAL INFORMATION & ELECTRICAL SCHEMATICS

7.1 GENERAL

This section contains basic electrical information and schematics to be used for locating and correcting most of the operating problems which may develop. If a problem should develop which is not presented in this section or which is not corrected by listed corrective actions, technically qualified guidance should be obtained before proceeding with any maintenance.

7.2 MULTIMETER BASICS

A wide variety of multimeters or Volt Ohm Meters (VOM) can be used for troubleshooting your equipment. 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 kW = 1200 W
Example: 50 mA = 0.05 A

Voltage Measurement

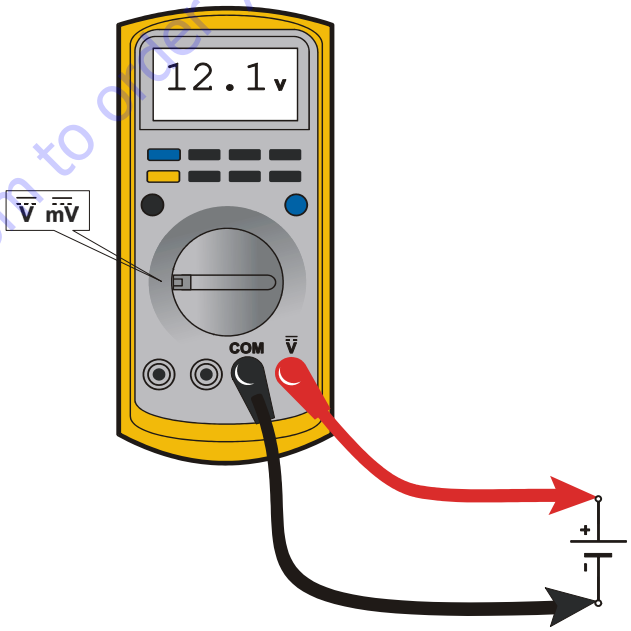

Figure 7-1. Voltage Measurement (DC)

- If meter is not auto ranging, set it to the correct range (See multimeter's operation manual)
- Use firm contact with meter leads

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Resistance Measurement

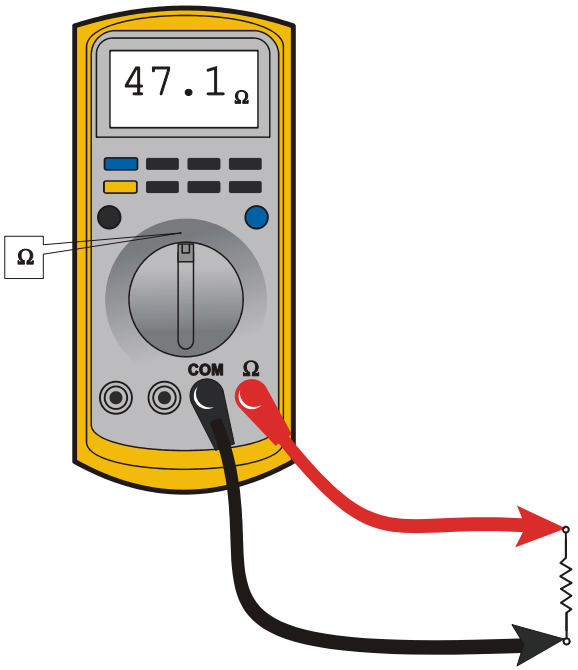

Figure 7-2. Resistance Measurement

- 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

Continuity Measurement

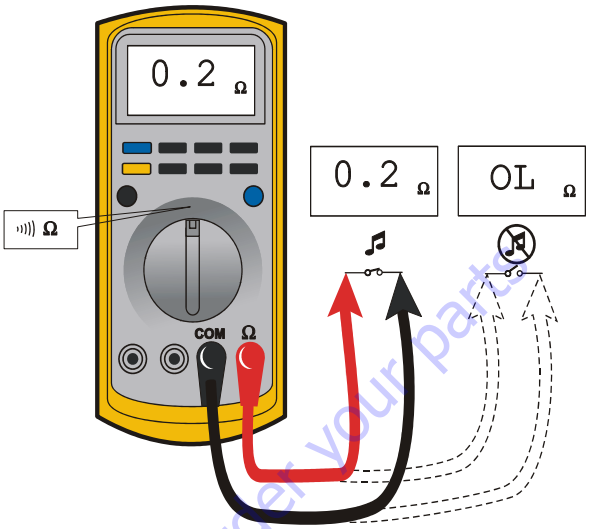

Figure 7-3. Continuity Measurement

- 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

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Current Measurement

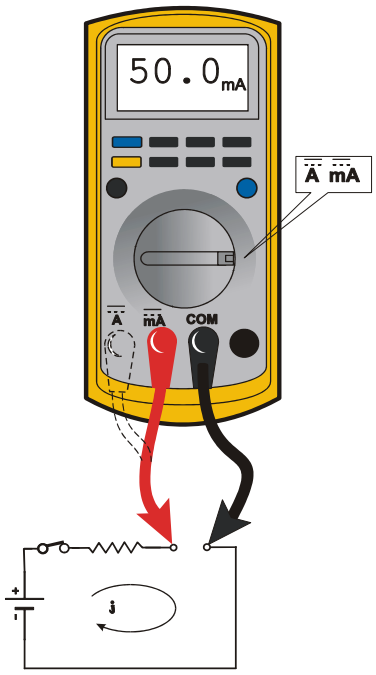

Figure 7-4. Current Measurement (DC)

- 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

7.3 APPLYING SILICONE DIELECTRIC COMPOUND TO ELECTRICAL CONNECTIONS

NOTE: *This section is not applicable for battery terminals.*

NOTICE

JLG PN 0100048 DIELECTRIC GREASE (NOVAGARD G661) IS THE ONLY MATERIAL APPROVED FOR USE AS A DIELECTRIC GREASE.

NOTE: *Do NOT apply dielectric grease to the following connections:*

- Main Boom Rotary sensor connections (on Celesco Sensor),
- LSS Modules connections,
- Deutz EMR 2 ECM connection.

Silicone Dielectric Compound must be used on all electrical connections except for those mentioned above 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. This procedure applies to all plug connections not enclosed in a box. Silicone grease should not be applied to connectors with external seals.

1. To prevent oxidation, silicone grease must be packed completely around male and female pins on the inside of the connector prior to assembly. This is most easily achieved by using a syringe.

NOTE: *Over a period of time, oxidation increases electrical resistance at the connection, eventually causing circuit failure.*

2. To prevent shorting, silicone grease must be packed around each wire where they enter the outside of the connector housing. Also, silicone grease must be applied at the joint where the male and female connectors come together. Any other joints (around strain reliefs, etc.) where water could enter the connector should also be sealed.

NOTE: *This condition is especially common when machines are pressure washed since the washing solution is much more conductive than water.*

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3. Anderson connectors for the battery boxes and battery chargers should have silicone grease applied to the contacts only.

NOTE: *Curing-type sealants might also be used to prevent shorting and would be less messy, but would make future pin removal more difficult.*

When applied to electrical connections, dielectric grease helps to prevent corrosion of electrical contacts and improper conductivity between contacts from moisture intrusion. Open and sealed connectors benefit from the application of dielectric grease.

Dielectric grease shall be applied to all electrical connectors at the time of connection (except those noted under Exclusions).

7.4 DIELECTRIC GREASE APPLICATION

Dielectric grease helps to prevent corrosion of electrical contacts and improper conductivity between contacts from moisture intrusion. Non-waterproof connectors benefit from the application of dielectric grease.

Installation

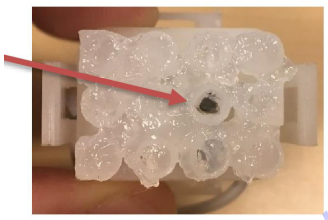
The following is general guidance for the installation of dielectric grease in a connector system.

- Use dielectric grease in a tube for larger connection points or apply with a syringe for small connectors.
- Apply dielectric grease to plug/male connector housing which typically contains sockets contact/female terminals.
- Leave a layer of dielectric grease on the mating face of the connector, completely covering each connector terminal hole. Refer the pictures shown below.
- Assemble the connector system immediately to prevent moisture ingress or dust contamination.

The following connector systems are specifically addressed because of their widespread use at JLG. However, this guidance may be applied to similar devices.

AMP Mate-N-Lok

This connector system is widely used inside enclosures for general-purpose interconnect. Follow the general guidance for installation.



Improper

Proper

AMP Faston

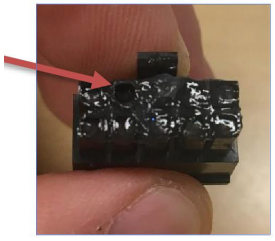
This connector system is typically used on operator switches at JLG. Follow the general guidance for installation.

Improper

Proper

AMP Micro-Fit

This connector system is typically used on control modules at JLG. Follow the general guidance for installation.



Improper

Proper

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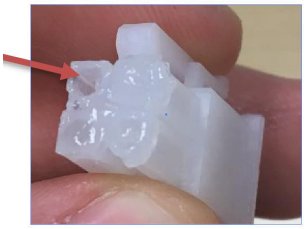
AMP Mini Fit Jr

This connector system is typically used on control modules at JLG. Follow the general guidance for installation.

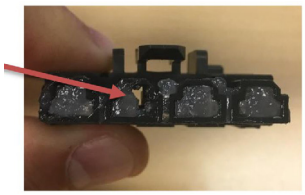


Improper

Proper

Mini Fit Sr

This connector system is typically used on control modules at JLG. Follow the general guidance for installation.

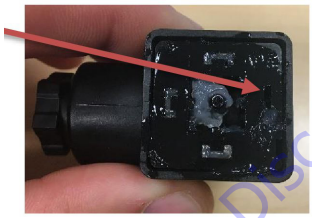


Improper

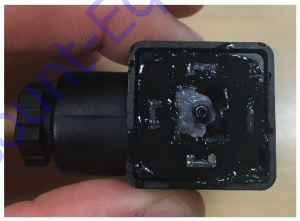
Proper

DIN Connectors

This connector is typically used on hydraulic valves. Follow the installation instructions.



Improper



Proper

Exceptions

Some waterproof connector applications do benefit from dielectric grease, and some non waterproof connectors do not benefit from dielectric grease.

In the exceptions below, we have found dielectric grease is not needed for some applications, and in some cases can interfere with the intended connection. Dielectric grease shall be used as an exception in other applications.

ENCLOSURES

Application of dielectric grease is not required in properly sealed enclosures. To meet criteria, the enclosure must be rated to at least IP56 (dust protected; protected from powerful jets of water).

CARLING SWITCH CONNECTORS

Carling switches may experience high impedance, or discontinuity, due to silicone dielectric grease ingress when switching inductive loads. Therefore, dielectric grease shall not be applied to Carling switch mating connectors unless specifically noted.

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7.5 AMP CONNECTOR

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 7-5.). Proceed as follows:

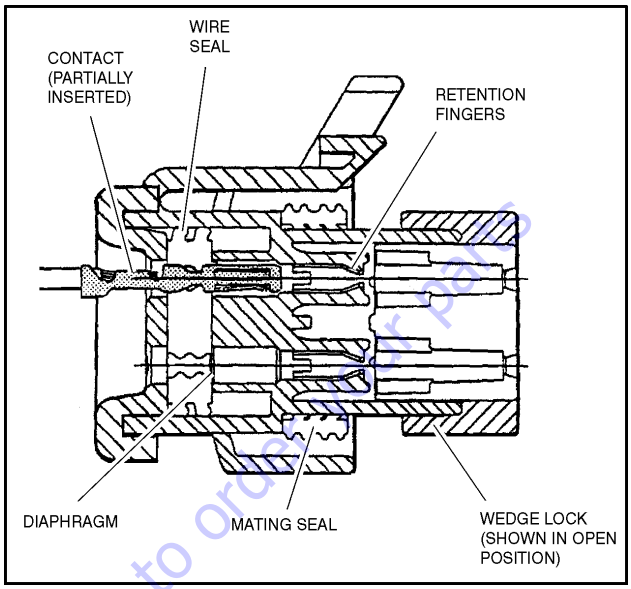

Figure 7-5. Connector Assembly

1. To insert a contact, push it straight into the appropriate circuit cavity as far as it will go (See Figure 7-7.).
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 7-7.).

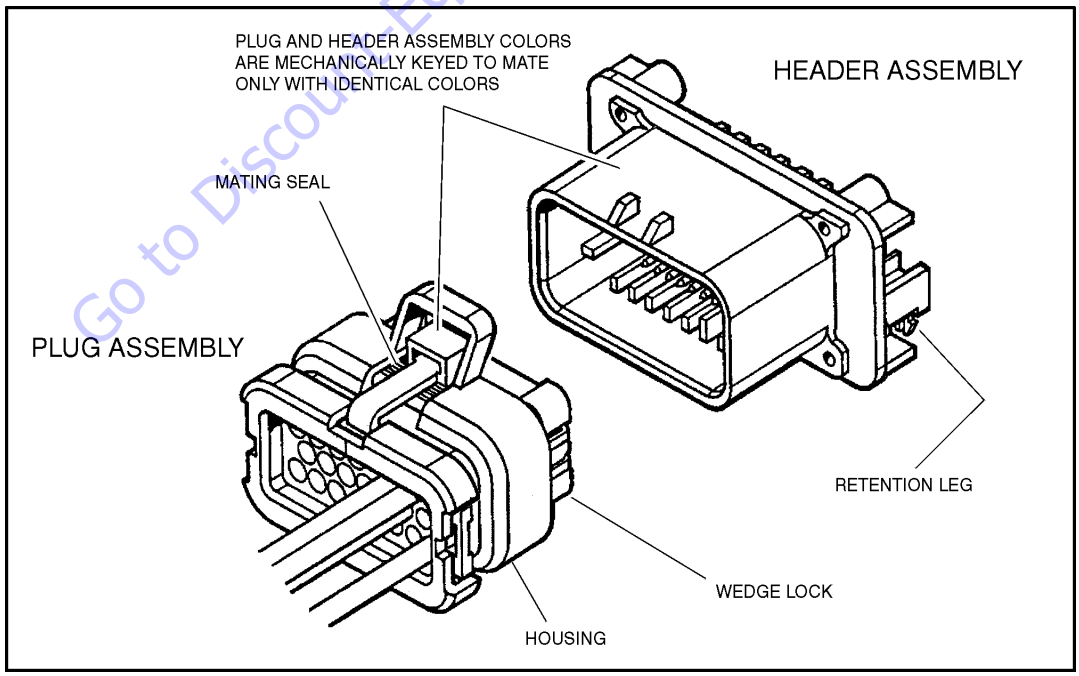

Figure 7-6. AMP Connector

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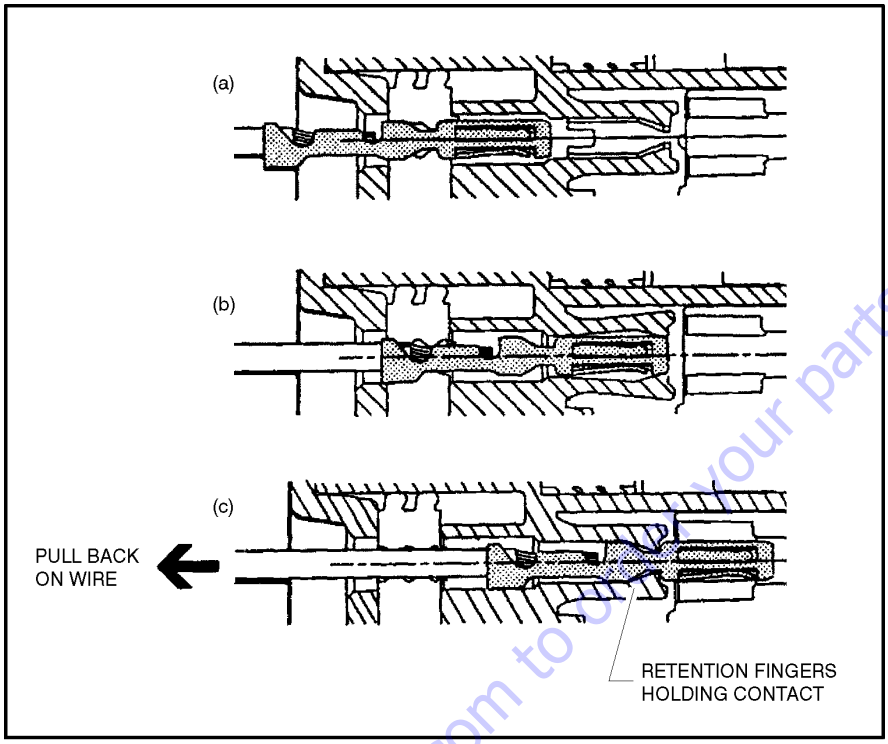

Figure 7-7. Connector Assembly Figure 2

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 7-8.).

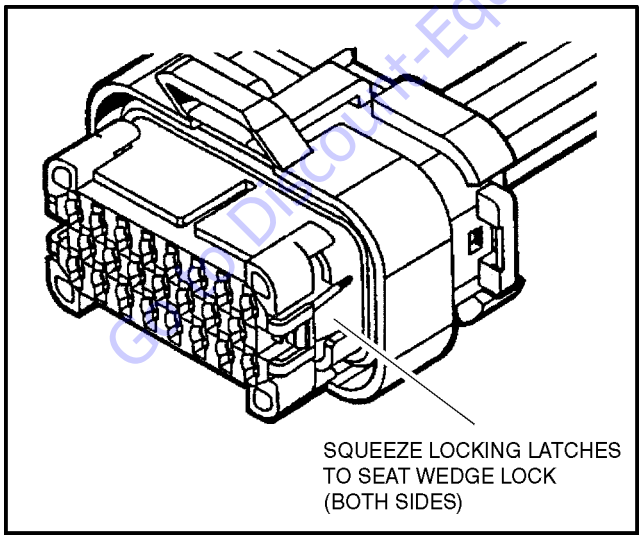

Figure 7-8. Connector Assembly Figure 3

4. Slide the wedge lock into the housing until it is flush with the housing (See Figure 7-9.).

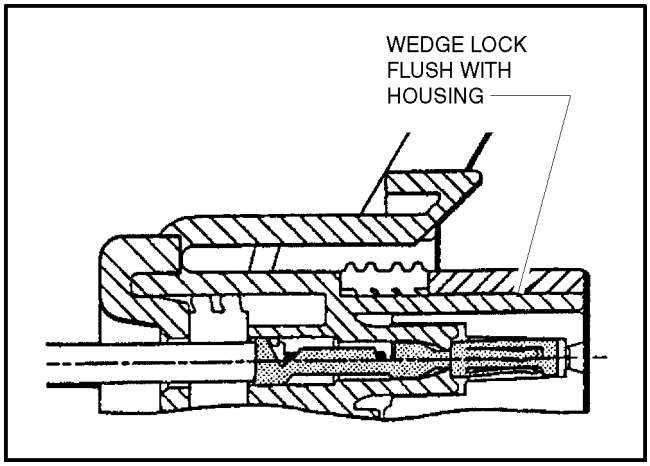

Figure 7-9. Connector Assembly Figure 4

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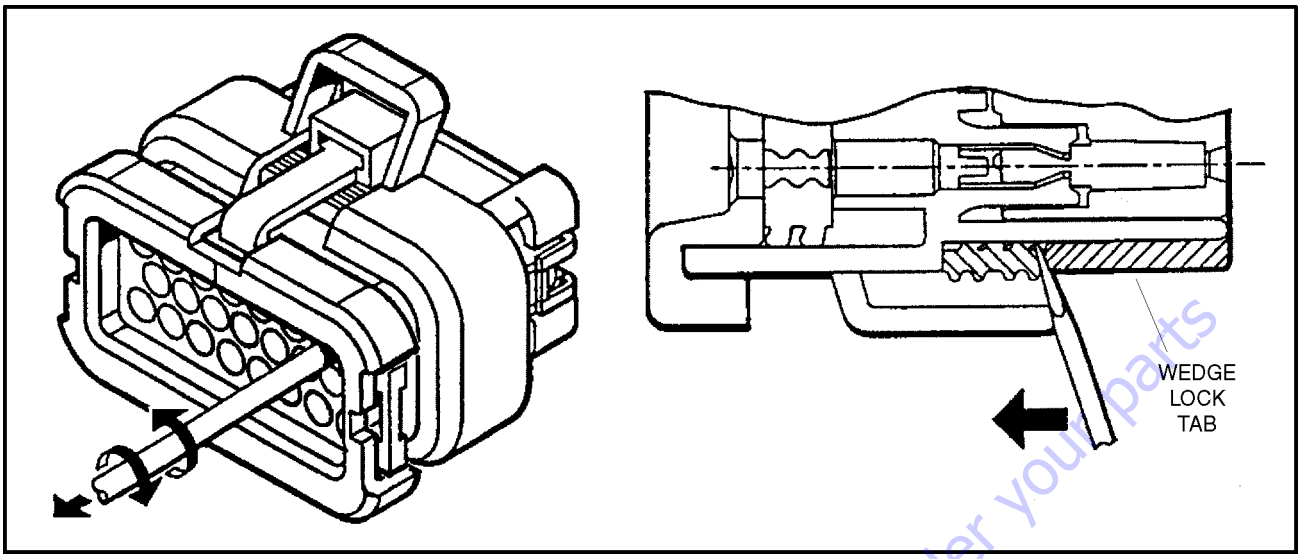

Figure 7-10. Connector Disassembly

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.

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.

Service - Voltage Reading

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.

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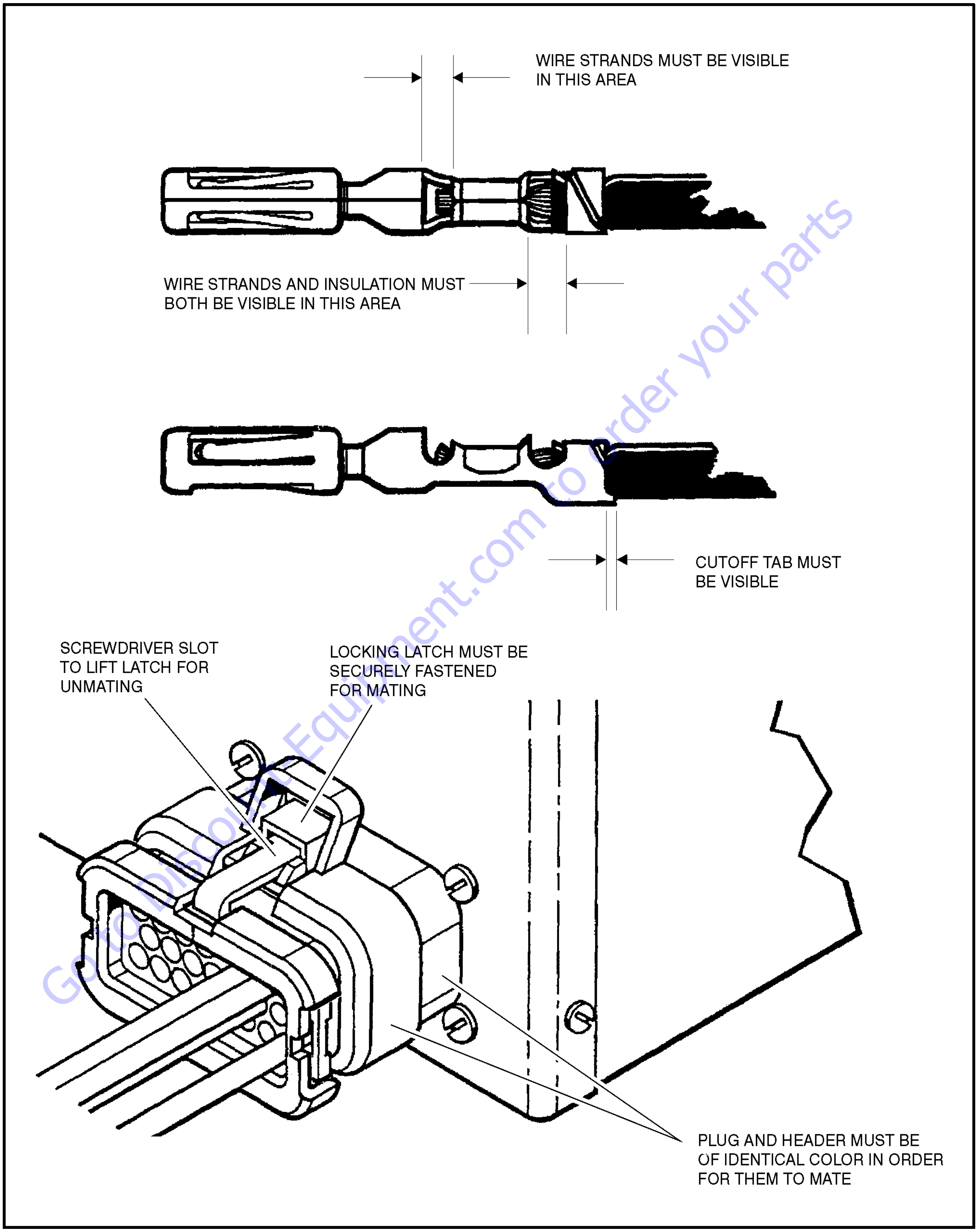

Figure 7-11. Connector Installation

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7.6 DEUTSCH CONNECTORS

DT/DTP Series Assembly

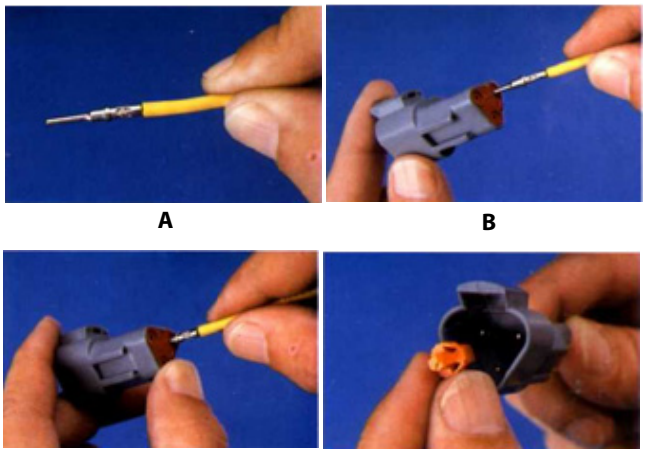

Figure 7-12. DT/DTP Contact Installation

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

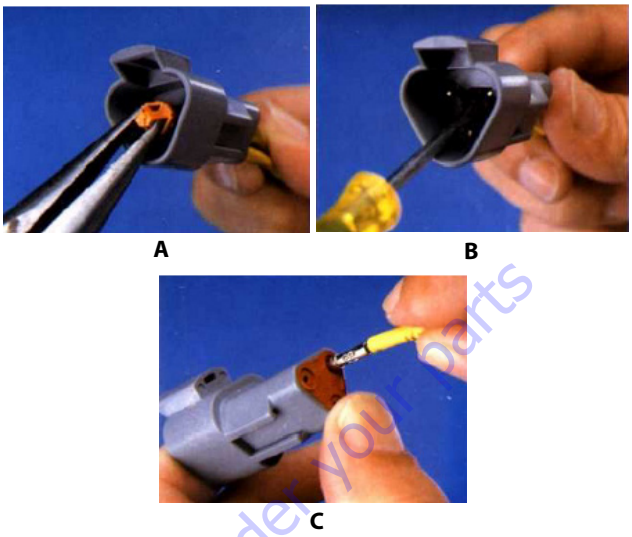

Figure 7-13. DT/DTP Contact Removal

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.

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HD30/HDP20 Series Assembly

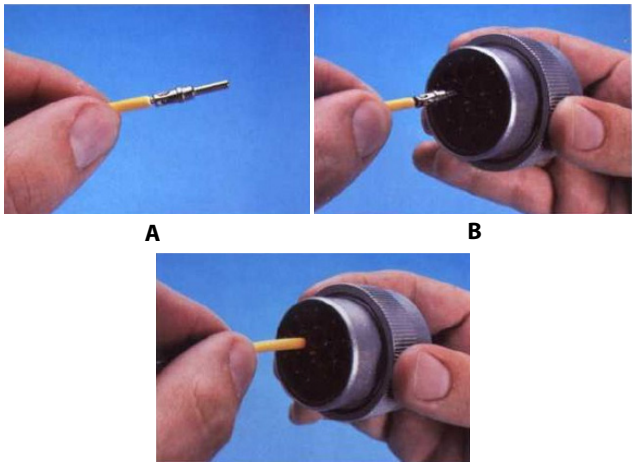

Figure 7-14. HD/HDP Contact Installation

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

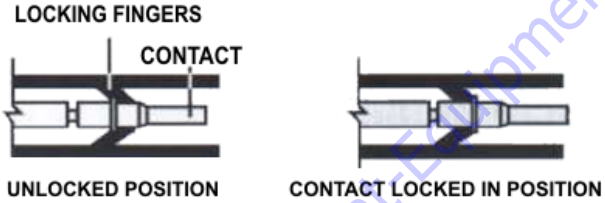

Figure 7-15. HD/HDP Locking Contacts Into Position

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

HD30/HDP20 Series Disassembly

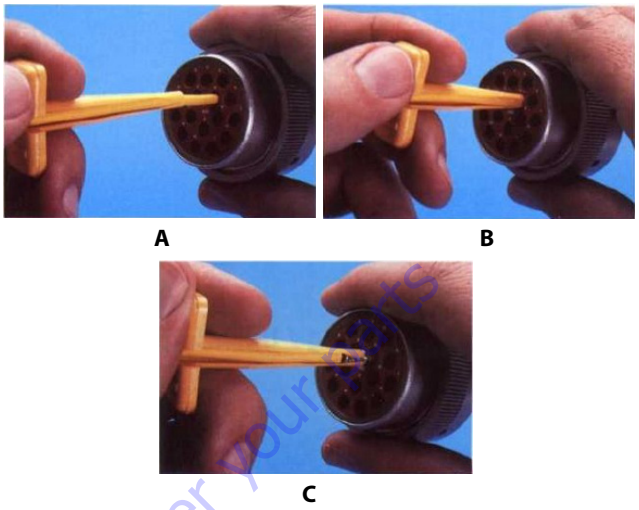

Figure 7-16. HD/HDP Contact Removal

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.

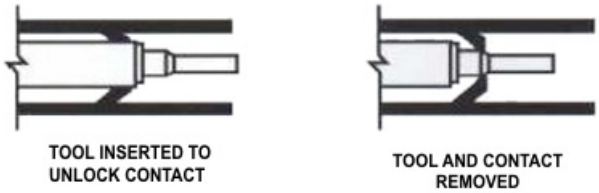

Figure 7-17. HD/HDP Unlocking Contacts

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

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7.7 TELEMATICS GATEWAY

Personnel using machines equipped with an optional telematics gateway will be able to view the following data through their telematics device:

JLG LABEL	DESCRIPTION	UNIT
Engine Speed	Actual engine speed.	RPM
DEF Tank Level (If Equipped)	Indicates the level of DEF (diesel exhaust fluid) within the DEF tank if the machine is equipped with DEF tank. • 0% = Empty • 100% = Full	Percentage (%)
JLG Machine Faults: Active / Not-Active	• 00 - No Machine Faults • 01 - Active Machine Fault • 10 - Error • 11 - Not available	Bit
Total Idle Fuel Used	Total amount of fuel used during vehicle operation during idle conditions.	Liters
Total Idle Hours	Total time of engine operation during idle conditions.	Seconds
Total Engine Hours	Total time of engine operation.	Seconds
Total Fuel Used	Total amount of fuel used during vehicle operation.	Liters
Fuel Rate	Amount of fuel consumed by engine per unit of time.	Liters/Hour
Fuel Level	Ratio of fuel volume to the total volume of the fuel storage container. When a low fuel limit switch is present, the fuel level will indicate "full" until the switch opens, which will then indicate 10% fuel remaining. When Fuel Level 2 (SPN 38) is not used, Fuel Level 1 represents the total fuel in all fuel storage containers. When Fuel Level 2 is used, Fuel Level 1 represents the fuel level in the primary or left side fuel storage container.	Percentage (%)
DM1 Engine Faults	Shows actual engine fault codes.	N/A

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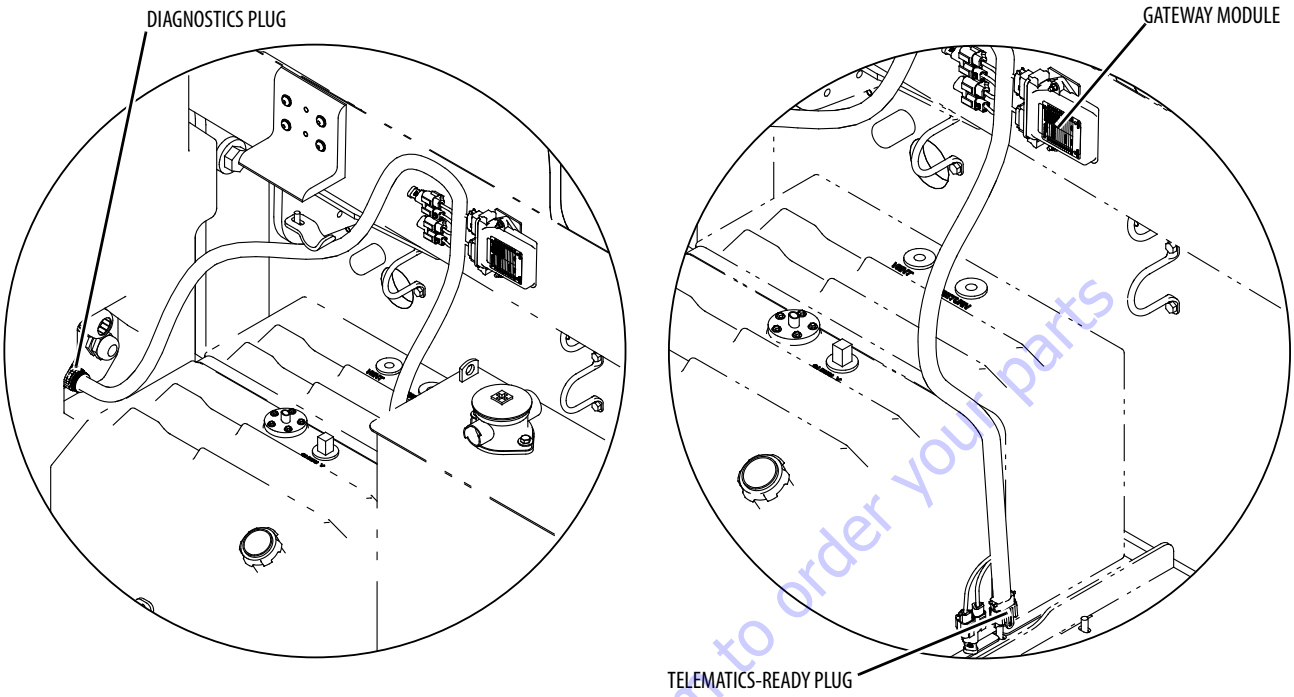
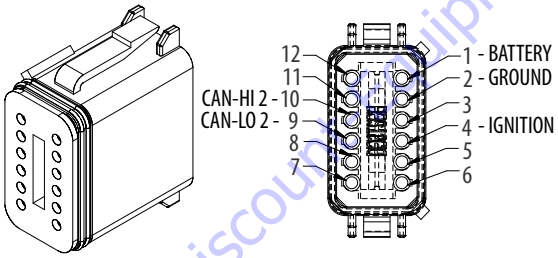


Telematics-Ready (TCU) Plug

The telematics-ready (TCU) plug is a standard 12-pin Deutsch connector. Pin-out locations are shown below:



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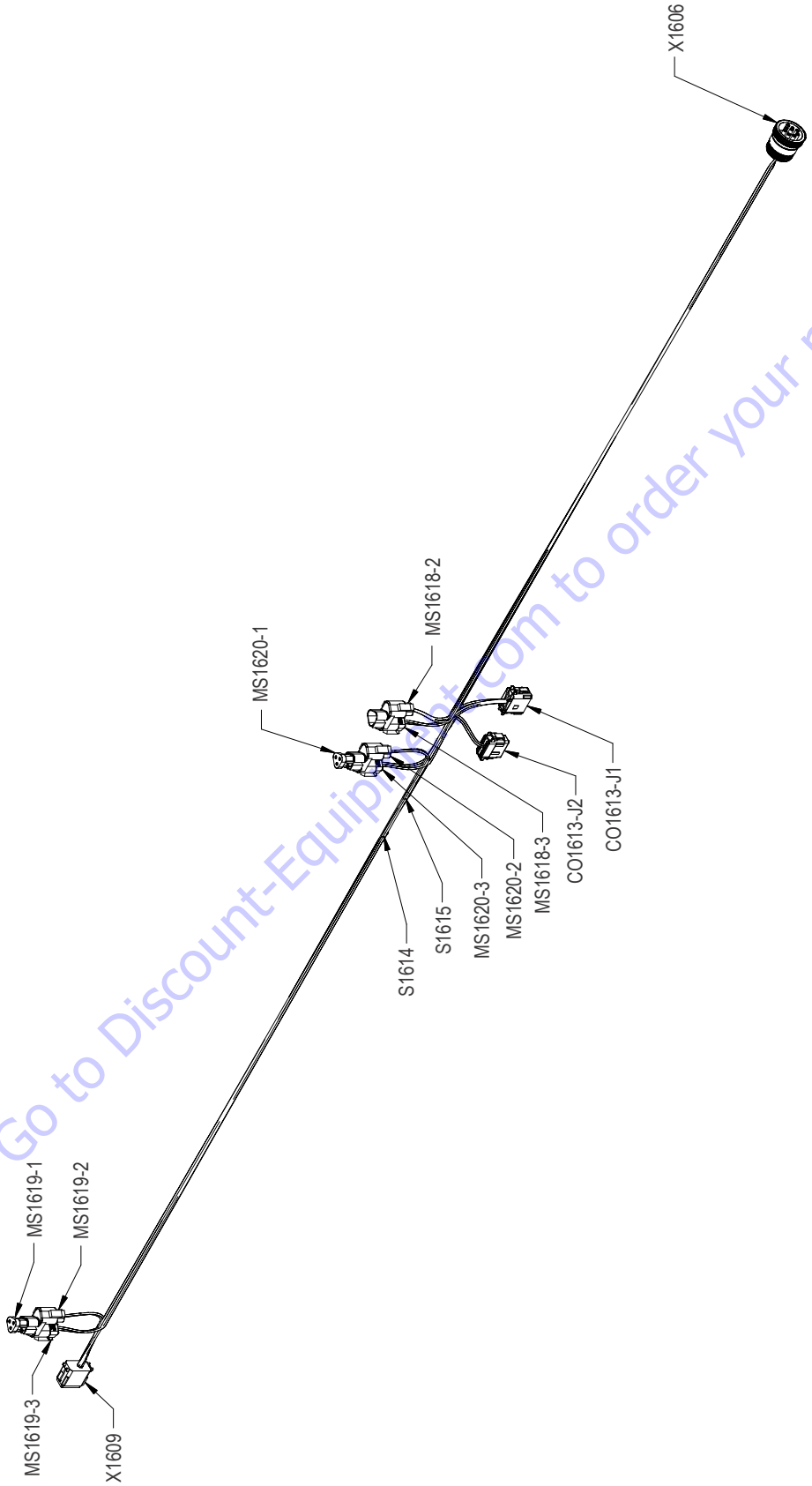

Figure 7-18. Telematics Gateway Harness - Sheet 1 of 3

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X1609 (TCU)					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	RED	1-0 BAT	16 AWG	GXL	X1606 (B)
2	BLK	0-0 GND	16 AWG	GXL	S1615 (1)
4	ORN	2-0 IGN	16 AWG	GXL	S1614 (1)
9	GRN	CANL2	18 AWG	GXL	MS1619-2 (B)
10	YEL	CANH2	18 AWG	GXL	MS1619-2 (A)

MS1619-2 (CAN-T 2)					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
A	YEL	CANH2	18 AWG	GXL	X1609 (10)
B	GRN	CANL2	18 AWG	GXL	X1609 (9)

MS1619-3 (CAN-T 2)					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
A	YEL	CANH2	18 AWG	GXL	MS1620-2 (A)
B	GRN	CANL2	18 AWG	GXL	MS1620-2 (B)

CO1613-J1 (GATEWAY 1)					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
9	GRN	CAN1	18 AWG	GXL	MS1618-2 (B)
10	YEL	CANH1	18 AWG	GXL	MS1618-2 (A)
11	BLK	0-2 GND	16 AWG	GXL	S1615 (2)
12	ORN	2-2 IGN	16 AWG	GXL	S1614 (2)

CO1613-J2 (GATEWAY 2)					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
9	GRN	CANL2	18 AWG	GXL	MS1620-3 (B)
10	YEL	CANH2	18 AWG	GXL	MS1620-3 (A)

MS1620-2 (CAN-T 2)					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
A	YEL	CANH2	18 AWG	GXL	MS1619-3 (A)
B	GRN	CANL2	18 AWG	GXL	MS1619-3 (B)

MS1620-3 (CAN-T 2)					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
A	YEL	CANH2	18 AWG	GXL	CO1613-J2 (10)
B	GRN	CANL2	18 AWG	GXL	CO1613-J2 (9)

S1614					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	ORN	2-0 IGN	16 AWG	GXL	X1609 (4)
2	ORN	2-1 IGN	16 AWG	GXL	X1606 (H)
2	ORN	2-2 IGN	16 AWG	GXL	CO1613-J1 (12)

S1615					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	BLK	0-0 GND	16 AWG	GXL	X1609 (2)
2	BLK	0-1 GND	16 AWG	GXL	X1606 (A)
2	BLK	0-2 GND	16 AWG	GXL	CO1613-J1 (11)

MS1618-2 (CAN-T 1)					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
A	YEL	CANH1	18 AWG	GXL	CO1613-J1 (10)
B	GRN	CANL1	18 AWG	GXL	CO1613-J1 (9)

MS1618-3 (CAN-T 1)					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
A	YEL	CANH1	18 AWG	GXL	X1606 (C)
B	GRN	CANL1	18 AWG	GXL	X1606 (D)

X1606 (DIAG)					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
A	BLK	0-1 GND	16 AWG	GXL	S1615 (2)
B	RED	1-0 BAT	16 AWG	GXL	X1609 (1)
C	YEL	CANH1	18 AWG	GXL	MS1618-3 (A)
D	GRN	CANL1	18 AWG	GXL	MS1618-3 (B)
H	ORN	2-1 IGN	16 AWG	GXL	S1614 (2)

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Figure 7-19. Telematics Gateway Harness - Sheet 2 of 3

					FROM		TO	
WIRE NO.	COLOR	WIRE GAUGE	LENGTH (mm)	JACKET	REFERENCE	PIN	REFERENCE	PIN
CAN L2	GRN	18 AWG	1151	GXL	MS1619-3	B	MS1620-2	B
CAN L2	GRN	18 AWG	151	GXL	X1609	9	MS1619-2	B
CAN L1	GRN	18 AWG	157	GXL	MS1618-2	B	CO1613-J1	9
CAN L2	GRN	18 AWG	225	GXL	MS1620-3	B	CO1613-J2	9
CAN L1	GRN	18 AWG	1076	GXL	MS1618-3	B	X1606	D
CAN H2	YEL	18 AWG	155	GXL	X1609	10	MS1619-2	A
CAN H2	YEL	18 AWG	233	GXL	MS1620-3	A	CO1613-J2	10
CAN H1	YEL	18 AWG	157	GXL	MS1618-2	A	CO1613-J1	10
CAN H2	YEL	18 AWG	1150	GXL	MS1619-3	A	MS1620-2	A
CAN H1	YEL	18 AWG	1079	GXL	MS1618-3	A	X1606	C
0-0 GND	BLK	16 AWG	1006	GXL	X1609	2	S1615	1
0-1 GND	BLK	16 AWG	1145	GXL	X1606	A	S1615	2
0-2 GND	BLK	16 AWG	223	GXL	CO1613-J1	11	S1615	2
1-0 BAT	RED	16 AWG	2150	GXL	X1609	1	X1606	B
2-0 IGN	ORN	16 AWG	939	GXL	X1609	4	S1614	1
2-1 IGN	ORN	16 AWG	1212	GXL	S1614	2	X1606	H
2-2 IGN	ORN	16 AWG	287	GXL	CO1613-J1	12	S1614	2

Figure 7-20. Telematics Gateway Harness - Sheet 3 of 3

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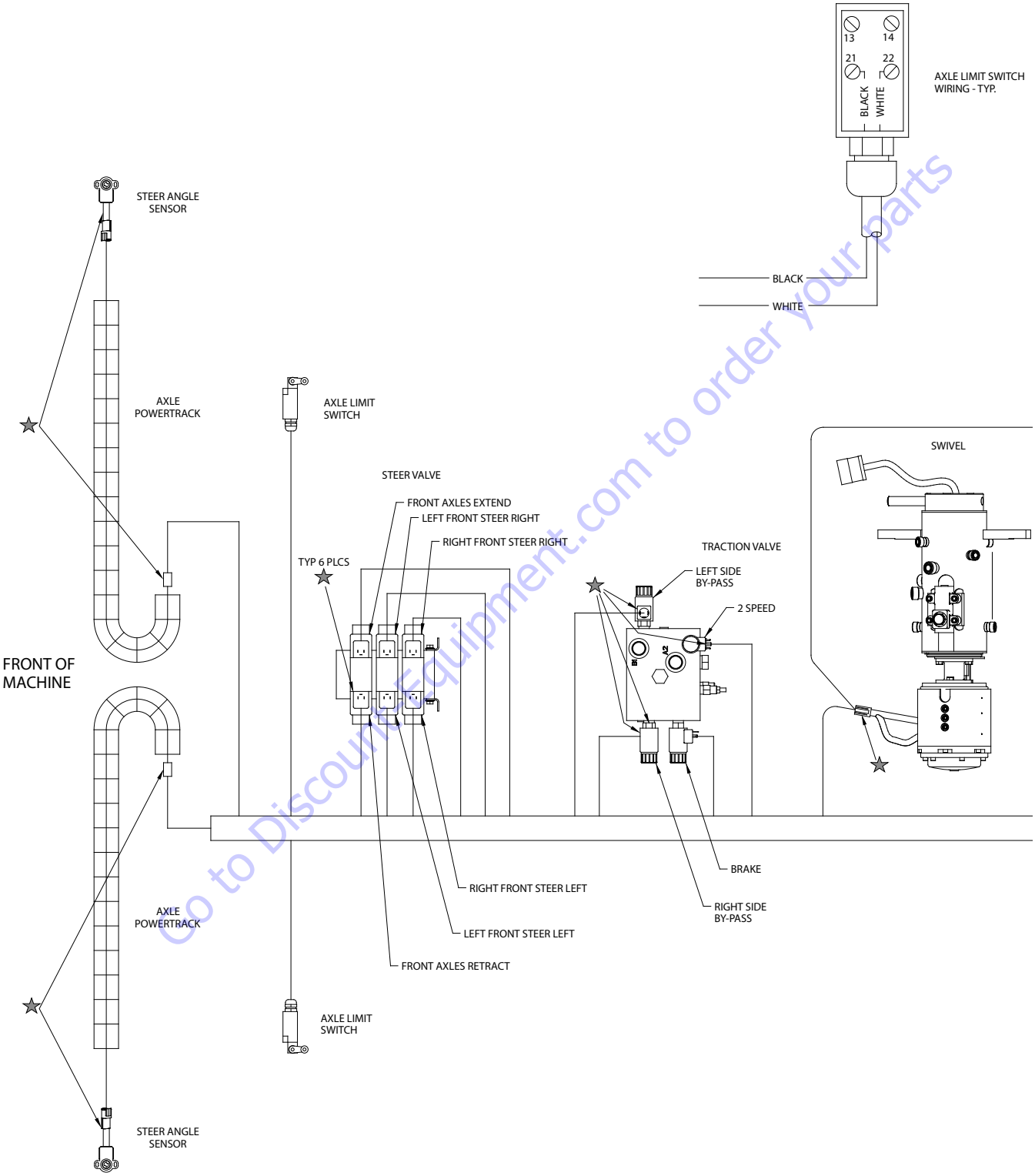

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Figure 7-21. Chassis Electrical Components - Sheet 1 of 2

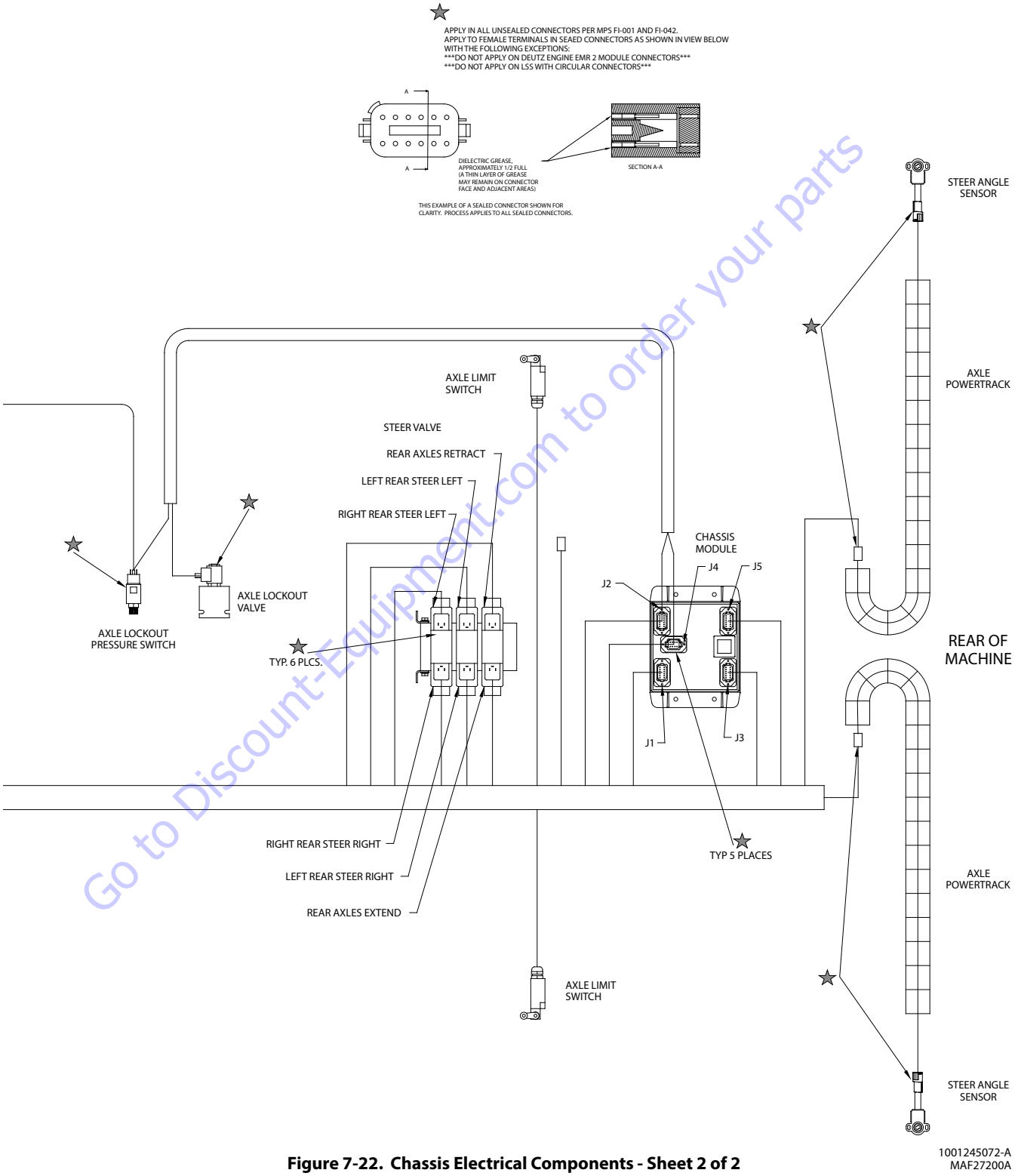

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Figure 7-22. Chassis Electrical Components - Sheet 2 of 2

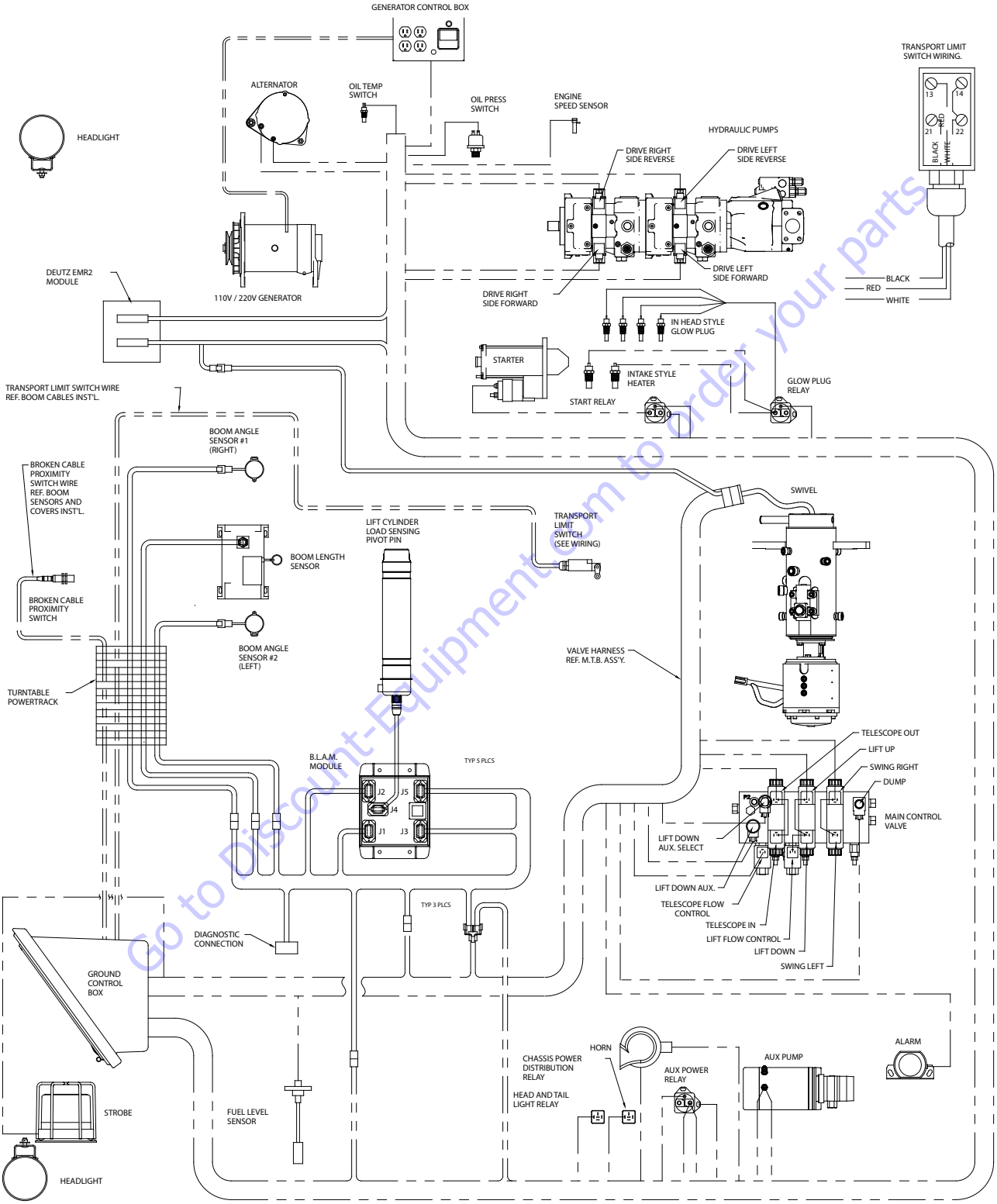

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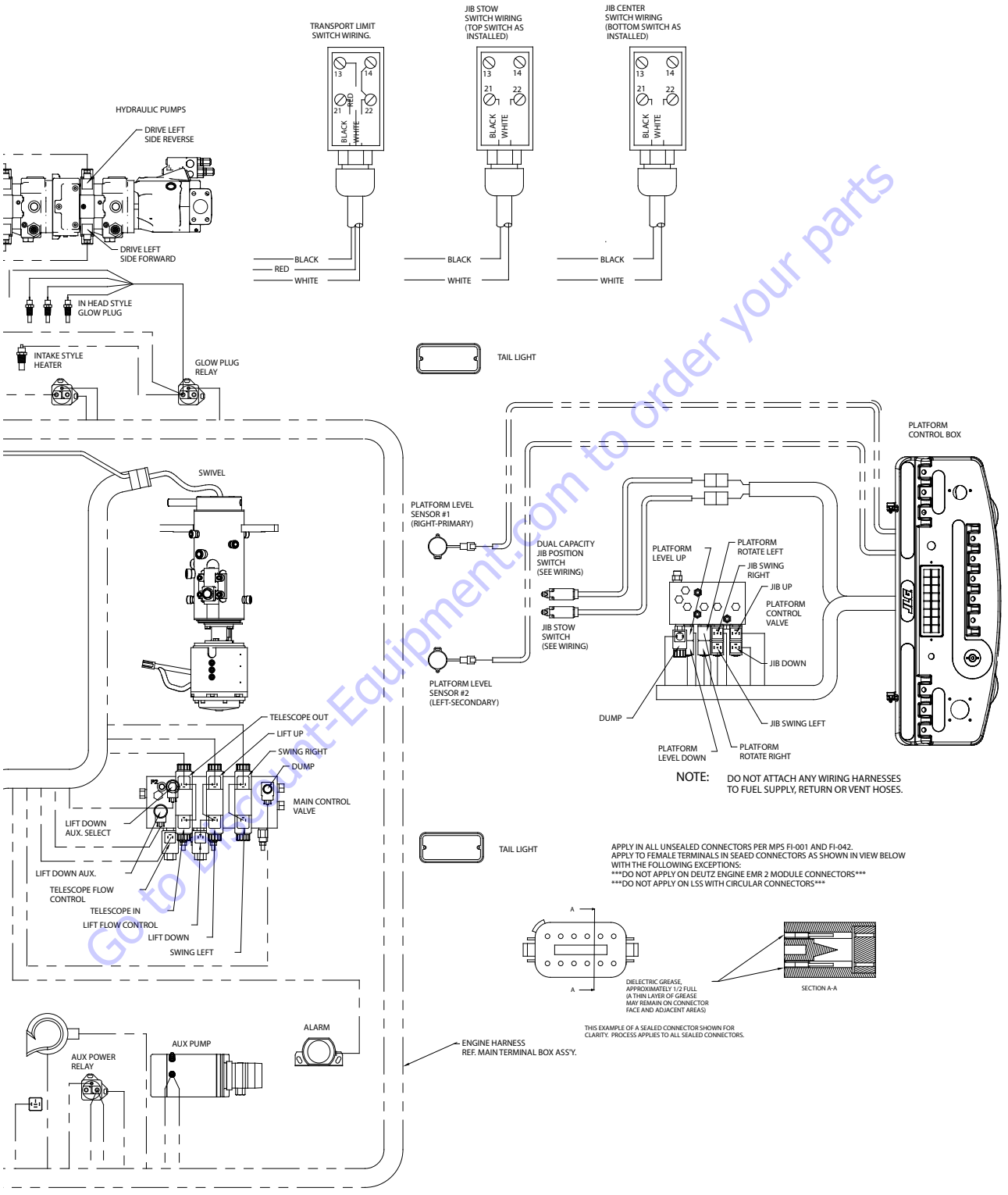
Figure 7-23. Turntable Electrical Components - Sheet 1 of 2



1001245072-A
MAF27210A

Figure 7-24. Turntable Electrical Components - Sheet 2 of 2

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7.8 ELECTRICAL SCHEMATICS

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SHEET 1 1001241888-B

Figure 7-25. Electrical Schematic - Sheet 1 of 19

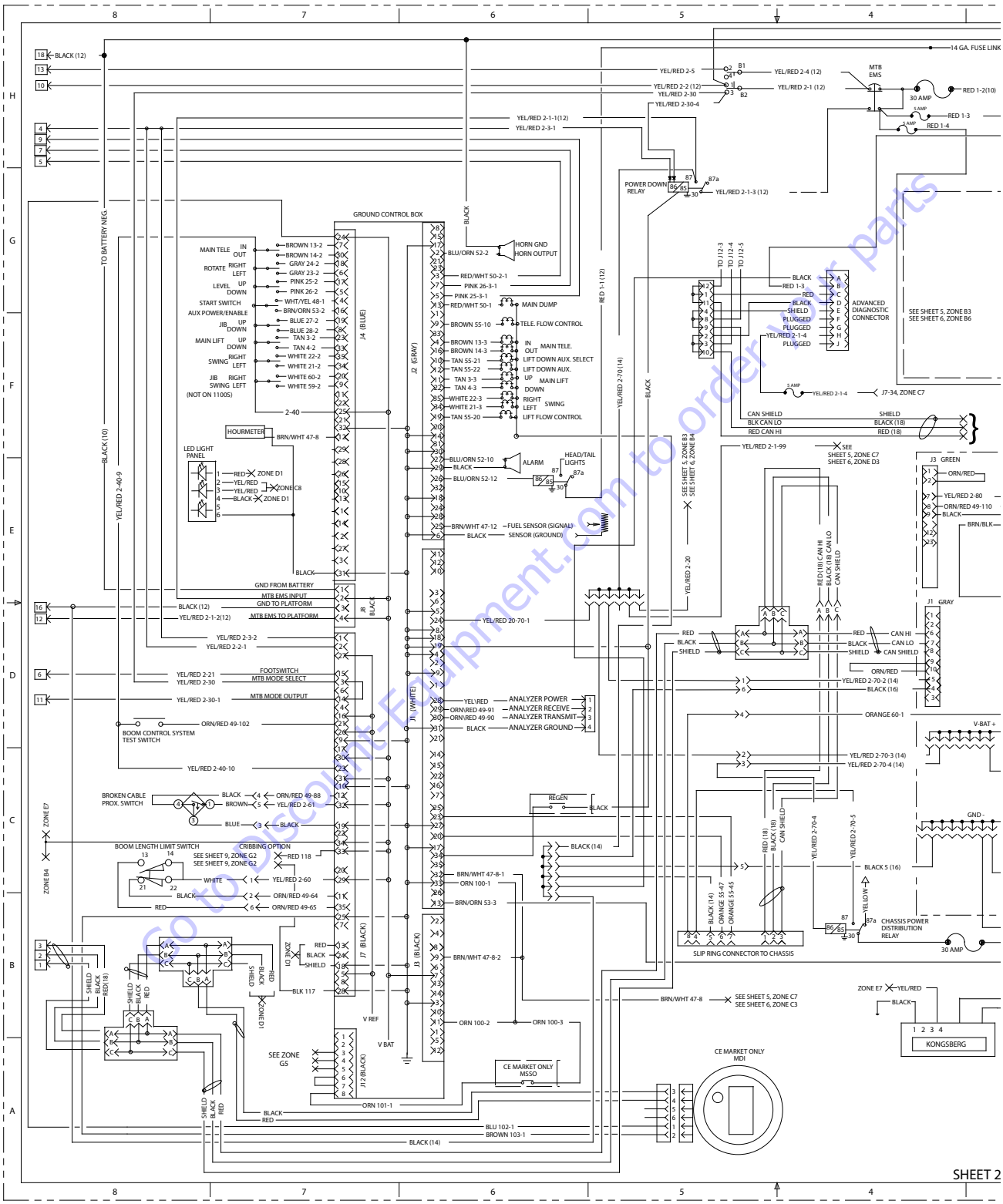

Figure 7-26. Electrical Schematic - Sheet 2 of 19

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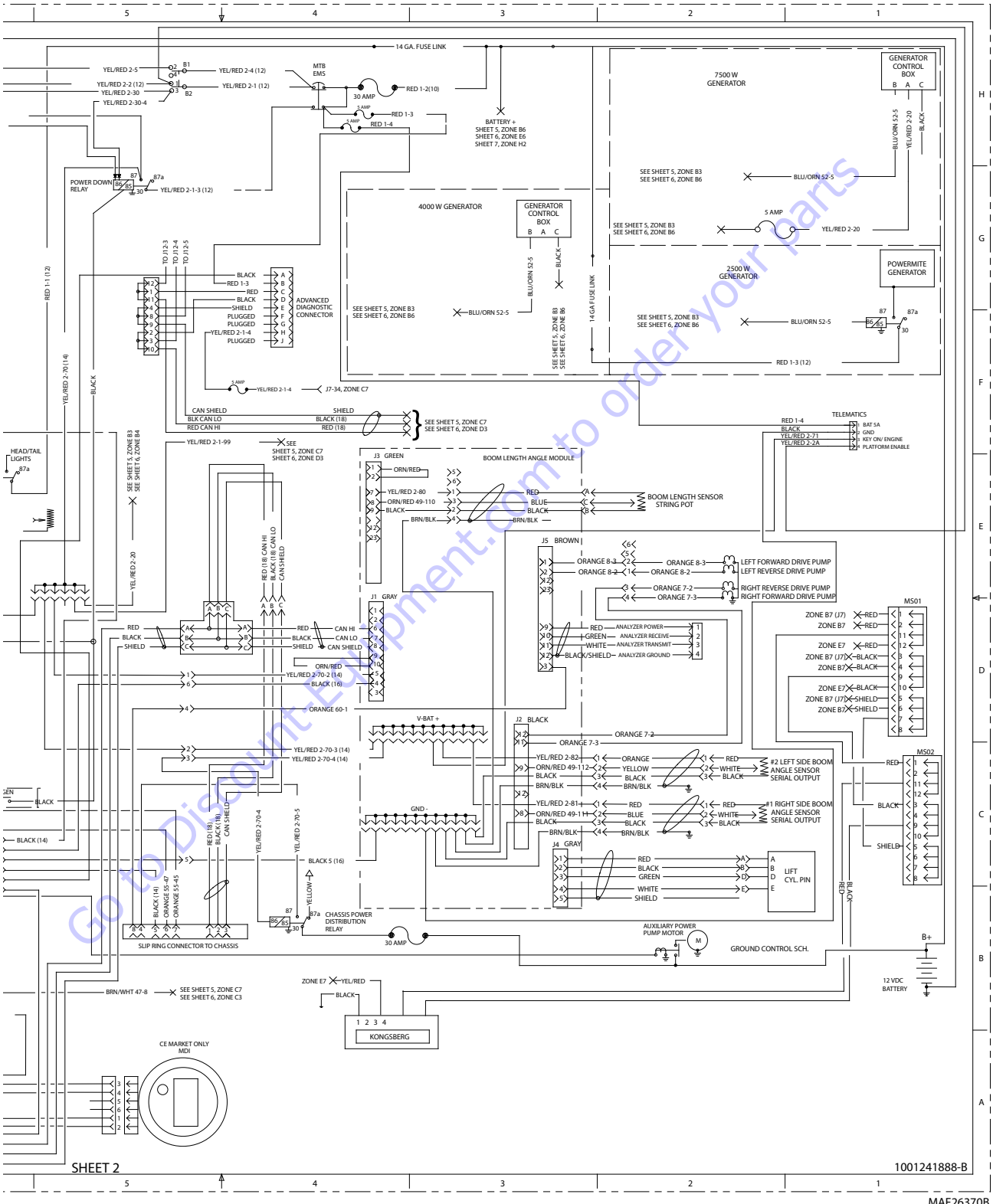

Figure 7-27. Electrical Schematic - Sheet 3 of 19

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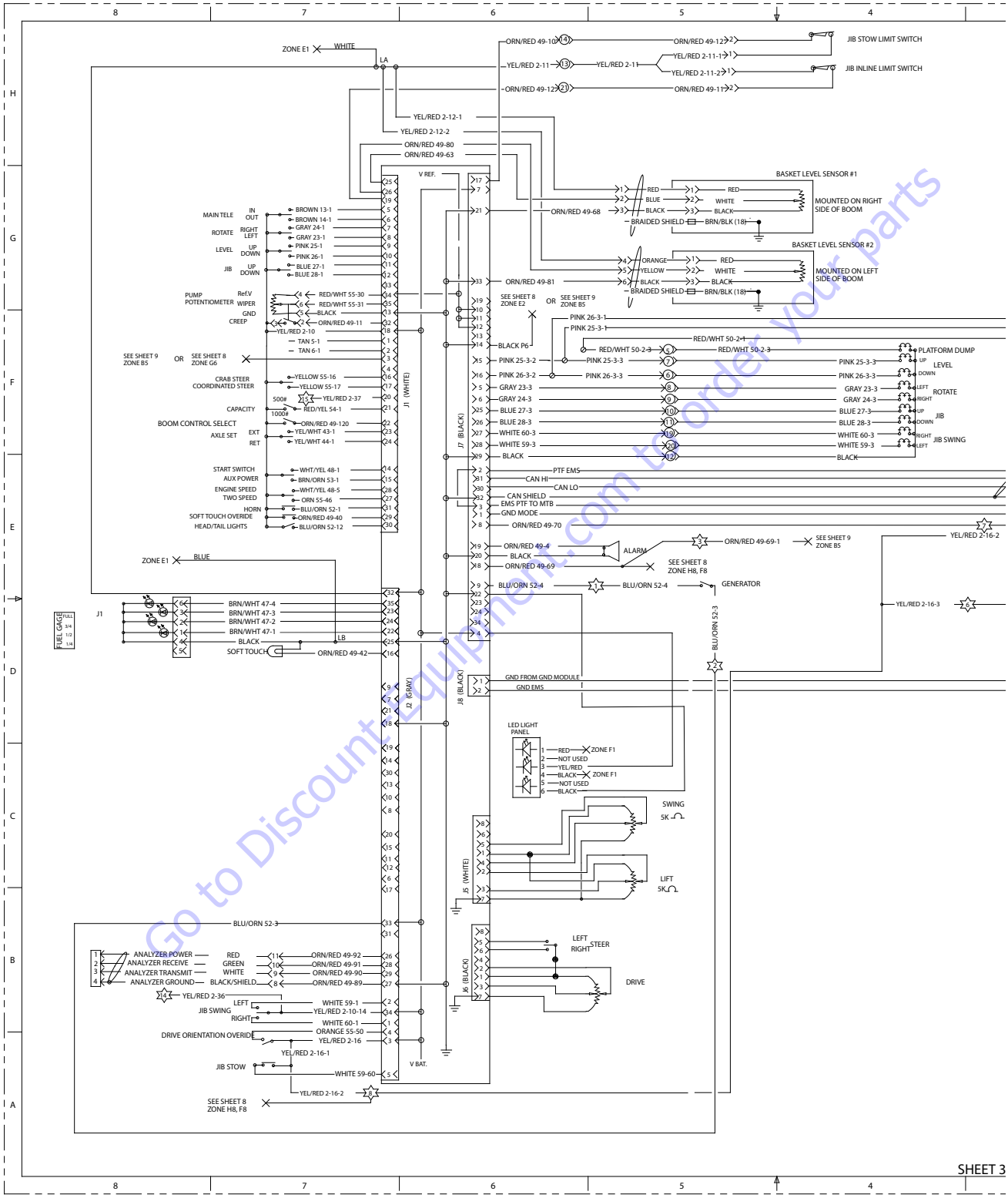

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Figure 7-28. Electrical Schematic - Sheet 4 of 19

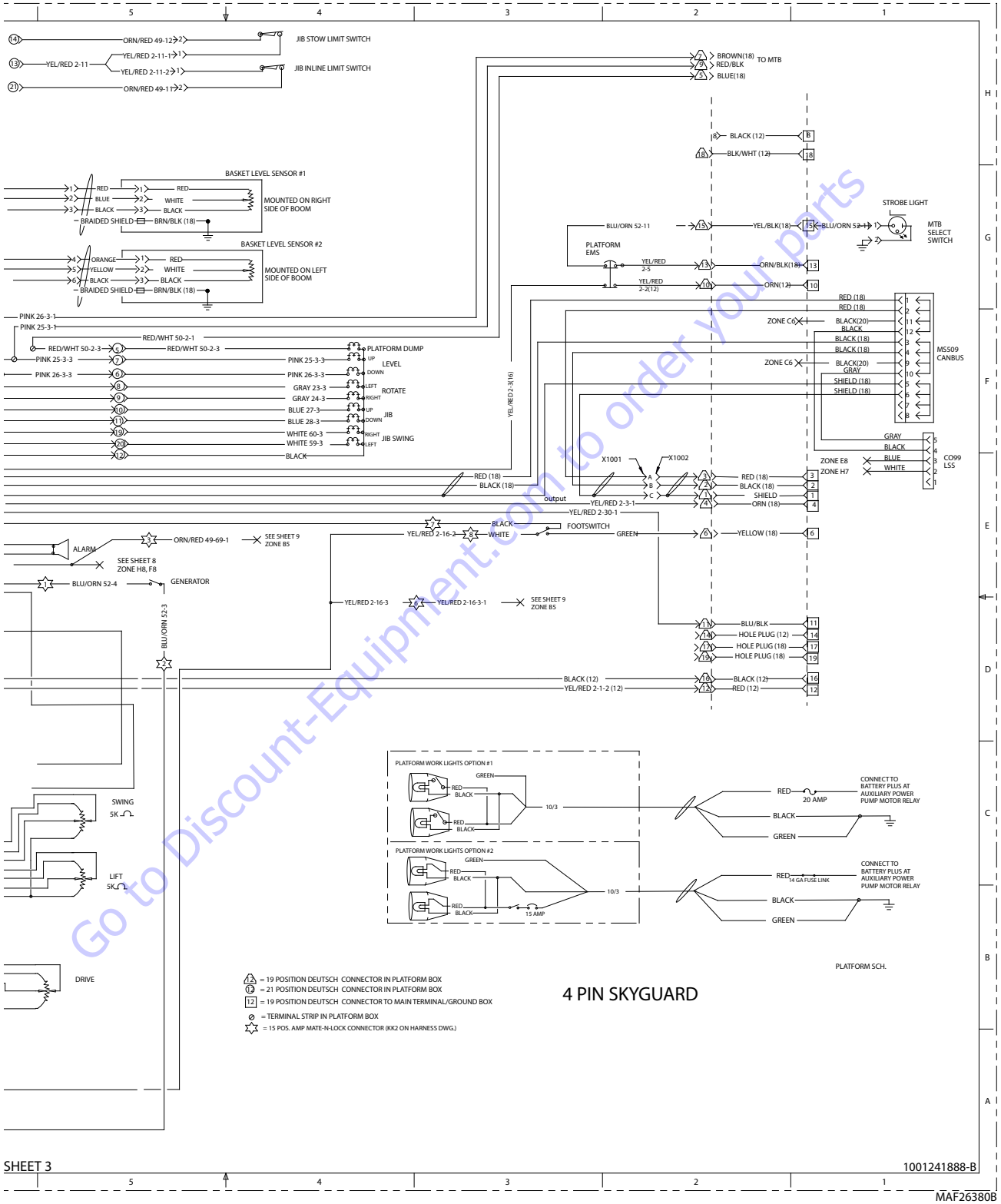

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Figure 7-29. Electrical Schematic - Sheet 5 of 19

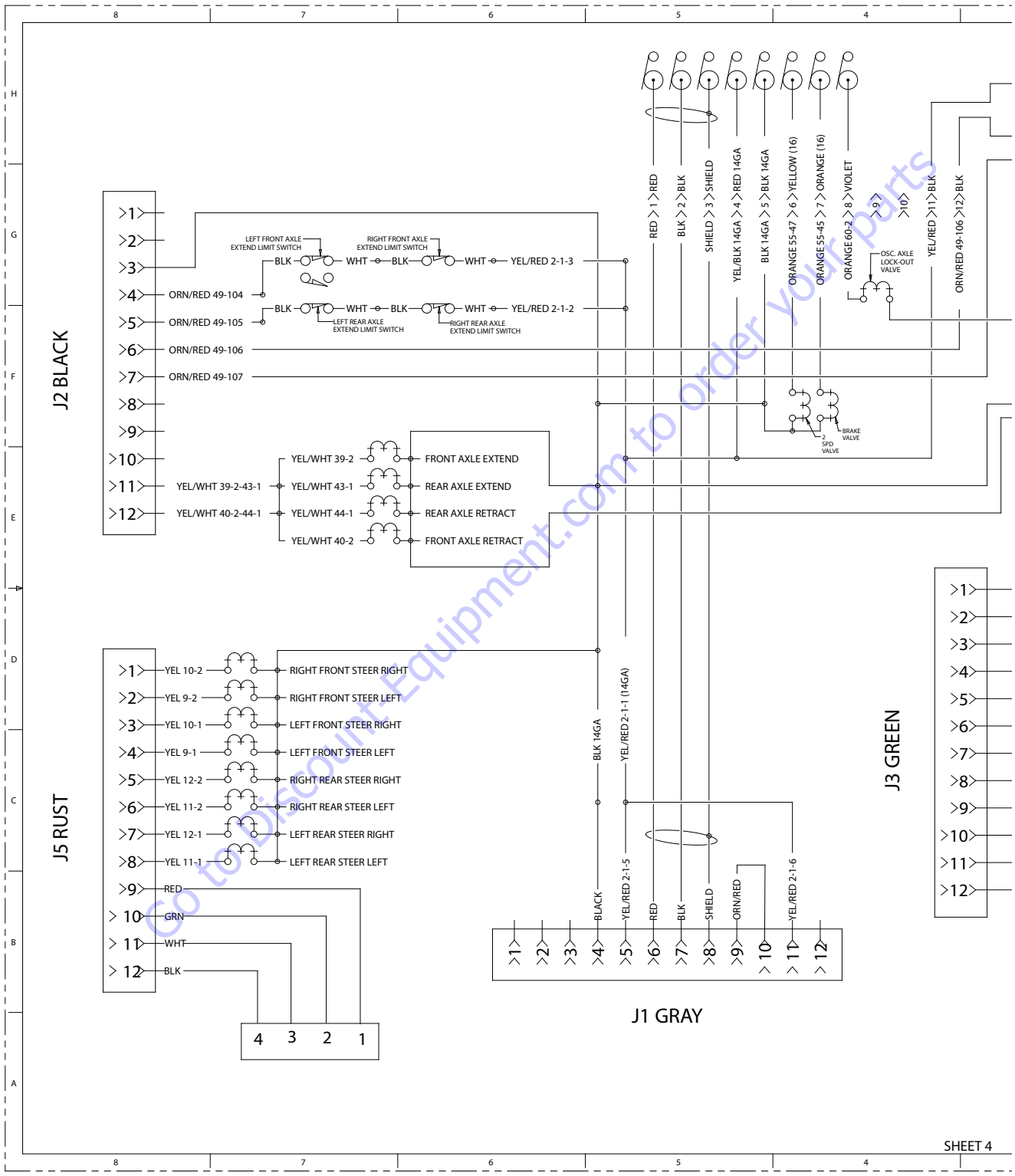

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Figure 7-30. Electrical Schematic - Sheet 6 of 19

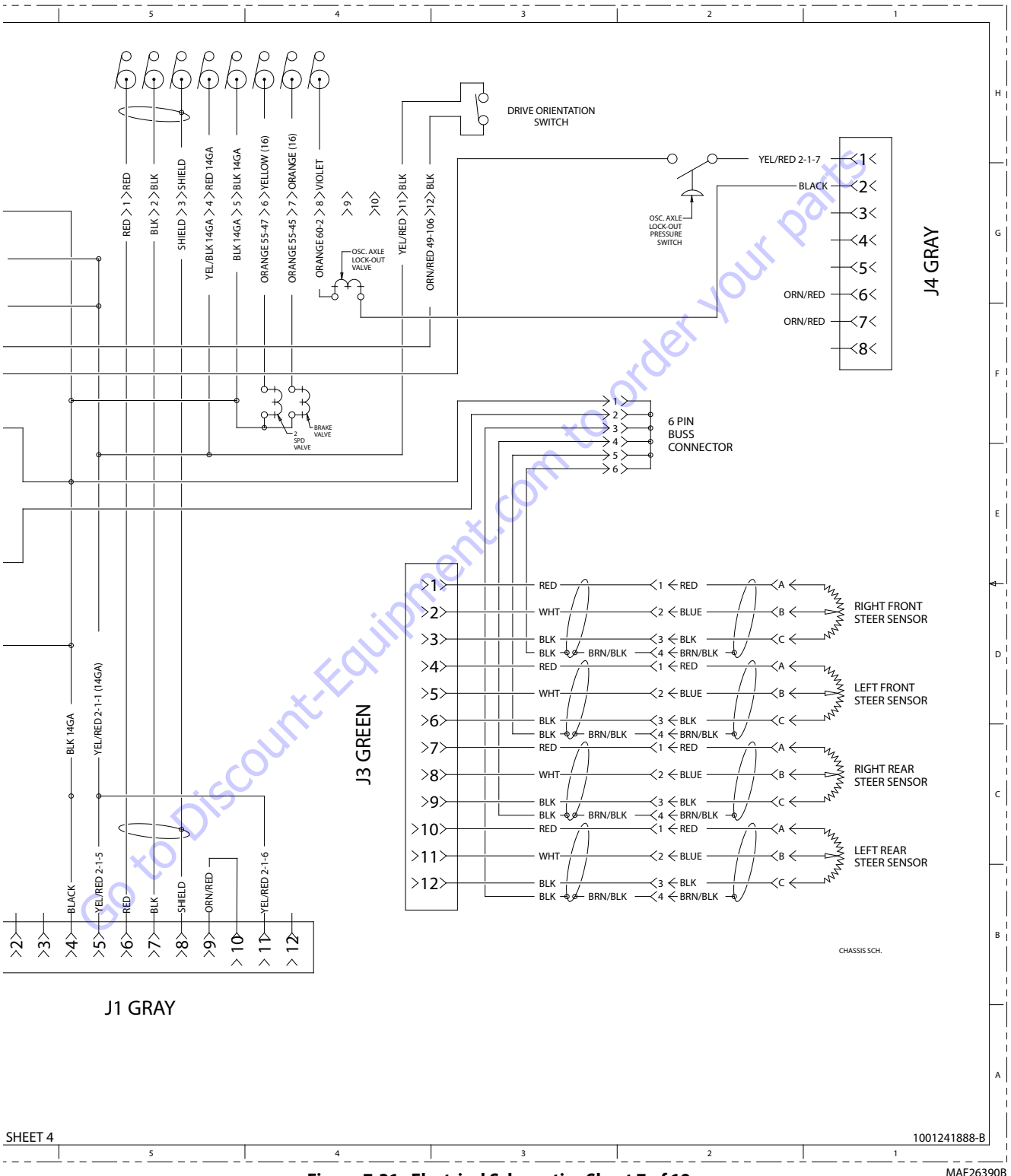

Figure 7-31. Electrical Schematic - Sheet 7 of 19

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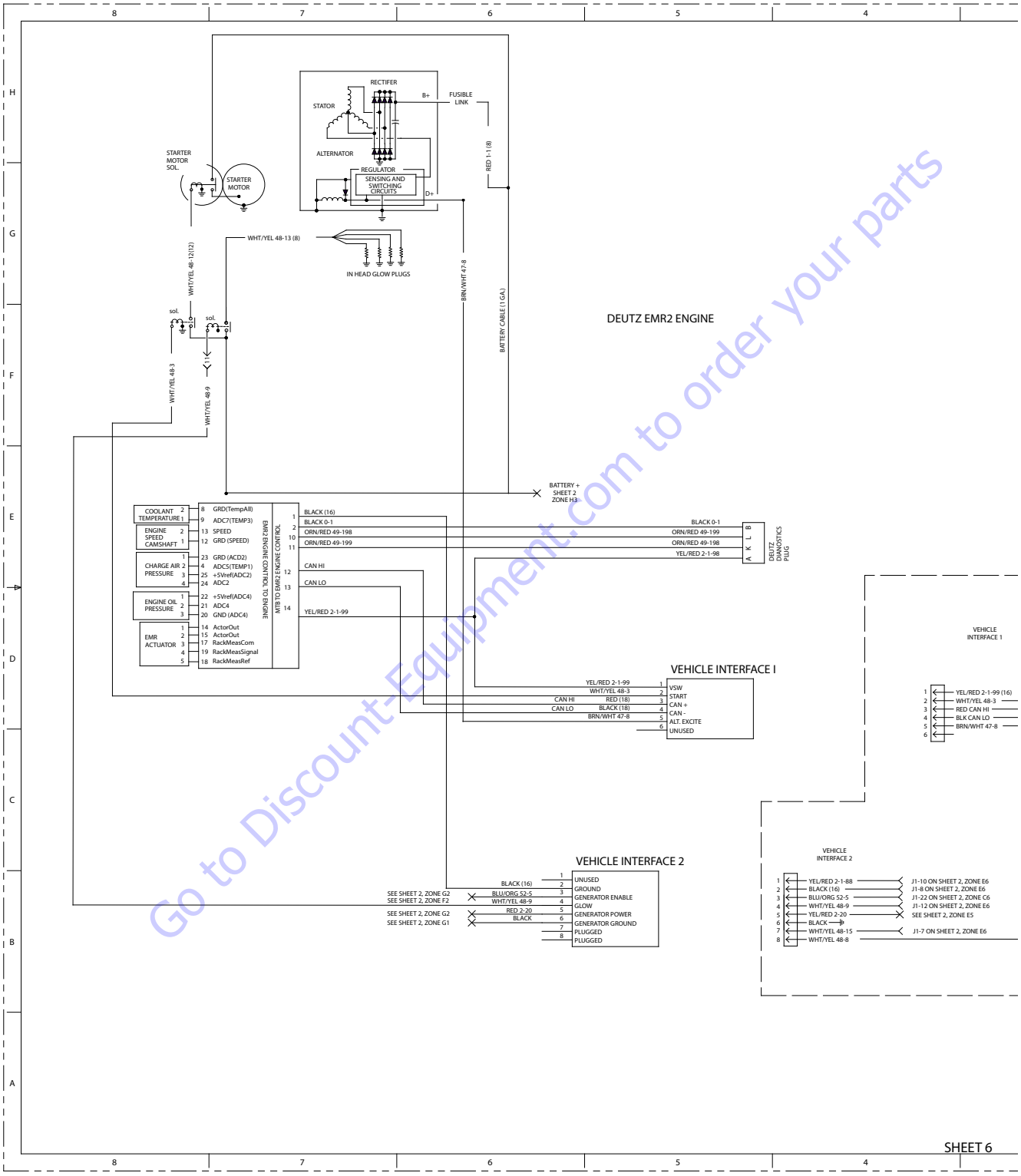

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Figure 7-32. Electrical Schematic - Sheet 8 of 19

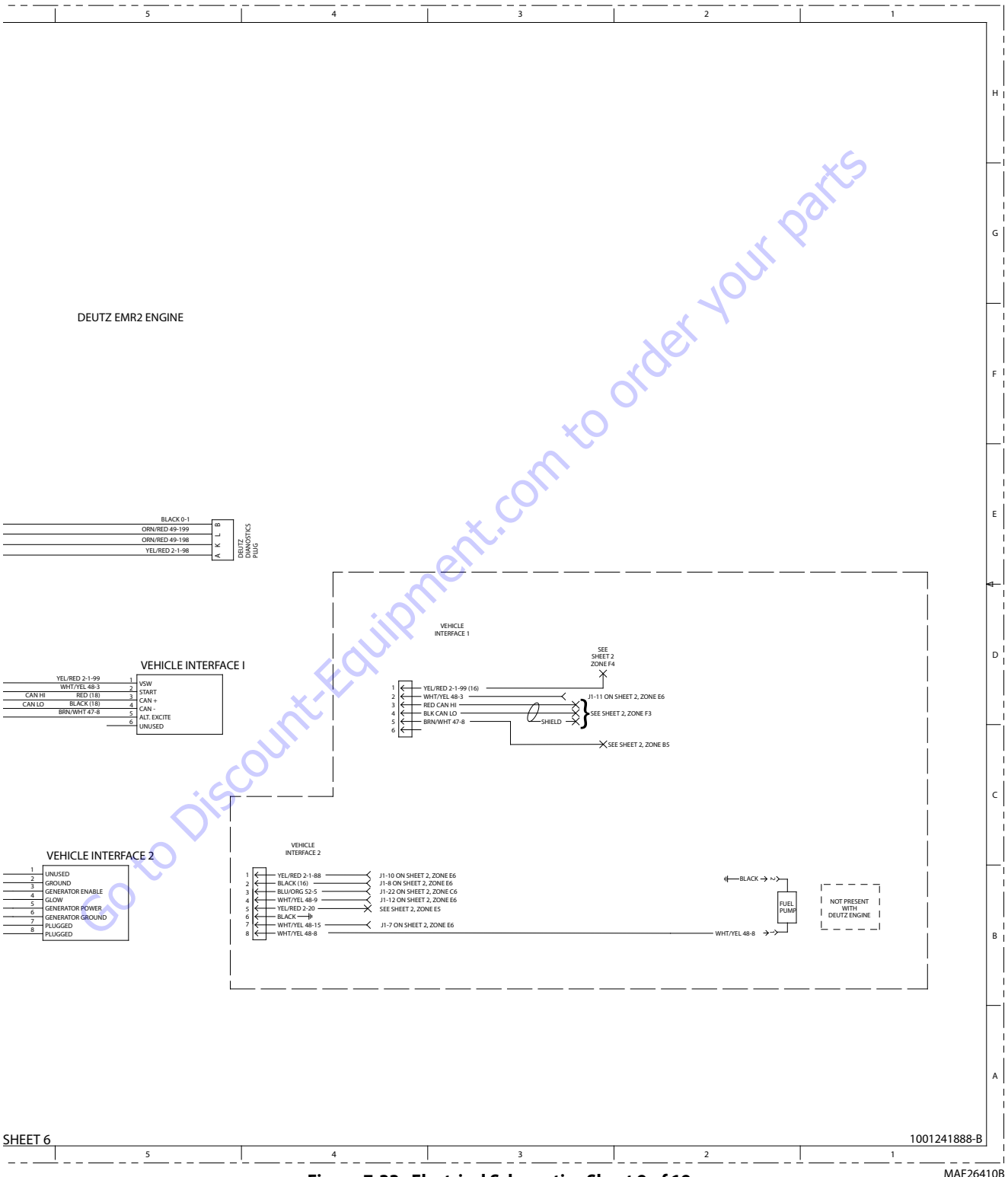

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Figure 7-33. Electrical Schematic - Sheet 9 of 19

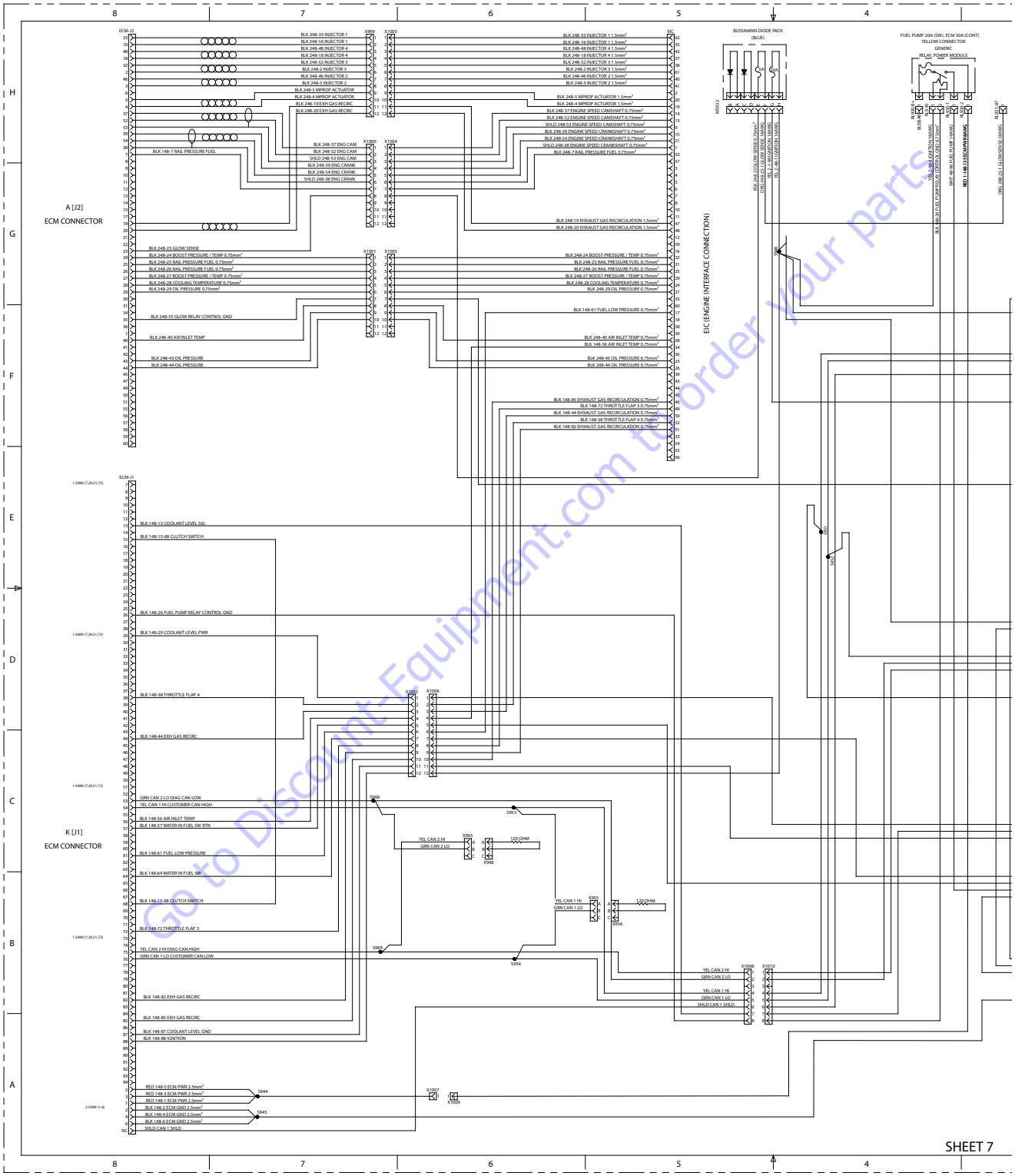

Figure 7-34. Electrical Schematic - Sheet 10 of 19

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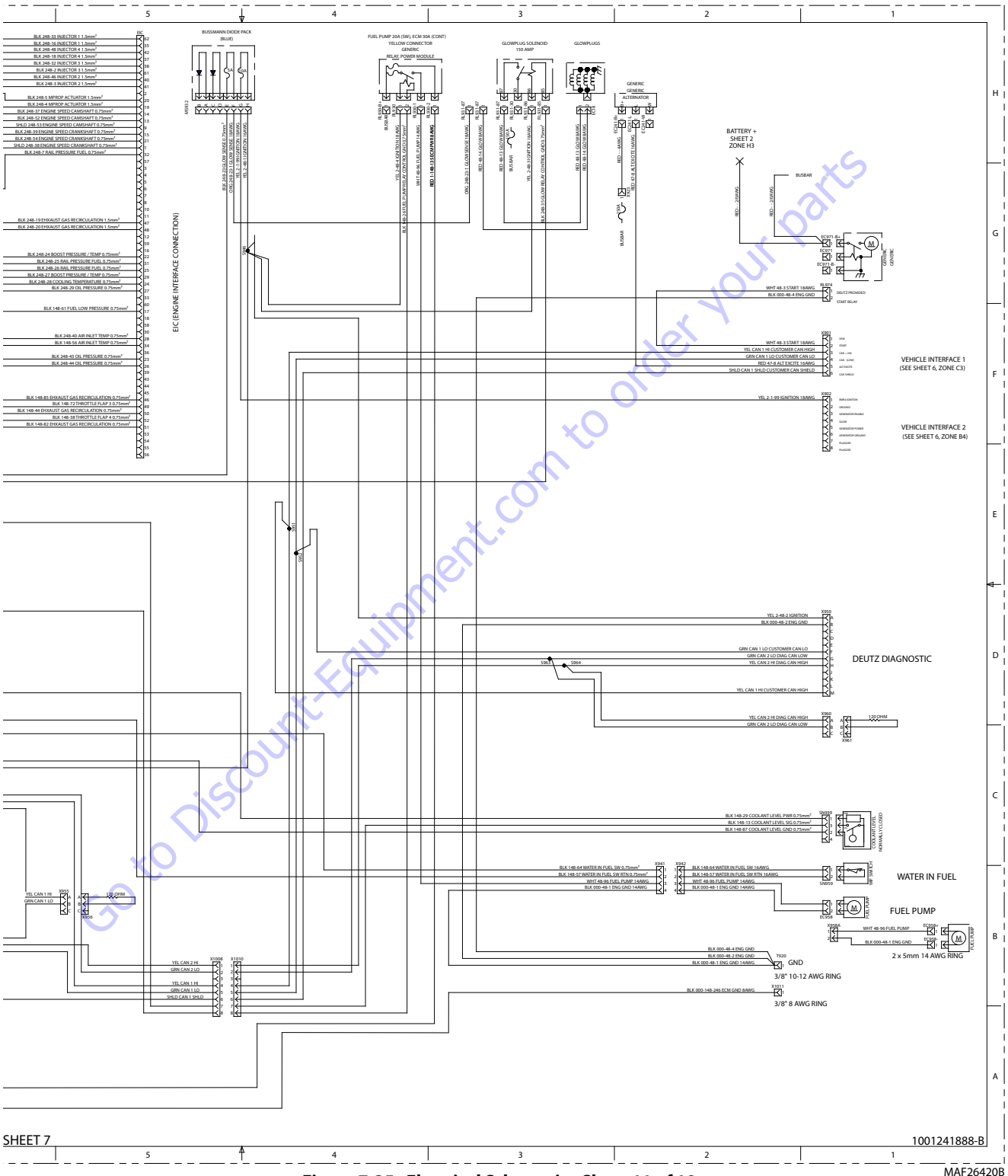

Figure 7-35. Electrical Schematic - Sheet 11 of 19

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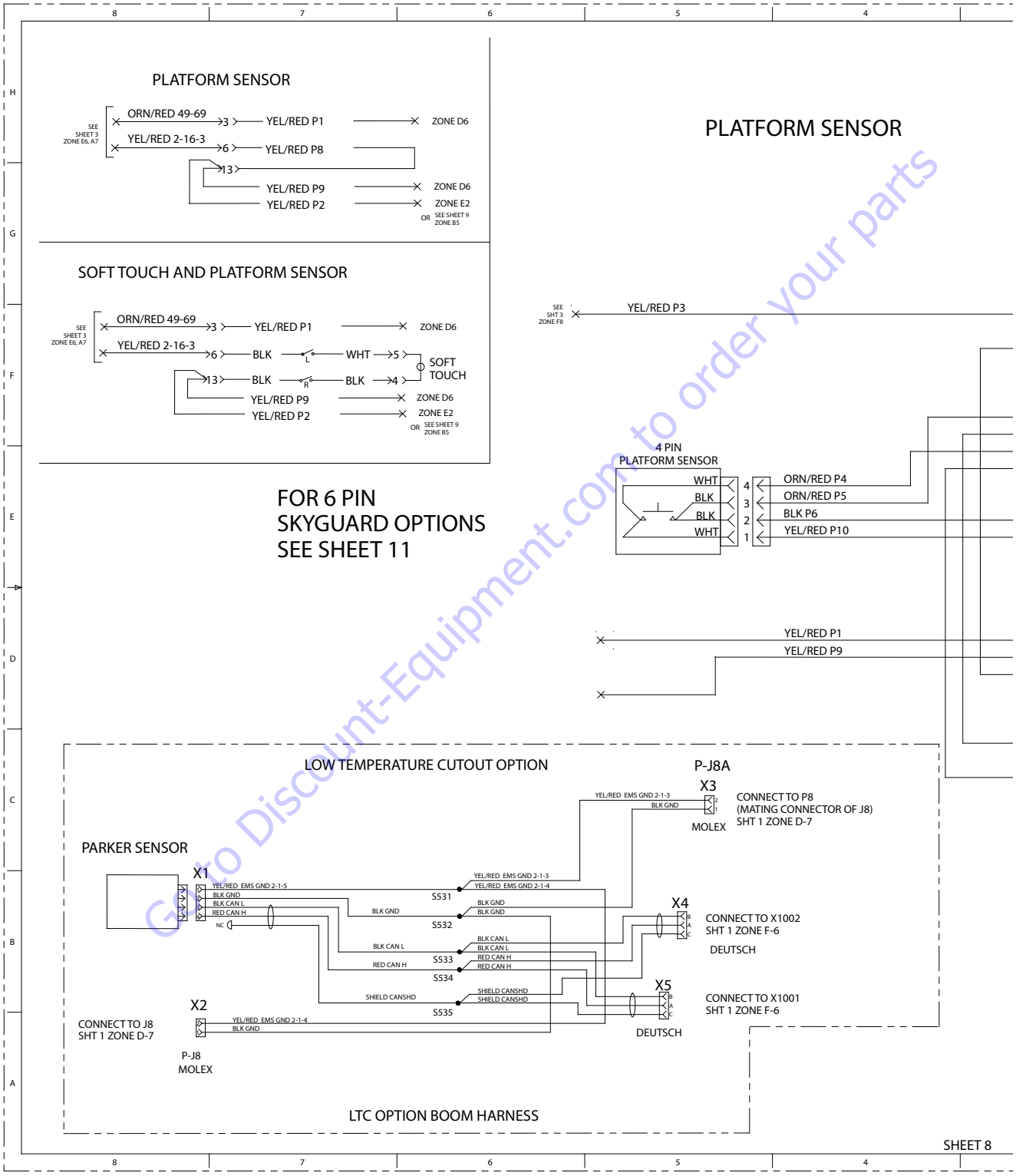

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Figure 7-36. Electrical Schematic - Sheet 12 of 19

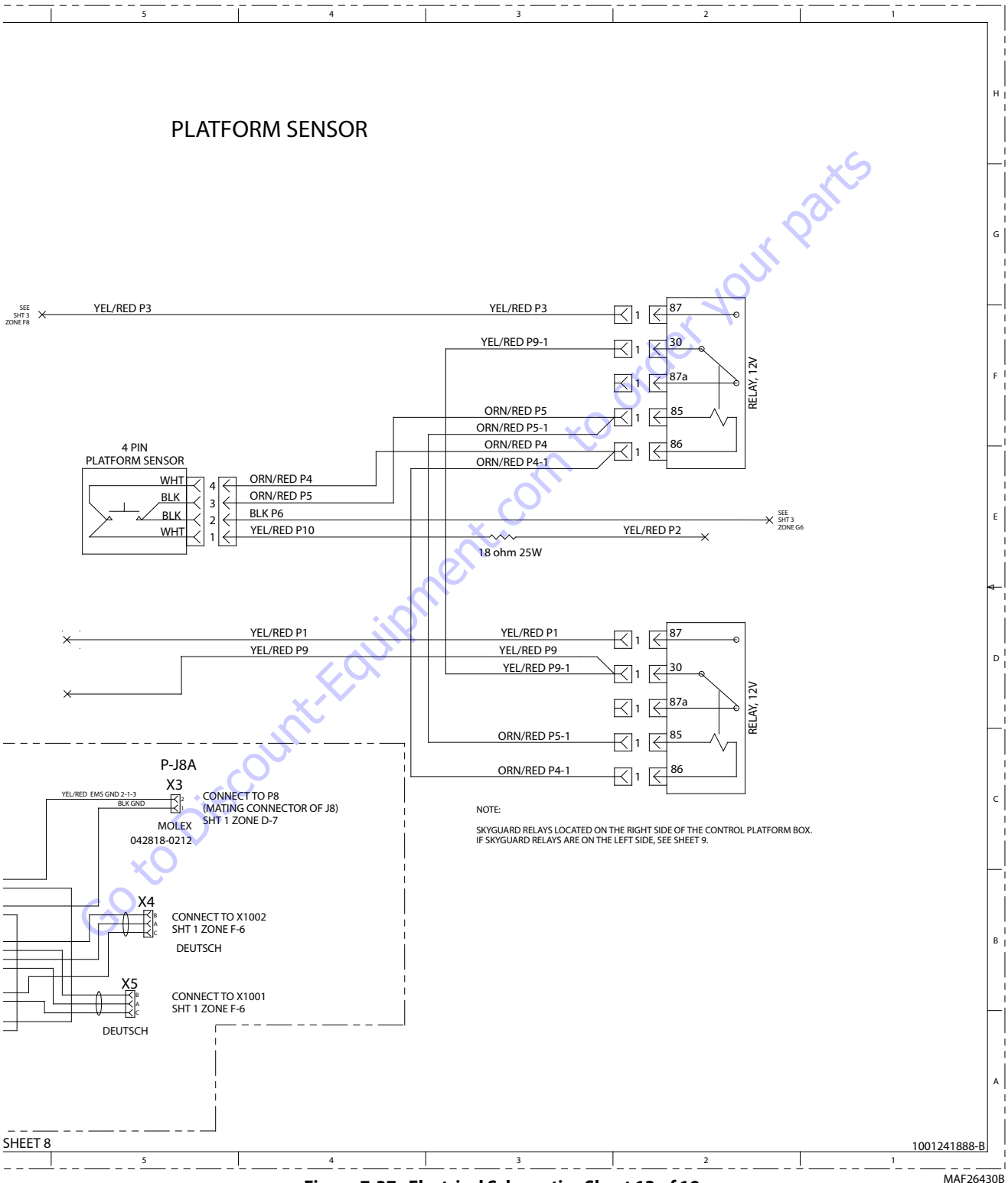

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Figure 7-37. Electrical Schematic - Sheet 13 of 19

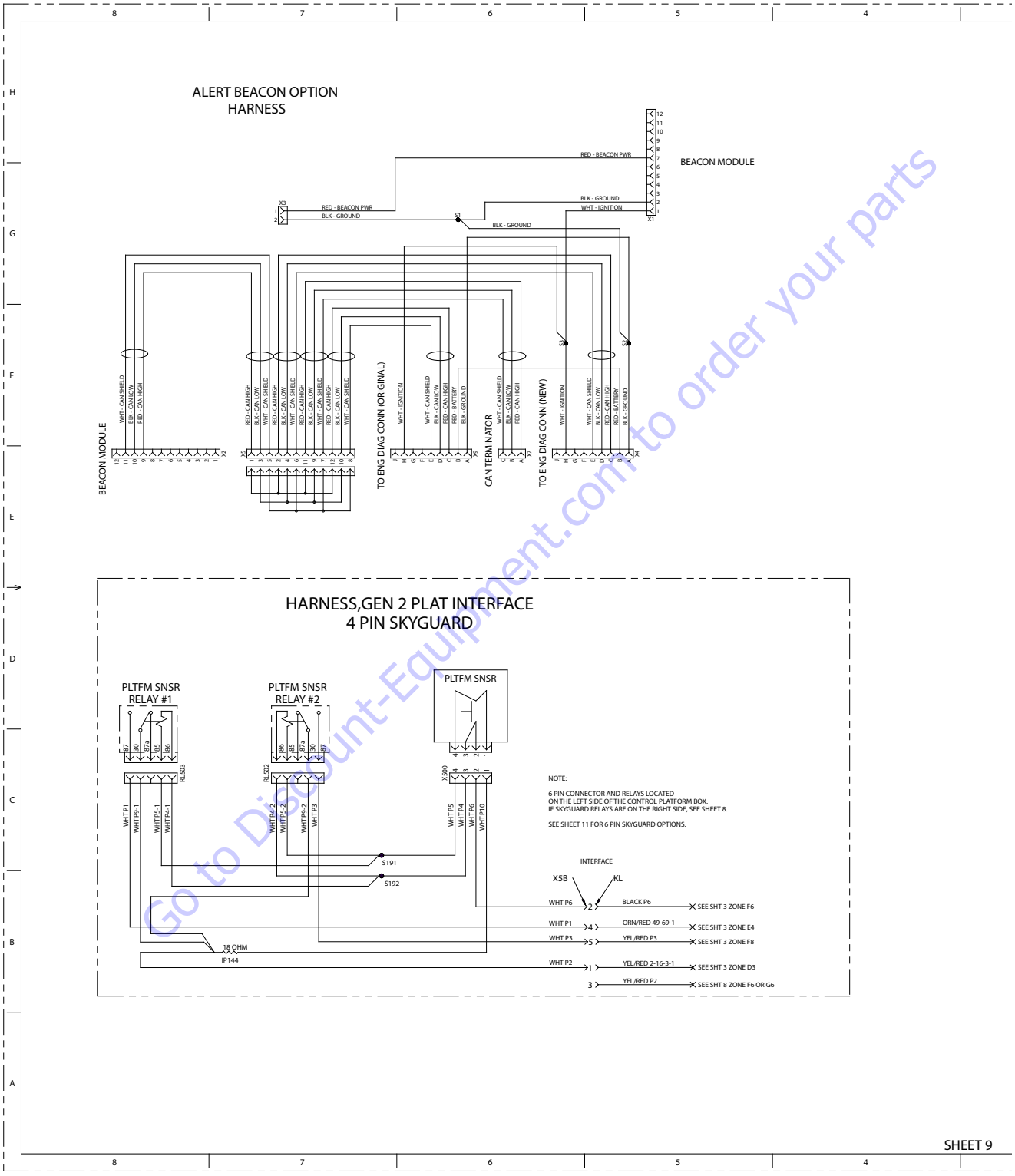

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Figure 7-38. Electrical Schematic - Sheet 14 of 19

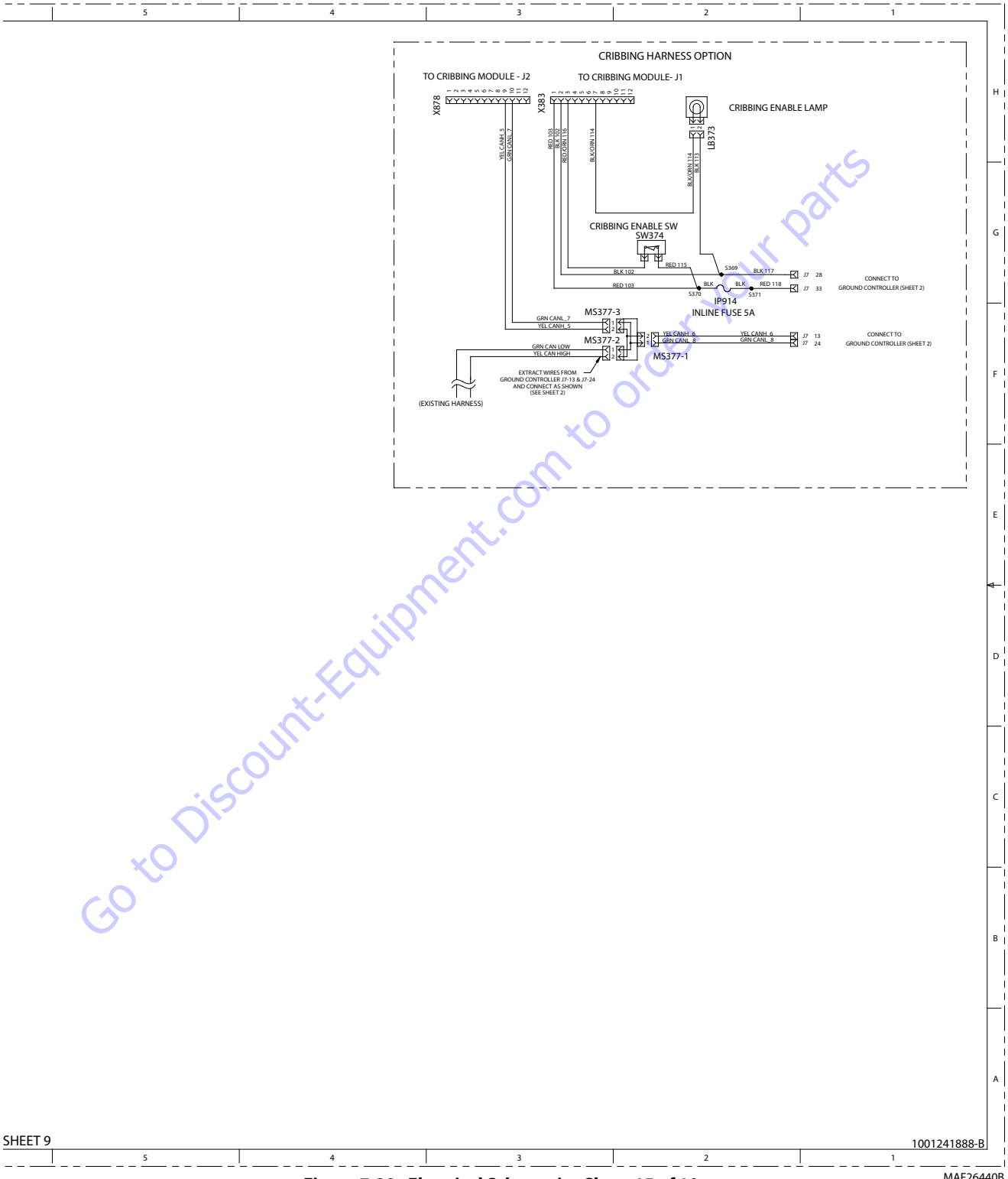

Figure 7-39. Electrical Schematic - Sheet 15 of 19

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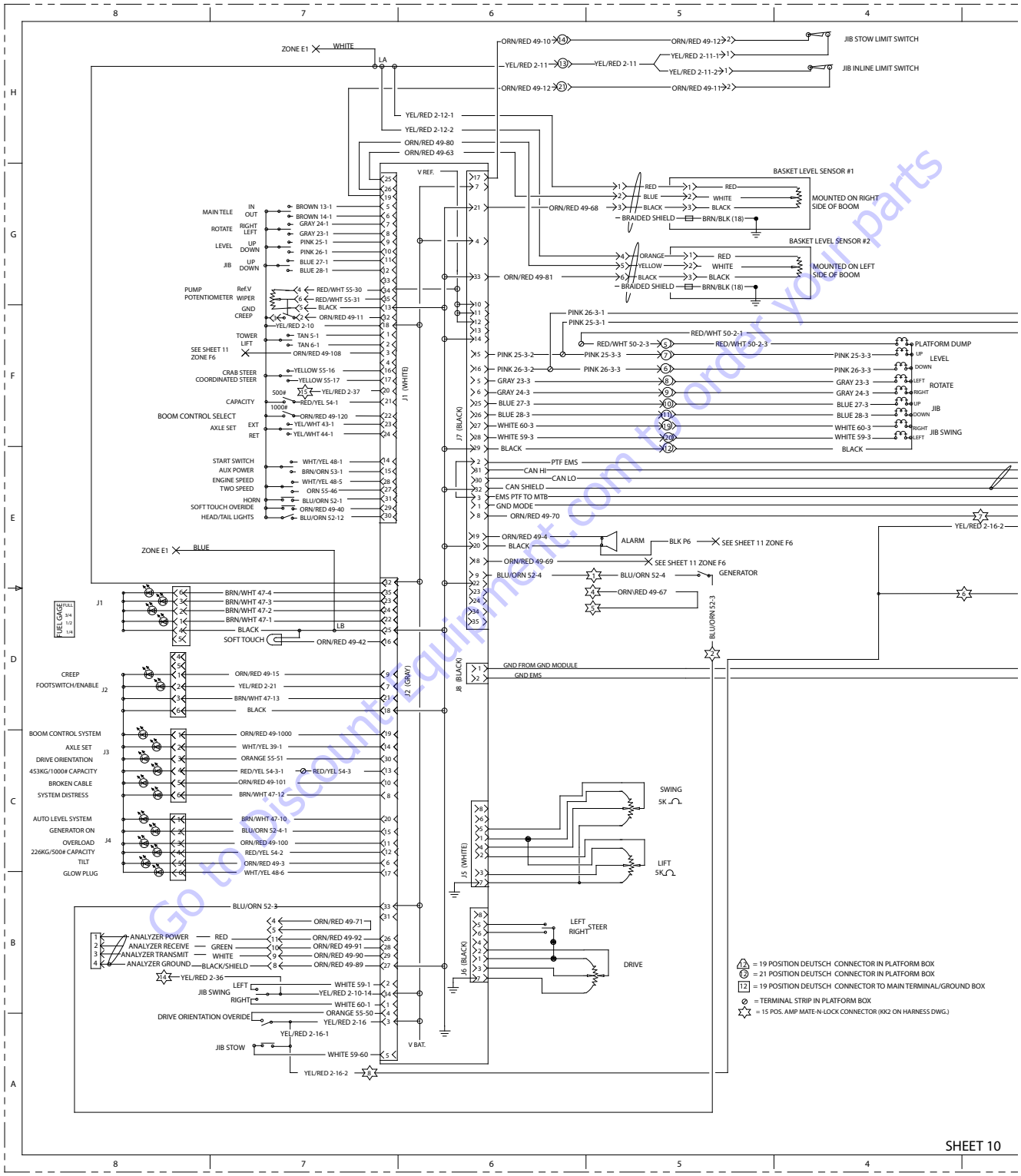

Figure 7-40. Electrical Schematic - Sheet 16 of 19

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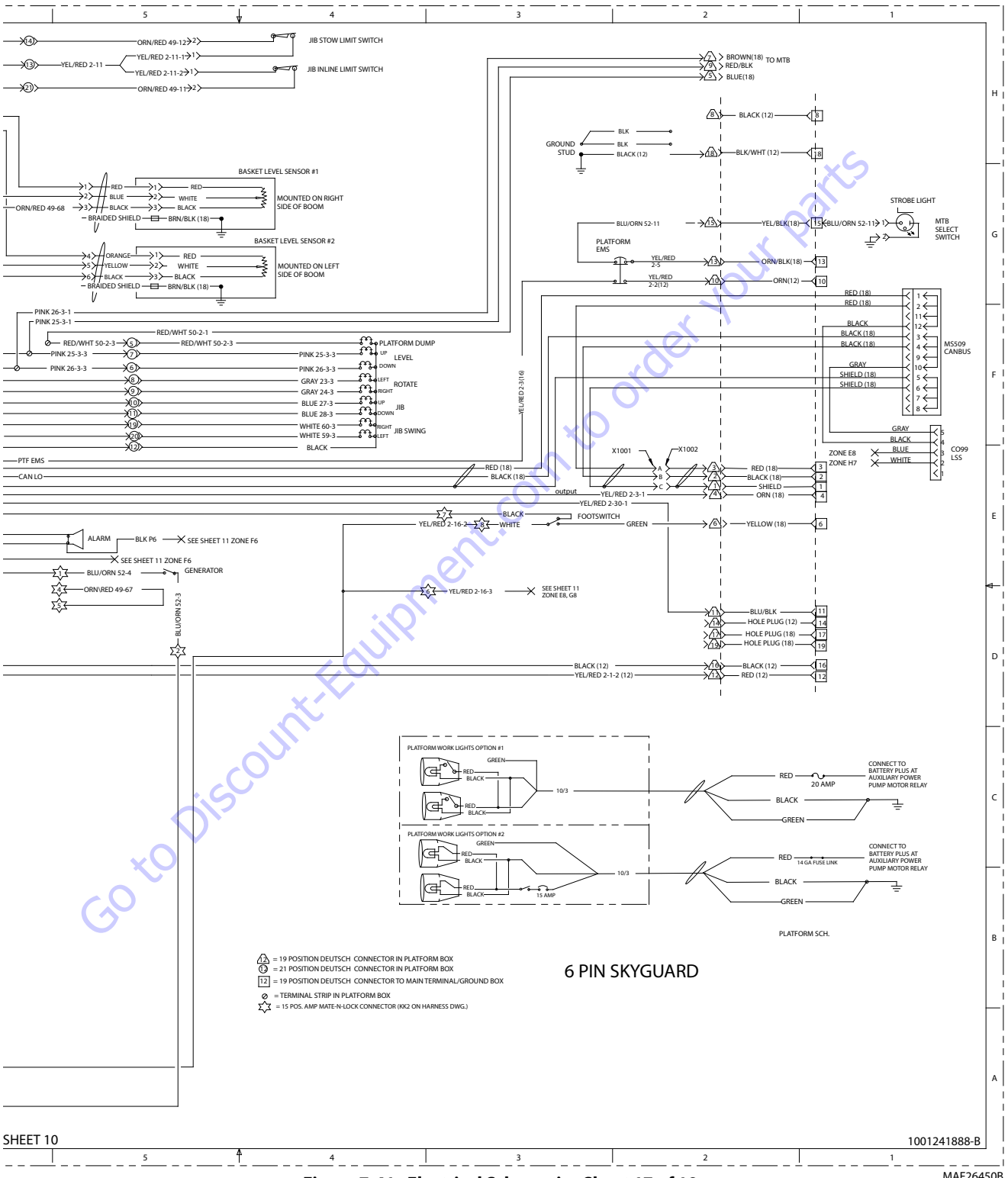

Figure 7-41. Electrical Schematic - Sheet 17 of 19

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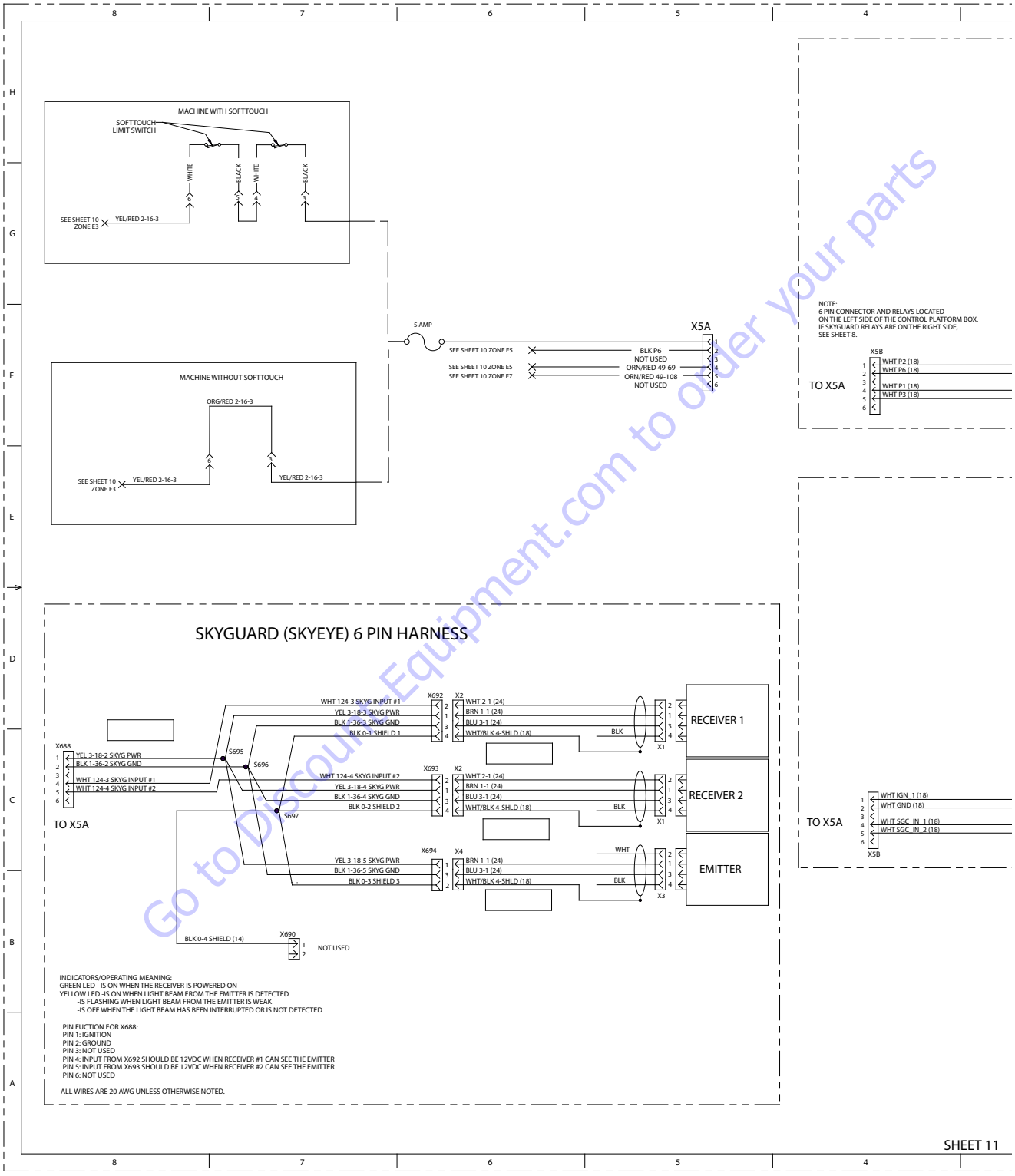

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Figure 7-42. Electrical Schematic - Sheet 18 of 19

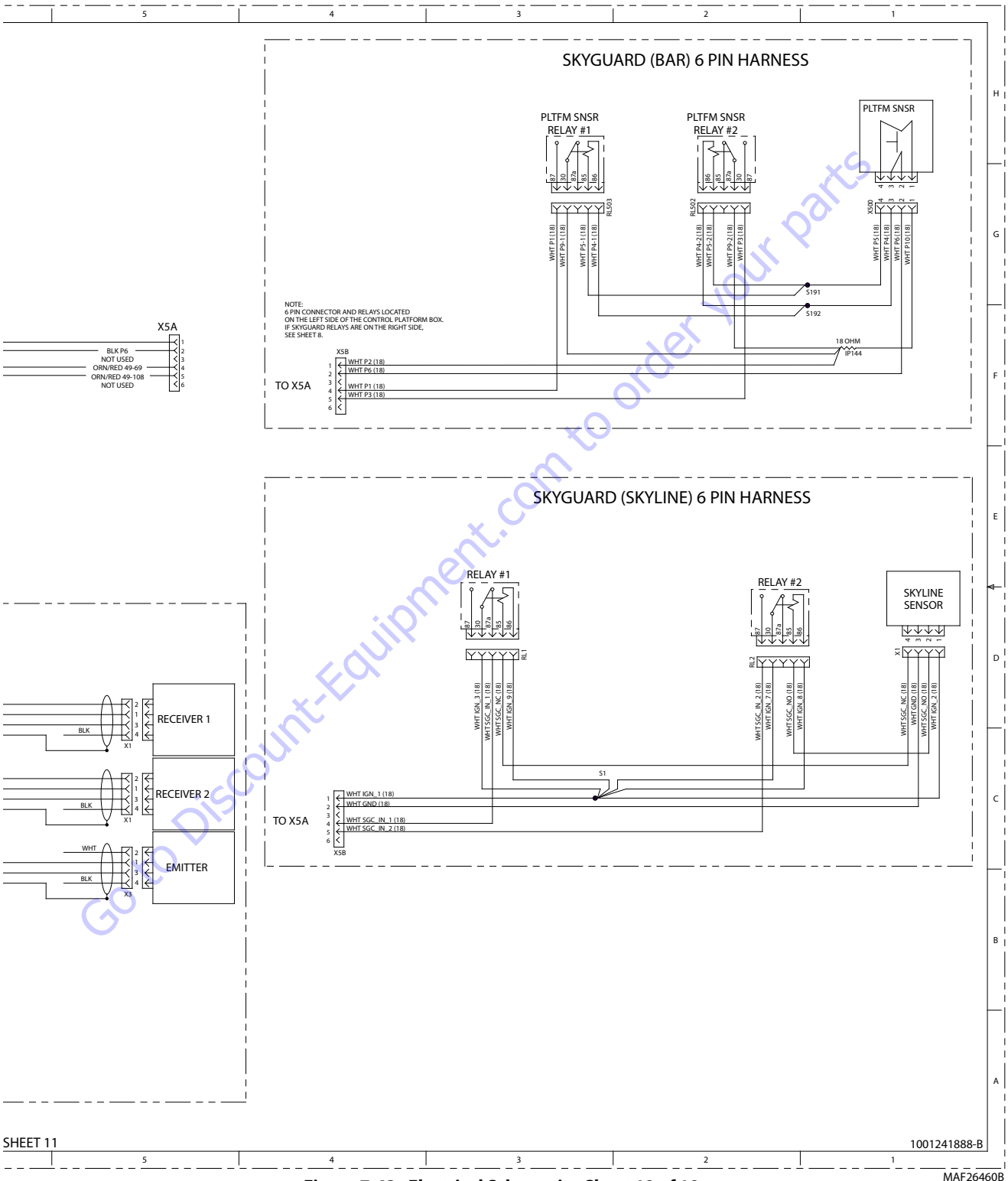

Figure 7-43. Electrical Schematic - Sheet 19 of 19

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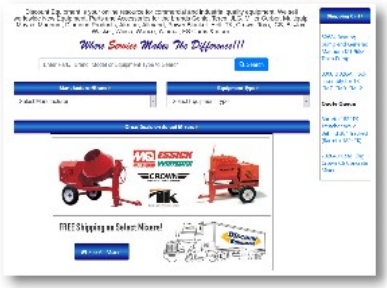

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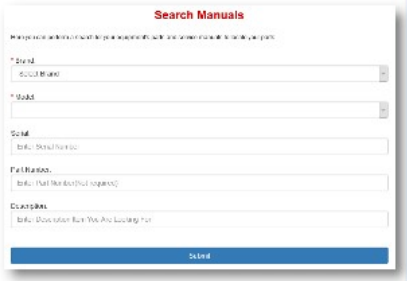

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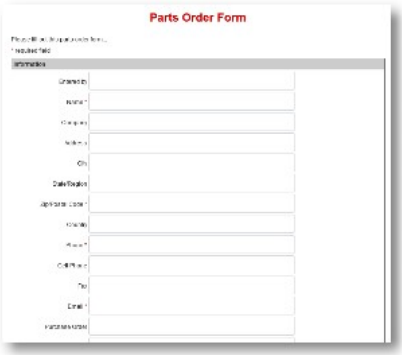

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