6.3 MACHINE ORIENTATION WHEN SETTING FUNCTION SPEEDS

LIFT UP, from platform control, lowest elevation up to maximum elevation, boom retracted, jib retracted.

LIFT DOWN, from platform control, maximum elevation down to minimum elevation, boom retracted, jib retracted.

JIB LIFT UP, from platform control, lowest jib elevation up to maximum jib elevation, boom retracted, jib retracted.

JIB LIFT DOWN, from platform control, maximum jib elevation down to minimum jib elevation, boom retracted, jib retracted.

SWING RIGHT (Max), 355 Degrees, from platform control, boom approximately 45° elevation, boom retracted, jib retracted.

SWING LEFT (Max), 355 Degrees, from platform control, boom approximately 45° elevation, boom retracted, jib retracted.

TELESCOPE OUT, from platform control, boom @ 20 degrees.

TELESCOPE IN, from platform control, boom @20 degrees.

DRIVE FORWARD (Max), high speed drive 200 ft. front wheels to front wheels. Timed after machine has obtained maximum speed.

DRIVE REVERSE (Max), drive 200 ft. front wheels to front wheels Timed after machine has obtained maximum speed.

DRIVE FORWARD (Creep Max), low speed setting, platform speed knob at full creep

DRIVE REVERSE (Creep Max), low speed setting, platform speed knob at full creep

DRIVE FORWARD (Elevated Max - Boom Beyond Transport), high speed, platform speed knob out of creep, Lift boom above transport, drive forward 50 ft.

DRIVE REVERSE (Elevated Max - Boom Beyond Transport), platform speed knob out of creep, Lift boom above transport, drive backward 50 ft.

Test Notes

1. Personality settings can be adjusted anywhere within the adjustment range in order to achieve optimum machine performance.
2. Stop watch should start when the function is activated. Not with the controller or switch.
3. Unless noted, function speeds should be measured from platform.
4. Platform speed knob must be at full speed (fully clockwise).
5. All test should be done with the oil temp above 100° F (38° C).

Table 6-5. Function Speeds

Function	H340AJ Speed Tolerances (In Seconds)
Main Lift Up	19 to 25
Main Lift Down	16 to 19
Swing Right & Left	58 to 72
NOTE: *No more than 10% difference between swing left and swing right.*	
Telescope Out	12 to 18
Telescope In	15 to 21
Platform Rotate Right & Left	23 to 34
NOTE: *No more that 15% difference between rotator left and rotator right.*	
Jib Up	25 to 32
Jib Down	17 to 23
Tower Lift Up	15 to 21
Tower Lift Down	16 to 20
High Drive Forward (200 ft)	37 to 40 (3.4 to 3.7 MPH)
High Drive Reverse (200 ft)	59 to 65 (2.1 to 2.3 MPH)
Drive Above Forward & Reverse (50 ft) (CE)	57 to 85 (0.4 to 0.6 MPH)

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6.4 CANBUS COMMUNICATIONS

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

Two-wire: One wire (Yellow or Red) is driven high (5v) and the other low (Green or black) (0v) to send a signal; both wire "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 on CAN1 and CAN2 at the UGM J7 and J12 connections, respectively.

The GROUND MODULE (UGM) is the master system controller. Most functions are dispatched and coordinated from this module, all other system modules (PLATFORM, GENSET, TRACTION) 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;)

Steer: The PLATFORM MODULE reports the steering switch position to the GROUND MODULE. The GROUND MODULE modulates each steer left / right valve to maintain commanded wheel position.

Drive: The GROUND MODULE sends traction commands to the TRACTION MODULE Master, who then coordinates traction commands and feedbacks. The TRACTION MODULE Master also coordinates inner wheel speed reduction based on steering angle feedback.

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 elevation and swing are controlled by the GROUND MODULE.

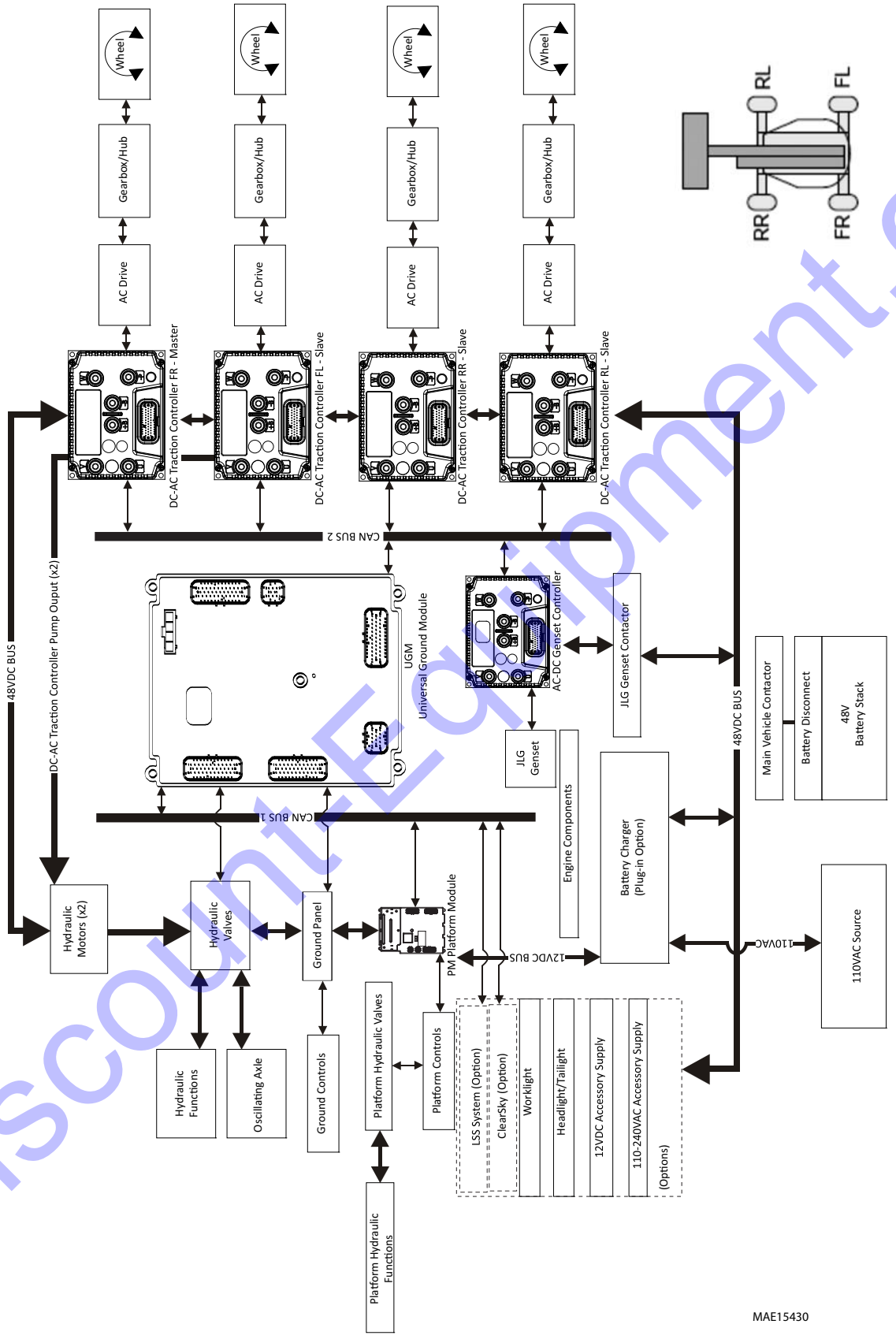


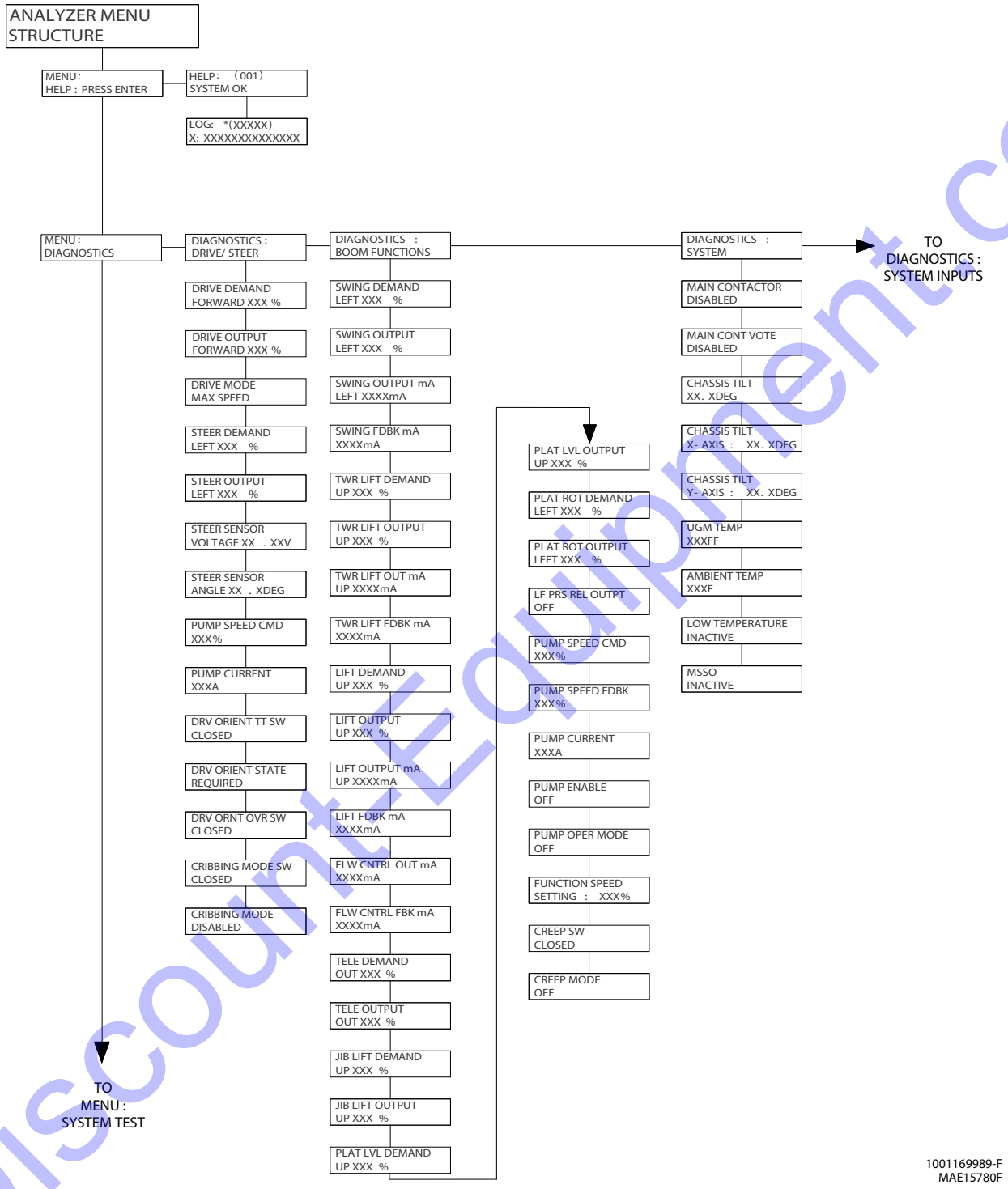
Figure 6-2. Control System Block Diagram

6.5 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.

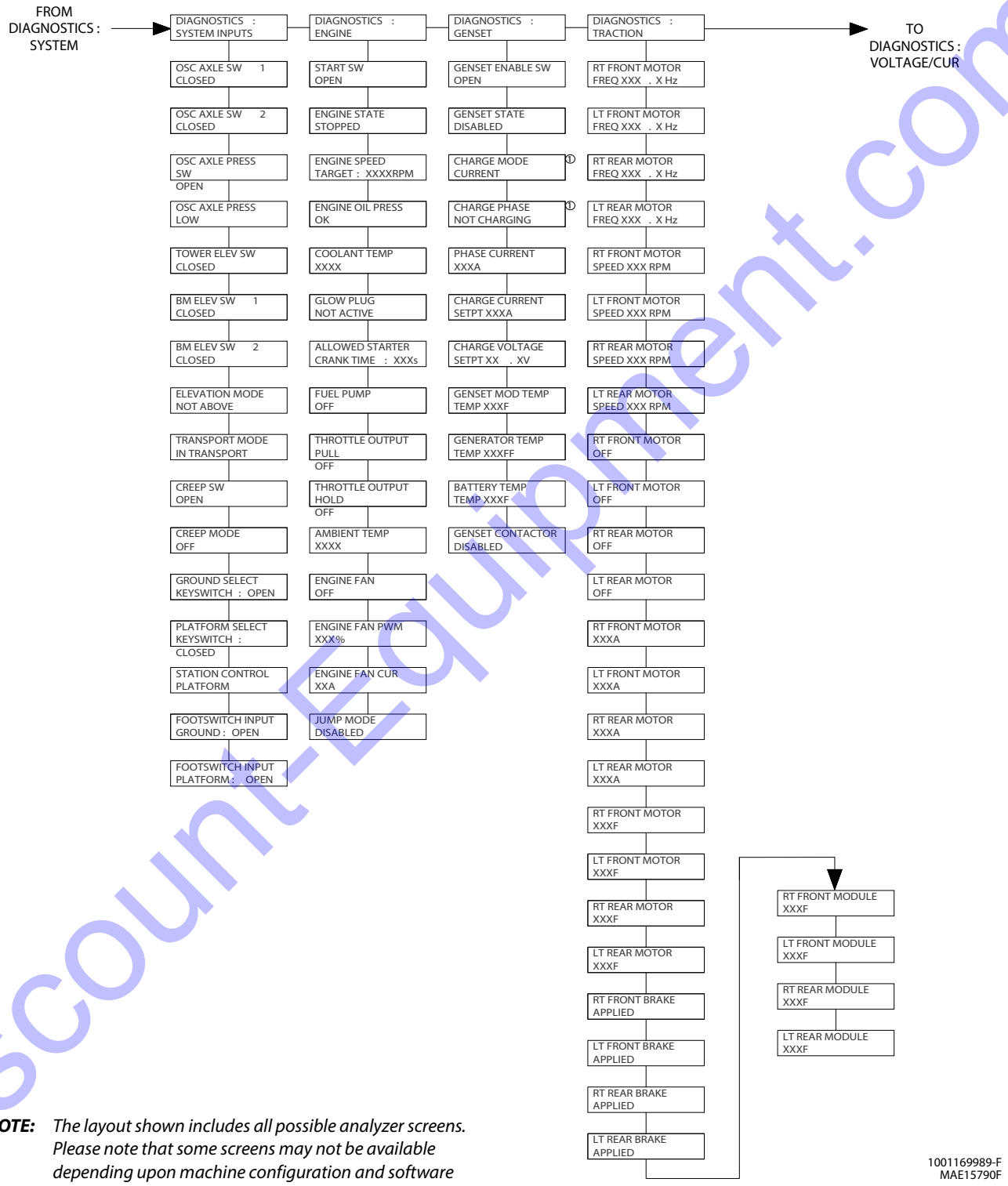
Table 6-6. Calibration Instructions

Calibration Procedure	Reasons for Re-calibration
Steering Calibration	Ground module replacement Chassis module replacement Steer sensor removal or replacement Persistent wheel misalignment
Chassis Tilt Calibration	Ground module removal or replacement Main terminal box removal or replacement Tilt indication inaccuracy



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

Figure 6-3. Analyzer Flow Chart_Version P1.4 Software - Sheet 1 of 11



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

Figure 6-4. Analyzer Flow Chart_Version P1.4 Software - Sheet 2 of 11

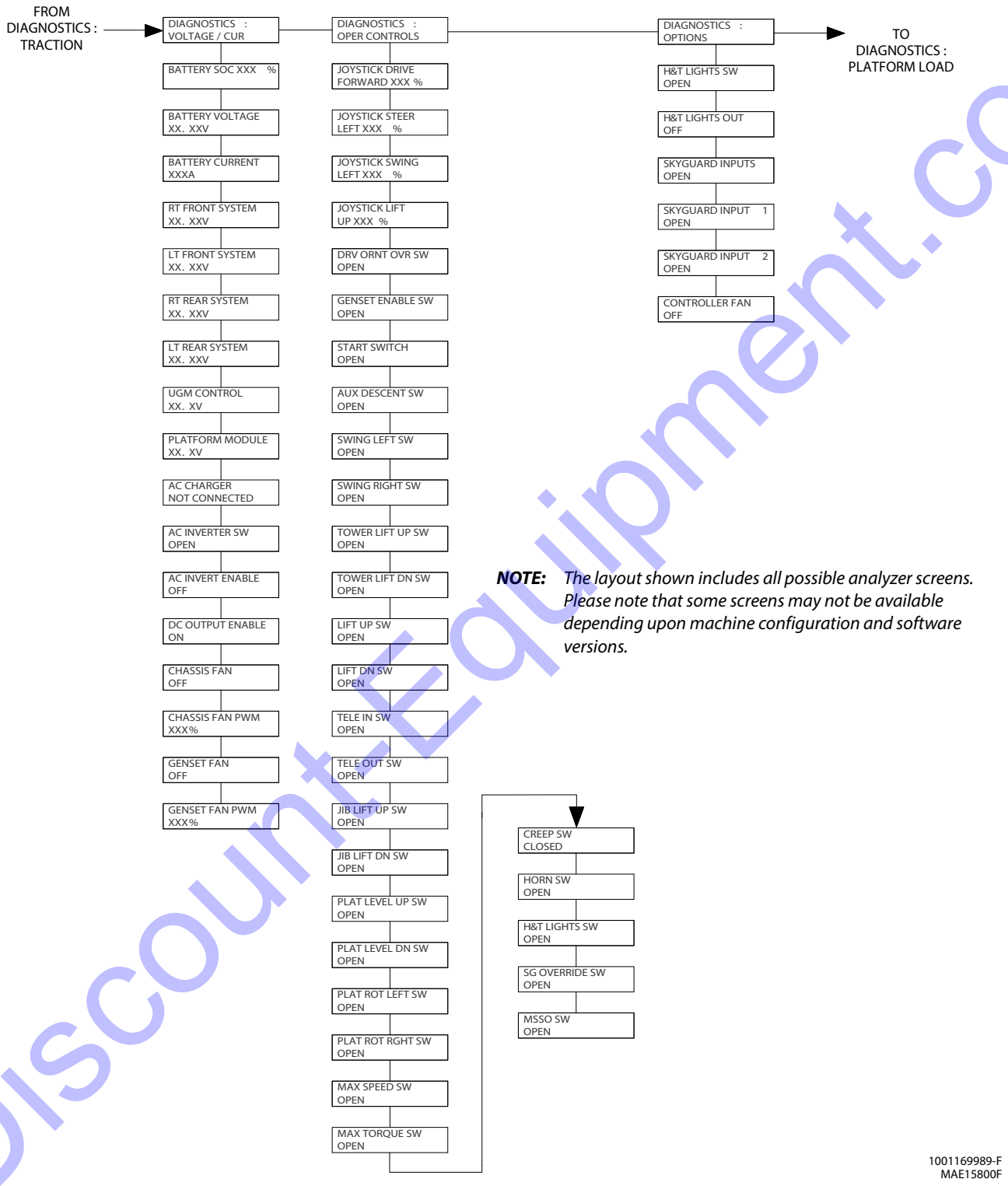
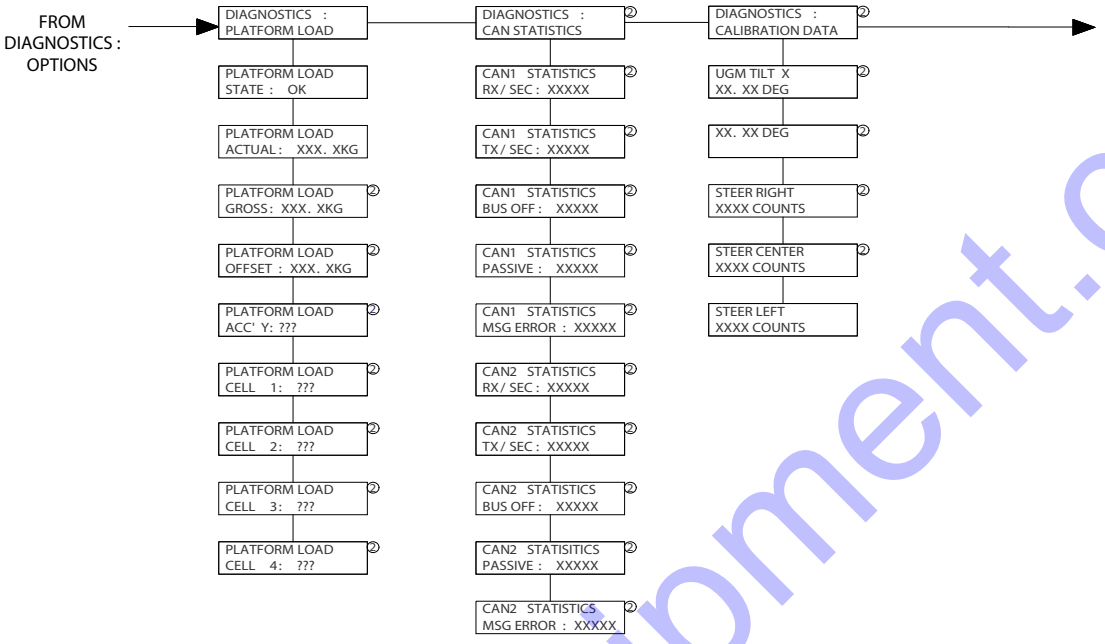


Figure 6-5. Analyzer Flow Chart_Version P1.4 Software - Sheet 3 of 11



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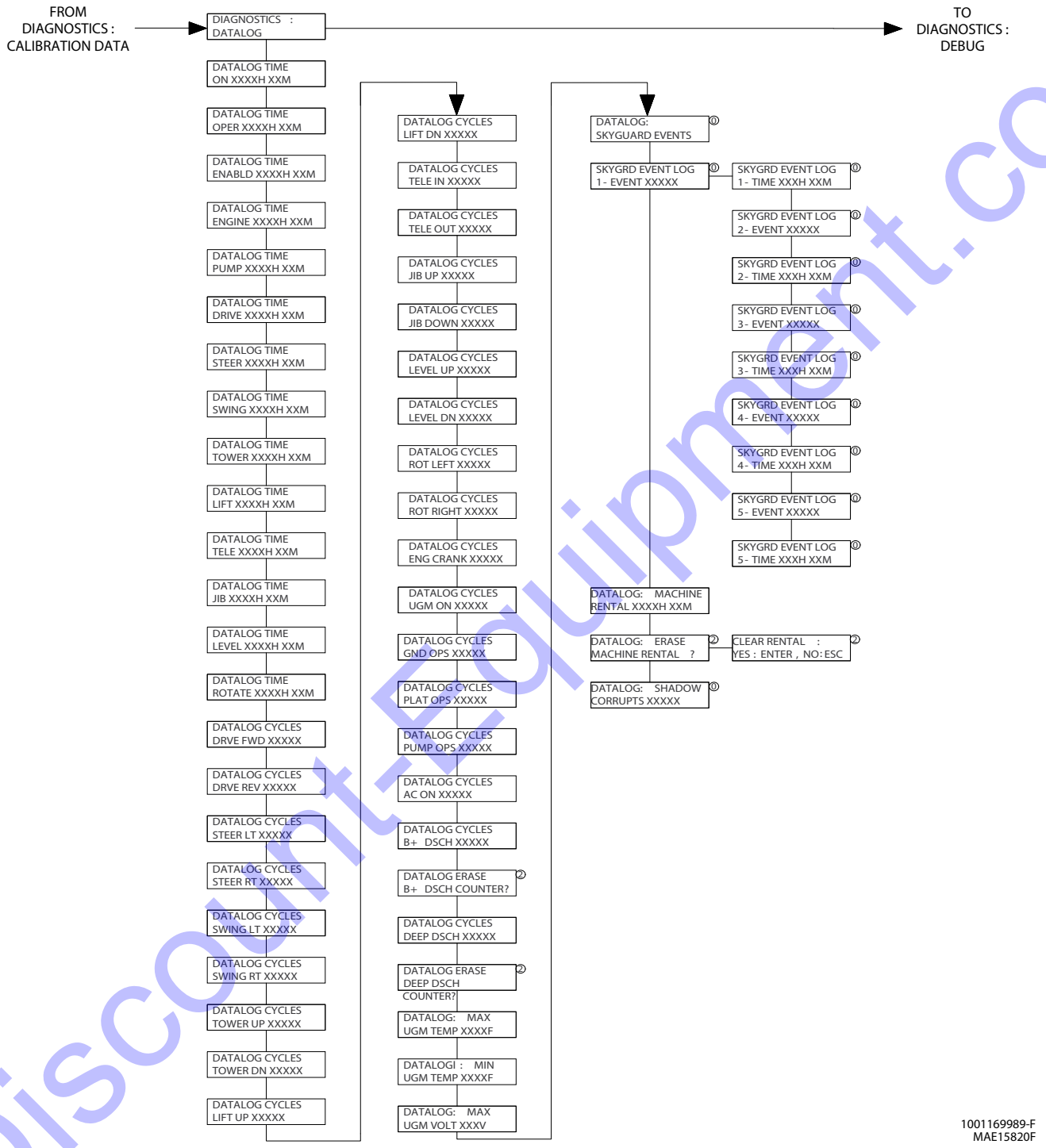
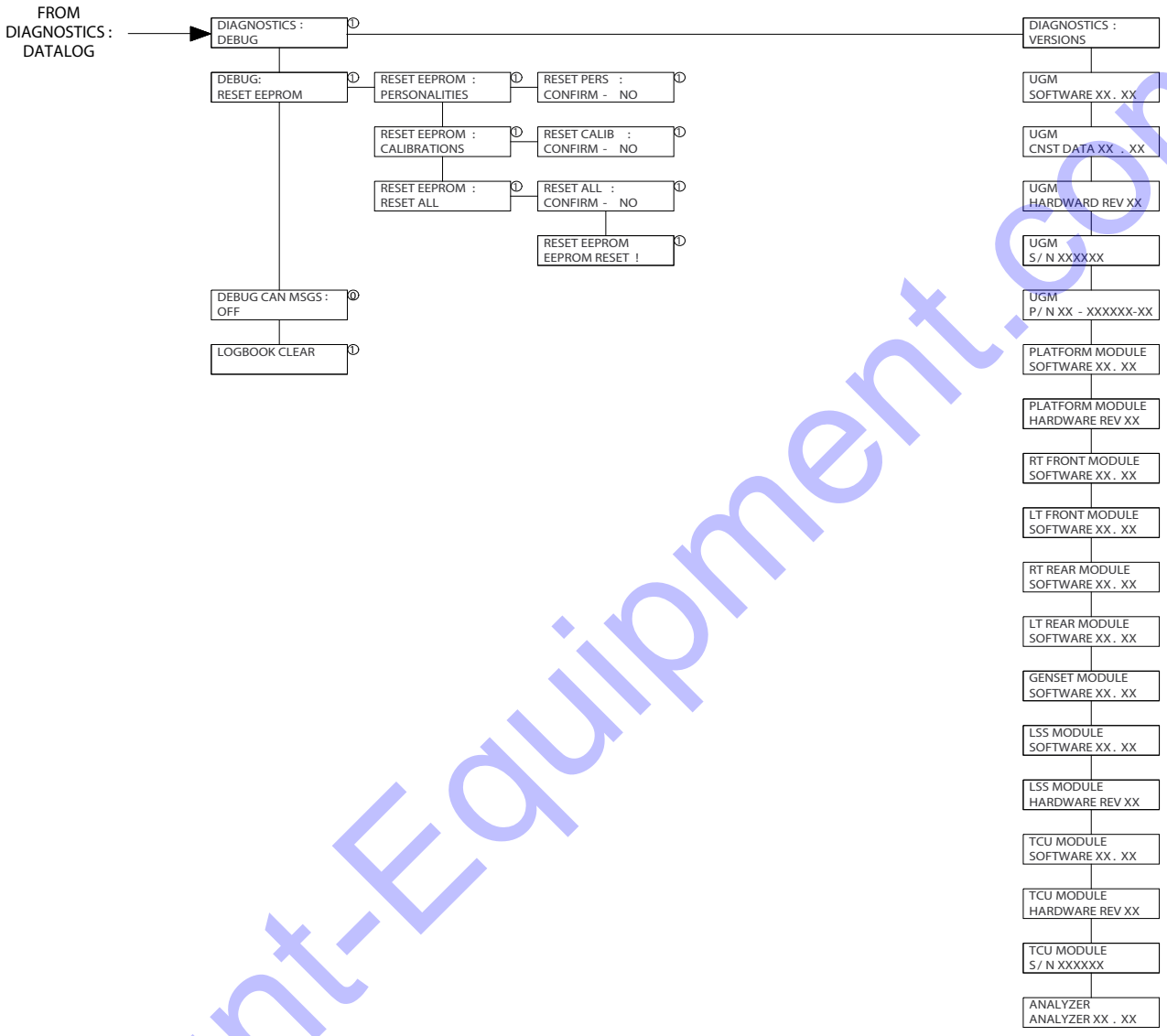
NOTE: *The layout shown includes all possible analyzer screens. Please note that some screens may not be available depending upon machine configuration and software versions.*

Figure 6-6. Analyzer Flow Chart_Version P1.4 Software - Sheet 4 of 11



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

Figure 6-7. Analyzer Flow Chart_Version P1.4 Software - Sheet 5 of 11



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

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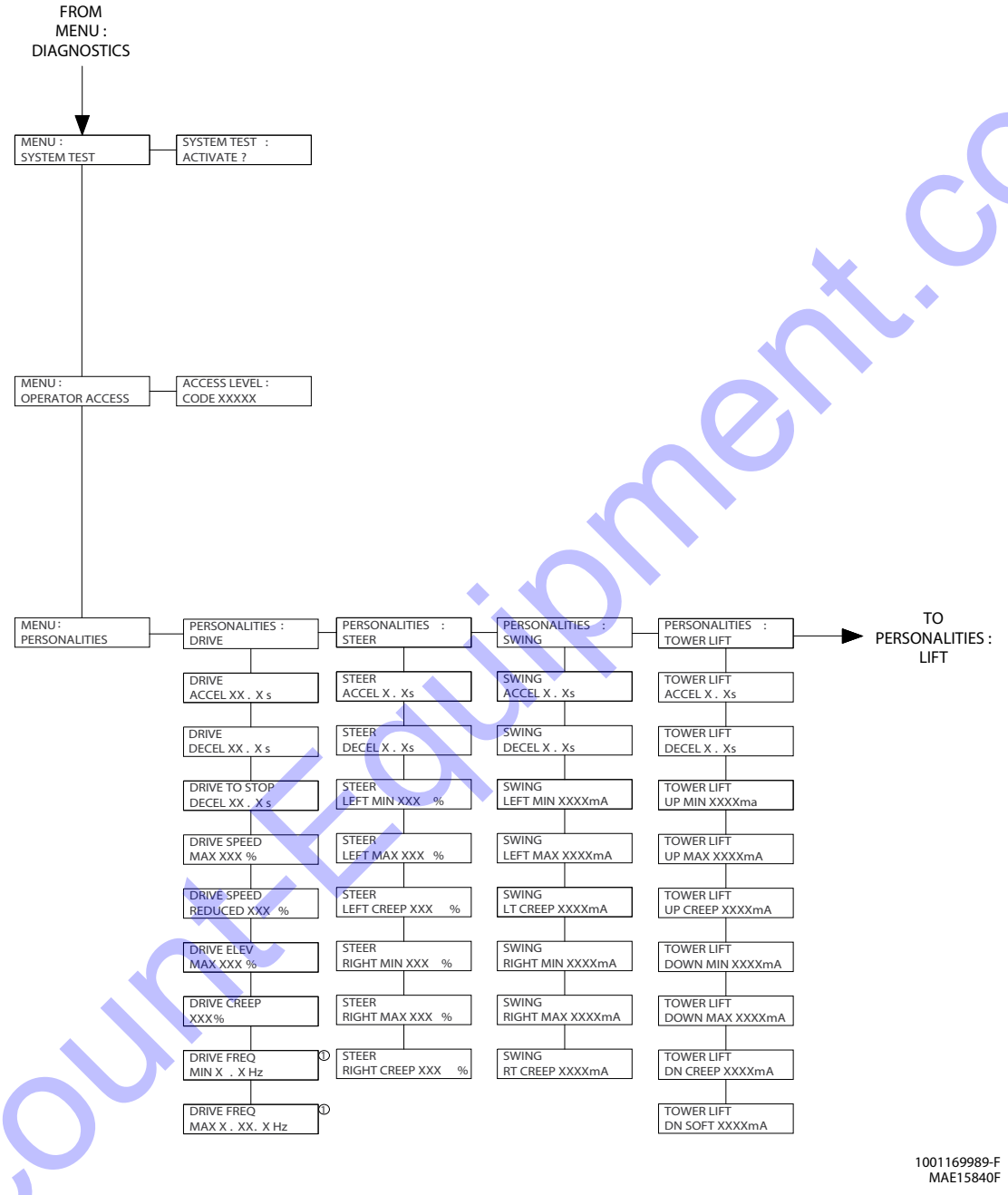
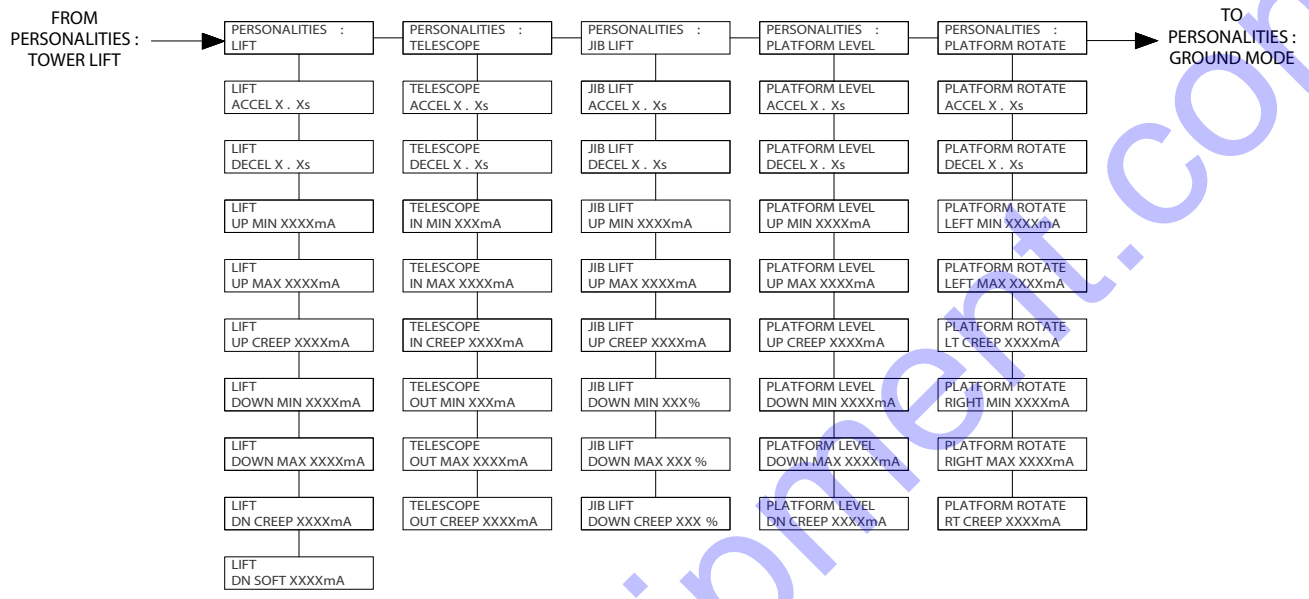
Figure 6-8. Analyzer Flow Chart_Version P1.4 Software - Sheet 6 of 11



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

Figure 6-9. Analyzer Flow Chart_Version P1.4 Software - Sheet 7 of 11



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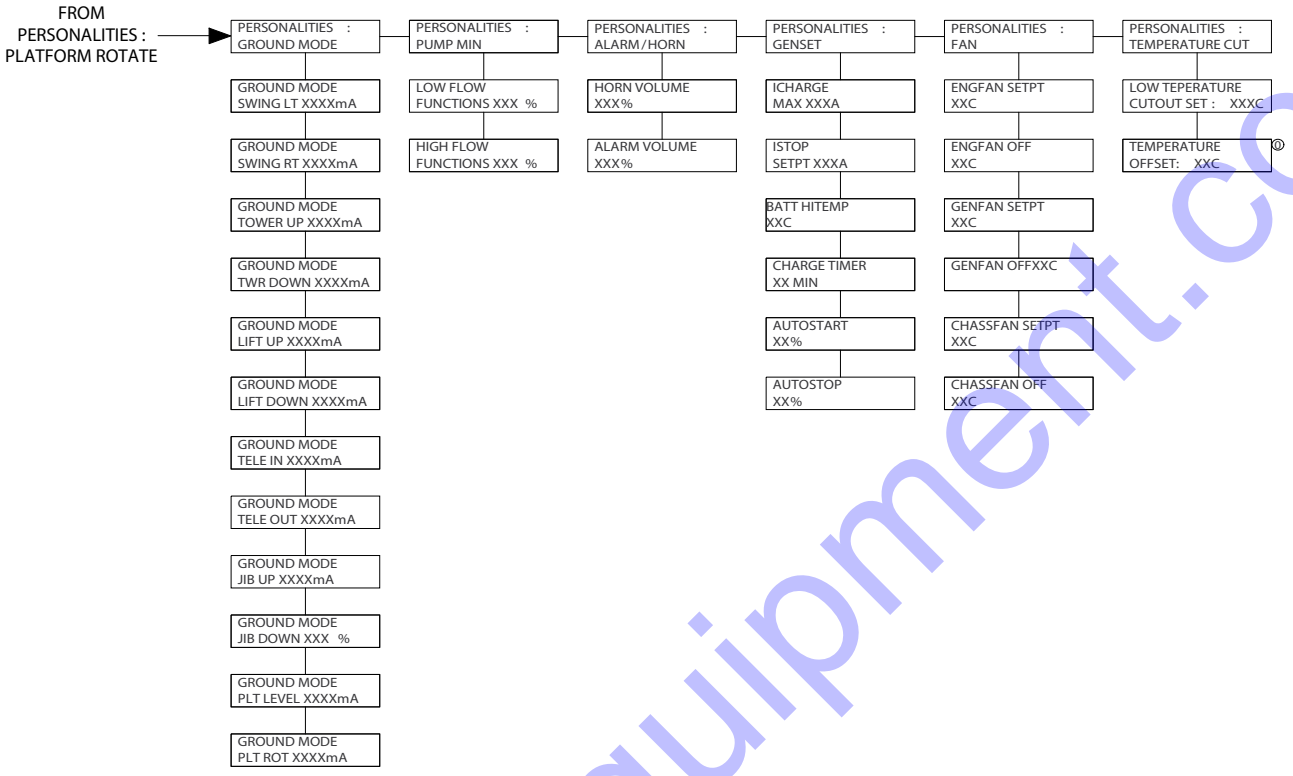
NOTE: *The layout shown includes all possible analyzer screens. Please note that some screens may not be available depending upon machine configuration and software versions.*

Figure 6-10. Analyzer Flow Chart_Version P1.4 Software - Sheet 8 of 11



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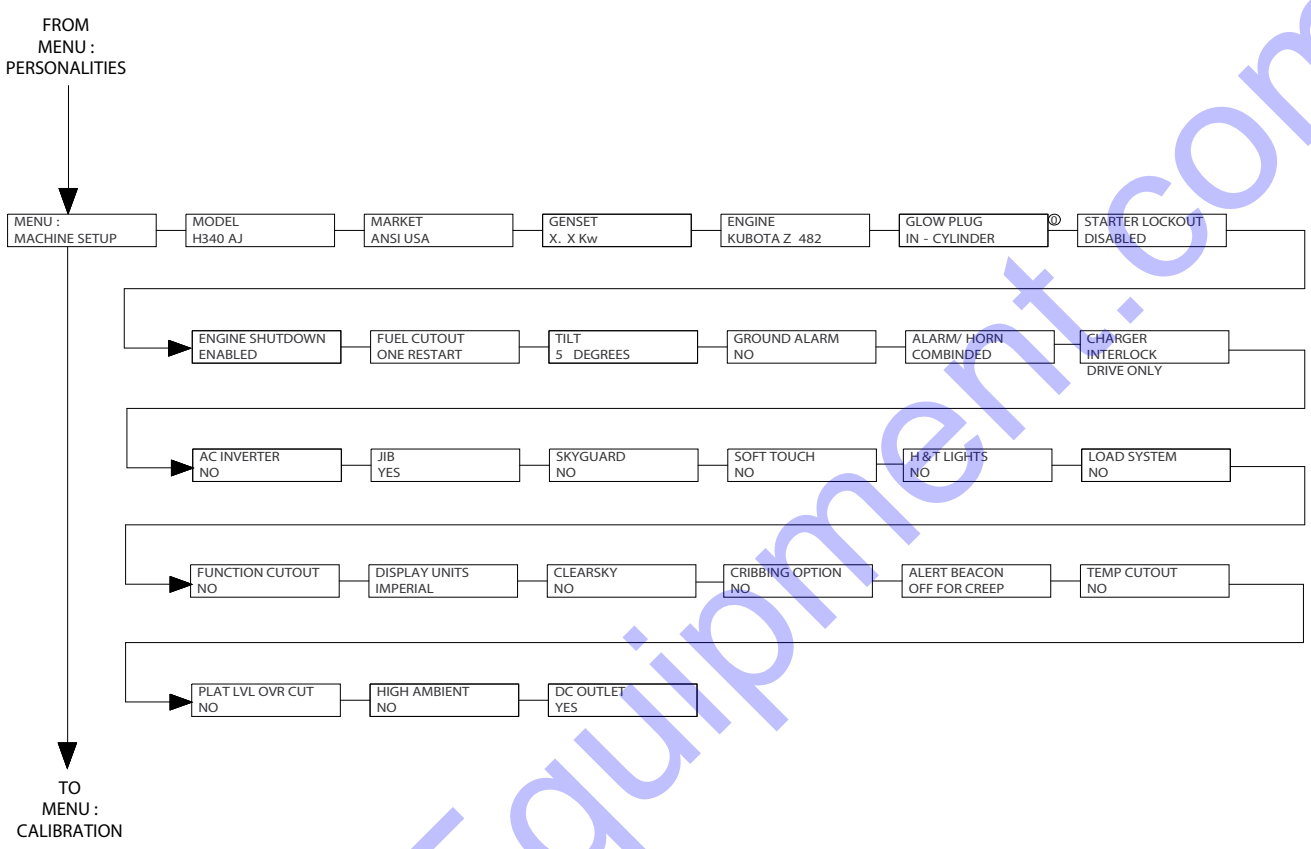
NOTE: *The layout shown includes all possible analyzer screens. Please note that some screens may not be available depending upon machine configuration and software versions.*

Figure 6-11. Analyzer Flow Chart_Version P1.4 Software - Sheet 9 of 11



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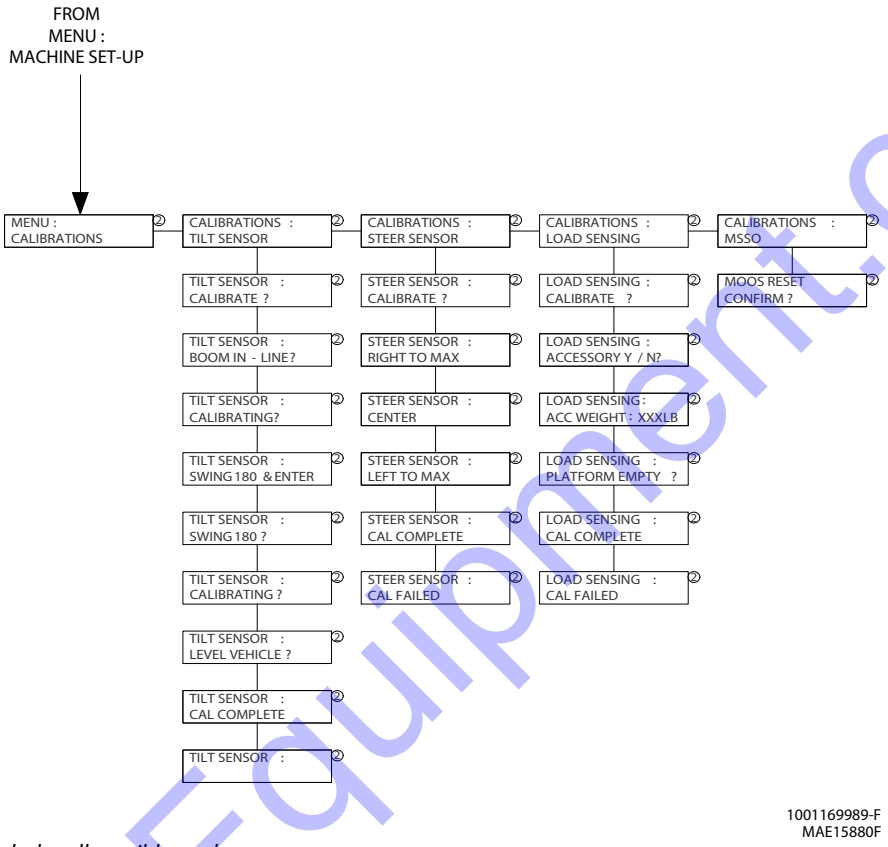
NOTE: *The layout shown includes all possible analyzer screens. Please note that some screens may not be available depending upon machine configuration and software versions.*

Figure 6-12. Analyzer Flow Chart_Version P1.4 Software - Sheet 10 of 11



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

Figure 6-13. Analyzer Flow Chart_Version P1.4 Software - Sheet 11 of 11

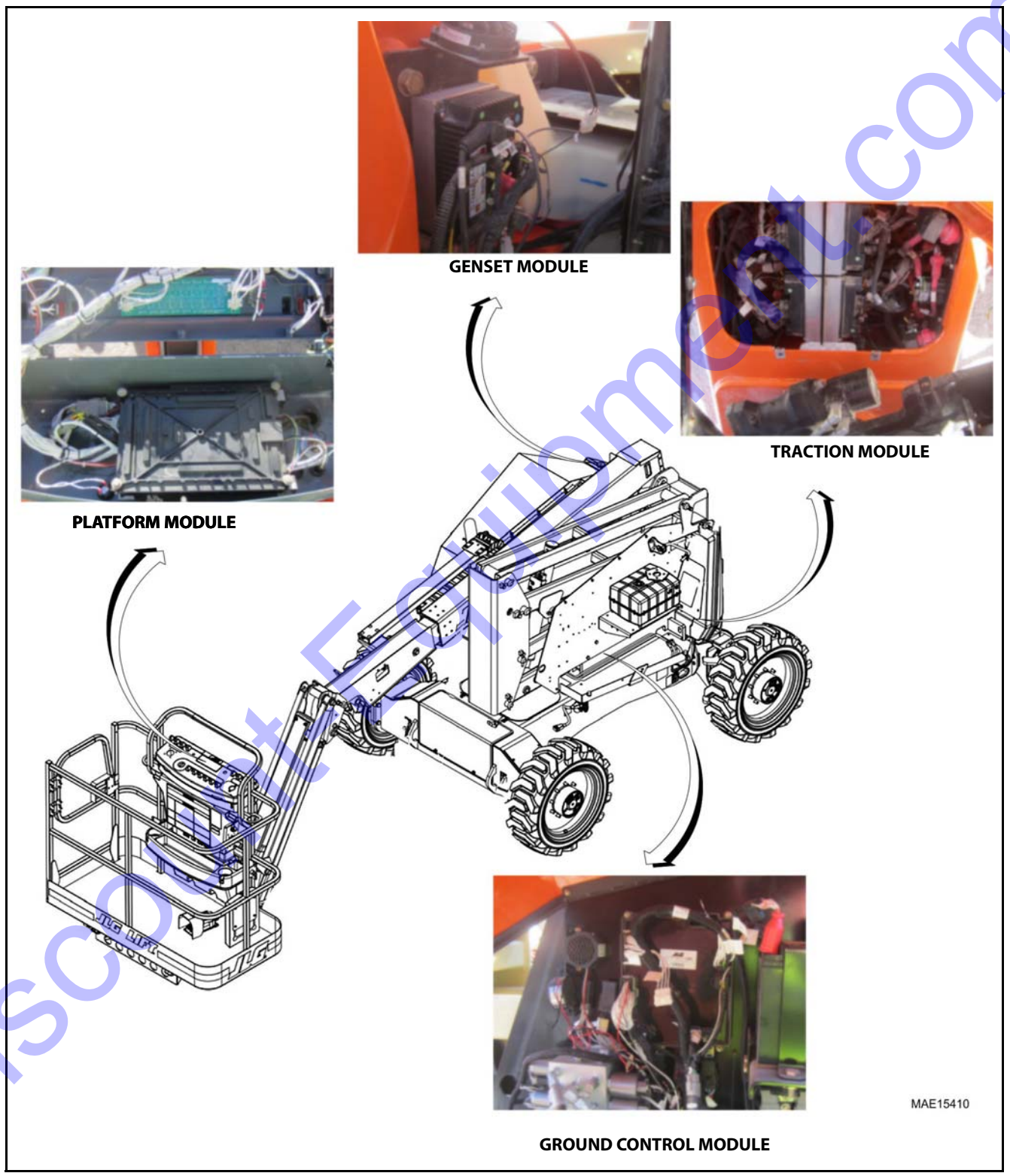


Figure 6-14. Control Module Location

Connector	Pin	Function	Type	
J1 (Natural)	1	ENERGIZED TO RUN/STOP ACTUATOR HOLD / FUEL PUMP RELAY	DIGITAL	OUTPUT
	2	ENERGIZED TO RUN/STOP ACTUATOR RELAY (PULL)	DIGITAL	OUTPUT
	3	UNUSED	DIGITAL	OUTPUT
	4	SUPPLEMENTAL GROUND ALARM (GROUND)	GROUND	INPUT
	5	12V ASSISTANT BATT DISCONNECT GROUND (RELAY)	GROUND	INPUT
	6	12V ASSISTANT BATT DISCONNECT (RELAY)	DIGITAL	OUTPUT
	7	OSCILLATING AXLE POWER	DIGITAL	OUTPUT
	8	COOLANT TEMP SENSOR GROUND	GROUND	INPUT
	9	MSSO SWITCH GROUND	GROUND	INPUT
	10	UGM MAIN CONTACTOR VOTE RELAY	DIGITAL	OUTPUT
	11	JUMP START RELAY (EXTERNAL STARTER)	DIGITAL	OUTPUT
	12	GLOW PLUGS RELAY	DIGITAL	OUTPUT
	13	AUX POWER RELAY	DIGITAL	OUTPUT
	14	ENGINE COOLANT TEMPERATURE SENSOR	ANALOG	INPUT
	15	ENGINE OIL PRESSURE SWITCH	ANALOG	INPUT
	16	UNUSED	FREQUENCY	INPUT
	17	INVERTER ENABLE RELAY GROUND	GROUND	INPUT
	18	ENGINE GROUND	GROUND	INPUT
	19	AUX POWER RELAY GROUND	GROUND	INPUT
	20	UNUSED	DIGITAL	OUTPUT
	21	UNUSED	DIGITAL	INPUT
	22	INVERTER ENABLE RELAY	DIGITAL	OUTPUT
	23	UNUSED	DIGITAL	OUTPUT
	24	UNUSED	N/C	N/C
	25	UNUSED (RESERVED FOR RS-485 HIGH)	SERIAL	I/O
	26	UNUSED (RESERVED FOR RS-485 LOW)	SERIAL	I/O
	27	UNUSED (GROUND)	GROUND	INPUT
	28	ANALYZER POWER	VOLTAGE	OUTPUT
	29	ANALYZER RS-232 RX	SERIAL	INPUT
	30	ANALYZER RS-232 TX	SERIAL	OUTPUT
	31	ANALYZER GROUND	GROUND	INPUT
	32	UNUSED	DIGITAL	OUTPUT
	33	UNUSED (GROUND)	GROUND	INPUT
	34	UNUSED	DIGITAL	INPUT
	35	UNUSED	DIGITAL	INPUT

Connector	Pin	Function	Type	
J2 (Gray)	1	DUMP VALVE (LOW FLOW)	DIGITAL	OUTPUT
	2	SUPPLEMENTAL GROUND ALARM OUTPUT	DIGITAL	OUTPUT
	3	UNUSED	DIGITAL	OUTPUT
	4	TELESCOPE IN SOLENOID	DIGITAL	OUTPUT
	5	PLATFORM LEVEL UP SOLENOID	DIGITAL	OUTPUT
	6	FUEL LEVEL SENSOR GROUND	GROUND	INPUT
	7	PLATFORM LEVEL DOWN SOLENOID	DIGITAL	OUTPUT
	8	RIGHT FRONT STEER SOLENOID	DIGITAL	OUTPUT
	9	TOWER LIFT DOWN SOLENOID	DIGITAL	OUTPUT
	10	UNUSED	DIGITAL	OUTPUT
	11	MAIN LIFT UP SOLENOID	DIGITAL	OUTPUT
	12	UNUSED	DIGITAL	OUTPUT
	13	HIGH FLOW DUMP	DIGITAL	OUTPUT
	14	MID VALVE SOLENOID GROUND	GROUND	INPUT
	15	UNUSED	DIGITAL	OUTPUT
	16	TELESCOPE OUT SOLENOID	DIGITAL	OUTPUT
	17	LOW FLOW PRESSURE RELEASE GROUND	GROUND	INPUT
	18	LOW FLOW DUMP GROUND	GROUND	INPUT
	19	LEFT FRONT STEER SOLENOID	DIGITAL	OUTPUT
	20	TOWER LIFT UP SOLENOID	DIGITAL	OUTPUT
	21	UNUSED	DIGITAL	OUTPUT
	22	LIFT DOWN SOLENOID	DIGITAL	OUTPUT
	23	UNUSED	DIGITAL	OUTPUT
	24	UNUSED	DIGITAL	INPUT
	25	FUEL LEVEL SENSOR	ANALOG	INPUT
	26	HEAD / TAIL LIGHT ENABLE RELAY	DIGITAL	OUTPUT
	27	HORN / GROUND ALARM OUTPUT	DIGITAL	OUTPUT
	28	STEER VALVE GROUND	GROUND	INPUT
	29	GROUND FOR GROUND ALARM	GROUND	INPUT
	30	HIGH FLOW DUMP GROUND	GROUND	INPUT
	31	FLOW CONTROL VALVE	DIGITAL	OUTPUT
	32	LOW FLOW PRESSURE RELEASE SOLENOID	DIGITAL	OUTPUT
	33	UNUSED	DIGITAL	OUTPUT
	34	SWING LEFT SOLENOID	DIGITAL	OUTPUT
	35	SWING RIGHT SOLENOID	DIGITAL	OUTPUT

Connector	Pin	Function	Type	
J3 (Black)	1	UNUSED (LSD CURRENT SENSE 1)	GROUND	INPUT
	2	UNUSED (LSD CURRENT SENSE 2)	GROUND	INPUT
	3	UNUSED (GROUND)	GROUND	INPUT
	4	SWING CURRENT FEEDBACK (LSD CURRENT SENSE 4)	GROUND	INPUT
	5	TOWER LIFT CURRENT FEEDBACK (LSD CURRENT SENSE 5)	GROUND	INPUT
	6	FLOW CONTROL VALVE CURRENT FEEDBACK (LSD CURRENT SENSE 6)	GROUND	INPUT
	7	BATTERY VOLTAGE FOR GROUND ALARM	VBAT	OUTPUT
	8	UNUSED	DIGITAL	INPUT
	9	CRIBBING ENABLE SWITCH	DIGITAL	INPUT
	10	JUMP MODE ENABLE	DIGITAL	INPUT
	11	UNUSED	DIGITAL	INPUT
	12	UNUSED (+5 VOLTS)	VOLTAGE	OUTPUT
	13	UNUSED	ANALOG	INPUT
	14	MAIN LIFT CURRENT FEEDBACK (LSD CURRENT SENSE 3)	GROUND	INPUT

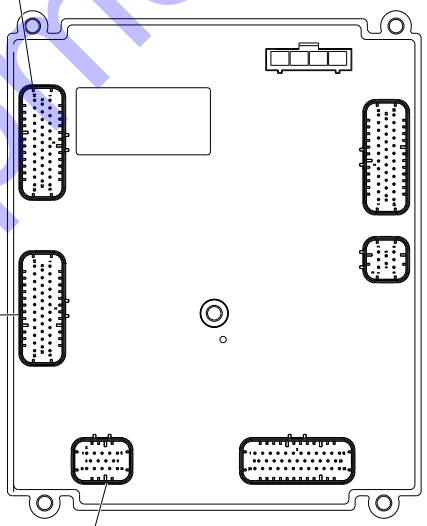


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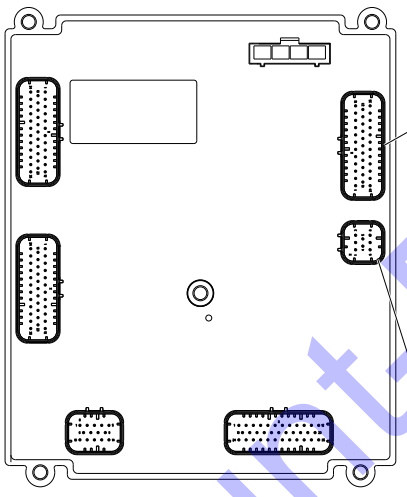
Figure 6-15. Ground Control Module - Sheet 1 of 3



Connector	Pin	Function	Type	
J7 (Black)	1	PLATFORM EMS	DIGITAL	INPUT
	2	PLATFORM MODE	DIGITAL	INPUT
	3	GROUND MODE	DIGITAL	INPUT
	4	BOOM ELEVATION SWITCH #1	ANALOG	INPUT
	5	UNUSED	VOLTAGE	OUTPUT
	6	CAN1 TERMINATOR	TERM	I/O
	7	BOOM ELEVATION SWITCH #2	ANALOG	INPUT
	8	UNUSED	ANALOG	INPUT
	9	UNUSED (GROUND)	GROUND	INPUT
	10	EXTERNAL TILT SENSOR (GROUND)	GROUND	INPUT
	11	TOWER ELEVATION SWITCH	DIGITAL	INPUT
	12	OSCILLATING AXLE COIL #1 (PRIMARY)	DIGITAL	INPUT
	13	CAN1 HIGH	SERIAL	I/O
	14	GROUND MODE POWER TO PLATFORM	DIGITAL	INPUT
	15	FOOTSWITCH	DIGITAL	INPUT
	16	UNUSED (+5 VOLTS)	VOLTAGE	OUTPUT
	17	CAN1 TERMINATOR	TERM	I/O
	18	CAN1 SHIELD	GROUND	INPUT
	19	IGNITION RELAY GROUND	GROUND	INPUT
	20	OSCILLATING AXLE COIL #2 (SECONDARY)	ANALOG	INPUT
	21	UNUSED	DIGITAL	INPUT
	22	OSCILLATING AXLE PRESSURE SWITCH	DIGITAL	INPUT
	23	UNUSED	DIGITAL	INPUT
	24	CAN1 LOW	SERIAL	I/O
	25	MDI GROUND	GROUND	INPUT
	26	UNUSED (+5 VOLTS)	VOLTAGE	OUTPUT
	27	UNUSED (+5 VOLTS)	VOLTAGE	OUTPUT
	28	UNUSED	GROUND	INPUT
	29	BATTERY VOLTAGE FOR MDI	VBAT	OUTPUT
	30	UNUSED	VBAT	OUTPUT
	31	UNUSED	VBAT	OUTPUT
	32	BATTERY VOLTAGE FOR DOS	VBAT	OUTPUT
	33	BATTERY VOLTAGE FOR OSCILLATING AXLE PRESSURE SWITCH	VBAT	OUTPUT
	34	EXTERNAL TILT SENSOR (POWER)	VBAT	OUTPUT
	35	DOS	DIGITAL	INPUT

Connector	Pin	Function	Type	
J12 (Blue)	1	UNUSED	FREQUENCY	INPUT
	2	UNUSED	FREQUENCY	INPUT
	3	CAN2 HIGH (ISOLATED)	SERIAL	I/O
	4	CAN2 LOW (ISOLATED)	SERIAL	I/O
	5	CAN2 SHIELD (ISOLATED)	GROUND	INPUT
	6	CAN2 HIGH (ISOLATED)	SERIAL	I/O
	7	CAN2 LOW (ISOLATED)	SERIAL	I/O
	8	MSSO SWITCH	DIGITAL	INPUT

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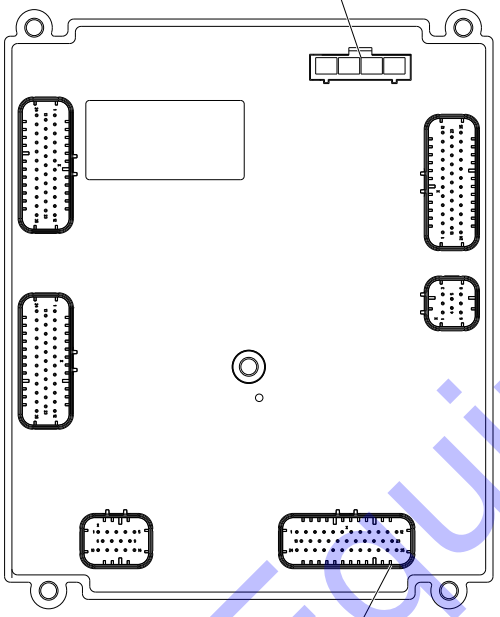
Figure 6-16. Ground Control Module - Sheet 2 of 3

Connector	Pin	Function	Type	
J8 (Black)	1	MODULE GROUND	GROUND	OUTPUT
	2	MODULE POWER	VBAT	INPUT
	3	GROUND TO PLATFORM MODULE	GROUND	INPUT
	4	POWER TO PLATFORM MODULE	VBAT	OUTPUT



Connector	Pin	Function	Type	
J4 (Blue)	1	CRIBBING ENABLED INDICATOR	DIGITAL	OUTPUT
	2	SYSTEM DISTRESS INDICATOR	DIGITAL	OUTPUT
	3	GLOWPLUG INDICATOR	DIGITAL	OUTPUT
	4	MANUAL START SWITCH	DIGITAL	INPUT
	5	PLATFORM LEVEL DOWN	DIGITAL	INPUT
	6	PLATFORM ROTATE LEFT	DIGITAL	INPUT
	7	MAIN TELESCOPE IN	DIGITAL	INPUT
	8	JIB DOWN	DIGITAL	INPUT
	9	UNUSED	DIGITAL	INPUT
	10	TOWER LIFT UP	DIGITAL	INPUT
	11	UNUSED	DIGITAL	INPUT
	12	UNUSED	DIGITAL	OUTPUT
	13	LOW FUEL INDICATOR	DIGITAL	OUTPUT
	14	PLATFORM OVERLOADED INDICATOR	DIGITAL	OUTPUT
	15	UNUSED	DIGITAL	OUTPUT
	16	AUXILIARY POWER / FUNCTION ENABLE	DIGITAL	INPUT
	17	PLATFORM LEVEL UP	DIGITAL	INPUT
	18	PLATFORM ROTATE RIGHT	DIGITAL	INPUT
	19	JIB UP	DIGITAL	INPUT
	20	UNUSED	DIGITAL	INPUT
	21	TOWER LIFT DOWN	DIGITAL	INPUT
	22	UNUSED	DIGITAL	INPUT
	23	MAIN LIFT UP	DIGITAL	INPUT
	24	UNUSED (BATTERY VOLTAGE)	VBAT	OUTPUT
	25	BATTERY VOLTAGE FOR SWITCHES	VBAT	OUTPUT
	26	GENSET AUTO MODE ENABLED INDICATOR	DIGITAL	OUTPUT
	27	UNUSED	DIGITAL	OUTPUT
	28	ENGINE HIGH COOLANT TEMPERATURE INDICATOR	DIGITAL	OUTPUT
	29	ENGINE LOW OIL PRESSURE INDICATOR	DIGITAL	OUTPUT
	30	TELESCOPE OUT	DIGITAL	INPUT
	31	LAMP GROUND	GROUND	INPUT
	32	UNUSED (GROUND)	GROUND	INPUT
	33	MAIN LIFT DOWN	DIGITAL	INPUT
	34	SWING LEFT	DIGITAL	INPUT
	35	SWING RIGHT	DIGITAL	INPUT

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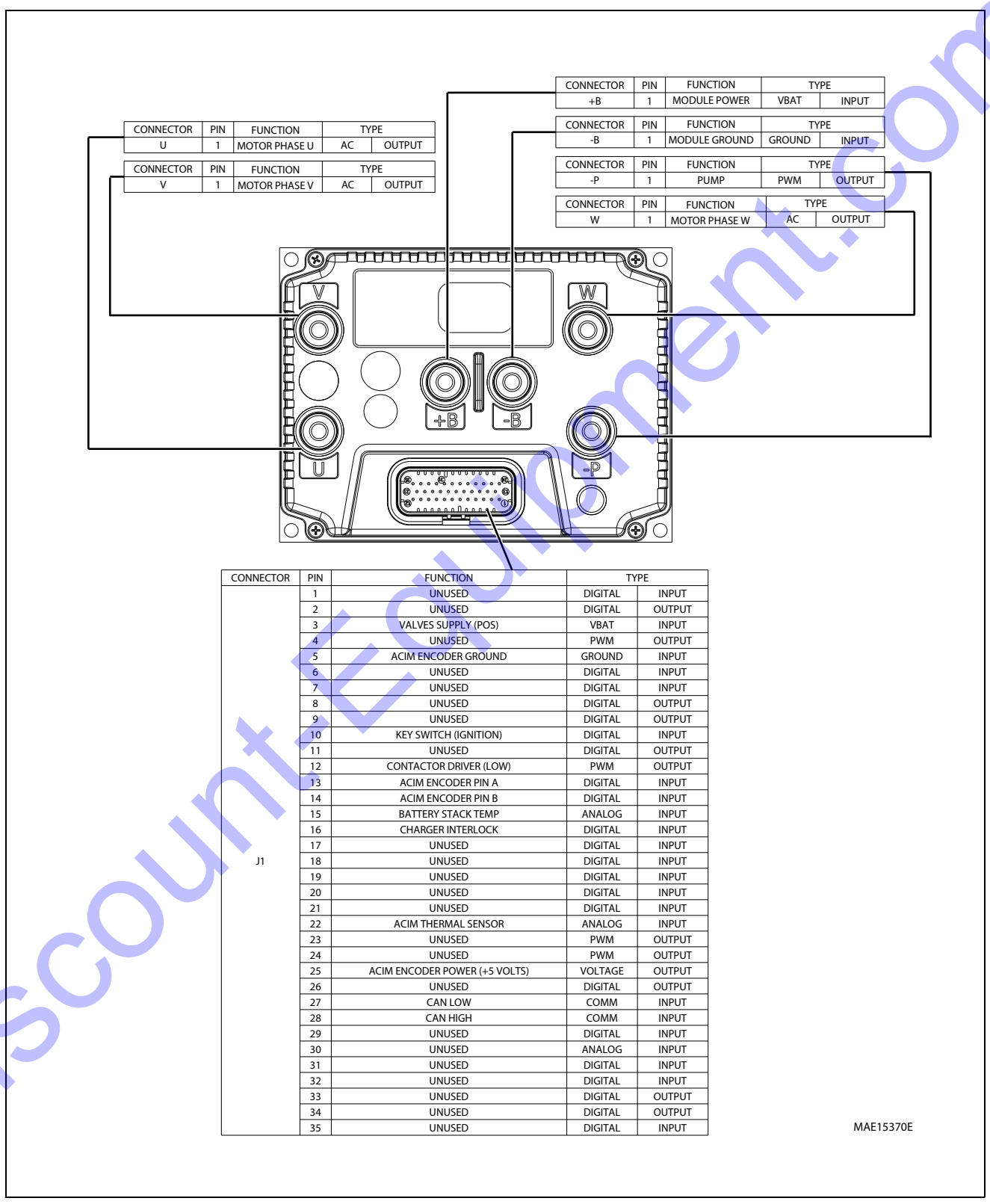
Figure 6-17. Ground Control Module - Sheet 3 of 3



CONNECTOR	PIN	FUNCTION	TYPE	
J1	1	UNUSED	DIGITAL	INPUT
	2	UNUSED	DIGITAL	OUTPUT
	3	VALVES SUPPLY (POS)	VBAT	INPUT
	4	UNUSED	PWM	OUTPUT
	5	ACIM ENCODER GROUND	GROUND	INPUT
	6	UNUSED	DIGITAL	INPUT
	7	UNUSED	DIGITAL	INPUT
	8	UNUSED	DIGITAL	OUTPUT
	9	UNUSED	DIGITAL	OUTPUT
	10	KEY SWITCH (IGNITION)	DIGITAL	INPUT
	11	UNUSED	DIGITAL	OUTPUT
	12	CONTACTOR DRIVER (LOW)	PWM	OUTPUT
	13	ACIM ENCODER PIN A	DIGITAL	INPUT
	14	ACIM ENCODER PIN B	DIGITAL	INPUT
	15	BATTERY STACK TEMP	ANALOG	INPUT
	16	CHARGER INTERLOCK	DIGITAL	INPUT
	17	UNUSED	DIGITAL	INPUT
	18	UNUSED	DIGITAL	INPUT
	19	UNUSED	DIGITAL	INPUT
	20	UNUSED	DIGITAL	INPUT
	21	UNUSED	DIGITAL	INPUT
	22	ACIM THERMAL SENSOR	ANALOG	INPUT
	23	UNUSED	PWM	OUTPUT
	24	UNUSED	PWM	OUTPUT
	25	ACIM ENCODER POWER (+5 VOLTS)	VOLTAGE	OUTPUT
	26	UNUSED	DIGITAL	OUTPUT
	27	CAN LOW	COMM	INPUT
	28	CAN HIGH	COMM	INPUT
	29	UNUSED	DIGITAL	INPUT
	30	UNUSED	ANALOG	INPUT
	31	UNUSED	DIGITAL	INPUT
	32	UNUSED	DIGITAL	INPUT
	33	UNUSED	DIGITAL	OUTPUT
	34	UNUSED	DIGITAL	OUTPUT
	35	UNUSED	DIGITAL	INPUT

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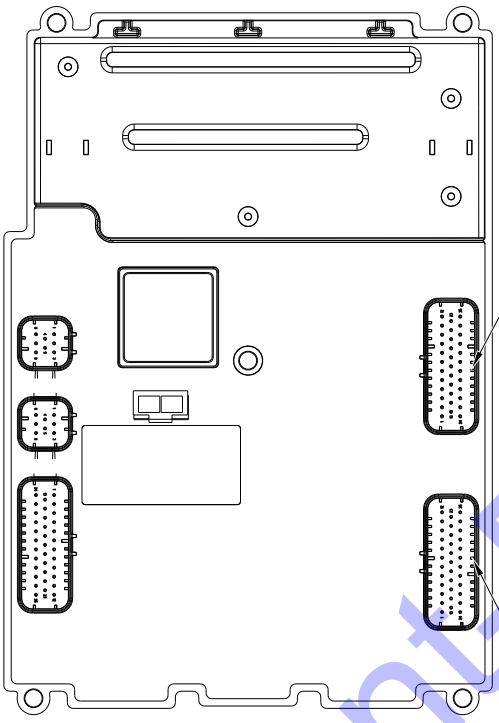
Figure 6-18. Genset Control Module



CONNECTOR	PIN	ASSIGNMENT	FUNCTION
J2 GRAY	1	UNALLOCATED (JIB RT)	DIGITAL INPUT
	2	UNALLOCATED (JIB LT)	DIGITAL INPUT
	3	UNUSED (BATTERY VOLTAGE)	BATTERY VOLTAGE
	4	DRIVE ORIENTATION SYSTEM OVERRIDE SWITCH	HS DIGITAL INPUT
	5	UNALLOCATED (BASKET STOW SWITCH)	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	UNUSED (BROKEN CABLE INDICATOR)	LAMP OUTPUT
	11	PLATFORM OVERLOADED INDICATOR	LAMP OUTPUT
	12	UNUSED (500 LB CAPACITY INDICATOR)	LAMP OUTPUT
	13	UNUSED (1000 LB CAPACITY INDICATOR)	LAMP OUTPUT
	14	DRIVE ORIENTATION SYSTEM INDICATOR	LAMP OUTPUT
	15	INVERTER ON INDICATOR	LAMP OUTPUT
	16	SOFT TOUCH/SKYGUARD INDICATOR	LAMP OUTPUT
	17	GLOW PLUG ENGAGED INDICATOR	LAMP OUTPUT
	18	LAMP RETURN	GROUND
	19	LOW BATTERY INDICATOR	LAMP OUTPUT
	20	UNUSED	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	UNUSED (BATTERY VOLTAGE)	BATTERY VOLTAGE
	31	SOFT TOUCH POWER	BATTERY VOLTAGE
	32	LSS POWER	BATTERY VOLTAGE
	33	PLT DISP POWER	BATTERY VOLTAGE
	34	UNUSED (SWITCH POWER)	BATTERY VOLTAGE
	35	FULL FUEL LEVEL INDICATOR	LAMP OUTPUT

CONNECTOR	PIN	ASSIGNMENT	FUNCTION
J1 NATURAL	1	TOWER LIFT UP	DIGITAL INPUT
	2	TOWER LIFT DOWN	DIGITAL INPUT
	3	UNUSED (TOWER TELESCOPE IN)	DIGITAL INPUT
	4	UNUSED (TOWER TELESCOPE OUT)	DIGITAL INPUT
	5	MAIN TELESCOPE IN	DIGITAL INPUT
	6	MAIN TELESCOPE OUT	DIGITAL INPUT
	7	PLATFORM ROTATE RIGHT	DIGITAL INPUT
	8	PLATFORM ROTATE LEFT	DIGITAL INPUT
	9	PLATFORM LEVEL UP	DIGITAL INPUT
	10	PLATFORM LEVEL DOWN	DIGITAL INPUT
	11	JIB UP	DIGITAL INPUT
	12	JIB DOWN	DIGITAL INPUT
	13	SPEED PUMP POTENTIOMETER GROUND	GROUND
	14	ENGINE START	DIGITAL INPUT
	15	AUXILIARY DESCENT	DIGITAL INPUT
	16	UNUSED (CRAB STEER SELECT)	DIGITAL INPUT
	17	UNUSED (COORDINATED STEER SELECT)	DIGITAL INPUT
	18	SWITCH POWER	BATTERY VOLTAGE
	19	UNALLOCATED	DIGITAL INPUT
	20	SOFT TOUCH SWITCH	DIGITAL INPUT
	21	UNALLOCATED	DIGITAL INPUT
	22	UNALLOCATED	DIGITAL INPUT
	23	SKYGUARD INPUT #2	DIGITAL INPUT
	24	UNALLOCATED	DIGITAL INPUT
	25	UNALLOCATED	DIGITAL INPUT
	26	UNALLOCATED	DIGITAL INPUT
	27	SPEED MODE	DIGITAL INPUT
	28	UNUSED (TORQUE MODE (LOW ENGINE))	DIGITAL INPUT
	29	SOFT TOUCH/SKYGUARD OVERRIDE	DIGITAL INPUT
	30	HEAD/TAIL LIGHT	DIGITAL INPUT
	31	HORN	DIGITAL INPUT
	32	CREEP MODE	DIGITAL INPUT
	33	GENSET ENABLE/DISABLE	DIGITAL INPUT
	34	SPEED PUMP POTENTIOMETER REFERENCE VOLTAGE	+7 REFERENCE VOLTAGE
	35	SPEED PUMP POTENTIOMETER	ANALOG INPUT

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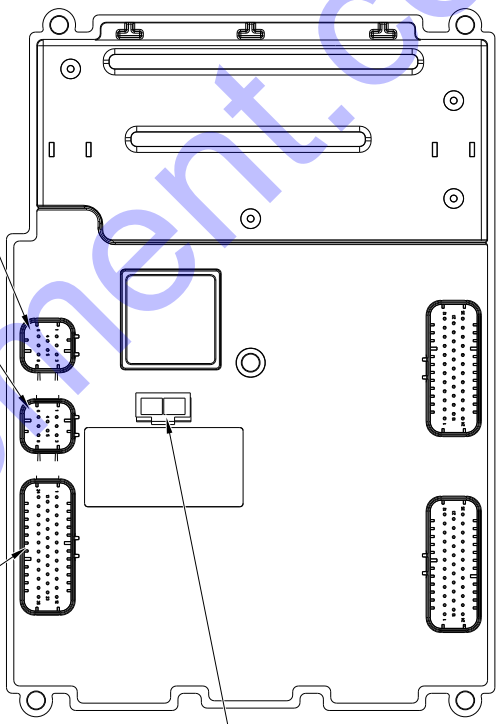
Figure 6-19. Platform Control Module - Sheet 1 of 2

CONNECTOR	PIN	ASSIGNMENT	FUNCTION
J5 NATURAL	1	LIFT / SWING JOYSTICK SUPPLY VOLTAGE	SUPPLY VOLTAGE
	2	LIFT CENTER TAP	ANALOG INPUT
	3	LIFT SIGNAL	ANALOG INPUT
	4	SWING SIGNAL	ANALOG INPUT
	5	SWING CENTER TAP	ANALOG INPUT
	6	UNUSED	ANALOG INPUT
	7	LIFT / SWING JOYSTICK RETURN	GROUND
	8	UNUSED	GROUND

CONNECTOR	PIN	ASSIGNMENT	FUNCTION
J6 BLACK	1	DRIVE / STEER JOYSTICK SUPPLY VOLTAGE	SUPPLY VOLTAGE
	2	DRIVE CENTER TAP	ANALOG INPUT
	3	DRIVE SIGNAL	ANALOG INPUT
	4	UNUSED	ANALOG INPUT
	5	STEER LEFT	ANALOG INPUT
	6	STEER RIGHT	ANALOG INPUT
	7	DRIVE / STEER JOYSTICK RETURN	GROUND
	8	UNUSED	GROUND

CONNECTOR	PIN	ASSIGNMENT	FUNCTION
J7 BLACK	1	GROUND MODE	PLATFORM EMS
	2	PLATFORM EMS	PLATFORM MODE
	3	PLATFORM EMS TO GROUND MODULE	GROUND MODE
	4	FOOTSWITCH (FUNCTION ENABLE SWITCH) POWER	BATTERY VOLTAGE
	5	INVERTER SWITCH POWER	BATTERY VOLTAGE
	6	UNUSED (JIB BLOCK LIMIT SWITCH POWER)	BATTERY VOLTAGE
	7	SKYGUARD POWER	BATTERY VOLTAGE
	8	FOOTSWITCH SIGNAL	DIGITAL INPUT
	9	INVERTER ON SIGNAL	DIGITAL INPUT
	10	UNUSED (+7 REFERENCE VOLTAGE)	+7 REFERENCE VOLTAGE
	11	UNUSED (LOAD CELL INPUT 1)	ANALOG INPUT
	12	UNUSED (LOAD CELL INPUT 2)	ANALOG INPUT
	13	UNALLOCATED	ANALOG INPUT
	14	UNUSED (GROUND RETURN)	GROUND
	15	UNUSED (LOAD CELL REFERENCE VOLTAGE)	+7 REFERENCE VOLTAGE
	16	LOAD CELL RETURN	GROUND
	17	UNUSED (JIB BLOCK LIMIT SWITCH)	HS DIGITAL INPUT
	18	SKYGUARD INPUT #1	HS DIGITAL INPUT
	19	PLATFORM ALARM	LAMP OUTPUT
	20	ALARM RETURN	GROUND
	21	UNUSED (PLATFORM LEVEL UP)	ME DIGITAL OUTPUT
	22	UNUSED (PLATFORM LEVEL DOWN)	ME DIGITAL OUTPUT
	23	VALVE RETURN	GROUND
	24	SKYGUARD RETURN	GROUND
	25	JIB UP	ME DIGITAL OUTPUT
	26	JIB DOWN	ME DIGITAL OUTPUT
	27	UNALLOCATED (JIB RT)	ME DIGITAL OUTPUT
	28	UNALLOCATED (JIB LT)	ME DIGITAL OUTPUT
	29	PLT DISP RETURN	GROUND
	30	CAN LOW	CAN LOW
	31	CAN HIGH	CAN HIGH
	32	CAN SHIELD	CAN SHIELD
	33	PLATFORM ROTATE LEFT	ME DIGITAL OUTPUT
	34	PLATFORM ROTATE RIGHT	ME DIGITAL OUTPUT
	35	UNUSED (GROUND RETURN)	GROUND



CONNECTOR	PIN	ASSIGNMENT	FUNCTION
J8	1	MODULE GROUND	GROUND
	2	MODULE POWER	BATTERY VOLTAGE

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Figure 6-20. Platform Control Module - Sheet 2 of 2

CONNECTOR	PIN	FUNCTION	TYPE	
U	1	MOTOR PHASE U	AC	OUTPUT

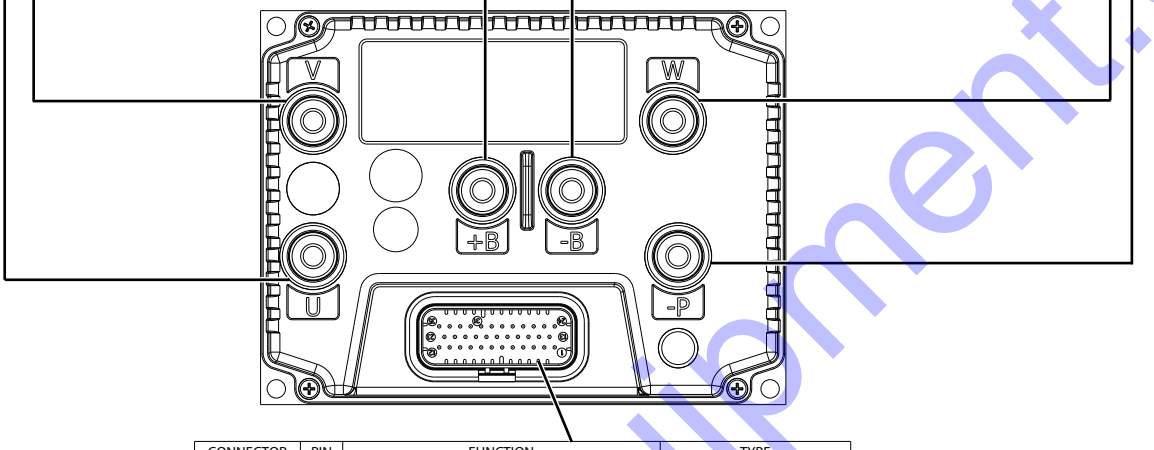
CONNECTOR	PIN	FUNCTION	TYPE	
V	1	MOTOR PHASE V	AC	OUTPUT

CONNECTOR	PIN	FUNCTION	TYPE	
+B	1	MODULE POWER	VBAT	INPUT

CONNECTOR	PIN	FUNCTION	TYPE	
-B	1	MODULE GROUND	GROUND	INPUT

CONNECTOR	PIN	FUNCTION	TYPE	
-P	1	PUMP	PWM	OUTPUT

CONNECTOR	PIN	FUNCTION	TYPE	
W	1	MOTOR PHASE W	AC	OUTPUT



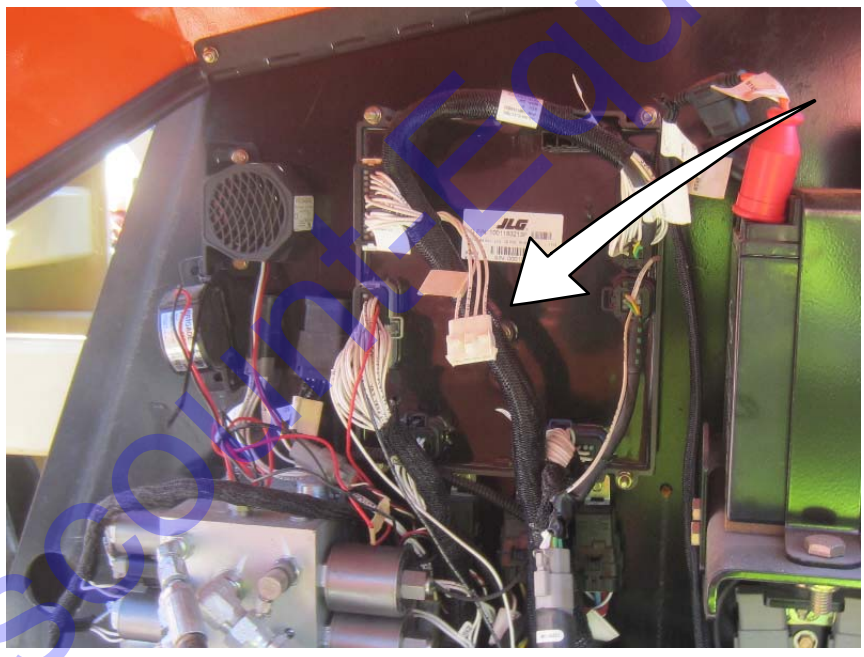
CONNECTOR	PIN	FUNCTION	TYPE	
J1	1	UNUSED	DIGITAL	INPUT
	2	ELECTRO BRAKE SUPPLY (POS)	DIGITAL	OUTPUT
	3	VALVES SUPPLY (POS)	VBAT	INPUT
	4	ELECTRO BRAKE DRIVER (NEG)	PWM	OUTPUT
	5	WHEEL ENCODER GROUND	GROUND	INPUT
	6	MODULE ADDRESS	DIGITAL	INPUT
	7	UNUSED	DIGITAL	INPUT
	8	UNUSED	DIGITAL	OUTPUT
	9	UNUSED	DIGITAL	OUTPUT
	10	KEY SWITCH (IGNITION)	DIGITAL	INPUT
	11	UNUSED	DIGITAL	OUTPUT
	12	CONTACTOR DRIVER (MASTER)	PWM	OUTPUT
	13	WHEEL ENCODER PIN B	DIGITAL	INPUT
	14	WHEEL ENCODER PIN A	DIGITAL	INPUT
	15	STEERING ANGLE (MASTER)	ANALOG	INPUT
	16	CHARGER INTERLOCK (MASTER)	DIGITAL	INPUT
	17	UNUSED	DIGITAL	INPUT
	18	UNUSED	DIGITAL	INPUT
	19	UNUSED	DIGITAL	INPUT
	20	MODULE ADDRESS MSB	DIGITAL	INPUT
	21	UNUSED	DIGITAL	INPUT
	22	MOTOR THERMAL SENSOR	ANALOG	INPUT
	23	UNUSED	PWM	OUTPUT
	24	UNUSED	PWM	OUTPUT
	25	WHEEL ENCODER POWER (+5 VOLTS)	VOLTAGE	OUTPUT
	26	UNUSED	DIGITAL	OUTPUT
	27	CAN LOW	COMM	I/O
	28	CAN HIGH	COMM	I/O
	29	UNUSED	DIGITAL	INPUT
	30	UNUSED	ANALOG	INPUT
	31	UNUSED	DIGITAL	INPUT
	32	UNUSED	DIGITAL	INPUT
	33	UNUSED	DIGITAL	OUTPUT
	34	UNUSED	DIGITAL	OUTPUT
	35	MODULE ADDRESS LSB	DIGITAL	INPUT

MAE15400E

Figure 6-21. Traction Control Module

MAE15330

PLATFORM CONNECTION



MAE15420

GROUND CONTROL CONNECTION

Figure 6-22. Analyzer Connecting Points

6.6 OPERATOR CONTROLS AND SWITCHES

Ground Control Switches

The Ground Control Station has switches that allows the operator to start the engine and activate boom functions.

Table 6-7. Ground Control Switch Inputs

Switch	Function	Ground Module Input
Engine start and Aux/ Function Enable	Engine Start	J4-4
	Aux/Function Enable	J4-16
Swing	Left	J4-34
	Right	J4-35
Tower lift	Up	J4-10
	Down	J4-21
Lift	Up	J4-23
	Down	J4-33
Telescope	In	J4-7
	Out	J4-30
Jib lift	Up	J4-19
	Down	J4-8
Platform level	Up	J4-17
	Down	J4-5
Platform Rotate	Left	J4-6
	Right	J4-18
MSSO	MSSO	J12-8

Platform Control Switches

The Platform Control Station has switches which allow the operator to operate boom, engine, and drive functions.

PROPORTIONAL JOYSTICKS

Table 6-8. Platform Control Joystick Inputs

Switch	Function	Platform Module Input
Lift/Swing Joystick	Lift	J5-3
	Swing	J5-4
Drive/Steer Joystick	Drive	J6-3
	Steer Left	J6-5
	Steer Right	J6-6

TOGGLE SWITCHES

Table 6-9. Platform Control Switch Inputs

Switch	Function	Platform Module Input
Tower Lift	Up	J1-1
	Down	J1-2
Telescope	In	J1-5
	Out	J1-6
Jib Lift	Up	J1-11
	Down	J1-12
Platform Level	Up	J1-9
	Down	J1-10
Platform Rotate	Left	J1-B
	Right	J1-7
Engine Start and Aux Descent Enable	Engine start	J1-14
	Aux Descent Enable	J1-15
Drive Speed	Max Speed	J1-27
Drive Orientation Override	Drive Orientation Override	J2-4
Horn	Horn	J1-31
Genset Operation Enable (SPST)	Enabled (High)	J1-33
	Disabled	

6.7 CONTROL SYSTEM BOOM SWITCHES

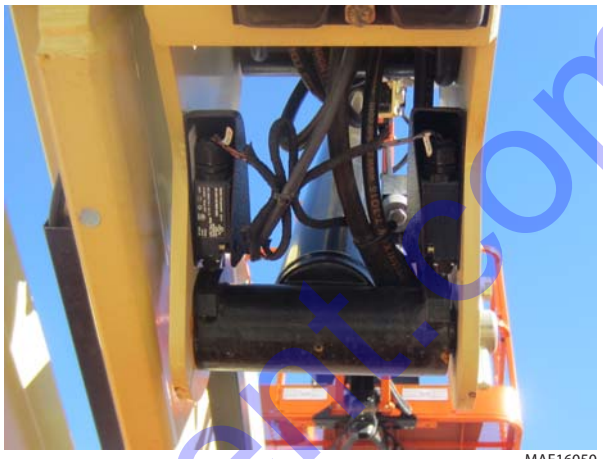
NOTE: *The machine is defined as being in transport mode if:*

Main boom lift is below elevation angle.
Main boom telescope is fully retracted.
Turntable swung so that the main boom is between the rear wheels.

The Boom Control System (BCS) uses a three switches to determine the position of the boom.

Tower Elevation and Boom Elevation Switch

MAE16040



MAE16050

The tower elevation or boom elevation switches are plunger type which senses when the boom has reached a particular point due to the ramp welded on the boom section.

6.8 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.

MAE15710

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

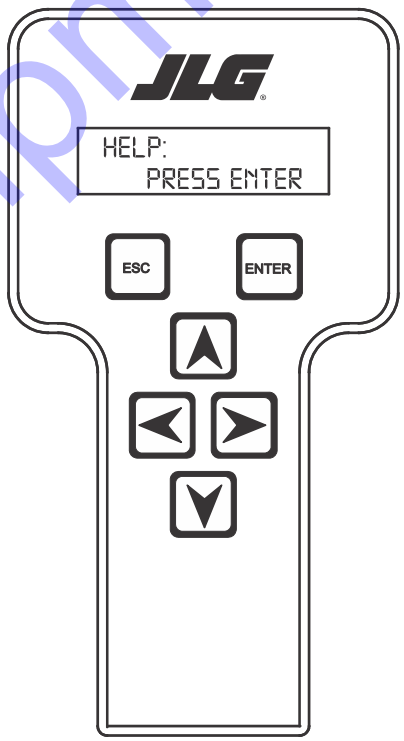
MAE15680

3. Before proceeding, ensure that the switches on the platform console are in the following positions:
   a. Drive speed dial is in the slow position. (Turtle Icon)
   b. Function speed potentiometer out of creep mode switch.
   c. Generator (if equipped) switched to the off position.
   d. Head and Tail lights (if equipped) switched to the off position.

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

MAE15700

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 6-23., 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).

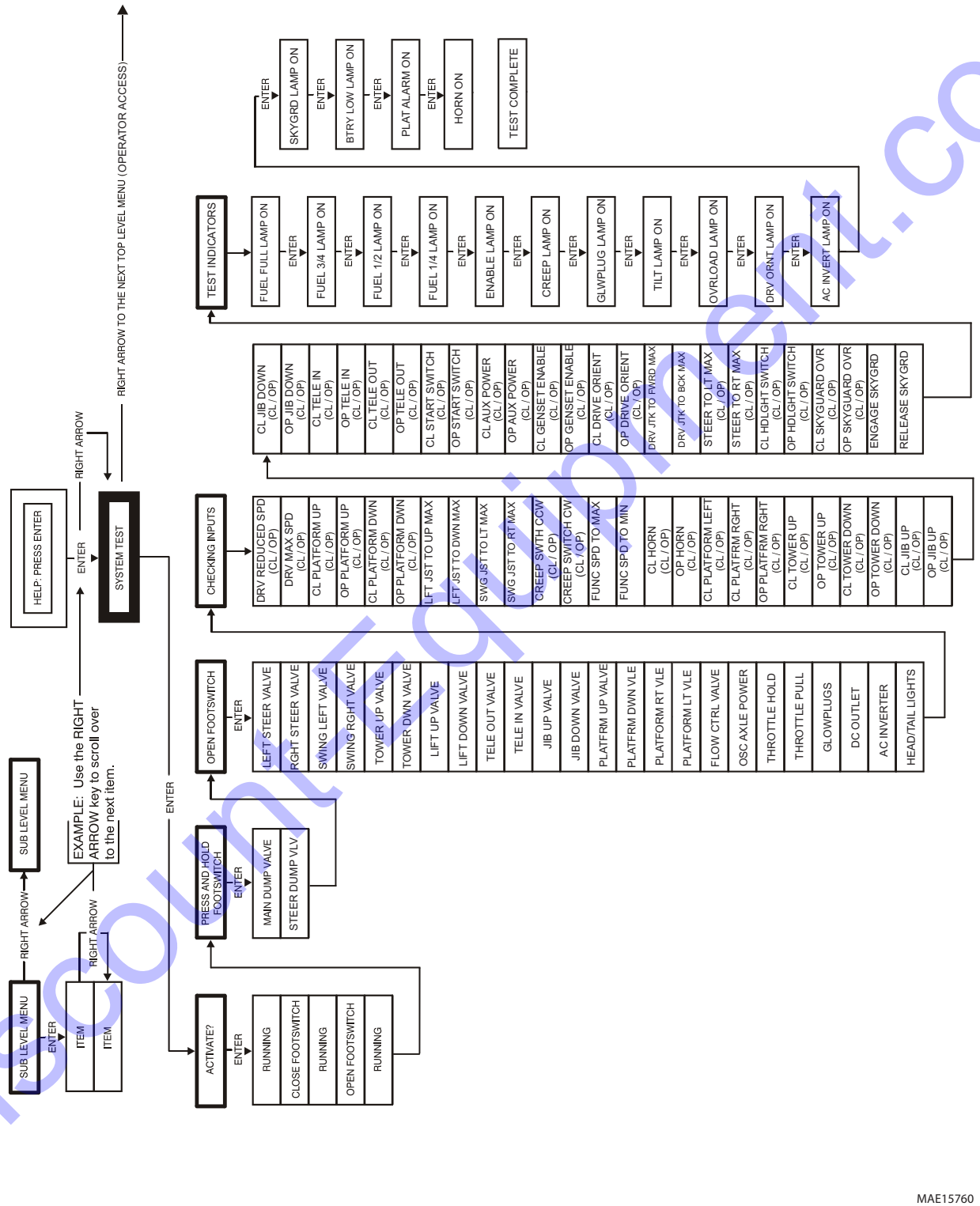


Figure 6-23. System Test Flow Chart- Platform Tests

Test from the Ground Station

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

MAE15710

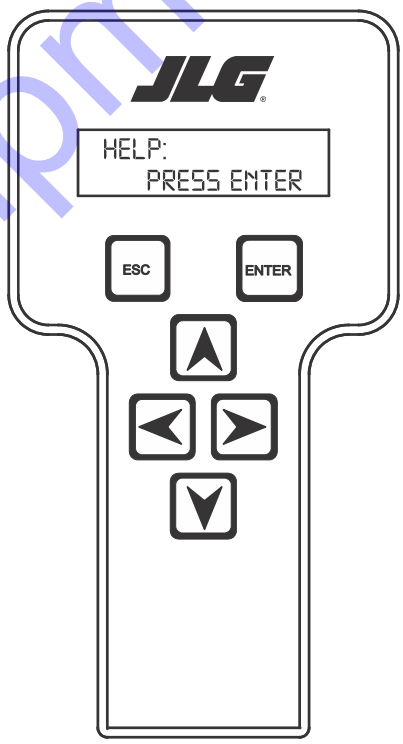
2. Plug the analyzer into the connector inside the Ground control box.

MAE15690

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

MAE15670

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 6-24., 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).

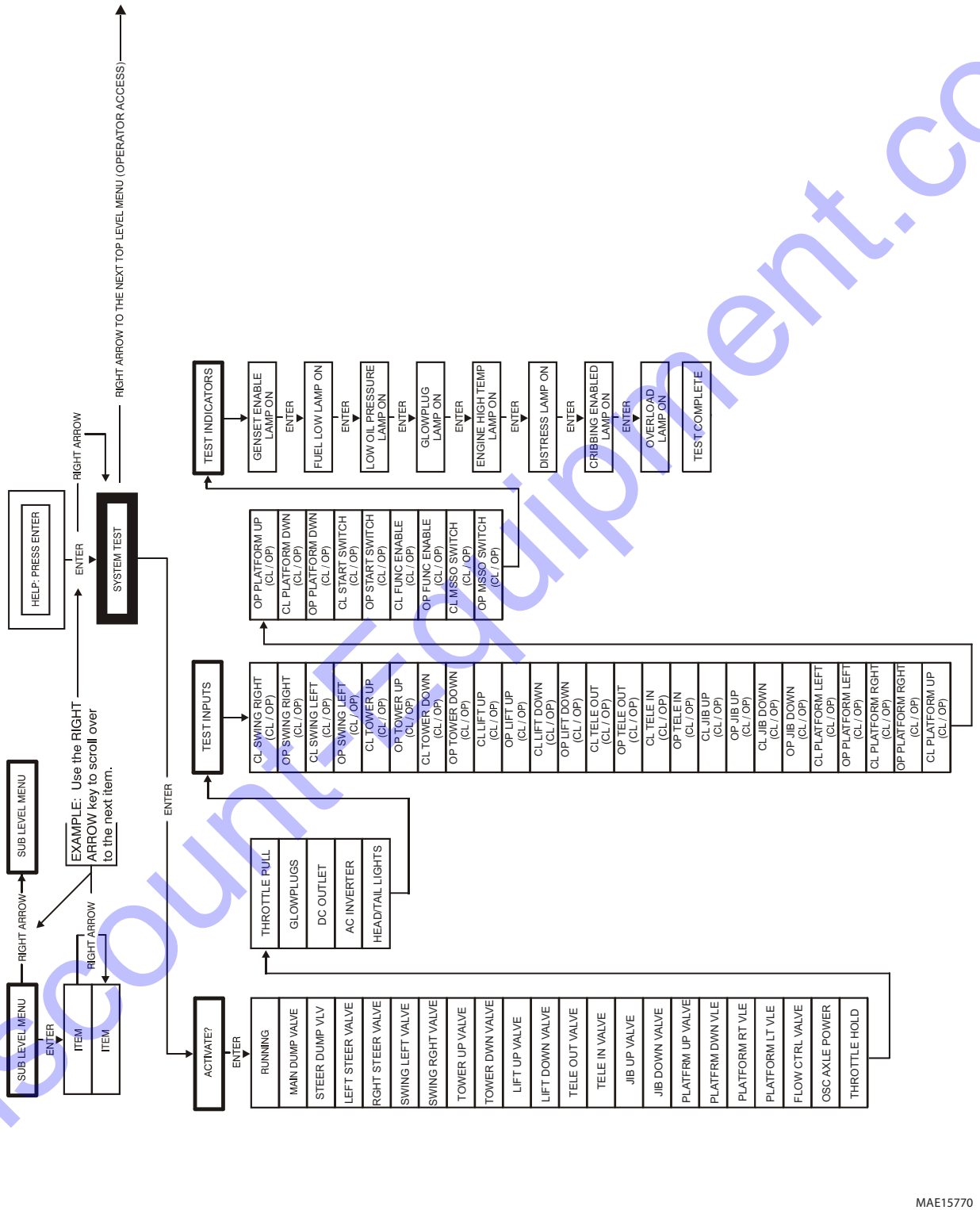


Figure 6-24. System Test Flow Chart- Ground Station Tests

Table 6-10. System Test Messages

Message Displayed on Analyzer	Message Displayed on Analyzer	Description
RUNNING		Initial display when system test is run while running certain "critical" checks are made.
	CHECK GROUND/ PLATFORM SELECT	The analyzer must be connected to the active control station to run the system test
	CHECK CAN WIRING	The system test cannot run unless the CAN Bus is operating properly
	BATTERY VOLTAGE TOO LOW	The system test cannot run with MTM-reported battery voltage below 39.5V (not UGM-compensated value)
	BATTERY VOLTAGE TOO HIGH	The system test cannot run with the MTM-reported battery voltage above 65V
	ENGINE RUNNING?	DTC LOSS OF ENGINE SPEED SENSOR (4322)
	CHECK SPEED	Reported vehicle speed must = 0 Hz (or mph)
	HIGH TILT ANGLE	The vehicle is tilted > 3° or the tilt sensor if faulty
	OPEN FOOTSWITCH	In platform mode, the footswitch must be open at the start of the test.
	CLOSE FOOTSWITCH	In platform mode, the operator must close the footswitch when this message is displayed
	BAD FOOTSWITCH	The two footswitch signals are not changing together, probably because one is open circuit. Check footswitch and wiring.
	OPEN FOOTSWITCH	In platform mode, the operator must open the footswitch when this message is displayed.
	PLATFORM OVERLOADED	Load Sensing is configured and the ground module considers the platform to be overloaded
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.

Table 6-10. System Test Messages

Message Displayed on Analyzer	Message Displayed on Analyzer	Description
TESTING LAMPS		Indicates that the lamps test is beginning. Each lamp is energized in turn; a prompt asks for confirmation that the lamp is lit. ENTER must be pressed or clicked to continue the test. NOTE: Lamps, which are not in use (due to the settings of machine digits), are not checked. NOTE: Platform Lamps are only tested in platform mode. NOTE: The GM overload lamp and 500# capacity lamp are not tested. NOTE: Head and tail lamps are tested in both platform and ground mode if enabled by a machine digit.
TESTING ALARMS		Indicates that the alarms test is beginning. Each alarm is energized in turn; a prompt asks for confirmation that the alarm is sounding.
		ENTER must be pressed or clicked to continue the test.
		NOTE: The platform alarm and the horn are only tested in platform mode.
		NOTE: The ground alarm is not tested if GROUND ALARM = NO.
TEST ALL INPUTS?		Prompts whether to check every operator input. If ESC is pressed or clicked, the system test ends. If ENTER is pressed or clicked, each operator input is prompted for in turn. In platform mode every platform switch and joystick is tested. In ground mode every ground switch is tested. NOTE: Tower lift switches are not tested if TOWER LIFT=NO. Tower telescope switches are not tested if TOWER TELE=NO. Jib switches are not tested if JIB = NO. Extendable axle switches are not tested if EXT AXLES=NO. Four wheel steer switches are not tested if 4WS=NO. NOTE: Left/right jib switches are not tested unless JIB = SIDESWING. Prompts displayed during the operator input test below messages.
	CLOSE XXXXXXX	The named switch should be closed.
	OPEN XXXXXXX	The named switch should be opened.
	XXXXXXX XXXXXXX TO MAX	The named joystick should be pushed to its full extent in the named direction.
	XXXXXXX XXXXXXX TO MIN	The named joystick should be returned to neutral from the named direction.
	PUMP POT TO MAX	The pump pot should be turned to maximum.
	PUMP POT TO MIN	The pump pot should be turned to minimum.
	MULTIPLE CLOSURE	More than one operator input is closed; if only one has been operated, there could be a short between two inputs.
TESTS COMPLETE		Indicates that the system test is complete. Any problems reported should have been noted and should now be rectified. Press ESC/CANCEL to return to the RUN SYSTEM TEST Analyzer menu.

Table 6-11. Machine Diagnostics Parameters

Diagnostics Submenu (Displayed on Analyzer 1st Line)	Parameter (Displayed on Analyzer 1st Line)	Parameter Value (Displayed on Analyzer 2nd Line)	Description
DRIVE/STEER (DISPLAY IN PLAT MODE ONLY)	DRIVE DEMAND	FORWARD/REVERSE XXX%	Direction and calibrated Control System Command percentage
	DRIVE OUTPUT	FORWARD/REVERSE XXX%	UGM direction and output speed command
	DRIVE MODE	MAX SPEED/REDUCED SPEED	Drive Mode status
	STEER DEMAND	LEFT/RIGHT XXX%	Direction and percentage of input command from Drive/Steer Joystick
	STEER OUT VALVE	LEFT/RIGHT/OFF	UGM directional valve output status
	STEER SENSOR	VOLTAGE XX.XXV	Steer sensor raw voltage reported by MTM; Platform Mode only
	STEER SENSOR	ANGLE XX.XDEG	Steer sensor angle reported by MTM; Platform Mode only
	PUMP SPEED CMD	XXX%	UGM pump command value: 0-100%
	PUMP CURRENT	FDBK: XXX.XA	DC Pump current reported from MTM
	DRV ORIENT TT SW	CLOSED-INLINE/OPEN-DOS	State of DOS switch (proxy energized when in line to close normally open contacts)
	DRV ORIENT STATE	CONFIRMED/REQUIRED	In Line and DOS Active = Confirmed
	DRV ORNT OVR SW	CLOSED/OPEN	State of Drive Orientation Override Switch
	CRIBBING MODE SW	CLOSED/OPEN	State of Cribbing Mode Switch; display only if MACHINE SETUP→ CRIBBING = YES
	CRIBBING MODE	DISABLED/ENABLED	Reflects state of Cribbing Mode Switch; display only if MACHINE SETUP→ CRIBBING = YES
BOOM FUNCTIONS	SWING DEMAND	LEFT/RIGHT XXX%	Direction and percentage of input command from Swing Joystick or Ground%
	SWING OUTPUT	LEFT/RIGHT XXX%	Direction and valve PWM output percentage
	SWING OUTPUT mA	LEFT/RIGHT XXXX mA	Direction and current output command
	SWING FDBK mA	XXXX mA	Current feedback measurement
	TWR LIFT DEMAND	UP/DOWN XXX%	Direction and percentage of input command from Function Speed Pot or Ground%
	TWR LIFT OUTPUT	UP/DOWN XXX%	Direction and valve PWM output percentage
	TWR LIFT OUT mA	UP/DOWN XXXX mA	Direction and current output command
	TWR LIFT FDBK mA	XXXX mA	Current feedback measurement
	LIFT DEMAND	UP/DOWN XXX%	Direction and percentage of Lift input command
	LIFT OUTPUT	UP/DOWN XXX%	Direction and valve PWM output percentage
	LIFT OUTPUT mA	UP/DOWN XXXX mA	Direction and current output command
	LIFT FDBK mA	XXXX mA	Current feedback measurement
	FLW CTRL OUT mA	XXXX mA	Flow Control current output command
	FLW CTRL FDBK mA	XXXX mA	Flow Control current feedback measurement
	TELE DEMAND	IN/OUT XXX%/CREEP	Direction and percentage of input command (or CREEP if applicable) from Function Speed Pot or Ground%
	TELE OUTPUT	IN/OUT/OFF	Direction/state of Tele directional valve

Diagnostics Submenu (Displayed on Analyzer 1st Line)	Parameter (Displayed on Analyzer 1st Line)	Parameter Value (Displayed on Analyzer 2nd Line)	Description
	JIB LIFT DEMAND	UP/DOWN XXX%/CREEP	Direction and percentage of input command (or CREEP if applicable) from Function Speed Pot or Ground%
	JIB LIFT OUTPUT	UP/OFF/DOWN XXX%	Direction for Up, but% command for Down
	PLAT LVL DEMAND	UP/DOWN XXX%/CREEP	Direction and percentage of input command (or CREEP if applicable) from Function Speed Pot or Ground%
	PLAT LVL OUTPUT	UP/DOWN XXX%	Direction/state of Level directional valve
	PLAT ROT DEMAND	LEFT/RIGHT XXX%/CREEP	Direction and percentage of input command (or CREEP if applicable) from Function Speed Pot or Ground%
	PLAT ROT OUTPUT	LEFT/RIGHT XXX%	Direction/state of Rotate directional valve
	LF PRS REL OUTPT	ON/OFF	Displays status of Low Flow Pressure Release Valve output
	PUMP SPEED CMD	XXX%	UGM pump command value: 0-100%
	PUMP SPEED FDBK	XXX%	Pump PWM reported from MTM
	PUMP CURRENT	FDBK: XXX.XA	Pump current reported from MTM
	PUMP ENABLE	ON/OFF	UGM pump enable bit status
	PUMP OPER MODE	OFF/RUNNING	Pump status from MTM
	FUNCTION SPEED	SETTING: XXX%	Displays the percentage demand from the Function Speed Potentiometer.
	CREEP SW	OPEN/CLOSED	Status of Creep Switch Input
	CREEP MODE	ON/OFF	Displays status of Creep Mode
SYSTEM	MAIN CONTACTOR	ENABLED/DISABLED	Status of Main Contactor reported by Zapi module
	MAIN CONT VOTE	ENABLED/DISABLED	Status of Main Contactor voting relay by UGM
	CHASSIS TILT	XX.XDEG	Combined X/Y Absolute Angle
	CHASSIS TILT	X-AXIS: XX.XDEG	X Angle with respect to sign
	CHASSIS TILT	Y-AXIS: XX.XDEG	Y Angle with respect to sign
	UGM TEMP	XXXC/XXXF	UGM on-board temperature measurement
	AMBIENT TEMP	XXXC/XXXF	Ambient Temperature sensor Reading; Display only if MACHINE SETUP → TEMP CUTOUT = YES
	LOW TEMPERATURE	CUTOUT: ACTIVE/INACTIVE/FAULTY	Status of Low Temperature Cutout; Only displayed if MACHINE SETUP→TEMP CUTOUT = YES
	MSSO	ACTIVE/INACTIVE	Status of MSSO; displayed only if MACHINE SETUP→ MARKET=CE and Operating Mode = Ground

Diagnostics Submenu (Displayed on Analyzer 1st Line)	Parameter (Displayed on Analyzer 1st Line)	Parameter Value (Displayed on Analyzer 2nd Line)	Description
SYSTEM INPUTS	OSC AXLE SW 1	UNKNOWN/OPEN/CLOSED	State of Oscillating Axle Switch #1; display UNKNOWN if BM ELEV SW = 1 OPEN or J1-7 Output = Off (H340AJ)
	OSC AXLE SW 2	UNKNOWN/OPEN/CLOSED	State of Oscillating Axle Switch #2; display UNKNOWN if BM ELEV SW = 2 OPEN or J1-7 Output = Off (H340AJ)
	OSC AXLE PRES SW	CLOSED/OPEN	Closed for High Pressure
	OSC AXLE PRES	HIGH/LOW	Pressure high if input = high
	TOWER ELEV SW	UNKNOWN/OPEN/CLOSED	State of Tower Elevation Switch; display UNKNOWN if J1-7 Output = Off (H340AJ)
	BM ELEV SW 1	UNKNOWN/OPEN/CLOSED	State of Boom Elevation Switch #1; display UNKNOWN if J1-7 Output = Off (H340AJ)
	BM ELEV SW 2	UNKNOWN/OPEN/CLOSED	State of Boom Elevation Switch #2; display UNKNOWN if J1-7 Output = Off (H340AJ)
	ELEVATION MODE	ABOVE/NOT ABOVE	Elevation State
	TRANSPORT MODE	IN TRANSPORT/OUT OF TRANSPORT	Transport Position
	CREEP SW	OPEN/CLOSED	Status of Creep Switch Input
	CREEP MODE	ON/OFF	Displays status of Creep Mode
	GROUND SELECT	KEYSWITCH: OPEN KEYSWITCH: CLOSED	Displays whether Ground Keyswitch position is being selected
	PLATFORM SELECT	KEYSWITCH: OPEN KEYSWITCH: CLOSED	Displays whether Platform Keyswitch position is being selected
	STATION CONTROL	GROUND/PLATFORM	Displays Active control station per System Mode definition
	FOOTSWITCH INPUT	GROUND: OPEN GROUND: CLOSED	State of Footswitch input at UGM
	FOOTSWITCH INPUT	PLATFORM: OPEN PLATFORM: CLOSED	State of Footswitch input at PM (closed when footswitch not activated)

Diagnostics Submenu (Displayed on Analyzer 1st Line)	Parameter (Displayed on Analyzer 1st Line)	Parameter Value (Displayed on Analyzer 2nd Line)	Description
ENGINE	START SW	OPEN/CLOSED	Display status of Start switch
	ENGINE state	STOPPED/CRANKING/STARTING/ RUNNING	Displays Engine State
	ENGINE SPEED	ACTUAL XXXXRPM	RPM reported by GenSet module
	ENGINE OIL PRESS	OK/LOW	Kubota reads > 7 PSI display OK, else LOW
	COOLANT TEMP	XXXC/XXXF	Degrees F or C displayed depending on Machine Setup Configuration
	GLOW PLUG	NOT ACTIVE/ACTIVE	Display diagnostic if glow plugs configured: MACHINE SETUP → GLOW PLUG ≠ NO GLOW PLUGS
	ALLOWED STARTER	CRANK TIME: XXs	MACHINE SETUP → MODEL = H340AJ and ENGINE = KUBOTA Z482
	FUEL PUMP	OFF/ON	Status of fuel pump
	THRTTLE OUT PULL	OFF/ON	Status of UGM output for throttle pull coil
	THRTTLE OUT HOLD	OFF/ON	Status of UGM output for throttle hold coil
	ENGINE FAN	OFF/ON	Status of engine fan
	ENGINE FAN PWM	XXX%	As reported by GenSet module
	ENGINE FAN CUR	XXA	DC current reported by GenSet module
	JUMP MODE	ENABLED/DISABLED	Status of Jump Mode
GENSET	GENSET ENABLE SW	OPEN/CLOSED	Display status of GenSet Enable Toggle Switch
	GENSET STATE	ENABLED/DISABLED	Displays GenSet State
	PHASE CURRENT	PHASE CURRENT XXXA	AC Phase current measure by GenSet module
	CHARGE CURRENT	SETPT XXXA	DC current set-point reported by GenSet module
	CHARGE VOLTAGE	SETPT XX.XV	DC voltage set-point reported by UGM
	GENSET MOD TEMP	TEMP XXXC/F	Module temperature reported by GenSet module
	GENERATOR TEMP	TEMP XXXC/F	Motor temperature reported by GenSet module
	BATTERY TEMP	TEMP XXXC/F	Battery temperature reported by GenSet module
	GENSET CONTACTOR	ENABLED/DISABLED	Status of GenSet Contactor reported by GenSet module
TRACTION	RT FRONT MOTOR	FREQ XXX Hz	Motor drive frequency reported by associated PM
	LT FRONT MOTOR	FREQ XXX Hz	Motor drive frequency reported by associated PM
	RT REAR MOTOR	FREQ XXX Hz	Motor drive frequency reported by associated PM
	LT REAR MOTOR	FREQ XXX Hz	Motor drive frequency reported by associated PM
	RT FRONT MOTOR	SPEED XXX RPM	Motor encoder speed reported by associated PM
	LT FRONT MOTOR	SPEED XXX RPM	Motor encoder speed reported by associated PM
	RT REAR MOTOR	SPEED XXX RPM	Motor encoder speed reported by associated PM
	LT REAR MOTOR	SPEED XXX RPM	Motor encoder speed reported by associated PM

Diagnostics Submenu (Displayed on Analyzer 1st Line)	Parameter (Displayed on Analyzer 1st Line)	Parameter Value (Displayed on Analyzer 2nd Line)	Description
	RT FRONT MOTOR	OFF/REGEN/DRIVE/MOTOR BRAKE/ PARKING BRAKE	Traction mode status as reported by associated PM
	LT FRONT MOTOR	OFF/REGEN/DRIVE/MOTOR BRAKE/ PARKING BRAKE	Traction mode status as reported by associated PM
	RT REAR MOTOR	OFF/REGEN/DRIVE/MOTOR BRAKE/ PARKING BRAKE	Traction mode status as reported by associated PM
	LT REAR MOTOR	OFF/REGEN/DRIVE/MOTOR BRAKE/ PARKING BRAKE	Traction mode status as reported by associated PM
	RT FRONT MOTOR	CURRENT XXXA	AC_{rms} Motor current reported by associated PM; display in Platform Mode only
	LT FRONT MOTOR	CURRENT XXXA	AC_{rms} Motor current reported by associated PM; display in Platform Mode only
	RT REAR MOTOR	CURRENT XXXA	AC_{rms} Motor current reported by associated PM; display in Platform Mode only
	LT REAR MOTOR	CURRENT XXXA	AC_{rms} Motor current reported by associated PM; display in Platform Mode only
	RT FRONT MOTOR	TEMP XXXC/F	Module temperature reported by PM; display in Platform Mode only
	LT FRONT MOTOR	TEMP XXXC/F	Module temperature reported by PM; display in Platform Mode only
	RT REAR MOTOR	TEMP XXXC/F	Module temperature reported by PM; display in Platform Mode only
	LT REAR MOTOR	TEMP XXXC/F	Module temperature reported by PM; display in Platform Mode only
	RT FRONT BRAKE	APPLIED/RELEASED	Brake status reported by associated PM
	LT FRONT BRAKE	APPLIED/RELEASED	Brake status reported by associated PM
	RT REAR BRAKE	APPLIED/RELEASED	Brake status reported by associated PM
	LT REAR BRAKE	APPLIED/RELEASED	Brake status reported by associated PM
	RT FRONT MODULE	TEMP XXXC/F	Module temperature reported by PM; display in Platform Mode only
	LT FRONT MODULE	TEMP XXXC/F	Module temperature reported by PM; display in Platform Mode only
	RT REAR MODULE	TEMP XXXC/F	Module temperature reported by PM; display in Platform Mode only
	LT REAR MODULE	TEMP XXXC/F	Module temperature reported by PM; display in Platform Mode only

Diagnostics Submenu (Displayed on Analyzer 1st Line)	Parameter (Displayed on Analyzer 1st Line)	Parameter Value (Displayed on Analyzer 2nd Line)	Description
VOLTAGE/CUR	BATTERY SOC	XXX% or DISCHARGED XXX% or DEEP DISCHARGED	UGM calculated battery State-of-Charge; display percentage and Discharged or Deeply Discharged and no percentage
	BATTERY VOLTAGE	XX.XV	UGM computed Vbat from MTM with compensation for voltage drop
	BATTERY CURRENT	XXX.XXXA	DC Current reported by Battery Current Sensor; capped at +/-400A.
	RT FRONT SYSTEM	VOLTAGE XX.XV	Real time system voltage reported by associated PM and compensated by UGM; not SOC
	LT FRONT SYSTEM	VOLTAGE XX.XV	Real time system voltage reported by associated PM and compensated by UGM; not SOC
	RT REAR SYSTEM	VOLTAGE XX.XV	Real time system voltage reported by associated PM and compensated by UGM; not SOC
	LT REAR SYSTEM	VOLTAGE XX.XV	Real time system voltage reported by associated PM and compensated by UGM; not SOC
	UGM CONTROL	VOLTAGE XX.XV	UGM measured system control voltage
	PLATFORM MODULE	VOLTAGE XX.XV	Platform Module reported battery voltage measurement
	AC CHARGER	CONNECTED/NOT CONNECTED	Reflect status of charger connectivity reported by MTM OR GenSet module as determined by UGM
	AC INVERTER SW	OPEN/CLOSED	Platform Generator Enable switch; only displayed if MACHINE SETUP → AC INVERTER ≠ NO
	AC INVERT ENABLE	OUTPUT: ON/OFF	UGM Inverter Relay Enable output; only displayed if MACHINE SETUP → AC INVERTER ≠ NO
	DC OUTPUT ENABLE	OUTPUT: ON/OFF	UGM DC Outlet Enable output; only displayed if MACHINE SETUP→ DC OUTLET ≠ NO
	CHASSIS FAN	OFF/ON	Status of chassis fan
	CHASSIS FAN PWM	XXX%	As reported by LR Power Module
	GENSET FAN	OFF/ON	Status of Genset Module fan
	GENSET FAN PWM	XXX%	As reported by RR Power Module

Diagnostics Submenu (Displayed on Analyzer 1st Line)	Parameter (Displayed on Analyzer 1st Line)	Parameter Value (Displayed on Analyzer 2nd Line)	Description
OPER CONTROLS	JOYSTICK DRIVE	FORWARD/REVERSE XXX%	Drive Joystick drive direction and command percentage as reported from PM if in Platform Mode
	JOYSTICK STEER	LEFT/RIGHT XXX%	Drive Joystick steer direction and percentage command as reported from PM if in Platform Mode
	JOYSTICK SWING	LEFT/RIGHT XXX%	Lift/Swing Joystick Swing direction and percentage command as reported from PM if in Platform Mode
	JOYSTICK LIFT	UP/DOWN XXX%	Lift/Swing Joystick Lift direction and percentage command as reported from PM if in Platform Mode
	DRV ORNT OVR SW	CLOSED/OPEN	State of Drive Orientation Override Switch if in Platform Mode
	GENSET ENABLE SW	OPEN/CLOSED	Status of Platform Toggle Switch Input if in Ground/Platform Mode
	START SWITCH	OPEN/CLOSED	Status of Ground/Platform Toggle Switch Input
	APU/AUX DESCENT SW	OPEN/CLOSED	Status of Ground/Platform Toggle Switch Input for Aux Descent
	SWING LEFT SW	OPEN/CLOSED	Status of Ground Toggle Switch Input if in Ground Mode
	SWING RIGHT SW	OPEN/CLOSED	Status of Ground Toggle Switch Input if in Ground Mode
	TOWER LIFT UP SW	OPEN/CLOSED	Status of Ground/Platform Toggle Switch Input (H340AJ)
	TOWER LIFT DN SW	OPEN/CLOSED	Status of Ground/Platform Toggle Switch Input (H340AJ)
	LIFT UP SW	OPEN/CLOSED	Status of Ground Toggle Switch Input if in Ground Mode
	LIFT DN SW	OPEN/CLOSED	Status of Ground Toggle Switch Input if in Ground Mode
	TELE IN SW	OPEN/CLOSED	Status of Ground/Platform Toggle Switch Input
	TELE OUT SW	OPEN/CLOSED	Status of Ground/Platform Toggle Switch Input
	JIB LIFT UP SW	OPEN/CLOSED	Status of Ground/Platform Toggle Switch Input
	JIB LIFT DN SW	OPEN/CLOSED	Status of Ground/Platform Toggle Switch Input
	PLAT LEVEL UP SW	OPEN/CLOSED	Status of Ground/Platform Toggle Switch Input
	PLAT LEVEL DN SW	OPEN/CLOSED	Status of Ground/Platform Toggle Switch Input
	PLAT ROT LEFT SW	OPEN/CLOSED	Status of Ground/Platform Toggle Switch Input
	PLAT ROT RGHT SW	OPEN/CLOSED	Status of Ground/Platform Toggle Switch Input
	MAX SPEED SW	OPEN/CLOSED	Status of Platform Toggle Switch Input if in Platform Mode
	MAX TORQUE SW	OPEN/CLOSED	Status of Platform Toggle Switch Input if in Platform Mode
	CREEP SW	OPEN/CLOSED	Status of Creep Switch Input if in Platform Mode
	HORN SW	OPEN/CLOSED	Status of Platform Switch Input if in Platform Mode
	H&T LIGHT SW	OPEN/CLOSED	Status of Platform Toggle Switch Input if in Platform Mode and MACHINE SETUP→H&T LIGHTS = YES
	SG OVERRIDE SW	OPEN/CLOSED	Status of Platform SkyGuard Override Switch Input if MACHINE SETUP →SKYGUARD = YES
	MSSO SW	OPEN/CLOSED	Status of MSSO switch; display only if MACHINE SETUP→ MARKET=CE and machine is in Ground mode

Diagnostics Submenu (Displayed on Analyzer 1st Line)	Parameter (Displayed on Analyzer 1st Line)	Parameter Value (Displayed on Analyzer 2nd Line)	Description
OPTIONS	H&T LIGHTS SW	OPEN/CLOSED	Only displayed if in Platform Mode and MACHINE SETUP→H&T LIGHTS = YES
	H&T LIGHTS OUT	ON/OFF	UGM Nite Brite Relay Enable output; only displayed if in Platform Mode and MACHINE SETUP→ H&T LIGHTS = YES
	SKYGUARD INPUTS	OPEN/CLOSED/DISAGREE	Displayed in Platform Mode and MACHINE SETUP→SKYGUARD ≠ NO. SkyGuard Input #1 (PLT J7-18) AND SkyGuard Input #2 (PLT J1-23) state.
	SKYGUARD INPUT 1	OPEN/CLOSED	Displayed in Platform Mode and MACHINE SETUP→SKYGUARD ≠ NO. State of SkyGuard Platform Input #1 (J7-18); relay NC contacts – closed when active
	SKYGUARD INPUT 2	OPEN/CLOSED	Displayed in Platform Mode and MACHINE SETUP →SKYGUARD ≠ NO. State of SkyGuard Platform Input #2 (J1-23); relay NC contacts – closed when active
	CONTROLLER FAN	OFF/ON	Status of controller fan; display only if MACHINE SETUP→ HIGH AMBIENT = YES
PLATFORM LOAD (DISPLAY ONLY IF MACHINE SETUP→ LOAD SYSTEM ≠ NO)	PLATFORM LOAD	STATE: OK/OVER LOAD	LSS Status
	PLATFORM LOAD	ACTUAL: XXX.XKG	Actual measured weight
	PLATFORM LOAD	GROSS: XXX.XKG	Combined weight of all cells; accounting for sign.
	PLATFORM LOAD	OFFSET: XXX.XKG	Tare weight of Platform Empty
	PLATFORM LOAD	ACC'Y XXX.XKG	Stored Accessory weight; visible only if Accessory recognized
	PLATFORM LOAD	CELL 1: XXX.XKG	Gross weight reading of Cell 1
	PLATFORM LOAD	CELL 2: XXX.XKG	Gross weight reading of Cell 2
	PLATFORM LOAD	CELL 3: XXX.XKG	Gross weight reading of Cell 3
	PLATFORM LOAD	CELL 4: XXX.XKG	Gross weight reading of Cell 4
CAN STATISTICS	CAN 1 STATISTICS	RX/SEC: XXX	
	CAN 1 STATISTICS	TX/SEC: XXX	
	CAN 1 STATISTICS	BUS OFF: XXX	
	CAN 1 STATISTICS	PASSIVE: XXX	
	CAN 1 STATISTICS	MSG ERROR: XXXX	
	CAN 2 STATISTICS	RX/SEC: XXX	
	CAN 2 STATISTICS	TX/SEC: XXX	
	CAN 2 STATISTICS	BUS OFF: XXX	
	CAN 2 STATISTICS	PASSIVE: XXX	
	CAN 2 STATISTICS	MSG ERROR: XXXX	

Diagnostics Submenu (Displayed on Analyzer 1st Line)	Parameter (Displayed on Analyzer 1st Line)	Parameter Value (Displayed on Analyzer 2nd Line)	Description
	DEBUG DIAG DIGITAL INPUTS	DIG IN J1-21 HIGH/LOW DIG IN J1-34 HIGH/LOW DIG IN J1-35 HIGH/LOW DIG IN J2-24 HIGH/LOW DIG IN J3-08 HIGH/LOW DIG IN J3-09 HIGH/LOW DIG IN J3-10 HIGH/LOW DIG IN J3-11 HIGH/LOW DIG IN J4-04 HIGH/LOW DIG IN J4-05 HIGH/LOW DIG IN J4-06 HIGH/LOW DIG IN J4-07 HIGH/LOW DIG IN J4-08 HIGH/LOW DIG IN J4-09 HIGH/LOW DIG IN J4-10 HIGH/LOW DIG IN J4-11 HIGH/LOW DIG IN J4-16 HIGH/LOW DIG IN J4-17 HIGH/LOW DIG IN J4-18 HIGH/LOW DIG IN J4-19 HIGH/LOW DIG IN J4-20 HIGH/LOW DIG IN J4-21 HIGH/LOW DIG IN J4-22 HIGH/LOW DIG IN J4-23 HIGH/LOW DIG IN J4-30 HIGH/LOW DIG IN J4-33 HIGH/LOW DIG IN J4-34 HIGH/LOW DIG IN J4-35 HIGH/LOW DIG IN J7-2 HIGH/LOW DIG IN J7-3 HIGH/LOW DIG IN J7-11 HIGH/LOW DIG IN J7-12 HIGH/LOW DIG IN J7-15 HIGH/LOW DIG IN J7-21 HIGH/LOW DIG IN J7-22 HIGH/LOW DIG IN J7-23 HIGH/LOW DIG IN J7-35 HIGH/LOW DIG IN J12-08 HIGH/LOW	Left and Right arrow keys scroll through the inputs. 1st Line = DIG IN JX.XX and 2nd Line displays measurement value

Diagnostics Submenu (Displayed on Analyzer 1st Line)	Parameter (Displayed on Analyzer 1st Line)	Parameter Value (Displayed on Analyzer 2nd Line)	Description
	DEBUG DIAG DIGITAL OUTPUTS	DIG OUT J1-02 ON/OFF DIG OUT J1-07 ON/OFF DIG OUT J1-11 ON/OFF DIG OUT J1-12 ON/OFF DIG OUT J1-13 ON/OFF DIG OUT J1-23 ON/OFF DIG OUT J1-32 ON/OFF DIG OUT J2-01 ON/OFF DIG OUT J2-02 ON/OFF DIG OUT J2-03 ON/OFF DIG OUT J2-04 ON/OFF DIG OUT J2-05 ON/OFF DIG OUT J2-07 ON/OFF DIG OUT J2-10 ON/OFFDIG OUT J2-12 ON/OFF DIG OUT J2-13 ON/OFF DIG OUT J2-15 ON/OFF DIG OUT J2-16 ON/OFF DIG OUT J2-21 ON/OFF DIG OUT J2-23 ON/OFF DIG OUT J2-32 ON/OFF DIG OUT J2-33 ON/OFF DIG OUT J4-01 ON/OFF DIG OUT J4-02 ON/OFF DIG OUT J4-03 ON/OFF DIG OUT J4-13 ON/OFF DIG OUT J4-14 ON/OFF DIG OUT J4-15 ON/OFF DIG OUT J4-26 ON/OFF DIG OUT J4-27 ON/OFF DIG OUT J4-28 ON/OFF DIG OUT J4-29 ON/OFF DIG OUT LED ON/OFF	Left and Right arrow keys scroll through the inputs. 1st Line = DIG OUT JX.XX and 2nd Line displays output value

Diagnostics Submenu (Displayed on Analyzer 1st Line)	Parameter (Displayed on Analyzer 1st Line)	Parameter Value (Displayed on Analyzer 2nd Line)	Description
DEBUG UGM I/O	DEBUG DIAG PWM OUTPUTS	PWM J1-01 XXX.XX% XXXHz PWM J1-03 XXX.XX% XXXHz PWM J1-06 XXX.XX% XXXHz PWM J1-10 XXX.XX% XXXHz PWM J1-20 XXX.XX% XXXHz PWM J1-22 XXX.XX% XXXHz PWM J2-08 XXX.XX% XXXHz PWM J2-09 XXX.XX% XXXHz PWM J2-11 XXX.XX% XXXHz PWM J2-19 XXX.XX% XXXHz PWM J2-20 XXX.XX% XXXHz PWM J2-22 XXX.XX% XXXHz PWM J2-26 XXX.XX% XXXHz PWM J2-27 XXX.XX% XXXHz PWM J2-31 XXX.XX% XXXHz PWM J2-34 XXX.XX% XXXHz PWM J2-35 XXX.XX% XXXHz FET J3-01 XXX.XX% XXXHz FET J3-02 XXX.XX% XXXHz FET J3-04 XXX.XX% XXXHz	Left and Right arrow keys scroll through the inputs. 1st Line = PWM JX.XX and 2nd Line displays output duty cycle and frequency.

Diagnostics Submenu (Displayed on Analyzer 1st Line)	Parameter (Displayed on Analyzer 1st Line)	Parameter Value (Displayed on Analyzer 2nd Line)	Description
		FET J3-05 XXX.XX% XXXHz FET J3-06 XXX.XX% XXXHz FET J3-14 XXX.XX% XXXHz PWM J4-12 XXX.XX% XXXHz	
	ANALOG INPUTS	ADC J1-14 XXXX ADC J1-15 XXXX ADC J2-25 XXXX ADC J3-13 XXXX ADC J7-2 XXXX ADC J7-04 XXXX ADC J7-07 XXXX ADC J7-08 XXXX ADC J7-20 XXXX ADC J8-02 XXXX	Left and Right arrow keys scroll through the inputs. 1st Line = ADC JX.XX and 2nd Line displays raw A/D counts XXXX of measurement
	FREQUENCY INPUTS	FREQ IN J1-16 XXXXX Hz FREQ IN J12-1 XXXXX Hz FREQ IN J12-2 XXXXX Hz	Left and Right arrow keys scroll through the inputs. 1st Line = FREQ IN JX.XX and 2nd Line displays frequency of measurement XXXXX Hz
CALIBRATION DATA	TILT X	X.XXDEGREES	Calibration X offset for mechanical mounting of Tilt 1
	TILT Y	X.XXDEGREES	Calibration Y offset for mechanical mounting of Tilt 1
	STEER RIGHT	XXXX COUNTS	Calibration value stored in UGM EEPROM for Steer Right Max
	STEER CENTER	XXXX COUNTS	Calibration value stored in UGM EEPROM for Steer Center position
	STEER LEFT	XXXX COUNTS	Calibration value stored in UGM EEPROM for Steer Left Max

Diagnostics Submenu (Displayed on Analyzer 1st Line)	Parameter (Displayed on Analyzer 1st Line)	Parameter Value (Displayed on Analyzer 2nd Line)	Description
DATALOG	DATALOG TIME	ON XXXXH XXM	*Controller On time
	DATALOG TIME	OPER XXXXH XXM	*Operating Hours - Incremented if ENABLD or ENGINE counters are active. Only incremented once if simultaneously active counters.
	DATALOG TIME	ENABLD XXXXH XXM	*Combined time for Machine Enabled in Platform Mode + any function active while in Ground Mode (excluding Emergency Descent)
	DATALOG TIME	ENGINE XXXXH XXM	*Engine Running time
	DATALOG TIME	PUMP XXXXH XXM	*Pump current reported by MTM > zero
	DATALOG TIME	DRIVE XXXXH XXM	Drive Forward + Reverse time
	DATALOG TIME	STEER XXXXH XXM	Steer Left + Right time
	DATALOG TIME	SWING XXXXH XXM	Swing Left + Right time
	DATALOG TIME	TOWER XXXXH XXM	Tower Up + Down time
	DATALOG TIME	LIFT XXXXH XXM	Lift Up + Down time
	DATALOG TIME	TELE XXXXH XXM	Tele In + Out time
	DATALOG TIME	JIB XXXXH XXM	Lift Up + Down time
	DATALOG TIME	LEVEL XXXXH XXM	Platform Level Up + Down time
	DATALOG TIME	ROTATE XXXXH XXM	Platform Rotate Left + Right time
	DATALOG CYCLES	DRVE FWD XXXXXXX	Number of times Drive Forward is commanded
	DATALOG CYCLES	DRVE REV XXXXXXX	Number of times Drive Reverse is commanded
	DATALOG CYCLES	STEER LT XXXXXXXX	Number of times Steer Left Output is commanded
	DATALOG CYCLES	STEER RT XXXXXXXX	Number of times Steer Right Output is commanded
	DATALOG CYCLES	SWING LT XXXXXXX	Number of times Swing Left output is commanded
	DATALOG CYCLES	SWING RT XXXXXXX	Number of times Swing Right output is commanded
	DATALOG CYCLES	TOWER UP XXXXXXX	Number of times Tower Up output is commanded (H340AJ)
	DATALOG CYCLES	TOWER DN XXXXXXX	Number of times Tower Down output is commanded (H340AJ)
	DATALOG CYCLES	LIFT UP XXXXXXX	Number of times Lift Up output is commanded
	DATALOG CYCLES	LIFT DN XXXXXXX	Number of times Lift Down output is commanded
	DATALOG CYCLES	TELE IN XXXXXXX	Number of times Tele In output is commanded
	DATALOG CYCLES	TELE OUT XXXXXXX	Number of times Tele Out output is commanded
	DATALOG CYCLES	JIB UP XXXXXXX	Number of times Jib Up is commanded (H340AJ)
	DATALOG CYCLES	JIB DOWN XXXXXXX	Number of times Jib Down is commanded (H340AJ)
	DATALOG CYCLES	LEVEL UP XXXXXXX	Number of times Level Up is commanded
	DATALOG CYCLES	LEVEL DN XXXXXXX	Number of times Level Down is commanded
	DATALOG CYCLES	ROT LEFT XXXXXXX	Number of times Rotate Left is commanded
	DATALOG CYCLES	ROT RGHT XXXXXXX	Number of times Rotate Right is commanded
	DATALOG CYCLES	ENG CRANK XXXXXXX	Number of times Engine State = Engine Cranking
	DATALOG CYCLES	UGM ON XXXXXXX	Number of times Power is applied
	DATALOG CYCLES	GND OPS XXXXXXX	Number of times machine is in Ground Mode and any function is active
	DATALOG CYCLES	PLAT OPS XXXXXXX	Number of times machine is Enabled from Platform Station

Diagnostics Submenu (Displayed on Analyzer 1st Line)	Parameter (Displayed on Analyzer 1st Line)	Parameter Value (Displayed on Analyzer 2nd Line)	Description
	DATALOG CYCLES	PUMP OPS XXXXXXX	Number of times pump current > zero, as reported by MTM
	DATALOG CYCLES	AC ON XXXXXXX	Number of times AC Inverter Relay is turned On; information logged and stored only if machine configured for AC Inverter.
	DATALOG CYCLES	B^+ DSCH XXXXXXX	Number of times UGM computes Battery SOC = Discharged
	DATALOG: ERASE	B^+ DSCH COUNTER?	Erases B^+ discharged counter
	DATALOG CYCLES	DEEP DSCH XXXXXXX	Number of times UGM computes Battery SOC = Deeply Discharged
	DATALOG: MAX	UGM TEMP XXXC/UGM TEMP XXXF	Hottest Temp observed by UGM
	DATALOG: MIN	UGM TEMP XXXC/ UGM TEMP XXXF	Coldest Temp observed by UGM
	DATALOG: MAX	UGM VOLT XX.XV	Maximum input voltage observed by UGM
	DATALOG: MACHINE	RENTAL XXXXH XXM	*Stores Operating Hours since last memory clear
	DATALOG: ERASE	MACHINE RENTAL?	Erases stored machine rental hours
VERSIONS:	UGM	SOFTWARE PX.X	Universal Ground Module Application Version
	UGM	CNST DATA PX.X	UGM Constant Data Version
	UGM	HARDWARE REV X	
	UGM	S/N XXXXXX	UGM Serial Number
	UGM	P/N XXXXXXXXXX	UGM Part Number
	PLATFORM MODULE	SOFTWARE PX.X	Platform Module Application Version
	PLATFORM MODULE	HARDWARE REV X	PM Hardware Revision
	RT FRONT MODULE	SOFTWARE PX.XX	Master Traction Module Application Version
	LT FRONT MODULE	SOFTWARE PX.XX	Slave Module Application Versions are the same as Master Traction Module
	RT REAR MODULE	SOFTWARE PX.XX	Slave Module Application Versions are the same as Master Traction Module
	LT REAR MODULE	SOFTWARE PX.XX	Slave Module Application Versions are the same as Master Traction Module
	GENSET MODULE	SOFTWARE PX.XX	Genset Module Application Version
	LSS MODULE	SOFTWARE PX.X	Load Sensing System Application Version; Displayed only if LSS is configured (MACHINE SETUP →LOAD SYSTEM ≠ NO)
	LSS MODULE	HARDWARE REV X	Load Sensing System Hardware Revision; Displayed only if LSS is configured (MACHINE SETUP→LOAD SYSTEM ≠ NO)
	TCU MODULE	SOFTWARE X.Xx	Telematics Control Unit Application Version; Displayed only if TCU is configured (MACHINE SETUP→CLEARSKY NO)
	TCU MODULE	HARDWARE REV X	Telematics Control Unit Hardware Revision; Displayed only if TCU is configured (MACHINE SETUP→CLEARSKY NO)
	TCU MODULE	S/N XXXXXX	Telematics Control Unit Serial Number; Displayed only if TCU is configured (MACHINE SETUP→ CLEARSKY NO)

6.9 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.

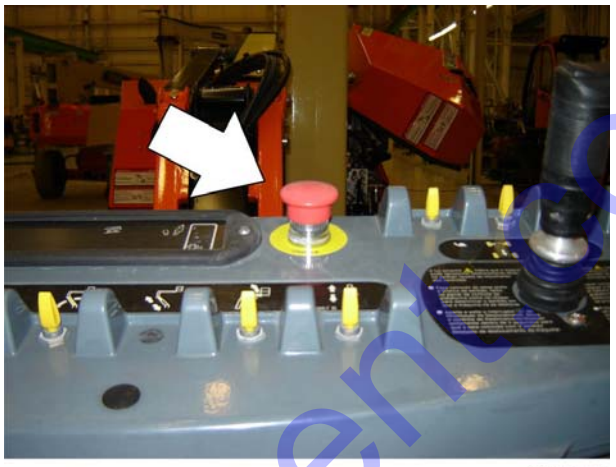
1. Position the Platform/Ground select switch to the Platform position.

MAE15710

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

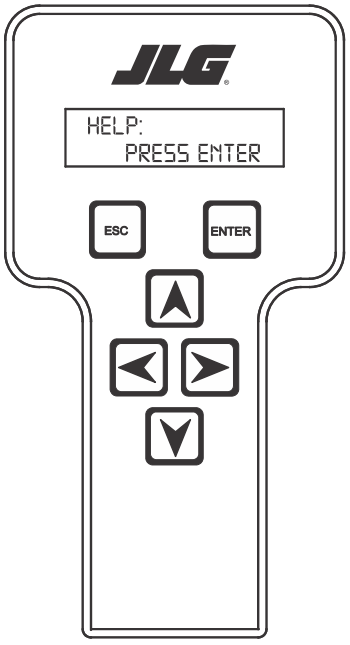
MAE15680

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

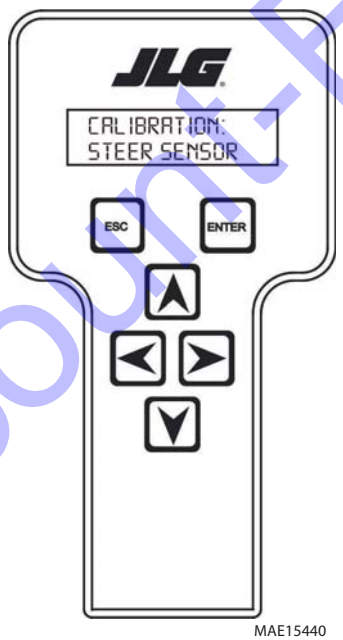


MAE15700

4. The analyzer screen should read:

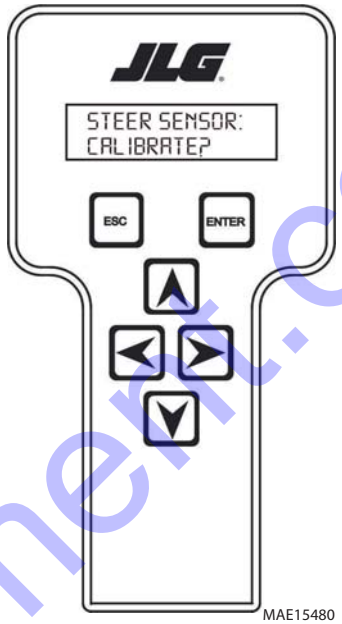


5. Use the arrow button to reach ACCESS LEVEL. Hit Enter.
6. Enter the Access Code, 33271.
7. Use the right Arrow key to reach CALIBRATIONS. Hit Enter.
8. Use the arrow keys to reach STEER SENSOR. The screen will read:



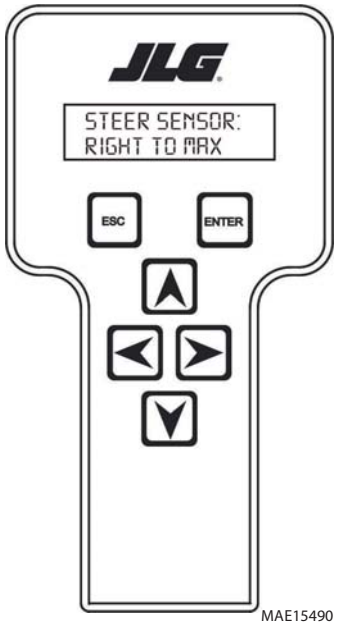
MAE15440

9. Hit Enter. The screen will read:



MAE15480

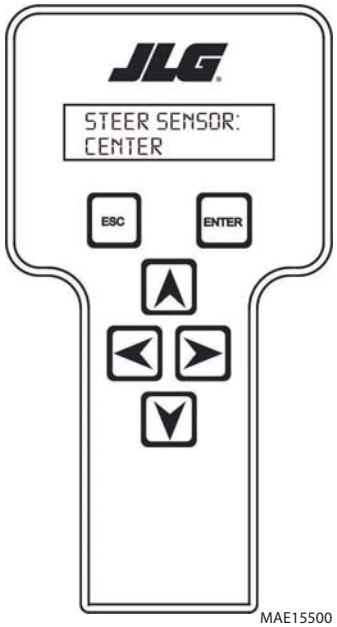
10. Hit Enter. The screen will read:



MAE15490

11. 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 Right Steer Maximum value.

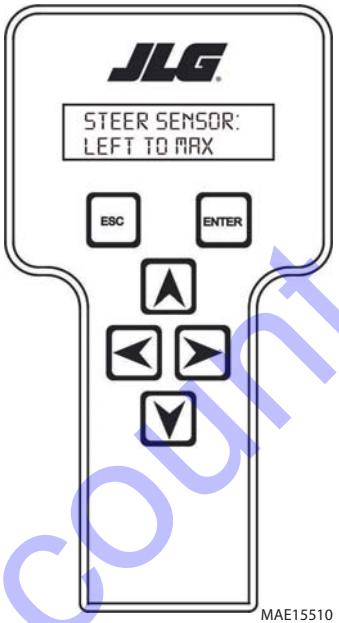
12. Hit Enter. The screen will read:



MAE15500

13. The display will read steering Center position value.

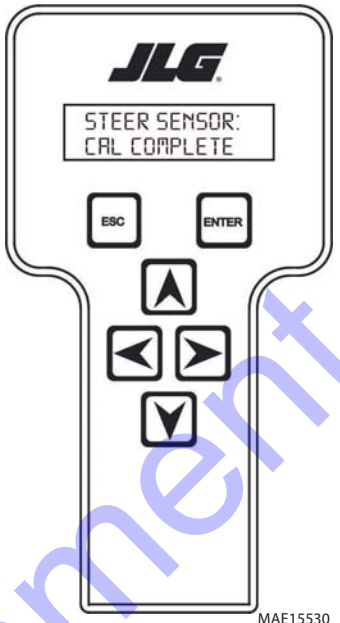
14. Hit Enter. The screen will read:



MAE15510

15. The display will read Left Steer Maximum value.

16. Hit Enter. The screen will read:



MAE15530

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

6.10 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.

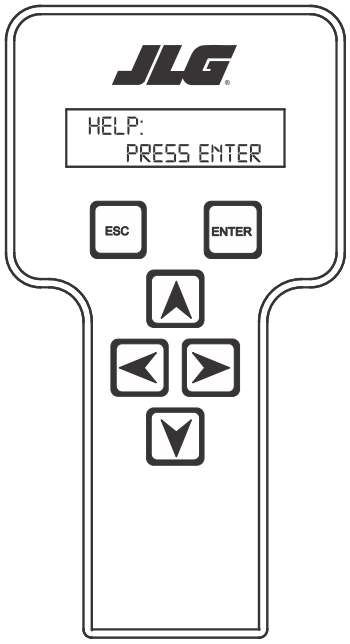
1. Use the following procedure to calibrate the tilt sensor.
2. Before the tilt sensor can be calibrated, the following conditions must be met:
   - **a.** Steering previously calibrated.
   - **b.** Wheels straight.
   - **c.** Turntable centered.
   - **d.** Boom fully retracted.
   - **e.** Boom angle is less than 45°.
   - **f.** Machine on firm, level ground.
3. Position the Platform/Ground select switch to the Platform position.

MAE15710

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

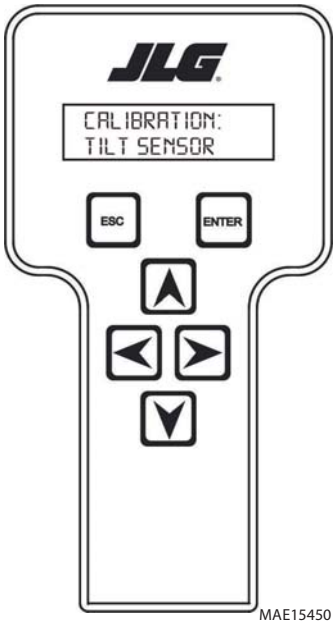
MAE15690

5. Pull out the Emergency Stop switch and Start the engine.
6. The analyzer screen should read:



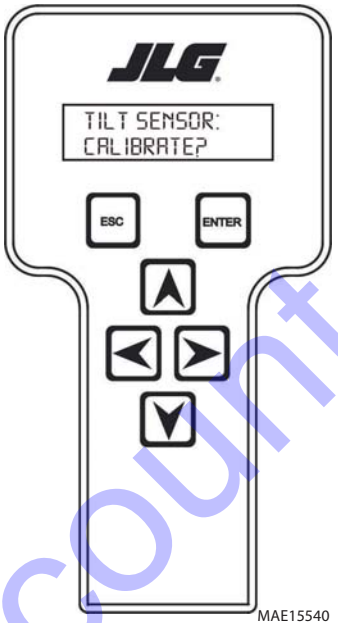
7. Use the arrow button to reach ACCESS LEVEL. Hit Enter.
8. Enter the Access Code, 33271.
9. Use the right Arrow key to reach CALIBRATIONS. Hit Enter.

10. Use the arrow keys to reach TILT SENSOR. The screen will read:



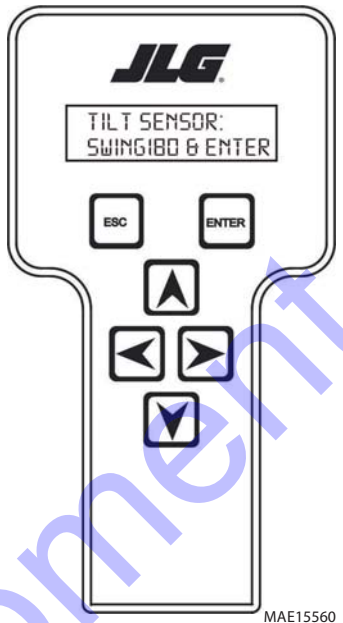
MAE15450

11. Hit Enter. The screen will read:



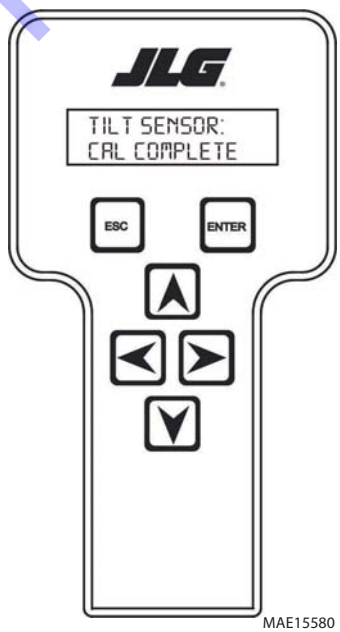
MAE15540

12. When prompted, swing turntable 180° to opposite end of chassis.



MAE15560

13. Hit Enter. The screen will read:



MAE15580

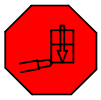
14. Upon completing swing calibration, swing turntable 180° back to the stowed position.

15. Hit ESC twice to go back to CALIBRATIONS.

6.11 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).

NOTICE

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.

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 6-12, Diagnostic Menu Descriptions details the structure of the Diagnostic Menu, and describes the meaning of each piece of information presented.

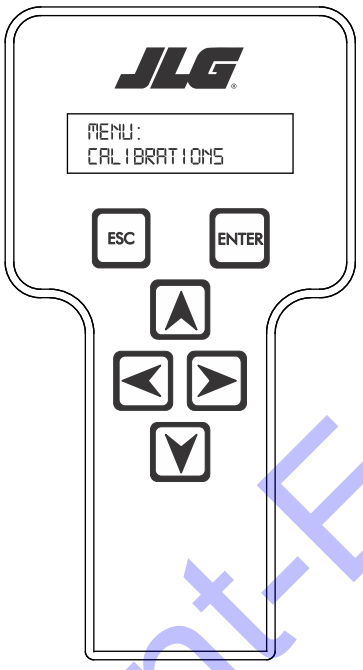
Table 6-12. Diagnostic Menu Descriptions

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

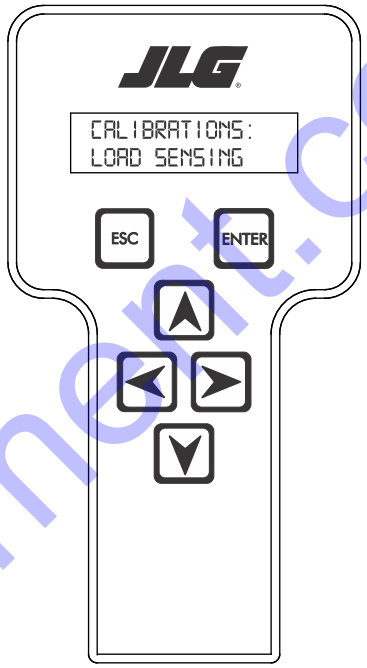
Calibration Procedure

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:

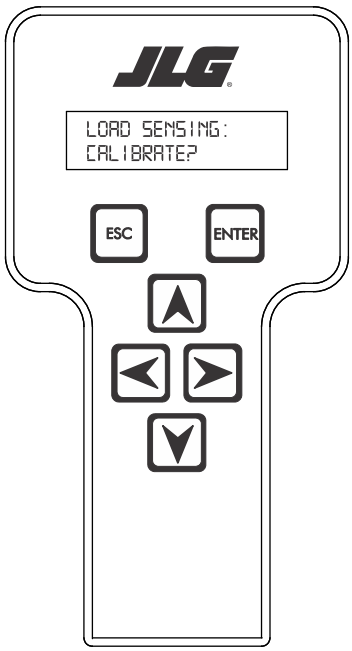


NOTE: *The Calibration Menu is not available in OPERATOR ACCESS.*

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



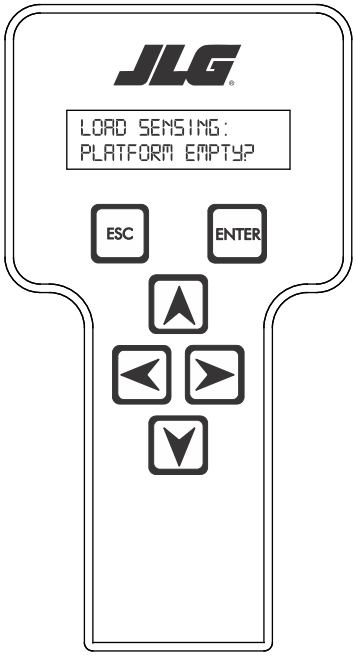
6. Press Enter . The Screen will read:



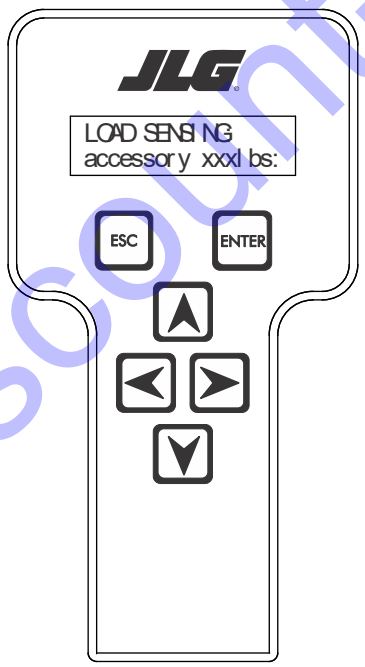
NOTE: *Calibration will auto fail if LSS DTC's are active (443, 444, 4479, 4480, 663, 821, 822, 823, 824, 8218, 8222 -> 8238, 991, 992, 993, 994 or 99285).*

Pressing the ESC key 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 . The analyzer screen will read:



8. If the platform is empty, press 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 6-13, Accessory Weights. Use the up and down analyzer keys to enter the accessory weight(s) (in lbs). When all the accessory weights are entered, press ENTER . The screen will read:

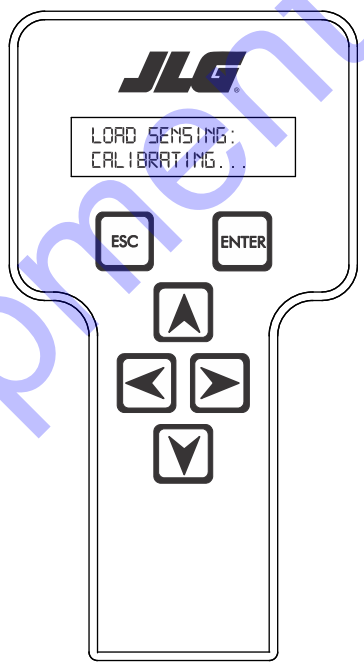


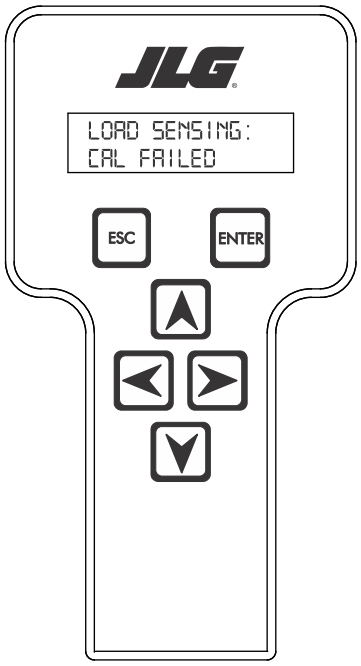
Table 6-13. Accessory Weights

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 SoftTouch	80 lb (36 kg)
Work Surface	20 lb (9 kg)

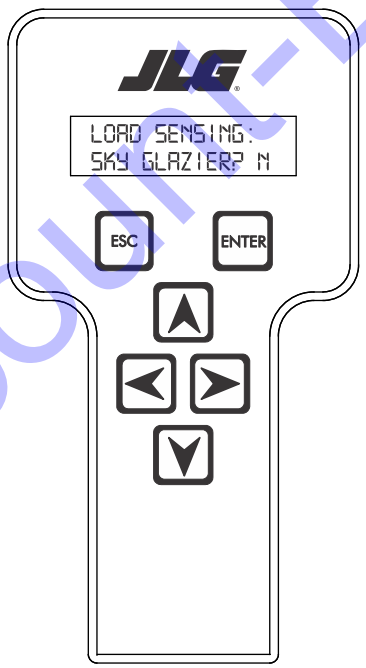
NOTE: *Not all Accessories are available on every JLG model. Some Accessory combinations are prohibited due to excessive weight and/or load restriction. If any installed JLG Accessories are labeled with weight decals but are not listed in the table above, include their weight when entering the ACC WEIGHT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

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

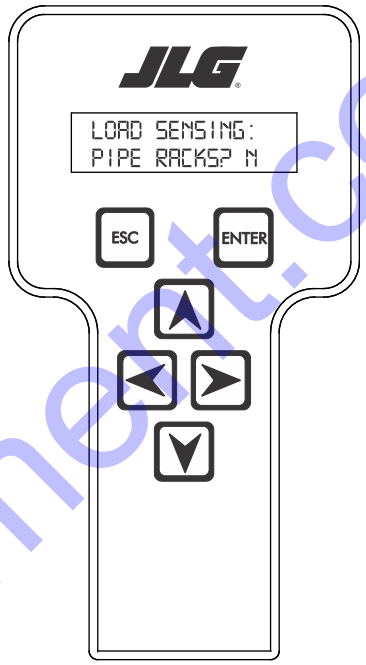
If the platform weight is not within the allowed range, the calibration attempt will be unsuccessful and the Analyzer will show the following:



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



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



12. Use the analyzer keys to select N for no or Y for yes. Press ENTER. The control system will default to an estimate of unrestricted capacity, which can be adjusted if necessary. Refer to Table 6-14, SkyGlazier Capacity Reductions and Table 6-15, Pipe Rack Capacity Reductions.

    The screen will read:

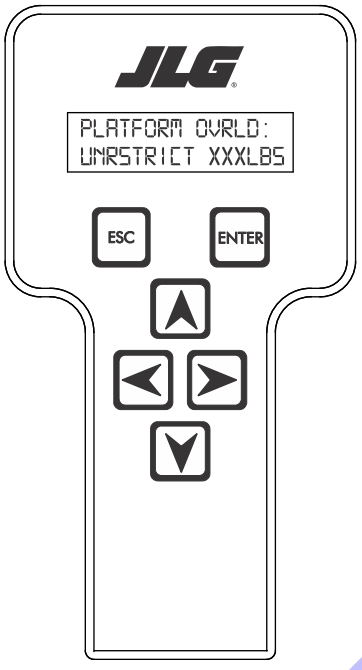


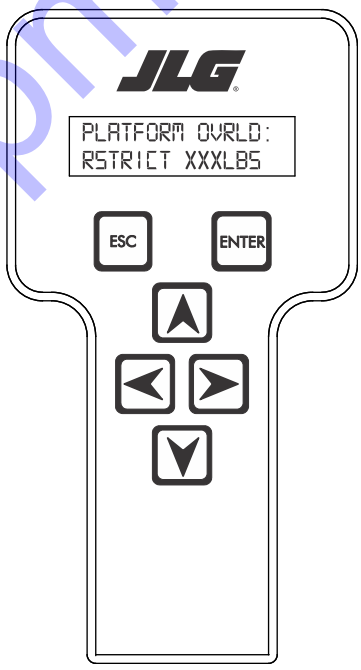
Table 6-14. SkyGlazier Capacity Reductions

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.		

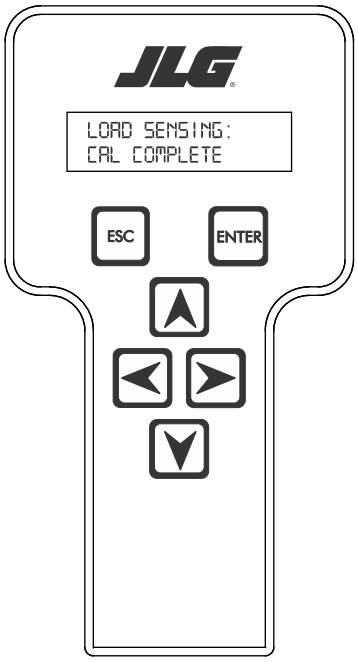
Table 6-15. Pipe Rack Capacity Reductions

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.		

13. Press ENTER. The following screen will be displayed for restricted capacity, which can be adjusted if necessary. Refer to Table 6-14, SkyGlazier Capacity Reductions and Table 6-15, Pipe Rack Capacity Reductions.



14. Press ENTER . If calibration is successful, the screen will read:



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 ±15lbs (± 7kg). Further, the reading should be stable and should not vary by more than ±2lbs (±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 500lbs (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).

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 6-16. LSS Troubleshooting Chart

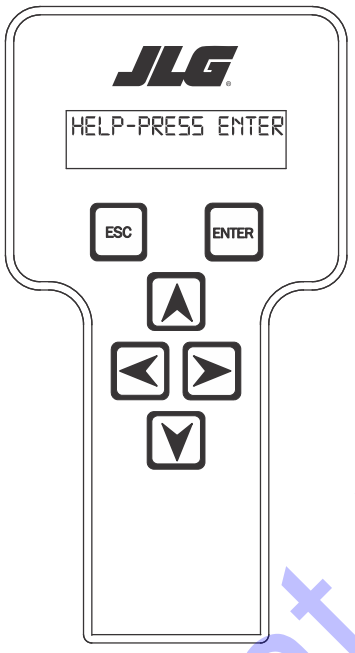
Difficulty	Possible Resolution
Empty Platform Weight (DIAGNOSTICS, PLATFORM LOAD) is not within ±15lbs (±7kg) of zero. or Platform Load readings (DIAGNOTICS, PLTLOAD) are unstable by more than ±2lbs (±1kg) (without the influence of vibration or wind). or There are large variations in Platform Load (DIAGNOSTICS, PLTLOAD) based on the location of the load. Tolerance to variations is 20lbs 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 ±2lbs (±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 (>6000lbs [>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.

6.12 RESETTING THE MSSO SYSTEM

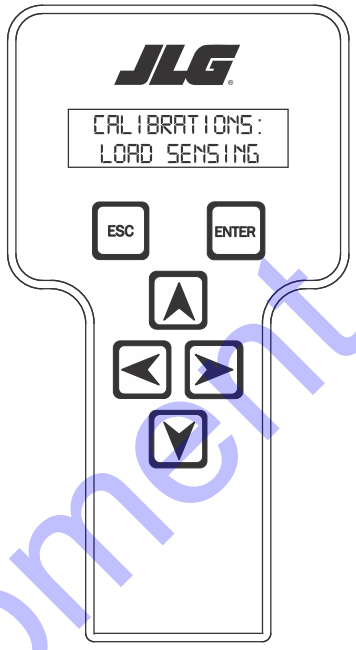
1. Use the following procedure to reset the MSSO system.
2. Position the Platform/Ground select switch to the desired position.
3. Plug the analyzer into the connector coming from the ground control module or from the platform console.

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:

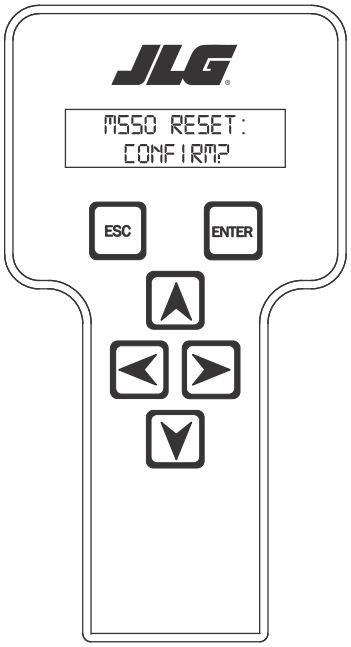


6. Use the arrow button to reach OPERATOR ACCESS. Press Enter ENTER.
7. Enter the Access Code, 33271.
8. Use the right Arrow key to reach MENU: CALIBRATIONS. Press Enter ENTER.
9. Use the arrow keys to reach the LOAD SENSING menu. The screen should read:



10. Press ENTER ENTER.
11. Use the Down arrow to reach MSSO RESET.

12. Press Enter (ENTER). The screen will read:



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.

Table 6-17. Diagnostic Trouble Codes

DTC	Help Message	Fault Condition/Trigger	Required Control Response or State Assignment	Conditions Required for Movement and/or to Clear Fault	Corrective Action
001	EVERYTHING OK	The UGM determines that platform station is selected and no system faults exist	No response required for this DTC		No response required for this DTC
002	GROUND MODE OK	The normal help message in Ground Mode. Displays on the analyzer only.	No response required for this DTC		No response required for this DTC
008	FUNCTIONS LOCKED OUT - SYSTEM POWERED DOWN	When conditions exist and time has expired.	UGM shall suspend all machine functions and disable all outputs, UGM shall command opening of Main Contactor and Genset Contactor. UGM shall display DTC on Analyzer and MDI and command MDI LED to blink. UGM shall prohibit engine start.	Power Cycled	Cycle power to clear the fault.
0010	RUNNING AT CUTBACK - OUT OF TRANSPORT POSITION	Machine is in the Out Of Transport Position Supress this DTC if DTC 008 is active.	UGM shall apply requirements in Drive/Steer Speed Reductions section	Machine is not Out of Transport	Lower boom into transport position
0011	FSW OPEN	Machine is in Platform Mode; Any of the following Platform inputs become active after power up, but before Machine Enabled: Drive joystick is not in the neutral position, SteerLift and/or Swing joystick is not in the neutral position; Tower Lift Telescope; Platform Level; Platform Rotate; Jib Lift (if MACHINE SETUP→ JIB = YES)	The UGM shall not Enable the Machine	Controls initialized	Release controls, Engage Footswitch and reactivate Drive/Steer and/or Boom function control
0012	RUNNING AT CREEP - CREEP SWITCH OPEN	Machine is in Platform Mode Platform creep switch input = HIGH Fault RUNNING AT CREEP – TILTED AND ABOVE ELEVATION (0013) is not active	The UGM shall limit the machine to Creep speed	Platform creep switch input = Low	Turn Platform creep switch off
0013	RUNNING AT CREEP - TILTED AND ABOVE ELEVATION	Machine is in Platform mode Machine is Above Elevation and Tilted MACHINE SETUP→ TILT (not + CUT)	UGM shall provide functionality	Not all of the trigger conditions are met; then non-Creep function speed permitted after controls initialized	Lower Machine and place on firm, level surface
0030	RUNNING AT CREEP – PLATFORM STOWED	Platform Stowed State = Set	Do not report DTC 8211; Lift Down and Level Down function speed maximums shall be limited to Ground Creep = [Platform ((Min) + 1.4* (Creep – Min))] while Platform Stowed State = Set.	Platform Stowed State = Cleared	Raise Platform from Stowed Position

DTC	Help Message	Fault Condition/Trigger	Required Control Response or State Assignment	Conditions Required for Movement and/or to Clear Fault	Corrective Action
0031	FUEL LEVEL LOW – ENGINE SHUTDOWN	Engine Shutdown has occurred due to Fuel Level = EMPTY condition.	Interlock requirements specified in Fuel Shutdown section.	Power Cycled	Add fuel to tank
0033	TRACTION MOTOR AT CURRENT LIMIT	Machine is in Platform Mode UGM detects that Traction Current reported by any Power Module > 270Arms for 15000ms; MTM or SPM will keep the Traction motor current below limit (280Arms@48V) but will not report fault	UGM shall limit Drive to Creep speed	Currents return to levels below trigger level for same time period as trigger; UGM shall remove Creep speed restriction after controls initialized	Check for damage on 3-phase cables from zapi module to drive motors. Replace if damaged. Verify proper operation of drive motors and zapi modules
0035	APU ACTIVE	Auxiliary Power/Emergency Descent Mode is active.	Operation specified in Auxiliary Power/Emergency Descent Mode	Auxiliary Power/Emergency Descent Mode is not active	Stop using Emergency Decent Mode
0036	FUNCTION PREVENTED - FUNCTION SELECTED BEFORE GROUND ENABLE	Machine is in Ground Mode; Any of the following Ground inputs become active after power up, but before Machine Enabled: Lift; Swing; Tower Lift Telescope; Platform Level; Platform Rotate; Jib Lift (if MACHINE SETUP→ JIB = YES)	The UGM shall not Enable the Machine	Controls initialized	Cycle power to clear the fault.
0039	SKYGUARD ACTIVE – FUNCTIONS CUTOUT	Machine is in Platform Mode and SkyGuard Enabled	Machine operation as specified in SkyGuard section	Not all of the triggers conditions are met	Cycle power to clear the fault.
211	POWER CYCLE	The normal help message is issued to designate the start of each power cycle in Analyzer Logged Help; new entry only recorded if new DTCs occurred since last power cycle	No special conditions required	No special conditions required	No response required for this DTC
212	KEYSWITCH FAULTY	UGM Ground Mode input J7-3 and UGM Platform Mode input J7-2 are both HIGH at the same time	The UGM assumes a station selection of Ground Mode	J7-3 or J7-2 = LOW	On Analyzer under DIAGONSTICS--> SYSTEM--> PLATFORM SELECT (and GROUND SELECT), activate Platform and Ground keyswitches to determine fault location: then trouble shoot wiring and/or keyswitch
213	FSW FAULTY	The ground footswitch input and platform footswitch input have been both HIGH or both LOW for greater than or equal to 1 second	Machine is not allowed to enter the Machine Enabled state	Power Cycled	Use the Emergency Stop Switch to cycle power
221	FUNCTION PROBLEM - HORN PERMANENTLY SELECTED	Machine in Platform Mode Subject switch input = High at Startup	UGM shall prohibit the Horn, but Ground and Platform Alarm permitted.	Horn switch input = LOW	Enable machine and on Analyzer under DIAGNOSTICS-->OPER CONTROLS --> HORN SW, observe Open and Closed commands: open Platform box and troubleshoot wiring or replace Horn switch.

DTC	Help Message	Fault Condition/Trigger	Required Control Response or State Assignment	Conditions Required for Movement and/or to Clear Fault	Corrective Action
224	FUNCTION PROBLEM - STEER LEFT PERMANENTLY SELECTED	Machine in Platform Mode Subject switch input = High at Startup	UGM prohibits Steer Left and Right; Drive speed limited to Creep	Function switch returns to neutral; steer permitted after remaining controls are initialized	Enable machine and on Analyzer under DIAGNOSTICS-->DRIVE/STEER --> STEERDEMAND, observe Steer Left and Right commands: open Platform box and troubleshoot wiring or replace joystick.
225	FUNCTION PROBLEM - STEER RIGHT PERMANENTLY SELECTED	Machine in Platform Mode Subject switch input = High at Startup	UGM prohibits Steer Left and Right; Drive speed limited to Creep	Function switch returns to neutral; steer permitted after remaining controls are initialized	Enable machine and on Analyzer under DIAGNOSTICS-->DRIVE/STEER --> STEERDEMAND, observe Steer Left and Right commands: open Platform box and troubleshoot wiring or replace joystick.
227	STEER SWITCHES FAULTY	Both steer switch inputs on the Drive/Steer joystick are High (detectable in Platform or Ground mode).	UGM prohibits Steer Left and Right; Drive speed limited to Creep	UGM detects that both steer switches are not active at the same time; steer and full Drive speed permitted after controls are initialized	Enable machine and on Analyzer under DIAGNOSTICS-->DRIVE/STEER --> STEERDEMAND, observe Steer Left and Right commands: open Platform box and troubleshoot wiring or replace joystick.
2211	FSW INTERLOCK TRIPPED	Machine is in Platform Mode. A Machine Enabled state has been active for greater than or equal to 7 seconds without activation of any drive, steer, or boom functions	The Machine Enabled state is disabled	The footswitch is released	Release the footswitch
2212	DRIVE LOCKED - JOYSTICK MOVED BEFORE FOOTSWITCH	The UGM detects one of the following conditions: The machine is in Platform Mode and the drive joystick is not in the neutral position immediately following Start Up. The machine is in Platform Mode and a proper machine enable signal is received or DTC 2213, 2221 or 2223 is active while the drive joystick is not in the neutral position.	If triggered by the drive joystick not being in the neutral position immediately following the startup period, then disable drive and steer. If triggered by a proper machine enable signal being received while the drive joystick is not in the neutral position, then do not allow the machine to enter the Machine Enabled state (7-second timer does not begin)	If triggered by the drive joystick not being in the neutral position immediately following Start Up, then when Drive joystick is returned to its neutral position and the machine is not in the Enabled state. If triggered by proper machine enable signal being received while the drive joystick is not in the neutral position then when the Drive joystick is returned to neutral or the footswitch is released	If caused by the drive joystick not being in the neutral position immediately following Start Up, then return Drive joystick to its neutral position before depressing footswitch If caused by the footswitch being depressed while the drive joystick si not in the neutral position then release the footswitch return the Drive joystick to neutral and depress the foootswitch again
2213	STEER LOCKED - SELECTED BEFORE FOOTSWITCH	The UGM detects that the machine is in Platform Mode and a proper machine enable signal is received or DTC 2212, 2221 or 2223 is active while the steer controls are not in the neutral position.	UGM shall prohibit the machine from entering the Machine Enabled state (7-second timer does not begin)	When the steer controls are returned to neutral or the footswitch is released	Steer controls are returned to neutral and the footswitch is released

DTC	Help Message	Fault Condition/Trigger	Required Control Response or State Assignment	Conditions Required for Movement and/or to Clear Fault	Corrective Action
2216	D/S JOY. OUT OF RANGE HIGH	The Platform Module detects that the drive or steer joystick signal voltage > 8.1V and reports the fault to the UGM.	UGM shall prohibit Drive; Steer still permitted.	The PM no longer reports the fault.	The Platform Module detects the voltage is in range and no longer reports the fault. Move joystick through range of motion and check voltage (should be approximately 0.7-6.3V)
2217	D/S JOY. CENTER TAP BAD	The Platform Module detects that the drive/steer center tap voltage is not between 3.31 volts and 3.75 volts and reports the fault to the UGM.	UGM shall prohibit Drive; Steer still permitted.	The PM detects that the drive/steer center tap voltage is between 3.31 and 3.75 volts and no longer reports the fault to the UGM.	The Platform Module detects the voltage is in range and no longer reports the fault.
2219	L/S JOY. OUT OF RANGE HIGH	The Platform Module detects that the Lift or Swing joystick signal voltage > 8.1V and reports the fault to the UGM.	UGM shall disable Lift and Swing in Platform Mode.	The PM no longer reports the fault.	The Platform Module no longer reports the fault.
2220	L/S JOY. CENTER TAP BAD	The Platform Module detects that the Lift or Swing center tap voltage is not between 3.31 volts and 3.75 volts and reports the fault to the UGM.	UGM shall disable Lift and Swing in Platform Mode.	The PM detects that the lift/swing center tap voltage is between 3.31 and 3.75 volts and no longer reports the fault to the UGM.	The Platform Module detects that the lift/swing center tap voltage is in range and no longer reports the fault.
2221	LIFT/SWING LOCKED - JOYSTICK MOVED BEFORE FOOTSWITCH	The UGM detects one of the following conditions: The machine is in Platform Mode and the Lift and/or Swing controls are not in the neutral position immediately following Start Up.	If fault occurs at startup, disable Lift and Swing in Platform Mode.	If triggered by the Lift/Swing controls not being in the neutral position immediately following Start Up, then when Lift/Swing controls are returned to neutral and the machine is not in the Enabled state.	Return Lift/Swing controls to neutral while not in the Enable state.
		The machine is in Platform Mode and a proper machine enable signal is received or DTC 2212, 2213 or 2223 is active while the Lift/Swing joystick is not in the neutral position.	If fault occurs by receipt of a proper enable signal, then machine is not permitted to enter the Machine Enabled state (7-second timer does not begin).	If triggered by proper machine enable signal being received while the Lift/Swing controls are not in the neutral position, then when the Lift/Swing controls are returned to neutral or the footswitch is released.	Return Lift/Swing controls to neutral and release the footswitch
2222	WAITING FOR FSW TO BE OPEN	Machine is in Platform Mode Footswitch has been engaged at Start Up	UGM shall prohibit the machine from entering the Machine Enabled state	Footswitch is disengaged	Release the footswitch
2223	FUNCTION SWITCHES LOCKED - SELECTED BEFORE ENABLE	The machine is in Platform Mode and a proper machine enable signal is received or DTC 2212, 2213 or 2221 is active while any of the following boom control inputs are engaged: Tower Lift Telescope Platform Level Platform Rotate Jib (if MACHINE SETUP→ JIB = YES)	Machine is not allowed to enter the Machine Enabled state (7-second timer does not begin)	None of the boom controls that trigger this fault are engaged or the Footswitch is disengaged.	Release engaged controls switch and then depress footswitch

DTC	Help Message	Fault Condition/Trigger	Required Control Response or State Assignment	Conditions Required for Movement and/or to Clear Fault	Corrective Action
2247	FUNCTION PROBLEM - PLATFORM ROTATE LEFT PERMANENTLY SELECTED	The machine is in Platform mode and the subject switch input = High at Startup	The UGM shall prohibit Platform Rotate Left and Right	Function switch returns to neutral and the machine is not in the Enabled state.	Release the footswitch and return the platform rotate switch to neutral. Actuate switch while monitoring state changes under appropriate menu in DIAGNOSTICS--> OPEN CONTROLS on Analyzer. Replace the switch if faulty.
2248	FUNCTION PROBLEM - PLATFORM ROTATE RIGHT PERMANENTLY SELECTED	The machine is in Platform mode and the subject switch input = High at Startup	The UGM shall prohibit Platform Rotate Left and Right	Function switch returns to neutral and the machine is not in the Enabled state.	Release the footswitch and return the platform rotate switch to neutral. Actuate switch while monitoring state changes under appropriate menu in DIAGNOSTICS--> OPEN CONTROLS on Analyzer. Replace the switch if faulty.
2249	FUNCTION PROBLEM - JIB LIFT UP PERMANENTLY SELECTED	If MACHINE SETUP→ JIB = YES and the machine is in Platform mode and the subject switch input = High at Startup	The UGM shall prohibit Jib Lift Up and Down	Function switch returns to neutral and the machine is not in the Enabled state.	Release the footswitch and return the platform jib switch to neutral. Actuate switch while monitoring state changes under appropriate menu in DIAGNOSTICS--> OPEN CONTROLS on Analyzer. Replace the switch if faulty.
2250	FUNCTION PROBLEM - JIB LIFT DOWN PERMANENTLY SELECTED	If MACHINE SETUP→ JIB = YES and the machine is in Platform mode and the subject switch input = High at Startup	The UGM shall prohibit Jib Lift Up and Down	Function switch returns to neutral and the machine is not in the Enabled state.	Release the footswitch and return the platform jib switch to neutral. Actuate switch while monitoring state changes under appropriate menu in DIAGNOSTICS--> OPEN CONTROLS on Analyzer. Replace the switch if faulty.
2251	FUNCTION PROBLEM - TELESCOPE IN PERMANENTLY SELECTED	The machine is in Platform mode and the subject switch input = High at Startup	The UGM shall prohibit Tele In and Out	Function switch returns to neutral and the machine is not in the Enabled state.	Release the footswitch and return the telescope switch to neutral. Actuate switch while monitoring state changes under appropriate menu in DIAGNOSTICS--> OPEN CONTROLS on Analyzer. Replace the switch if faulty.
2252	FUNCTION PROBLEM - TELESCOPE OUT PERMANENTLY SELECTED	The machine is in Platform mode and the subject switch input = High at Startup	The UGM shall prohibit Tele In and Out	Function switch returns to neutral and the machine is not in the Enabled state.	Release the footswitch and return the telescope switch to neutral. Replace the switch if faulty
2257	FUNCTION PROBLEM - TOWER LIFT UP PERMANENTLY SELECTED	The machine is in Platform mode and the subject switch input = High at Startup	The UGM shall prohibit Tower Lift Up and Down	Function switch returns to neutral and the machine is not in the Enabled state.	Release the footswitch and return the telescope switch to neutral. Actuate switch while monitoring state changes under appropriate menu in DIAGNOSTICS--> OPEN CONTROLS on Analyzer. Replace the switch if faulty.

DTC	Help Message	Fault Condition/Trigger	Required Control Response or State Assignment	Conditions Required for Movement and/or to Clear Fault	Corrective Action
2258	FUNCTION PROBLEM - TOWER LIFT DOWN PERMANENTLY SELECTED	The machine is in Platform mode and the subject switch input = High at Startup	The UGM shall prohibit Tower Lift Up and Down	Function switch returns to neutral and the machine is not in the Enabled state.	Release the footswitch and return the telescope switch to neutral. Actuate switch while monitoring state changes under appropriate menu in DIAGNOSTICS--> OPEN CONTROLS on Analyzer. Replace the switch if faulty.
2262	FUNCTION PROBLEM - PLATFORM LEVEL UP PERMANENTLY SELECTED	The machine is in Platform mode and the subject switch input = High at Startup	The UGM shall prohibit Platform Level Up and Down	Function switch returns to neutral and the machine is not in the Enabled state	Release the footswitch and return the platform level switch to neutral. Actuate switch while monitoring state changes under appropriate menu in DIAGNOSTICS--> OPEN CONTROLS on Analyzer. Replace the switch if faulty.
2263	FUNCTION PROBLEM - PLATFORM LEVEL DOWN PERMANENTLY SELECTED	The machine is in Platform mode and the subject switch input = High at Startup	The UGM shall prohibit Platform Level Up and Down	Function switch returns to neutral and the machine is not in the Enabled state	Release the footswitch and return the platform level switch to neutral. Actuate switch while monitoring state changes under appropriate menu in DIAGNOSTICS--> OPEN CONTROLS on Analyzer. Replace the switch if faulty.
2264	FUNCTION PROBLEM – DOS OVERRIDE PERMANENTLY SELECTED	The machine is in Platform mode and the subject switch input = High at Startup	No response required for this DTC	Function switch returns to neutral and the machine is not in the Enabled state	No response required for this DTC
2285	FUNCTION PROBLEM - START PERMANENTLY SELECTED	The machine is in Platform mode and the subject switch input = High at Startup	UGM prohibits Engine Start functionality	Function switch returns to neutral	Enable machine and on Analyzer under DIAGNOSTICS-->OPER CONTROLS--> START SWITCH, observe Open and Closed commands: open Platform box and troubleshoot wiring or replace Start switch.
2286	FUNCTION PROBLEM - SOFT TOUCH / SKYGUARD OVERRIDE PERMANENTLY SELECTED	[(MACHINE SETUP→ SKYGUARD = YES) Machine is in Platform Mode; The Soft Touch / SkyGuard Override switch input = High at Startup	No response required for this DTC	The Soft Touch / SkyGuard Override switch input = Low	Check that switch functions open and closed as expected
234	FUNCTION SWITCHES FAULTY - CHECK DIAGNOSTICS/BOOM	The UGM detects one of the following conditions (continuous monitoring): The machine is in Ground Mode and both direction inputs of the following boom controls are engaged at the same time: Engine Start/Aux, Telescope, Platform Level, Platform Rotate, Jib Lift if MACHINE SETUP→ JIB = YES, Tower Lift, Lift, or Swing. The machine is in Platform Mode and both direction inputs of the following boom controls are engaged at the same time: Engine Start/Aux, Telescope, Platform Level, Platform Rotate, Jib Lift if MACHINE SETUP→ JIB = YES, Tower Lift.	Disable whichever boom functions whose boom control inputs are triggering the fault. If Engine Start/Aux at fault, disable Manual Engine Start but permit Auxiliary Power/Emergency Descent.	None of the boom controls that trigger this fault have both of their direction inputs engaged at the same time	Check the switch for the applicable function. Actuate switch while monitoring state changes under appropriate menu in DIAGNOSTICS--> OPER CONTROLS on Analyzer, Replace if faulty.

DTC	Help Message	Fault Condition/Trigger	Required Control Response or State Assignment	Conditions Required for Movement and/or to Clear Fault	Corrective Action
235	FUNCTION SWITCHES LOCKED - SELECTED BEFORE AUX POWER	The UGM detects one of the following conditions: The machine is in Ground Mode and the ground APU/Function Enable switch becomes engaged while a Ground control input is already engaged. The machine is in Platform Mode and the platform APU/Auxiliary Descent switch becomes engaged while a Platform control input is already engaged.	Disable Auxiliary Power/ Emergency Descent Mode	The applicable APU/Auxiliary Descent switch is disengaged or all applicable control inputs become disengaged	Release all functions switches. Activate the Auxiliary Decent switch before any other applicable control switches or start the engine.
2310	FUNCTION PROBLEM - GROUND ENABLE PERMANENTLY SELECTED	The machine is in Ground mode and the subject switch input = High at Startup	UGM shall suspend all machine functions and disable all outputs. In Ground Mode, UGM shall prohibit the Enabled state, except through MSSO.	Enable switch = LOW; Enable permitted after controls initialized	Return the switch to the off position. View switch state on Analyzer under DIAGNOSTICS--> OPER CONTROLS--> AUX DESCENT SW. Replace the switch if defective
2370	FUNCTION PROBLEM - JIB LIFT UP PERMANENTLY SELECTED	If MACHINE SETUP→ JIB = YES and the machine is in Ground mode and the subject switch input = High at Start Up	Jib Lift Up and Down prohibited.	Function switch returns to neutral and the machine is not in the Enabled state.	With the machine controls not enable, return the Jib Lift switch to neutral. Actuate switch while monitoring state changes under appropriate menu in DIAGNOSTICS--> OPER CONTROLS on Analyzer. Replace the switch if defective
2371	FUNCTION PROBLEM - JIB LIFT DOWN PERMANENTLY SELECTED	If MACHINE SETUP→ JIB = YES and the machine is in Ground mode and the subject switch input = High at Start Up	Jib Lift Up and Down prohibited.	Function switch returns to neutral and the machine is not in the Enabled state.	With the machine controls not enable, return the Jib Lift switch to neutral. Actuate switch while monitoring state changes under appropriate menu in DIAGNOSTICS--> OPER CONTROLS on Analyzer. Replace the switch if defective
2372	FUNCTION PROBLEM - SWING LEFT PERMANENTLY SELECTED	The machine is in Ground mode and the subject switch input = High at Start Up	In Ground Mode, UGM shall prohibit Swing functionality	Function switch returns to neutral and the machine is not in the Enabled state.	With the machine controls not enable, return the Swing switch to neutral. Actuate switch while monitoring state changes under appropriate menu in DIAGNOSTICS--> OPER CONTROLS on Analyzer. Replace the switch if defective
2373	FUNCTION PROBLEM - SWING RIGHT PERMANENTLY SELECTED	The machine is in Ground mode and the subject switch input = High at Start Up	In Ground Mode, UGM shall prohibit Swing functionality	Function switch returns to neutral and the machine is not in the Enabled state.	With the machine controls not enable, return the Swing switch to neutral. Actuate switch while monitoring state changes under appropriate menu in DIAGNOSTICS--> OPER CONTROLS on Analyzer. Replace the switch if defective
23104	BOOM TRANSPORT SWITCH DISAGREEMENT	The UGM detects that Boom Elevation switch #1 and switch #2 are not reporting congruent switch states, as defined in the Boom Elevation Switch Evaluation section.	UGM to assume Above Elevation State and deenergize J1-7 Oscillating Axle digital output.	Power Cycled	Verify that two boom angle switches are adjusted to actuate simultaneously. Cycle Power.

DTC	Help Message	Fault Condition/Trigger	Required Control Response or State Assignment	Conditions Required for Movement and/or to Clear Fault	Corrective Action
23105	FUNCTION PROBLEM – TOWER LIFT UP PERMANENTLY SELECTED	The machine is in Ground mode and the subject switch input = High at Start Up	UGM shall prohibit Tower Lift Up and Down.	Function switch returns to neutral and the machine is not in the Enabled state.	With the machine controls not enable, return the Tower Lift switch to neutral. Actuate switch while monitoring state changes under appropriate menu in DIAGNOSTICS--> OPER CONTROLS on Analyzer. Replace the switch if defective
23106	FUNCTION PROBLEM – TOWER LIFT DOWN PERMANENTLY SELECTED	The machine is in Ground mode and the subject switch input = High at Start Up	UGM shall prohibit Tower Lift Up and Down.	Function switch returns to neutral and the machine is not in the Enabled state.	With the machine controls not enable, return the Tower Lift switch to neutral. Actuate switch while monitoring state changes under appropriate menu in DIAGNOSTICS--> OPER CONTROLS on Analyzer. Replace the switch if defective
23107	FUNCTION PROBLEM - LIFT UP PERMANENTLY SELECTED	The machine is in Ground mode and the subject switch input = High at Start Up	UGM shall prohibit Lift Up and Down prohibited.	Function switch returns to neutral and the machine is not in the Enabled state.	With the machine controls not enable, return the Lift switch to neutral. Actuate switch while monitoring state changes under appropriate menu in DIAGNOSTICS--> OPER CONTROLS on Analyzer. Replace the switch if defective
23108	FUNCTION PROBLEM - LIFT DOWN PERMANENTLY SELECTED	The machine is in Ground mode and the subject switch input = High at Start Up	UGM shall prohibit Lift Up and Down.	Function switch returns to neutral and the machine is not in the Enabled state.	With the machine controls not enable, return the Lift switch to neutral. Actuate switch while monitoring state changes under appropriate menu in DIAGNOSTICS--> OPER CONTROLS on Analyzer. Replace the switch if defective
23109	FUNCTION PROBLEM - TELESCOPE IN PERMANENTLY SELECTED	The machine is in Ground mode and the subject switch input = High at Start Up	UGM shall prohibit Tele In and Out	Function switch returns to neutral and the machine is not in the Enabled state.	With the machine controls not enable, return the Lift switch to neutral. Actuate switch while monitoring state changes under appropriate menu in DIAGNOSTICS--> OPER CONTROLS on Analyzer. Replace the switch if defective
23110	FUNCTION PROBLEM - TELESCOPE OUT PERMANENTLY SELECTED	The machine is in Ground mode and the subject switch input = High at Start Up	UGM shall prohibit Tele In and Out	Function switch returns to neutral and the machine is not in the Enabled state.	With the machine controls not enable, return the Lift switch to neutral. Actuate switch while monitoring state changes under appropriate menu in DIAGNOSTICS--> OPER CONTROLS on Analyzer. Replace the switch if defective

DTC	Help Message	Fault Condition/Trigger	Required Control Response or State Assignment	Conditions Required for Movement and/or to Clear Fault	Corrective Action
23111	FUNCTION PROBLEM - PLATFORM LEVEL UP PERMANENTLY SELECTED	The machine is in Ground mode and the subject switch input = High at Start Up	UGM shall prohibit Platform Level Up and Down.	Function switch returns to neutral and the machine is not in the Enabled state.	With the machine controls not enable, return the Lift switch to neutral. Actuate switch while monitoring state changes under appropriate menu in DIAGNOSTICS--> OPER CONTROLS on Analyzer. Replace the switch if defective
23112	FUNCTION PROBLEM - PLATFORM LEVEL DOWN PERMANENTLY SELECTED	The machine is in Ground mode and the subject switch input = High at Start Up	UGM shall prohibit Platform Level Up and Down.	Function switch returns to neutral and the machine is not in the Enabled state.	With the machine controls not enable, return the Lift switch to neutral. Actuate switch while monitoring state changes under appropriate menu in DIAGNOSTICS--> OPER CONTROLS on Analyzer. Replace the switch if defective
23113	FUNCTION PROBLEM - PLATFORM ROTATE LEFT PERMANENTLY SELECTED	The machine is in Ground mode and the subject switch input = High at Start Up	P UGM shall prohibit platform Rotate Right and Left.	Function switch returns to neutral and the machine is not in the Enabled state.	With the machine controls not enable, return the Lift switch to neutral. Actuate switch while monitoring state changes under appropriate menu in DIAGNOSTICS--> OPER CONTROLS on Analyzer. Replace the switch if defective
23114	FUNCTION PROBLEM - PLATFORM ROTATE RIGHT PERMANENTLY SELECTED	The machine is in Ground mode and the subject switch input = High at Start Up	UGM shall prohibit Platform Rotate Right and Left.	Function switch returns to neutral and the machine is not in the Enabled state.	With the machine controls not enable, return the Lift switch to neutral. Actuate switch while monitoring state changes under appropriate menu in DIAGNOSTICS--> OPER CONTROLS on Analyzer. Replace the switch if defective
23153	FUNCTION PROBLEM – START PERMANENTLY SELECTED	The machine is in Ground mode and the subject switch input = High at Start Up	UGM shall prohibit Engine Start functionality	Function switch returns to neutral	Enable machine and on Analyzer under DIAGNOSTICS--->OPER CONTROLS --> START SWITCH, observe Open and Closed commands: open Ground control box and troubleshoot wiring or replace Start switch.
23163	FUNCTION PROBLEM – MSSO PERMANENTLY SELECTED	If MACHINE SETUP→ MARKET = CE, and UGM determines that subject low-side switch is selected at Startup	No inhibits required; MSSO permitted if requirements of MSSO section are met	Function switch returns to neutral and the machine is not in the Enabled state.	Contact JLG service to reset code. Verify correct operation of the MSSO switch.
23206	OSCILLATING AXLE SWITCH – NOT RESPONDING	If oscillating axle pressure switch does not change state from low to high before OXP times out, DTC will be triggered.	No response required	Switch state change from low to high is processed during OXP.	Check switch state during pressurization and when pressure decays. Check for hydraulic circuit leakage.

DTC	Help Message	Fault Condition/Trigger	Required Control Response or State Assignment	Conditions Required for Movement and/or to Clear Fault	Corrective Action
23253	MACHINE SETUP WIRING - ERROR	The UGM detects any of the following conditions: Stored Jumper Configuration ? Jumper Configuration; Jumper Configuration < 1 and (Platform Light Panel or Ground Light Panel is detected on the CANbus)	UGM shall assume Jumper Configuration = 1	Power Cycled	Check Jumper connections.
241	AMBIENT TEMPERATURE SENSOR – OUT OF RANGE LOW	UGM determines that all of the following conditions exists: · MACHINE SETUP→ TEMP CUTOUT = YES · Low Temperature Cutout sensor reading ≤ -50 °C	If the machine is in Platform Mode and above Elevation, UGM shall suspend motion and set Low Temperature Cutout state = Faulty; all functions limited to Creep speed after controls initialized If the Machine is in Platform Mode and Not Above Elevation, UGM shall suspend motion; all functions except Drive/Steer limited to Creep speed after controls initialized If the machine is in Ground Mode, no response required.	Ambient Temperature sensor reading > -50 °C; speed restrictions removed after controls are initialized	Inspect harnessing for physical damage. Check low temp cutout sennsor in platfrom box for failur.
242	AMBIENT TEMPERATURE SENSOR – OUT OF RANGE HIGH	UGM determines that all of the following conditions exists: · MACHINE SETUP→ TEMP CUTOUT = YES · Low Temperature Cutout sensor reading ≥ 85°C	If the machine is in Platform Mode and above Elevation, UGM shall suspend motion and set Low Temperature Cutout state = Faulty; all functions limited to Creep speed after controls initialized If the Machine is in Platform Mode and Not Above Elevation, UGM shall suspend motion; all functions except Drive/Steer limited to Creep speed after controls initialized If the machine is in Ground Mode, no response required.	Ambient Temperature sensor reading < 85 °C; speed restrictions removed after controls are initialized	Inspect harnessing for physical damage. Check low temp cutout sensor in platform box for failure.
253	DRIVE PREVENTED - CHARGER CONNECTED	MACHINE SETUP→ CHARGER INTRLOCK = DRIVE ONLY Power Module reports charger connected UGM determines that vehicle is plugged in for charging, machine was Enabled, and a Drive/Steer command was attempted.	UGM shall prohibit functions per Charger Interlock section	Not all of the trigger conditions are met	Unplug charger from external AC source. Cycle power to remove fault.

DTC	Help Message	Fault Condition/Trigger	Required Control Response or State Assignment	Conditions Required for Movement and/or to Clear Fault	Corrective Action
259	MODEL CHANGED - HYDRAULICS SUSPENDED - CYCLE EMS	The MACHINE SETUP→ MODEL has changed	UGM shall suspend all machine functions and disable all outputs and prevent engine start.	Power Cycled	Verify in MACHINE SETUP ? MODEL is correct. Correct if necessary and cycle power to clear fault.
2514	BOOM PREVENTED – DRIVE SELECTED	MACHINE SETUP→ FUNCTION CUTOUT = BOOM CUTOUT Drive or Steer is already engaged The boom is Above Elevation The operator is attempting to activate one of the boom functions DTC 2514 supersedes DTC 2518 if drive/steer and boom functions are both active when machine transitions from Below Elevation to Above Elevation.	UGM shall disable all boom functions	Not all of the trigger conditions are met	Stop operating any Drive or Steer functions. Activate the Boom function.
2516	DRIVE PREVENTED – ABOVE ELEVATION	MACHINE SETUP→ FUNCTION CUTOUT = DRIVE CUTOUT The boom is Above Elevation The operator is attempting to activate Drive or Steer	UGM shall disable Drive and Steer	Not all of the trigger conditions are met	Place the machine in the transport position before attempting to drive or steer.
2517	DRIVE PREVENTED – TILTED & ABOVE ELEVATION	Machine is in Platform mode Machine is Above Elevation and Tilted MACHINE SETUP→ TILT→ X DEGREES + DRV CUT and the operator is attempting to activate Drive or Steer. Where X = 3, 4 or 5 Degrees.	UGM shall provide functionality as they pertain to Drive and Steer	At least one of the trigger conditions is not met; then non-Creep function speed permitted after controls initialized.	Place the machine in the transport position before attempting to drive or steer.
2518	DRIVE PREVENTED – BOOM SELECTED	MACHINE SETUP→ FUNCTION CUTOUT = BOOM CUTOUT The boom is Above Elevation Any boom function is already active The operator attempts to activate Drive or Steer	UGM shall disable Drive and Steer	Not all of the trigger conditions are met	Stop operating any boom functions. Activate the Drive or Steer function.
2538	FUNCTION PREVENTED - CHARGER CONNECTED	MACHINE SETUP→ CHARGER INTRLOCK = CUTOUT ALL MTM or GenSet Module reports AC wall-charger connected. UGM determines that vehicle is plugged in for charging, machine was Enabled, and a function command was attempted.	UGM shall prohibit functions per Charger Interlock section	Not all of the trigger conditions are met	Unplug charger from external AC source. Cycle power to remove fault.
2548	SYSTEM TEST MODE ACTIVE	UGM determines that System Test Mode is active	UGM shall provide the functionality and indications as described in the System Test section	Power Cycled	Cycle power to clear the fault.
2563	SKYGUARD SWITCH – DISAGREEMENT	MACHINE SETUP→ SKYGUARD ≠ NO Machine is in Platform Mode [(SkyGuard input #1 Platform Module J7-18) ≠ (SkyGuard input #2 Platform Module J1-23)] > 160ms	Response detailed in SkyGuard section.	[{SkyGuard inputs (Platform Module J7-18 = High) and (Platform Module J1-23 = High)} and (Footswitch State = Not Depressed)]	Verify that the two Skyguard switches are functioning normal. Open platform box and trouble shoot wiring.

DTC	Help Message	Fault Condition/Trigger	Required Control Response or State Assignment	Conditions Required for Movement and/or to Clear Fault	Corrective Action
2568	TEMPERATURE CUTOUT ACTIVE – AMBIENT TEMPERATURE TOO LOW	Low Temperature Cutout = Active	If the machine is in Platform Mode and Above Elevation, UGM shall suspend motion and set Low Temperature Cutout state = Active; all functions limited to Creep speed after controls initialized If the Machine is in Platform Mode and Not Above Elevation, UGM shall suspend motion; all functions except Drive/Steer limited to Creep speed after controls initialized	Low Temperature Cutout = Inactive; speed restrictions removed after controls are initialized	Inspect harnessing for physical damage. Check low temp cut-out sensor in platform box for failure.
2572 2573 2574 2575	FRONT LEFT FRONT RIGHT REAR LEFT REAR RIGHT DRIVE PREVENTED – [PM] BRAKE DRIVER FAILURE	Module detects brakes have not released because EB coil driver is not able to close	UGM shall suspend motion and prohibit Drive/Steer; remaining functions permitted after controls initialized MTM shall perform an Emergency Stop.	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Check for drive motor damage or shorting condition in connector. Cycle power to clear the fault.
2576	PLATFORM LEVEL PREVENTED – ABOVE ELEVATION	UGM has determined that all of the following conditions exists: Machine is in Platform mode Machine is Above Elevation MACHINE SETUP→ Platform Level Override Cutout = Enabled; Machine is Enabled The Platform Level Up or Down switch input = High	The UGM shall prohibit Platform Level Up and Down override leveling	Not all of the trigger conditions are met	Place the machine in the transport position before attempting to Platform Level.
2577	DRIVE PREVENTED – START BATTERY CONNECTED	UGM determines that vehicle is connected to a 12V jump start battery, machine was Enabled, and a Drive/Steer command was attempted.	UGM shall prohibit Drive and Steer.	Not all of the trigger conditions are met	Disconnect 12V jump battery.
2578	FUNCTIONS PREVENTED – TILTED AND ABOVE ELEVATION	Machine is in Platform mode Machine is Above Elevation and Tilted MACHINE SETUP→ TILT→ X DEGREES + CUT and the operator is attempting to activate Drive or Steer, Lift Up, Tower Up or Telescope Out. Where X = 3, 4, or 5 Degrees)	UGM shall provide functionality as they pertain to the hydraulic functions.	At least one of the trigger conditions is not met; then non-Creep function speed permitted after controls initialized.	Return machine to transport position. Move machine to firm level surface and operate.
317	GENSET CONTACTOR – PERMANENTLY OFF	GenSet Power Module detects current through Contactor Coil but no voltage on Contactor contacts @ PM B+ terminal	UGM shall disable charging, command engine shutdown, and prevent engine start; UGM/GenSet module shall command GenSet contactor open	Power Cycled	With the machine powered up, use a Multi-meter check for 48V on the harness side of contactor. If no voltage trouble shoot harness. If voltage is present, replace contactor. Cycle power to then remove fault.

DTC	Help Message	Fault Condition/Trigger	Required Control Response or State Assignment	Conditions Required for Movement and/or to Clear Fault	Corrective Action
318	GENSET CONTACTOR - SHORT TO GROUND OR OPEN CIRCUIT	GenSet Power Module detects, at startup, that the line contactor driver output failed short or contactor coil is disconnected/open circuit	UGM shall disable charging, command engine shutdown, and prevent engine start; UGM/GenSet module shall command GenSet contactor open	Power Cycled	With the machine powered up, use a Multi-meter check for 48V on the harness side of contactor. If no voltage trouble shoot harness. If voltage is present, replace contactor. Cycle power to then remove fault.
319	MAIN CONTACTOR - PERMANENTLY OFF	Master Traction Module detects current through Contactor Coil but no voltage on Contactor contacts @ PM B+ terminal during active traction or pump.	UGM shall suspend motion and prohibit all Pump-powered functions. UGM shall disable Voting Relay and UGM/MTM shall command main contactor open; UGM shall set Ground Emergency Descent Mode = Enabled and permit Emergency Descent after controls initialized.	Power Cycled	With the machine powered up, use a Multi-meter check for 48V on the harness side of contactor. If no voltage trouble shoot harness. If voltage is present, replace contactor. Cycle power to then remove fault.
3110	MAIN CONTACTOR - SHORT TO GROUND OR OPEN CIRCUIT	Master Traction Module detects, at startup, that the line contactor driver output failed short or contactor coil is disconnected/open circuit	UGM shall suspend motion and prohibit all Pump-powered functions. UGM shall disable Voting Relay and UGM/MTM shall command main contactor open; UGM shall set Ground Emergency Descent Mode = Enabled and permit Emergency Descent after controls initialized	Power Cycled	With the machine powered up, use a Multi-meter check for 48V on the harness side of contactor. If no voltage trouble shoot harness. If voltage is present, replace contactor. Cycle power to then remove fault.
3210	GENSET CONTACTOR - WELDED OR MISWIRED	GenSet Power Module determines at Startup that Line Contactor is closed/stuck before commanded	UGM shall disable charging, command engine shutdown, and prevent engine start; UGM/GenSet module shall command GenSet contactor open	Power Cycled	With the machine powered up, use a Multi-meter check for 48V on the harness side of contactor. If no voltage trouble shoot harness. If voltage is present, replace contactor. Cycle power to then remove fault.
3211	GENSET CONTACTOR COIL - SHORT TO BATTERY	At Startup, the GenSet Power Module detects an overcurrent condition on pin A4 or A12, indicating a short between B+ and the GenSet Contactor	UGM shall disable charging, command engine shutdown, and prevent engine start GenSet module shall disable charging	Power Cycled	With the machine powered up, use a Multi-meter check for 48V on the harness side of contactor. If no voltage trouble shoot harness. If voltage is present, replace contactor. Cycle power to then remove fault.

DTC	Help Message	Fault Condition/Trigger	Required Control Response or State Assignment	Conditions Required for Movement and/or to Clear Fault	Corrective Action
3212	MAIN CONTACTOR - WELDED OR MISWIRED	Master Traction Module determines at Startup that Line Contactor is closed/stuck before commanded (48V at B+ from STB on A2, A3 or A4)	UGM shall suspend motion and prohibit all Pump-powered functions. UGM shall disable Voting Relay and UGM/MTM shall command main contactor open; UGM shall set Ground Emergency Descent Mode = Enabled and permit Emergency Descent after controls initialized	Power Cycled	With the machine powered up, use a Multi-meter check for 48V on the harness side of contactor. If no voltage trouble shoot harness. If voltage is present, replace contactor. Cycle power to then remove fault.
334	LIFT UP VALVE – OPEN CIRCUIT	The UGM detects an open circuit at this output J2-11	UGM shall suspend Lift Up/Down command and revert to Open Loop Current control for Lift; Lift speed limited to Creep after both Lift Up/Down controls have been returned to neutral and machine is not Enabled.	UGM no longer detects open circuit; speed restrictions removed after controls are initialized	Inspect wiring for physical damage. Check for a good connection at the solenoid and for continuity through the circuit. With the solenoid disconnected, and open circuit voltage of nearly 8.0V exists on the Ground Module output pin for diagnostic purposes. Cycle power to clear the fault.
336	LIFT DOWN VALVE – OPEN CIRCUIT	The UGM detects an open circuit at this output J2-22	UGM shall suspend Lift Up/Down command and revert to Open Loop Current control for Lift; UGM disables Lift Up; Lift Down speed limited to Creep after both Lift Up/Down controls have been returned to neutral and machine is not Enabled.	UGM no longer detects open circuit; Lift Up permitted after controls are initialized; speed restrictions removed after controls are initialized	Check for a good connection at the solenoid and for continuity through this circuit. With the solenoid disconnected, and open circuit voltage of nearly 8.0V exists on the Ground Module output pin for diagnostic purposes. Inspect wiring for physical damage. Cycle power to clear the fault.
3311	GROUND ALARM – SHORT TO BATTERY	The UGM detects a short to 12V battery at this output J2-2 when MACHINE SETUP→ ALARM/HORN = SEPARATE. The UGM detects a short to 12V battery at this output J2-27 when MACHINE SETUP→ ALARM/HORN = COMBINED	MACHINE SETUP→ ALARM/HORN = SEPARATE: UGM shall prohibit J2-2 output. MACHINE SETUP→ ALARM/HORN = COMBINED: UGM shall prohibit J2-27 output.	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Cycle power to clear the fault.
3371	GROUND ALARM – SHORT TO GROUND	The UGM detects a short to ground at this output J2-2 when MACHINE SETUP→ ALARM/HORN = SEPARATE. Note: STG on J2-2 may result in fuse IP588 being blown before detection can occur.	MACHINE SETUP→ ALARM/HORN = SEPARATE: UGM shall prohibit J2-2 output.	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Cycle power to clear the fault.

DTC	Help Message	Fault Condition/Trigger	Required Control Response or State Assignment	Conditions Required for Movement and/or to Clear Fault	Corrective Action
3372	GROUND ALARM – OPEN-CIRCUIT	The UGM detects an open-circuit at this output J2-2 when MACHINE SETUP→ ALARM/HORN = SEPARATE.	MACHINE SETUP→ ALARM/HORN = SEPARATE: No response required for this DTC.	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Cycle power to clear the fault.
3358	MAIN DUMP VALVE – SHORT TO GROUND	The UGM detects a short to ground at this output J2-13	UGM shall suspend and prohibit UGM High Flow Dump, Swing, Tower Lift Up, and Lift Up.	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Cycle power to clear the fault.
3359	MAIN DUMP VALVE – OPEN CIRCUIT	The UGM detects an open circuit at this output J2-13	UGM shall suspend and prohibit UGM High Flow Dump, Swing, Tower Lift Up, and Lift Up.	Power Cycled	Check for a good connection at the solenoid and for continuity through this circuit. With the solenoid disconnected, and open circuit voltage of nearly 8.0V exists on the Ground Module output pin for diagnostic purposes. Inspect wiring for physical damage. Cycle power to clear the fault.
3360	MAIN DUMP VALVE – SHORT TO BATTERY	The UGM detects a short to 12V battery at this output J2-13	UGM shall suspend and prohibit UGM High Flow Dump, Swing, Tower Lift Up, and Lift Up.	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Cycle power to clear the fault.
3362	START SOLENOID – SHORT TO GROUND	UGM detects a short to ground at this output J1-11 (Starter Relay)	UGM shall disable starter output, disable charging, and prevent engine start	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Cycle power to clear the fault.
3363	START SOLENOID – OPEN CIRCUIT	UGM detects an open circuit at this output J1-11 (Starter Relay)	No response required.	UGM no longer detects open circuit	Inspect wiring for physical damage and check for wire continuity. Cycle power to clear the fault.
3364	START SOLENOID – SHORT TO BATTERY	UGM detects a short to 12V battery at this output J1-11 (Starter Relay)	UGM shall disable starter output, disable charging, command engine shutdown, and prevent engine start	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Cycle power to clear the fault.
3365	STEER DUMP VALVE – SHORT TO GROUND	The UGM detects a short to ground at this output J2-1	UGM shall suspend Drive/Steer and shall limit Drive to Creep speed after controls initialized. UGM shall suspend and prohibit Steer (Low Flow) Dump, Steer, Flow Control, Tele, Jib Up, Platform Level, and Platform Rotate functions.	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Cycle power to clear the fault.

DTC	Help Message	Fault Condition/Trigger	Required Control Response or State Assignment	Conditions Required for Movement and/or to Clear Fault	Corrective Action
3366	STEER DUMP VALVE – OPEN CIRCUIT	The UGM detects an open circuit at this output J2-1	UGM shall suspend Drive/ Steer and shall limit Drive to Creep speed after controls initialized. UGM shall suspend and prohibit Steer (Low Flow) Dump, Steer, Flow Control, Tele, Jib Up, Platform Level, and Platform Rotate functions.	Power Cycled	Check for a good connection at the solenoid and for continuity through this circuit. With the solenoid disconnected, and open circuit voltage of nearly 8.0V exists on the Ground Module output pin for diagnostic purposes. Inspect wiring for physical damage. Cycle power to clear the fault.
3367	STEER DUMP VALVE – SHORT TO BATTERY	The UGM detects a short to 12V battery at this output J2-1	UGM shall suspend Drive/ Steer and shall limit Drive to Creep speed after controls initialized. UGM shall suspend prohibit Steer (Low Flow) Dump, Steer, Flow Control, Tele, Jib Up, Platform Level, and Platform Rotate functions.	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Cycle power to clear the fault.
3376	HEAD TAIL LIGHT – SHORT TO GROUND	MACHINE SETUP→ H & T LIGHTS = YES and the UGM detects a short to ground at this output J2-26 (Head/Tail Light Relay)	UGM shall disable H&T Light relay output	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Cycle power to clear the fault.
3377	HEAD TAIL LIGHT – OPEN CIRCUIT	MACHINE SETUP→ H & T LIGHTS = YES and the UGM detects an open circuit at this output J2-26 (Head/Tail Light Relay)	No response required.	The UGM no longer detects open circuit	Check for a good connection at the solenoid and for continuity through this circuit. With the solenoid disconnected, and open circuit voltage of nearly 8.0V exists on the Ground Module output pin for diagnostic purposes. Inspect wiring for physical damage. Cycle power to clear the fault.
3378	HEAD TAIL LIGHT – SHORT TO BATTERY	MACHINE SETUP→ H & T LIGHTS = YES and the UGM detects a short to 12V battery at this output J2-26 (Head/Tail Light Relay)	UGM shall disable H&T Light relay output	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Cycle power to clear the fault.
3382	PLATFORM LEVEL UP VALVE – SHORT TO GROUND	The UGM detects a short to ground at this output J2-5	UGM shall disable Platform Level Up; Level Down speed shall be limited to Creep	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Check for coil damage or shorting condition in connector. Cycle power to clear the fault.
3383	PLATFORM LEVEL UP VALVE – OPEN CIRCUIT	The UGM detects an open circuit at this output J2-5	UGM shall suspend Platform Level; UGM shall limit Platform Level speed to Creep after controls initialized	UGM no longer detects open circuit; speed restrictions removed after controls are initialized	Check for a good connection at the solenoid and for continuity through this circuit. Inspect wire for physical damage. Cycle power to clear the fault.

DTC	Help Message	Fault Condition/Trigger	Required Control Response or State Assignment	Conditions Required for Movement and/or to Clear Fault	Corrective Action
3384	PLATFORM LEVEL UP VALVE – SHORT TO BATTERY	The UGM detects a short to 12V battery at this output J2-5	UGM shall disable UGM Platform Level and Flow Control valves	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Cycle power to clear the fault.
3388	PLATFORM LEVEL DOWN VALVE – SHORT TO GROUND	The UGM detects a short to ground at this output J2-7	UGM shall disable UGM Platform Level	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Check for coil damage or shorting condition in connector. Cycle power to clear the fault.
3389	PLATFORM LEVEL DOWN VALVE – OPEN CIRCUIT	The UGM detects an open circuit at this output J2-7	UGM shall suspend Platform Level; UGM shall prohibit Platform Level Up and limit Platform Level Down speed to Creep after controls initialized	UGM no longer detects open circuit; Platform Level Up permitted and speed restrictions removed after controls are initialized	Check for a good connection at the solenoid and for continuity through this circuit. Inspect wiring for physical damage. Cycle power to clear the fault.
3390	PLATFORM LEVEL DOWN VALVE – SHORT TO BATTERY	The UGM detects a short to 12V battery at this output J2-7	UGM disables Platform Level Up, Level Down, and Flow Control Valve outputs	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Cycle power to clear the fault.
33106	TOWER LIFT UP VALVE – SHORT TO GROUND	The UGM detects a short to ground at this output J2-20	UGM disables Tower Lift Up output; Tower Lift Down speed limited to Creep after controls initialized	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Check for coil damage or shorting condition in connector. Cycle power to clear the fault.
33107	TOWER LIFT UP VALVE – OPEN CIRCUIT	The UGM detects an open circuit at this output J2-20	The UGM shall suspend Tower Lift and revert to Open Loop Current control for Tower Lift; UGM shall limit Tower Lift speed to Creep after controls initialized	The UGM no longer detects open circuit; speed restriction removed after controls are initialized	Check for a good connection at the solenoid and for continuity through this circuit. With the solenoid disconnected, and open circuit voltage of nearly 8.0V exists on the Ground Module output pin for diagnostic purposes. Inspect wiring for physical damage. Cycle power to clear the fault.
33109	TOWER LIFT DOWN VALVE – SHORT TO GROUND	The UGM detects a short to ground at this output J2-9	UGM shall disable Tower Lift Up and Down	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Check for coil damage or shorting condition in connector. Cycle power to clear the fault.
33110	TOWER LIFT DOWN VALVE – OPEN CIRCUIT	The UGM detects an open circuit at this output J2-9	The UGM shall suspend Tower Lift and revert to Open Loop Current control for Tower Lift; UGM shall prohibit Tower Lift Up and shall limit Tower Lift Down speed to Creep after controls initialized	UGM no longer detects open circuit; Tower Lift Up permitted and speed restriction removed for Tower Lift Down after controls are initialized	Check for a good connection at the solenoid and for continuity through this circuit. With the solenoid disconnected, and open circuit voltage of nearly 8.0V exists on the Ground Module output pin for diagnostic purposes. Inspect wiring for physical damage. Cycle power to clear the fault.

DTC	Help Message	Fault Condition/Trigger	Required Control Response or State Assignment	Conditions Required for Movement and/or to Clear Fault	Corrective Action
33118	SWING RIGHT VALVE – SHORT TO GROUND	The UGM detects a short to ground at this output J2-35	UGM shall disable Swing Left and Right	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Check for coil damage or shorting condition in connector. Cycle power to clear the fault.
33119	SWING RIGHT VALVE – OPEN CIRCUIT	The UGM detects an open circuit at this output J2-35	The UGM shall suspend Swing and revert to Open Loop Current control for Swing; UGM shall limit Swing speed to Creep after controls initialized	UGM no longer detects open circuit; speed restriction removed after controls are initialized	Check for a good connection at the solenoid and for continuity through this circuit. With the solenoid disconnected, and open circuit voltage of nearly 8.0V exists on the Ground Module output pin for diagnostic purposes. Inspect wiring for physical damage. Cycle power to clear the fault.
33120	TELESCOPE IN VALVE – SHORT TO BATTERY	The UGM detects a short to 12V battery at this output J2-4	UGM shall disable Telescope and Flow Control valves	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Cycle power to clear the fault.
33122	SWING LEFT VALVE – SHORT TO GROUND	The UGM detects a short to ground at this output J2-34	UGM shall disable Swing Left and Right	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Check for coil damage or shorting condition in connector. Cycle power to clear the fault.
33123	TELESCOPE OUT VALVE – SHORT TO BATTERY	The UGM detects a short to 12V battery at this output J2-16	UGM shall disable Telescope and Flow Control valves	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Cycle power to clear the fault.
33130	THROTTLE ACTUATOR – SHORT TO GROUND	The UGM detects a short to ground at throttle actuator relay output J1-2 (Pull Coil)	Before start: UGM shall disable this output and prevent engine start. After start: Not detected.	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Check for coil damage or shorting condition in connector. Cycle power to clear the fault.
33131	THROTTLE ACTUATOR – OPEN CIRCUIT	The UGM detects an open circuit at throttle actuator relay output J1-2 (Pull Coil)	Before start: UGM shall disable charging, command engine shutdown, and prevent engine start After start:	UGM no longer detects open circuit; all starting modes permitted after controls initialized	Check for a good connection at the solenoid and for continuity through this circuit. With the solenoid disconnected, and open circuit voltage of nearly 8.0V exists on the Ground Module output pin for diagnostic purposes. Inspect wiring for physical damage. Cycle power to clear the fault.

DTC	Help Message	Fault Condition/Trigger	Required Control Response or State Assignment	Conditions Required for Movement and/or to Clear Fault	Corrective Action
33132	THROTTLE – SHORT TO BATTERY	The UGM detects a short to 12V battery at throttle actuator relay output J1-2 (Pull Coil)	Before start: UGM shall disable charging, command engine shutdown, and prevent engine start After start: Engine cannot be shut down due to pull coil being driven; only when 12V removed from pull coil will UGM command take effect. Fuel pump should be off.	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Cycle power to clear the fault.
33182	LIFT VALVES - SHORT TO BATTERY	UGM detects a short to 12V battery at either the Lift Up or Lift Down valve (J2-11 or J2-22)	Disable UGM Lift Up and Down outputs and open the low side FET.	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Cycle power to clear the fault.
33186	TELESCOPE OUT VALVE – OPEN CIRCUIT	UGM detects an open circuit at this output J2-16	UGM shall suspend Telescope and limit Telescope speed to Creep after controls initialized	UGM no longer detects open circuit; speed restriction shall be removed after controls are initialized	Check for a good connection at the solenoid and for continuity through this circuit. With the solenoid disconnected, and open circuit voltage of nearly 8.0V exists on the Ground Module output pin for diagnostic purposes. Inspect wiring for physical damage. Cycle power to clear the fault.
33188	TELESCOPE OUT VALVE – SHORT TO GROUND	The UGM detects a short to ground at this output J2-16	UGM shall suspend motion; Tele Out prohibited and Tele In limited to Creep after controls initialized	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Check for coil damage or shorting condition in connector. Cycle power to clear the fault.
33189	TELESCOPE IN VALVE – OPEN CIRCUIT	The UGM detects an open circuit at this output J2-4	UGM shall suspend Tele; UGM shall prohibit Tele Out and limit Telescope In speed to Creep after controls initialized	UGM no longer detects open circuit; Tele Out permitted and speed restrictions removed for Telescope In after controls are initialized	Check for a good connection at the solenoid and for continuity through this circuit. With the solenoid disconnected, and open circuit voltage of nearly 8.0V exists on the Ground Module output pin for diagnostic purposes. Inspect wiring for physical damage. Cycle power to clear the fault.
33190	TELESCOPE IN VALVE – SHORT TO GROUND	The UGM detects a short to ground at this output J2-4	UGM shall disable Tele In and Out	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Check for coil damage or shorting condition in connector. Cycle power to clear the fault.
33267	ENGINE FUEL RELAY - OPEN CIRCUIT	The UGM detects an open circuit at Throttle Hold Coil/Fuel Pump output J1-1	UGM shall disable charging, command engine shutdown, and prevent engine start	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Cycle power to clear the fault.

DTC	Help Message	Fault Condition/Trigger	Required Control Response or State Assignment	Conditions Required for Movement and/or to Clear Fault	Corrective Action
33208	HORN - SHORT TO BATTERY	The UGM detects a short to 12V battery at this output J2-27 when MACHINE SETUP→ ALARM/HORN = SEPARATE.	MACHINE SETUP→ ALARM/HORN = SEPARATE: UGM shall prohibit J2-27 output.	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Cycle power to clear the fault.
33268	ENGINE FUEL RELAY - SHORT TO BATTERY	The UGM detects a short to 12V battery at Throttle Hold Coil/Fuel Pump output J1-1	Before start: UGM shall disable this output and charging, command engine shutdown, and prevent engine start After start: Note: Fuel pump damage if Run Actuator is Off and Fuel Pump is stuck on.	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Cycle power to clear the fault.
33269	ENGINE FUEL RELAY - SHORT TO GROUND	The UGM detects a short to ground at Throttle Hold Coil/Fuel Pump output J1-1. Note: STG on J1-1 may result in fuse IP588 being blown before detection can occur.	UGM shall disable this output and charging, command engine shutdown, and prevent engine start	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Inspect fuse IP588. Cycle power to clear the fault.
33279	GLOWPLUG – OPEN CIRCUIT	MACHINE SETUP→ GLOW PLUG ≠ NO UGM detects an open circuit at this relay output J1-12	No response required. Engine start will proceed without glow.	Power Cycled	Check for a good connection at the solenoid and for continuity through this circuit. With the solenoid disconnected, and open circuit voltage of nearly 8.0V exists on the Ground Module output pin for diagnostic purposes. Inspect wiring for physical damage. Cycle power to clear the fault.
33280	GLOWPLUG – SHORT TO BATTERY	MACHINE SETUP→ GLOW PLUG ≠ NO The UGM detects a short to battery at this relay output J1-12	UGM shall disable Glow Plug relay output	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Cycle power to clear the fault.
33281	GLOWPLUG – SHORT TO GROUND	MACHINE SETUP→ GLOW PLUG ≠ NO The UGM detects a short to ground at this relay output J1-12	Before Start: UGM shall disable Glow Plug relay output and prohibit glow plug cycle.	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Check for relay damage or shorting condition in connector. Cycle power to clear the fault.
33287	LIFT – CURRENT FEEDBACK READING TOO LOW	UGM commanded current > 250mA The difference between the commanded current and the measured feedback current > [the larger of (125mA) or (20% of the commanded function Max)] for longer than 1 second.	UGM shall suspend Lift Up/Down command and revert to Open Loop Current control for Lift; Lift speed limited to Creep after both Lift Up/Down controls have been returned to neutral and machine is not Enabled	Power Cycled	Part of the commanded current is being divided either prior to the solenoid connection or on the ground return path. Inspect wiring for physical damage and check for wire continuity and a low resistance return path. Cycle power to clear fault.

DTC	Help Message	Fault Condition/Trigger	Required Control Response or State Assignment	Conditions Required for Movement and/or to Clear Fault	Corrective Action
33295	SWING LEFT VALVE – OPEN CIRCUIT	The UGM detects an open circuit at this output J2-34	The UGM shall suspend Swing command and revert to Open Loop Current control for Swing; UGM shall limit Swing speed to Creep after controls initialized	UGM no longer detects open circuit; restrictions on Swing speed shall be removed after controls are initialized	Check for a good connection at the solenoid and for continuity through this circuit. With the solenoid disconnected, and open circuit voltage of nearly 8.0V exists on the Ground Module output pin for diagnostic purposes. Inspect wiring for physical damage. Cycle power to clear the fault.
33314	FLOW CONTROL VALVE – OPEN CIRCUIT	The UGM detects an open circuit at this output J2-31	The UGM shall suspend Flow Control and revert to Open Current loop control for Flow Control; UGM shall limit Telescope, Jib Lift Up, Platform Rotate and Platform Level to Creep speed after controls initialized	The UGM no longer detects open circuit; speed restrictions removed on Telescope, Jib Lift Up, Platform Rotate and Platform Level after controls are initialized	Check for a good connection at the solenoid and for continuity through this circuit. With the solenoid disconnected, and open circuit voltage of nearly 8.0V exists on the Ground Module output pin for diagnostic purposes. Inspect wiring for physical damage. Cycle power to clear the fault.
33315	FLOW CONTROL VALVE – SHORT TO BATTERY	The UGM detects a short to 12V battery at this output J2-31	Disable UGM Flow Control Valve output and open the low side FET; disallow energization of valves for Tele In/Out, Level Up/Down, or Rotate Right/Left.	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Cycle power to clear the fault.
33316	FLOW CONTROL VALVE – SHORT TO GROUND	The UGM detects a short to ground at this output J2-31	Disable UGM Flow Control Valve output; disallow energization of valves for Tele In/Out, Level Up/Down, or Rotate Right/Left.	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Check for coil damage or shorting conditions in connector. Cycle power to clear the fault.
33406	LIFT UP VALVE – SHORT TO GROUND	The UGM detects a short to ground at this output J2-11	UGM shall disable Lift Up; Lift Down speed limited to Creep	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Check for coil damage or shorting conditions in connector. Cycle power to clear the fault.
33407	LIFT DOWN VALVE – SHORT TO GROUND	The UGM detects an open circuit at this output J2-22	UGM shall disable Lift Up/Down	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Check for coil damage or shorting conditions in connector. Cycle power to clear the fault.
33412	SWING VALVES – SHORT TO BATTERY	The UGM detects a short to 12V battery at this output (J2-34 or J2-35)	UGM shall suspend motion; disable Swing and open the low side FET; motion permitted on other functions after controls initialized	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Cycle power to clear the fault.

DTC	Help Message	Fault Condition/Trigger	Required Control Response or State Assignment	Conditions Required for Movement and/or to Clear Fault	Corrective Action
33413	TOWER LIFT – CURRENT FEEDBACK READING LOW	The UGM commanded current > 250mA The difference between the commanded current and the measured feedback current > [the larger of (125mA) or (15% of the commanded function Max)] for longer than 1 second	UGM shall suspend Tower Lift command and revert to Open Current loop control for Tower Lift; Tower Lift speed limited to Creep after both Tower Lift Up/Down controls have been returned to neutral and machine is not Enabled.	Power Cycled	Part of the commanded current is being divided either prior to the solenoid connection or on the ground return path. Inspect wiring for physical damage and check for wire continuity and a low resistance return path. Cycle power to clear fault.
33414	SWING – CURRENT FEEDBACK READING TOO LOW	The UGM commanded current > 250mA The difference between the commanded current and the measured feedback current > [the larger of (125mA) or (15% of the commanded function Max)] for longer than 1 second	UGM shall suspend Swing Left/Right command and revert to Open Loop Current control for Swing; Swing speed limited to Creep after both Swing Left/Right have been returned to neutral and machine is not Enabled	Power Cycled	Part of the commanded current is being divided either prior to the solenoid connection or on the ground return path. Inspect wiring for physical damage and check for wire continuity and a low resistance return path. Cycle power to clear fault.
33415	FLOW CONTROL VALVE – CURRENT FEEDBACK READING TOO LOW	The UGM commanded current > 250mA The difference between the commanded current and the measured feedback current > [the larger of (125mA) or (15% of the commanded function Max)] for longer than 1 second	UGM shall suspend and revert to Open Current loop control for Flow Control Valve; Tele In/Out, Jib Up, Rotate Right/Left, and Level Up/Down speed limited to Creep after controls for those functions have all been simultaneously returned to neutral and machine is not Enabled	Power Cycled	Part of the commanded current is being divided either prior to the solenoid connection or on the ground return path. Inspect wiring for physical damage and check for wire continuity and a low resistance return path. Cycle power to clear fault.
33416	TOWER LIFT – CURRENT FEEDBACK READING LOST	Measured feedback current < 225mA while PWM output > 40% for a period of 120ms.	UGM shall suspend command and revert to Open Current loop control for Tower Lift; Tower Lift speed limited to Creep after both Lift Up/Down controls have been returned to neutral and machine is not Enabled.	Power Cycled	Part or all of the commanded current is being diverted from the ground return path. Inspect wiring for physical damage and check for wire continuity and a low resistance return path. Cycle power to clear the fault.
33417	LIFT – CURRENT FEEDBACK READING LOST	Measured feedback current < 225mA while PWM output > 40% for a period of 120ms.	UGM shall suspend Lift Up/Down command and revert to Open Loop Current control for Lift; Lift speed limited to Creep after both Lift Up/Down controls have been returned to neutral and machine is not Enabled	Power Cycled	Part or all of the commanded current is being diverted from the ground return path. Inspect wiring for physical damage and check for wire continuity and a low resistance return path. Cycle power to clear the fault.
33418	SWING – CURRENT FEEDBACK READING LOST	Measured feedback current < 225mA while PWM output > 40% for a period of 120ms.	UGM shall suspend Swing Left/Right command and revert to Open Loop Current control for Swing; Swing speed limited to Creep after both Swing Left/Right have been returned to neutral and machine is not Enabled	Power Cycled	Part or all of the commanded current is being diverted from the ground return path. Inspect wiring for physical damage and check for wire continuity and a low resistance return path. Cycle power to clear the fault.

DTC	Help Message	Fault Condition/Trigger	Required Control Response or State Assignment	Conditions Required for Movement and/or to Clear Fault	Corrective Action
33419	FLOW CONTROL VALVE – CURRENT FEEDBACK READING LOST	Measured feedback current < 225mA while PWM output > 40% for a period of 120ms.	UGM shall suspend and revert to Open Current loop control for Flow Control Valve; Tele In/Out, Jib Up, Rotate Right/Left, and Level Up/Down speed limited to Creep after controls for those functions have all been simultaneously returned to neutral and machine is not Enabled	Power Cycled	Part or all of the commanded current is being diverted from the ground return path. Inspect wiring for physical damage and check for wire continuity and a low resistance return path. Cycle power to clear the fault.
33423	OSCILLATING AXLE VALVES – SHORT TO BATTERY	The UGM detects a short to 12V battery condition on the J1-7 output.	UGM to assume Above Elevation State, deenergize J1-7 Oscillating Axle output, and prohibit Oscillating Axle Pressurization	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Cycle power to clear the fault.
33424	OSCILLATING AXLE VALVES – SHORT TO GROUND	The UGM detects a short to ground condition on the J1-7 output.	UGM to assume Above Elevation State, deenergize J1-7 Oscillating Axle output, and prohibit Oscillating Axle Pressurization	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Check for shoring condition in connector. Cycle power to clear the fault.
33425	TOWER LIFT VALVES – SHORT TO BATTERY	The UGM detects a short to battery at either the Tower Lift Up or Tower Lift Down valve.	UGM shall disable Tower outputs and open the low side FET	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Cycle power to clear the fault.
33479	VOTING RELAY - SHORT TO BATTERY	The UGM detects a short to 12V battery at this output J1-10; related to Main Contactor	UGM shall suspend motion and prohibit all Pump-powered functions. UGM shall disable Voting Relay and UGM/MTM shall command main contactor open; UGM shall set Ground Emergency Descent Mode = Enabled and permit Emergency Descent after controls initialized	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Cycle power to clear the fault.
33480	VOTING RELAY - SHORT TO GROUND	The UGM detects a short to ground at this output J1-10; related to Main Contactor	UGM shall suspend motion and prohibit all Pump-powered functions. UGM shall disable Voting Relay and UGM/MTM shall command main contactor open; UGM shall set Ground Emergency Descent Mode = Enabled and permit Emergency Descent after controls initialized	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Cycle power to clear the fault.

DTC	Help Message	Fault Condition/Trigger	Required Control Response or State Assignment	Conditions Required for Movement and/or to Clear Fault	Corrective Action
33549	VOTING RELAY - OPEN CIRCUIT	The UGM detects an open circuit at this output J1-10; related to Main Contactor	UGM shall suspend motion and prohibit all Pump-powered functions. UGM shall disable Voting Relay and UGM/MTM shall command main contactor open; UGM shall set Ground Emergency Descent Mode = Enabled and permit Emergency Descent after controls initialized	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Cycle power to clear the fault.
33553	AC INVERTER RELAY – SHORT TO GROUND	MACHINE SETUP→ AC INVERTER = YES and the UGM detects a short to ground at this output J1-22	Disable UGM converter output	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Cycle power to clear the fault.
33554	AC INVERTER RELAY – OPEN CIRCUIT	MACHINE SETUP→ AC INVERTER = YES and the UGM detect an open circuit at this output J1-22	No response required.	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Cycle power to clear the fault.
33555	AC INVERTER RELAY – SHORT TO BATTERY	MACHINE SETUP→ AC INVERTER = YES and the UGM detects a short to 12V battery at this output J1-22	Disable UGM converter output, but UGM shall consider converter always excited (enabled)	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Cycle power to clear the fault.
33556	ACCESSORY BATTERY RELAY – SHORT TO GROUND	The UGM detects a short to ground at this output J1-6, that controls 12V accessory battery connection to the bus, via this relay.	UGM shall disable this output and prohibit Glow Plug energization	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Cycle power to clear the fault.
33557	ACCESSORY BATTERY RELAY – OPEN CIRCUIT	The UGM detects an open circuit at this output J1-6 that controls 12V accessory battery connection to the bus, via this relay. Checked only after startup.	UGM shall prohibit Glow Plug energization	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Cycle power to clear the fault.
33558	ACCESSORY BATTERY RELAY – SHORT TO BATTERY	The UGM detects a short to 12V battery at this output J1-6. Checked only after startup	No response required.	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Cycle power to clear the fault.
33559	ACCESSORY POWER RELAY – SHORT TO GROUND	If MACHINE SETUP→ DC OUTLET = YES, the UGM detects a short to ground at this output J1-13, that controls the Platform 12V Outlet relay.	UGM shall disable this output	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Cycle power to clear the fault.
33560	ACCESSORY POWER RELAY – OPEN CIRCUIT	If MACHINE SETUP→ DC OUTLET = YES, the UGM detects an open circuit at this output J1-13, that controls the Platform 12V Outlet relay.	UGM shall disable this output	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Cycle power to clear the fault.
33561	ACCESSORY POWER RELAY – SHORT TO BATTERY	If MACHINE SETUP→ DC OUTLET = YES, the UGM detects a short to 12V battery at this output J1-13 that controls the Platform 12V Outlet relay.	UGM shall disable this output, but assume that the Accessory Power is available	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Cycle power to clear the fault.

DTC	Help Message	Fault Condition/Trigger	Required Control Response or State Assignment	Conditions Required for Movement and/or to Clear Fault	Corrective Action
33642	LF PRESSURE RELEASE VALVE – SHORT TO BATTERY	The UGM detects a short to 12V battery at this output J2-32	UGM shall disable output J2-32.	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Cycle power to clear the fault.
33643	LF PRESSURE RELEASE VALVE – SHORT TO GROUND	The UGM detects a short to ground at this output J2-32	UGM shall disable output J2-32.	Power Cycled	Check for a good connection at the solenoid and for continuity through this circuit. Inspect wiring for physical damage. Cycle power to clear the fault.
33644	LF PRESSURE RELEASE VALVE – OPEN CIRCUIT	The UGM detects an open circuit at this output J2-32	No response required for this DTC.	UGM no longer detects this condition	Check for a good connection at the solenoid and for continuity through this circuit. Inspect wiring for physical damage. Cycle power to clear the fault.
349	PLATFORM ROTATE LEFT VALVE – OPEN CIRCUIT	The PM detects an open circuit at this output (PM J7-33) and reports it to the UGM	The UGM shall suspend commands to PM for Platform Rotate; UGM shall limit Platform Rotate speed to Creep after controls are initialized	The PM no longer detects open circuit; speed restrictions shall be removed after controls are initialized	Check for a good connection at the solenoid and for continuity through this circuit. Inspect wiring for physical damage. Cycle power to clear the fault.
3410	PLATFORM ROTATE LEFT VALVE – SHORT TO BATTERY	The PM detects a short to 12V battery at this output (PM J7-33) and reports it to the UGM	UGM shall disable commands to Platform Module for Platform Rotate and Flow Control valve outputs	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Cycle power to clear the fault.
3411	PLATFORM ROTATE LEFT VALVE – SHORT TO GROUND	The PM detects a short to ground at this output (PM J7-33) and reports it to the UGM	UGM shall disable commands to Platform Module for Platform Rotate Left	Power Cycled	Check for a good connection at the solenoid and for continuity through this circuit. Inspect wiring for physical damage. Cycle power to clear the fault.
3412	PLATFORM ROTATE RIGHT VALVE – OPEN CIRCUIT	The PM detects an open circuit at this output (PM J7-34) and reports it to the UGM	The UGM shall suspend commands to PM for Platform Rotate; UGM shall limit Platform Rotate speed to Creep after controls are initialized	The PM no longer detects open circuit; speed restrictions shall be removed after controls are initialized	Check for a good connection at the solenoid and for continuity through this circuit. Inspect wiring for physical damage. Cycle power to clear the fault.
3413	PLATFORM ROTATE RIGHT VALVE – SHORT TO BATTERY	The PM detects a short to 12V battery at this output (PM J7-34) and reports it to the UGM	UGM shall disable commands to Platform Module for Platform Rotate and Flow Control valve outputs	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Cycle power to clear the fault.
3414	PLATFORM ROTATE RIGHT VALVE – SHORT TO GROUND	The PM detects a short to ground at this output (PM J7-34) and reports it to the UGM	UGM shall disable commands to Platform Module for Platform Rotate Right	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Check for coil damage or shorting condition in connector. Cycle power to clear the fault.
3415	JIB LIFT UP VALVE – OPEN CIRCUIT	MACHINE SETUP→ JIB = YES The PM detects an open circuit at this output (PM J7-25) and reports it to the UGM	The UGM shall command Platform Module to suspend Jib Lift; UGM shall limit Jib Lift speed to Creep after controls are initialized	The PM no longer detects open circuit; speed restrictions shall be removed after controls are initialized	Check for a good connection at the solenoid and for continuity through this circuit. Inspect wiring for physical damage. Cycle power to clear the fault.

DTC	Help Message	Fault Condition/Trigger	Required Control Response or State Assignment	Conditions Required for Movement and/or to Clear Fault	Corrective Action
3416	JIB LIFT UP VALVE – SHORT TO BATTERY	MACHINE SETUP→ JIB = YES The PM detects a short to battery at this output (PM J7-25) and reports it to the UGM	UGM shall disable Jib Lift Up and Flow Control valve outputs; Jib Lift Down speed limited to Creep	Power Cycled	Check for a good connection at the solenoid and for continuity through this circuit. Inspect wiring for physical damage. Cycle power to clear the fault.
3417	JIB LIFT UP VALVE – SHORT TO GROUND	MACHINE SETUP→ JIB = YES The PM detects a short to ground at this output (PM J7-25) and reports it to the UGM	The UGM shall command Platform Module to suspend Jib Lift outputs; UGM shall disable Jib Lift Up.	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Check for coil damage or shorting condition in connector. Cycle power to clear the fault.
3418	JIB LIFT DOWN VALVE – OPEN CIRCUIT	MACHINE SETUP→ JIB = YES The PM detects an open circuit at this output (PM J7-26) and reports it to the UGM	UGM shall command PM to suspend Jib Lift; UGM shall prohibit Jib Lift Up and limit Jib Lift Down speed to Creep after controls are initialized	The PM no longer detects open circuit; speed restrictions shall be removed and motion permitted after controls are initialized	Check for a good connection at the solenoid and for continuity through this circuit. Inspect wiring for physical damage. Cycle power to clear the fault.
3419	JIB LIFT DOWN VALVE – SHORT TO BATTERY	MACHINE SETUP→ JIB = YES The PM detects a short to battery at this output (PM J7-26) and reports it to the UGM	UGM shall command Platform Module to disable Jib Lift outputs	Power Cycled	Check for a good connection at the solenoid and for continuity through this circuit. Inspect wiring for physical damage. Cycle power to clear the fault.
3420	JIB LIFT DOWN VALVE – SHORT TO GROUND	MACHINE SETUP→ JIB = YES The PM detects a short to ground at this output (PM J7-26) and reports it to the UGM; detection occurs for PWM output approximately ≤ 15% or for STG condition. PM does not report until PWM > 30%.	UGM shall command to Platform Module to disable Jib Lift outputs	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Check for coil damage or shorting condition in connector. Cycle power to clear the fault.
4217 4219 4220	FRONT LEFT REAR LEFT REAR RIGHT [PM] MODULE TEMPERATURE - OUT OF RANGE	The Power Module temperature sensor is out of the permitted operating range and reports a fault	UGM shall limit Drive function speeds to Creep. Power modules shall limit maximum current to half the MAXIMUM CURRENT parameter.	Power Module no longer reporting fault; Creep restriction lifted after controls initialized	Allow motor to throughly cool to prevent motor damage. This could take several hours.
4216	GENSET MODULE TEMPERATURE - OUT OF RANGE	The GenSet Power Module temperature sensor is out of the permitted operating range and reports a fault	UGM shall suspend charging, shut down engine, and prohibit engine start.	GenSet Power Module no longer reporting fault	Allow module to throughly cool to prevent module damage. This could take several hours.
4218	FRONT RIGHT MODULE TEMPERATURE - OUT OF RANGE	The Front Right Power Module temperature sensor is out of the permitted operating range and reports a fault	UGM shall limit Drive and Pump-powered function speeds to Creep. Right Front Power module shall limit maximum current to half the MAXIMUM CURRENT parameter.	Power Module no longer reporting fault; Creep restriction lifted after controls initialized	Allow module to throughly cool to prevent module damage. This could take several hours.
4221 4223 4224	FRONT LEFT REAR LEFT REAR RIGHT [PM] MODULE TOO HOT – PLEASE WAIT	Associated Power Module has reached thermal cutout limit and reports alarm beginning at 85°C	UGM shall decrease allowed Drive Max value by 5% for every 1°C over 85°C (debounce temp reading for 5s) The PM shall begin current foldback at 85°C and decrease to zero (cutout) at 105°C, linearly.	Power Module no longer reporting fault and UGM has debounced temperature to below 85°C foldback limit	Allow module to throughly cool to prevent module damage. This could take several hours.

DTC	Help Message	Fault Condition/Trigger	Required Control Response or State Assignment	Conditions Required for Movement and/or to Clear Fault	Corrective Action
4222	FRONT RIGHT MODULE TOO HOT – PLEASE WAIT	Front Right Power Module has reached thermal cutout limit and reports alarm beginning at 85°C.	UGM shall decrease maximum allowed Tower Up, Lift Up, Jib Up, and Drive Max command values by 5% of the established function range for every 1°C over 85°C (debounce temp reading for 5s). Lower limits will be the function MIN. The Power Module shall begin current foldback at 85°C and decrease to zero (cutout) at 105°C, linearly.	Power Module no longer reporting fault and UGM has debounced temperature to below 85°C foldback limit	Allow module to throughly cool to prevent module damage. This could take several hours.
4226 4227 4228 4229	FRONT LEFT FRONT RIGHT REAR LEFT REAR RIGHT [PM] MOTOR TEMPERATURE - OUT OF RANGE	The Power Module reports that motor temperature sensor is out of range due to Open-Circuit (Temp Out of Range – High > 240°C), STG (Temp Out of Range – Low < -30°C) or damage	UGM shall limit Drive to Creep Power Module shall reduce maximum allowed drive current to half MAXIMUM CURRENT parameter	Power Cycled	Allow motor to throughly cool to prevent motor damage. This could take several hours.
4230 4231 4232 4233	FRONT LEFT FRONT RIGHT REAR LEFT REAR RIGHT [PM] MOTOR TOO HOT - PLEASE WAIT	The UGM determines that the drive motor temperature reported by the PM > 140°C but < 200 °C or the PM determines that motor temperature sensor is reporting > 150°C UGM to suppress if DTCs 4226, 4227, 4228, 4229 are active, respectively	UGM shall limit Drive to Creep If > 150°C Power Module shall reduce maximum allowed drive current to half MAXIMUM CURRENT parameter	Power Module no longer report fault and UGM determines motor temp < 140°C and Controls initialized)	Allow motor to throughly cool to prevent motor damage. This could take several hours.
4234	GENSET MODULE - TEMPERATURE TOO HIGH	GenSet Module has reached thermal cutout limit	UGM shall decrease existing Charge commanded by 10%for every 1°C over 85°C (debounce temp reading for 5s) The GenSet shall begin DC charge current foldback at 85°C; decrease module linearly to zero (cutout) at 105°C.	GenSet Module no longer reporting fault and UGM has debounced temperature to below 85°C foldback limit	Allow module to throughly cool to prevent module damage. This could take several hours.
431	FUEL SENSOR - SHORT TO BATTERY OR OPEN CIRCUIT	UGM fuel sensor analog input J2-25 detects a voltage higher than 2.50 volts (A/D > 512)	UGM shall respond with functionality detailed in the System Indicators and GenSet/Fuel sections	Power Cycled	Disconnect fuel sender and verify resistance readings can range from approximately 30ohms (full) to 240ohms (empty). If not, replace sender. With fuel sender connected, backprobe J2-25 and verify voltage range from approximately 0.5V to 2.3V. Troubleshoot wiring or connections.

DTC	Help Message	Fault Condition/Trigger	Required Control Response or State Assignment	Conditions Required for Movement and/or to Clear Fault	Corrective Action
432	FUEL SENSOR - SHORT TO GROUND	UGM fuel sensor analog input J2-25 detects a voltage less than or equal to 0.3 volts (A/D < 61)	UGM shall respond with functionality detailed in the System Indicators and GenSet/Fuel sections	Power Cycled	Disconnect fuel sender and verify resistance readings can range from approximately 30ohms (full) to 240ohms (empty). If not, replace sender. With fuel sender connected, backprobe J2-25 and verify voltage range from approximately 0.5V to 2.3V. Troubleshoot wiring or connections.
433	OIL PRESSURE - SHORT TO BATTERY	Oil Pressure = High ("1") at Startup with Engine RPM = 0 (occurs for STB or OC – wire off switch). High = > 7PSI	If MACHINE SETUP→ ENGINE SHUTDOWN = ENABLED, UGM shall shut down engine and not permit engine start Activate Low Oil Pressure indicator J4-29 per System Indicators	Power Cycled	Verify wire is connected to oil pressure switch. With engine off, switch should show low impedance to ground or replace switch. Observe state change on Analyzer under DIAGNOSTICS--> ENGINE-->ENGINE OIL PRESS
435	COOLANT TEMPERATURE - SHORT TO GROUND	MACHINE SETUP→ ENGINE = KUBOTA Z482 UGM coolant temperature analog input J1-14 detects a voltage less than or equal to 0.05 volts, which corresponds to a high temperature reading.	MACHINE SETUP→ ENGINE SHUTDOWN = ENABLED then UGM assumes maximum temperature exceeded and will shutdown the engine and prevent engine start. activate High Engine Temperature indicator J4-28	Not all of the trigger conditions are met	Disconnect temperature sender and verify resistance readings > 0.15ohms (up to 50ohms is acceptable); then troubleshoot wiring. With system on, backprobe J1-14 and verify voltage >1.5V.
438	HIGH ENGINE TEMP	UGM determines: Engine state = ENGINE RUNNING > 10s Engine coolant temp ≥ allowed max temp (110°C)	If MACHINE SETUP→ ENGINE SHUTDOWN = ENABLED, UGM shall shut down engine and not permit engine start Activate High Engine Temperature indicator J4-28 per System Indicators	Power Cycled	Reduce hydraulic loading of machine and inspect radiator for blockage of air flow.
4311	LOW OIL PRESSURE	UGM determines: Engine state = ENGINE RUNNING > 5s Engine oil pressure = LOW (debounce 1s)	If MACHINE SETUP→ ENGINE SHUTDOWN = ENABLED, UGM shall disable charging, command engine shutdown, and prohibit engine start Activate Low Oil Pressure indicator J4-29 per System Indicators	Power Cycled	Check engine oil level. Cycle power to clear fault.

DTC	Help Message	Fault Condition/Trigger	Required Control Response or State Assignment	Conditions Required for Movement and/or to Clear Fault	Corrective Action
4322	LOSS OF ENGINE SPEED SENSOR	UGM determines: LOW OIL PRESSURE (4311) is not active OIL PRESSURE SHORT TO BATTERY (12V) (433) is not active GenSet Enable switch = Enabled No engine shutdown command exists Engine State = ENGINE RUNNING Engine RPM = 0 (reported by GenSet module) for 1500ms and Engine oil pressure is not LOW	UGM shall disable charging, open GenSet conactor, command engine shutdown, and prevent engine start; GenSet module shall disable charging and open GenSet contactor	Power Cycled	Check proper seating/clearance of engine speed sensor installation. Verify continuity of wiring before replacing sensor. Fault cleared when Engine RPM greater than 0
4335	ENGINE RPM TOO HIGH	UGM determines reported engine RPM > 3400 for 5s; (RPM HIGH); RPM > 3600 for 512ms; 221	UGM shall command engine shutdown Genset Module will report alarm to the UGM.	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Check for speed sensor on generator for damage or shorting condition in connector. Cycle power to clear the fault. Replace sensor if necessary.
4353	ENGINE COOLANT TEMPERATURE – OUT OF RANGE LOW	UGM temperature sensor is reading > 0°C, while the engine coolant sensor is reading ≤ -30°C for greater than 5 seconds.	If MACHINE SETUP→ ENGINE SHUTDOWN = ENABLED, UGM shall shut down engine and not permit engine start	Power Cycled	Inspect harnessing for physical damage and check for wire continuity. Check coolant temp sensor for failure. Verify UGM temperature in analyzer DIAGNOSTICS--> SYSTEM--> AMBIENT TEMP. Verify coolant temp in analyzer DIAGNOSTICS--> ENGINE--> COOLANT TEMPERATURE. Cycle power to clear fault.
443	LSS BATTERY VOLTAGE TOO HIGH	MACHINE SETUP→ LOAD SYSTEM ≠ NO The UGM determines that LSS error bit is set for supply voltage too high (> 34.0V)	UGM to set Platform Load State = Overloaded	Not all of the trigger conditions are met; motion restrictions removed after controls initialized	LSS reports voltage less than 16.0V
444	LSS BATTERY VOLTAGE TOO LOW	MACHINE SETUP→ LOAD SYSTEM ≠ NO The UGM determines that LSS error bit is set for supply voltage too low (< 9.0V)	UGM to set Platform Load State = Overloaded	Not all of the trigger conditions are met; motion restrictions removed after controls initialized	LSS reports voltage greater than 9.0V
4417	BATTERY POWER LOW	UGM determines that the SOC% related to the Battery has reached the Discharged condition; No audible annunciation for this DTC. Supress if Charger Interlock signal is asserted.	Machine response described in Functional sections. No response if Charger Interlock signal is asserted.	Battery SOC > Discharged; speed restrictions removed after controls initialized	Engage engine for charging of the batteries, or plug into external AC power source to charge batteries.
4420	BATTERY DEEPLY DISCHARGED	UGM determines that the SOC% related to the Battery has reached the Deeply Discharged condition. Based on SOC% only, not Voltage threshold specified in Section 8.1.1.3.2; No audible annunciation for this DTC. Supress if Charger Interlock signal is asserted.	UGM shall suspend all functions; motion permitted as detailed in tables in Functional sections after controls initialized. No response if Charger Interlock signal is asserted.	Battery SOC > Deeply Discharged; speed changes permitted after controls initialized	Engage engine for charging of the batteries, or plug into external AC power source to charge batteries.

DTC	Help Message	Fault Condition/Trigger	Required Control Response or State Assignment	Conditions Required for Movement and/or to Clear Fault	Corrective Action
4431	BATTERY TEMPERATURE – TOO HIGH	The UGM determines that the battery temperature ≥ BATT HITEMP +5°C personality for 2000ms and charging is Enabled.	UGM shall disable charging, command engine shutdown, and prevent engine start GenSet module shall disable charging	Battery temperature returns to within acceptable range, BATT HITEMP – 5 degrees.	Allow batteries to thoroughly cool to prevent battery damage. This could take several hours.
4433	GENERATOR TEMPERATURE – TOO HIGH	The UGM determines that the generator motor temperature reported by the GenSet PM > 140°C but < 200 °C or the Genset PM determines that motor temperature sensor is reporting > 150°C	UGM shall decrease the existing Charge current by 10% for every 1°C over 140°C; charging shall be disabled > 150 °C. If > 150°C GenSet Module shall reduce maximum allowed controller current to half MAXIMUM CURRENT parameter and linearly reduce battery current between 140°C and 150°C (cutback to zero)	GenSet module no longer report fault and UGM determines motor temp < 140°C)	Allow generator to thoroughly cool to prevent generator damage. This could take several hours.
4434	ENGINE START FAILED - TOO MANY ATTEMPTS	UGM has determined that maximum number of failed engine start attempts has been reached	UGM shall prohibit engine start	Power Cycled	Recycle power to clear this fault or contact qualified engine repair personal to troubleshoot the engine.
4440	GENSET MODULE - FEEDBACK FAILURE	After contactor is closed, GenSet Power Module detects that the motor voltage feedback circuits are damaged	UGM shall disable charging, command engine shutdown, and prevent engine start GenSet module shall disable charging	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Cycle power to clear the fault.
4443	GENERATOR SPEED SENSOR - NOT RESPONDING PROPERLY	GenSet Power Module has detected an encoder or directional sensing problem [encoder reading jumps > 40 Hz in 3ms @ speed > 40 Hz]	UGM shall disable charging, command engine shutdown, and prevent engine start; UGM shall debounce reporting for 2 sec and not report if DTC 4322 applies. GenSet module shall disable charging	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Cycle power to clear the fault.

DTC	Help Message	Fault Condition/Trigger	Required Control Response or State Assignment	Conditions Required for Movement and/or to Clear Fault	Corrective Action
4446	GENSET MODULE - VOLTAGE OUT OF RANGE	Power Module determines System Overvoltage/ Undervoltage, Voltage measurement ≥ 65V or ≤ 12V	UGM shall disable charging. GenSet module shall disable charging and open power bridge. Contactor will be re-enabled in an effort to clear the fault, Charging will then be re-enabled. If any of the five Power Modules report Alarm #19, the UGM shall disregard CAN2 loss for 500ms to give Power Modules time to restore communications.	Genset Module no longer reports fault.	Inspect wiring for physical damage and check for wire continuity. Verify voltage to module with multimeter. Cycle power to clear the fault.
4447	GENERATOR OUTPUT - OUT OF RANGE LOW	The GenSet Module detects at Startup that the motor voltage output is lower than expected (Vmn Low; 30/at startup, could be STG or OC; during standby STG).	UGM shall disable charging, command engine shutdown, and prevent engine start GenSet module shall disable charging	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Cycle power to clear the fault. Replace Generator if necessary.
4448	GENERATOR OUTPUT - OUT OF RANGE HIGH	The GenSet Power Module detects at Startup that the motor voltage output is higher than expected (Vmn High; 31/could be STB).	UGM shall disable charging, command engine shutdown, and prevent engine start GenSet module shall disable charging	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Cycle power to clear the fault. Replace Generator if necessary.
4452	BATTERY TEMPERATURE – OUT OF RANGE	The UGM determines that battery temperature reported by GenSet Module ≥ 75°C. or Genset Module battery temperature analog reading is outside range of 0.2V – 4.5V; 221 and reports via CAN2	UGM shall disable charging, command engine shutdown, and prevent engine start GenSet module shall disable charging	The UGM determines that battery temperature reported by GenSet Module < 75°C and the GenSet module is no longer reporting fault	Allow batteries to thoroughly cool to prevent battery damage. This could take several hours.
4453	GENERATOR TEMPERATURE - OUT OF RANGE	The GenSet Power Module reports that motor temperature sensor is out of range due to Open-Circuit (Temp Out of Range – High > 240°C), STG (Temp Out of Range – Low < -30°C) or damage	UGM shall disable charging and shut down engine.	Power Cycled	Inspect harnessing for physical damage and check for wire continuity. Check generator temp sensor for failure. Verify Generator temperature in analyzer DIAGNOSTICS--> GENSET--> GENERATOR TEMP. Cycle power to clear fault.
4456	ENGINE FAN – CURRENT FEEDBACK OUT OF RANGE	The UGM determines that the Power Module reported Pump/Fan current feedback, related to the engine, is outside of the acceptable range for > 5000ms AND the engine state is RUNNING AND the engine fan enable status is TRUE.	UGM sets the engine fan enable bits to FALSE. Power Module turns fan off when fan enable status is FALSE.	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Cycle power to clear the fault.

DTC	Help Message	Fault Condition/Trigger	Required Control Response or State Assignment	Conditions Required for Movement and/or to Clear Fault	Corrective Action
4458	ENGINE FAN OUTPUT – OUT OF RANGE LOW	The Power Module has communicated via CAN2 that the engine fan voltage feedback is lower than expected [Note: P- VMN LOW can cause full voltage on Fan (cannot turn off, except with Genset Contactor)]	UGM shall disable charging, command engine shutdown and prevent engine start; UGM/GenSet module shall command GenSet contactor open	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Cycle power to clear the fault.
4459	ENGINE FAN OUTPUT– OUT OF RANGE HIGH	The Power Module has communicated via CAN that the engine fan voltage feedback is higher than expected, only when not being driven)	UGM shall set the Fan Enable = 0	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Cycle power to clear the fault.
4461 4462 4463 4464	FRONT LEFT FRONT RIGHT REAR LEFT REAR RIGHT [PM] MODULE - VOLTAGE OUT OF RANGE	Associated Power Module determines System Overvoltage/Undervoltage, Voltage measurement ≥ 65V or ≤ 12V	UGM/MTM shall command main contactor open. UGM shall set Ground Emergency Descent Mode = Enabled and permit Emergency Descent after controls initialized. MTM will handle the hardware interrupt while maintaining CAN communications. If voltage is within range after interrupt is processed the fault will be reset. If any of the five Power Modules report Alarm #19, the UGM shall disregard CAN2 loss for 500ms to give Power Modules time to restore communications.	Traction Modules no longer report fault, then Controls Initialized.	Inspect wiring for physical damage and check for wire continuity. Verify voltage to module with multimeter. Cycle power to clear the fault.
4465	START PREVENTED – CHARGER CONNECTED	UGM determines that either the MTM or GenSet Module is reporting that the Plug-in Battery Charger is connected and an Engine Start was attempted	UGM shall disable charging, command engine shutdown, and prevent engine start	Plug-in Battery Charger is no longer connected	Unplug charger from external AC source. Cycle power to remove fault.

DTC	Help Message	Fault Condition/Trigger	Required Control Response or State Assignment	Conditions Required for Movement and/or to Clear Fault	Corrective Action
4466	CONTROL VOLTAGE TOO LOW – SYSTEM SHUT-DOWN	The UGM detects that its 12V supply voltage < than 9 volts for 5 seconds. Engine State ≠ ENGINE CRANKING Auxiliary Power/Emergency Descent Mode is not active Glow plugs are not energized	UGM shall suspend all machine functions and disable all outputs, except those used for Emergency Descent. UGM shall disable Voting Relay and UGM/MTM shall command main contactor open. UGM shall set Ground Emergency Descent Mode = Enabled and permit Emergency Descent after controls initialized. UGM/GenSet module shall command GenSet contactor open. If MACHINE SETUP → H&T LIGHTS = YES, disable lights	Power Cycled	Plug battery charger into external AC power source and allow battery voltage to recharge. Cycle power to remove fault.
4467	CONTROL VOLTAGE TOO HIGH – SYSTEM SHUT-DOWN	The UGM detects that its 12V supply voltage > 16.0 volts for 0 seconds.	UGM shall disable charging, command engine shutdown, and prevent engine start. Disable all UGM and Platform outputs and shall not permit Machine Enable.	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Verify voltage to module with multimeter. Cycle power to clear the fault.
4468	CONTROL VOLTAGE LOW	UGM detects that its supply voltage < 11 volts for 5 seconds. Engine State ≠ ENGINE CRANKING Auxiliary Power/Emergency Descent Mode is not active Glow Plugs are not energized	No function inhibits required	UGM voltage > 11.25V	Plug battery charger into external AC power source and allow battery voltage to recharge. Cycle power to remove fault.
4470	GENSET MODULE FAN – CURRENT FEEDBACK OUT OF RANGE	The UGM determines that the Power Module has communicated that the Genset Module Pump/Fan current feedback is outside of the acceptable range for > 5000ms.	UGM sets the Genset Module fan enable status to FALSE. Power Module turns fan off when enabled status is FALSE.	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Verify voltage to module with multimeter. Cycle power to clear the fault.
4471	GENSET MODULE FAN OUTPUT – OUT OF RANGE LOW	Right Rear Traction Module reports fault that the (fan voltage feedback is lower than expected, only when not being driven)	UGM shall disable charging, command engine shutdown and prevent engine start; UGM/GenSet module shall command GenSet contactor open.	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Verify voltage to module with multimeter. Cycle power to clear the fault.

DTC	Help Message	Fault Condition/Trigger	Required Control Response or State Assignment	Conditions Required for Movement and/or to Clear Fault	Corrective Action
4472	GENSET MODULE FAN OUTPUT – OUT OF RANGE HIGH	Right Rear Traction Module reports fault that the (fan voltage feedback is higher than expected, only when not being driven)	UGM shall set the Genset Module Fan Enable = 0	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Verify voltage to module with multimeter. Cycle power to clear the fault.
4481	SYSTEM DC CURRENT – AT MAXIMUM	If 0°F (-18°C) < Any Drive Motor Temp < 10°F (-12°C). Drive Motor Temp reported by TM. Temperature set-points in Constant Data. AND UGM determines that averaged SUM of DC Estimated Current from Traction Power Modules + Offset is > 800A for 500mSec When SUM > 400A, Offset is +150A;	UGM shall limit Drive to Creep	If All Drive Motor Temps > 10°F (-12°C); UGM shall remove Creep speed restriction after controls initialized	Check forrotational interference or stalled AC motor.
4482	WHEEL DRIVE COMPONENTS – TOO COLD	If Any Drive Motor Temp < 0°F (-18°C) Drive Motor Temp reported by TM. Temperature set-point in Constant Data (same as low temp set-point above).	UGM shall limit Drive to Creep	If All Drive Motor Temps > 10°F (-12°C); UGM shall remove Creep speed restriction after controls initialized	Hub oil too cold or rotational interference
4483	BATTERY SOC ERROR - CHARGING DISABLED	ICHARGE (Commanded Charge Current) < ISTOP set-point for CHARGETIMER AND SOC < = 60% (CONSTANT DATA)	Disable Charging	Power Cycle	Check operation of current sensor and all battery connections
4688	CHASSIS FAN OUTPU – OUT OF RANGE LOW	Left Rear Traction Module reports fault that the (fan voltage feedback is lower than expected, only when not being driven)	UGM shall suspend motion and prohibit all Pump-powered functions. UGM shall command an Emergency Stop. At the end of the Emergency Stop command, the UGM shall enable a timer based on 0x0102 value (EMERGENCY BRAKING) and once timer expired, UGM shall command main contactor open and disable voting relay. MTM shall perform an Emergency Stop and command main contactor open. UGM shall set Ground Emergency Descent Mode = Enabled and permit Emergency Descent after controls initialized.	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Verify voltage to module with multimeter. Cycle power to clear the fault.
4689	CHASSIS FAN OUTPUT – OUT OF RANGE HIGH	Left Rear Traction Module reports fault that the	UGM shall set the Chassis Fan Enable = 0.	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Verify voltage to module with multimeter. Cycle power to clear the fault.

DTC	Help Message	Fault Condition/Trigger	Required Control Response or State Assignment	Conditions Required for Movement and/or to Clear Fault	Corrective Action
4690 4691 4692 4693	FRONT LEFT FRONT RIGHT REAR LEFT REAR RIGHT [PM] BRAKE DRIVER – SHORT TO GROUND OR OPEN CIRCUIT	Associated Power Module detects A4 shorted to ground: at Standby or at Running	UGM shall suspend motion and prohibit all Pump-powered functions. UGM shall disable Voting Relay and UGM/MTM shall command main contactor open; UGM shall set Ground Emergency Descent Mode = Enabled and permit Emergency Descent after controls initialized.	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Check for sensor damage at the drive motor for damage or shorting condition in connector. Cycle power to clear the fault.
4699	MAIN CONTACTOR / FRONT RIGHT BRAKE RETURN – SHORT TO BATTERY	At Startup, the Master Traction Module detects an overcurrent condition on pin A12, indicating a short between B+ and the Main Contactor. During active traction, the Master Traction Module detects an overcurrent condition on pin A4, Electric Brake FET	UGM shall suspend motion and prohibit all Pump-powered functions. UGM shall disable Voting Relay and UGM/MTM shall command main contactor open; UGM shall set Ground Emergency Descent Mode = Enabled and permit Emergency Descent after controls initialized.	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Cycle power to clear the fault.
4698 46100 46101	FRONT LEFT REAR LEFT REAR RIGHT [PM] BRAKE RETURN – SHORT TO BATTERY	At Startup, Traction Module detects an overcurrent condition on pin A4, indicating a short between B+ and the Electric Brake FET	UGM shall suspend motion and prohibit all Pump-powered functions. UGM shall disable Voting Relay and UGM/MTM shall command main contactor open; UGM shall set Ground Emergency Descent Mode = Enabled and permit Emergency Descent after controls initialized	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Check for sensor damage at the drive motor for damage or shorting condition in connector. Cycle power to clear the fault.
46102 46103 46104 46105	FRONT LEFT FRONT RIGHT REAR LEFT REAR RIGHT [PM] SPEED SENSOR - NOT RESPONDING PROPERLY	Associated Power Module has detected an encoder or directional sensing problem [encoder reading jumps > 40 Hz in 3ms @ speed > 40 Hz]	UGM shall suspend motion and keep Drive disabled; remaining functions permitted after controls initialized. MTM shall disable traction and apply parking brake.	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Check for sensor damage at the drive motor for damage or shorting condition in connector. Cycle power to clear the fault.

DTC	Help Message	Fault Condition/Trigger	Required Control Response or State Assignment	Conditions Required for Movement and/or to Clear Fault	Corrective Action
46106 46107 46108 46109	FRONT LEFT FRONT RIGHT REAR LEFT REAR RIGHT [PM] SPEED SENSOR - RPM HIGH	Associated Power Module determines an over-speed condition (measured motor speed > DRIVE MAX + 15Hz) has occurred on a motor or UGM determines that Encoder counts > 5000 for > 1s on any wheel	If Power Module detects, MTM shall perform an Emergency Stop. If UGM triggered DTC due to Power Module report of fault, UGM shall suspend motion and keep Drive disabled; remaining functions permitted after controls initialized. If UGM triggered DTC due to high encoder counts, UGM shall command an Emergency Stop, suspend motion and keep Drive disabled; remaining functions permitted after controls initialized.	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Check for sensor damage at the drive motor for damage or shorting condition in connector. Cycle power to clear the fault.
46110	CHASSIS FAN – CURRENT FEEDBACK OUT OF RANGE	The UGM determines that the Power Module has communicated that the Pump/Fan current related to the Chassis Fan current feedback is outside of the acceptable range for > 5000ms.	UGM sets the chassis fan enable status to FALSE. Power Module turns fan off when enabled status is FALSE.	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Cycle power to clear the fault.
46134 46135 46136 46137	FRONT LEFT FRONT RIGHT REAR LEFT REAR RIGHT [PM] BRAKE SUPPLY VOLTAGE – OUT OF RANGE LOW	Associated Power Module determines that the high-side brake supply to Pin A3 is open-circuit or voltage is not as expected	UGM shall disable Voting Relay and UGM/MTM shall command main contactor open; UGM shall set Ground Emergency Descent Mode = Enabled and permit Emergency Descent after controls initialized	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Check for sensor damage at the drive motor for damage or shorting condition in connector. Cycle power to clear the fault.

DTC	Help Message	Fault Condition/Trigger	Required Control Response or State Assignment	Conditions Required for Movement and/or to Clear Fault	Corrective Action
662	CANBUS FAILURE – PLATFORM MODULE	UGM does not receive any CAN messages from Platform Module in 250ms	If in Platform mode, UGM shall suspend all machine functions and disable all outputs. Jib Lift and Platform Rotate also disable in Ground Mode. If MACHINE SETUP→ POWER INVERTER = YES, UGM to retain state of Inverter switch and GenSet Enable switch at the state prior to CAN1 loss until CAN1 is restored or power cycled.	CAN1 messages are received from the PM and controls are initialized	With power off, disconnect the boom cable at the bottom of the Platform box. With a multimeter, verify that the resistance between the CAN1H and CAN1L pins of the boom cable is approximately 120ohms. Verify the same at the connector entering the bottom of the box. If Okay, connect cable at platform and disconnect cable at connection near turntable. Check in the same manner then continue splitting the measuring in the manner over remainder of machine CAN Bus. When a bad reading occurs, check wire continuity on the individual wire. Fault is cleared when CAN message are received from Platform Module.
663	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.	UGM to set Platform Load State = Overloaded	Not all of the trigger conditions are met; motion restrictions removed after controls initialized	Check wiring to load sensor.
6613	CANBUS FAILURE – EXCESSIVE CANBUS ERRORS	UGM observes more than 22 error frames per second for 4 seconds or more than 500 Buss Off conditions since last power cycle.	No UGM function inhibits required.	Power Cycled	Cycle power to clear the fault.
6622	CANBUS FAILURE – TCU MODULE	MACHINE SETUP→ CLEARSKY = YES No CAN1 messages are received from the TCU module for more than 30 seconds; do not report if DTC 6623 is active	No function inhibits required	Not all of the trigger conditions are met	CAN messages are received from the TCU module.
6623	CANBUS FAILURE – GATEWAY MODULE	MACHINE SETUP→ CLEARSKY = YES No CAN1 messages are received from the Gateway Module for more than 30 seconds	No function inhibits required	Not all of the trigger conditions are met	With power off, disconnect the connector. With a multimeter, verify that the resistance between the CAN1H and CAN1L pins of the boom cable is approximately 60ohms. If Okay, reconnect the connector. Replace the sensor. Fault is cleared when CAN message are received from the Module.

DTC	Help Message	Fault Condition/Trigger	Required Control Response or State Assignment	Conditions Required for Movement and/or to Clear Fault	Corrective Action
6629	CANBUS FAILURE - TELEMATICS CANBUS LOADING TOO HIGH		No function inhibits required	Zero Configuration Status (Status Byte = 00) sent on first byte	With power off, disconnect the connector. With a multimeter, verify that the resistance between the CAN1H and CAN1L pins of the boom cable is approximately 60ohms. If Okay, reconnect the connector. Replace the sensor. Fault is cleared when CAN message are received from the Module.
6635	CANBUS FAILURE – CHASSIS TILT SENSOR	UGM does not receive any CAN1 messages from Chassis Tilt Sensor in 250ms	For Tilt and Grade considerations, UGM shall consider the omnidirectional tilt angle = 90° (machine tilted), display?? on Analyzer for X/Y axes, and externally report X and Y axes = 20°	CAN1 messages are received from the sensor and controls are initialized	With power off, disconnect the connector. With a multimeter, verify that the resistance between the CAN1H and CAN1L pins of the boom cable is approximately 60ohms. If Okay, reconnect the connector. Replace the sensor. Fault is cleared when CAN message are received from the Module.

DTC	Help Message	Fault Condition/Trigger	Required Control Response or State Assignment	Conditions Required for Movement and/or to Clear Fault	Corrective Action
6652	FRONT LEFT	After Startup complete, Power Module CAN2 messages are not received in 200ms	UGMàPM: If UGM CAN bus loss to Traction Power Modules, UGM shall suspend motion and prohibit all Pump-powered functions. UGM shall command an Emergency Stop. At the end of the Emergency Stop command, the UGM shall enable a timer based on 0x0102 value (EMERGENCY BRAKING) and once timer expired, UGM shall command main contactor open and disable voting relay. MTM shall perform an Emergency Stop and command main contactor open. PM→ PM: If CAN bus loss between Traction Power Modules (>200ms), MTM shall command main contactor open immediately. UGM shall suspend motion and prohibit all Pump-powered functions.	UGM receives all traction modules CAN2 messages and shall command main contactor closed; once fault reset, motion permitted after controls are initialized. If CAN messages are lost more than 5 times, the fault shall be latched until Power Cycle.	With power off, disconnect the module 35 pin amp connector. With a multimeter, verify that the resistance between the CAN1H and CAN1L pins of the boom cable is approximately 60ohms. If Okay, reconnect the connector. Check in the same manner then continue splitting the measuring in the manner over remainder of machine CAN Bus. When a bad reading occurs, check wire continuity on the individual wire. Fault is cleared when CAN message are received from the Module.
6653	FRONT RIGHT		All Conditions: UGM shall set Ground Emergency Descent Mode = Enabled and permit Emergency Descent after controls initialized. UGM shall retain $SOC\%_{BATT.}$ UGM/GenSet module shall command GenSet contactor open.		
6654	REAR LEFT				
6655	REAR RIGHT				
	CANBUS FAILURE - [PM] MODULE				

DTC	Help Message	Fault Condition/Trigger	Required Control Response or State Assignment	Conditions Required for Movement and/or to Clear Fault	Corrective Action
6656	CANBUS FAILURE - GENSET MODULE	After Startup complete, GenSet Module CAN2 messages are not received in 200ms	UGM shall disable charging, command engine shut-down, and disable engine start. UGM/GenSet module shall command GenSet contactor open.	UGM receives GenSet CAN 2 messages, clears fault, and commands GenSet contactor closed. If CAN messages are lost more than 5 times, the fault shall be latched until Power Cycle.	With power off, disconnect the module 35 pin amp connector. With a multimeter, verify that the resistance between the CAN1H and CAN1L pins of the boom cable is approximately 60ohms. If Okay, reconnect the connector. Check in the same manner then continue splitting the measuring in the manner over remainder of machine CAN Bus. When a bad reading occurs, check wire continuity on the individual wire. Fault is cleared when CAN message are received from the Module.
6657	CANBUS FAILURE – TEMPERATURE SENSOR	UGM determines that: · MACHINE SETUP→ TEMP CUTOUT = YES · UGM does not receive any CAN1 messages from the Low Temperature Cutout sensor in 250ms Suppress DTCs 241 and 242 if this DTC is active.	If the machine is in Platform Mode and Above Elevation, UGM shall suspend motion and set Low Temperature Cutout state = Faulty; all functions limited to Creep speed after controls initialized If the Machine is in Platform Mode and Not Above Elevation, UGM shall suspend motion; all functions except Drive/Steer limited to Creep speed after controls initialized. If the machine is in Ground Mode, no response required.	UGM receives CAN1 messages from the Ambient Temperature sensor; speed restrictions removed after controls initialized	With power off, disconnect the connector. With a multimeter, verify that the resistance between the CAN1H and CAN1L pins of the boom cable is approximately 60ohms. If Okay, reconnect the connector. Check in the same manner then continue splitting the measuring in the manner over remainder of machine CAN Bus. When a bad reading occurs, check wire continuity on the individual wire. Fault is cleared when CAN message are received from the Module.
6646	CANBUS FAILURE – BATTERY CURRENT SENSOR	UGM does not receive any CAN1 messages from DC Current Sensor in 250ms	The UGM shall estimate the battery current draw = [(1s Averaged Estimated DC Current FR + FL + RR + RL + Offset A) + (Estimated DC Current GenSet)], where Offset A = 0A if total Traction Module Estimated DC Current < 10A or Offset A = 10A, if Total Traction Module Estimated DC Current >= 10A (Constant Data) Note: GenSet Est DC Current is negative.	UGM receives CAN1 messages from the Current Sensor and uses its reported current	With power off, disconnect the connector. With a multimeter, verify that the resistance between the CAN1H and CAN1L pins of the boom cable is approximately 60ohms. If Okay, reconnect the connector. Check in the same manner then continue splitting the measuring in the manner over remainder of machine CAN Bus. When a bad reading occurs, check wire continuity on the individual wire. Fault is cleared when CAN message are received from the Module.

DTC	Help Message	Fault Condition/Trigger	Required Control Response or State Assignment	Conditions Required for Movement and/or to Clear Fault	Corrective Action
6682	CANBUS FAILURE – GROUND LIGHT PANEL	(Jumper Configuration Status > 0); UGM does not receive any CAN messages from the Ground Light Panel in 250ms	No function inhibits required	Not all of the trigger conditions are met	Check CAN1 connections and bus impedance (~60 ohms)
6683	CANBUS FAILURE – PLATFORM LIGHT PANEL	(Jumper Configuration Status > 0); UGM does not receive any CAN messages from the Platform Light Panel in 250ms	No function inhibits required	Not all of the trigger conditions are met	Check CAN1 connections and bus impedance (~60 ohms)
681	REMOTE CONTRACT MANAGEMENT OVERRIDE – ALL FUNCTIONS IN CREEP	MACHINE SETUP→ CLEARSKY = YES UGM assesses value set by ClearSky TCU	UGM shall limit all machine function speeds to Creep and lock in Transport position	Cleared by ClearSky TCU	Cleared by ClearSky TCU
7725	PUMP MOTOR - NOT RESPONDING	The Master Traction Module detects that the pump motor feedback is not responding when the pump is being commanded	UGM shall suspend motion and prohibit pump-powered functions; Drive speed shall be limited to Creep after controls initialized; Master Traction Module shall immediately disable the Pump output and report fault. UGM shall set Ground Emergency Descent Mode = Enabled and permit Emergency Descent after controls initialized	Power Cycled	Check for physical harness damage. Verify operation of pump and traction module. Replace if necessary. Cycle power to clear fault.
7730	PUMP MOTOR OUTPUT - OUT OF RANGE HIGH	Master Traction Module detects that the pump motor voltage output is higher than expected. Too high with respect to PWM applied.	UGM shall immediately stop all functions and prohibit pump-powered functions; Drive speed shall be limited to Creep after controls initialized. Master Traction Module shall immediately disable the Pump output and report fault. UGM shall set Ground Emergency Descent Mode = Enabled and permit Emergency Descent after controls initialized	Power Cycled	Check for physical harness damage. Verify operation of pump and traction module. Replace if necessary. Cycle power to clear fault.

DTC	Help Message	Fault Condition/Trigger	Required Control Response or State Assignment	Conditions Required for Movement and/or to Clear Fault	Corrective Action
7731	PUMP MOTOR OUTPUT - OUT OF RANGE LOW	Master Traction Module detects that the pump motor voltage output lower than expected. Too low with respect to PWM applied.	UGM shall suspend motion and prohibit pump-powered functions. UGM shall command an Emergency Stop. At the end of the Emergency Stop command, the UGM shall enable a timer equal to the 0x0102 value (EMERGENCY BRAKING) and once timer expired, UGM shall command main contactor open and disable voting relay. MTM shall perform an Emergency Stop and command main contactor open UGM shall set Ground Emergency Descent Mode = Enabled and permit Emergency Descent after controls initialized	Power Cycled	Check for physical harness damage. Verify operation of pump and traction module. Replace if necessary. Cycle power to clear fault.
7737	PUMP MOTOR OVERLOADED	UGM detects that Pump Current reported by MTM > 210A for 3000ms (both Constant Data values). MTM detects pump current > 220A	UGM shall suspend motion and prohibit pump-powered functions; Drive speed shall be limited to Creep after controls initialized. MTM will keep the Pump motor current below limit (220A@48V) based on thermal cutback, but will not report fault.	Currents return to levels below trigger level for same time period as trigger, and controls initialized. UGM shall remove Drive Creep speed restriction after controls initialized.	Check for physical harness damage. Verify operation of pump and traction module. Replace if necessary. Cycle power to clear fault.
7755 7756 7757 7758 	FRONT LEFT FRONT RIGHT REAR LEFT REAR RIGHT [PM] MOTOR OUTPUT - OUT OF RANGE HIGH	Associated Power Module detects at Startup or during active traction that the motor voltage output is higher than expected	UGM shall command an Emergency Stop and Power Modules shall perform an Emergency Stop; UGM shall keep Drive disabled. Other functions permitted after controls initialized.	Power Cycled	Check for physical harness damage. Verify operation of motor and traction module. Replace if necessary. Cycle power to clear fault.
7759 7760 7761 7762 	FRONT LEFT FRONT RIGHT REAR LEFT REAR RIGHT [PM] MOTOR OUTPUT - OUT OF RANGE LOW	Associated Power Module detects at Startup or during active traction that the motor voltage output is lower than expected	UGM shall command an Emergency Stop and Power Modules shall perform an Emergency Stop; UGM shall keep Drive disabled. Other functions permitted after controls initialized.	Power Cycled	Check for physical harness damage. Verify operation of motor and traction module. Replace if necessary. Cycle power to clear fault.

DTC	Help Message	Fault Condition/Trigger	Required Control Response or State Assignment	Conditions Required for Movement and/or to Clear Fault	Corrective Action
7751 7752 7753 7754	FRONT LEFT FRONT RIGHT REAR LEFT REAR RIGHT [PM] MOTOR STALLED	The UGM or Power Module(s) detects that the motor is stalled during active traction. For the UGM commanded speed ≥ Creep AND (LEFT) +33 > Steer Angle < -25 (RIGHT), the reported avg motor encoder feedback < 70 counts/s for 5 seconds (1.685 Hz). Avg motor encoder feedback evaluate on a 1s running average. For MTM, the encoder-measured motor speed < 0.6Hz for 5 seconds, when applied frequency > 1.5 Hz and Command > 10 Hz	UGM shall suspend Drive	UGM and associated Power Module(s) shall clear the fault after drive joystick returns to neutral (and command returns to zero)	Check for physical harness damage. Verify operation of motor and traction module. Replace if necessary. Cycle power to clear fault.
7763 7764 7765 7766	FRONT LEFT FRONT RIGHT REAR LEFT REAR RIGHT [PM] MOTOR - FEEDBACK FAILURE	After main contactor is closed, Power Module detects that the motor voltage feedback circuits are damaged	UGM shall command an Emergency Stop and Power Modules shall perform an Emergency Stop; UGM shall keep Drive disabled. Other functions permitted after controls.initialized.	Power Cycled	Check for physical harness damage. Verify operation of motor and traction module. Replace if necessary. Cycle power to clear fault.
7767 7768 7769 7770	FRONT LEFT FRONT RIGHT REAR LEFT REAR RIGHT [PM] MOTOR - ROTATION OPPOSITE CONTROL	Associated Power Module detects that the motor is rotating in the direction opposite of the commanded direction during active traction and deceleration is less than 50% of deceleration personality setting for a period of more than 0.5 seconds	UGM and Power Modules shall perform an Emergency Stop; UGM shall keep Drive disabled. Remaining functions permitted after controls initialized	Power Cycled	Check for physical harness damage. Verify operation of motor and traction module. Replace if necessary. Cycle power to clear fault.
7771 7772 7773 7774	FRONT LEFT FRONT RIGHT REAR LEFT REAR RIGHT [PM] MOTOR – OPEN CIRCUIT	When motor output is active, the Power Module detects that a motor phase is disconnected/open during active traction	UGM shall command an Emergency Stop and Power Modules shall perform an Emergency Stop; UGM shall keep Drive disabled. Remaining functions permitted after controls initialized	Power Cycled	Check for physical harness damage. Verify operation of motor and traction module. Replace if necessary. Cycle power to clear fault.
813	CHASSIS TILT SENSOR NOT CALIBRATED	UGM determines that tilt sensor, . has not been calibrated · serial number does not match stored value · unitialized sensor has been installed	The UGM reports individual axes readings, but reports the omnidirectional tilt angle = 90 degrees (machine treated as tilted)	Tilt sensor calibrated	Calibrate the Tilt sensor to clear the fault.
814	CHASSIS TILT SENSOR OUT OF RANGE	Fault CHASSIS TILT SENSOR NOT CALIBRATED (813) is not present and either of the external tilt sensor X or Y axis ≥ ABS [35 º] for 4 seconds. Not to be reported during Tilt Sensor calibration.	UGM reports individual and omnidirectional axis reading; no other controls response is required.	Not all of the trigger conditions are met.	Tilt sensor reads less than 19°
818	TILT SENSOR STAGNANT	UGM shall consider the Tilt Sensor stagnant if neither the X-axis or Y-axis unfiltered reading change by ≥ ±0.05º in 5000ms while the reported Drive speed ≥ Drive Creep Hz for all Traction modules	For Tilt and Grade considerations, UGM shall consider the omnidirectional tilt angle = 90° (machine tilted) and externally report X and Y axes = 20°; UGM shall continue to display actual individual axis readings on Analyzer	Power Cycled	Cycle power to clear fault.

DTC	Help Message	Fault Condition/Trigger	Required Control Response or State Assignment	Conditions Required for Movement and/or to Clear Fault	Corrective Action
821	LSS CELL #1 ERROR	MACHINE SETUP→ LOAD SYSTEM ≠ NO The UGM detects that LSS is reporting error with Cell #1	UGM shall set Platform Load State = Overloaded and provide the operation/interlocks described Load Sensing System section	Not all of the trigger conditions are met; motion restrictions removed after controls initialized	CAN messages are received from the LSS module
822	LSS CELL #2 ERROR	MACHINE SETUP→ LOAD SYSTEM ≠ NO The UGM detects that LSS is reporting error with Cell #2	UGM shall set Platform Load State = Overloaded and provide the operation/interlocks described Load Sensing System section	Not all of the trigger conditions are met; motion restrictions removed after controls initialized	CAN messages are received from the LSS module
823	LSS CELL #3 ERROR	MACHINE SETUP→ LOAD SYSTEM ≠ NO The UGM detects that LSS is reporting error with Cell #3	UGM shall set Platform Load State = Overloaded and provide the operation/interlocks described Load Sensing System section	Not all of the trigger conditions are met; motion restrictions removed after controls initialized	CAN messages are received from the LSS module
824	LSS CELL #4 ERROR	MACHINE SETUP→ LOAD SYSTEM ≠ NO The UGM detects that LSS is reporting error with Cell #4.	UGM shall set Platform Load State = Overloaded and provide the operation/interlocks described Load Sensing System section	Not all of the trigger conditions are met; motion restrictions removed after controls initialized	CAN messages are received from the LSS module
825	LSS HAS NOT BEEN CALIBRATED	The load sensing system is configured but has not been calibrated. The machine will assume the platform is overloaded.	UGM shall set Platform Load State = Overloaded and provide the operation/interlocks described Load Sensing System section	Not all of the trigger conditions are met	Calibrate the load sensing system.
826	RUNNING AT CREEP – PLATFORM OVERLOADED	MACHINE SETUP→ LOAD SYSTEM = WARN ONLY The platform is Overloaded Ground mode is active with Auxiliary Power/ Emergency Descent mode not active or Platform mode is active	The UGM shall set Platform Load State = Overloaded and provide the operation/interlocks described Load Sensing System section	UGM determines that the Platform is not Overloaded; motion restrictions removed after controls initialized	Not all of the trigger conditions are met
827	DRIVE & BOOM PREVENTED – PLATFORM OVERLOADED	The Platform is Overloaded and Machine Setup→ LOAD SYSTEM = CUTOUT PLATFORM, Platform Mode is active, and conditions of Table 9-1 apply. -or- The Platform is Overloaded and Machine Setup→ LOAD SYSTEM = CUTOUT ALL and conditions of Table 9-1 apply.	Refer to Table 9-1 for machine response.	Not all of the trigger conditions are met	Not all of the trigger conditions are met

DTC	Help Message	Fault Condition/Trigger	Required Control Response or State Assignment	Conditions Required for Movement and/or to Clear Fault	Corrective Action
8211	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.	The UGM shall set Platform Load State = Overloaded and provide the operation/interlocks described Load Sensing System section	Not all of the trigger conditions are met; full functionality permitted after controls initialized	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.
8639	FRONT LEFT STEER VALVE – OPEN CIRCUIT	The UGM detects an open circuit at this output	UGM shall limit Drive and Steer speed to Creep	UGM no longer detects open circuit; Creep restriction removed after fault clears and controls initialized	Cycle power to clear the fault.
8640	FRONT LEFT STEER VALVE – SHORT TO BATTERY	The UGM detects a short to12V battery at this output	UGM shall disable Drive and Steer	Power Cycled	Cycle power to clear the fault.
8641	FRONT LEFT STEER VALVE – SHORT TO GROUND	The UGM detects a short to ground at this output J2-19. Only detected at Startup	UGM shall disable Steer Left and Right outputs and limit Drive to Creep	Power Cycled	Cycle power to clear the fault.
8642	FRONT RIGHT STEER VALVE – OPEN CIRCUIT	The UGM detects an open circuit at this output J2-19. Only detected at Startup	UGM shall limit Drive and Steer speed to Creep	UGM no longer detects open circuit; Creep restriction removed after fault clears and controls initialized	Cycle power to clear the fault.
8643	FRONT RIGHT STEER VALVE – SHORT TO BATTERY	The UGM detects a short to 12V battery at this output J2-8	UGM shall disable Drive and Steer	Power Cycled	Cycle power to clear the fault.
8644	FRONT RIGHT STEER VALVE – SHORT TO GROUND	The UGM detects a short to ground at this output J2-8	UGM shall disable Steer Left and Right outputs and limit Drive to Creep	Power Cycled	Cycle power to clear the fault.
8664	STEER SENSOR - OUT OF RANGE HIGH	The UGM observes the Master Traction Module reported steer raw voltage signal ≥ 3.9V	UGM to suspend Drive/Steer and limit Drive to Creep; motion permitted after controls initialized	UGM observes steer voltage within calibrated range for 1000ms; Drive Creep restriction lifted after fault clears and controls initialized	Check harness for physical damage. Observe state change on Analyzer under DIAGNOSTICS--> DRIVE/STEER--> STEER SENSOR SWITCH. Change will be 0.5V to 4.5V. If not replace STEER SENSOR
8665	STEER SENSOR - OUT OF RANGE LOW	The UGM observes the Master Traction Module reported steer raw voltage signal <0.3V	UGM to suspend Drive/Steer and limit Drive to Creep; motion permitted after controls initialized	UGM observes steer angle voltage within calibrated range for 1000ms; Drive Creep restriction lifted after fault clears and controls initialized	Check harness for physical damage. Observe state change on Analyzer under DIAGNOSTICS--> DRIVE/STEER--> STEER SENSOR SWITCH. Change will be 0.5V to 4.5V. If not replace STEER SENSOR

DTC	Help Message	Fault Condition/Trigger	Required Control Response or State Assignment	Conditions Required for Movement and/or to Clear Fault	Corrective Action
8666	STEER SENSOR - DECOUPLED	The UGM observes the Master Traction Module reported steer raw voltage 0.3V ≤ signal < 0. 5V	UGM to suspend Drive/Steer and limit Drive to Creep; motion permitted after controls initialized	UGM observes steer angle voltage within calibrated range for 1000ms; Drive Creep restriction lifted after fault clears and controls initialized	Check harness for physical damage. Observe state change on Analyzer under DIAGNOSTICS--> DRIVE/STEER--> STEER SENSOR SWITCH. Change will be 0.5V to 4.5V. If not replace STEER SENSOR
8667	STEER SENSOR - NOT RESPONDING	The UGM determines that the Master Traction Module reported angle does not change ≥ 1.0° in 4000mS while the steering output is being commanded > Creep, while steer is calibrated and properly reported by MTM in range (-33°<angle<42°); 3 degree buffer	UGM to suspend Drive/Steer and limit Drive to Creep; motion permitted after controls initialized	UGM determines steer angle changes more than trigger amount while in allowed evaluation range; Drive Creep restriction removed after fault clears and controls initialized	Check harness for physical damage. Observe state change on Analyzer under DIAGNOSTICS--> DRIVE/STEER--> STEER SENSOR SWITCH. Change will be 0.5V to 4.5V. If not replace STEER SENSOR
8668	STEER SENSOR - NOT CALIBRATED	UGM determines that the steering sensor has not been calibrated; UGM EEPROM values are default, do not match MTM	UGM to limit Drive to Creep	UGM determines that sensor is calibrated	Calibrate the Steer Sensor to clear the fault.
8669	OSCILLATING AXLE SWITCH DISAGREEMENT	The UGM detects that Oscillating Axle switch #1 and switch #2 are not reporting congruent switch states, as defined in the Oscillating Axle Switch Evaluation section. Not to be reported if DTC 23104 BOOM TRANSPORT SWITCH DISAGREEMENT is active.	UGM to assume Above Elevation State and deenergize J1-7 Oscillating Axle digital output.	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Inspect the switches for damage/corrosion. Cycle power to clear the fault.
873	MACHINE SAFETY SYSTEM OVERRIDE OCCURRED	UGM determines that an MSSO has occurred	Machine response as described in the MSSO section	Fault shall be considered active and retained through power cycle; reset only via Analyzer/Calibrations	Contact JLG service to reset code
991	LSS WATCHDOG RESET	MACHINE SETUP→ LOAD SYSTEM ≠ NO UGM detects LSS report of an anomaly exists that has caused a WatchDog Timer reset.	UGM to set Platform Load State = Overloaded	Power Cycled	Cycle power to clear the fault.
992	LSS EEPROM ERROR	MACHINE SETUP→ LOAD SYSTEM ≠ NO UGM detects LSS report of an anomaly that exists in the LSS EEPROM	UGM to set Platform Load State = Overloaded	Power Cycled	Cycle power to clear the fault.
993	LSS INTERNAL ERROR – PIN EXCITATION	MACHINE SETUP→ LOAD SYSTEM ≠ NO UGM detects LSS report of improper excitation voltage	UGM to set Platform Load State = Overloaded	Power Cycled	Cycle power to clear the fault.
994	LSS INTERNAL ERROR – DRDY MISSING FROM A/D	MACHINE SETUP→ LOAD SYSTEM ≠ NO UGM detects LSS report of an anomaly that exists in the LSS A/D converter operations.	UGM to set Platform Load State = Overloaded	Power Cycled	Cycle power to clear the fault.
998	EEPROM FAILURE - CHECK ALL SETTINGS	The UGM has detected an anomaly in the UGM EEPROM that can not be auto-corrected from the backup EEPROM bank.	UGM shall suspend all machine functions and disable all outputs and reset the section of EEPROM where the failure occurred to defaults (if occurs to MACHINE SETUP, reset to NO MODEL???)	Power Cycled	Cycle power to clear the fault.

DTC	Help Message	Fault Condition/Trigger	Required Control Response or State Assignment	Conditions Required for Movement and/or to Clear Fault	Corrective Action
9910	FUNCTIONS LOCKED OUT - PLATFORM MODULE SOFTWARE VERSION IMPROPER	The UGM software version type is 'P' The UGM has received valid version information from the PM. The PM software version type is 'P' The UGM software major version number does not match the major version number of the platform software	UGM shall suspend all machine functions and disable all outputs and activate the platform alarm continuously. If in Platform mode, disable all Drive, Steer, and Boom functions; otherwise, restrict functions to Creep	Not all of the trigger conditions are met	Platform Module needs reprogrammed with correct version of software.
9911	FUNCTIONS LOCKED OUT	MACHINE SETUP → LOAD SYSTEM ≠ NO The UGM determines that the LSS software version is not compatible with existing code per the referenced Software Version Compatibility table.	UGM to set Platform Load State = Overloaded	Power Cycled	Cycle power to clear the fault.
9919	GROUND SENSOR REF VOLTAGE OUT OF RANGE	The UGM has detected reference voltage is out of range: 2.3V < Reference Voltage < 2.7V(debounced for 100ms)	UGM shall command engine shutdown and disable engine start operations; otherwise, no interlocks required.	Power Cycled	Cycle power to clear the fault.
9920	PLATFORM SENSOR REF VOLTAGE OUT OF RANGE	The UGM detects that the reference voltage being reported by PM out of range (4.8V < voltage < 5.2V); debounced for 100ms	UGM shall suspend motion. If in Platform mode, all function speeds shall be limited to Creep	Power Cycled	Cycle power to clear the fault.
9921	GROUND MODULE FAILURE:HIGH SIDE DRIVER CUTOUT FAULTY	The UGM footswitch input J7-15 is LOW The machine is in Platform Mode The High Flow Dump output J2-13 is detected as HIGH via the analog feedback 300ms after it is attempted to be activated during the one time startup test of the UGM hardware shutoff circuitry. This test is not performed if STB is detected on J2-13.	UGM shall suspend all machine functions and disable all outputs. UGM shall prohibit the machine from entering the Machine Enabled state (7-second timer does not begin)	Power Cycled	Cycle power to clear the fault.
9922	PLATFORM MODULE FAILURE - HWFS CODE 1	The PM detects that its V(low) FET has failed and reports this fault to the UGM	No response required.	Power Cycled	Cycle power to clear the fault; if fault remains, replace board.
9924	FUNCTIONS LOCKED OUT - MACHINE NOT CONFIGURED	The machine is powered up and no model has been selected yet in the MACHINE SETUP menu	UGM shall suspend all machine functions and disable all outputs. UGM shall display??? or NO MODEL at Analyzer MACHINE SETUP menu MACHINE SETUP → MODEL NUMBER; UGM shall not report any other faults and shall disable all machine functions	Power Cycled	Cycle power to clear the fault.

DTC	Help Message	Fault Condition/Trigger	Required Control Response or State Assignment	Conditions Required for Movement and/or to Clear Fault	Corrective Action
9927	GROUND MODULE CONSTANT DATA UPDATE REQUIRED	The UGM detects one of the following conditions when software type is 'P' or 'B': The Version Verification Word #1 or the Version Verification Word #2 values located in the constant data sector of flash memory (found on constant data spreadsheet tab pstConstantDataVersion) do not match the values located in the code area of flash memory The Version Major value located in the constant data sector of flash memory (found on constant data spreadsheet tab pstConstantDataVersion) does not match the value located in the code area of flash memory	UGM shall suspend all machine functions and disable all outputs. (i.e., command engine shutdown and do not permit start)	A different application code or constant data version is programmed so that the values match Power Cycled	Contact JLG service to program the new data.
9944	CURRENT FEEDBACK GAINS OUT OF RANGE	One or more of the current feedback gains that are calculated and written to flash memory during the JDES manufacturing test process are detected as being out of range	A gain of 1 is used for the factory gain(s) that was out of range; all functions shall be placed in Creep mode.	Power Cycled	Cycle power to clear the fault.
9945	CURRENT FEEDBACK CALIBRATION CHECKSUM INCORRECT	The current feedback gains checksum that is calculated and written to flash memory during the JDES manufacturing test process is detected as being incorrect	UGM shall suspend all machine functions and disable all outputs	Power Cycled	Cycle power to clear the fault.
9949	MACHINE CONFIGURATION OUT OF RANGE – CHECK ALL SETTINGS	UGM has detected an anomaly in EEPROM with regard to the Machine Setup configuration.	UGM shall suspend all machine functions and disable all outputs. UGM to prompt operator to correct issue via Analyzer and disable all functions until EEPROM data in corrupted area is changed.	Power Cycled and EEPROM data in associated area is changed	Cycle Power and change the Machine Setup data.
9977	LSS CORRUPT EEPROM	MACHINE SETUP→ LOAD SYSTEM ≠ NO and one of the following conditions: UGM determines LSS-stored values for Unloaded weight in Indirect or UGM determines LSS-stored values for Accessory weight in Indirect UGM determines LSS-stored	UGM shall set Platform Load State = Overloaded	Power Cycled	Cycle power to clear the fault.
9979	FUNCTIONS LOCKED OUT - GROUND MODULE SOFTWARE VERSION IMPROPER	Ground software has been installed on a UGM with a ST10F274 processor (Hardware Rev < 6), which does not have guaranteed flash storage in the sector where Constant Data is written.	UGM shall suspend all machine functions and disable all outputs. (i.e., command engine shutdown and do not permit start)	Power Cycled	Cycle power to clear the fault.
9986	GROUND MODULE VLOW FET FAILURE	VLow FET determined to be failed on Startup; UGM unable to read high-sensing inputs.	UGM shall suspend all machine functions and disable all outputs.	Power Cycled	Cycle power to clear the fault.

DTC	Help Message	Fault Condition/Trigger	Required Control Response or State Assignment	Conditions Required for Movement and/or to Clear Fault	Corrective Action
99189	GENSET MODULE - EEPROM FAILURE	Applicable Power Module determines at Startup that an internal EEPROM error exists or UGM fails to successfully verify or write to/read back Indirect Table three times; in latter case, UGM to suppress if DTC 6656 active	UGM and GenSet module shall assume previously stored values.	Power Cycled	Check CAN buss two terminator at J12 connector. If 60 ohms crossed verify proper operations of Genset Module. Replace if necessary
99197	ENGINE FAN – CURRENT FEEDBACK NOT ZERO	GenSet Module determines that the Pump/Fan current related to the engine fan is being measured as not zero when expected to be zero at Startup or during standby	No UGM response required. Master Traction Module shall immediately disable the Pump output and report fault.	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Cycle power to clear the fault.
99218 99232 99246 99260	FRONT LEFT FRONT RIGHT REAR LEFT REAR RIGHT [PM] MODULE - CAPACITOR BANK FAULT	The power capacitor bank of the Power Module is not charging properly (increasing voltage) at Startup, OR Power Module detects A4 shorted to ground at Startup, OR Power Module detects A2 shorted to ground only at Startup.	UGM shall suspend motion and prohibit all Pump-powered functions. UGM shall disable Voting Relay and UGM/MTM shall command main contactor open; UGM shall set Ground Emergency Descent Mode = Enabled and permit Emergency Descent after controls initialized	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Cycle power to clear the fault. Replace module if necessary.
99201	GENSET MODULE - CAPACITOR BANK FAULT	The power capacitor bank of the GenSet Module is not charging properly (increasing voltage) at Startup	UGM shall disable charging, command engine shutdown, and prevent engine start; UGM/GenSet module shall command GenSet contactor open	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Cycle power to clear the fault. Replace module if necessary.
99219 99233 99247 99261	FRONT LEFT FRONT RIGHT REAR LEFT REAR RIGHT [PM] MODULE - A/D FAILURE	Applicable Power Module determines that an internal Analog Input error exists	UGM shall suspend motion and prohibit all Pump-powered functions. UGM shall disable Voting Relay and UGM/MTM shall command main contactor open; UGM shall set Ground Emergency Descent Mode = Enabled and permit Emergency Descent after controls initialized	Power Cycled	Cycle power to clear fault. If fault continues replace module.
99202	GENSET MODULE - A/D FAILURE	GenSet Module determines that an internal Analog Input error exists	UGM shall disable charging, command engine shutdown, and prevent engine start; UGM/GenSet module shall command GenSet contactor open	Power Cycled	Cycle power to clear fault. If fault continues replace module.

DTC	Help Message	Fault Condition/Trigger	Required Control Response or State Assignment	Conditions Required for Movement and/or to Clear Fault	Corrective Action
99206	FRONT LEFT	Applicable Power Module determines at Startup that an internal EEPROM error exists or UGM fails to successfully verify or write to/read back Indirect Table three times; in latter case, UGM to suppress if DTCs 6652, 6653, 6654 or 6655 are active, respectively	UGM shall command an Emergency Stop and Power Modules shall perform Emergency Stop; UGM shall suspend motion and disable Drive. Master Traction Module shall immediately disable the Pump output and report fault. Motion permitted after controls initialized. Power Modules shall use default EEPROM values; UGM shall assume previously stored values.	Power Cycled	Check CAN buss two terminator at J12 connector. If 60 ohms crossed verify proper operations of module. Replace module if necessary.
99220	FRONT RIGHT				
99234	REAR LEFT				
99248	REAR RIGHT				
	[PM] MODULE - EEPROM FAILURE				
99207	FRONT LEFT	Applicable Power Module determines that an internal failure exists in the hardware protection circuit (Logic Failure #3; 17)	UGM shall suspend motion and prohibit all Pump-powered functions. UGM shall disable Voting Relay and UGM/MTM shall command main contactor open; UGM shall set Ground Emergency Descent Mode = Enabled and permit Emergency Descent after controls initialized	Power Cycled	Cycle power to clear fault. If fault continues replace module.
99221	FRONT RIGHT				
99235	REAR LEFT				
99249	REAR RIGHT				
	[PM] MODULE - PROTECTION FAILURE				
99190	GENSET MODULE - PROTECTION FAILURE	GenSet Module determines that an internal failure exists in the hardware protection circuit	UGM shall disable charging, command engine shutdown, and prevent engine start; UGM/GenSet module shall command GenSet contactor open	Power Cycled	Cycle power to clear fault. If fault continues replace module.
99208	FRONT LEFT	Applicable Power Module determines at Startup that a short circuit exists on the power MOSFET outputs	UGM shall command an Emergency Stop and Power Modules shall perform Emergency Stop; UGM to suspend motion and disable Drive; remaining functions permitted after controls initialized.	Power Cycled	Cycle power to clear fault. If fault continues replace module.
99222	FRONT RIGHT				
99236	REAR LEFT				
99250	REAR RIGHT				
	[PM] MODULE - CHECK POWER CIRCUITS OR MOSFET SHORT CIRCUIT				
99191	GENSET MODULE - CHECK POWER CIRCUITS OR MOSFET SHORT CIRCUIT	GenSet Module determines at Startup that a short circuit exists on the power MOSFET outputs	UGM shall disable charging, command engine shutdown, and prevent engine start; UGM/GenSet module shall command GenSet contactor open	Power Cycled	Cycle power to clear fault. If fault continues replace module.

DTC	Help Message	Fault Condition/Trigger	Required Control Response or State Assignment	Conditions Required for Movement and/or to Clear Fault	Corrective Action
99209 99223 99237 99251	FRONT LEFT FRONT RIGHT REAR LEFT REAR RIGHT [PM] MODULE - WATCHDOG RESET	Applicable Power Module determines that Watchdog failure/reset has occurred to one if two, or both	UGM shall suspend motion and prohibit all Pump-powered functions. UGM shall disable Voting Relay and UGM/MTM shall command main contactor open; UGM shall set Ground Emergency Descent Mode = Enabled and permit Emergency Descent after controls initialized	Power Cycled	Cycle power to clear fault. If fault continues replace module.
99192	GENSET MODULE - WATCHDOG RESET	GenSet Module determines that Watchdog failure/reset has occurred to one if two, or both	UGM shall disable charging, command engine shutdown, and prevent engine start; UGM/GenSet module shall command GenSet contactor open	Power Cycled	Cycle power to clear fault. If fault continues replace module.
99210 99224 99238 99252	FRONT LEFT FRONT RIGHT REAR LEFT REAR RIGHT [PM] MODULE - WATCHDOG2 RESET	Applicable Power Module determines that Watchdog2 failure/reset has occurred	UGM shall suspend motion and prohibit all Pump-powered functions. UGM shall disable Voting Relay and UGM/MTM shall command main contactor open; UGM shall set Ground Emergency Descent Mode = Enabled and permit Emergency Descent after controls initialized	Power Cycled	Cycle power to clear fault. If fault continues replace module.
99193	GENSET MODULE - WATCHDOG2 RESET	GenSet Module determines that Watchdog2 failure/reset has occurred	UGM shall disable charging, command engine shutdown, and prevent engine start; UGM/GenSet module shall command GenSet contactor open	Power Cycled	Cycle power to clear fault. If fault continues replace module.
99211 99225 99239 99253	FRONT LEFT FRONT RIGHT REAR LEFT REAR RIGHT [PM] MODULE - RAM FAILURE	Applicable Power Module determines that a RAM checksum error has occurred	UGM shall suspend motion and prohibit all Pump-powered functions. UGM shall disable Voting Relay and UGM/MTM shall command main contactor open; UGM shall set Ground Emergency Descent Mode = Enabled and permit Emergency Descent after controls initialized.	Power Cycled	Cycle power to clear fault. If fault continues replace module.

DTC	Help Message	Fault Condition/Trigger	Required Control Response or State Assignment	Conditions Required for Movement and/or to Clear Fault	Corrective Action
99194	GENSET MODULE - RAM FAILURE	GenSet Module determines that a RAM checksum error has occurred	UGM shall disable charging, command engine shut-down, and prevent engine start; UGM/GenSet module shall command GenSet contactor open	Power Cycled	Cycle power to clear fault. If fault continues replace module.
99262 99263 99264 99265	FRONT LEFT FRONT RIGHT REAR LEFT REAR RIGHT [PM] MODULE - CURRENT MEASUREMENT ERROR	Applicable Power Module determines when traction is active that the current feedback sensors are out of the permitted range and may cause incorrect data acquisition values	UGM shall suspend motion, command Emergency Stop and disable Drive; Power Modules shall perform an Emergency Stop. Remaining functions permitted after controls initialized.	Power Cycled	Cycle power to clear fault. If fault continues replace module.
99267 99268 99269 99270	FRONT LEFT FRONT RIGHT REAR LEFT REAR RIGHT [PM] MODULE - DRIVE COMMAND ERROR	Power Modules determine that an inconsistency has occurred between the Drive direction/enable bits and Drive magnitude/direction command	UGM shall command and Power Modules shall perform Emergency Stop; UGM shall suspend motion and disable Drive. Motion permitted after controls initialized. Remaining functions permitted after controls initialized.	Power Cycled	Verify drive command through the analyzer. DIAGNOSTICS--> DRIVE/STEER--> DRIVE DEMAND. If drive demand is correct replace module. If drive demand is not correct replace joystick.
99167	PUMP COMMAND ERROR	Master Traction Module determines that an inconsistency has occurred between the Pump Enable bits and the Pump commands; Pump enable bit = set, but Pump Command = 0	UGM shall suspend motion and prohibit all Pump-powered functions; Drive limited to Creep.UGM shall set Ground Emergency Descent Mode = Enabled and permit Emergency Descent after controls initialized Master Traction Module shall immediately disable the Pump output and report fault.	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Cycle power to clear the fault. Replace module if necessary.
99242	CHASSIS FAN – CURRENT FEEDBACK NOT ZERO	Left Rear Power Module determines that the Pump/Fan current related to the Chassis Fan is being measured as not zero when expected to be zero at Startup or during standby	No UGM response required. Power Module will linearly reduce maximum ACrms traction current from 85°C to 105°C (shutdown).	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Cycle power to clear the fault. Replace module if necessary.

DTC	Help Message	Fault Condition/Trigger	Required Control Response or State Assignment	Conditions Required for Movement and/or to Clear Fault	Corrective Action
99271 99272 99273 99274	FRONT LEFT FRONT RIGHT REAR LEFT REAR RIGHT FUNCTIONS LOCKED OUT - [PM] MODULE SOFTWARE VERSION IMPROPER	The UGM software version type is 'P' The UGM has received valid version information from all Power Modules. The Power Module major version number is not compliant with the version specified on the Software section of this document.	UGM to suspend motion, activate the platform alarm continuously, and disable Drive/Steer; after controls initialized restrict remaining functions to Creep.	Not all of the trigger conditions are met	Contact JLG service to program the new parameters.
99275	FUNCTIONS LOCKED OUT – GENSET MODULE SOFTWARE VERSION IMPROPER	The UGM software version type is 'P' The UGM has received valid version information from GenSet Power Modules. The GenSet Power Module major version number is not compliant with the version specified on the Software section of this document.	UGM shall disable charging, command engine shutdown, and prevent engine start; UGM/GenSet module shall command GenSet contactor open	Not all of the trigger conditions are met	Contact JLG service to program the new parameters.
99276	GENSET MODULE – CONTACTOR DRIVER FAILURE	GenSet Power Module detects that the line contactor driver is out of order and not able to close	UGM shall disable charging, command engine shutdown, and prevent engine start; UGM/GenSet module shall command GenSet contactor open	Power Cycled	Contact JLG service to program the new parameters.
99277	FRONT RIGHT MODULE – CONTACTOR DRIVER FAILURE	GenSet Power Module detects that the line contactor driver is out of order and not able to close	UGM shall disable charging, command engine shutdown, and prevent engine start; UGM/GenSet module shall command GenSet contactor open	Power Cycled	Contact JLG service to program the new parameters.
99200	GENSET MODULE - WRONG LOGIC VOLTAGE AT POWER-ON	GenSet Module determines at Startup that there is a problem with overvoltage/undervoltage detection	UGM shall disable charging command engine shutdown, and prevent engine start; UGM/GenSet module shall command GenSet contactor open	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Check generator for proper operation. Cycle power to clear the fault. Replace module if necessary.
99217 99231 99245 99259	FRONT LEFT FRONT RIGHT REAR LEFT REAR RIGHT [PM] MODULE - WRONG LOGIC VOLTAGE AT POWER-ON	Applicable Power Module determines at Startup that there is a problem with overvoltage/undervoltage detection due to interrupt pin being low at startup, indicating that over/under voltage (11V<LogicV<65V) circuit assessment on pin A10 is not possible	UGM shall suspend motion and prohibit all Pump-powered functions. UGM shall disable Voting Relay and UGM/MTM shall command main contactor open; UGM shall set Ground Emergency Descent Mode = Enabled and permit Emergency Descent after controls initialized	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Check wheel motors for proper operation. Cycle power to clear the fault. Replace module if necessary.
99199	GENSET MODULE - CURRENT FEEDBACK OUT OF RANGE	GenSet Module determines that the current feedbacks are out of range at Startup or when in standby	UGM shall disable charging command engine shutdown, and prevent engine start; UGM/GenSet module shall command GenSet contactor open	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Cycle power to clear the fault. Replace module if necessary.

DTC	Help Message	Fault Condition/Trigger	Required Control Response or State Assignment	Conditions Required for Movement and/or to Clear Fault	Corrective Action
99216 99230 99244 99258 	FRONT LEFT FRONT RIGHT REAR LEFT REAR RIGHT [PM] MODULE - CURRENT FEEDBACK OUT OF RANGE	Applicable Power Module determines that the current feedbacks are out of range at Startup or when in standby	UGM shall command an Emergency Stop and Power Modules shall perform Emergency Stop; UGM shall suspend motion, disable Drive, and limit all functions to Creep; remaining functions permitted after controls initialized	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Cycle power to clear the fault. Replace module if necessary.
99195	GENSET MODULE - CURRENT FEEDBACK GAIN OUT OF RANGE	GenSet Module determines at Startup that the current gain is incorrect and may cause incorrect data acquisition values	UGM shall disable charging, command engine shutdown, and prevent engine start; UGM/GenSet module shall command GenSet contactor open	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Cycle power to clear the fault. Replace module if necessary.
99212 99226 99240 99254 	FRONT LEFT FRONT RIGHT REAR LEFT REAR RIGHT [PM] MODULE - CURRENT FEEDBACK GAIN OUT OF RANGE	Applicable Power Module determines at Startup that the current gain is incorrect and may cause incorrect data acquisition values	UGM shall limit all functions to Creep.	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Cycle power to clear the fault. Replace module if necessary.
99196	GENSET MODULE - DATA ACQUISITION ERROR	GenSet Module determines that the data acquisition is in error (Data Acquisition; 47 (maximum current acquisition in progress)	UGM shall disable charging, command engine shutdown, and prevent engine start; UGM/GenSet module shall command GenSet contactor open	Power Cycled	Contact JLG service to program the new parameters.
99213 99227 99241 99255 	FRONT LEFT FRONT RIGHT REAR LEFT REAR RIGHT [PM] MODULE - DATA ACQUISITION ERROR	Applicable Power Module determines that the data acquisition is in error	UGM shall suspend motion and limit Drive to Creep; motion permitted after controls initialized.	Power Cycled	Contact JLG service to program the new parameters.
99214	FRONT LEFT MODULE – PUMP 2 CURRENT NOT ZERO	Applicable Power Module determines that the Pump current is being measured is not zero when expected to be zero at Startup or during standby	UGM shall suspend motion and limit all functions to Creep; motion permitted after controls initialized	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Cycle power to clear the fault. Replace module if necessary.
99228	FRONT RIGHT MODULE – PUMP CURRENT NOT ZERO	Applicable Power Module determines that the Pump current is being measured is not zero when expected to be zero at Startup or during standby	UGM shall suspend motion and limit all functions to Creep; motion permitted after controls initialized	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Cycle power to clear the fault. Replace module if necessary.

DTC	Help Message	Fault Condition/Trigger	Required Control Response or State Assignment	Conditions Required for Movement and/or to Clear Fault	Corrective Action
99256	GENSET MODULE FAN - CURRENT FEEDBACK NOT ZERO	Rear Right Module determines that the Pump/Fan current related to the Genset Module Fan is being measured as not zero when expected to be zero at Startup or during standby	No UGM response required. Power Module will linearly reduce maximum DC charge current from 85°C to 105°C (shutdown).	Power Cycled	Inspect wiring for physical damage and check for wire continuity. Cycle power to clear the fault. Replace module if necessary.
99198	GENSET MODULE - SLIP PARAMETER INCORRECT	Applicable Power Module determines that the Slip parameter is incorrect	UGM shall disable charging, command engine shutdown, and prevent engine start; UGM/GenSet module shall command GenSet contactor open	Power Cycled	Contact JLG service to program the new parameters.
99215 99229 99243 99257	FRONT LEFT FRONT RIGHT REAR LEFT REAR RIGHT [PM] MODULE - SLIP PARAMETER INCORRECT	Applicable Power Module determines that the Slip parameter is incorrect	UGM shall suspend motion and prohibit Drive/Steer; remaining functions permitted after controls initialized MTM shall perform an Emergency Stop.	Power Cycled	Contact JLG service to program the new parameters.
99281	FUNCTIONS LOCKED OUT - IMPROPER MOTOR PARAMETERS	The UGM determines an incorrect protected Indirect Table value at start-up	UGM shall disable all machine functions	Power Cycled	Contact JLG service to program the new parameters.

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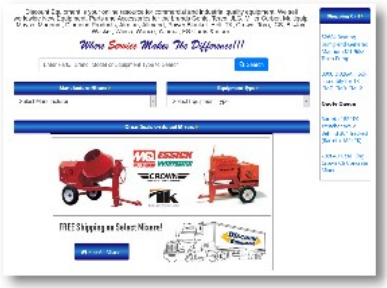

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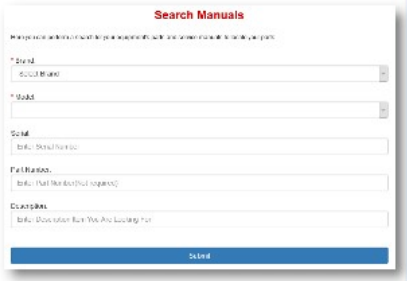

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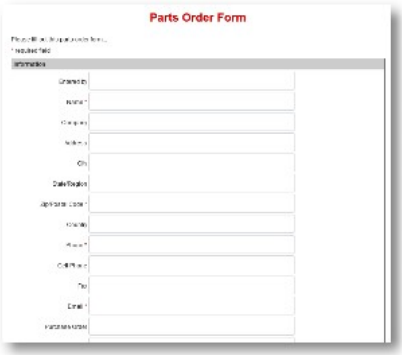

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SECTION 7. BASIC ELECTRICAL INFORMATION & ELECTRICAL SCHEMATICS

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.

NOTE: *Some of the procedures/connectors shown in this section may not be applicable to all models.*

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

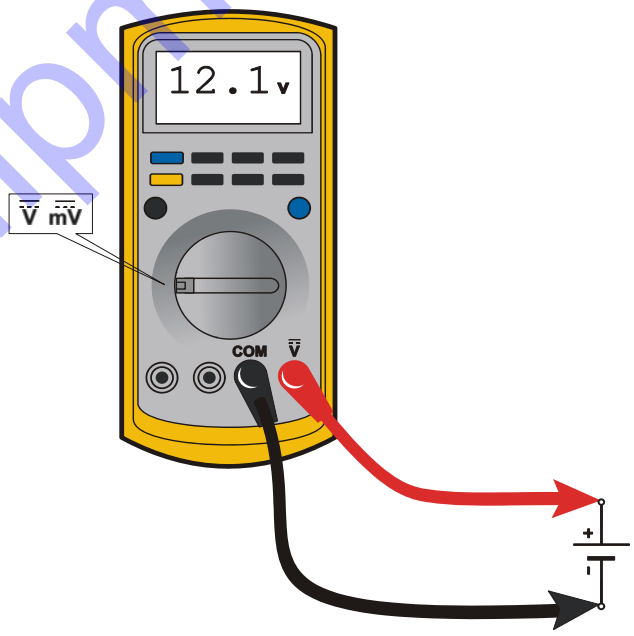


Figure 7-1. Voltage Measurement (DC)

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

Resistance Measurement

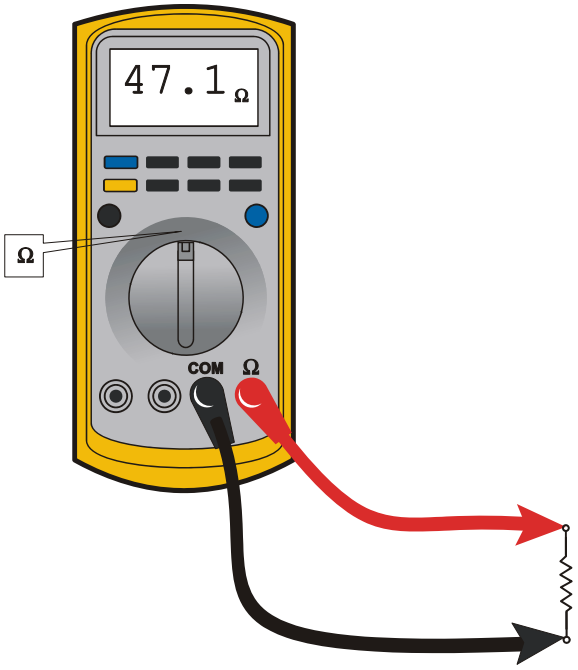


Figure 7-2. Resistance Measurement

- 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

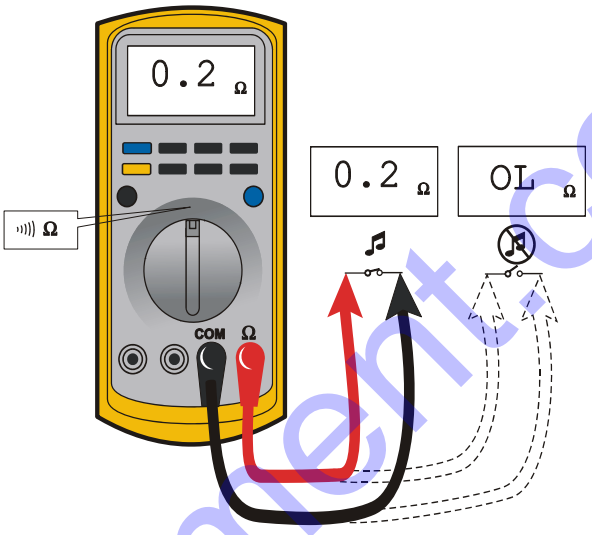


Figure 7-3. Continuity Measurement

- 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

Current Measurement

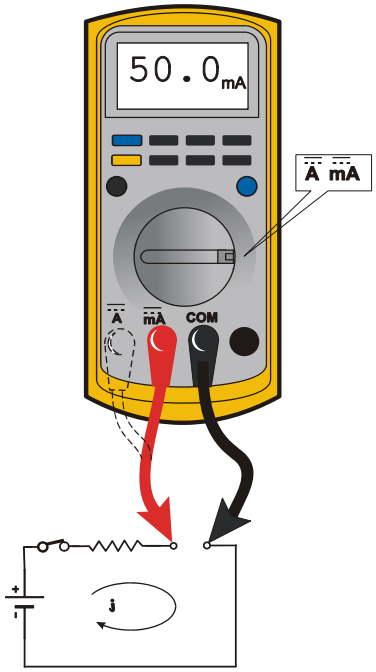


Figure 7-4. Current Measurement (DC)

- 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 P/N 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.*

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.*

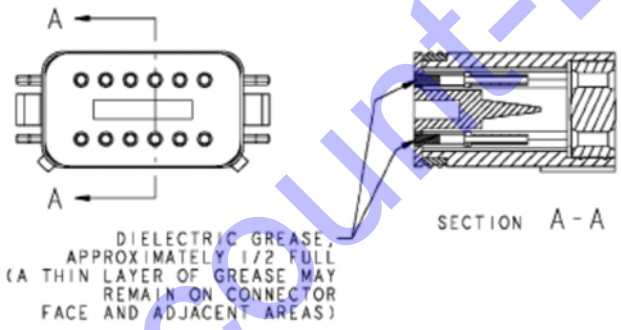
When applied to electrical connections, dielectric grease helps to prevent corrosion of electrical contacts and improper conductivity between contacts from moisture intrusion. Open and sealed connectors benefit from the application of dielectric grease.

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

Installation of Dielectric Grease

Before following these instructions, refer to excluded connector types (See Exclusions below).

1. Use dielectric grease in a tube for larger connection points or apply with a syringe for small connectors.
2. Apply dielectric grease to the female contact (fill it approximately ½ full; see example below)
3. Leave a thin layer of dielectric grease on the face of the connector
4. Assemble the connector system immediately to prevent moisture ingress or dust contamination
5. Pierce one of the unused wire seals prior to assembly if the connector system tends to trap air (i.e. AMP Seal) and then install a seal plug.



Deutsch HD, DT, DTM, DRC Series

The Deutsch connector system is commonly used for harsh environment interconnect. Follow the installation instructions.

AMP Seal

The AMP Seal connector system is used on the Control ADE Platform and Ground Modules.

Apply dielectric grease to the male contact. If trapped air prevents the connector from latching, pierce one of the unused wire seals. After assembly, install a seal plug (JLG #4460905) to prevent moisture ingress.

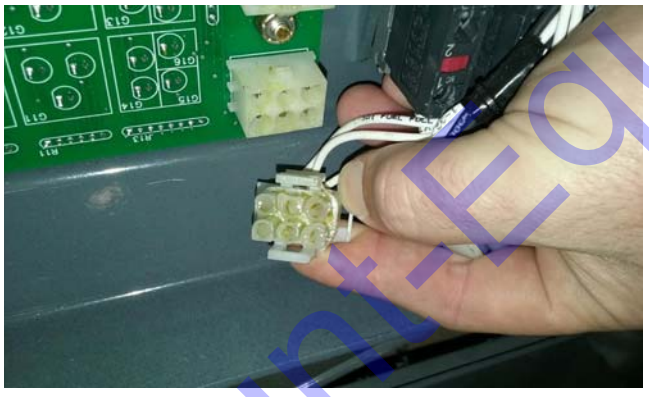
Note that seal plugs may be installed by the wire harness manufacturer if an unused wire seal becomes compromised (wire inserted in the wrong cavity during assembly and then corrected).

Figure 7-5. Application to Male Contacts

Figure 7-6. Use of Seal Plugs

AMP Mate-N-Lok

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



DIN Connectors

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

Exclusions

A limited number of connectors do not benefit from dielectric grease, or may be permanently damaged by application. Dielectric grease may not be required in properly sealed enclosures.

BRAD HARRISON / PHOENIX CONTACT M12

The connector uses gold contact material to resist corrosion and an o-ring seal for moisture integrity. If dielectric grease is mistakenly applied to this connector system, the low-force contacts cannot displace the grease to achieve electrical contact. Once contaminated, there is no practical way to remove the dielectric grease (replacement of female contacts required). The JLG Load Sensing System and Rotary Angle Sensors are examples of components with the M12 connector system.

Figure 7-7. Brad-Harrison M12

Figure 7-8. Phoenix Contact M12

ENGINE CONTROL UNIT CONNECTORS

These connectors use back-seals for moisture integrity. However, the low-force contacts cannot displace dielectric grease and create electrical contact. It is possible to use solvents (i.e. contact cleaner or mineral spirits) for the removal of improperly applied dielectric grease. The EMR4 engine control module from Deutz employs this connector system (for example).

SEALED ENCLOSURES

Application of dielectric grease is not required in properly sealed enclosures. To meet criteria, the enclosure must be rated to at least IP66 (dust tight; protected from powerful jets of water). The enclosure must be fitted with a high quality, continuous gasket and all wiring must pass through cable entrances.

MIL-C-5015 SPEC CONNECTORS

Crown Connector Inc's recommendation is to not use dielectric grease for this series connector. For similar model series connectors, the manufacturer should be contacted for confirmation before applying dielectric grease. A typical application for this connector is on David Clark Intercom connections in Aerial Work Platforms.

MOLEX CMC SERIES CONNECTORS

The CMC connector family is a sealed, high-density connection system using matte-seal technology for CP 0.635 and 1.50 mm terminals. To guarantee IP6K7 and IP6K9 sealing, a seal plug option is used. However, the low-force contacts cannot displace dielectric grease and create electrical contact. It is possible to use solvents (i.e. contact cleaner or mineral spirits) for the removal of improperly applied dielectric grease. The flexbox control modules from JDES employ this connector system (for example).

7.4 AMP CONNECTOR

Assembly

Check to be sure the wedge lock is in the open, or as-shipped, position (See Figure 7-9.). Proceed as follows:

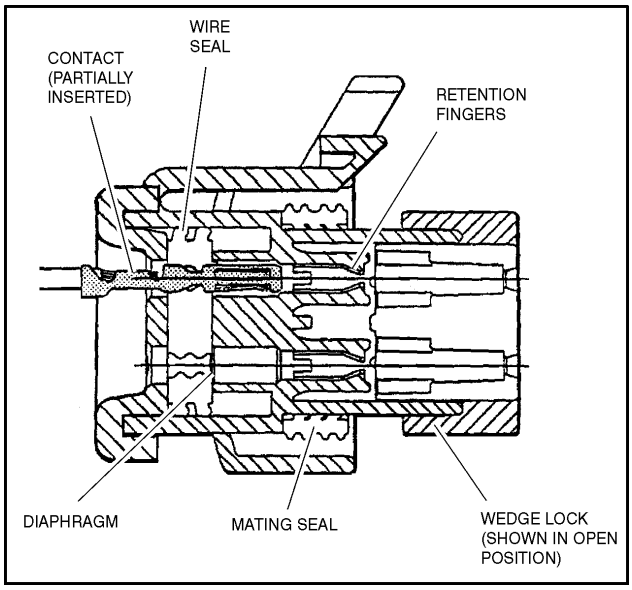


Figure 7-9. Connector Assembly Figure 1

1. To insert a contact, push it straight into the appropriate circuit cavity as far as it will go (See Figure 7-11.).
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 7-11.).

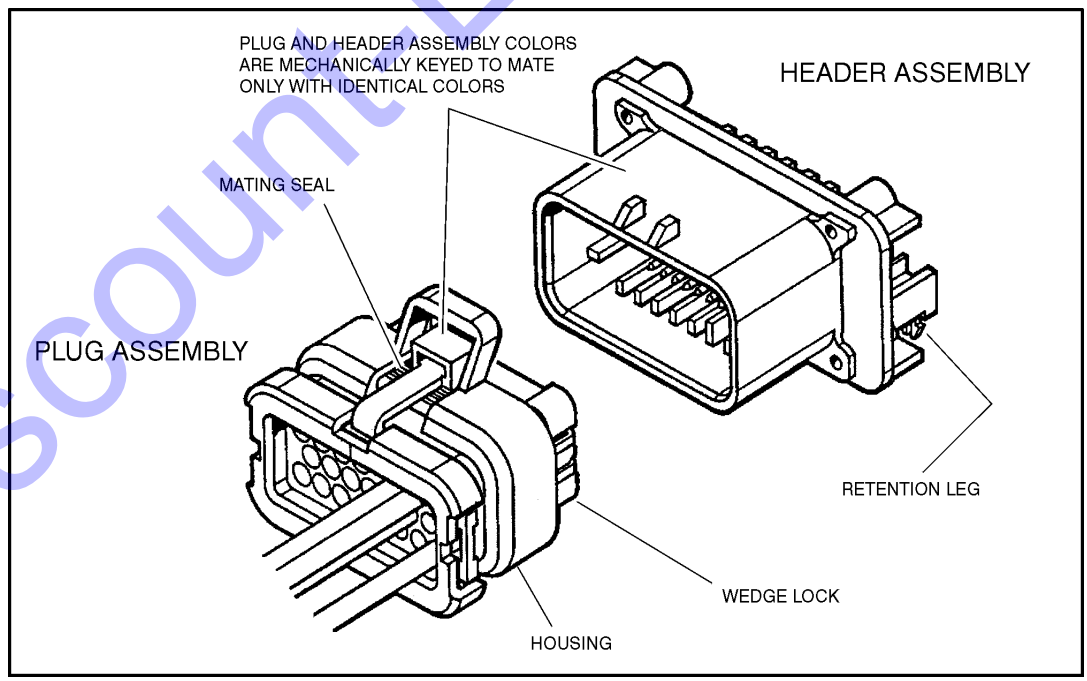


Figure 7-10. AMP Connector

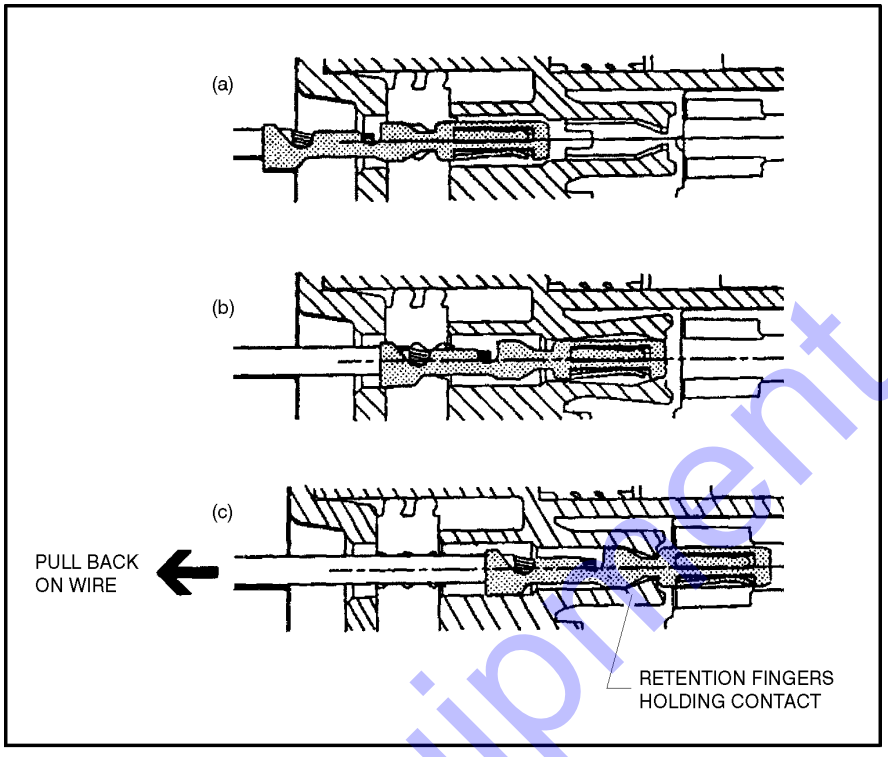


Figure 7-11. Connector Assembly Figure 2

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 7-12.).

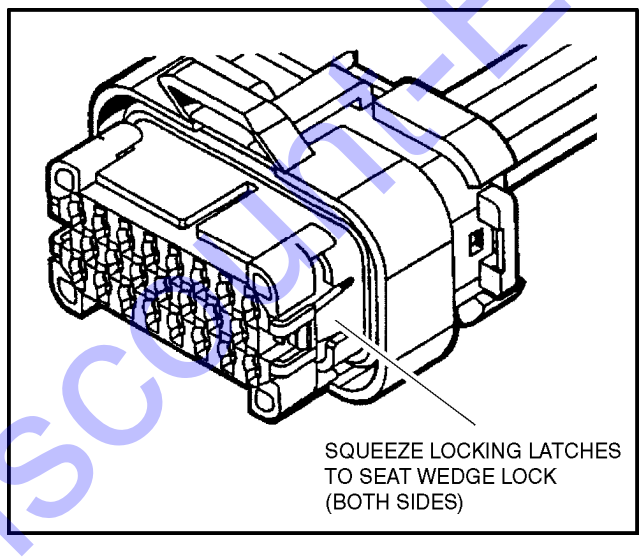


Figure 7-12. Connector Assembly Figure 3

4. Slide the wedge lock into the housing until it is flush with the housing (See Figure 7-13.).

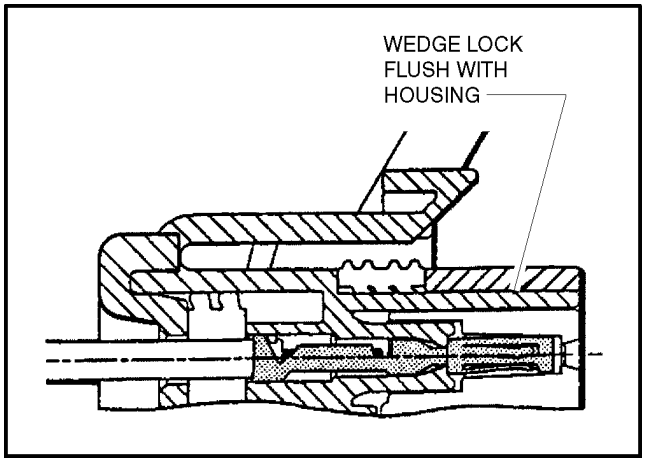


Figure 7-13. Connector Assembly Figure 4

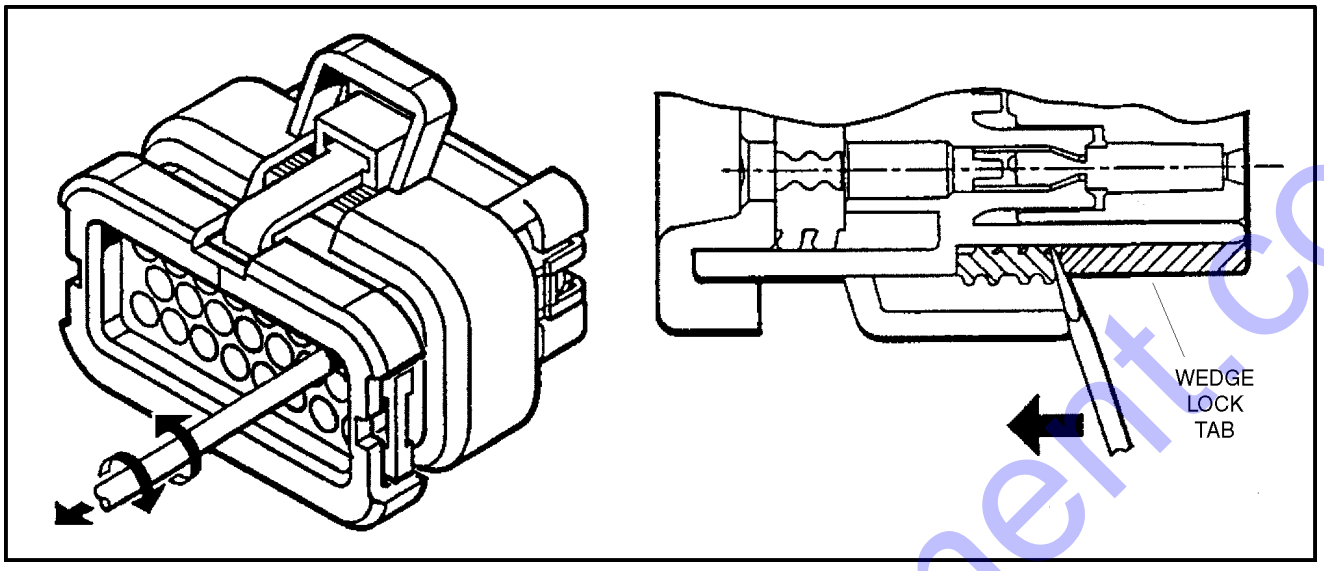


Figure 7-14. Connector Disassembly

Disassembly

5. Insert a 4.8 mm (3/16") wide screwdriver blade between the mating seal and one of the red wedge lock tabs.
6. Pry open the wedge lock to the open position.
7. 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

NOTICE

DO NOT PIERCE WIRE INSULATION TO TAKE VOLTAGE READINGS.

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

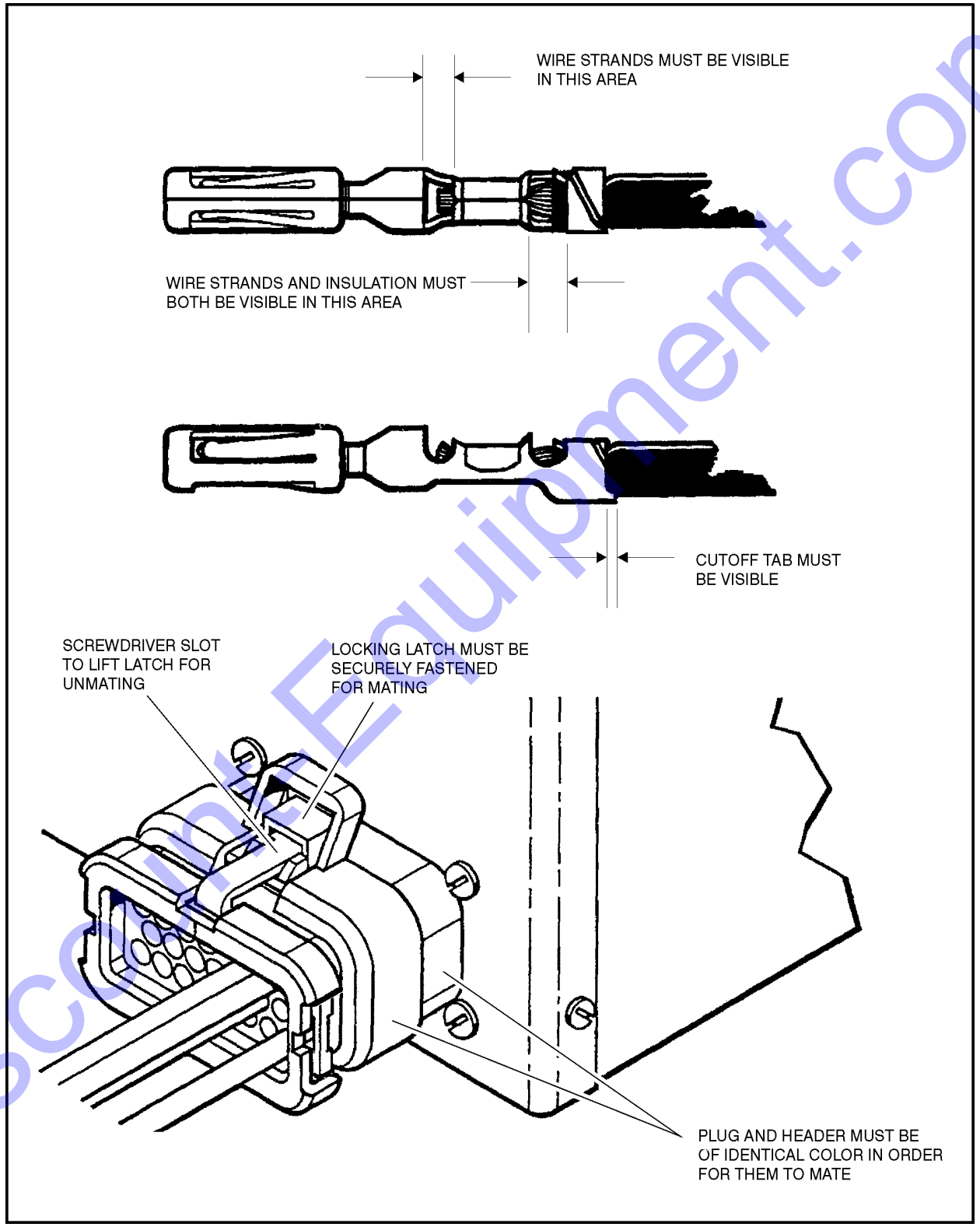


Figure 7-15. Connector Installation

7.5 DEUTSCH CONNECTORS

DT/DTP Series Assembly

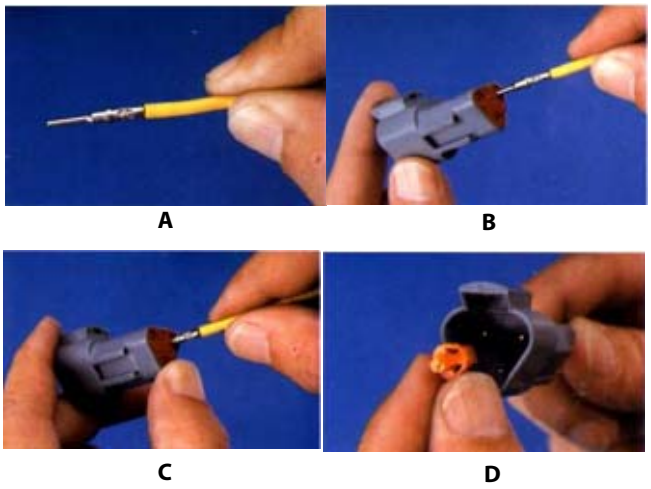


Figure 7-16. DT/DTP Contact Installation

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

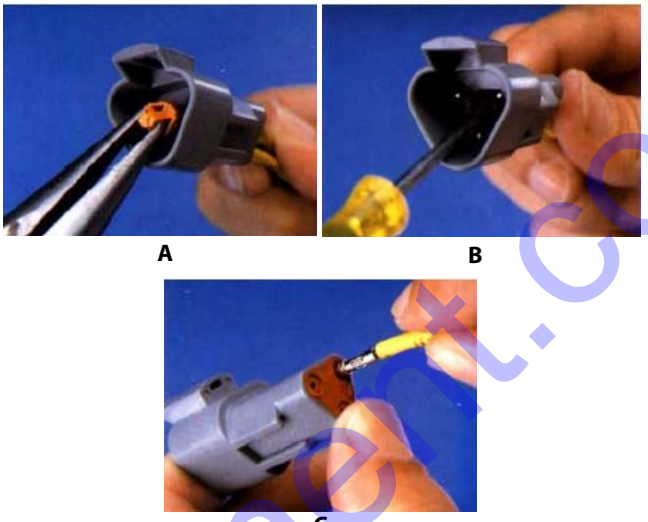


Figure 7-17. DT/DTP Contact Removal

5. Remove wedgelock using needlenose pliers or a hook shaped wire to pull wedge straight out.
6. 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.
7. Hold the rear seal in place, as removing the contact may displace the seal.

HD30/HDP20 Series Assembly

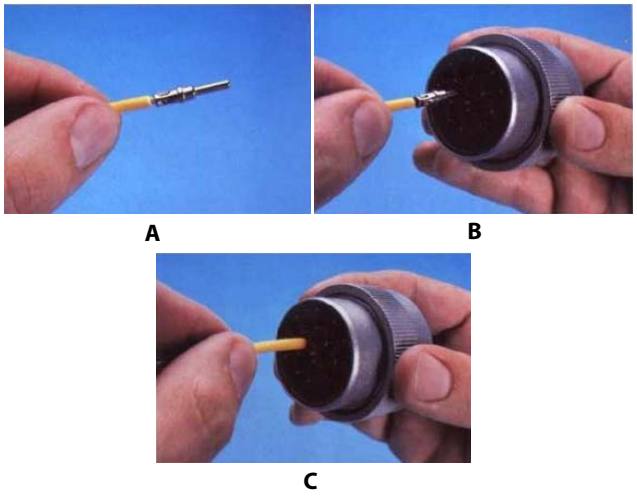


Figure 7-18. HD/HDP Contact Installation

8. Grasp contact about 25mm behind the contact crimp barrel.
9. Hold connector with rear grommet facing you.
10. Push contact straight into connector grommet until a positive stop is felt. A slight tug will confirm that it is properly locked in place.

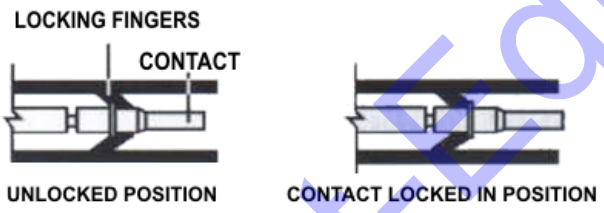


Figure 7-19. HD/HDP Locking Contacts Into Position

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

HD30/HDP20 Series Disassembly

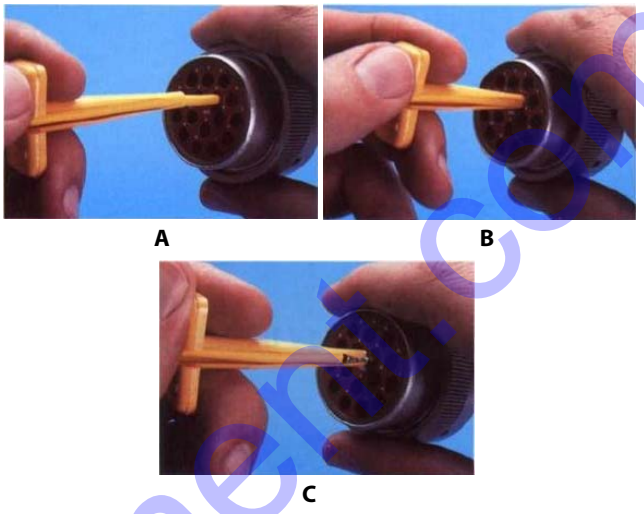


Figure 7-20. HD/HDP Contact Removal

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

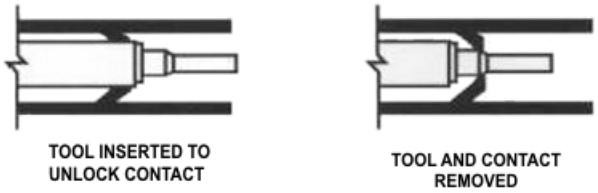


Figure 7-21. HD/HDP Unlocking Contacts

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

7.6 BATTERY DISCONNECT SWITCH

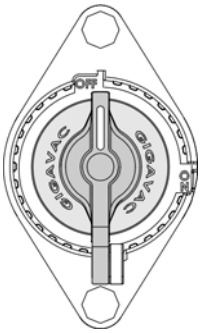
Function Check

The functionality of the Battery Disconnect Switch should be tested before operating the machine or in the event of any electrical failure that results in a blown fuse.

1. Position the Platform/Ground Select switch to the ground position.

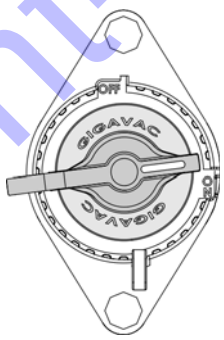
2. Pull out the Power/Emergency Stop Switch on the ground console to power up the machine.

3. Turn the Battery Disconnect Switch to the Off position.



4. Watch the Indicator Gauge on the Ground Control Console to see if the power is disconnected. It will take approximately 15 seconds for the Control System to shut down the power.

5. If the power shuts down properly, turn the Battery Disconnect Switch back to the On position. If the power did not shut down properly, Report the problem to the proper maintenance personnel. Do not operate the machine until it is declared safe for operation.



7.7 BATTERIES

Battery Stack Charging System

The battery stack consists of (8) 12V sealed AGM maintenance free batteries. The machine offers two methods of charging the battery stack. The primary method uses a 6.6 kW diesel engine, which powers a 100A motor/generator which in turn charges the battery stack. The second method to recharge the battery stack is the on-board battery charger. The charger is located on the turntable and works with 120VAC or 240VAC (external power source).

There are three operating modes available; Hybrid, Electric or Engine.

- **Hybrid Mode** - If the Engine Enable switch in the platform control is selected to the ON position, the machine is in HYBRID mode. When in Hybrid mode, each time the battery stack reaches 60% State-of-Change (SOC) the diesel engine will start and continues to run to charge the battery pack until the battery stack reaches 90% SOC (values configurable via Analyzer).
- **Electric Mode** - If the Engine Enable switch in the platform control is selected to the OFF position, the machine is in ELECTRIC Mode. When in Electric mode, the machine operates all functions using battery power only. The machine is capable of 4 hour or less continuous operation in this mode. If operated in this mode until the battery stack State-of-Charge (SOC) reaches a Discharged state (Approximately 20% SOC), a flash code will warn the operator that HYBRID or ENGINE mode must be reactivated or the battery charger plugged into an external AC source. In the event the battery stack is not re-charged after the warning indicators are illuminated and the machine is stored, the warning indicator will resume flashing after the E-Stop is reset. If the machine is stored with the batteries in this condition for more than 60 days, the engine may need to be jump started or the battery charger plugged in and the battery stack charged before use.
- **Engine Mode:** By manually starting the engine on the platform control while the Engine Enable switch is in ON position, the vehicle will enter ENGINE mode. In this mode, the engine will continuously run to provide needed power for machine operations, and charges the power battery stack if its SOC is less than 100%. The engine will continue to run until the generator shuts the machine down. charging may resume as required.

Battery State of Charge (SOC)

The UGM gathers information from CAN-based components to compute battery voltage and current usage to determine battery SOC. Because the state of machine operation affects reported battery voltage, the UGM estimates SOC and battery voltage based on the state of operations described below:

- Initial assessment at Power-On
- No Load assessment (performed when applicable)
- Amp-hour Discharge (AhD) assessment (performed [including a Discharged and Deeply Discharged due to Significant Load assessment] when applicable)
- Difference in Voltage assessment (performed after a Significant load is deactivated)

NOTE: *Battery SOC voltage based evaluations are only done while the battery is not in a charging condition. Battery SOC current based evaluations are done while the battery is charging and while the battery is being substantially loaded.*

The UGM stores each of the above assessments. The UGM then weighs each of the individual assessments for control decisions. Once the SOC is updated, the calculated assessment is replaced by the next assessment calculation (not zeroed).

Battery Charging

Once the engine is running, the UGM determines if charging is required and permitted. If permitted, the UGM determines the charging requirements after considering a combination of factors; including system demand, SOC, battery voltage, and battery temperature.

The UGM will monitor operating conditions, SOC, battery voltage, engine coolant and battery temperature after the engine is running, and decide when Charging will be enabled.

The UGM will stop charging for any of the following conditions:

- any condition that requires an Engine Stop
- DTC exists that requires an Charge Stop
- Auto Start Charging Targets met

Battery Thermal Adjustment Of Target Voltage

High battery temperatures can increase localized internal heating and shorten battery life. The ideal charge voltage required by the batteries changes with battery temperature. A battery temperature sensor mounted on the high voltage terminal of the stack is used to infer the battery temperature. The battery temperature readings are averaged over a period of 2 minutes. The battery temperature data reported by the GenSet Module then allows the UGM module to adjust charge voltage for thermal adjustment as necessary.

NOTE: *When clamping down power cable connections, make sure mounting rings of the cables are contacting each other directly without any washer or bolt in between.*

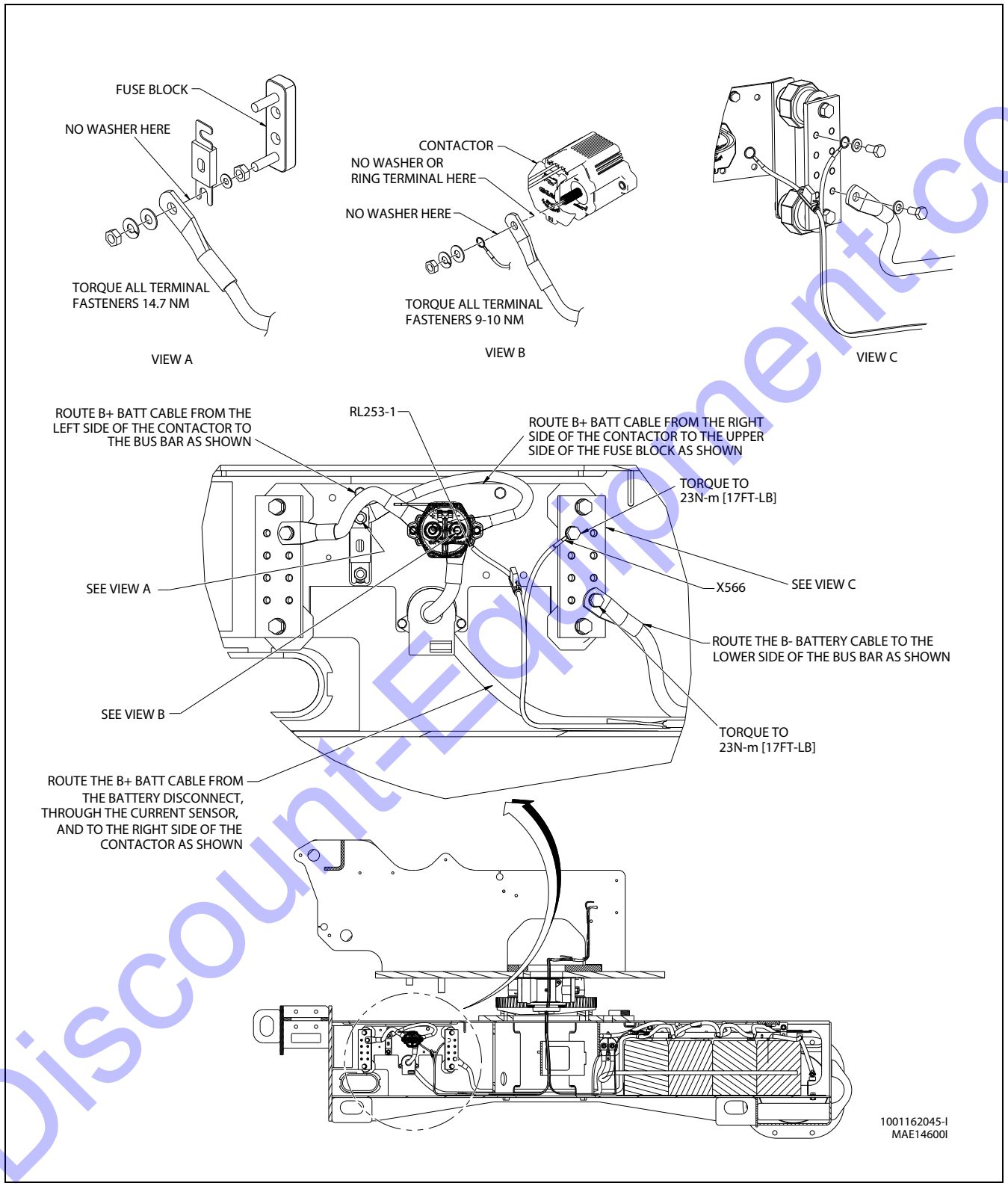


Figure 7-22. Battery Installation - Sheet 1 of 5

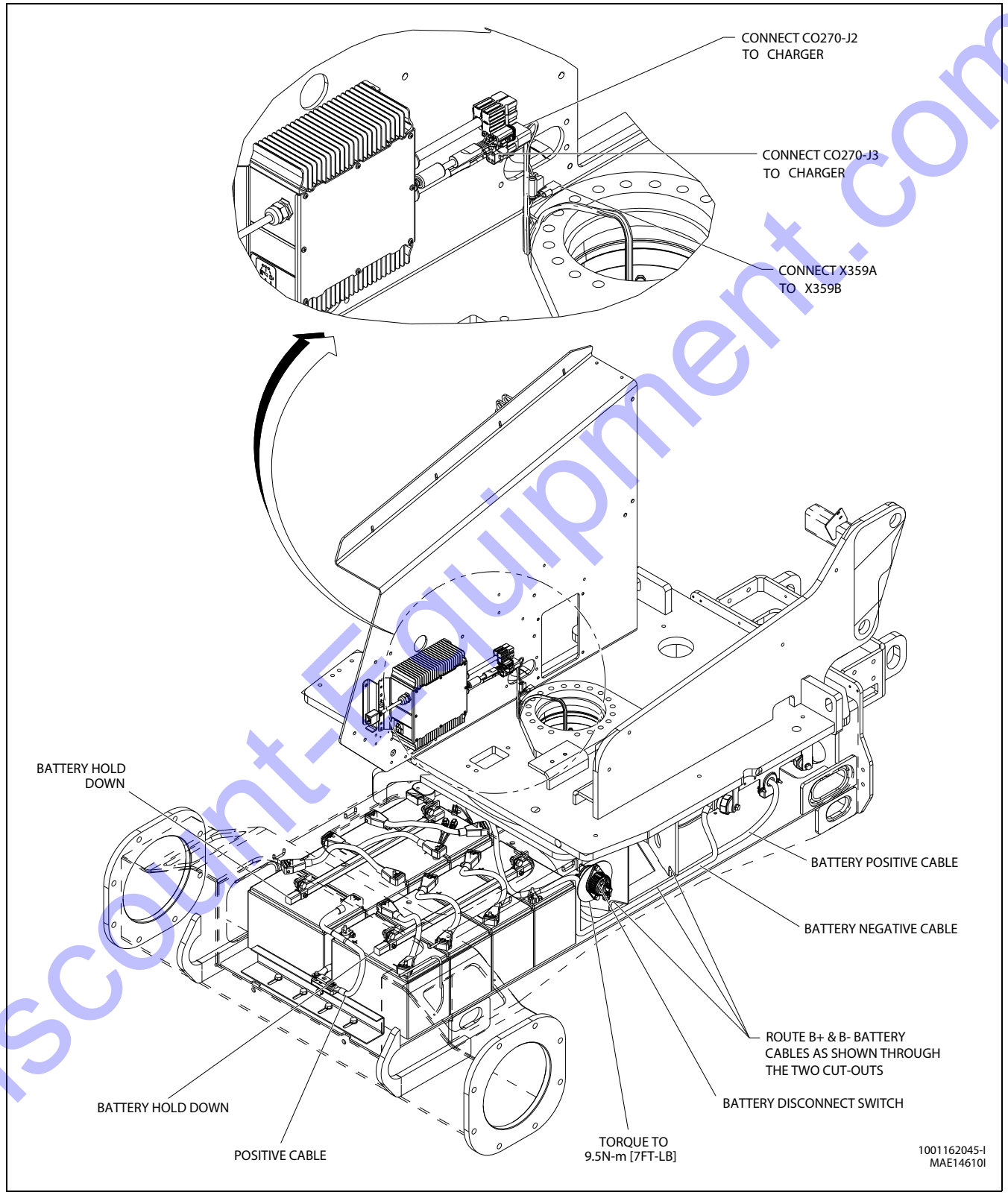


Figure 7-23. Battery Installation - Sheet 2 of 5

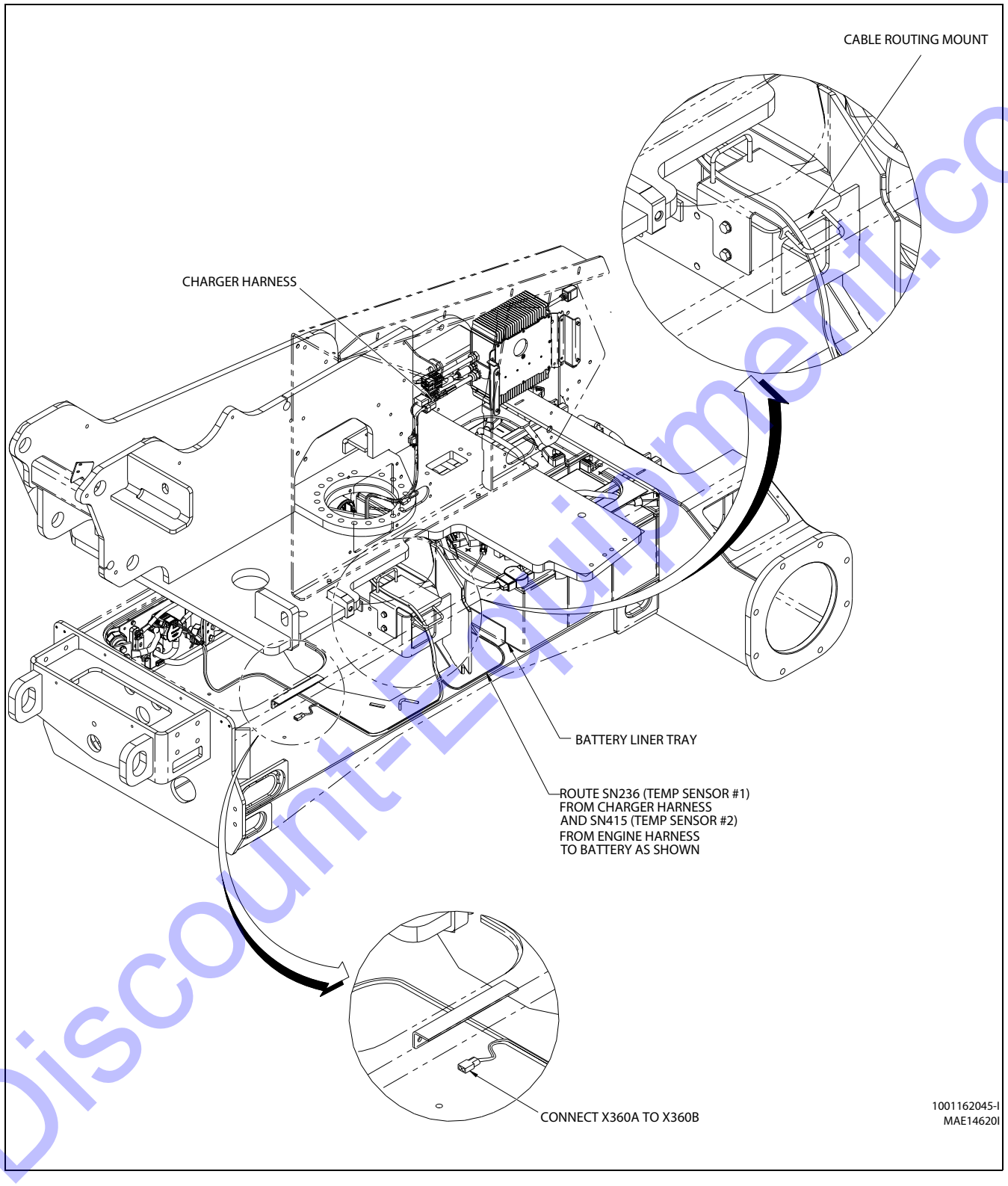


Figure 7-24. Battery Installation - Sheet 3 of 5

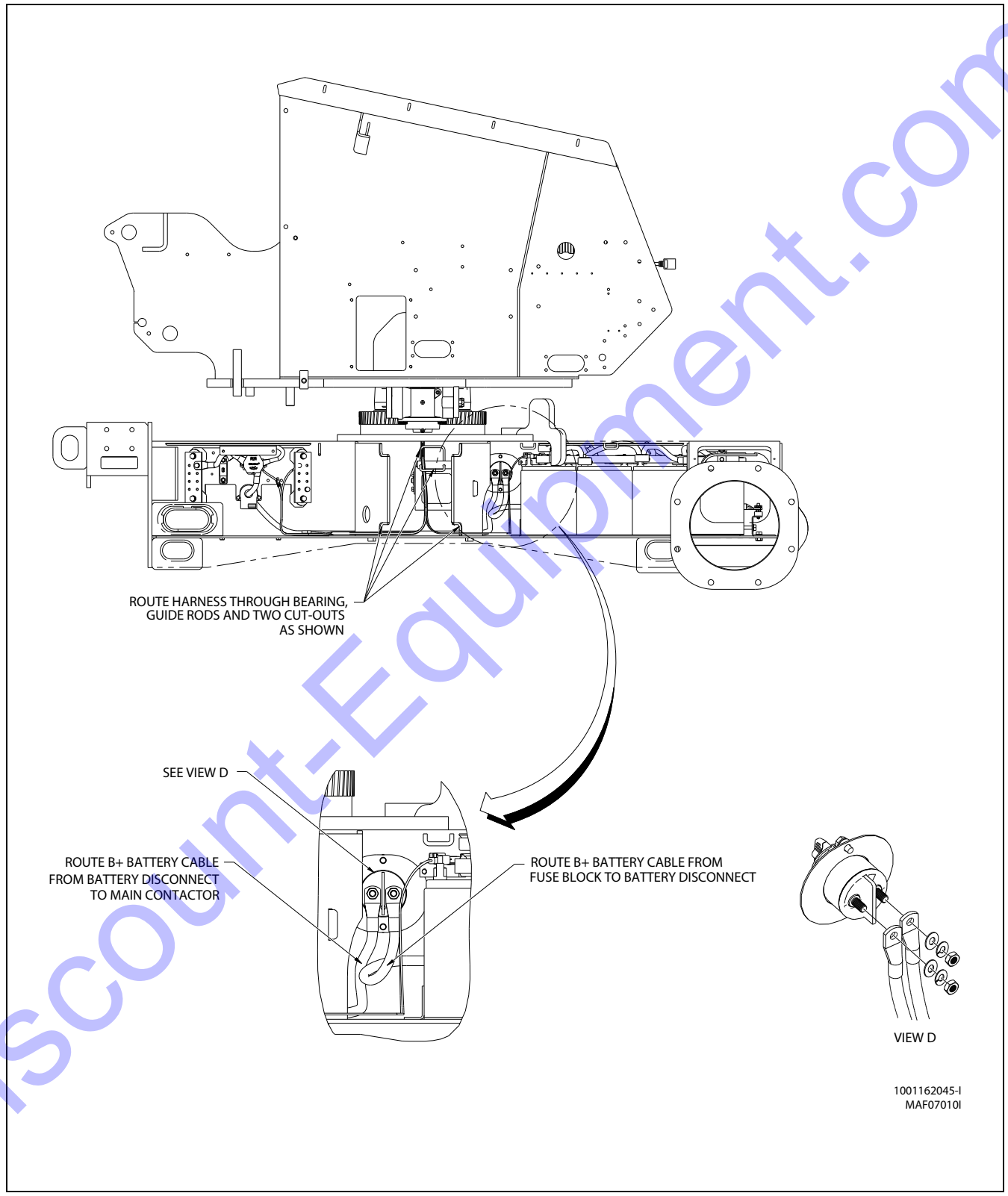


Figure 7-25. Battery Installation - Sheet 4 of 5

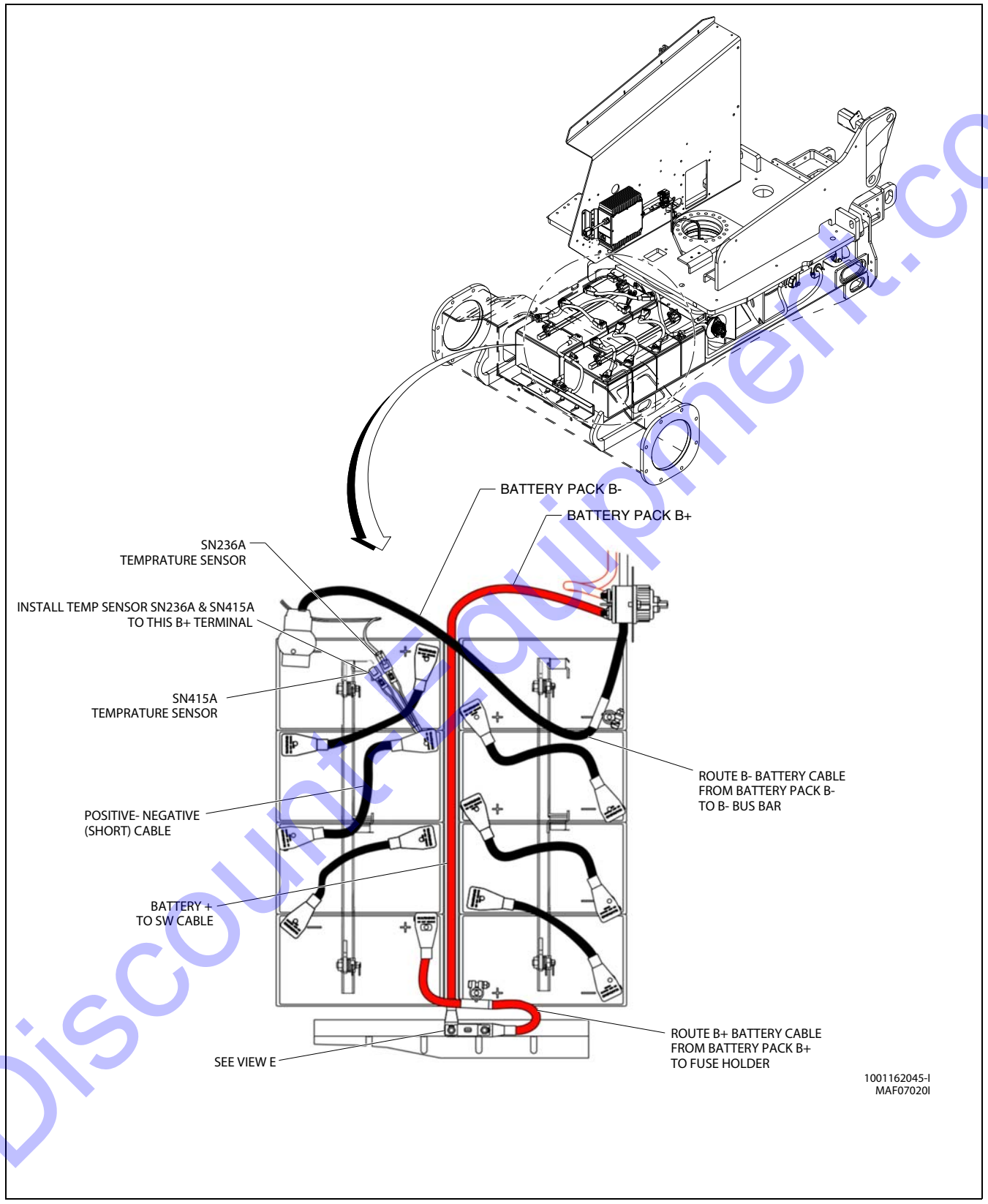


Figure 7-26. Battery Installation - Sheet 5 of 5

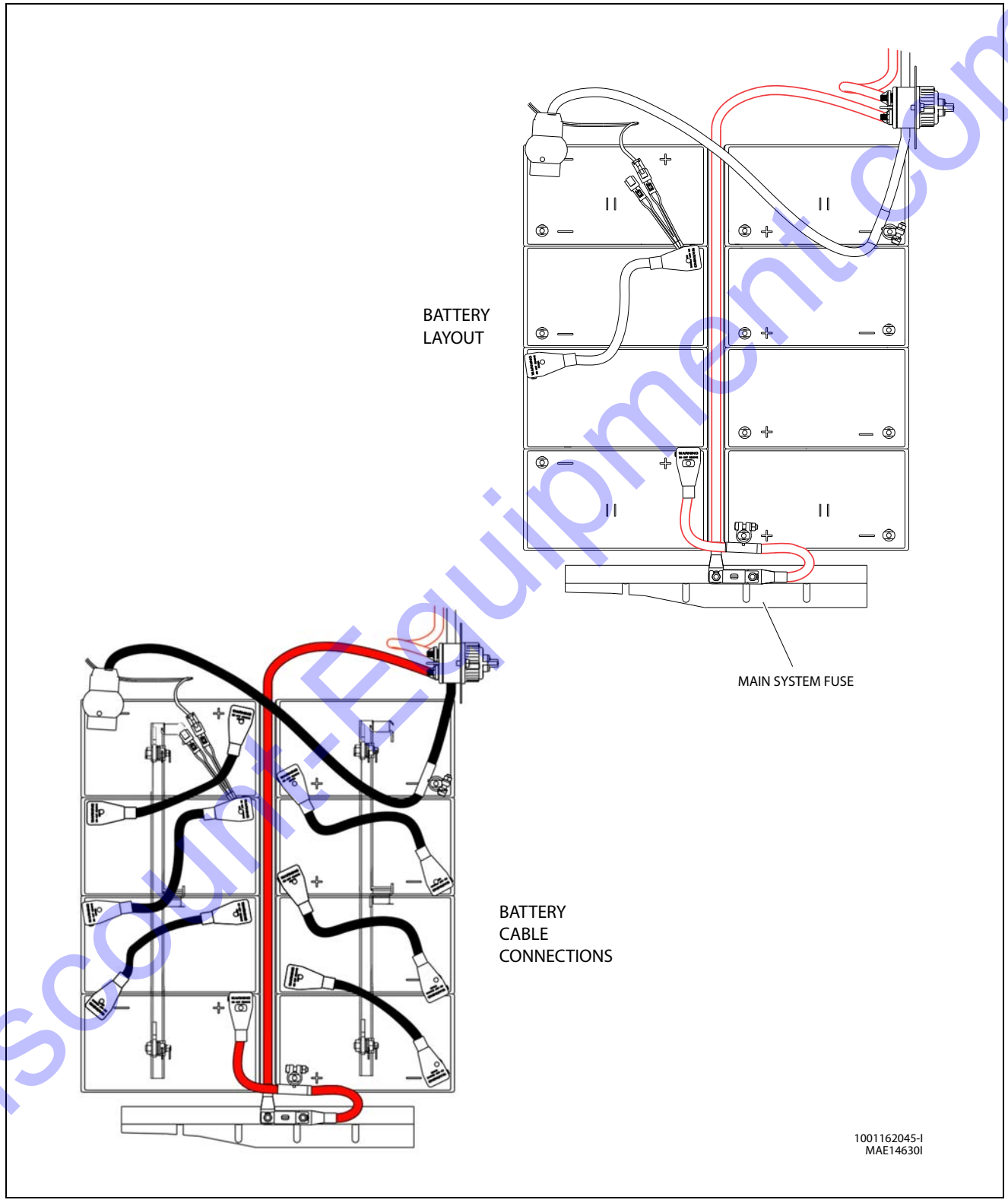


Figure 7-27. Battery Layout

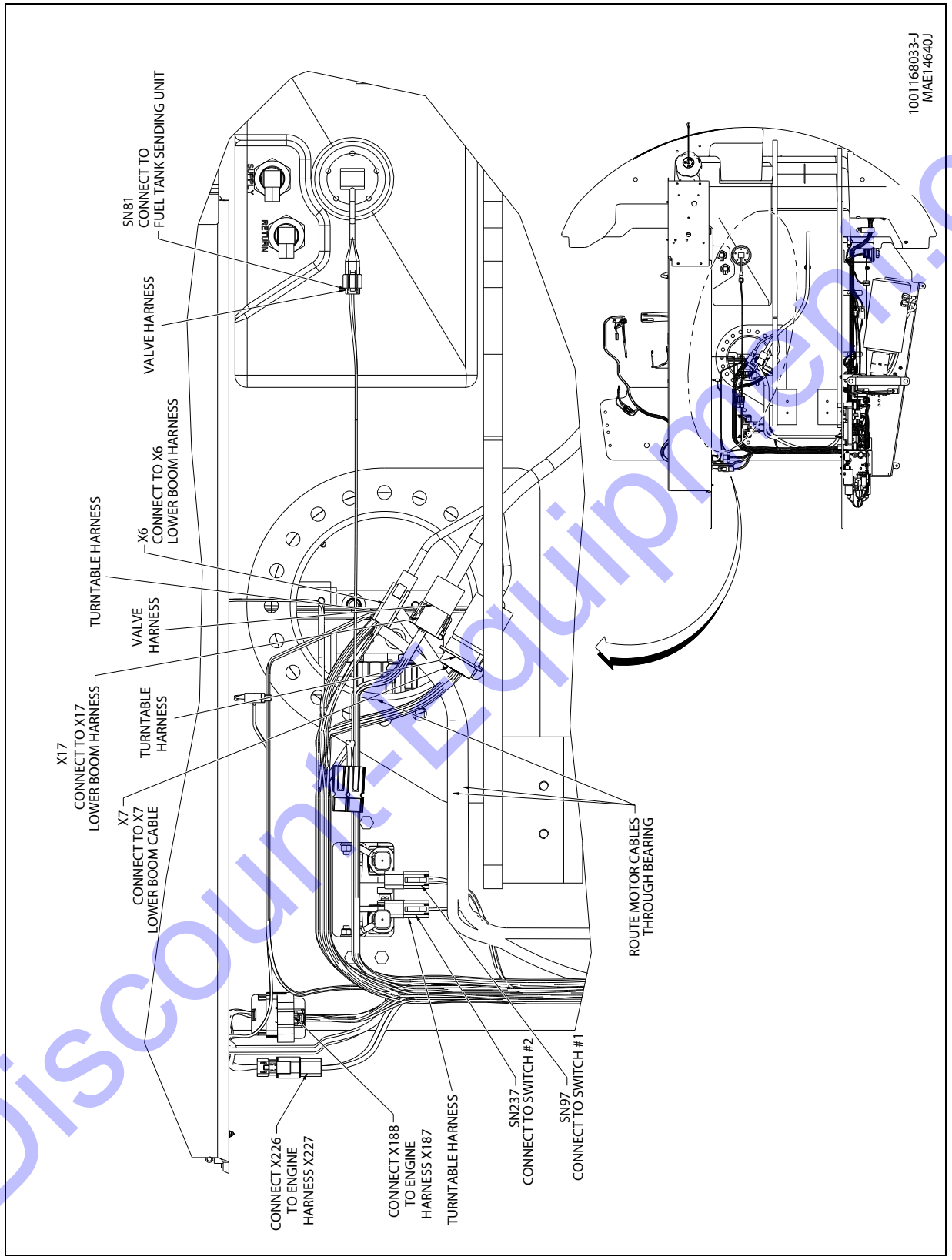


Figure 7-28. Electrical Installation - Sheet 1 of 8

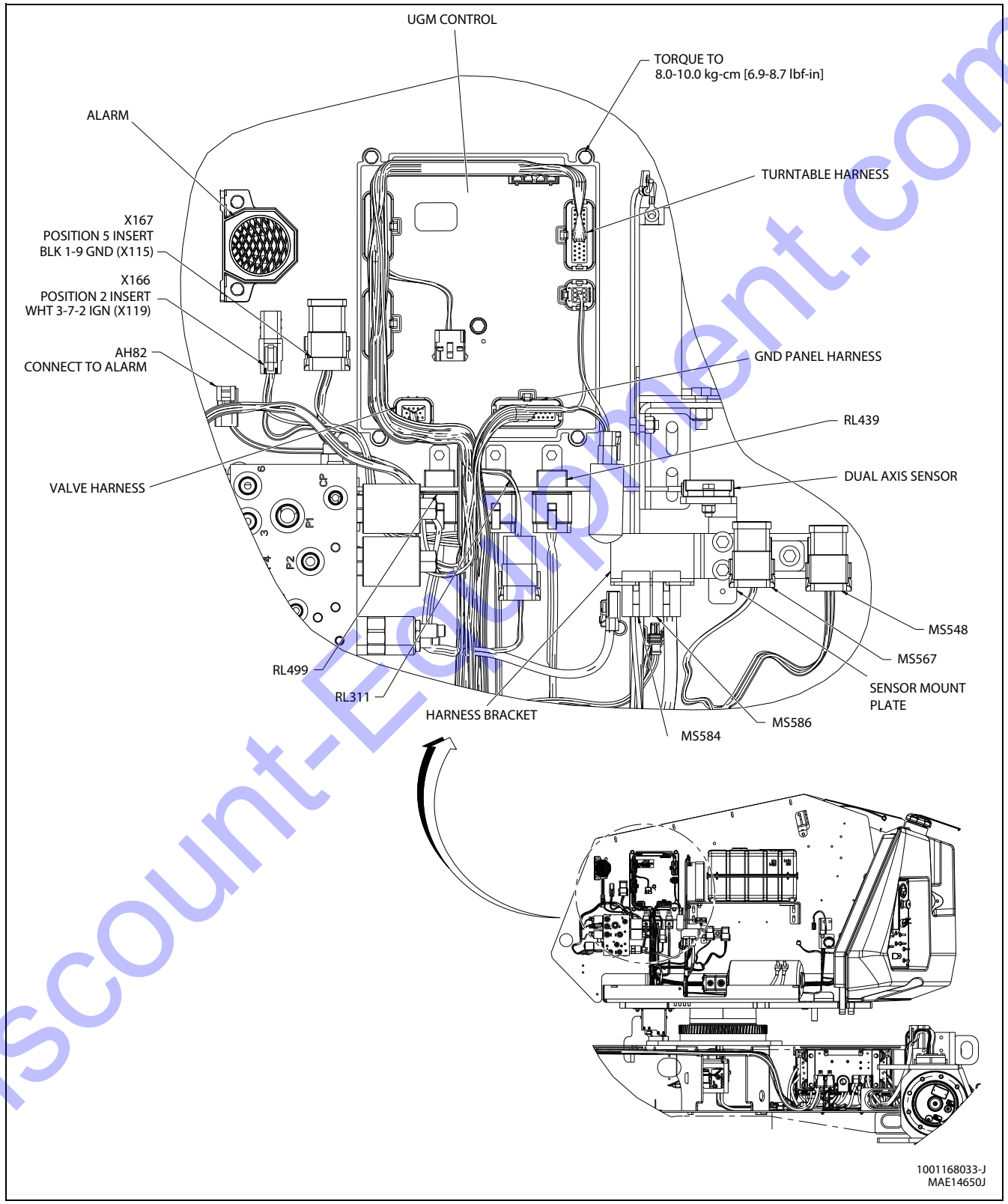


Figure 7-29. Electrical Installation - Sheet 2 of 8

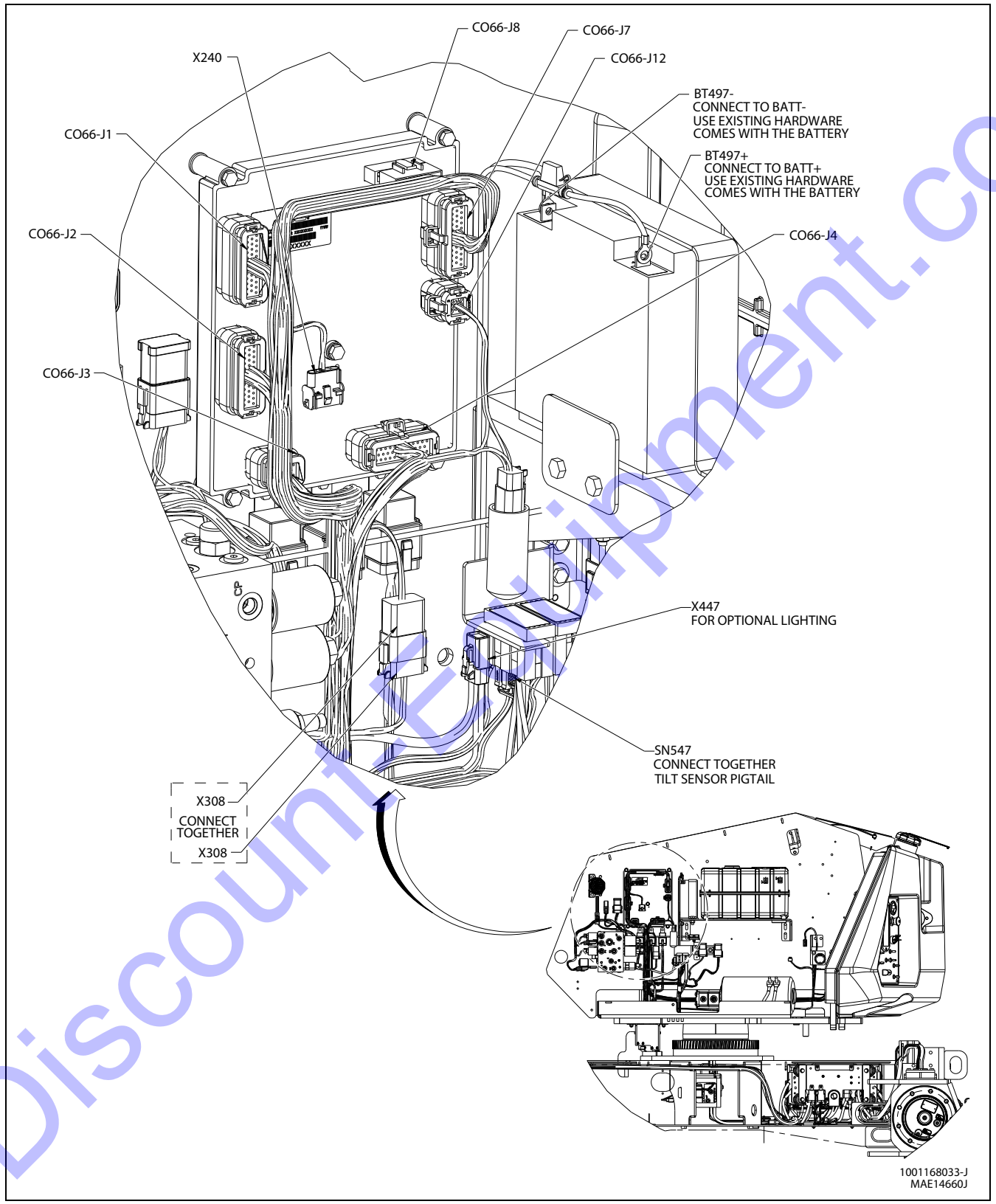


Figure 7-30. Electrical Installation - Sheet 3 of 8

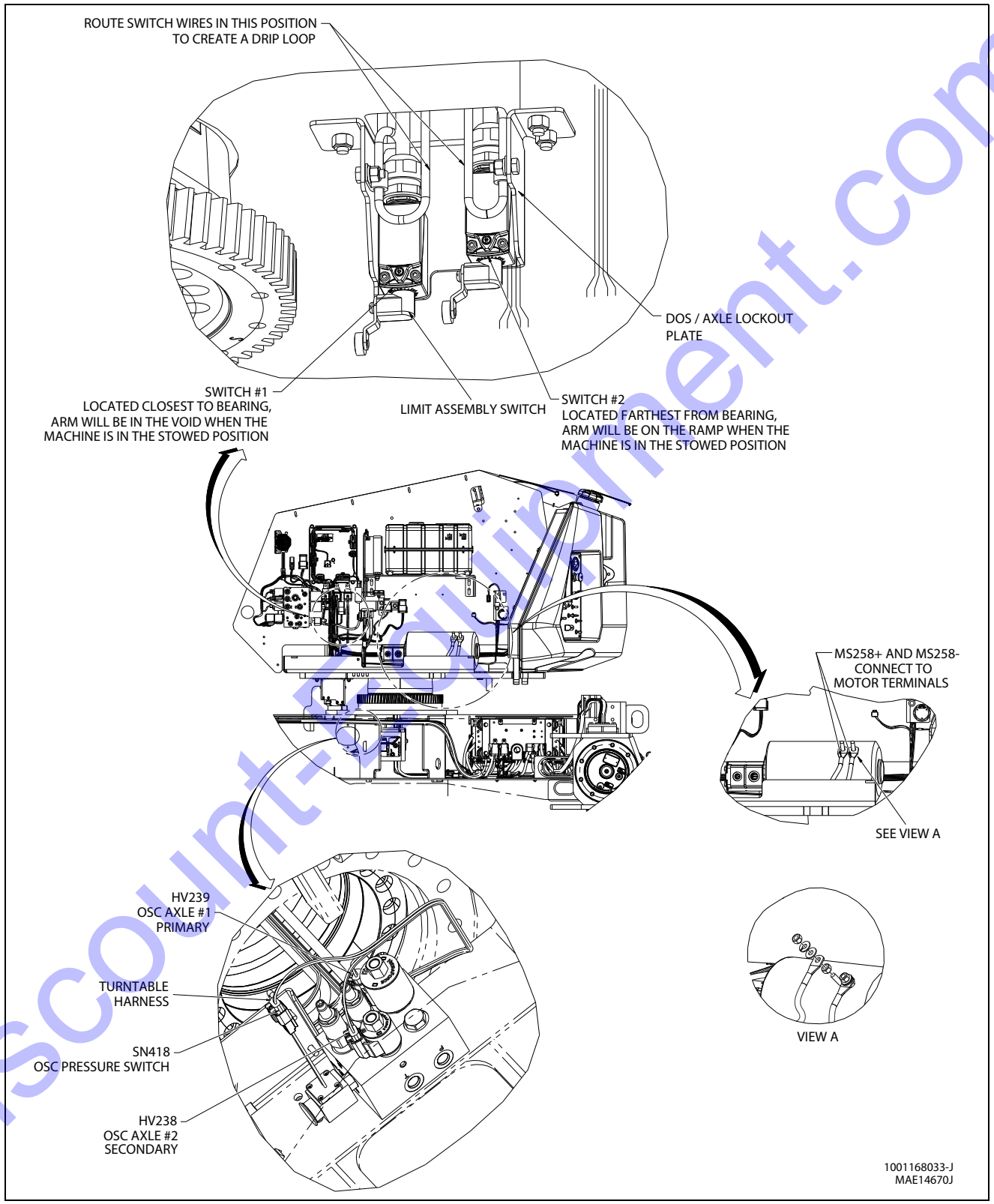


Figure 7-31. Electrical Installation - Sheet 4 of 8

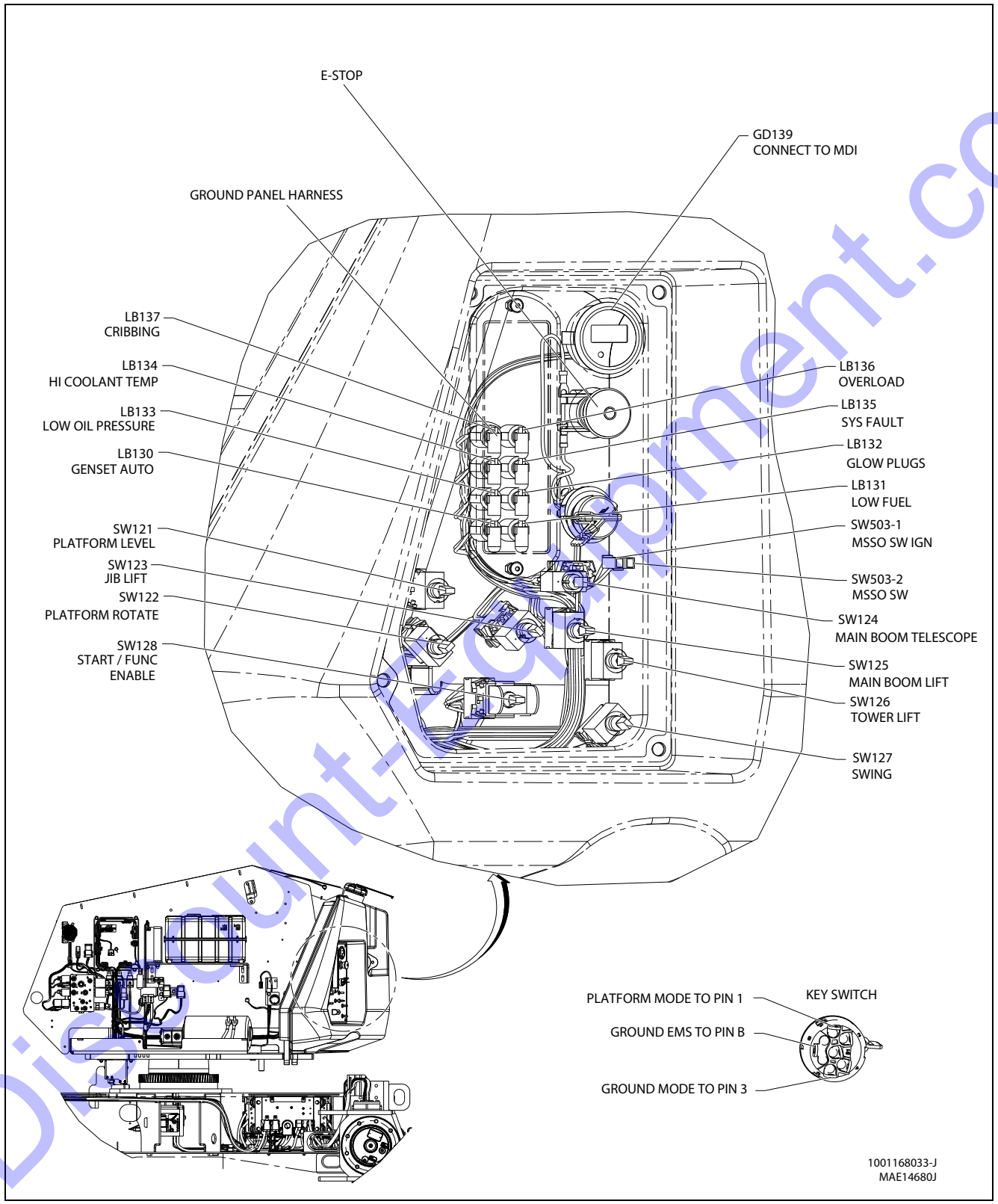


Figure 7-32. Electrical Installation - Sheet 5 of 8

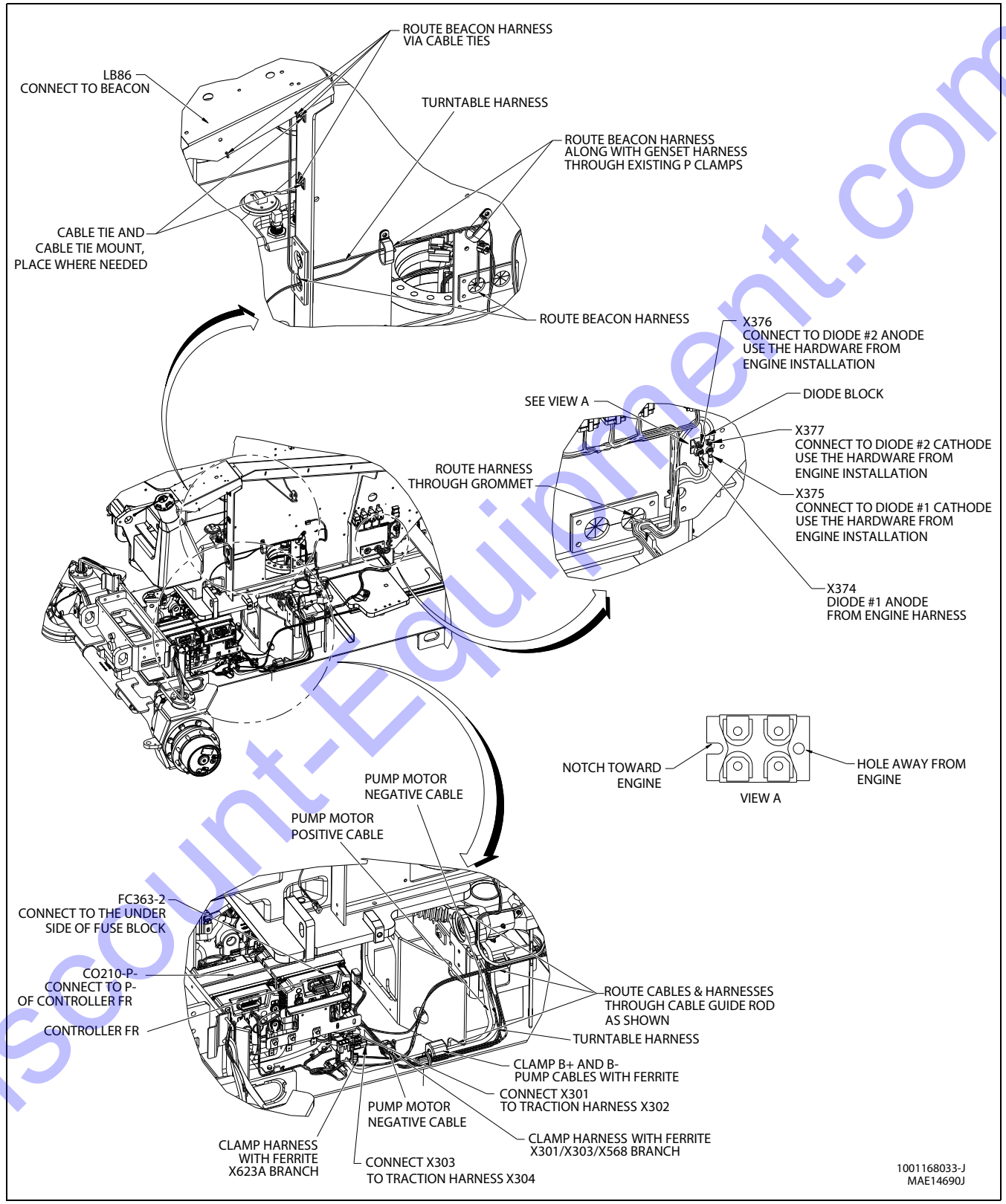


Figure 7-33. Electrical Installation - Sheet 6 of 8

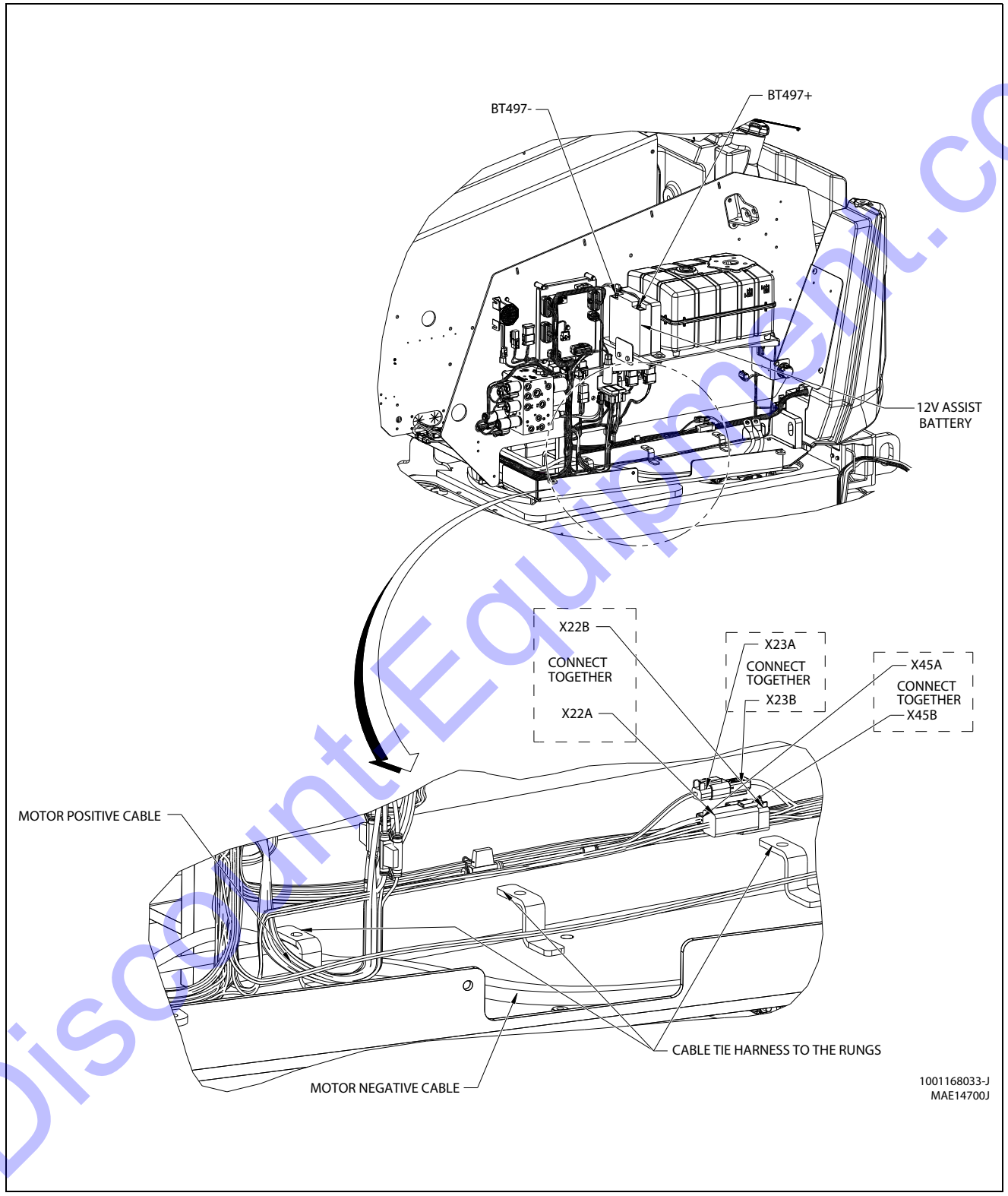


Figure 7-34. Electrical Installation - Sheet 7 of 8

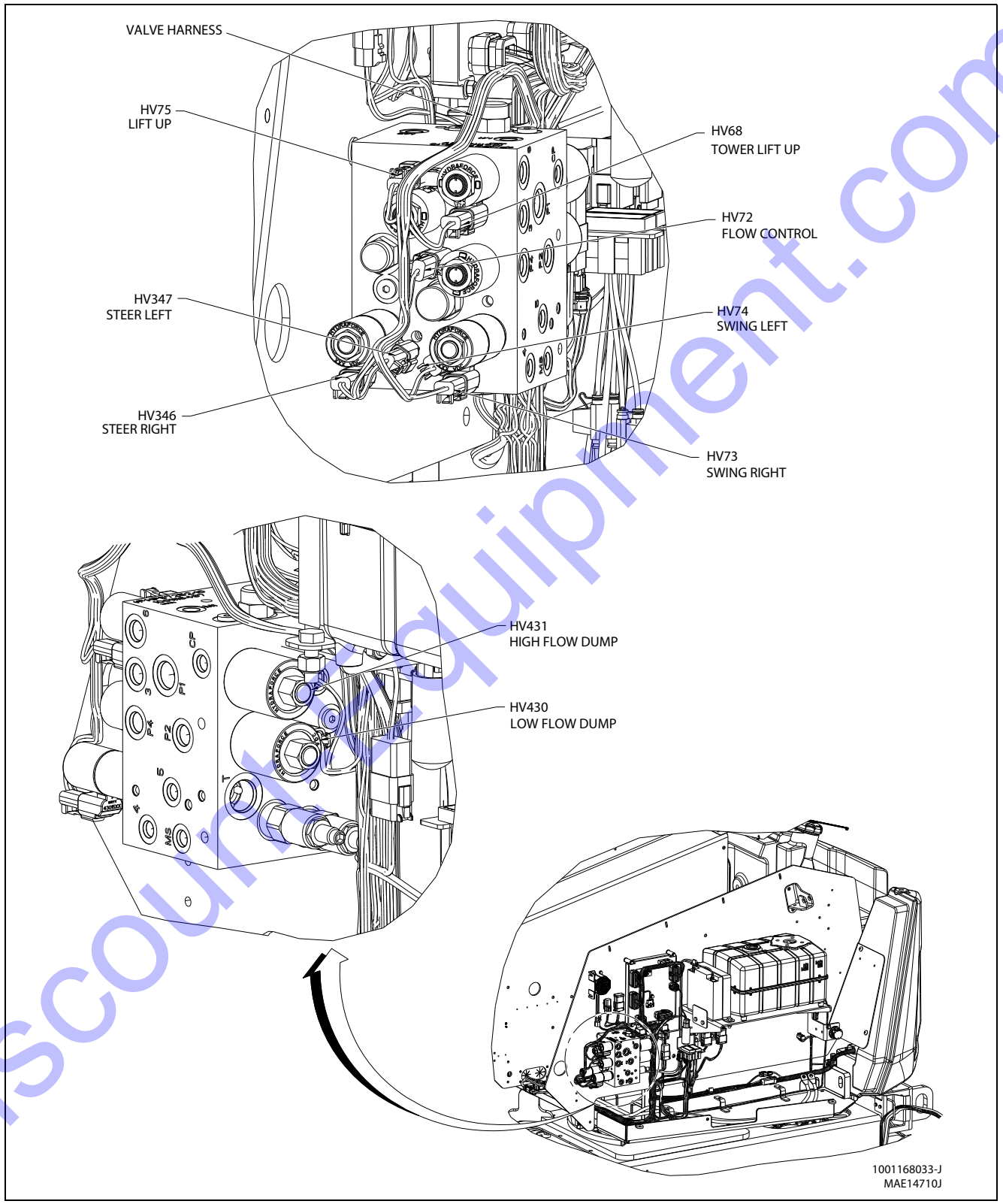


Figure 7-35. Electrical Installation - Sheet 8 of 8

7.8 FERRITE BEADS

A ferrite bead is used in order to suppress or filter the amount of high frequency electromagnetic interference (EMI) noise found in electronic circuits.

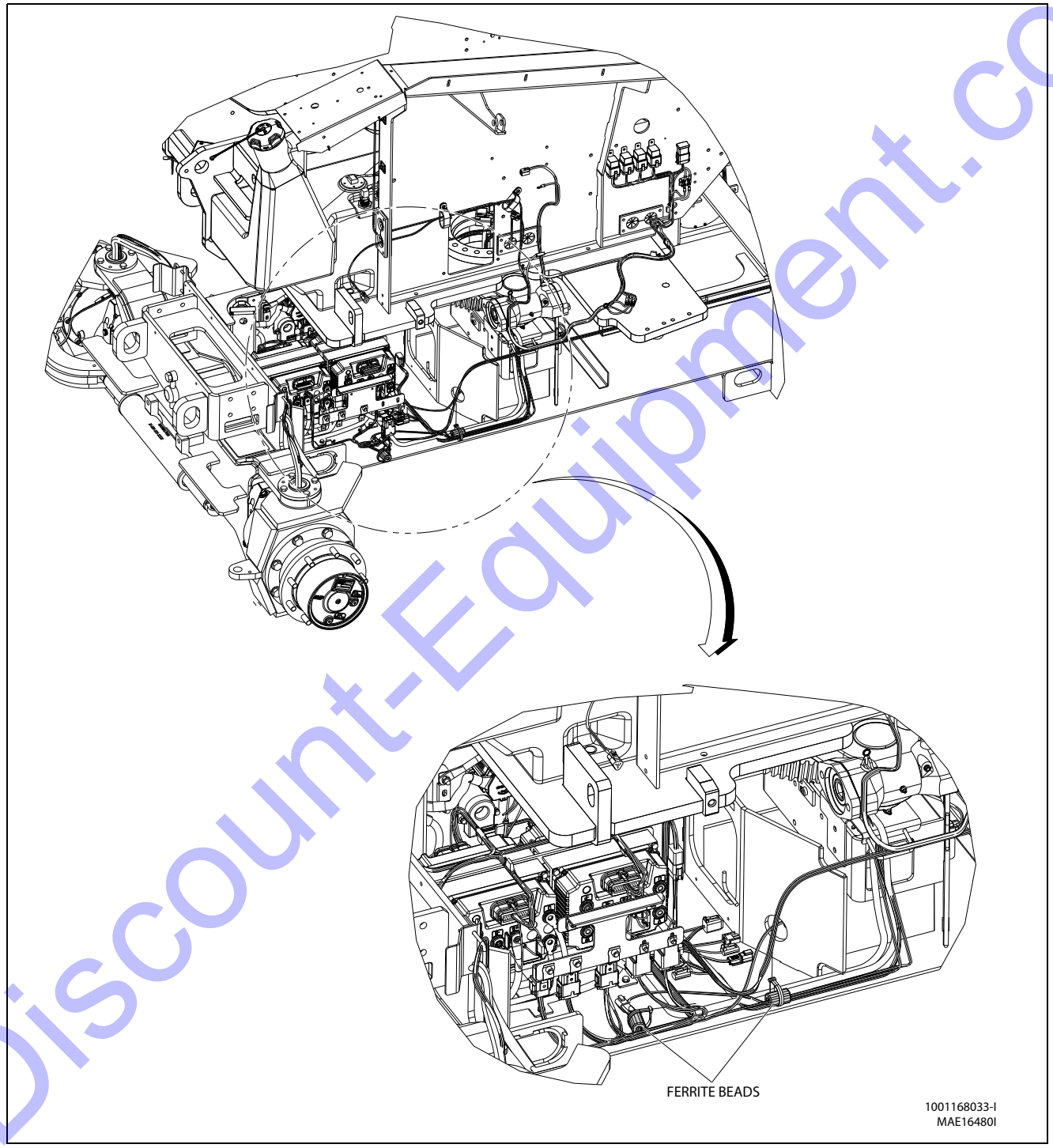


Figure 7-36. Ferrite Beads - Electrical Components (Prior to SN 0300236472)

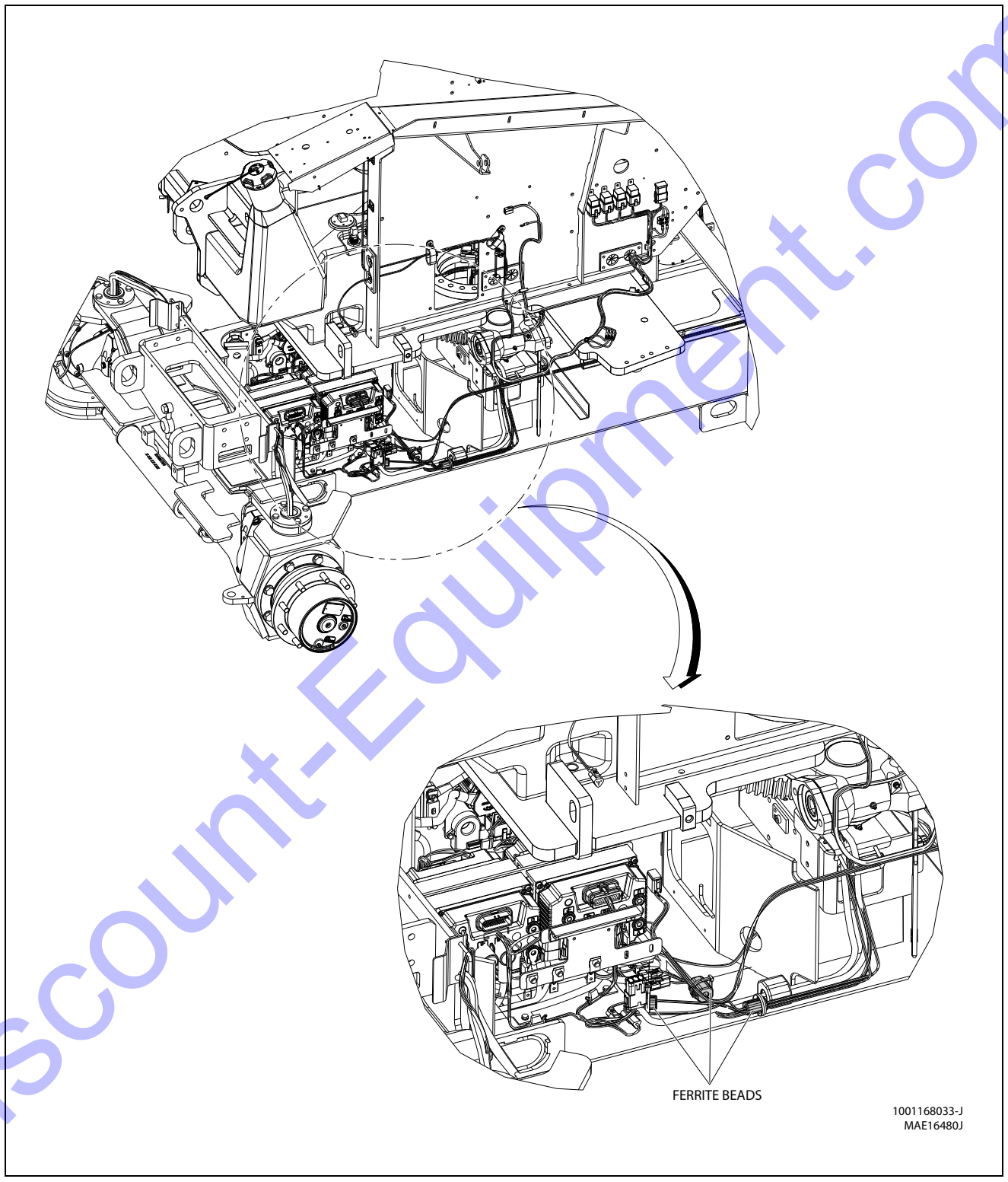


Figure 7-37. Ferrite Beads - Electrical Components (SN 0300236472 to Present)

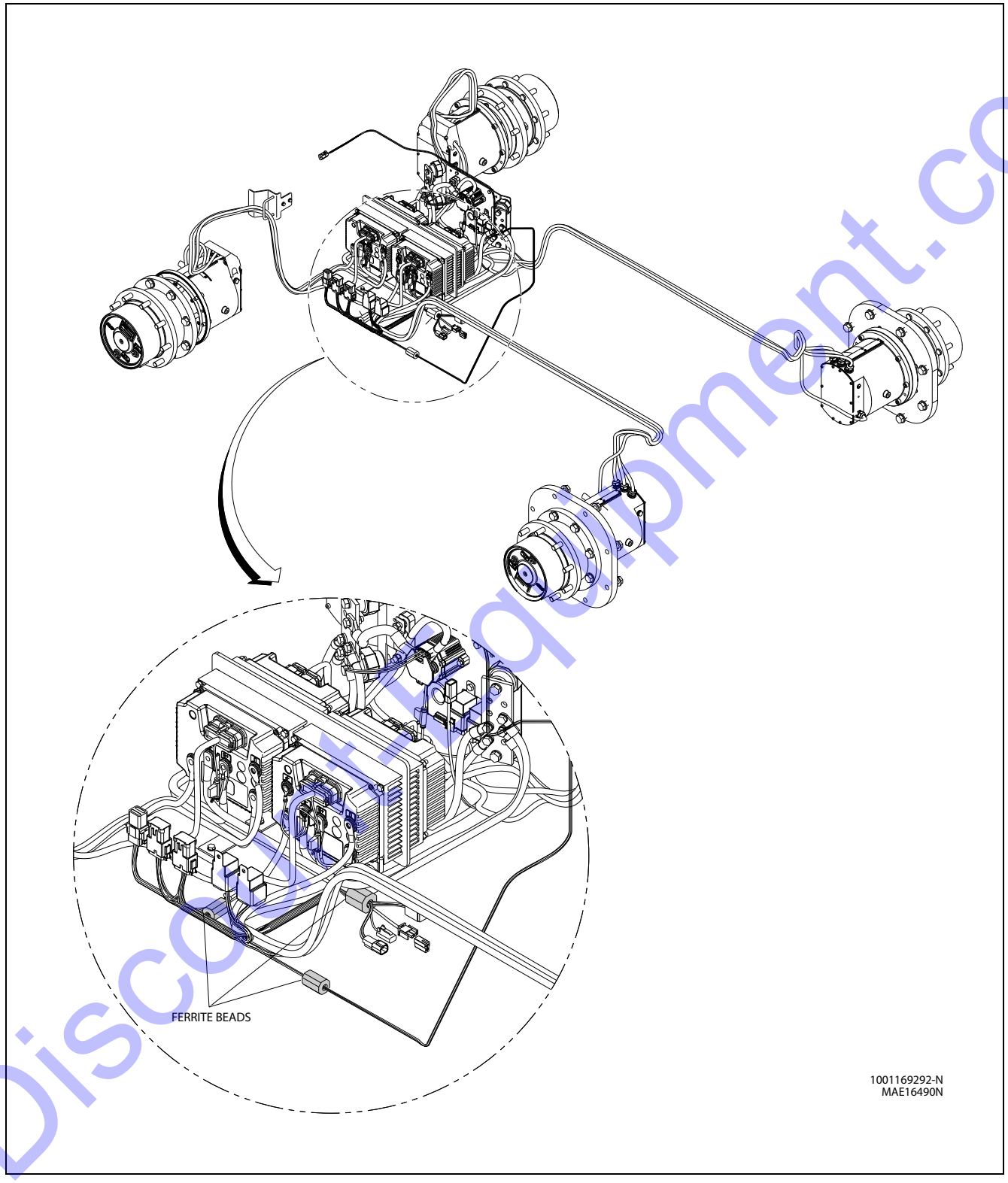


Figure 7-38. Ferrite Beads - Drive Cables (Prior to SN 0300236472)

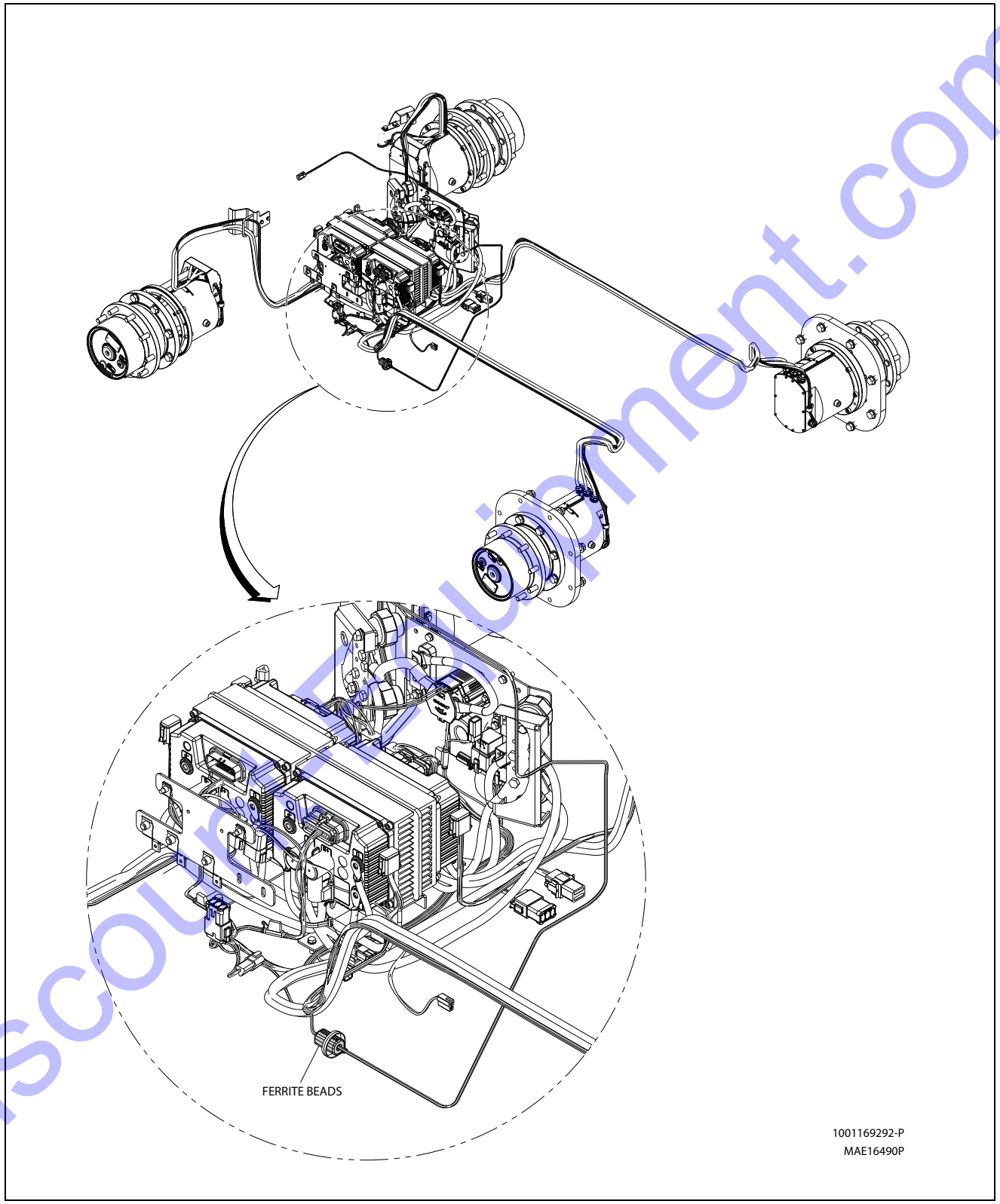


Figure 7-39. Ferrite Beads - Drive Cables (SN 0300236472 to Present)

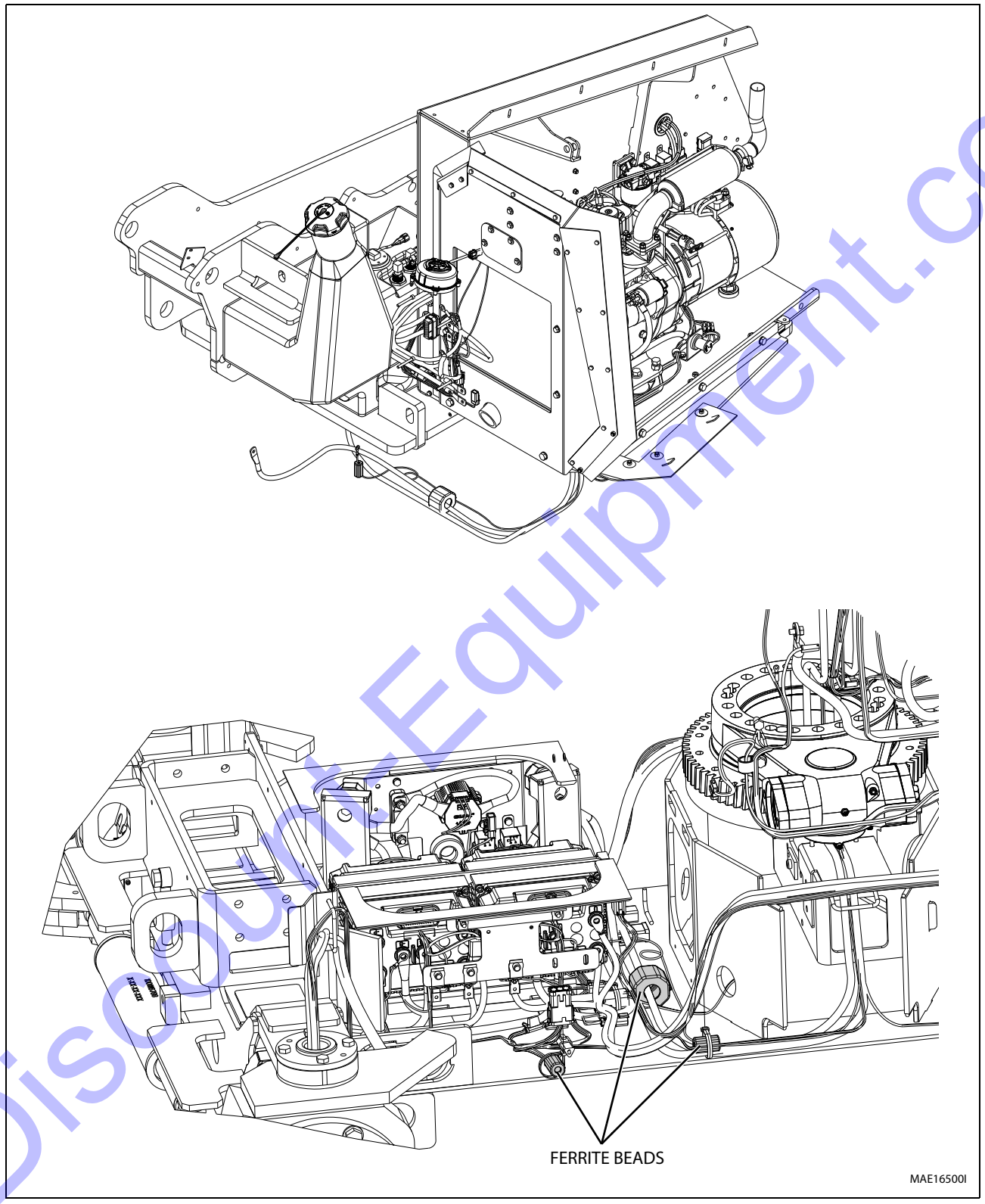


Figure 7-40. Ferrite Beads - Engine Cables

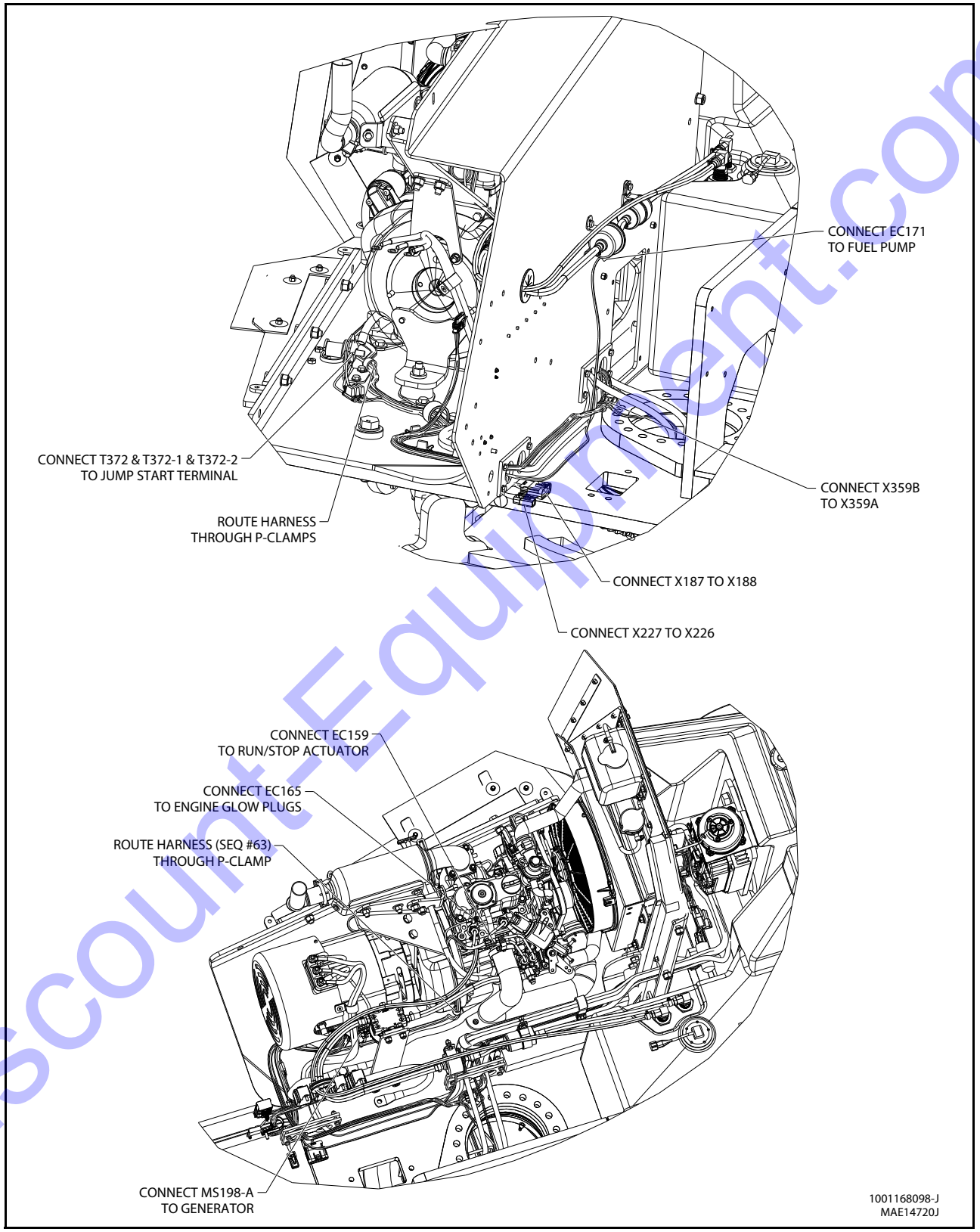


Figure 7-41. Engine and Generator Electrical Components - Sheet 1 of 4

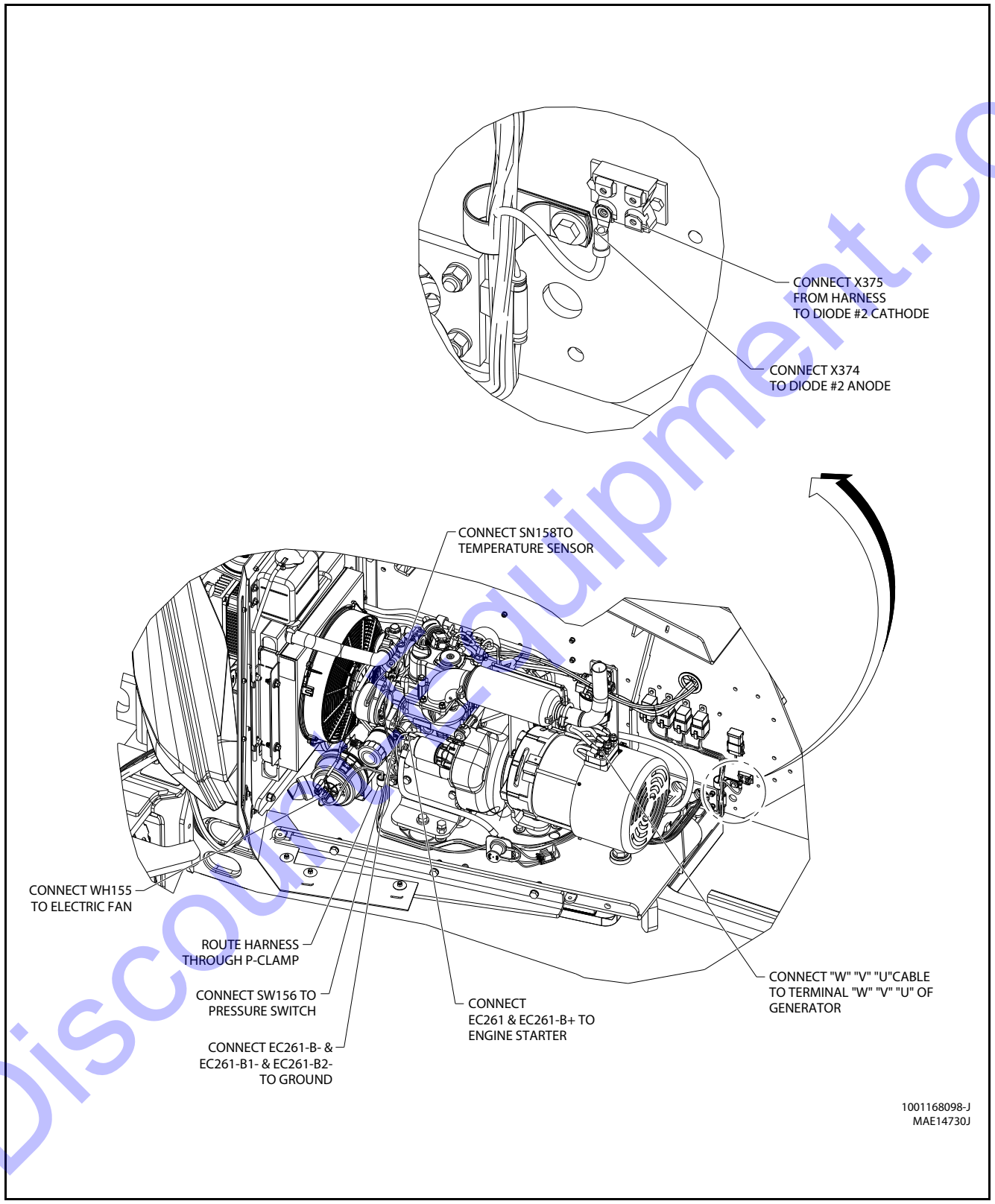


Figure 7-42. Engine and Generator Electrical Components - Sheet 2 of 4

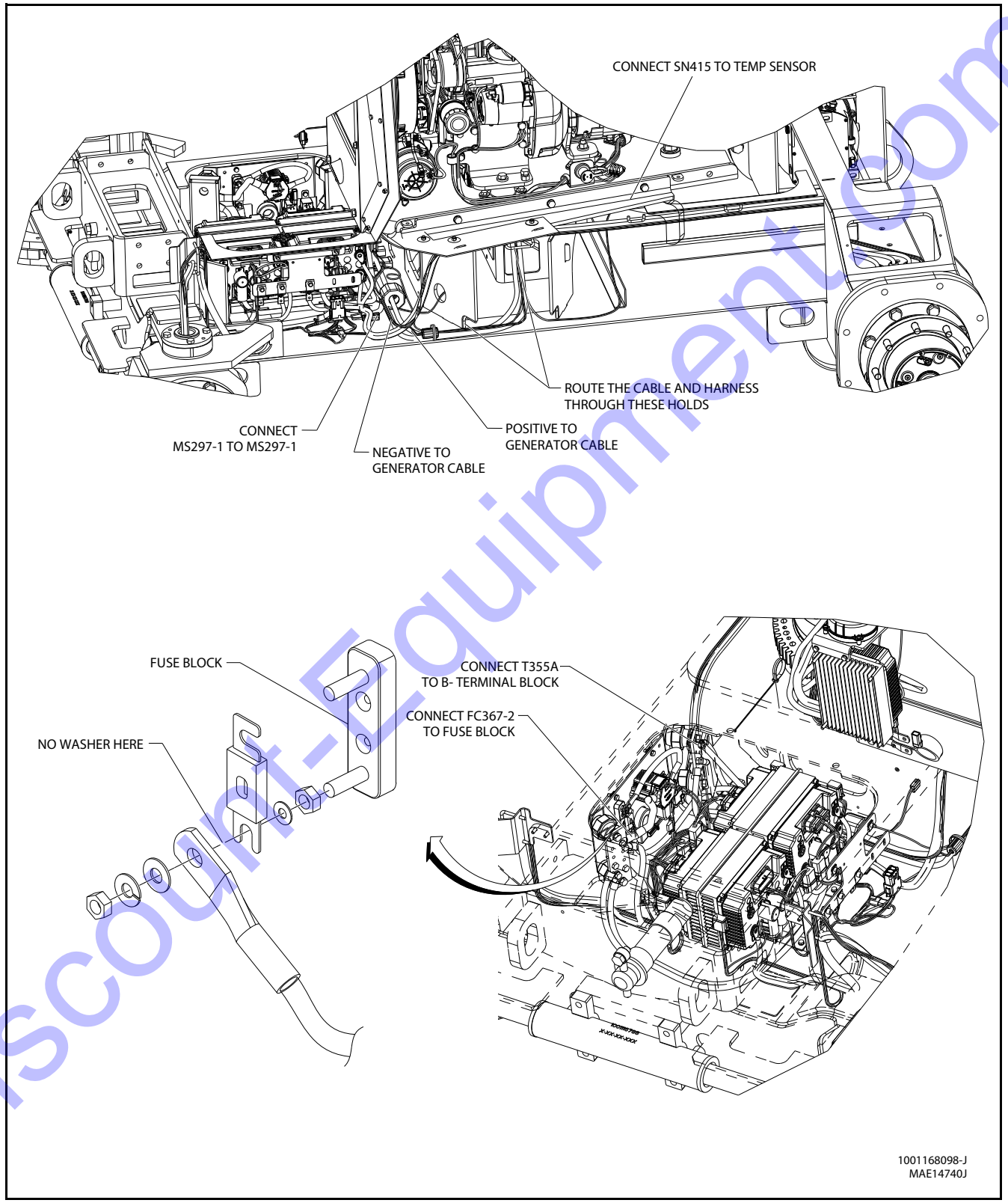


Figure 7-43. Engine and Generator Electrical Components - Sheet 3 of 4

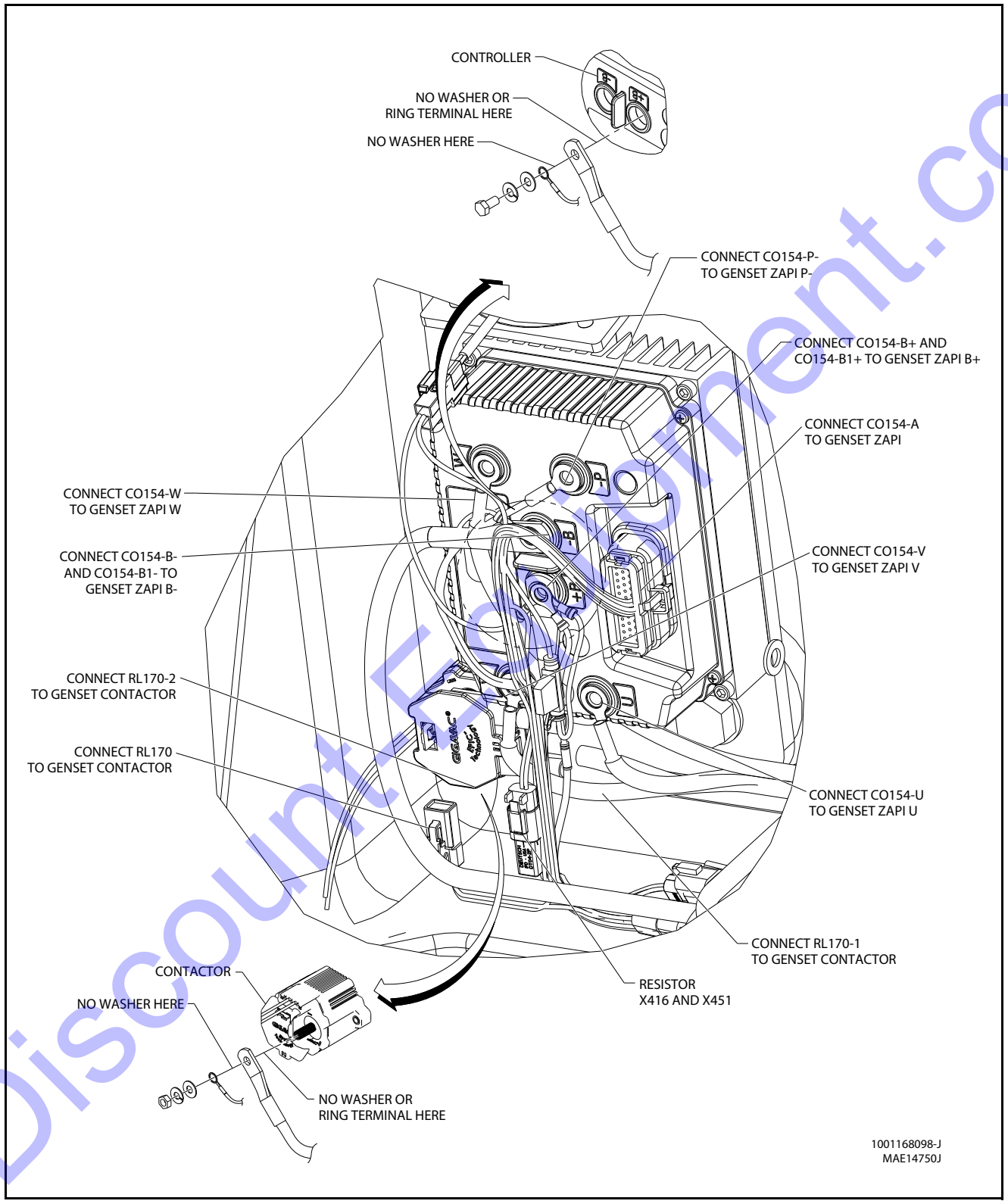


Figure 7-44. Engine and Generator Electrical Components - Sheet 4 of 4

7.9 WIRING HARNESS CONNECTOR LABELS

Connector Labels

Connectors between harnesses are identified by the prefix "X" and a sequentially assigned number. An optional suffix (letters & numbers) may be added when multiple terminations occur at one device or when there are optional connections.

Examples:

X25 connects to X25 in another harness.

X65A, X65B connect to different portions of one device

X163 connects to X163A in ANSI and X163B in CE machines

Component Labels

Every component on the vehicle has a unique identification. A standard prefix letter is assigned according to the table below, followed by a unique sequential number. An optional suffix (letters & numbers) may be added when multiple terminations occur at one device.

Terminals that are not loaded into connectors are considered independent components and labeled in the same fashion.

Table 7-1. Wiring Harness Connector Labels

Component	Category	Label
Audible	Alarms	AH
	Horns	
Battery	Batteries	BT
	Battery Terminals	
Control Module	Ground	CO
	LSS	
	Platform	
Engine	Alternator	EC
	Cold Start	
	Controller	
	Coolant Temp	
	Fuel Pump	
	Fuel Solenoid	
	Glow Plugs	
	Oil Pressure	
	Starter	
Fuse & CB Fuse FC	Fuse	FC
	Fusible Link	FC
	Circuit Breaker	CB
Gauge & Display	Board	GD
	Cluster	
	Hour meter	
	LMI	
	Speedometer	
Inline	Resistor	R
	Diode	D
Joystick & Steering	Electronic	JS
	Hydraulic	
Lights	Dome	LB
	Headlights	
	Simple	
	Taillights	
Membrane Panel		MP
Miscellaneous	Radio	MS
	Speakers	
	Splice Blocks	
	T-Connectors	

Table 7-1. Wiring Harness Connector Labels

Component	Category	Label
Other Switches	Disconnect	SW
	EMS	
	Foot	
	HVAC	WH
	Key	SW
	Park brake	
	Pump pot	
	Push	
	Shifter	
	Turn signal	
Relay	5 Pin	RL
	4 Pin	
	Contactor	
	Power module	
Rocker Switch		SW
Sensor	Angle	SN
	Fuel	
	Length	
	Limit	
	Load	
	Pressure	
	Proximity	
	Speed	
	Temperature	
Terminals	Pins	T
	Sockets	
	Male Blades	
	Female Blades	
	Rings	
	Forks	
Toggle Switch	DPDT	SW
	DPST	
	SPDT	
	SPST	
	Special	
Valves	Simple	HV
	Suppression	

Examples:
T67 is a ring terminal connected during installation.
C01-J3 is the J3 connector for a UGM control module.
EC9 is a glow plug supplied with the engine

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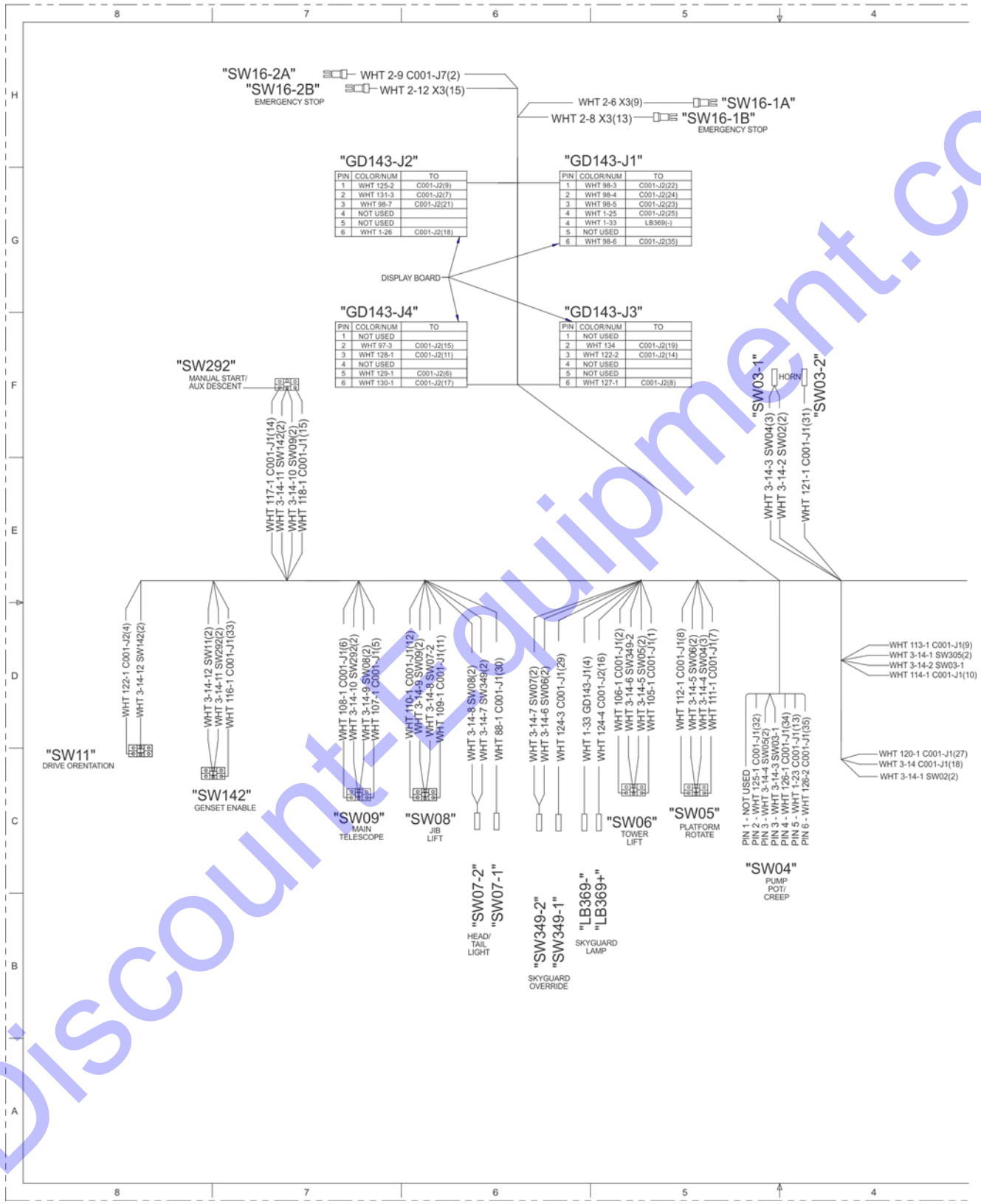

Figure 7-45. Console Harness - Sheet 1 of 2

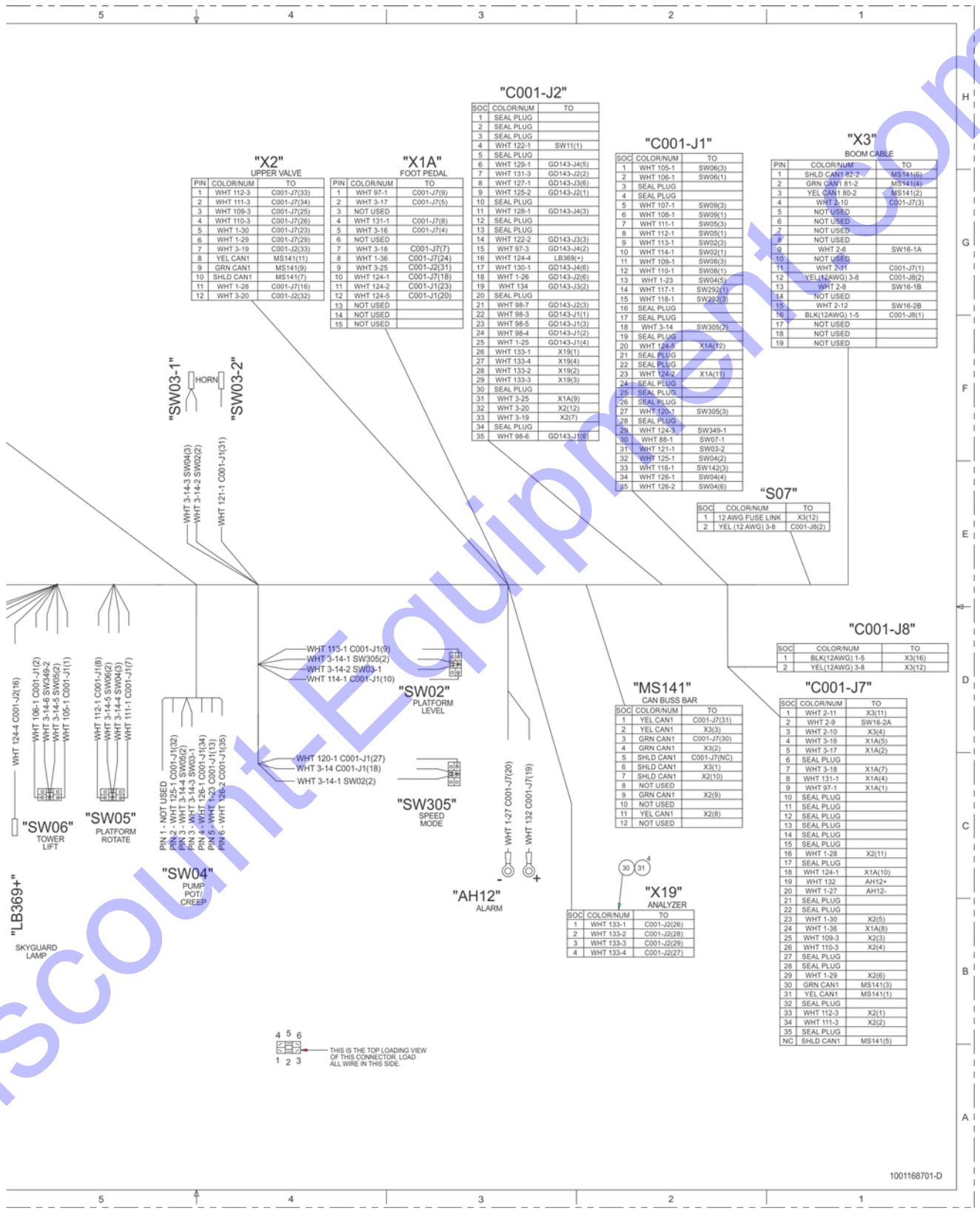

Figure 7-46. Console Harness - Sheet 2 of 2

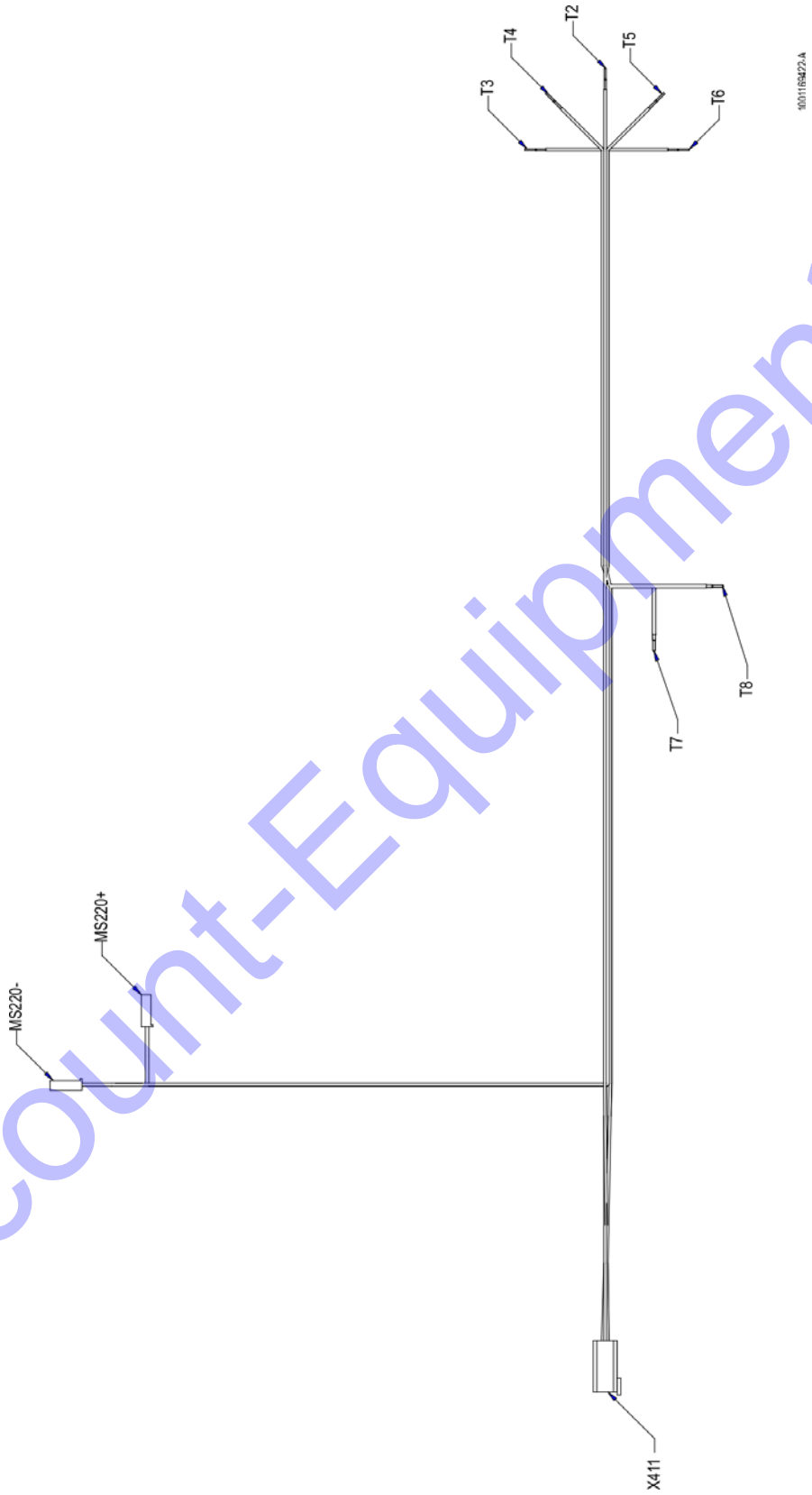

Figure 7-47. Platform to Boom Harness - Sheet 1 of 2

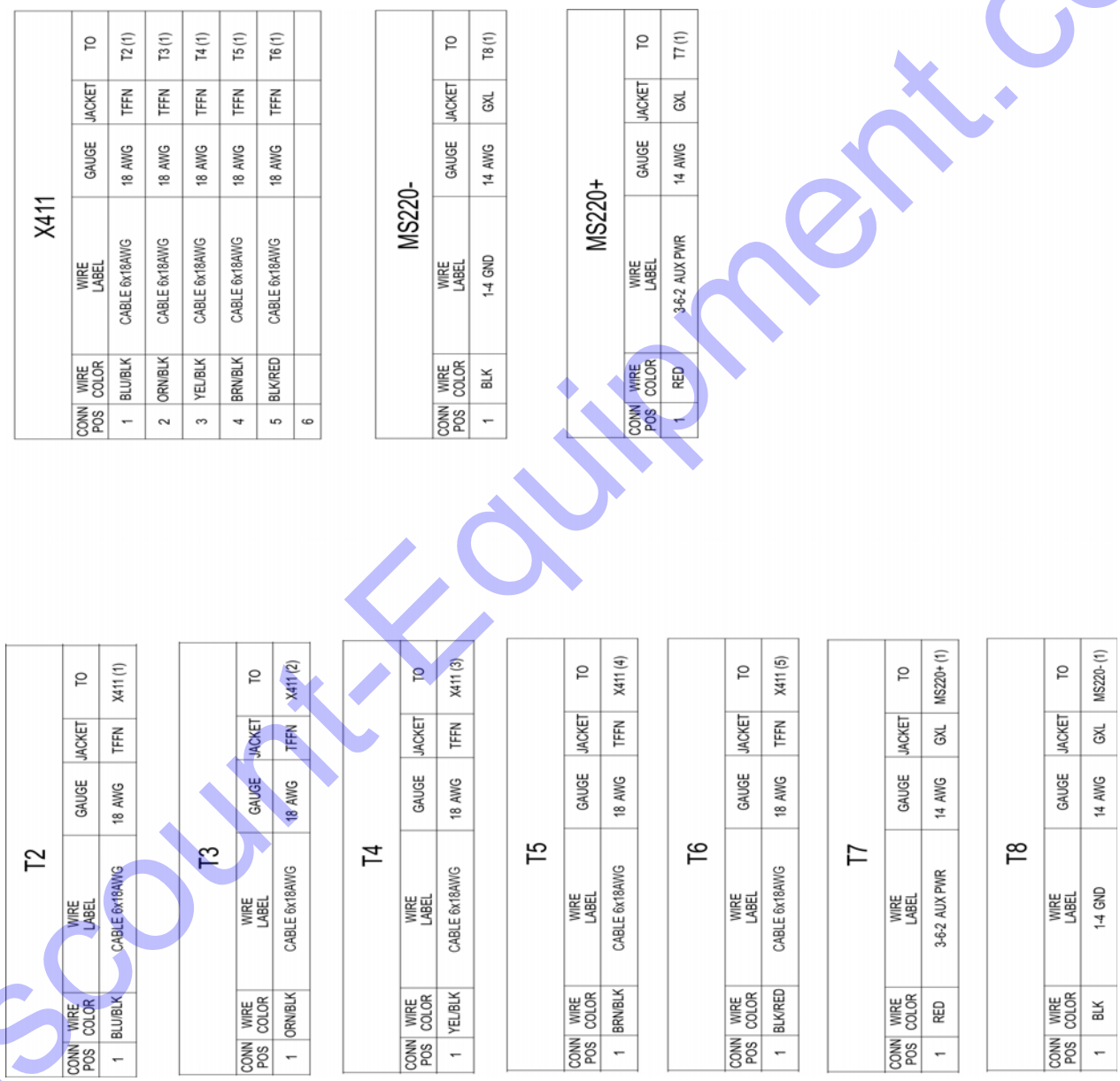

Figure 7-48. Platform to Boom Harness - Sheet 2 of 2

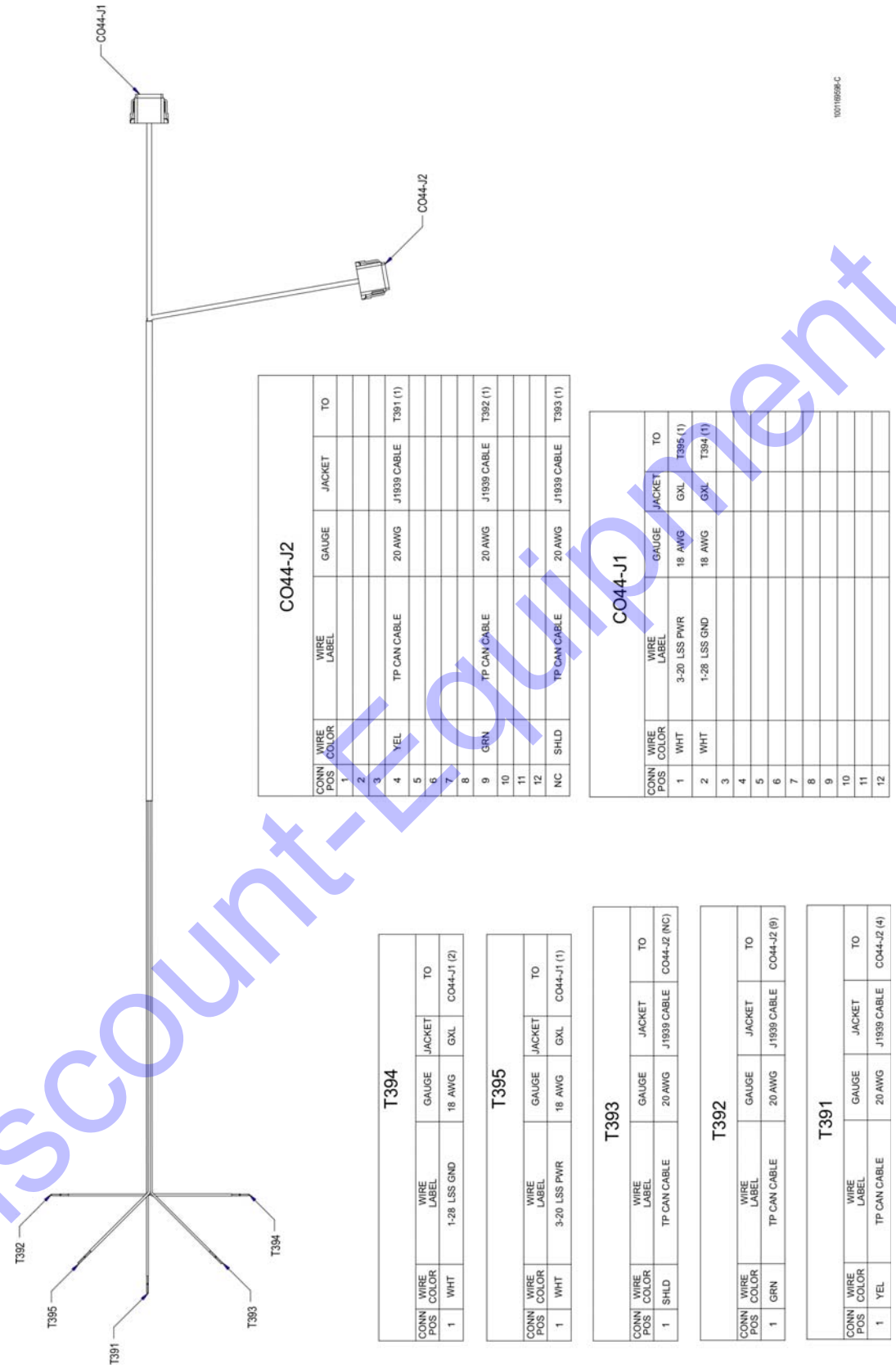

Figure 7-49. LSS Harness

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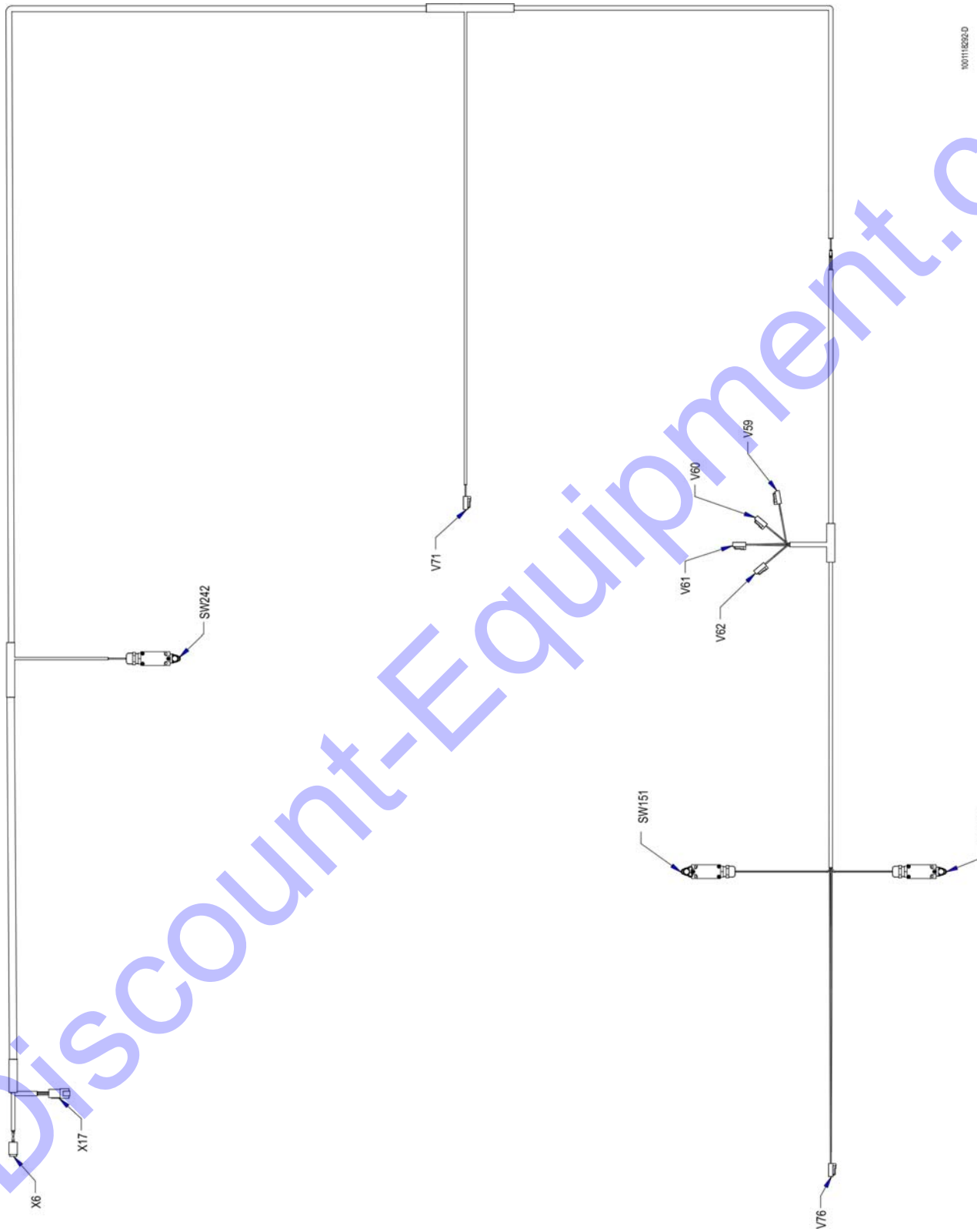
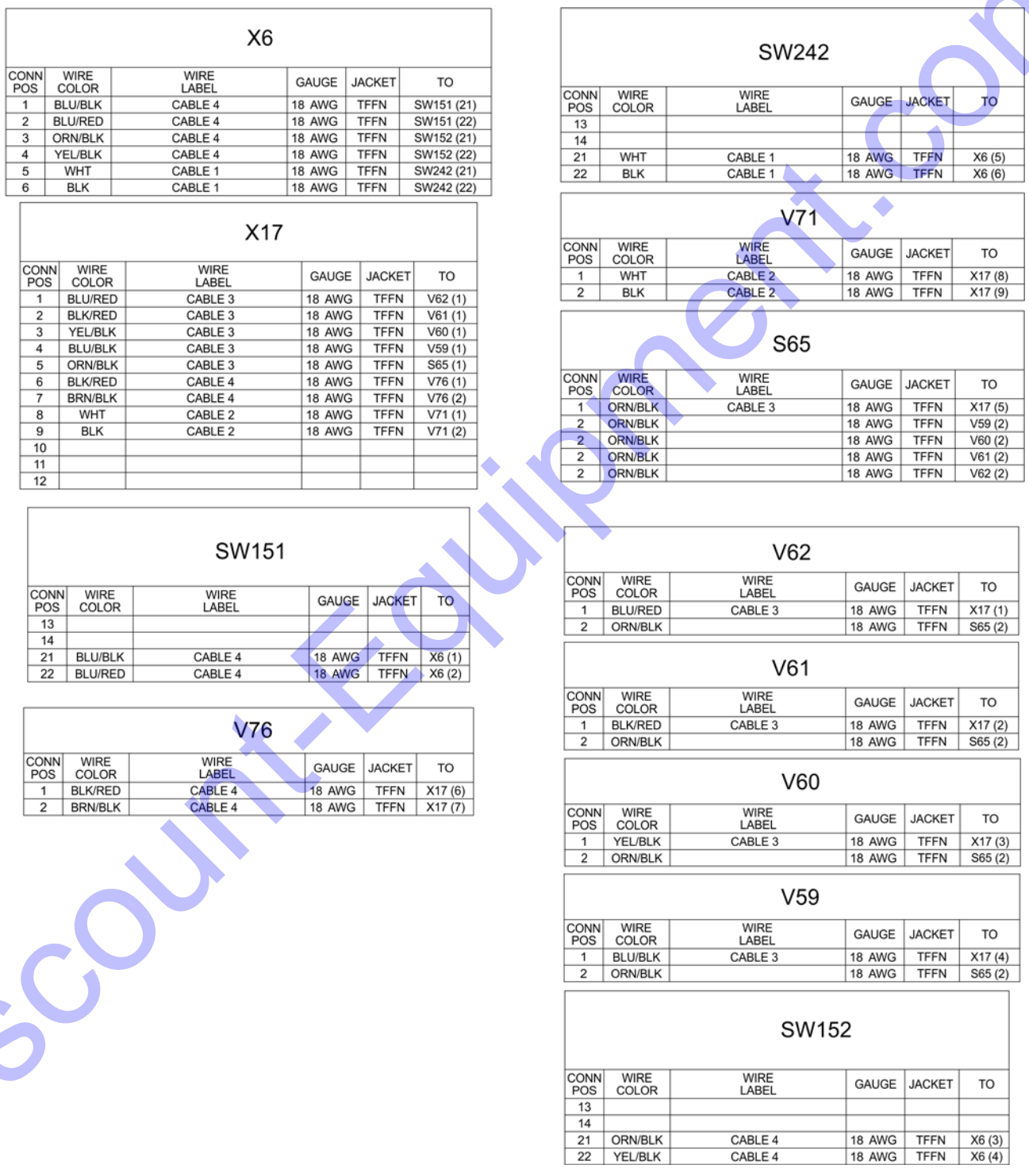


Figure 7-50. Lower Boom Harness - Sheet 1 of 2



X6

CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	BLU/BLK	CABLE 4	18 AWG	TFFN	SW151 (21)
2	BLU/RED	CABLE 4	18 AWG	TFFN	SW151 (22)
3	ORN/BLK	CABLE 4	18 AWG	TFFN	SW152 (21)
4	YEL/BLK	CABLE 4	18 AWG	TFFN	SW152 (22)
5	WHT	CABLE 1	18 AWG	TFFN	SW242 (21)
6	BLK	CABLE 1	18 AWG	TFFN	SW242 (22)

X17

CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	BLU/RED	CABLE 3	18 AWG	TFFN	V62 (1)
2	BLK/RED	CABLE 3	18 AWG	TFFN	V61 (1)
3	YEL/BLK	CABLE 3	18 AWG	TFFN	V60 (1)
4	BLU/BLK	CABLE 3	18 AWG	TFFN	V59 (1)
5	ORN/BLK	CABLE 3	18 AWG	TFFN	S65 (1)
6	BLK/RED	CABLE 4	18 AWG	TFFN	V76 (1)
7	BRN/BLK	CABLE 4	18 AWG	TFFN	V76 (2)
8	WHT	CABLE 2	18 AWG	TFFN	V71 (1)
9	BLK	CABLE 2	18 AWG	TFFN	V71 (2)
10					
11					
12					

SW151

CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
13					
14					
21	BLU/BLK	CABLE 4	18 AWG	TFFN	X6 (1)
22	BLU/RED	CABLE 4	18 AWG	TFFN	X6 (2)

V76

CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	BLK/RED	CABLE 4	18 AWG	TFFN	X17 (6)
2	BRN/BLK	CABLE 4	18 AWG	TFFN	X17 (7)

SW242

CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
13					
14					
21	WHT	CABLE 1	18 AWG	TFFN	X6 (5)
22	BLK	CABLE 1	18 AWG	TFFN	X6 (6)

V71

CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	CABLE 2	18 AWG	TFFN	X17 (8)
2	BLK	CABLE 2	18 AWG	TFFN	X17 (9)

S65

CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	ORN/BLK	CABLE 3	18 AWG	TFFN	X17 (5)
2	ORN/BLK		18 AWG	TFFN	V59 (2)
2	ORN/BLK		18 AWG	TFFN	V60 (2)
2	ORN/BLK		18 AWG	TFFN	V61 (2)
2	ORN/BLK		18 AWG	TFFN	V62 (2)

V62

CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	BLU/RED	CABLE 3	18 AWG	TFFN	X17 (1)
2	ORN/BLK		18 AWG	TFFN	S65 (2)

V61

CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	BLK/RED	CABLE 3	18 AWG	TFFN	X17 (2)
2	ORN/BLK		18 AWG	TFFN	S65 (2)

V60

CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	YEL/BLK	CABLE 3	18 AWG	TFFN	X17 (3)
2	ORN/BLK		18 AWG	TFFN	S65 (2)

V59

CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	BLU/BLK	CABLE 3	18 AWG	TFFN	X17 (4)
2	ORN/BLK		18 AWG	TFFN	S65 (2)

SW152

CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
13					
14					
21	ORN/BLK	CABLE 4	18 AWG	TFFN	X6 (3)
22	YEL/BLK	CABLE 4	18 AWG	TFFN	X6 (4)

Figure 7-51. Lower Boom Harness - Sheet 2 of 2

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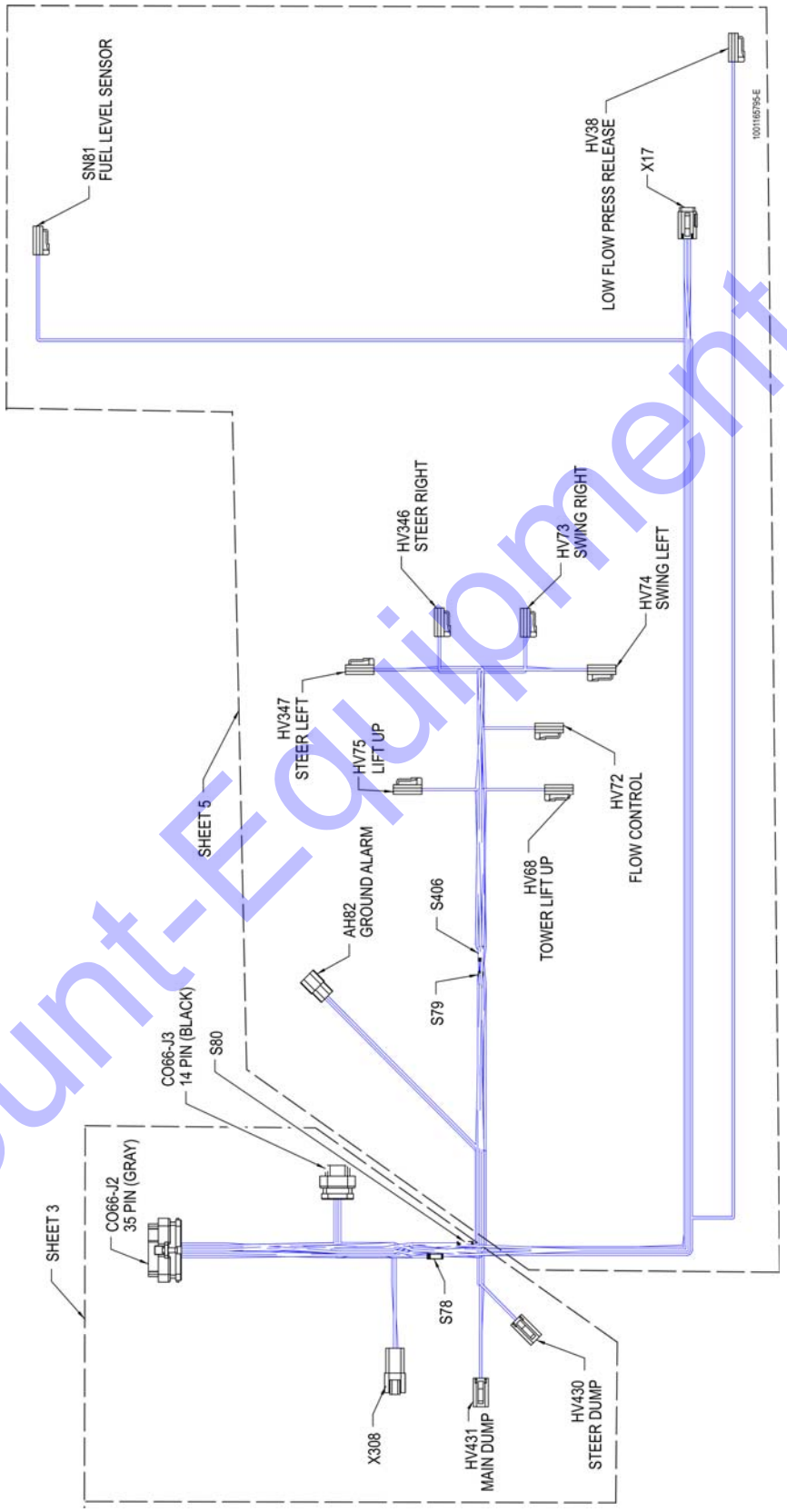

Figure 7-52. Valve Harness - Sheet 1 of 6

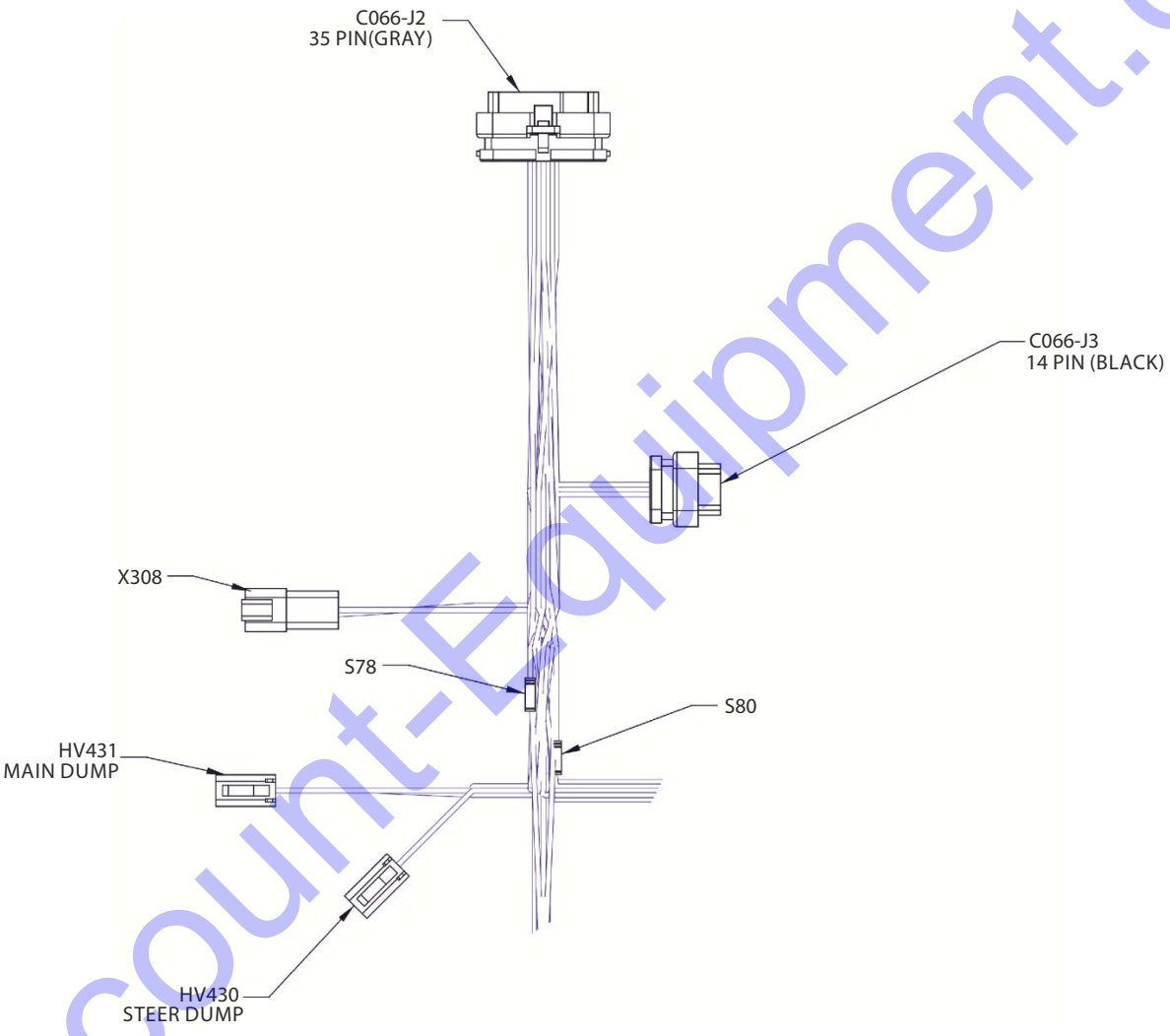

Figure 7-53. Valve Harness - Sheet 2 of 6

CO66-J2 (35 PIN [GRAY])					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	115-1 STEER DUMP	18 AWG	GXL	HV430 (1)
2					
3					
4	WHT	107-3 TELE IN	18 AWG	GXL	X17 (3)
5	WHT	113-3 PLAT LVL UP	18 AWG	GXL	X17 (1)
6	WHT	1-20 FUEL GND	18 AWG	GXL	SN81 (2)
7	WHT	114-3 PLAT LVL DN	18 AWG	GXL	X17 (2)
8	WHT	78-1 STEER RT	18 AWG	GXL	HV346 (1)
9	WHT	106-3 TWR LFT DN	18 AWG	GXL	X17 (8)
10					
11	WHT	101-3 LIFT UP	18 AWG	GXL	HV75 (1)
12					
13	WHT	115-2 MAIN DUMP	18 AWG	GXL	HV431 (1)
14	WHT	1-16 GND	18 AWG	GXL	X17 (5)
15					
16	WHT	108-3 TELE OUT	18 AWG	GXL	X17 (4)
17	WHT	1-99 LOW FLOW VLV RTN	18 AWG	GXL	HV38 (2)
18	WHT	1-37 STEER DUMP GND	18 AWG	GXL	HV430 (2)
19	WHT	79-1 STEER LT	18 AWG	GXL	HV347 (1)
20	WHT	105-3 TWR LFT UP	18 AWG	GXL	HV68 (1)
21					
22	WHT	102-3 LIFT DN	18 AWG	GXL	X17 (6)
23					
24					
25	WHT	98-1 FUEL LVL	18 AWG	GXL	SN81 (1)
26	WHT	88-2 CHASSIS LIGHT	18 AWG	GXL	X308 (2)
27	WHT	99-2 GND ALARM	18 AWG	GXL	AH82 (B)
28	WHT	1-34 STR VLV GND	18 AWG	GXL	S406 (2)
29	WHT	1-21 ALARM GND	18 AWG	GXL	AH82 (C)
30	WHT	1-38 MAIN DUMP GND	18 AWG	GXL	HV431 (2)
31	WHT	115-3 FLOW CTRL	18 AWG	GXL	HV72 (1)
32	WHT	1-98 LOW FLOW VLV	18 AWG	GXL	HV38 (1)
33					
34	WHT	103-3 SWING LT	18 AWG	GXL	HV74 (1)
35	WHT	104-3 SWING RT	18 AWG	GXL	HV73 (1)

X308					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	49-1 CRIBBING	16 AWG	GXL	CO66-J3 (9)
2	WHT	88-2 CHASSIS LIGHT	18 AWG	GXL	CO66-J2 (26)
3					
4					
5	WHT	27-2-1 JUMP ENABLE	18 AWG	GXL	CO66-J3 (10)
6					
7					
8					

HV430 (STEER DUMP)					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	115-1 STEER DUMP	18 AWG	GXL	CO66-J2 (1)
2	WHT	1-37 STEER DUMP GND	18 AWG	GXL	CO66-J2 (18)

HV431 (MAIN DUMP)					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	115-2 MAIN DUMP	18 AWG	GXL	CO66-J2 (13)
2	WHT	1-38 MAIN DUMP GND	18 AWG	GXL	CO66-J2 (30)

CO66-J3 (14 PIN [BLACK])					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1					
2					
3					
4	WHT	1-18 SWG VLV RTN	18 AWG	GXL	S79 (2)
5	WHT	1-17 TWR VLV RTN	18 AWG	GXL	S78 (2)
6	WHT	1-15 FLOW VLV RTN	18 AWG	GXL	HV72 (2)
7	WHT	99-1 ALARM PWR	18 AWG	GXL	AH82 (A)
8					
9	WHT	49-1 CRIBBING	16 AWG	GXL	X308 (1)
10	WHT	27-2-1 JUMP ENABLE	18 AWG	GXL	X308 (5)
11					
12					
13					
14	WHT	1-19 LFT VLV RTN	18 AWG	GXL	S80 (2)

S78					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	1-17-1 TWR VLV RTN	18 AWG	GXL	HV68 (2)
1	WHT	1-17-2 TWR VLV RTN	18 AWG	GXL	X17 (9)
2	WHT	1-17 TWR VLV RTN	18 AWG	GXL	CO66-J3 (5)

S80					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	1-19-1 LFT VLV RTN	18 AWG	GXL	HV75 (2)
1	WHT	1-19-2 LFT VLV RTN	18 AWG	GXL	X17 (7)
2	WHT	1-19 LFT VLV RTN	18 AWG	GXL	CO66-J3 (14)

Figure 7-54. Valve Harness - Sheet 3 of 6

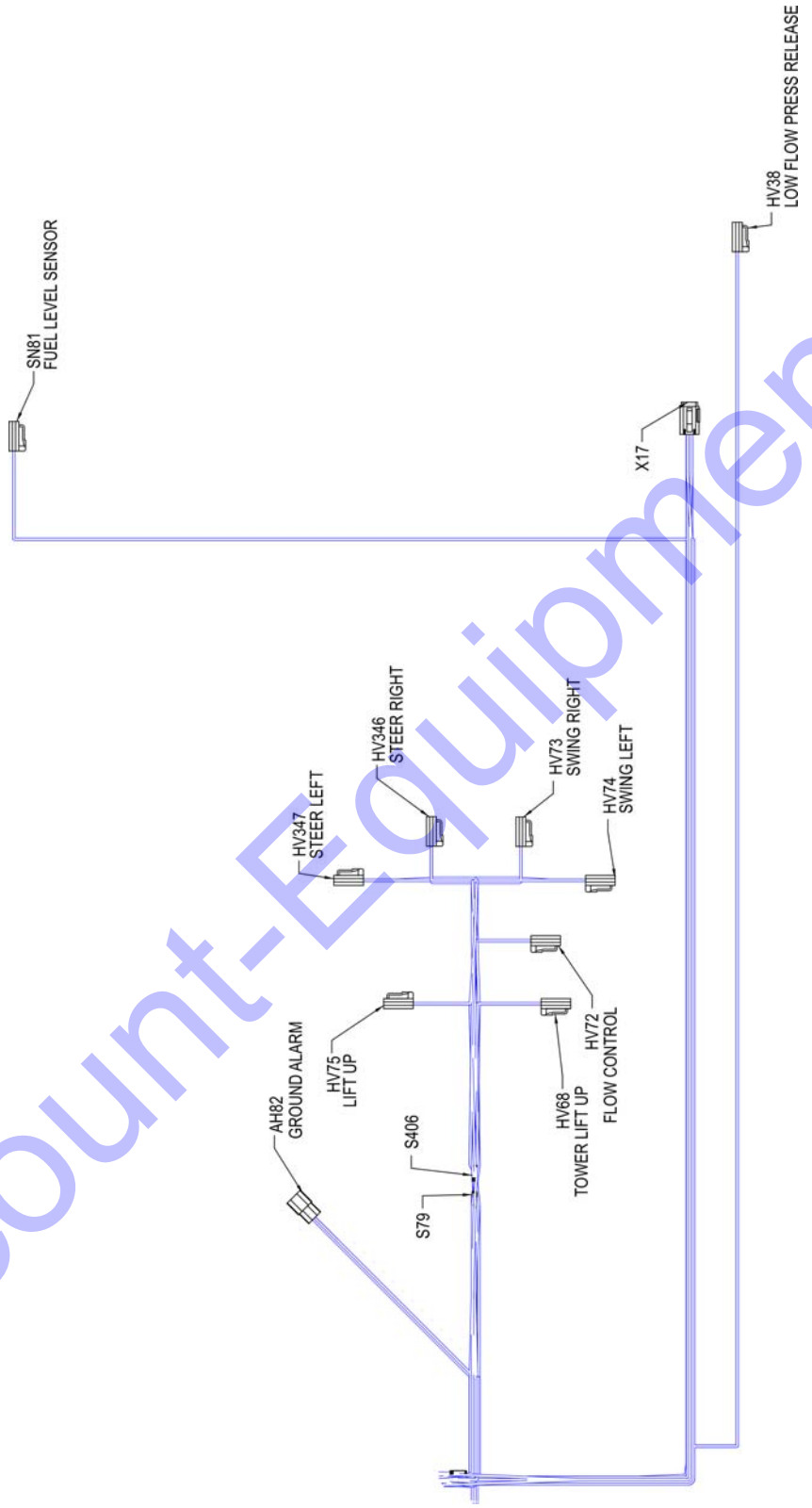

Figure 7-55. Valve Harness - Sheet 4 of 6

AH82 (GROUND ALARM)					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
A	WHT	99-1 ALARM PWR	18 AWG	GXL	CO66-J3 (7)
B	WHT	99-2 GND ALARM	18 AWG	GXL	CO66-J2 (27)
C	WHT	1-21 ALARM GND	18 AWG	GXL	CO66-J2 (29)

S79					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	1-18-1 SWG VLV RTN	18 AWG	GXL	HV74 (2)
1	WHT	1-18-2 SWG VLV RTN	18 AWG	GXL	HV73 (2)
2	WHT	1-18 SWG VLV RTN	18 AWG	GXL	CO66-J3 (4)

S406					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	1-34-1 STR VLV GND	18 AWG	GXL	HV346 (2)
1	WHT	1-34-2 STR VLV GND	18 AWG	GXL	HV347 (2)
2	WHT	1-34 STR VLV GND	18 AWG	GXL	CO66-J2 (28)

HV68 (TOWER LIFT UP)					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	105-3 TWR LFT UP	18 AWG	GXL	CO66-J2 (20)
2	WHT	1-17-1 TWR VLV RTN	18 AWG	GXL	S78 (1)

HV72 (FLOW CONTROL)					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	115-3 FLOW CTRL	18 AWG	GXL	CO66-J2 (31)
2	WHT	1-15 FLOW VLV RTN	18 AWG	GXL	CO66-J3 (6)

HV75 (LIFT UP)					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	101-3 LIFT UP	18 AWG	GXL	CO66-J2 (11)
2	WHT	1-19-1 LFT VLV RTN	18 AWG	GXL	S80 (1)

HV347 (STEER LEFT)					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	79-1 STEER LT	18 AWG	GXL	CO66-J2 (19)
2	WHT	1-34-2 STR VLV GND	18 AWG	GXL	S406 (1)

HV346 (STEER RIGHT)					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	78-1 STEER RT	18 AWG	GXL	CO66-J2 (8)
2	WHT	1-34-1 STR VLV GND	18 AWG	GXL	S406 (1)

HV74 (SWING LEFT)					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	103-3 SWING LT	18 AWG	GXL	CO66-J2 (34)
2	WHT	1-18-1 SWG VLV RTN	18 AWG	GXL	S79 (1)

HV73 (SWING RIGHT)					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	104-3 SWING RT	18 AWG	GXL	CO66-J2 (35)
2	WHT	1-18-2 SWG VLV RTN	18 AWG	GXL	S79 (1)

SN81 (FUEL LEVEL SENSOR)					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	98-1 FUEL LVL	18 AWG	GXL	CO66-J2 (25)
2	WHT	1-20 FUEL GND	18 AWG	GXL	CO66-J2 (6)

X17					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	113-3 PLAT LVL UP	18 AWG	GXL	CO66-J2 (5)
2	WHT	114-3 PLAT LVL DN	18 AWG	GXL	CO66-J2 (7)
3	WHT	107-3 TELE IN	18 AWG	GXL	CO66-J2 (4)
4	WHT	108-3 TELE OUT	18 AWG	GXL	CO66-J2 (16)
5	WHT	1-16 GND	18 AWG	GXL	CO66-J2 (14)
6	WHT	102-3 LIFT DN	18 AWG	GXL	CO66-J2 (22)
7	WHT	1-19-2 LFT VLV RTN	18 AWG	GXL	S80 (1)
8	WHT	106-3 TWR LFT DN	18 AWG	GXL	CO66-J2 (9)
9	WHT	1-17-2 TWR VLV RTN	18 AWG	GXL	S78 (1)
10					
11					
12					

HV38 (LOW FLOW PRESS RELEASE)					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	1-98 LOW FLOW VLV	18 AWG	GXL	CO66-J2 (32)
2	WHT	1-99 LOW FLOW VLV RTN	18 AWG	GXL	CO66-J2 (17)

Figure 7-56. Valve Harness - Sheet 5 of 6

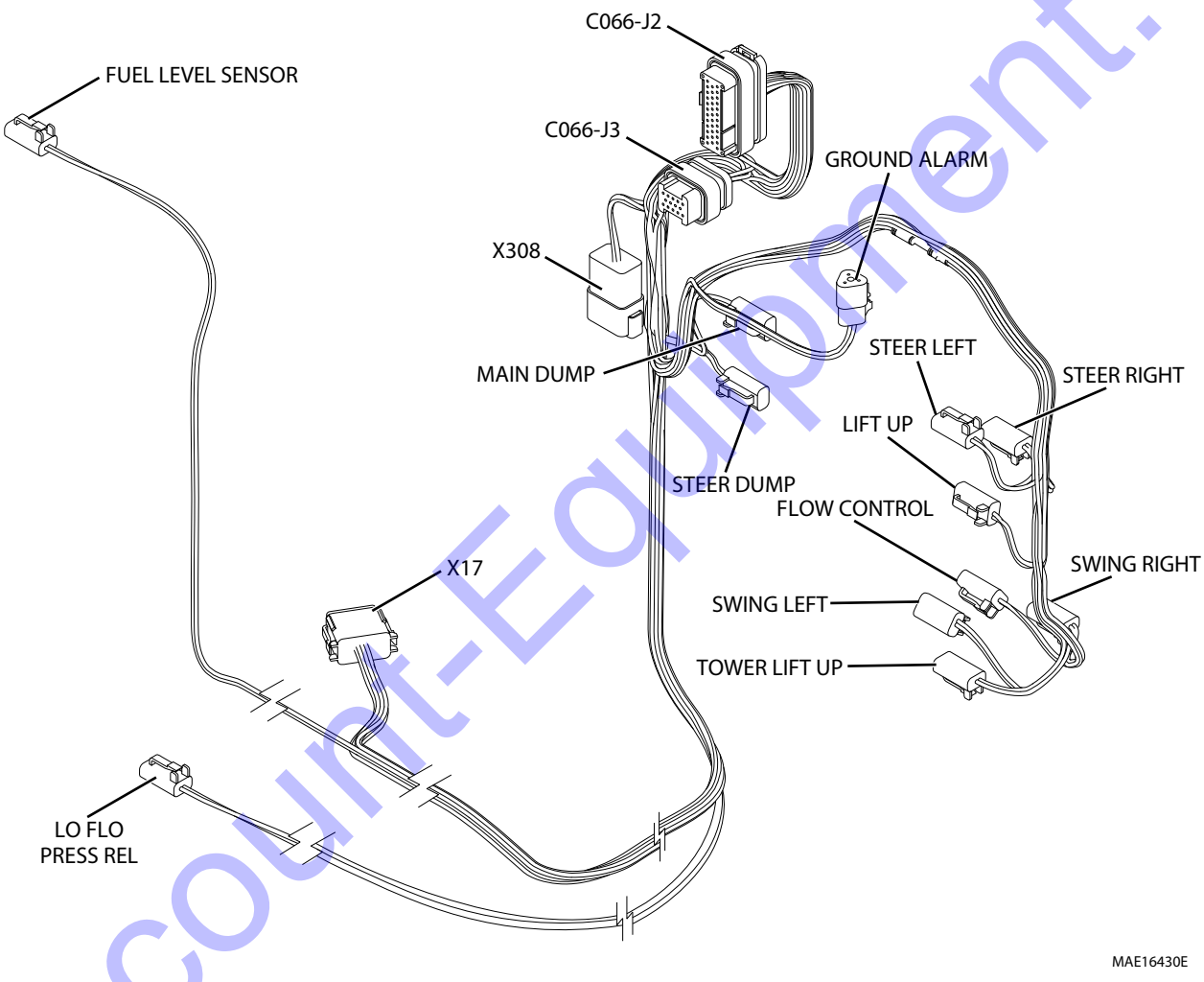

Figure 7-57. Valve Harness - Sheet 6 of 6

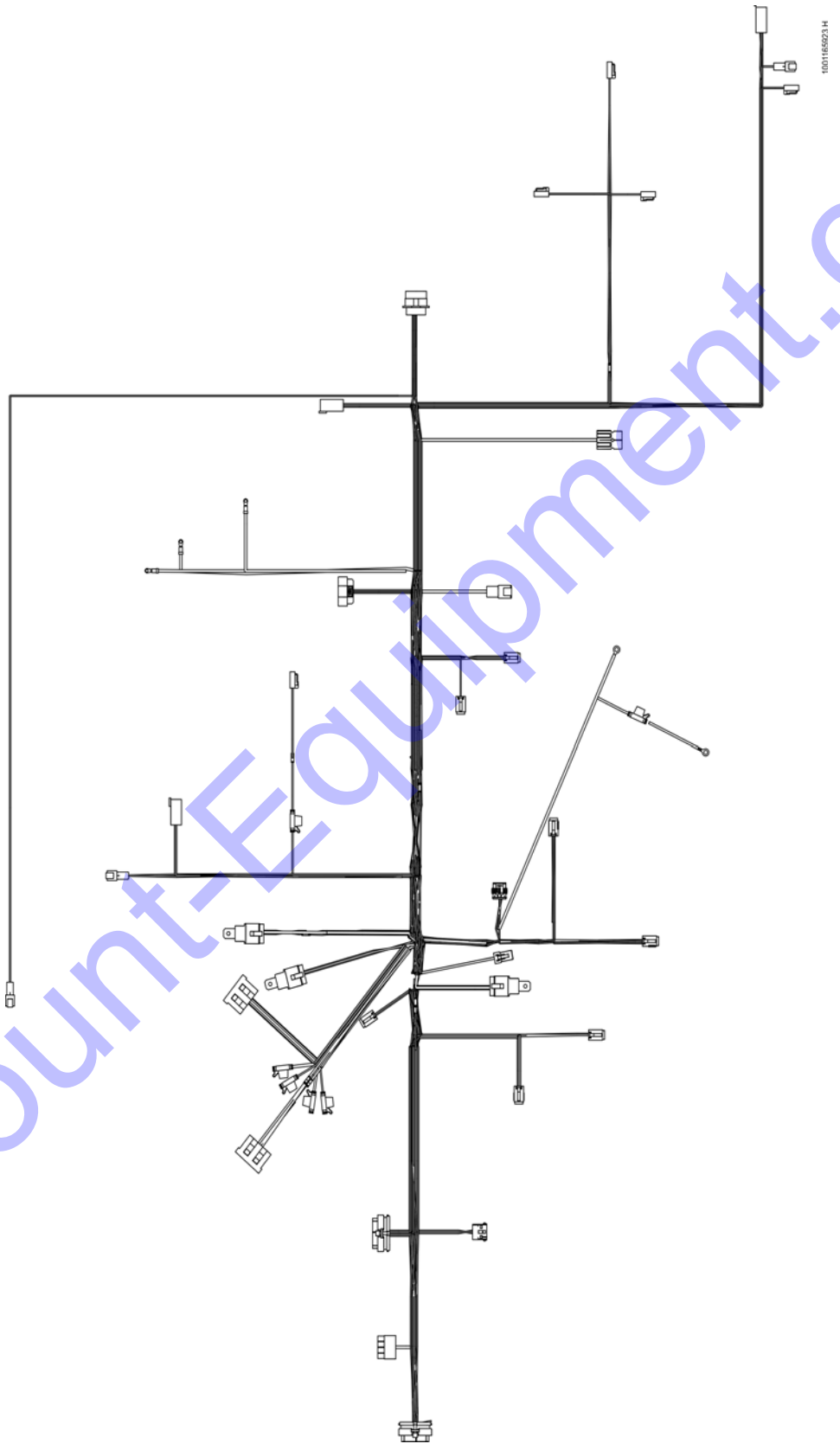

Figure 7-58. Turntable Harness - Sheet 1 of 11

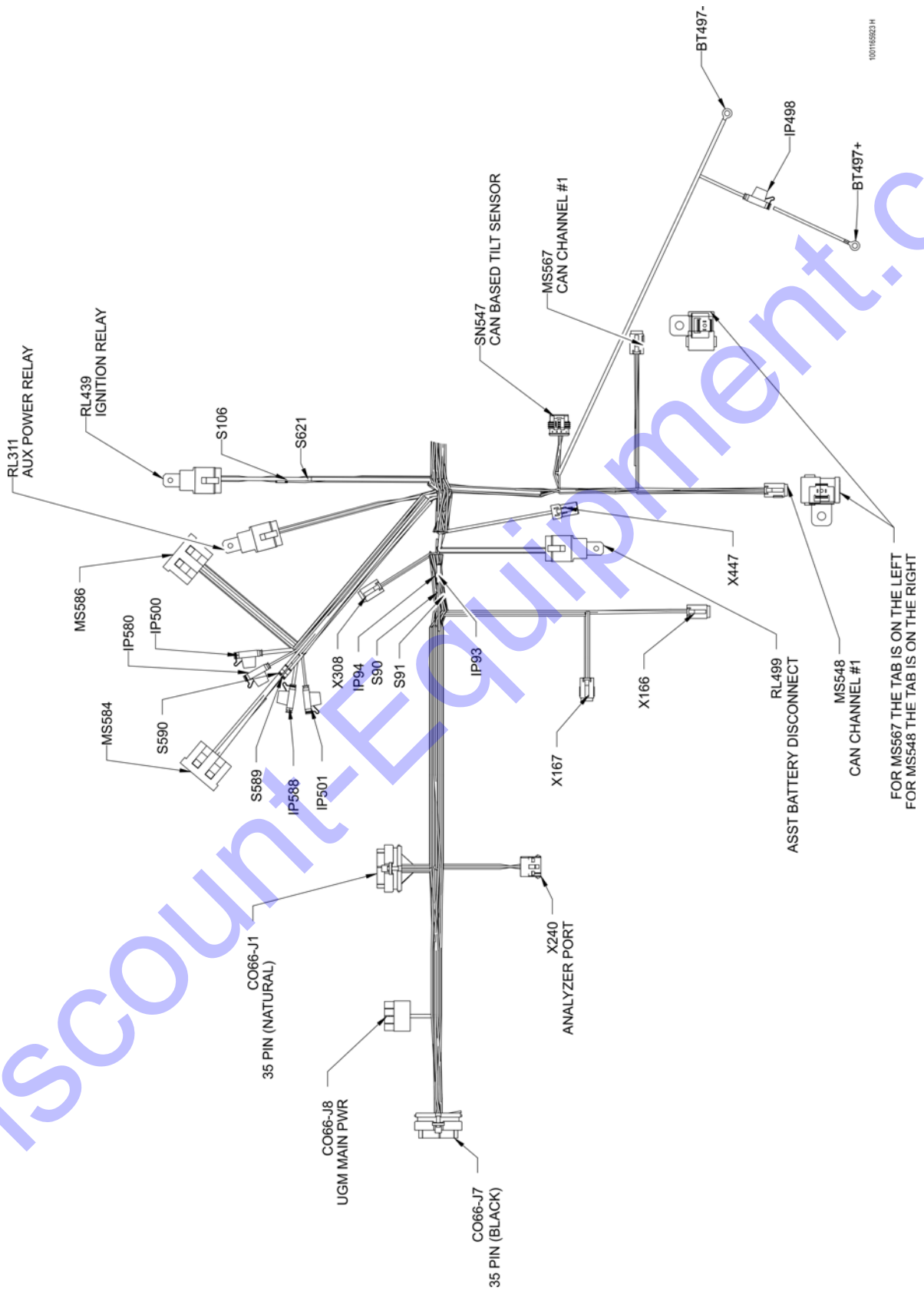

Figure 7-59. Turntable Harness - Sheet 2 of 11

CO66-J7 (35 PIN (BLACK))					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	2-10-1 PLAT EMS	18 AWG	GXL	S90 (1)
2	WHT	2-10-2 PLAT MODE	18 AWG	GXL	S90 (1)
3	WHT	2-7-1 GND MODE	18 AWG	GXL	S91 (1)
4	WHT	85-3-2 BOOM ELEV SW#1	18 AWG	GXL	S329 (1)
5					
6	WHT	83 CAN TERM JUMPER	18 AWG	GXL	CO66-J7 (17)
7	WHT	85-4-2 BOOM ELEV SW#2	18 AWG	GXL	S244 (1)
8					
9					
10	BLK	1-6-1 GND	18 AWG	GXL	SN547 (2)
11	WHT	85-7-3 TRANSPORT SW	18 AWG	GXL	X6 (6)
12	WHT	85-5-2 OSC AXLE#1	18 AWG	GXL	S243 (1)
13	YEL	80 CAN1 HIGH	20 AWG	J1939 CABLE	MS548 (1)
14	WHT	2-11 GND MODE	18 AWG	GXL	X7 (11)
15	WHT	131-2 FOOT PEDAL	18 AWG	GXL	X7 (6)
16					
17	WHT	83 CAN TERM JUMPER	18 AWG	GXL	CO66-J7 (6)
18	SHLD	82 SHIELD	20 AWG	J1939 CABLE	MS548 (5)
19	WHT	1-39 IGN GND	18 AWG	GXL	RL439 (2)
20	WHT	85-6-2 OSC AXLE#2	18 AWG	GXL	S245 (1)
21					
22	WHT	86-2 OSC PRESSURE	18 AWG	GXL	SN418 (2)
23					
24	GRN	81 CAN1 LOW	20 AWG	J1939 CABLE	MS548 (3)
25	WHT	1-32 MDI GND	18 AWG	GXL	X45A (2)
26					
27					
28					
29	WHT	3-21 MDI PWR	18 AWG	GXL	X45A (1)
30					
31					
32	WHT	85-7 DOS PWR	18 AWG	GXL	S246 (1)
33	WHT	86-1 OSC PRES VCC	18 AWG	GXL	SN418 (1)
34	WHT	3-7-3 IGN	18 AWG	GXL	SN547 (1)
35	WHT	85-7-4 DOS SW	18 AWG	GXL	SN237 (3)

CO66-J8 (UGM MAIN PWR)					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	BLK	1-4 GND	10 AWG	GXL	MS586 (6)
2	YEL	3-7 IGN	12 AWG	GXL	IP588 (1)
3					
4					

IP580					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	ORG	HOLDER LEAD	12 AWG	GXL	MS584 (6)
2	WHT	3-7-1 IGN	16 AWG	GXL	X166 (1)

CO66-J1 [35 PIN (NATURAL)]					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	21 FUEL PUMP	18 AWG	GXL	X188 (G)
2	WHT	22 RUN/STOP ACTUATOR	18 AWG	GXL	X188 (H)
3					
4					
5	BLK	1-40 GND	18 AWG	GXL	RL499 (2)
6	WHT	136 ASST BATT DISC	18 AWG	GXL	RL499 (5)
7	WHT	85 BOOM ELEV SW	18 AWG	GXL	S241 (1)
8	WHT	1-14 GND	18 AWG	GXL	X188 (N)
9	WHT	56 MSSO RTN	18 AWG	GXL	X22A (6)
10	WHT	9 UGM MAIN VOTE	18 AWG	GXL	X303 (1)
11	WHT	24 JUMP START	18 AWG	GXL	X188 (K)
12	WHT	20 GLOW PLUG	18 AWG	GXL	X188 (F)
13	WHT	96 AUX POWER	18 AWG	GXL	RL311 (5)
14	WHT	18-1 COOLANT TEMP	18 AWG	GXL	X188 (B)
15	WHT	17-1 OIL PRESSURE	18 AWG	GXL	X188 (A)
16					
17	BLK	1-10 GND	18 AWG	GXL	X308 (4)
18	BLK	1-13 GND	18 AWG	GXL	X188 (M)
19	BLK	1-12 GND	18 AWG	GXL	RL311 (2)
20					
21					
22	WHT	97-2 INVERT ENABLE	18 AWG	GXL	X308 (3)
23					
24					
25					
26					
27					
28	WHT	87-1 PWR	18 AWG	GXL	X240 (1)
29	WHT	87-2 RX	18 AWG	GXL	X240 (2)
30	WHT	87-3 TX	18 AWG	GXL	X240 (3)
31	WHT	87-4 GND	18 AWG	GXL	X240 (4)
32					
33					
34					
35					

Figure 7-60. Turntable Harness - Sheet 3 of 11

X240					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	87-1 PWR	18 AWG	GXL	CO66-J1 (28)
2	WHT	87-2 RX	18 AWG	GXL	CO66-J1 (29)
3	WHT	87-3 TX	18 AWG	GXL	CO66-J1 (30)
4	WHT	87-4 GND	18 AWG	GXL	CO66-J1 (31)

X166					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	3-7-1 IGN	16 AWG	GXL	IP580 (2)
2					
3	WHT	3-24 ZAPI IGN RELAY	18 AWG	GXL	X301 (1)
4					
5	WHT	2-25 CURNT SEN PWR	18 AWG	GXL	X568A (5)
6	WHT	2-12 STROBE	18 AWG	GXL	LB86 (1)

X167					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	BLK	1-6	14 AWG	GXL	MS586 (8)
2	BLK	1-7 GND	18 AWG	GXL	LB86 (2)
3	BLK	1-35 GND	18 AWG	GXL	X301 (2)
4	BLK	1-8 GND	18 AWG	GXL	S247 (1)
5					
6					
7					
8					
9					
10	BLK	1-50 GND	18 AWG	GXL	X568A (6)
11					
12					

S621					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	YEL	3 SW 12V	10 AWG	GXL	MS584 (4)
2	-	FUSIBLE LINK	12 AWG	FUSIBLE LINK	RL439 (4)

S91					
POS	COLOR	LABEL	GAUGE	JACKET	TO
1	WHT	2-7-1 GND MODE	18 AWG	GXL	CO66-J7 (3)
2	WHT	2-7 GND MODE	18 AWG	GXL	X22A (2)
2	WHT	2-7-2 GND MODE	18 AWG	GXL	IP93 (2)

S90					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	2-10-1 PLAT EMS	18 AWG	GXL	CO66-J7 (1)
1	WHT	2-10-2 PLAT MODE	18 AWG	GXL	CO66-J7 (2)
2	WHT	2-10 PLAT EMS	18 AWG	GXL	X7 (4)
2	WHT	2-10-3 PLAT EMS	18 AWG	GXL	IP94 (2)

IP498					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	ORG	HOLDER LEAD	12 AWG	GXL	BT497+ (1)
2	RED	2-19 ASST BAT+	12 AWG	GXL	RL499 (1)

S106					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	2-13 SYS ON	18 AWG	GXL	RL439 (5)
2	WHT	2-10-3 PLAT EMS	18 AWG	GXL	IP94 (1)
2	WHT	2-7-2 GND MODE	18 AWG	GXL	IP93 (1)

IP500					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	ORG	HOLDER LEAD	12 AWG	GXL	MS584 (5)
2	YEL	3-2 ENG 12V	10 AWG	GXL	X226 (1)

IP588					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	YEL	3-7 IGN	12 AWG	GXL	CO66-J8 (2)
2	ORG	HOLDER LEAD	12 AWG	GXL	MS584 (1)

IP501					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	ORG	HOLDER LEAD	12 AWG	GXL	MS584 (2)
2	BLK	HOLDER LEAD	16 AWG	GXL	RL311 (1)

IP93					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	2-7-2 GND MODE	18 AWG	GXL	S106 (2)
2	WHT	2-7-2 GND MODE	18 AWG	GXL	S91 (2)

Figure 7-61. Turntable Harness - Sheet 4 of 11

BT497-					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	BLK	1-42 GND	10 AWG	GXL	MS586 (2)

BT497+					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	ORG	HOLDER LEAD	12 AWG	GXL	IP498 (1)

X447					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	YEL	3-11 LIGHT PWR	12 AWG	GXL	S590 (1)
2	BLK	1-22 GND	12 AWG	GXL	MS586 (5)

RL499 (ASST BATTERY DISCONNECT)					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	RED	2-19 ASST BAT+	12 AWG	GXL	IP498 (2)
2	BLK	1-40 GND	18 AWG	GXL	CO66-J1 (5)
3					
4	RED	2-20 ASST BAT+	10 AWG	GXL	S442 (2)
5	WHT	136 ASST BATT DISC	18 AWG	GXL	CO66-J1 (6)

RL439 (IGNITION RELAY)					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	RED	2-1 UNSW 12V	10 AWG	GXL	S442 (1)
2	WHT	1-39 IGN GND	18 AWG	GXL	CO66-J7 (19)
3					
4	-	FUSIBLE LINK	12 AWG	FUSIBLE LINK	S621 (2)
5	WHT	2-13 SYS ON	18 AWG	GXL	S106 (1)

SN547 (CAN BASED TILT SENSOR)					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	3-7-3 IGN	18 AWG	GXL	CO66-J7 (34)
2	BLK	1-6-1 GND	18 AWG	GXL	CO66-J7 (10)
3	YEL	80-3 CAN 1 HIGH	20 AWG	J1939 CABLE	MS548 (12)
4	GRN	81-3 CAN 1 LOW	20 AWG	J1939 CABLE	MS548 (10)

RL311 (AUX POWER RELAY)					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	BLK	HOLDER LEAD	16 AWG	GXL	IP501 (2)
2	BLK	1-12 GND	18 AWG	GXL	CO66-J1 (19)
3					
4	YEL	3-6-2 AUX PWR	14 AWG	GXL	X7 (10)
5	WHT	96AUX POWER	18 AWG	GXL	CO66-J1 (13)

MS567 (CAN CHANNEL #1)					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	YEL	80-5 CAN1 HIGH	20 AWG	J1939 CABLE	X568A (1)
2					
3	GRN	81-5 CAN1 LOW	20 AWG	J1939 CABLE	X568A (2)
4					
5	SHLD	82-5 SHIELD	20 AWG	J1939 CABLE	X568A (3)
6					
7					
8	SHLD	82-4 SHIELD	20 AWG	J1939 CABLE	MS548 (6)
9					
10	GRN	81-4 CAN1 LOW	20 AWG	J1939 CABLE	MS548 (4)
11					
12	YEL	80-4 CAN1 HIGH	20 AWG	J1939 CABLE	MS548 (2)

X308					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1					
2					
3	WHT	97-2 INVERT ENABLE	18 AWG	GXL	CO66-J1 (22)
4	BLK	1-10 GND	18 AWG	GXL	CO66-J1 (17)
5	WHT	27-2-1 JUMP ENABLE	18 AWG	GXL	X188 (C)
6					
7					
8					

MS548 (CAN CHANNEL #1)					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	YEL	80 CAN1 HIGH	20 AWG	J1939 CABLE	CO66-J7 (13)
2	YEL	80-4 CAN1 HIGH	20 AWG	J1939 CABLE	MS567 (12)
3	GRN	81 CAN1 LOW	20 AWG	J1939 CABLE	CO66-J7 (24)
4	GRN	81-4 CAN1 LOW	20 AWG	J1939 CABLE	MS567 (10)
5	SHLD	82 SHIELD	20 AWG	J1939 CABLE	CO66-J7 (18)
6	SHLD	82-4 SHIELD	20 AWG	J1939 CABLE	MS567 (8)
7	SHLD	82-2 SHIELD	20 AWG	J1939 CABLE	X7 (1)
8					
9	GRN	81-2 CAN1 LOW	20 AWG	J1939 CABLE	X7 (2)
10	GRN	81-3 CAN 1 LOW	20 AWG	J1939 CABLE	SN547 (4)
11	YEL	80-2 CAN1 HIGH	20 AWG	J1939 CABLE	X7 (3)
12	YEL	80-3 CAN 1 HIGH	20 AWG	J1939 CABLE	SN547 (3)

S590					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	YEL	3-11 LIGHT PWR	12 AWG	GXL	X447 (1)
2	-	LT PWR	12 AWG	FUSIBLE LINK	MS584 (3)

S589					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	YEL	3-8 PLAT IGN	12 AWG	GXL	X7 (12)
2	-	PLTFM PWR	12 AWG	FUSIBLE LINK	MS584 (7)

Figure 7-62. Turntable Harness - Sheet 5 of 11

MS586					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	BLK	1 GND	10 AWG	GXL	CO270-J4 (1-RED)
2	BLK	1-42 GND	10 AWG	GXL	BT497- (1)
3	BLK	1-11 GND	14 AWG	GXL	X7 (18)
4	BLK	1-2 GND	10 AWG	GXL	X226 (2)
5	BLK	1-22 GND	12 AWG	GXL	X447 (2)
6	BLK	1-4 GND	10 AWG	GXL	CO66-J8 (1)
7	BLK	1-5 PLAT GND	12 AWG	GXL	X7 (16)
8	BLK	1-6	14 AWG	GXL	X167 (1)
9					
10					

MS584					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	ORG	HOLDER LEAD	12 AWG	GXL	IP588 (2)
2	ORG	HOLDER LEAD	12 AWG	GXL	IP501 (1)
3	-	LT PWR	12 AWG	FUSIBLE LINK	S590 (2)
4	YEL	3 SW 12V	10 AWG	GXL	S621 (1)
5	ORG	HOLDER LEAD	12 AWG	GXL	IP500 (1)
6	ORG	HOLDER LEAD	12 AWG	GXL	IP580 (1)
7	-	PLTFM PWR	12 AWG	FUSIBLE LINK	S589 (2)
8					
9					
10					

IP94					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	2-10-3 PLAT EMS	18 AWG	GXL	S106 (2)
2	WHT	2-10-3 PLAT EMS	18 AWG	GXL	S90 (2)

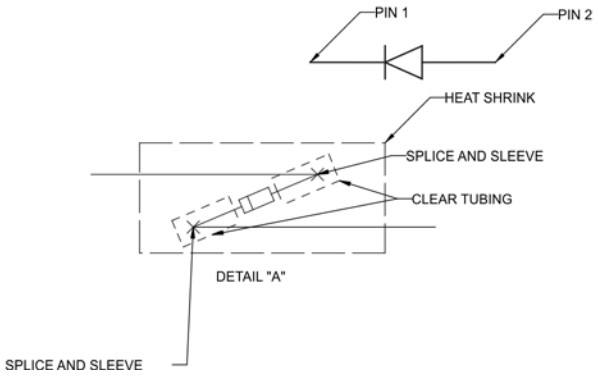

Figure 7-63. Turntable Harness - Sheet 6 of 11

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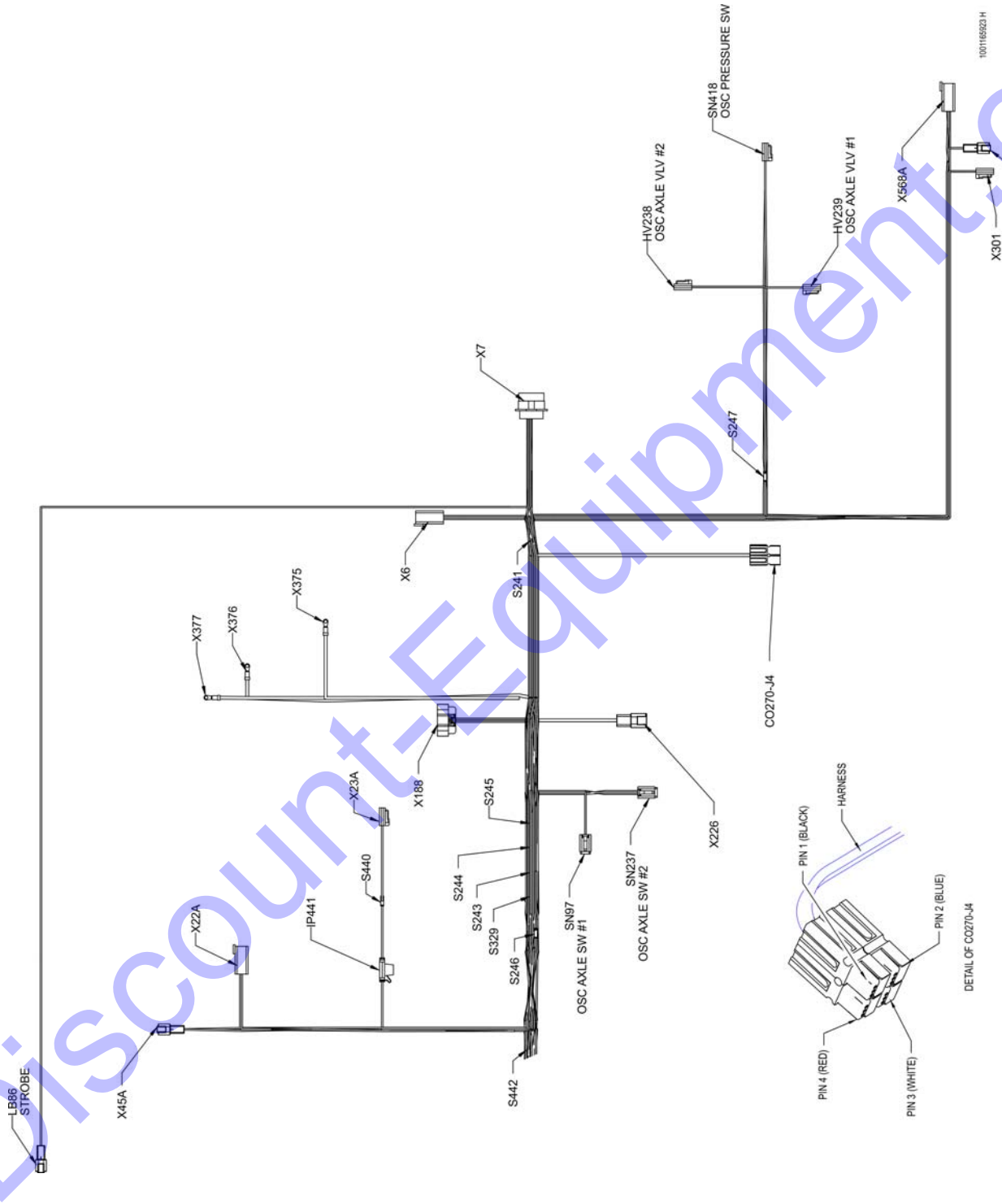


Figure 7-64. Turntable Harness - Sheet 7 of 11

X45A					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	3-21 MDI PWR	18 AWG	GXL	CO66-J7 (29)
2	WHT	1-32 MDI GND	18 AWG	GXL	CO66-J7 (25)

X22A					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	2-6 PLAT MODE	18 AWG	GXL	X7 (9)
2	WHT	2-7 GND MODE	18 AWG	GXL	S91 (2)
3					
4					
5					
6	WHT	56 MSSO RTN	18 AWG	GXL	CO66-J1 (9)

IP441					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	RED	2-2 UNSW 12V	16 AWG	GXL	S442 (1)
2	BLK	HOLDER LEAD	16 AWG	GXL	S440 (1)

S440					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	BLK	HOLDER LEAD	16 AWG	GXL	IP441 (2)
2	RED	2-3-1 UNSW 12V	16 AWG	GXL	X23A (2)
2	RED	2-3-2 UNSW 12V	16 AWG	GXL	X23A (1)

X23A					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	RED	2-3-2 UNSW 12V	16 AWG	GXL	S440 (2)
2	RED	2-3-1 UNSW 12V	16 AWG	GXL	S440 (2)

S442					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	RED	2-1 UNSW 12V	10 AWG	GXL	RL439 (1)
1	RED	2-2 UNSW 12V	16 AWG	GXL	IP441 (1)
2	RED	2-18 JUMP BAT+	10 AWG	GXL	X375 (1)
2	RED	2-20 ASST BAT+	10 AWG	GXL	RL499 (4)
2	RED	2-20 UNSW 12V CATHODE	10 AWG	GXL	X377 (1)

S246					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	85-7 DOS PWR	18 AWG	GXL	CO66-J7 (32)
2	WHT	85-7-1 TRANS SW IGN	18 AWG	GXL	X6 (5)
2	WHT	85-7-2 DOS SW IGN	18 AWG	GXL	SN237 (2)

S329					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	85-3-2 BOOM ELEV SW#1	18 AWG	GXL	CO66-J7 (4)
2	WHT	85-3 BOOM ELEV SW#1	18 AWG	GXL	X6 (2)
2	WHT	85-3-1 BOOM ELEV SW#1	18 AWG	GXL	SN97 (2)

S243					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	85-5-2 OSC AXLE#1	18 AWG	GXL	CO66-J7 (12)
2	WHT	85-5 OSC AXLE#1	18 AWG	GXL	SN97 (3)
2	WHT	85-5-1 OSC AXLE#2	18 AWG	GXL	HV238 (1)

S244					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	85-4-2 BOOM ELEV SW#2	18 AWG	GXL	CO66-J7 (7)
2	WHT	85-4 BOOM ELEV SW#2	18 AWG	GXL	X6 (4)
2	WHT	85-4-1 BOOM ELEV SW#2	18 AWG	GXL	SN237 (1)

S245					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	85-6-2 OSC AXLE#2	18 AWG	GXL	CO66-J7 (20)
2	WHT	85-6 OSC AXLE#2	18 AWG	GXL	SN237 (4)
2	WHT	85-6-1 OSC AXLE#1	18 AWG	GXL	HV239 (1)

SN97 (OSC AXLE SW #1)					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1					
2	WHT	85-3-1 BOOM ELEV SW#1	18 AWG	GXL	S329 (2)
3	WHT	85-5 OSC AXLE#1	18 AWG	GXL	S243 (2)
4					

SN237 (OSC AXLE SW #2)					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	85-4-1 BOOM ELEV SW#2	18 AWG	GXL	S244 (2)
2	WHT	85-7-2 DOS SW IGN	18 AWG	GXL	S246 (2)
3	WHT	85-7-4 DOS SW	18 AWG	GXL	CO66-J7 (35)
4	WHT	85-6 OSC AXLE#2	18 AWG	GXL	S245 (2)

Figure 7-65. Turntable Harness - Sheet 8 of 11

LB86					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	2-12 STROBE	18 AWG	GXL	X166 (6)
2	BLK	1-7 GND	18 AWG	GXL	X167 (2)

X188					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
A	WHT	17-1 OIL PRESSURE	18 AWG	GXL	CO66-J1 (15)
B	WHT	18-1 COOLANT TEMP	18 AWG	GXL	CO66-J1 (14)
C	WHT	27-2-1 JUMP ENABLE	18 AWG	GXL	X308 (5)
D					
E					
F	WHT	20GLOW PLUG	18 AWG	GXL	CO66-J1 (12)
G	WHT	21 FUEL PUMP	18 AWG	GXL	CO66-J1 (1)
H	WHT	22RUN/STOP ACTUATOR	18 AWG	GXL	CO66-J1 (2)
J					
K	WHT	24 JUMP START	18 AWG	GXL	CO66-J1 (11)
L					
M	BLK	1-13 GND	18 AWG	GXL	CO66-J1 (18)
N	WHT	1-14 GND	18 AWG	GXL	CO66-J1 (8)
P					
R					
S					

X226					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	YEL	3-2 ENG 12V	10 AWG	GXL	IP500 (2)
2	BLK	1-2 GND	10 AWG	GXL	MS586 (4)

X375					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	RED	2-18 JUMP BAT+	10 AWG	GXL	S442 (2)

X376					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	RED	2-21 UNSW 12V ANODE	10 AWG	GXL	CO270-J4 (4-BLK)

S247					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	BLK	1-8 GND	18 AWG	GXL	X167 (4)
2	WHT	1-8-1 VLV GND	18 AWG	GXL	HV238 (2)
2	WHT	1-8-2 VLV GND	18 AWG	GXL	HV239 (2)

HV239 (OSC AXLE VLV #1)					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	85-6-1 OSC AXLE#1	18 AWG	GXL	S245 (2)
2	WHT	1-8-2 VLV GND	18 AWG	GXL	S247 (2)

X303					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	9 UGM MAIN VOTE	18 AWG	GXL	CO66-J1 (10)
2					

X377					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	RED	2-20 UNSW 12V CATHODE	10 AWG	GXL	S442 (2)

CO270-J4					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1-BLK	BLK	1 GND	10 AWG	GXL	MS586 (1)
2-BLU					
3-WHT					
4-RED	RED	2-21 UNSW 12V ANODE	10 AWG	GXL	X376 (1)

S241					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	85 BOOM ELEV SW	18 AWG	GXL	CO66-J1 (7)
2	WHT	85-1 BOOM ELEV SW	18 AWG	GXL	X6 (1)
2	WHT	85-2 BOOM ELEV SW	18 AWG	GXL	X6 (3)

Figure 7-66. Turntable Harness - Sheet 9 of 11

SN418 (OSC PRESSURE SW)					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	86-1 OSC PRES VCC	18 AWG	GXL	CO66-J7 (33)
2	WHT	86-2 OSC PRESSURE	18 AWG	GXL	CO66-J7 (22)

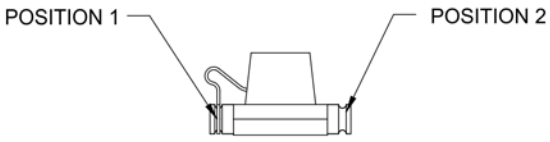
HV238 (OSC AXLE VLV #2)					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	85-5-1 OSC AXLE#2	18 AWG	GXL	S243 (2)
2	WHT	1-8-1 VLV GND	18 AWG	GXL	S247 (2)

X7					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	SHLD	82-2 SHIELD	20 AWG	J1939 CABLE	MS548 (7)
2	GRN	81-2 CAN1 LOW	20 AWG	J1939 CABLE	MS548 (9)
3	YEL	80-2 CAN1 HIGH	20 AWG	J1939 CABLE	MS548 (11)
4	WHT	2-10 PLAT EMS	18 AWG	GXL	S90 (2)
5					
6	WHT	131-2 FOOT PEDAL	18 AWG	GXL	CO66-J7 (15)
7					
8					
9	WHT	2-6 PLAT MODE	18 AWG	GXL	X22A (1)
10	YEL	3-6-2 AUX PWR	14 AWG	GXL	RL311 (4)
11	WHT	2-11 GND MODE	18 AWG	GXL	CO66-J7 (14)
12	YEL	3-8 PLAT IGN	12 AWG	GXL	S589 (1)
13					
14					
15					
16	BLK	1-5 PLAT GND	12 AWG	GXL	MS586 (7)
17					
18	BLK	1-11 GND	14 AWG	GXL	MS586 (3)
19					

X568A					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	YEL	80-5 CAN1 HIGH	20 AWG	J1939 CABLE	MS567 (1)
2	GRN	81-5 CAN1 LOW	20 AWG	J1939 CABLE	MS567 (3)
3	SHLD	82-5 SHIELD	20 AWG	J1939 CABLE	MS567 (5)
4					
5	WHT	2-25 CURNT SEN PWR	18 AWG	GXL	X166 (5)
6	BLK	1-50 GND	18 AWG	GXL	X167 (10)

X301					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	3-24 ZAPI IGN RELAY	18 AWG	GXL	X166 (3)
2	BLK	1-35 GND	18 AWG	GXL	X167 (3)

X6					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	85-1 BOOM ELEV SW	18 AWG	GXL	S241 (2)
2	WHT	85-3 BOOM ELEV SW#1	18 AWG	GXL	S329 (2)
3	WHT	85-2 BOOM ELEV SW	18 AWG	GXL	S241 (2)
4	WHT	85-4 BOOM ELEV SW#2	18 AWG	GXL	S244 (2)
5	WHT	85-7-1 TRANS SW IGN	18 AWG	GXL	S246 (2)
6	WHT	85-7-3 TRANSPORT SW	18 AWG	GXL	CO66-J7 (11)



FUSE HOLDER LAYOUT

Figure 7-67. Turntable Harness - Sheet 10 of 11

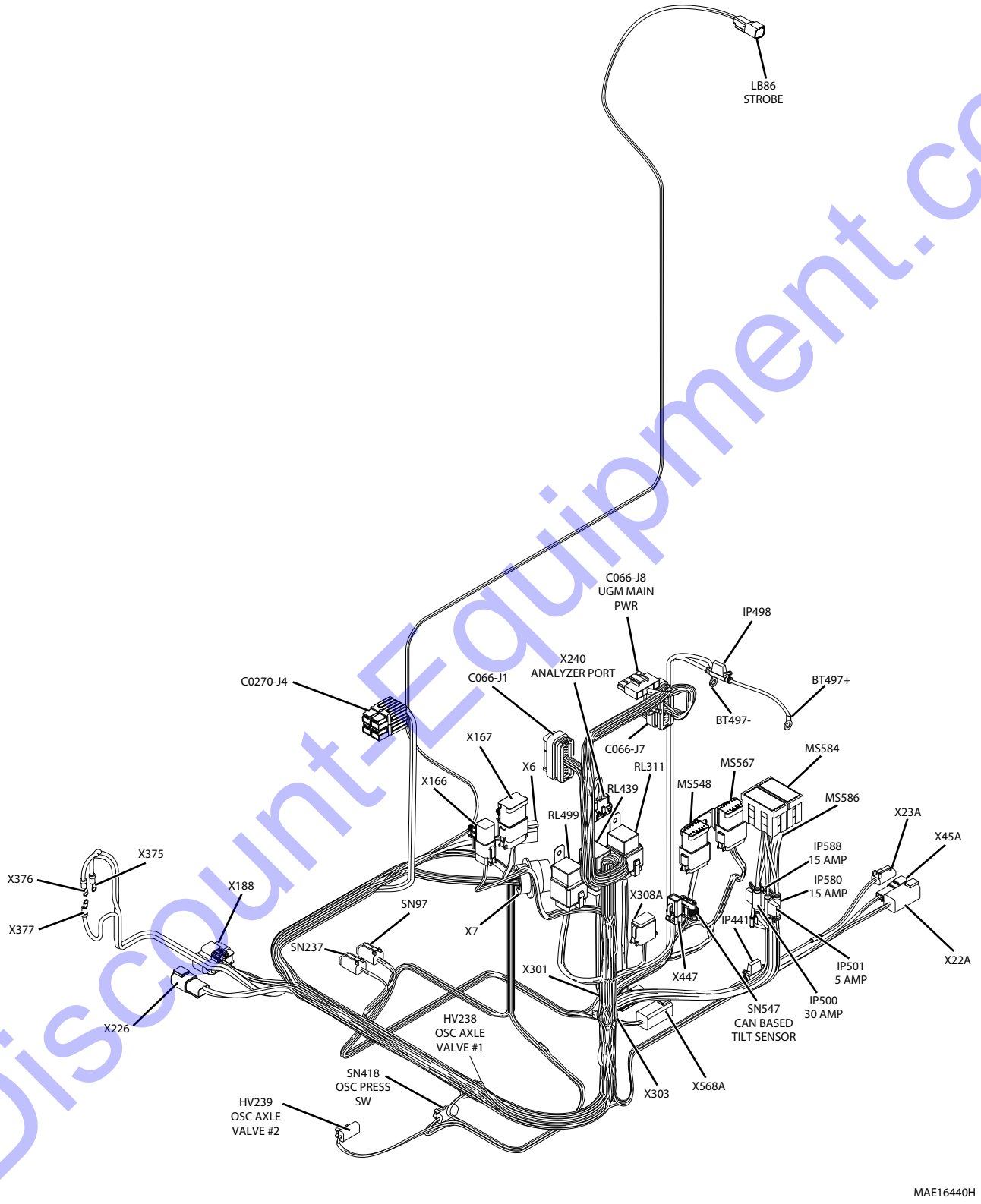


Figure 7-68. Turntable Harness - Sheet 11 of 11

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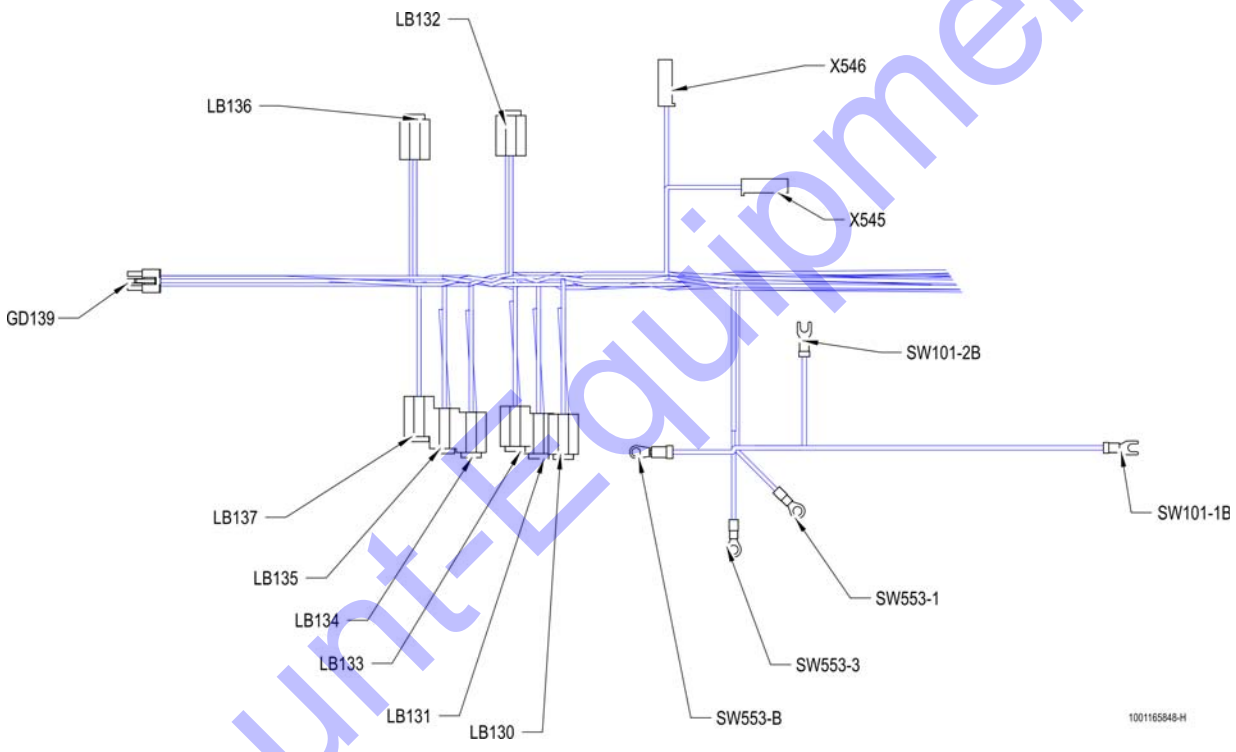

Figure 7-69. Ground Panel Harness - Sheet 1 of 10

GD139					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	3-21 MDI PWR	18 AWG	GXL	X45B (1)
2	WHT	1-32 MDI GND	18 AWG	GXL	X45B (2)
3	GRN	81-1-2 CAN1 LOW	20 AWG	J1939 CABLE	MS563-2 (B)
4	YEL	80-1-2 CAN1 HIGH	20 AWG	J1939 CABLE	MS563-2 (A)
5					
6					
NC	SHLD	82-1-2 SHIELD	20 AWG	J1939 CABLE	MS563-2 (C)

LB137					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	49-2 CRIBBING	18 AWG	GXL	CO66-J4 (1)
2	WHT	1-31-7 LAMP GND	18 AWG	GXL	LB136 (2)

LB135					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	127-2 SYS DISTRESS	18 AWG	GXL	CO66-J4 (2)
2	WHT	1-31-5 LAMP GND	18 AWG	GXL	LB134 (2)
2	WHT	1-31-6 LAMP GND	18 AWG	GXL	LB136 (2)

LB134					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	18-2 HI TEMP	18 AWG	GXL	CO66-J4 (28)
2	WHT	1-31-4 LAMP GND	18 AWG	GXL	LB133 (2)
2	WHT	1-31-5 LAMP GND	18 AWG	GXL	LB135 (2)

X546					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	56 MSSO RTN	18 AWG	GXL	X22B (6)

LB132					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	130-2 GLOW PLUGS	18 AWG	GXL	CO66-J4 (3)
2	WHT	1-31-2 LAMP GND	18 AWG	GXL	LB131 (2)
2	WHT	1-31-3 LAMP GND	18 AWG	GXL	LB133 (2)

LB133					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	17-2 LOW OIL PR	18 AWG	GXL	CO66-J4 (29)
2	WHT	1-31-3 LAMP GND	18 AWG	GXL	LB132 (2)
2	WHT	1-31-4 LAMP GND	18 AWG	GXL	LB134 (2)

LB131					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	98-7 LOW FUEL	18 AWG	GXL	CO66-J4 (13)
2	WHT	1-31-1 LAMP GND	18 AWG	GXL	LB130 (2)
2	WHT	1-31-2 LAMP GND	18 AWG	GXL	LB132 (2)

Figure 7-70. Ground Panel Harness - Sheet 2 of 10

LB136					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	128-2 OVERLOAD	18 AWG	GXL	CO66-J4 (14)
2	WHT	1-31-6 LAMP GND	18 AWG	GXL	LB135 (2)
2	WHT	1-31-7 LAMP GND	18 AWG	GXL	LB137 (2)

X545					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	55 MSSO SIG	18 AWG	GXL	X22B (5)

SW101-2B					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
2B	WHT	2-4 GND EMS	16 AWG	GXL	SW553-B (1)

SW101-1B					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1B	RED	2-3-1 UNSW 12V	16 AWG	GXL	X23B (2)

SW553-1					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	2-6 PLAT MODE	18 AWG	GXL	X22B (1)
1	WHT	2-7 GND MODE	18 AWG	GXL	()
1	WHT	49-50 PLTFM EN	18 AWG	GXL	X666 (4)

SW553-3					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	2-6 PLAT MODE	18 AWG	GXL	()
1	WHT	2-7 GND MODE	18 AWG	GXL	X22B (2)

SW553-B					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	2-4 GND EMS	16 AWG	GXL	SW101-2B (2B)

LB130					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	116-2 GENSET AUTO	18 AWG	GXL	CO66-J4 (26)
2	WHT	1-31 LAMP GND	18 AWG	GXL	CO66-J4 (31)
2	WHT	1-31-1 LAMP GND	18 AWG	GXL	LB131 (2)

Figure 7-71. Ground Panel Harness - Sheet 3 of 10

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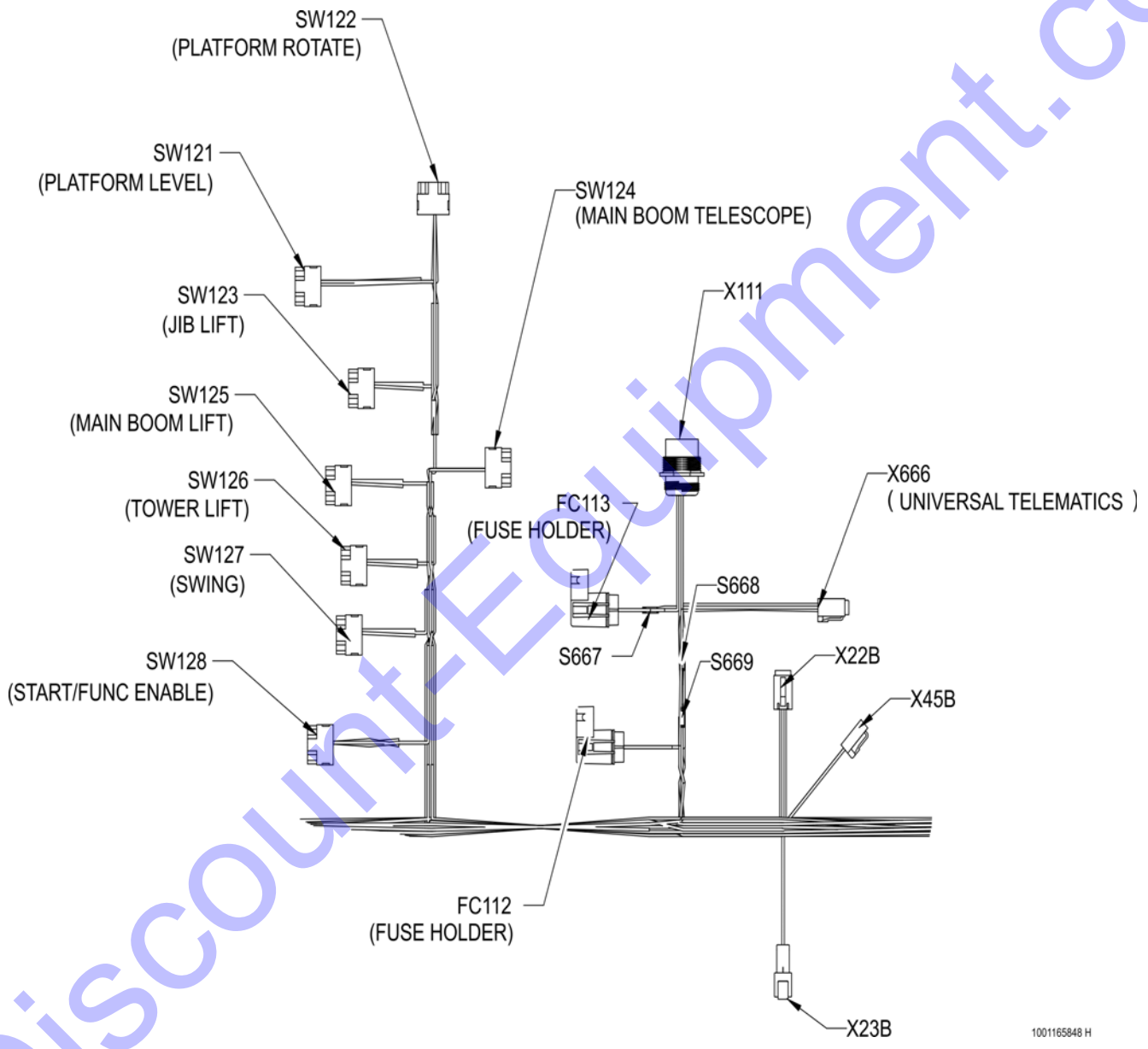

Figure 7-72. Ground Panel Harness - Sheet 4 of 10

SW122

CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	112-2 PLAT ROT LT	18 AWG	GXL	CO66-J4 (6)
2	WHT	3-15-6 SW IGN	18 AWG	GXL	SW123 (2)
2	WHT	3-15-7 SW IGN	18 AWG	GXL	SW121 (2)
3	WHT	111-2 PLAT ROT RT	18 AWG	GXL	CO66-J4 (18)

SW121

CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	114-2 PLAT LVL DN	18 AWG	GXL	CO66-J4 (5)
2	WHT	3-15-7 SW IGN	18 AWG	GXL	SW122 (2)
3	WHT	113-2 PLAT LVL UP	18 AWG	GXL	CO66-J4 (17)

SW123

CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	109-2 JIB UP	18 AWG	GXL	CO66-J4 (19)
2	WHT	3-15-5 SW IGN	18 AWG	GXL	SW124 (2)
2	WHT	3-15-6 SW IGN	18 AWG	GXL	SW122 (2)
3	WHT	110-2 JIB DN	18 AWG	GXL	CO66-J4 (8)

SW124

CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	108-2 TELE OUT	18 AWG	GXL	CO66-J4 (30)
2	WHT	3-15-4 SW IGN	18 AWG	GXL	SW125 (2)
2	WHT	3-15-5 SW IGN	18 AWG	GXL	SW123 (2)
3	WHT	107-2 TELE IN	18 AWG	GXL	CO66-J4 (7)

SW125

CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	101-2 LIFT UP	18 AWG	GXL	CO66-J4 (23)
2	WHT	3-15-3 SW IGN	18 AWG	GXL	SW126 (2)
2	WHT	3-15-4 SW IGN	18 AWG	GXL	SW124 (2)
3	WHT	102-2 LIFT DN	18 AWG	GXL	CO66-J4 (33)

SW126

CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	105-2 TWR LFT UP	18 AWG	GXL	CO66-J4 (10)
2	WHT	3-15-2 SW IGN	18 AWG	GXL	SW127 (2)
2	WHT	3-15-3 SW IGN	18 AWG	GXL	SW125 (2)
3	WHT	106-2 TWR LFT DN	18 AWG	GXL	CO66-J4 (21)

SW127

CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	104-2 SWING RT	18 AWG	GXL	CO66-J4 (35)
2	WHT	3-15-1 SW IGN	18 AWG	GXL	SW128 (2)
2	WHT	3-15-2 SW IGN	18 AWG	GXL	SW126 (2)
3	WHT	103-2 SWING LT	18 AWG	GXL	CO66-J4 (34)

SW128

CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	118-2 AUX/ENABLE	18 AWG	GXL	CO66-J4 (16)
2	WHT	3-15 SW IGN	18 AWG	GXL	CO66-J4 (25)
2	WHT	3-15-1 SW IGN	18 AWG	GXL	SW127 (2)
3	WHT	117-2 START	18 AWG	GXL	CO66-J4 (4)

FC113

CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	3-7-3 IGN	18 AWG	GXL	S667(2)
2	WHT	3-7-2 IGN	18 AWG	GXL	X119 (1)

FC112

CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	RED	2-14	18 AWG	GXL	X23B (1)
2	RED	2-15 PWR	18 AWG	GXL	S668 (1)

Figure 7-73. Ground Panel Harness - Sheet 5 of 10

X111					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
A	BLK	1-9-1 GND	18 AWG	GXL	S669 (2)
B	RED	2-15-1 PWR	18 AWG	GXL	S668 (2)
C	YEL	80-5 CAN1 HIGH	20 AWG	J1939 CABLE	X572 (1)
D	GRN	81-5 CAN1 LOW	20 AWG	J1939 CABLE	X571 (1)
E	SHLD	82-5 SHIELD	20 AWG	J1939 CABLE	X570 (1)
F					
G					
H	WHT	3-7-4 IGN	18 AWG	GXL	S667 (1)
J					

S669					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	BLK	1-9 GND	18 AWG	GXL	X115 (1)
2	BLK	1-9-1 GND	18 AWG	GXL	X111 (A)
2	BLK	1-9-2 GND	18 AWG	GXL	X666 (2)

S668					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	RED	2-15 PWR	18 AWG	GXL	FC112 (2)
2	RED	2-15-1 PWR	18 AWG	GXL	X111 (B)
2	RED	2-15-2 PWR	18 AWG	GXL	X666 (1)

X22B					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	2-6 PLAT MODE	18 AWG	GXL	SW553-1 (1)
2	WHT	2-7 GND MODE	18 AWG	GXL	SW553-3 (1)
3					
4					
5					
6	WHT	56 MSSO RTN	18 AWG	GXL	X546 (1)

X45B					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	3-21 MDI PWR	18 AWG	GXL	GD139 (1)
2	WHT	1-32 MDI GND	18 AWG	GXL	GD139 (2)

X666					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	RED	2-15-2 PWR	18 AWG	GXL	S668 (2)
2	BLK	1-9-2 GND	18 AWG	GXL	S669 (2)
3	WHT	3-7-5 IGN	18 AWG	GXL	S667 (1)
4	WHT	49-50 PLTFM EN	18 AWG	GXL	SW553-1 (1)

X23B					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	RED	2-14	18 AWG	GXL	FC112 (1)
2	RED	2-3-1 UNSW 12V	16 AWG	GXL	SW101-1B (1B)

S667					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	3-7-4 IGN	18 AWG	GXL	X111 (H)
1	WHT	3-7-5 IGN	18 AWG	GXL	X666 (3)
2	WHT	3-7-3 IGN	18 AWG	GXL	FC113 (1)

Figure 7-74. Ground Panel Harness - Sheet 6 of 10

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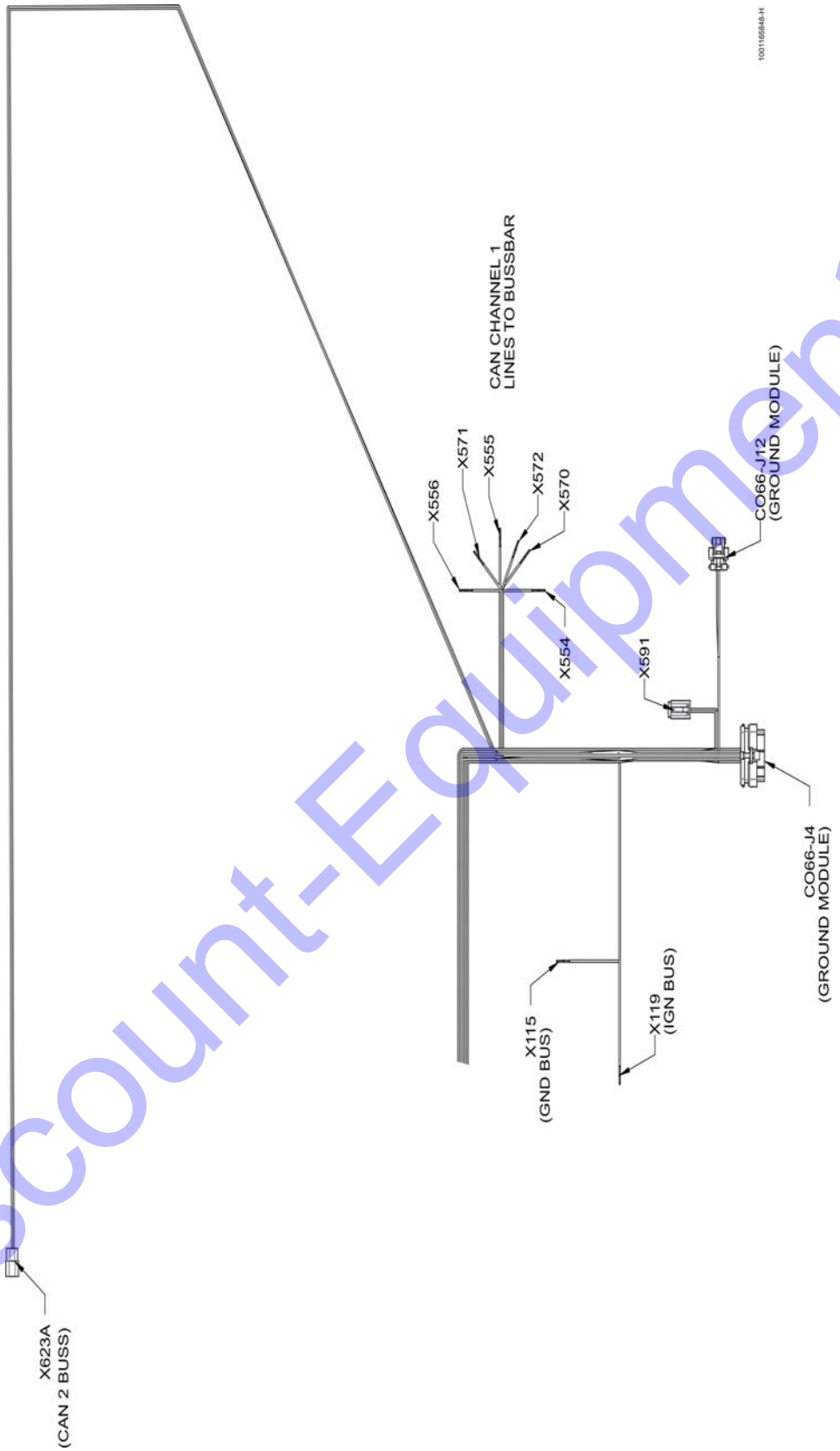


Figure 7-75. Ground Panel Harness - Sheet 7 of 10

X115					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	BLK	1-9 GND	18 AWG	GXL	S669 (1)

X554					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	SHLD	82-1 SHIELD	20 AWG	J1939 CABLE	GD139 (NC)

X570					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	SHLD	82-5 SHIELD	20 AWG	J1939 CABLE	X111 (E)

X572					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	YEL	80-5 CAN1 HIGH	20 AWG	J1939 CABLE	X111 (C)

X555					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	GRN	81-1 CAN1 LOW	20 AWG	J1939 CABLE	GD139 (3)

X571					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	GRN	81-5 CAN1 LOW	20 AWG	J1939 CABLE	X111 (D)

X556					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	YEL	80-1 CAN1 HIGH	20 AWG	J1939 CABLE	GD139 (4)

CO66-J12					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1					
2					
3	YEL	75-2 CAN2 HIGH	20 AWG	J1939 CABLE	X591 (2)
4	GRN	76-2 CAN2 LOW	20 AWG	J1939 CABLE	X591 (3)
5					
6					
7					
8	WHT	55 MSSO SIG	18 AWG	GXL	X545 (1)
NC					

X119					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	3-7-2 IGN	18 AWG	GXL	FC113 (2)

X591					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	YEL	75-2 CAN2 HIGH	20 AWG	J1939 CABLE	X623A (A)
2	YEL	75-2 CAN2 HIGH	20 AWG	J1939 CABLE	CO66-J12 (3)
3	GRN	76-2 CAN2 LOW	20 AWG	J1939 CABLE	CO66-J12 (4)
4	GRN	76-2 CAN2 LOW	20 AWG	J1939 CABLE	X623A (B)
NC	SHLD	77-2 SHIELD	20 AWG	J1939 CABLE	X623A (C)

Figure 7-76. Ground Panel Harness - Sheet 8 of 10

CO66-J4					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	49-2 CRIBBING	18 AWG	GXL	LB137 (1)
2	WHT	127-2 SYS DISTRESS	18 AWG	GXL	LB135 (1)
3	WHT	130-2 GLOW PLUGS	18 AWG	GXL	LB132 (1)
4	WHT	117-2 START	18 AWG	GXL	SW128 (3)
5	WHT	114-2 PLAT LVL DN	18 AWG	GXL	SW121 (1)
6	WHT	112-2 PLAT ROT LT	18 AWG	GXL	SW122 (1)
7	WHT	107-2 TELE IN	18 AWG	GXL	SW124 (3)
8	WHT	110-2 JIB DN	18 AWG	GXL	SW123 (3)
9					
10	WHT	105-2 TWR LFT UP	18 AWG	GXL	SW126 (1)
11					
12					
13	WHT	98-7 LOW FUEL	18 AWG	GXL	LB131 (1)
14	WHT	128-2 OVERLOAD	18 AWG	GXL	LB136 (1)
15					
16	WHT	118-2 AUX/ENABLE	18 AWG	GXL	SW128 (1)
17	WHT	113-2 PLAT LVL UP	18 AWG	GXL	SW121 (3)
18	WHT	111-2 PLAT ROT RT	18 AWG	GXL	SW122 (3)
19	WHT	109-2 JIB UP	18 AWG	GXL	SW123 (1)
20					
21	WHT	106-2 TWR LFT DN	18 AWG	GXL	SW126 (3)
22					
23	WHT	101-2 LIFT UP	18 AWG	GXL	SW125 (1)
24					
25	WHT	3-15 SW IGN	18 AWG	GXL	SW128 (2)
26	WHT	116-2 GENSET AUTO	18 AWG	GXL	LB130 (1)
27					
28	WHT	18-2 HI TEMP	18 AWG	GXL	LB134 (1)
29	WHT	17-2 LOW OIL PR	18 AWG	GXL	LB133 (1)
30	WHT	108-2 TELE OUT	18 AWG	GXL	SW124 (1)
31	WHT	1-31 LAMP GND	18 AWG	GXL	LB130 (2)
32					
33	WHT	102-2 LIFT DN	18 AWG	GXL	SW125 (3)
34	WHT	103-2 SWING LT	18 AWG	GXL	SW127 (3)
35	WHT	104-2 SWING RT	18 AWG	GXL	SW127 (1)

X623A					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
A	YEL	75-2 CAN2 HIGH	20 AWG	J1939 CABLE	X591 (1)
B	GRN	76-2 CAN2 LOW	20 AWG	J1939 CABLE	X591 (4)
C	SHLD	77-2 SHIELD	20 AWG	J1939 CABLE	X591 (NC)

Figure 7-77. Ground Panel Harness - Sheet 9 of 10

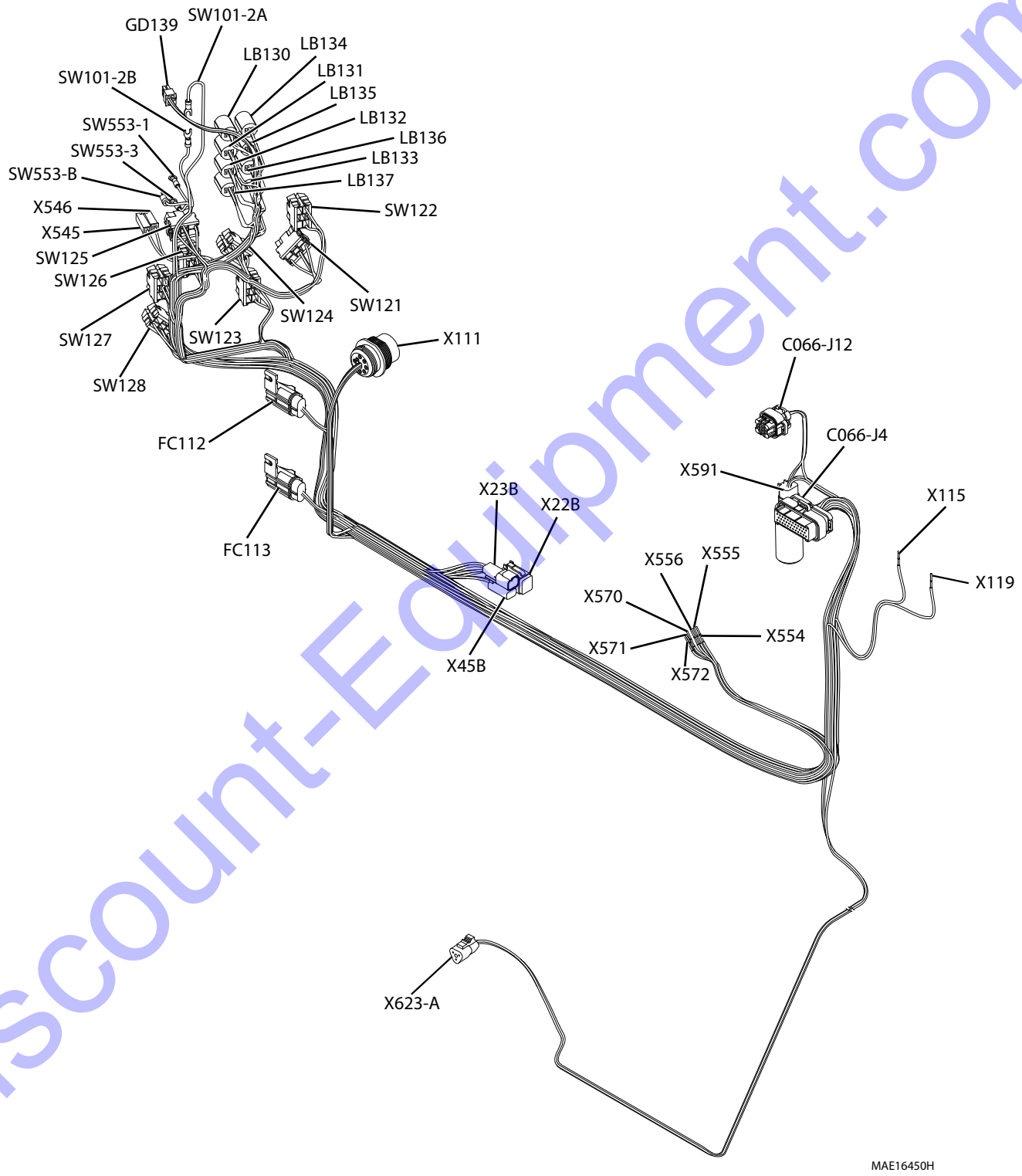


Figure 7-78. Ground Panel Harness - Sheet 10 of 10

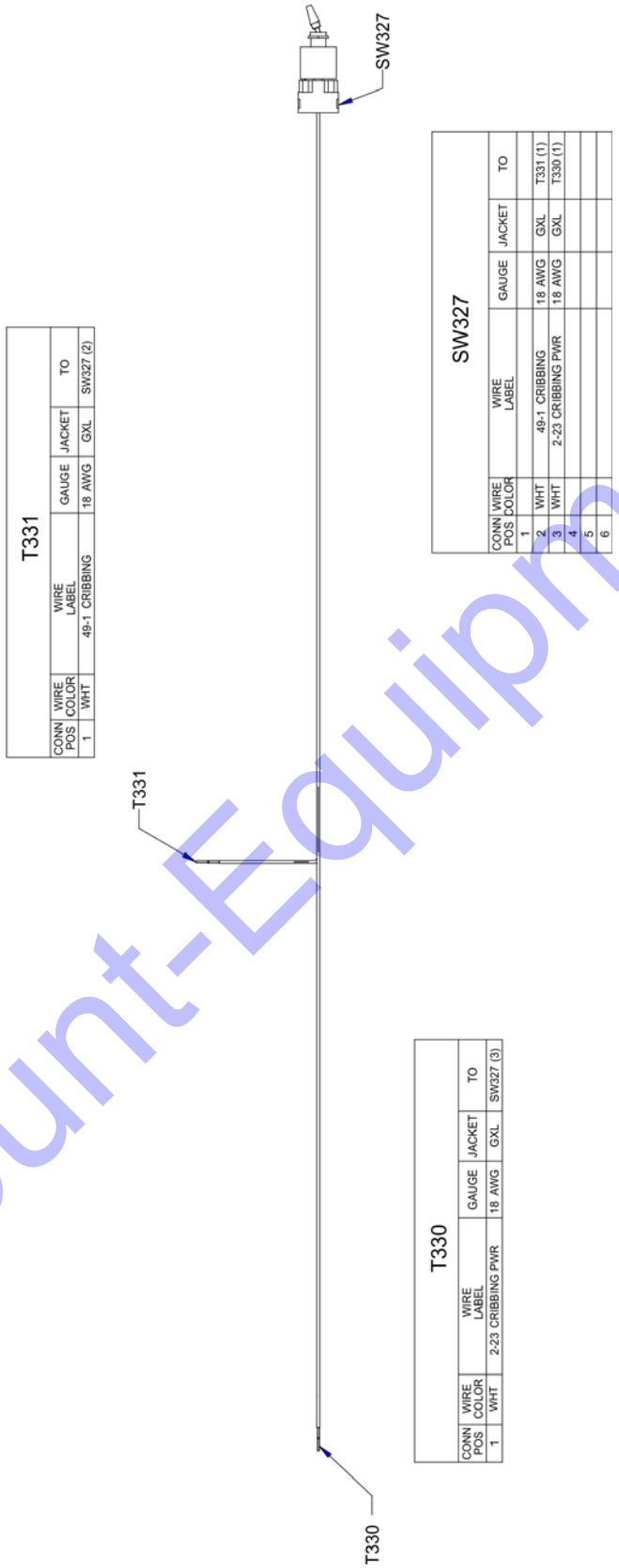


Figure 7-79. Cribbing Harness

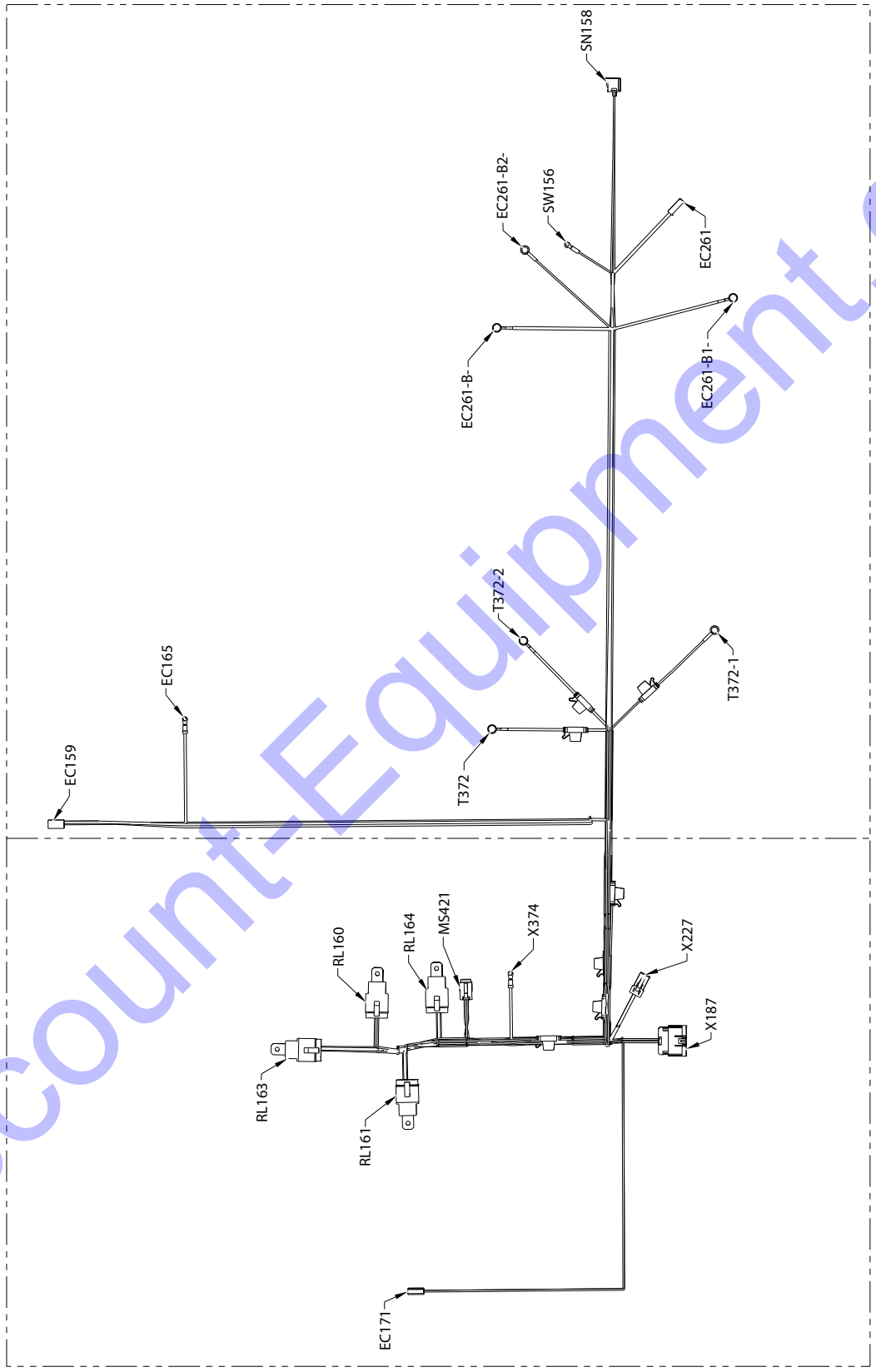


Figure 7-80. Kubota Engine Harness - Sheet 1 of 6

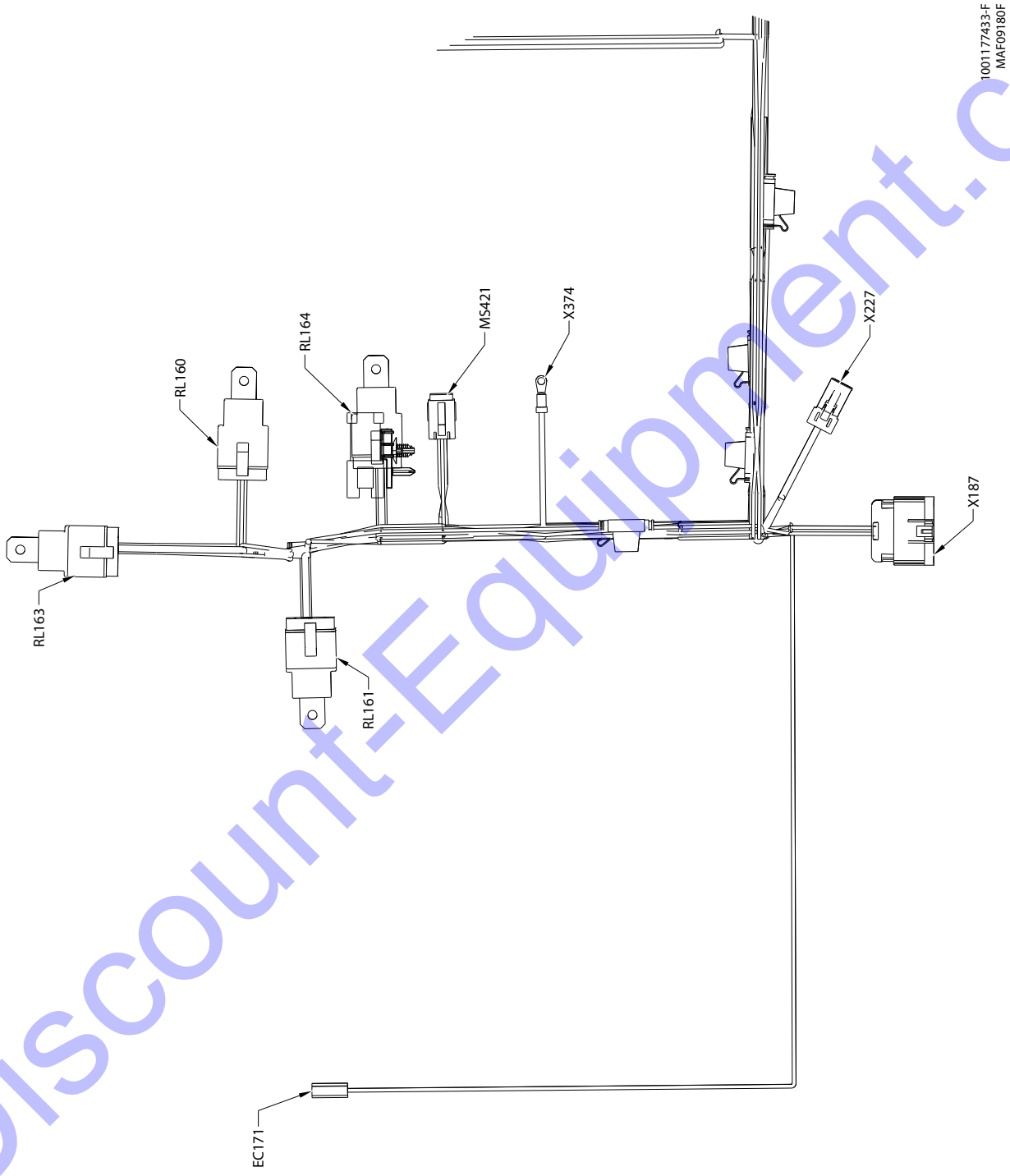


Figure 7-81. Kubota Engine Harness - Sheet 2 of 6

RL163						
CONNECTOR PART NUMBER: 1001118282						
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	TO
1	YEL	3-4-2 12V PWR	10 AWG	GXL	1001116734	S181 (2)
2	BLK	1-13-1 GND	18 AWG	GXL	1001116732	MS421 (2)
3						
4	YEL	15 GLOW PLUGS	12 AWG	GXL	1001116734	IP493 (1)
5	WHT	20 GLOW PLUG	18 AWG	GXL	1001116732	X187 (F)

RL160						
CONNECTOR PART NUMBER: 1001118282						
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	TO
1	YEL	3-4-3 12V PWR	16 AWG	GXL	1001116733	S181 (2)
2	BLK	1-13-2 GND	18 AWG	GXL	1001116732	MS421 (3)
3						
4	YEL	16 FUEL PUMP	16 AWG	GXL	1001116733	S180 (1)
5	WHT	21 FUEL PUMP	18 AWG	GXL	1001116732	X187 (G)

RL161						
CONNECTOR PART NUMBER: 1001118282						
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	TO
1	YEL	3-4-1 12V PWR	10 AWG	GXL	1001116734	S181 (1)
2	BLK	1-13-3 GND	18 AWG	GXL	1001116732	MS421 (4)
3						
4	YEL	14 ACTUATOR PEAK	12 AWG	GXL	1001116734	IP494 (1)
5	WHT	22 RUN/STOP ACTUATOR	18 AWG	GXL	1001116732	X187 (H)

RL164						
CONNECTOR PART NUMBER: 1001118282						
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	TO
1	RED	27-4 JUMP BAT+	12 AWG	GXL	1001116734	IP542 (2)
2	BLK	1-13-5 GND	18 AWG	GXL	1001116732	MS421 (6)
3						
4	YEL	29 STARTER	10 AWG	GXL	1001116734	EC261 (1)
5	WHT	24 JUMP START	18 AWG	GXL	1001116732	X187 (K)

X187						
CONNECTOR PART NUMBER: 4461109						
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	TO
A	WHT	17-1 OIL PRESSURE	18 AWG	GXL	4461111	SW156 (1)
B	WHT	18-1 COOLANT TEMP	18 AWG	GXL	4461111	SN158 (1)
C	WHT	27-2-1 JUMP ENABLE	18 AWG	GXL	4461111	IP492 (2)
D					4461222	
E					4461222	
F	WHT	20 GLOW PLUG	18 AWG	GXL	4461111	RL163 (5)
G	WHT	21 FUEL PUMP	18 AWG	GXL	4461111	RL160 (5)
H	WHT	22 RUN/STOP ACTUATOR	18 AWG	GXL	4461111	RL161 (5)
J					4461222	
K	WHT	24 JUMP START	18 AWG	GXL	4461111	RL164 (5)
L					4461222	
M	BLK	1-13 GND	18 AWG	GXL	4461111	MS421 (1)
N	BLK	1-14 GND	18 AWG	GXL	4461111	SN158 (2)
P					4461222	
R					4461222	
S					4461222	

EC171						
CONNECTOR PART NUMBER: 1001118744						
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	TO
1	YEL	16-3 FUEL PUMP	16 AWG	GXL	1001116720	IP370 (2)
2	BLK	28-2 GND	16 AWG	GXL	1001116720	EC261-B2- (1)

X227						
CONNECTOR PART NUMBER: 4461018						
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	TO
1	YEL	3-4 12V PWR	10 AWG	GXL	4460509	S181 (1)
2	BLK	1-2 GND	10 AWG	GXL	4460509	EC261-B- (1)

MS421						
CONNECTOR PART NUMBER: 4460836 MUST INCLUDE 4460837 & 1001121172						
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	TO
1	BLK	1-13 GND	18 AWG	GXL	4460465	X187 (M)
2	BLK	1-13-1 GND	18 AWG	GXL	4460465	RL163 (2)
3	BLK	1-13-2 GND	18 AWG	GXL	4460465	RL160 (2)
4	BLK	1-13-3 GND	18 AWG	GXL	4460465	RL161 (2)
5					4460466	
6	BLK	1-13-5 GND	18 AWG	GXL	4460465	RL164 (2)
7					4460466	
8					4460466	
9					4460466	
10					4460466	
11					4460466	
12					4460466	

1001177433-F
MAF09190F

Figure 7-82. Kubota Engine Harness - Sheet 3 of 6

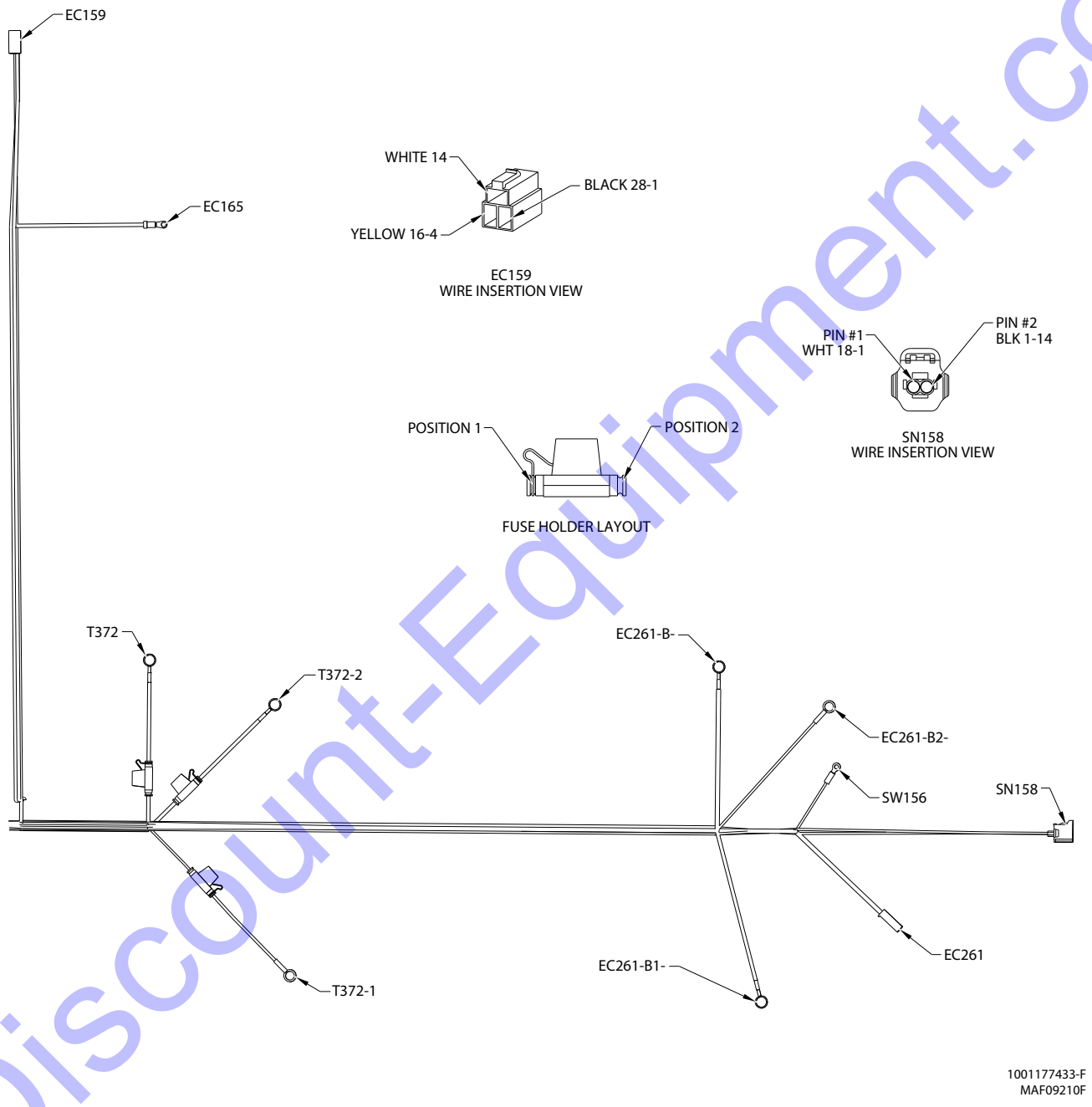
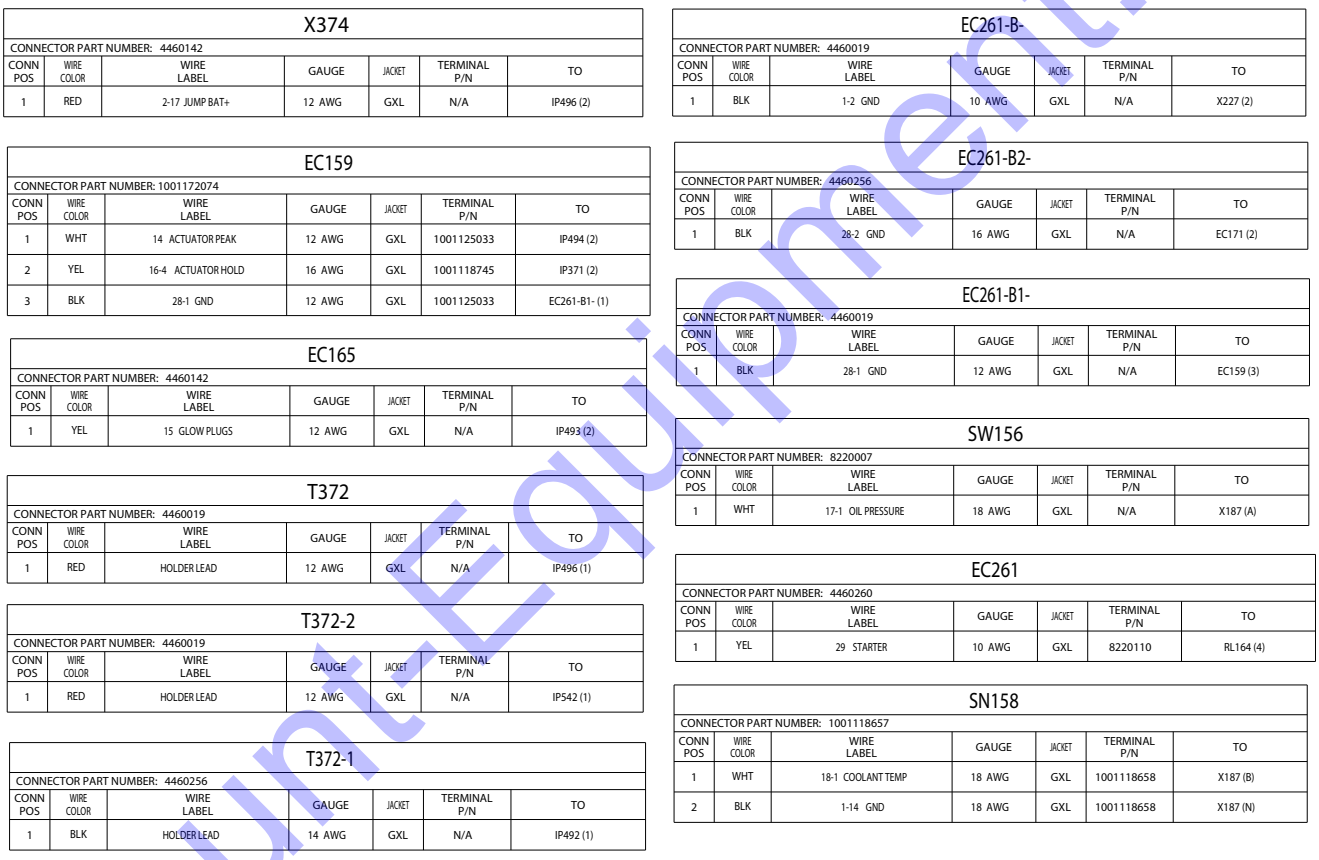


Figure 7-83. Kubota Engine Harness - Sheet 4 of 6



X374

CONNECTOR PART NUMBER: 4460142

CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	TO
1	RED	2-17 JUMP BAT+	12 AWG	GXL	N/A	IP496 (2)

EC159

CONNECTOR PART NUMBER: 1001172074

CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	TO
1	WHT	14 ACTUATOR PEAK	12 AWG	GXL	1001125033	IP494 (2)
2	YEL	16-4 ACTUATOR HOLD	16 AWG	GXL	1001118745	IP371 (2)
3	BLK	28-1 GND	12 AWG	GXL	1001125033	EC261-B1- (1)

EC165

CONNECTOR PART NUMBER: 4460142

CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	TO
1	YEL	15 GLOW PLUGS	12 AWG	GXL	N/A	IP493 (2)

T372

CONNECTOR PART NUMBER: 4460019

CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	TO
1	RED	HOLDER LEAD	12 AWG	GXL	N/A	IP496 (1)

T372-2

CONNECTOR PART NUMBER: 4460019

CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	TO
1	RED	HOLDER LEAD	12 AWG	GXL	N/A	IP542 (1)

T372-1

CONNECTOR PART NUMBER: 4460256

CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	TO
1	BLK	HOLDER LEAD	14 AWG	GXL	N/A	IP492 (1)

EC261-B-

CONNECTOR PART NUMBER: 4460019

CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	TO
1	BLK	1-2 GND	10 AWG	GXL	N/A	X227 (2)

EC261-B2-

CONNECTOR PART NUMBER: 4460256

CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	TO
1	BLK	28-2 GND	16 AWG	GXL	N/A	EC171 (2)

EC261-B1-

CONNECTOR PART NUMBER: 4460019

CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	TO
1	BLK	28-1 GND	12 AWG	GXL	N/A	EC159 (3)

SW156

CONNECTOR PART NUMBER: 8220007

CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	TO
1	WHT	17-1 OIL PRESSURE	18 AWG	GXL	N/A	X187 (A)

EC261

CONNECTOR PART NUMBER: 4460260

CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	TO
1	YEL	29 STARTER	10 AWG	GXL	8220110	RL164 (4)

SN158

CONNECTOR PART NUMBER: 1001118657

CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	TO
1	WHT	18-1 COOLANT TEMP	18 AWG	GXL	1001118658	X187 (B)
2	BLK	1-14 GND	18 AWG	GXL	1001118658	X187 (N)

1001177433-F
MAF09200F

Figure 7-84. Kubota Engine Harness - Sheet 5 of 6

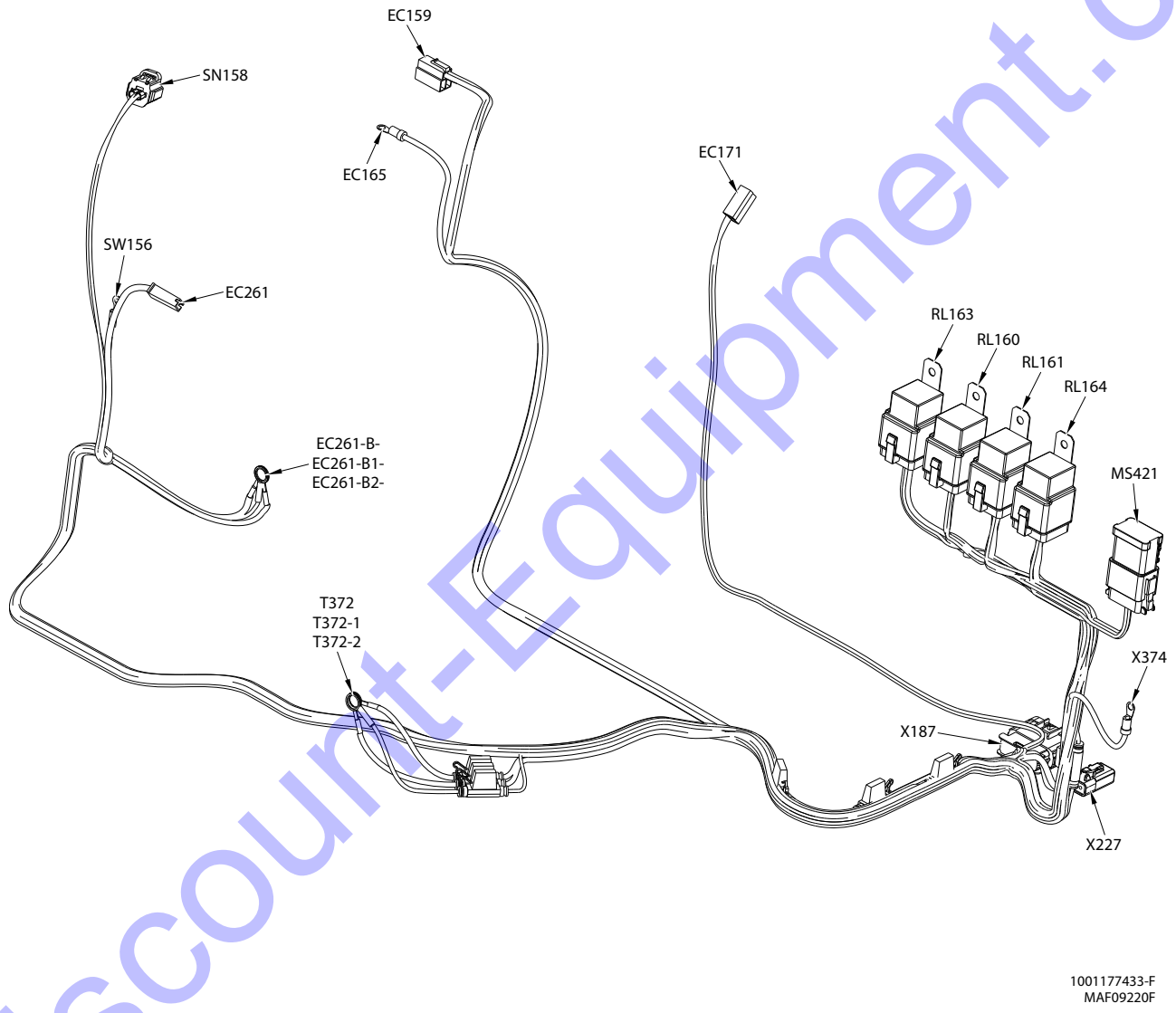


Figure 7-85. Kubota Engine Harness - Sheet 6 of 6

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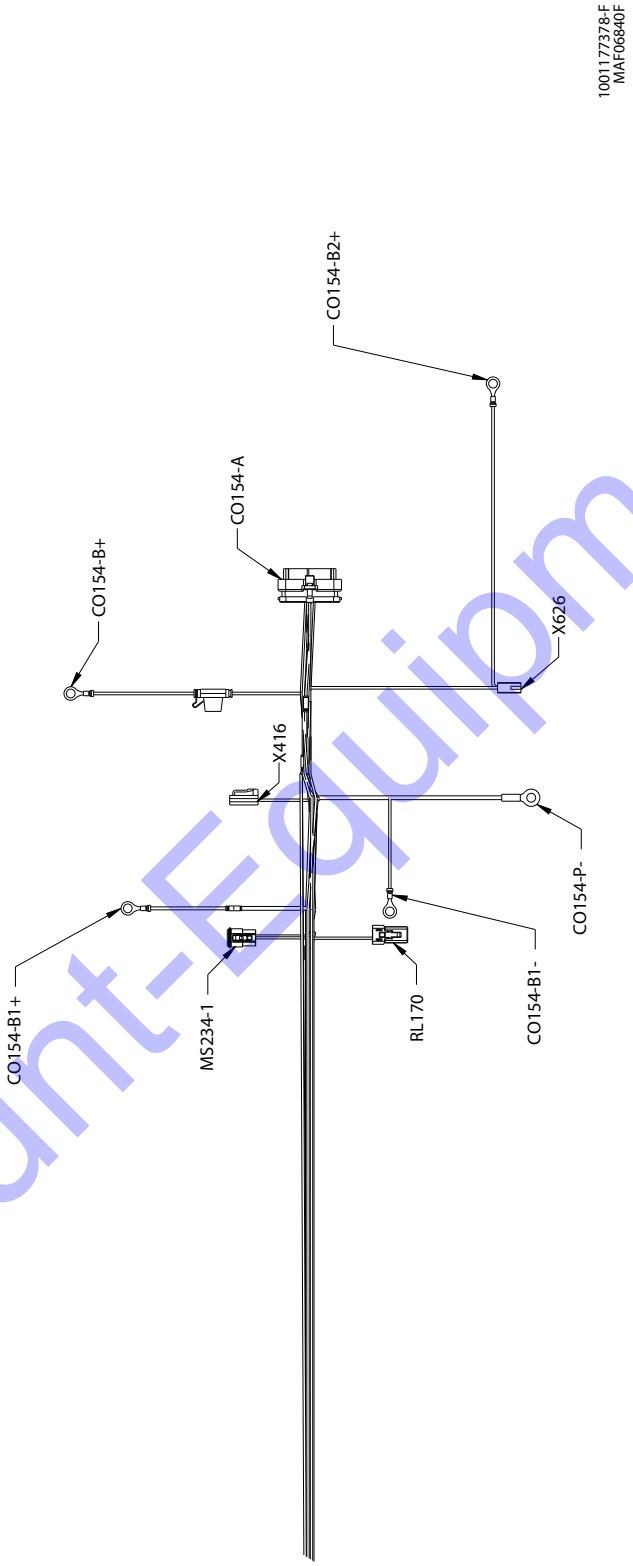


Figure 7-86. Generator Harness - Sheet 1 of 4

CO154-A					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1					
2					
3	BLK	HOLDER LEAD	16 AWG	GXL	IP407 (2)
4					
5	BLK	36 ENC GND	18 AWG	GXL	S229 (1)
6					
7					
8					
9					
10	WHT	12-2 GENSET ZAPI IGN	16 AWG	GXL	S307 (2)
11					
12	WHT	30 GENSET CONT NEG	16 AWG	TXL	RL170 (2)
13	BRN	CABLE 18/8 ENC B	18 AWG	TFFN	MS198-A (4)
14	YEL	CABLE 18/8 ENC A	18 AWG	TFFN	MS198-A (3)
15	WHT	34 BATT TEMP	18 AWG	GXL	S417 (1)
16	WHT	45-3-1 CHARGING STAT	18 AWG	GXL	X359B (1)
17					
18					
19					
20					
21					
22	RED/BLK	CABLE 18/8 GEN THERMAL	18 AWG	TFFN	MS198-A (5)
23					
24					
25	RED	35 ENC PWR	18 AWG	GXL	S228 (1)
26					
27	GRN	76-3 CAN2 LOW	20 AWG	J1939 CABLE	MS234-1 (B)
28	YEL	75-3 CAN2 HIGH	20 AWG	J1939 CABLE	MS234-1 (A)
29					
30					
31					
32					
33					
34					
35					
NC	SHLD	77-3 SHIELD	20 AWG	J1939 CABLE	MS234-1 (C)

CO154-B+					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	BLK	HOLDER LEAD	16 AWG	GXL	IP407 (1)

X416					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	RED	35-2 TEMP PWR	18 AWG	GXL	S228 (2)
2	WHT	34-2 BATT TEMP	18 AWG	GXL	S417 (2)

MS234-1					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
A	YEL	75-3 CAN2 HIGH	20 AWG	J1939 CABLE	CO154-A (28)
B	GRN	76-3 CAN2 LOW	20 AWG	J1939 CABLE	CO154-A (27)
C	SHLD	77-3 SHIELD	20 AWG	J1939 CABLE	CO154-A (NC)

RL170					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	12-1 GENSET CONT POS	16 AWG	TXL	S307 (2)
2	WHT	30 GENSET CONT NEG	16 AWG	TXL	CO154-A (12)

CO154-B1+					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	-	16 GA FUSIBLE LINK	14 AWG	FUSIBLE LINK	S189 (2)

CO154-B1-					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	SHIELD	CABLE 18/8 SHLD	18 AWG	SHLD	MS198-A (NC)

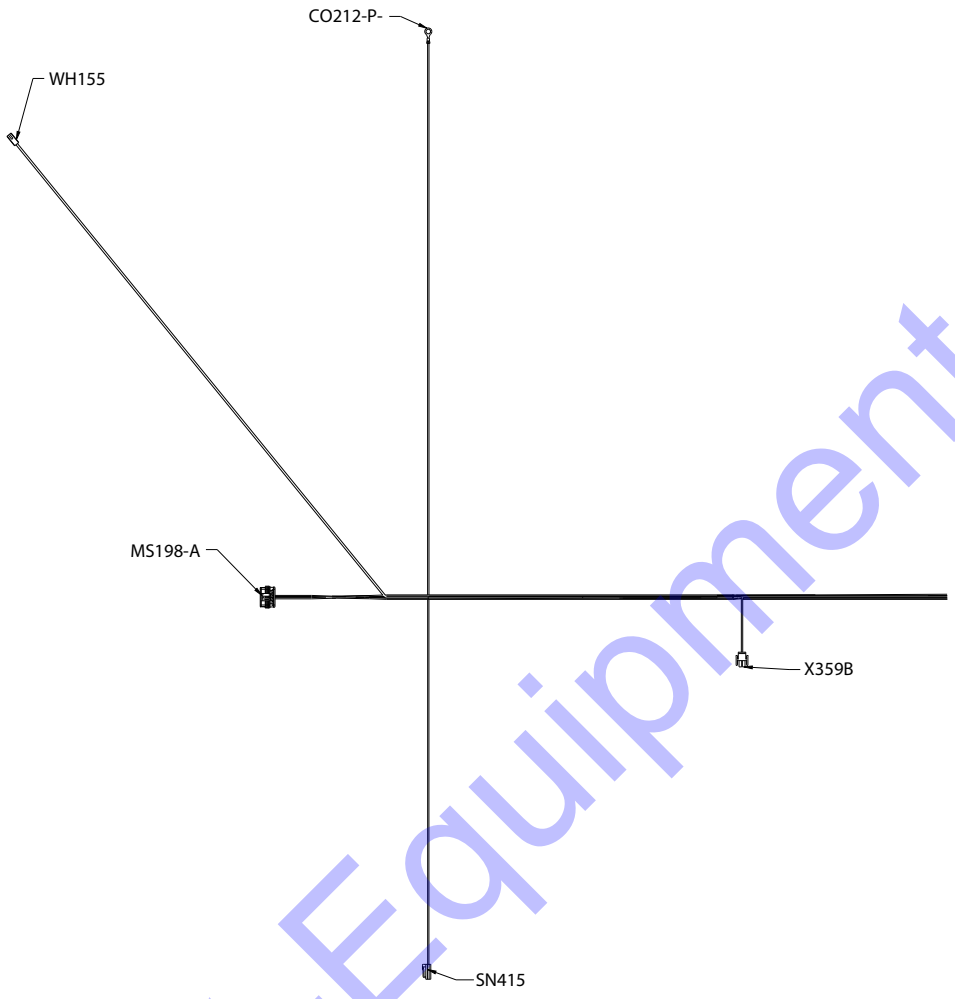
CO154-P-					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	BLK	37 FAN RTN	12 AWG	GXL	WH155 (2)

X626					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1		11-12	16 AWG	FUSIBLE LINK	CO154-B2+ (1)
2	BLK	10-20	16 AWG	GXL	CO212-P- (1)

CO154-B2+					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1		11-12	16 AWG	FUSIBLE LINK	X626 (1)

1001177378-F
MAF06850F

Figure 7-87. Generator Harness - Sheet 2 of 4



X359B					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	45-3-1 CHARGING STAT	18 AWG	GXL	CO154-A (16)
2	WHT	12 GENSET CONT IGN	16 AWG	GXL	S307 (1)

CO212-P-					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	BLK	10-20	16 AWG	GXL	X626 (2)

WH155					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	YEL	11-14-2 B+	12 AWG	GXL	S189 (1)
2	BLK	37 FAN RTN	12 AWG	GXL	CO154-P- (1)

MS198-A					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	RED	CABLE 18/8 ENC PWR	18 AWG	TFFN	S228 (2)
2	BLK	CABLE 18/8 ENC GND	18 AWG	TFFN	S229 (2)
3	YEL	CABLE 18/8 ENC A	18 AWG	TFFN	CO154-A (14)
4	BRN	CABLE 18/8 ENC B	18 AWG	TFFN	CO154-A (13)
5	RED/BLK	CABLE 18/8 GEN THERMAL	18 AWG	TFFN	CO154-A (22)
6	BLU	CABLE 18/8 THERMAL GND	18 AWG	TFFN	S229 (2)
NC	SHIELD	CABLE 18/8 SHLD	18 AWG	SHLD	CO154-B1- (1)

SN415					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	BLK	36-3 TEMP GND	18 AWG	GXL	S229 (1)
2	WHT	34-1 BATT TEMP	18 AWG	GXL	S417 (2)

1001177378-F
MAF06870F

Figure 7-88. Generator Harness - Sheet 3 of 4

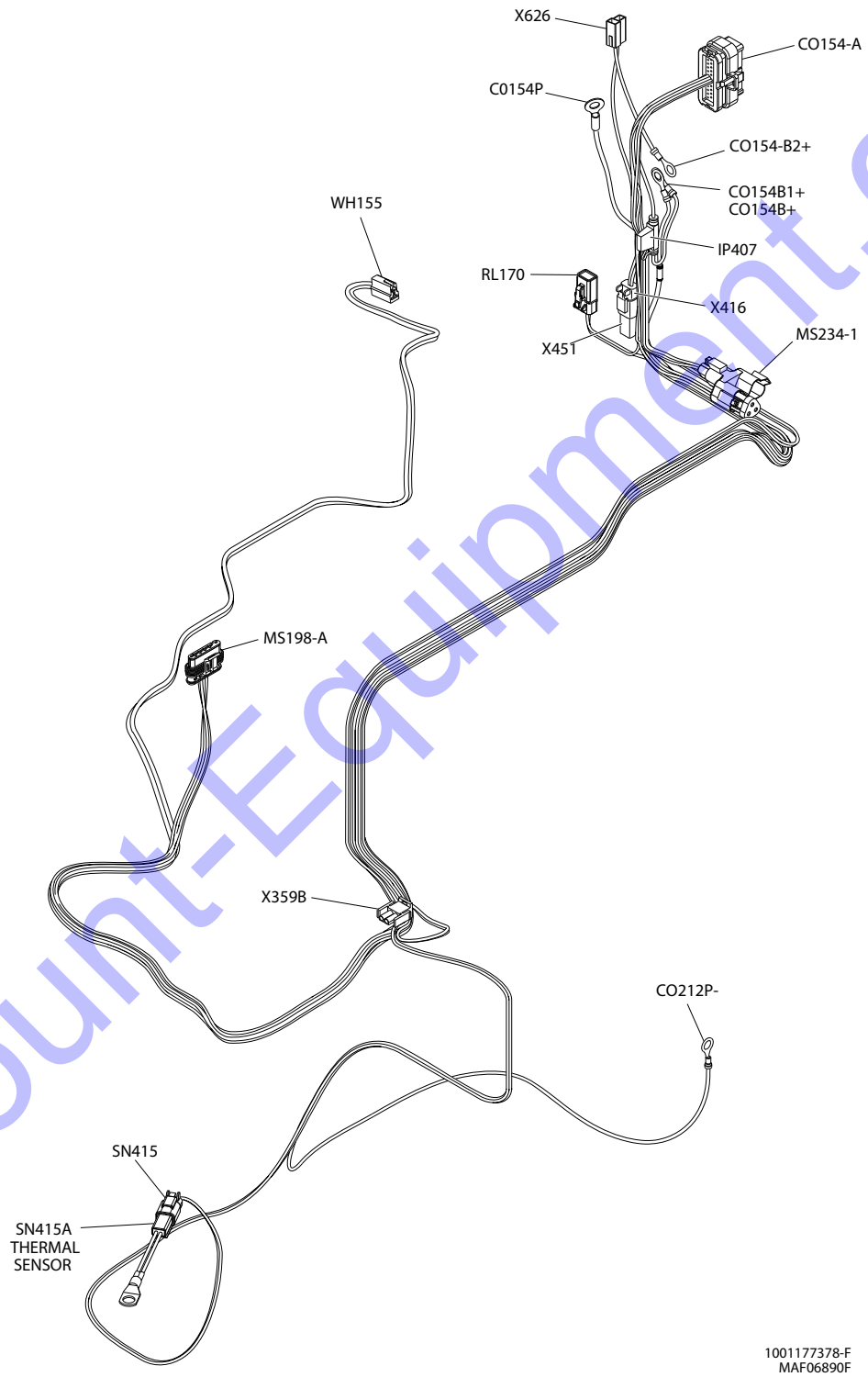


Figure 7-89. Generator Harness - Sheet 4 of 4

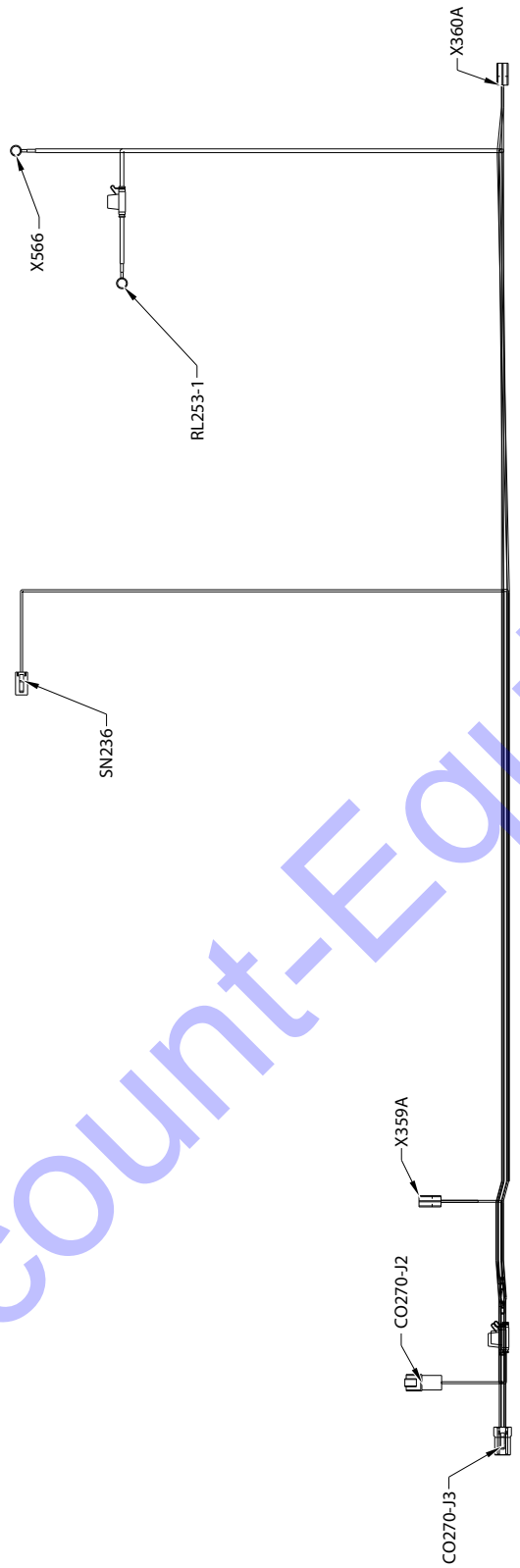


Figure 7-90. Charger Harness - Sheet 1 of 3

SN236						
CONNECTOR PART NUMBER: 4460891						
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	TO
1	WHT	47 TEMP SENSE	16 AWG	GXL	4460465	CO270-J3 (2)
2	WHT	48 SENSE NEG	16 AWG	GXL	4460465	CO270-J3 (4)

X359A						
CONNECTOR PART NUMBER: 4460424						
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	TO
1	WHT	45-3-1 CHARGING STAT	18 AWG	GXL	4460268	S231 (2)
2	WHT	12 GENSET CONT IGN	16 AWG	GXL	4460268	X360A (2)

CO270-J3						
CONNECTOR PART NUMBER: 1001116810						
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	TO
1	RED	45 B+	10 AWG	GXL	4460509	IP400 (2)
2	WHT	47 TEMP SENSE	16 AWG	GXL	4460509	SN236 (1)
3	BLK	46 B-	10 AWG	GXL	4460509	X566 (1)
4	WHT	48 SENSE NEG	16 AWG	GXL	4460509	SN236 (2)

RL253-1						
CONNECTOR PART NUMBER: 4460019						
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	TO
1	RED	45-3 B+	10 AWG	GXL	N/A	IP565 (2)

X360A						
CONNECTOR PART NUMBER: 4460424						
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	TO
1	WHT	45-3-2 CHARGING STAT	18 AWG	GXL	4460268	S231 (2)
2	WHT	12 GENSET CONT IGN	16 AWG	GXL	4460268	X359A (2)

CO270-J2						
CONNECTOR PART NUMBER: 4460931						
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	TO
1	WHT	45-3 CHARGING STAT	18 AWG	GXL	4460464	S231 (1)
2					4460466	
3					4460466	
4					4460466	
5					4460466	
6					4460466	
7					4460466	
8	WHT	45-2 B+	18 AWG	GXL	4460464	IP596 (2)

X566						
CONNECTOR PART NUMBER: 4460019						
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	TO
1	BLK	46 B-	10 AWG	GXL		CO270-J3 (3)

1001167538-F
MAF09240F

Figure 7-91. Charger Harness - Sheet 2 of 3

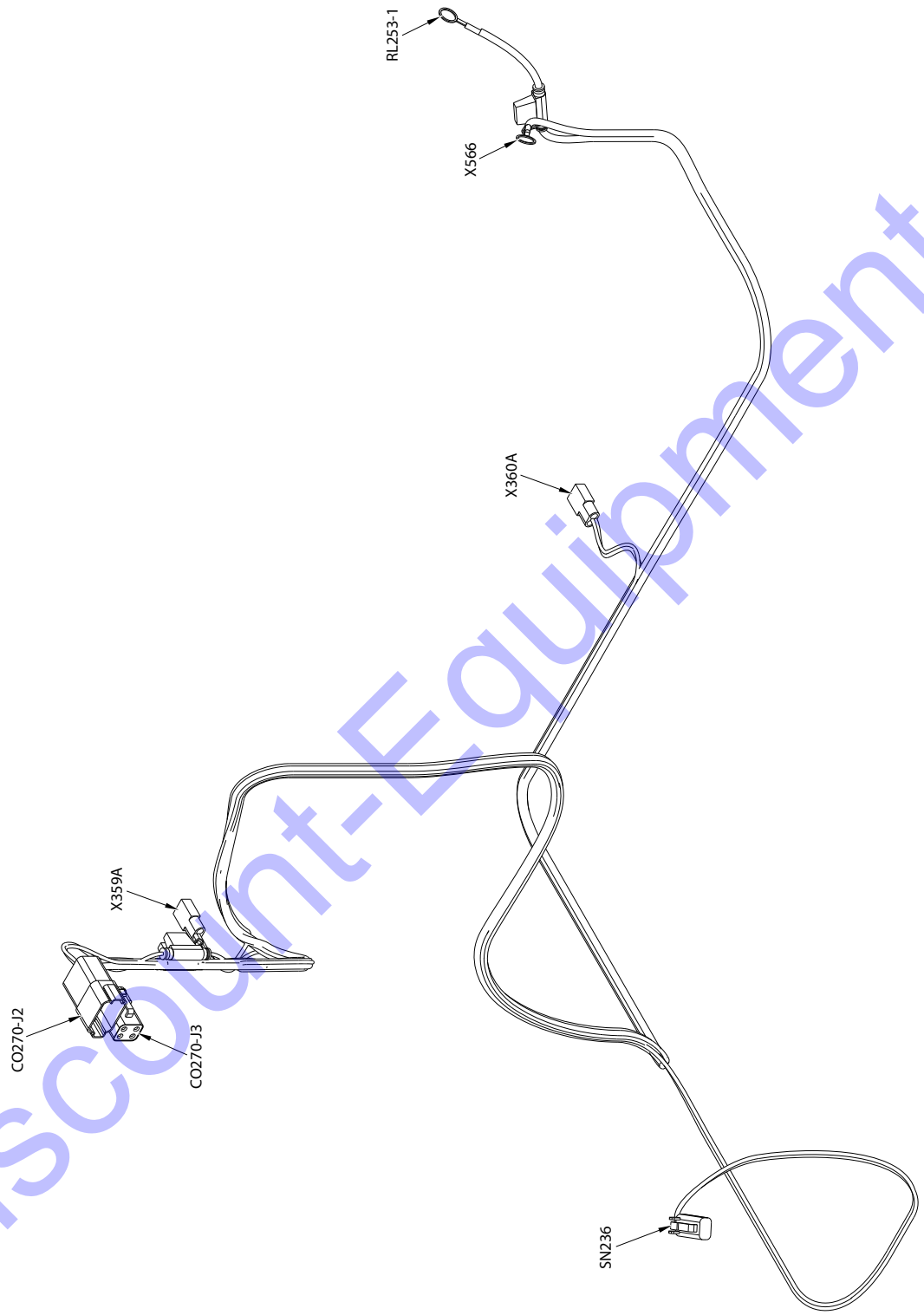


Figure 7-92. Charger Harness - Sheet 3 of 3

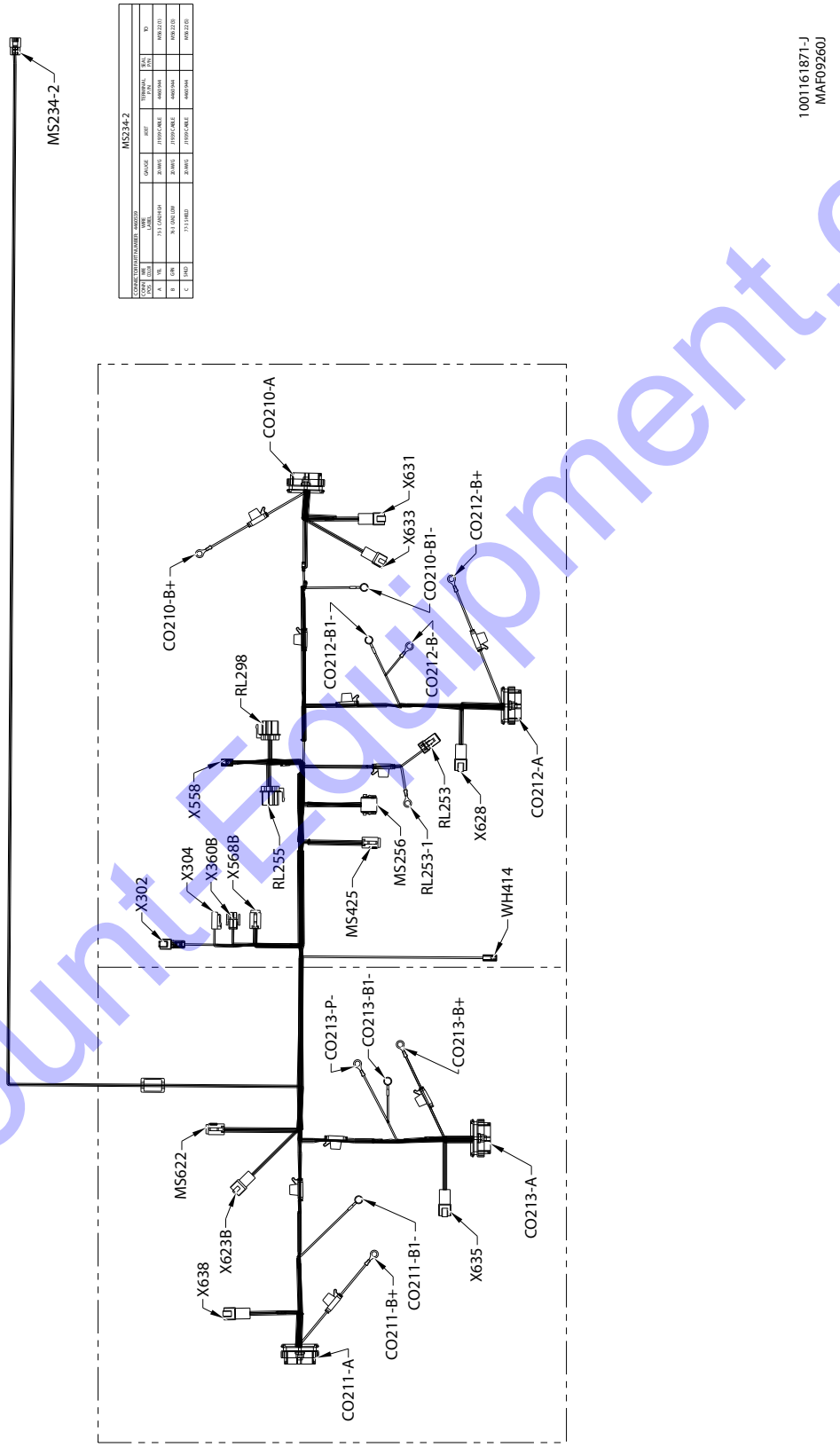


Figure 7-93. Traction Harness - Sheet 1 of 8

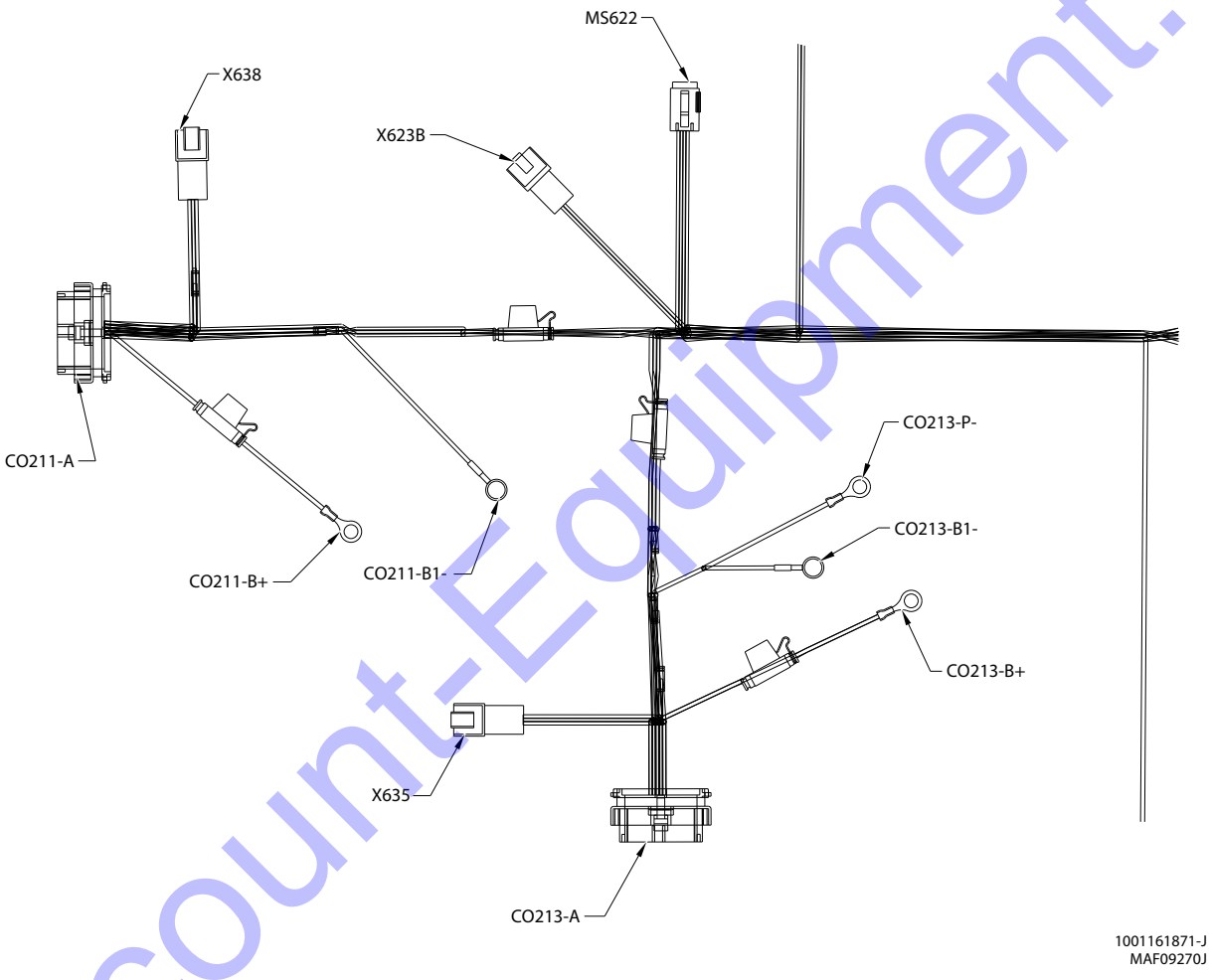


Figure 7-94. Traction Harness - Sheet 2 of 8

CO211-A - DRIVE CONTROL LFT FRONT

CONNECTOR PART NUMBER: 4460873

CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	SEAL P/N	TO
1					4460905		
2	ORN	CABLE2 18/8 BRAKE POS	18 AWG	TFFN	4460871		X638 (1)
3	BLK	HOLDER LEAD	16 AWG	GXL	4460871		IP409 (2)
4	BLU/BLK	CABLE2 18/8 BRAKE NEG	18 AWG	TFFN	4460871		X638 (2)
5	BLK	57 ENC GND	18 AWG	GXL	4460871		S273 (2)
6	WHT	4-2-3 ADDR 1	18 AWG	GXL	4460871		S427 (2)
7					4460905		
8					4460905		
9					4460905		
10	WHT	4-2-1 ZAPI IGN	16 AWG	GXL	4460871		S427 (2)
11					4460905		
12					4460905		
13	BRN	CABLE2 18/8 ENC B	18 AWG	TFFN	4460871		X638 (6)
14	YEL	CABLE2 18/8 ENC A	18 AWG	TFFN	4460871		X638 (7)
15					4460905		
16					4460905		
17					4460905		
18					4460905		
19					4460905		
20	BLK	10-10 ADDR 0	18 AWG	GXL	4460871		CO211-B1- (1)
21					4460905		
22	RED/BLK	CABLE2 18/8 MOTOR TEMP	18 AWG	TFFN	4460871		X638 (3)
23					4460905		
24					4460905		
25	RED	CABLE2 18/8 ENC PWR	18 AWG	TFFN	4460871		X638 (5)
26					4460905		
27	GRN	76-10 CAN2 LOW	20 AWG	J1939 CABLE	4460871		MS425 (10)
28	YEL	75-10 CAN2 HIGH	20 AWG	J1939 CABLE	4460871		MS425 (12)
29					4460905		
30					4460905		
31					4460905		
32					4460905		
33					4460905		
34					4460905		
35	WHT	4-2-2 ADDR 1	18 AWG	GXL	4460871		S427 (2)
NC	SHLD	77-10 SHIELD	20 AWG	J1939 CABLE	N/A		MS425 (8)

CO213-A - DRIVE CONTROL LFT REAR

CONNECTOR PART NUMBER: 4460873

CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	SEAL P/N	TO
1					4460905		
2	ORN	CABLE4 18/8 BRAKE POS	18 AWG	TFFN	4460871		X635 (1)
3	BLK	HOLDER LEAD	16 AWG	GXL	4460871		IP466 (2)
4	BLU/BLK	CABLE4 18/8 BRAKE NEG	18 AWG	TFFN	4460871		X635 (2)
5	BLK	69 ENC GND	18 AWG	GXL	4460871		S271 (1)
6	WHT	4-4-2 ADDR 1	18 AWG	GXL	4460871		S429 (2)
7					4460905		
8					4460905		
9					4460905		
10	WHT	4-4-1 ZAPI IGN	16 AWG	GXL	4460871		S429 (2)
11					4460905		
12					4460905		
13	BRN	CABLE4 18/8 ENC B	18 AWG	TFFN	4460871		X635 (6)
14	YEL	CABLE4 18/8 ENC A	18 AWG	TFFN	4460871		X635 (7)
15					4460905		
16					4460905		
17					4460905		
18					4460905		
19					4460905		
20	WHT	4-4-3 ADDR 1	18 AWG	GXL	4460871		S429 (2)
21					4460905		
22	RED/BLK	CABLE4 18/8 MOTOR TEMP	18 AWG	TFFN	4460871		X635 (3)
23					4460905		
24					4460905		
25	RED	CABLE4 18/8 ENC PWR	18 AWG	TFFN	4460871		X635 (5)
26					4460905		
27	GRN	76-9 CAN2 LOW	20 AWG	J1939 CABLE	4460871		MS622 (9)
28	YEL	75-9 CAN2 HIGH	20 AWG	J1939 CABLE	4460871		MS622 (11)
29					4460905		
30					4460905		
31					4460905		
32					4460905		
33					4460905		
34					4460905		
35	BLK	10-12 ADDR 0	18 AWG	GXL	4460871		CO213-B1- (1)
NC	SHLD	77-9 SHIELD	20 AWG	J1939 CABLE	N/A		MS622 (7)

CO211-B+

CONNECTOR PART NUMBER: 4460670

CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	SEAL P/N	TO
1	BLK	HOLDER LEAD	16 AWG	GXL	N/A		IP409 (1)

X635

CONNECTOR PART NUMBER: 4460931
SEE NOTE # 7

CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	SEAL P/N	TO
1	ORN	CABLE4 18/8 BRAKE POS	18 AWG	TFFN	4460464		CO213-A (2)
2	BLU/BLK	CABLE4 18/8 BRAKE NEG	18 AWG	TFFN	4460464		CO213-A (4)
3	RED/BLK	CABLE4 18/8 MOTOR TEMP	18 AWG	TFFN	4460464		CO213-A (22)
4	BLU	CABLE4 18/8 TEMP GND	18 AWG	TFFN	4460464		S271 (2)
5	RED	CABLE4 18/8 ENC PWR	18 AWG	TFFN	4460464		CO213-A (25)
6	BRN	CABLE4 18/8 ENC B	18 AWG	TFFN	4460464		CO213-A (13)
7	YEL	CABLE4 18/8 ENC A	18 AWG	TFFN	4460464		CO213-A (14)
8	BLK	CABLE4 18/8 ENC GND	18 AWG	TFFN	4460464		S271 (2)

X638

CONNECTOR PART NUMBER: 4460931
SEE NOTE # 7

CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	SEAL P/N	TO
1	ORN	CABLE2 18/8 BRAKE POS	18AWG	TFFN	4460464		CO211-A (2)
2	BLU/BLK	CABLE2 18/8 BRAKE NEG	18AWG	TFFN	4460464		CO211-A (4)
3	RED/BLK	CABLE2 18/8 MOTOR TEMP	18AWG	TFFN	4460464		CO211-A (22)
4	BLU	CABLE2 18/8 TEMP GND	18AWG	TFFN	4460464		S273 (1)
5	RED	CABLE2 18/8 ENC PWR	18AWG	TFFN	4460464		CO211-A (25)
6	BRN	CABLE2 18/8 ENC B	18AWG	TFFN	4460464		CO211-A (13)
7	YEL	CABLE2 18/8 ENC A	18AWG	TFFN	4460464		CO211-A (14)
8	BLK	CABLE2 18/8 ENC GND	18AWG	TFFN	4460464		S273 (1)

1001161871-J
MAF09280J

Figure 7-95. Traction Harness - Sheet 3 of 8

CO211-B1-							
CONNECTOR PART NUMBER: 4460703							
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	SEAL P/N	TO
1	BLK	10-10 ADDR 0	18 AWG	GXL	N/A		CO211-A (20)

X623B							
CONNECTOR PART NUMBER: 4460536							
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	SEAL P/N	TO
A	YEL	75-2 CAN2 HIGH	20 AWG	J1939 CABLE	4460943		MS622 (2)
B	GRN	76-2 CAN2 LOW	20 AWG	J1939 CABLE	4460943		MS622 (4)
C	SHLD	77-2 SHIELD	20 AWG	J1939 CABLE	4460943		MS622 (6)

MS622							
CONNECTOR PART NUMBER: 4460933 MUST INCLUDE JLG P/N 1001119020							
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	SEAL P/N	TO
1	YEL	75-3 CAN2 HIGH	20 AWG	J1939 CABLE	4460944		MS234-2 (A)
2	YEL	75-2 CAN2 HIGH	20 AWG	J1939 CABLE	4460944		X623B (A)
3	GRN	76-3 CAN2 LOW	20 AWG	J1939 CABLE	4460944		MS234-2 (B)
4	GRN	76-2 CAN2 LOW	20 AWG	J1939 CABLE	4460944		X623B (B)
5	SHLD	77-3 SHIELD	20 AWG	J1939 CABLE	4460944		MS234-2 (C)
6	SHLD	77-2 SHIELD	20 AWG	J1939 CABLE	4460944		X623B (C)
7	SHLD	77-9 SHIELD	20 AWG	J1939 CABLE	4460944		CO213-A (NC)
8	SHLD	77-5 SHIELD	20 AWG	J1939 CABLE	4460944		MS425 (5)
9	GRN	76-9 CAN2 LOW	20 AWG	J1939 CABLE	4460944		CO213-A (27)
10	GRN	76-5 CAN2 LOW	20 AWG	J1939 CABLE	4460944		MS425 (3)
11	YEL	75-9 CAN2 HIGH	20 AWG	J1939 CABLE	4460944		CO213-A (28)
12	YEL	75-5 CAN2 HIGH	20 AWG	J1939 CABLE	4460944		MS425 (1)

CO213-P-							
CONNECTOR PART NUMBER: 4460670							
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	SEAL P/N	TO
1	BLK	25 FAN RTN	16 AWG	GXL	N/A		WH414 (2)

CO213-B1-							
CONNECTOR PART NUMBER: 4460703							
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	SEAL P/N	TO
1	BLK	10-12 ADDR 0	18 AWG	GXL	N/A		CO213-A (35)

CO213-B+							
CONNECTOR PART NUMBER: 4460670							
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	SEAL P/N	TO
1		20 GA FUSIBLE LINK	18 AWG	FUSIBLE LINK	N/A		S489 (2)
1	BLK	HOLDER LEAD	16 AWG	GXL	N/A		IP466 (1)

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Figure 7-96. Traction Harness - Sheet 4 of 8

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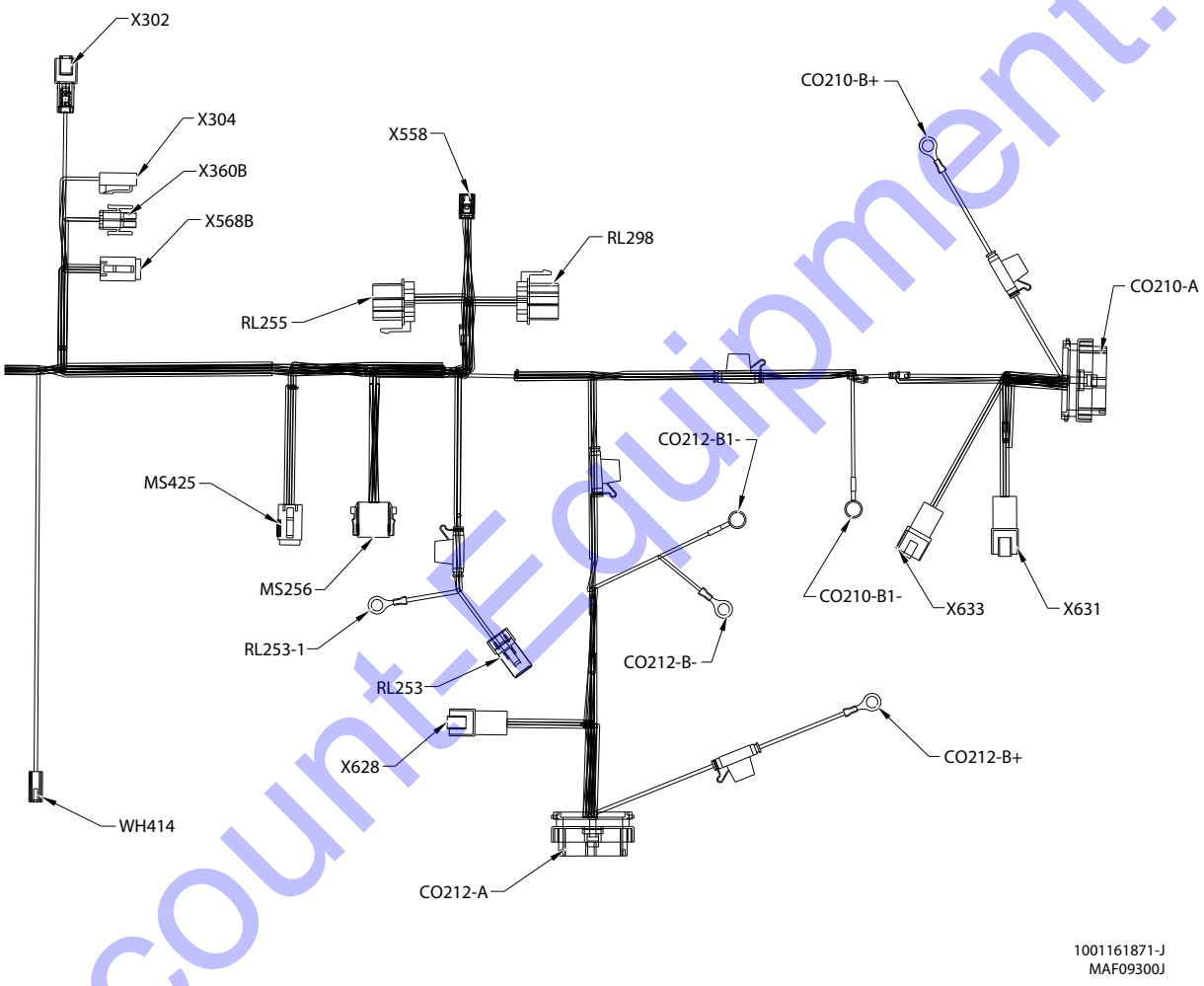

Figure 7-97. Traction Harness - Sheet 5 of 8

RL255

CONNECTOR PART NUMBER: 4460374
MUST INCLUDE JLG P/N 1001171295

CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	SEAL P/N	TO
1	YEL	11-2-1 B+	14 AWG	GXL	4460375		IP424 (1)
2	BLK	1-35-1 GND	18 AWG	GXL	4460375		S306 (2)
3							
4	WHT	4 ZAPI IGN	14 AWG	GXL	4460375		MS256 (1)
5	WHT	3-24 ZAPI IGN RELAY	18 AWG	GXL	4460375		X302 (1)

X302

CONNECTOR PART NUMBER: 4460897

CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	SEAL P/N	TO
1	WHT	3-24 ZAPI IGN RELAY	18 AWG	GXL	4460464		RL255 (5)
2	BLK	1-35 GND	18 AWG	GXL	4460464		S306 (1)

X360B

CONNECTOR PART NUMBER: 4460320

CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	SEAL P/N	TO
1	WHT	45-3-2 CHARGING STAT	18 AWG	GXL	4460267		CO210-A (16)
2	WHT	12 GENSET CONT IGN	16 AWG	GXL	4460267		MS256 (7)

X304

CONNECTOR PART NUMBER: 4460891

CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	SEAL P/N	TO
1	WHT	9 UGM MAIN VOTE	18 AWG	GXL	4460465		RL298 (5)
2					4460466		

X568B

CONNECTOR PART NUMBER: 4460894

CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	SEAL P/N	TO
1	YEL	80-5 CAN1 HIGH	20 AWG	J1939 CABLE	4460465		X558 (B)
2	GRN	81-5 CAN1 LOW	20 AWG	J1939 CABLE	4460465		X558 (A)
3	SHLD	82-5 SHIELD	20 AWG	J1939 CABLE	4460465		X558 (N/C)
4					4460466		
5	WHT	2-25 CURNT SEN PWR	18 AWG	GXL	4460465		X558 (D)
6	BLK	1-50 GND	18 AWG	GXL	4460465		X558 (C)

WH414 - ELECTRIC FAN (OPTION)

CONNECTOR PART NUMBER: 4460994 (SEE WIRE INSERTION VIEW)

CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	SEAL P/N	TO
1	WHT	11-22 FAN B+	16 AWG	GXL	1001116723		S489 (1)
2	BLK	25 FAN RTN	16 AWG	GXL	1001116723		CO213-P- (1)

MS256 - IGNITION BUSS 48V

CONNECTOR PART NUMBER: 4460851
MUST INCLUDE JLG P/N 4460852

CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	SEAL P/N	TO
1	WHT	4 ZAPI IGN	14 AWG	GXL	4460942		RL255 (4)
2	WHT	4-1 ZAPI IGN	16 AWG	GXL	4460465		IP402 (2)
3	WHT	4-2 ZAPI IGN	16 AWG	GXL	4460465		IP403 (1)
4	WHT	4-3 ZAPI IGN	16 AWG	GXL	4460465		IP404 (2)
5	WHT	4-4 ZAPI IGN	16 AWG	GXL	4460465		IP405 (1)
6	WHT	4-5 MAIN CONT POS	18 AWG	GXL	4460465		RL298 (1)
7	WHT	12 GENSET CONT IGN	16 AWG	GXL	4460465		X360B (2)
8					4460466		

MS425 - CAN BUSS CHANNEL #2

CONNECTOR PART NUMBER: 4460933
MUST INCLUDE JLG P/N 10011190020

CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	SEAL P/N	TO
1	YEL	75-5 CAN2 HIGH	20 AWG	J1939 CABLE	4460944		MS622 (12)
2	YEL	75-8 CAN2 HIGH	20 AWG	J1939 CABLE	4460944		CO212-A (28)
3	GRN	76-5 CAN2 LOW	20 AWG	J1939 CABLE	4460944		MS622 (10)
4	GRN	76-8 CAN2 LOW	20 AWG	J1939 CABLE	4460944		CO212-A (27)
5	SHLD	77-5 SHIELD	20 AWG	J1939 CABLE	4460944		MS622 (8)
6	SHLD	77-8 SHIELD	20 AWG	J1939 CABLE	4460944		CO212-B- (1)
7	SHLD	77-7 SHIELD	20 AWG	J1939 CABLE	4460944		CO210-A (NC)
8	SHLD	77-10 SHIELD	20 AWG	J1939 CABLE	4460944		CO211-A (NC)
9	GRN	76-7 CAN2 LOW	20 AWG	J1939 CABLE	4460944		CO210-A (27)
10	GRN	76-10 CAN2 LOW	20 AWG	J1939 CABLE	4460944		CO211-A (27)
11	YEL	75-7 CAN2 HIGH	20 AWG	J1939 CABLE	4460944		CO210-A (28)
12	YEL	75-10 CAN2 HIGH	20 AWG	J1939 CABLE	4460944		CO211-A (28)

RL298

CONNECTOR PART NUMBER: 4460374
MUST INCLUDE JLG P/N 1001171295

CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	SEAL P/N	TO
1	WHT	4-5 MAIN CONT POS	18 AWG	GXL	4460375		MS256 (6)
2	BLK	1-35-2 GND	18 AWG	GXL	4460375		S306 (2)
3							
4	WHT	5 MAIN CONT POS	18 AWG	GXL	4460375		RL253 (1)
5	WHT	9 UGM MAIN VOTE	18 AWG	GXL	4460375		X304 (1)

X558 - CURRENT SENSOR

CONNECTOR PART NUMBER: 1001183402

CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	SEAL P/N	TO
A	GRN	81-5 CAN1 LOW	20 AWG	J1939 CABLE	1001183405		X568B (2)
B	YEL	80-5 CAN1 HIGH	20 AWG	J1939 CABLE	1001183405		X568B (1)
C	BLK	1-50 GND	18 AWG	GXL	1001183405		X568B (6)
D	WHT	2-25 CURNT SEN PWR	18 AWG	GXL	1001183405		X568B (5)
N/C	SHLD	82-5 SHIELD	20 AWG	J1939 CABLE			X568B (3)

CO212-A - DRIVE CONTROL RHT REAR

CONNECTOR PART NUMBER: 4460873

CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	SEAL P/N	TO
1					4460905		
2	ORN	CABLE3 18/8 BRAKE POS	18 AWG	TFFN	4460871		X628 (1)
3	BLK	HOLDER LEAD	16 AWG	GXL	4460871		IP410 (1)
4	BLU/BLK	CABLE3 18/8 BRAKE NEG	18 AWG	TFFN	4460871		X628 (2)
5	BLK	62 ENC GND	18 AWG	GXL	4460871		S272 (1)
6	BLK	10-11 ADDR 0	18 AWG	GXL	4460871		CO212-B1- (1)
7					4460905		
8					4460905		
9					4460905		
10	WHT	4-3-1 ZAPI IGN	16 AWG	GXL	4460871		S428 (1)
11					4460905		
12					4460905		
13	BRN	CABLE3 18/8 ENC B	18 AWG	TFFN	4460871		X628 (6)
14	YEL	CABLE3 18/8 ENC A	18 AWG	TFFN	4460871		X628 (7)
15					4460905		
16					4460905		
17					4460905		
18					4460905		
19					4460905		
20	WHT	4-3-3 ADDR 1	18 AWG	GXL	4460871		S428 (1)
21					4460905		
22	RED/BLK	CABLE3 18/8 MOTOR TEMP	18 AWG	TFFN	4460871		X628 (3)
23					4460905		
24					4460905		
25	RED	CABLE3 18/8 ENC PWR	18 AWG	TFFN	4460871		X628 (5)
26					4460905		
27	GRN	76-8 CAN2 LOW	20 AWG	J1939 CABLE	4460871		MS425 (4)
28	YEL	75-8 CAN2 HIGH	20 AWG	J1939 CABLE	4460871		MS425 (2)
29					4460905		
30					4460905		
31					4460905		
32					4460905		
33					4460905		
34					4460905		
35	WHT	4-3-2 ADDR 1	18 AWG	GXL	4460871		S428 (1)

1001161871-J
MAF09310J

Figure 7-98. Traction Harness - Sheet 6 of 8

CO212-B1-

CONNECTOR PART NUMBER: 4460703

CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	SEAL P/N	TO
1	BLK	10-11 ADDR 0	18 AWG	GXL	N/A		CO212-A (6)

CO212-B-

CONNECTOR PART NUMBER: 4460670

CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	SEAL P/N	TO
1	SHLD	77-8 SHIELD	20 AWG	J1939 CABLE	N/A		MS425 (6)

CO212-B+

CONNECTOR PART NUMBER: 4460670

CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	SEAL P/N	TO
1	BLK	HOLDER LEAD	16 AWG	GXL	N/A		IP410 (2)

CO210-B1-

CONNECTOR PART NUMBER: 4460703

CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	SEAL P/N	TO
1	BLK	10-9 ADDRESSING	18 AWG	GXL	N/A		S426 (2)

CO210-B+

CONNECTOR PART NUMBER: 4460670

CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	SEAL P/N	TO
1	BLK	HOLDER LEAD	16 AWG	GXL	N/A		IP408 (2)

X633

CONNECTOR PART NUMBER: 4460536
SEE NOTE # 6

CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	SEAL P/N	TO
1	BLU	CABLE5 18/3 STEER SN SIG	18 AWG	TFFN	4460464		CO210-A (15)
2	RED	CABLE5 18/3 STEER SN IGN	18 AWG	TFFN	4460464		S277 (2)
3	BLK	CABLE5 18/3 STEER SN GND	18 AWG	TFFN	4460464		S278 (2)

CO210-A - DRIVE CONTROL RHT FRONT

CONNECTOR PART NUMBER: 4460873

CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	SEAL P/N	TO
1					4460905		
2	ORN	CABLE1 18/8 BRAKE POS	18 AWG	TFFN	4460871		X631 (1)
3	BLK	HOLDER LEAD	16 AWG	GXL	4460871		IP408 (1)
4	BLU/BLK	CABLE1 18/8 BRAKE NEG	18 AWG	TFFN	4460871		X631 (2)
5	BLK	51 ENC GND	18 AWG	GXL	4460871		S278 (1)
6	BLK	10-9-2 ADDR 0	18 AWG	GXL	4460871		S426 (2)
7					4460905		
8					4460905		
9					4460905		
10	BLK	HOLDER LEAD	16 AWG	GXL	4460871		IP402 (1)
11					4460905		
12	WHT	6 MAIN CONT NEG	18 AWG	GXL	4460871		RL253 (2)
13	BRN	CABLE1 18/8 ENC B	18 AWG	TFFN	4460871		X631 (6)
14	YEL	CABLE1 18/8 ENC A	18 AWG	TFFN	4460871		X631 (7)
15	BLU	CABLE5 18/3 STEER SN SIG	18 AWG	TFFN	4460871		X633 (1)
16	WHT	45-3-2 CHARGING STAT	18 AWG	GXL	4460871		X360B (1)
17					4460905		
18					4460905		
19					4460905		
20	BLK	10-9-3 ADDR 0	18 AWG	GXL	4460871		S426 (1)
21					4460905		
22	RED/BLK	CABLE1 18/8 MOTOR TEMP	18 AWG	TFFN	4460871		X631 (4)
23					4460905		
24					4460905		
25	RED	50 ENC PWR	18 AWG	GXL	4460871		S277 (1)
26					4460905		
27	GRN	76-7 CAN2LOW	20 AWG	J1939 CABLE	4460871		MS425 (9)
28	YEL	75-7 CAN2 HIGH	20 AWG	J1939 CABLE	4460871		MS425 (11)
29					4460905		
30					4460905		
31					4460905		
32					4460905		
33					4460905		
34					4460905		
35	BLK	10-9-1 ADDR 0	18 AWG	GXL	4460871		S426 (2)
NC	SHLD	77-7 SHIELD	20 AWG	J1939 CABLE	N/A		MS425 (7)

RL253-1

CONNECTOR PART NUMBER: 4460670

CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	SEAL P/N	TO
1	YEL	HOLDER LEAD	14 AWG	GXL	N/A		IP424 (2)

RL253

CONNECTOR PART NUMBER: 1001126245

CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	SEAL P/N	TO
1	WHT	5 MAIN CONT POS	18 AWG	GXL	1001126008		RL298 (4)
2	WHT	6 MAIN CONT NEG	18 AWG	GXL	1001126008		CO210-A (12)

X628

CONNECTOR PART NUMBER: 4460931
SEE NOTE # 7

CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	SEAL P/N	TO
1	ORN	CABLE3 18/8 BRAKE POS	18 AWG	TFFN	4460464		CO212-A (2)
2	BLU/BLK	CABLE3 18/8 BRAKE NEG	18 AWG	TFFN	4460464		CO212-A (4)
3	RED/BLK	CABLE3 18/8 MOTOR TEMP	18 AWG	TFFN	4460464		CO212-A (22)
4	BLU	CABLE3 18/8 TEMP GND	18 AWG	TFFN	4460464		S272 (2)
5	RED	CABLE3 18/8 ENC PWR	18 AWG	TFFN	4460464		CO212-A (25)
6	BRN	CABLE3 18/8 ENC B	18 AWG	TFFN	4460464		CO212-A (13)
7	YEL	CABLE3 18/8 ENC A	18 AWG	TFFN	4460464		CO212-A (14)
8	BLK	CABLE3 18/8 ENC GND	18 AWG	TFFN	4460464		S272 (2)

X631

CONNECTOR PART NUMBER: 4460931
SEE NOTE # 7

CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	SEAL P/N	TO
1	ORN	CABLE1 18/8 BRAKE POS	18 AWG	TFFN	4460464		CO210-A (2)
2	BLU/BLK	CABLE1 18/8 BRAKE NEG	18 AWG	TFFN	4460464		CO210-A (4)
3	BLU	CABLE1 18/8 TEMP GND	18 AWG	TFFN	4460464		S278 (2)
4	RED/BLK	CABLE1 18/8 MOTOR TEMP	18 AWG	TFFN	4460464		CO210-A (22)
5	RED	CABLE1 18/8 ENC PWR	18 AWG	TFFN	4460464		S277 (2)
6	BRN	CABLE1 18/8 ENC B	18 AWG	TFFN	4460464		CO210-A (13)
7	YEL	CABLE1 18/8 ENC A	18 AWG	TFFN	4460464		CO210-A (14)
8	BLK	CABLE1 18/8 ENC GND	18 AWG	TFFN	4460464		S278 (2)

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Figure 7-99. Traction Harness - Sheet 7 of 8

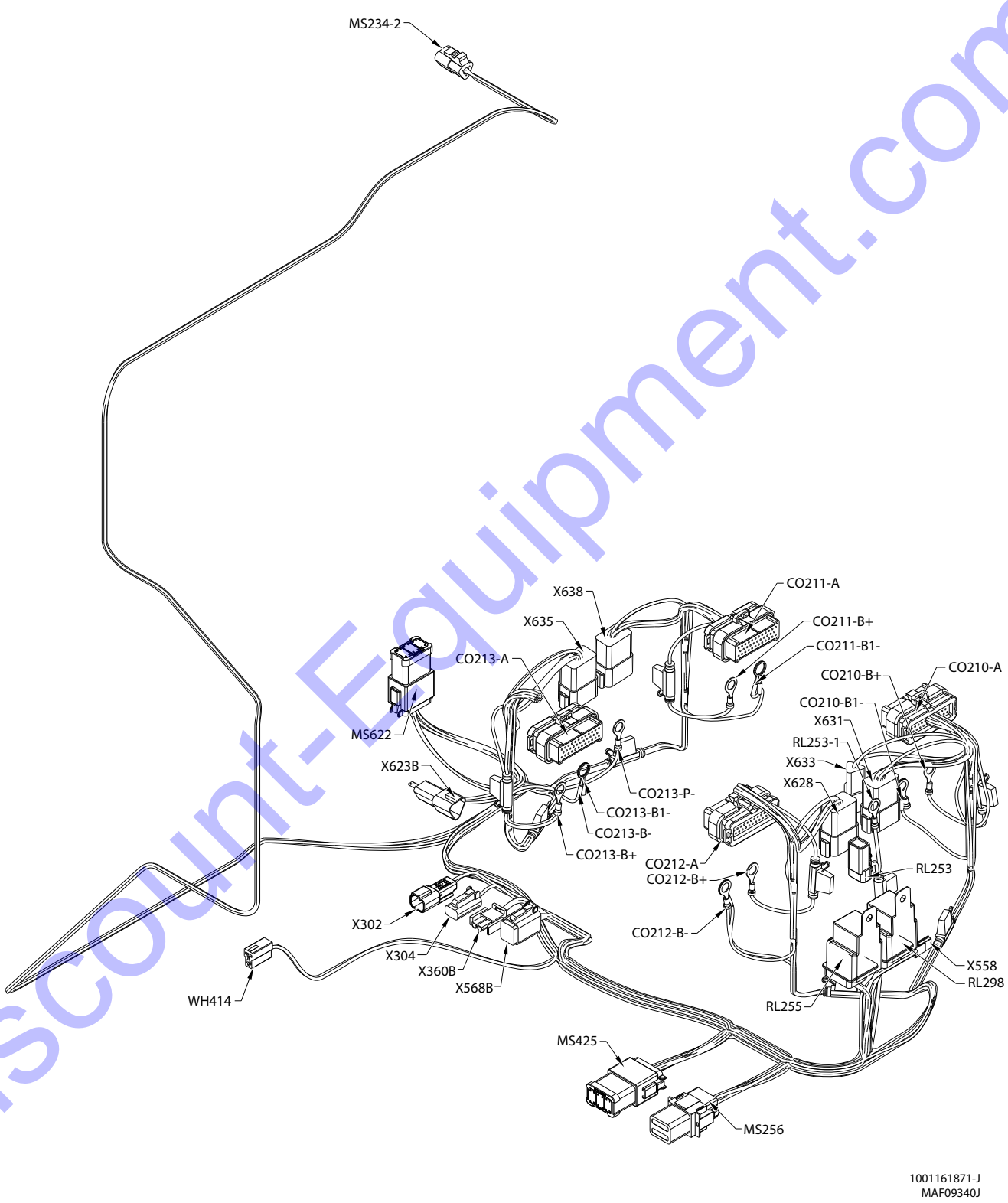

Figure 7-100. Traction Harness - Sheet 8 of 8

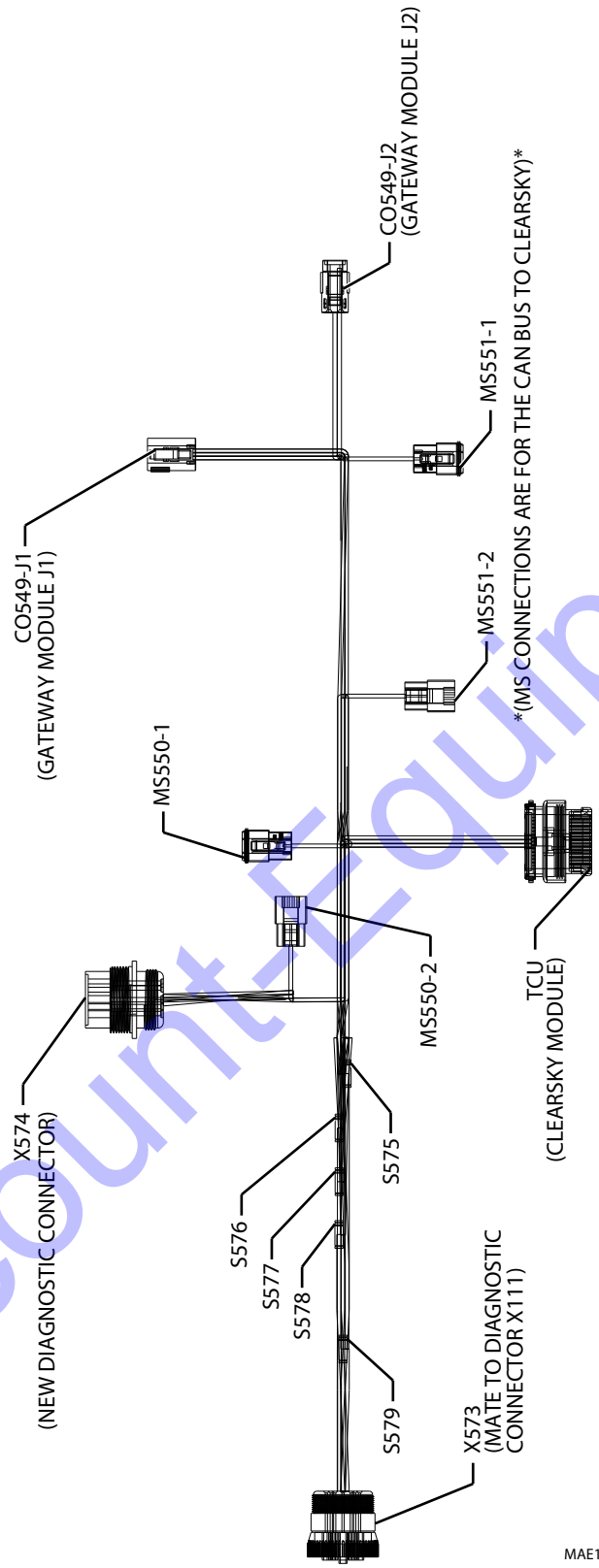

Figure 7-101. Clearsky Harness - Sheet 1 of 4

S576						
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	TO
1	GRN	203-3 CAN1 LOW	20 AWG	J1939 CABLE	N/A	X573 (D)
2	GRN	203-1 CAN1 LOW	20 AWG	J1939 CABLE	N/A	CO549-J1 (9)
2	GRN	203-2 CAN1 LOW	20 AWG	J1939 CABLE	N/A	X574 (D)

S577						
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	TO
1	YEL	204-3 CAN1 HIGH	20 AWG	J1939 CABLE	N/A	X573 (C)
2	YEL	204-1 CAN1 HIGH	20 AWG	J1939 CABLE	N/A	CO549-J1 (10)
2	YEL	204-2 CAN1 HIGH	20 AWG	J1939 CABLE	N/A	X574 (C)

S578						
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	TO
1	RED	201-3 12V+	16 AWG	GXL	N/A	X573 (B)
2	RED	201-1 12V+	16 AWG	GXL	N/A	TCU (23)
2	RED	201-2 12V+	16 AWG	GXL	N/A	X574 (B)

S575						
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	TO
1	YEL	202-3 IGN	16 AWG	GXL	N/A	X573 (H)
2	YEL/RED	202-1 IGN	18 AWG	GXL	N/A	TCU (15)
2	YEL	202-2 IGN	16 AWG	GXL	N/A	X574 (H)
2	YEL	202-4 IGN	18 AWG	GXL	N/A	CO549-J1 (12)

S579						
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	TO
1	BLK	200-3 GND	16 AWG	GXL	N/A	X573 (A)
2	BLK	200-1 GND	16 AWG	GXL	N/A	TCU (16)
2	BLK	200-2 GND	16 AWG	GXL	N/A	X574 (A)
2	BLK	200-4 GND	18 AWG	GXL	N/A	CO549-J1 (11)

X573						
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	TO
A	BLK	200-3 GND	16 AWG	GXL	4460944	S579 (1)
B	RED	201-3 12V+	16 AWG	GXL	4460944	S578 (1)
C	YEL	204-3 CAN1 HIGH	20 AWG	J1939 CABLE	4460944	S577 (1)
D	GRN	203-3 CAN1 LOW	20 AWG	J1939 CABLE	4460944	S576 (1)
E					4460466	
F					4460466	
G					4460466	
H	YEL	202-3 IGN	16 AWG	GXL	4460944	S575 (1)
J					4460466	

CO549-J2						
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	TO
1	WHT	NA JUMPER	18 AWG	GXL	1001126008	CO549-J2 (3)
2					4460518	
3	WHT	NA JUMPER	18 AWG	GXL	1001126008	CO549-J2 (1)
4					4460518	
5					4460518	
6					4460518	
7					4460518	
8					4460518	
9					4460518	
10					4460518	
11					4460518	
12					4460518	

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Figure 7-102. Clearsky Harness - Sheet 2 of 4

TCU						
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	TO
1					4460905	
2					4460905	
3					4460905	
4					4460905	
5					4460905	
6					4460905	
7	YEL	CAN HI GTW	20 AWG	J1939 CABLE	4460871	MS550-1 (A)
8					4460905	
9					4460905	
10					4460905	
11					4460905	
12					4460905	
13					4460905	
14					4460905	
15	YEL/RED	202-1 IGN	18 AWG	GXL	4460871	S575 (2)
16	BLK	200-1 GND	16 AWG	GXL	4460871	S579 (2)
17					4460905	
18					4460905	
19					4460905	
20					4460905	
21					4460905	
22	GRN	CAN LOW GTW	20 AWG	J1939 CABLE	4460871	MS550-1 (B)
23	RED	201-1 12V+	16 AWG	GXL	4460871	S578 (2)

X574						
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	TO
A	BLK	200-2 GND	16 AWG	GXL	4460943	S579 (2)
B	RED	201-2 12V+	16 AWG	GXL	4460943	S578 (2)
C	YEL	204-2 CAN1 HIGH	20 AWG	J1939 CABLE	4460943	S577 (2)
D	GRN	203-2 CAN1 LOW	20 AWG	J1939 CABLE	4460943	S576 (2)
E					4460466	
F					4460466	
G					4460466	
H	YEL	202-2 IGN	16 AWG	GXL	4460943	S575 (2)
J					4460466	

CO549-J1						
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	TO
1					4460518	
2					4460518	
3					4460518	
4					4460518	
5					4460518	
6					4460518	
7	GRN	CAN LOW GTW	20 AWG	J1939 CABLE	4460918	MS551-1 (B)
8	YEL	CAN HI GTW	20 AWG	J1939 CABLE	4460918	MS551-1 (A)
9	GRN	203-1 CAN1 LOW	20 AWG	J1939 CABLE	4460918	S576 (2)
10	YEL	204-1 CAN1 HIGH	20 AWG	J1939 CABLE	4460918	S577 (2)
11	BLK	200-4 GND	18 AWG	GXL	1001126008	S579 (2)
12	YEL	202-4 IGN	18 AWG	GXL	1001126008	S575 (2)

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Figure 7-103. Clearsky Harness - Sheet 3 of 4

MS551-1						
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	TO
A	YEL	CAN HI GTW	20 AWG	J1939 CABLE	4460944	CO549-J1 (8)
B	GRN	CAN LOW GTW	20 AWG	J1939 CABLE	4460944	CO549-J1 (7)
C					4460466	

MS551-2						
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	TO
A	YEL	CAN HI GTW	20 AWG	J1939 CABLE	4460944	MS550-2 (A)
B	GRN	CAN LOW GTW	20 AWG	J1939 CABLE	4460944	MS550-2 (B)
C					4460466	

MS550-1						
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	TO
A	YEL	CAN HI GTW	20 AWG	J1939 CABLE	4460944	TCU (7)
B	GRN	CAN LOW GTW	20 AWG	J1939 CABLE	4460944	TCU (22)
C					4460466	

MS550-2						
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	TO
A	YEL	CAN HI GTW	20 AWG	J1939 CABLE	4460944	MS551-2 (A)
B	GRN	CAN LOW GTW	20 AWG	J1939 CABLE	4460944	MS551-2 (B)
C					4460466	

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Figure 7-104. Clearsky Harness - Sheet 4 of 4

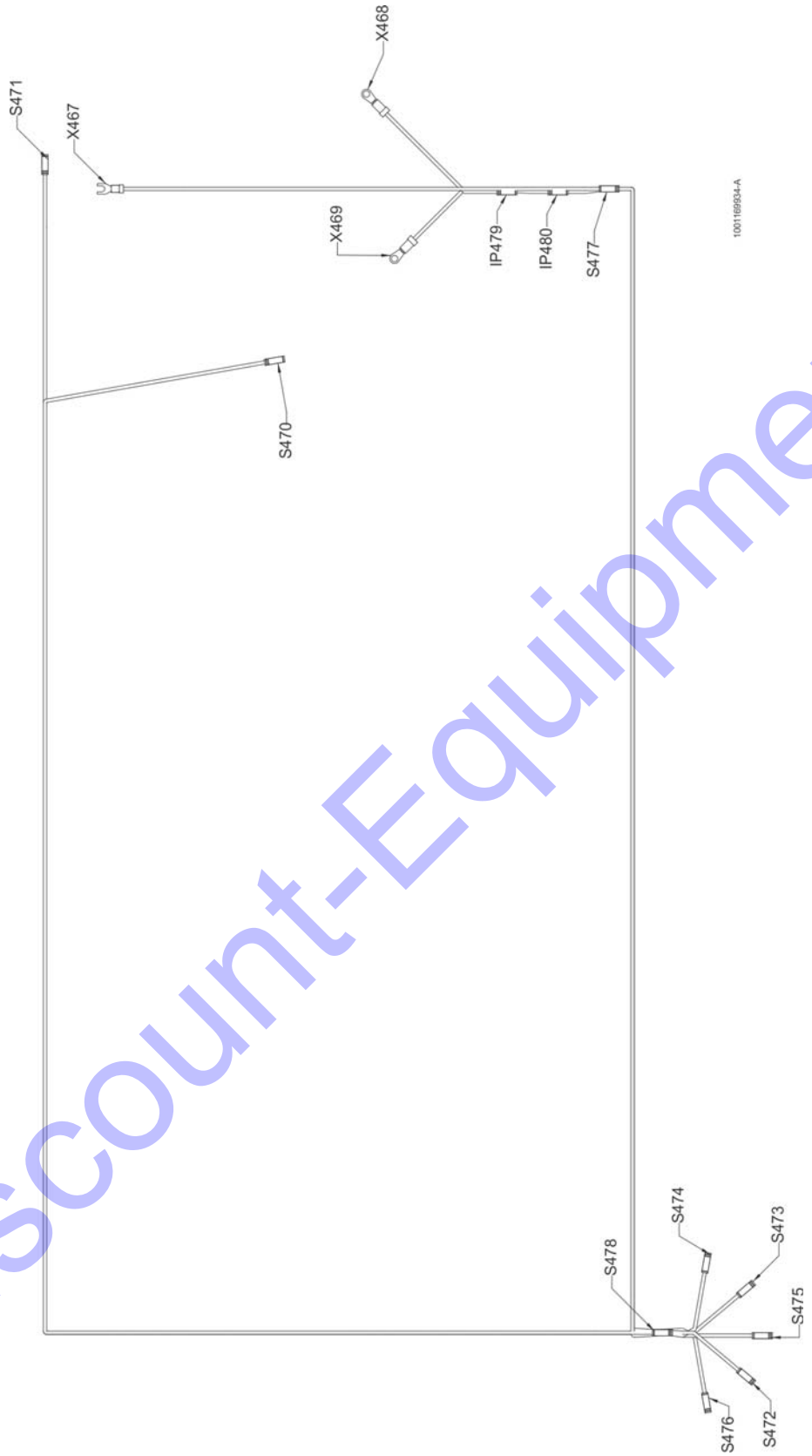


Figure 7-105. Security Lock Harness - Sheet 1 of 2

S472					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	RED	2-16 12V+	16 AWG	GXL	X467 (1)
2					

S473					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	90-1 LOCK	16 AWG	GXL	S477 (2)
2					

S474					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	90-2-1 LOCK	16 AWG	GXL	S478 (2)
2					

S475					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	90-2-2 LOCK	16 AWG	GXL	S478 (2)
2					

S476					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	90-3 LOCK	16 AWG	GXL	S471 (2)
2					

S478					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	90-2 LOCK	16 AWG	GXL	S470 (2)
2	WHT	90-2-1 LOCK	16 AWG	GXL	S474 (1)
2	WHT	90-2-2 LOCK	16 AWG	GXL	S475 (1)

S477					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	90-1-1 LOCK	16 AWG	GXL	IP479 (1)
1	WHT	90-1-2 LOCK	16 AWG	GXL	IP480 (1)
2	WHT	90-1 LOCK	16 AWG	GXL	S473 (1)

S470					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1					
2	WHT	90-2 LOCK	16 AWG	GXL	S478 (1)

S471					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1					
2	WHT	90-3 LOCK	16 AWG	GXL	S476 (1)

IP479					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	90-1-1 LOCK	16 AWG	GXL	S477 (1)
2	WHT	90-1-1 LOCK	16 AWG	GXL	X468 (1)

IP480					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	90-1-2 LOCK	16 AWG	GXL	S477 (1)
2	WHT	90-1-2 LOCK	16 AWG	GXL	X469 (1)

X467					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	RED	2-16 12V+	16 AWG	GXL	S472 (1)

X469					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	90-1-2 LOCK	16 AWG	GXL	IP480 (2)

X468					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	90-1-1 LOCK	16 AWG	GXL	IP479 (2)

Figure 7-106. Security Lock Harness - Sheet 2 of 2

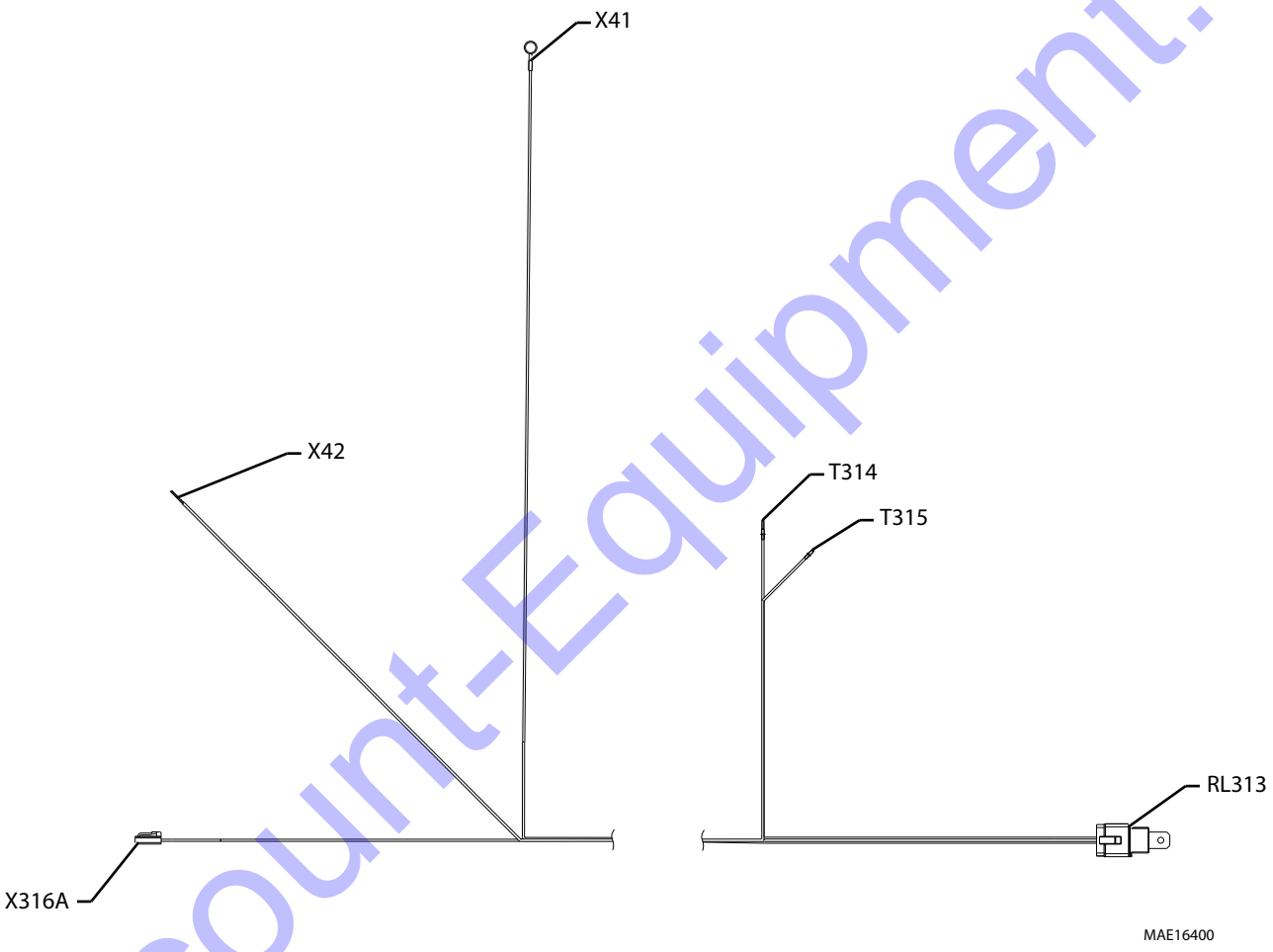


Figure 7-107. Inverter Harness - Sheet 1 of 2

X41						
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	TO
1	WHT	140 INVERTER REMOTE B-	16 AWG	TXL	N/A	X316A (2)

X42						
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	TO
1	WHT	138 INVERTER REM COM	16 AWG	GXL	N/A	RL313 (1)

X316A						
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	TO
1	WHT	139 INVERTER REMOTE	16 AWG	TXL		RL313 (4)
2	WHT	140 INVERTER REMOTE B-	16 AWG	TXL		X41 (1)

T314						
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	TO
1	WHT	97-2 INVERTER ENABLE	18 AWG	GXL	N/A	RL313 (5)

T315						
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	TO
1	BLK	1-10 GND	18 AWG	GXL	N/A	RL313 (2)

RL313						
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	TO
1	WHT	138 INVERTER REM COM	16 AWG	GXL		X42 (1)
2	BLK	1-10 GND	18 AWG	GXL		T315 (1)
3						
4	WHT	139 INVERTER REMOTE	16 AWG	TXL		X316A (1)
5	WHT	97-2 INVERTER ENABLE	18 AWG	GXL		T314 (1)

MAE16410

Figure 7-108. Inverter Harness - Sheet 2 of 2

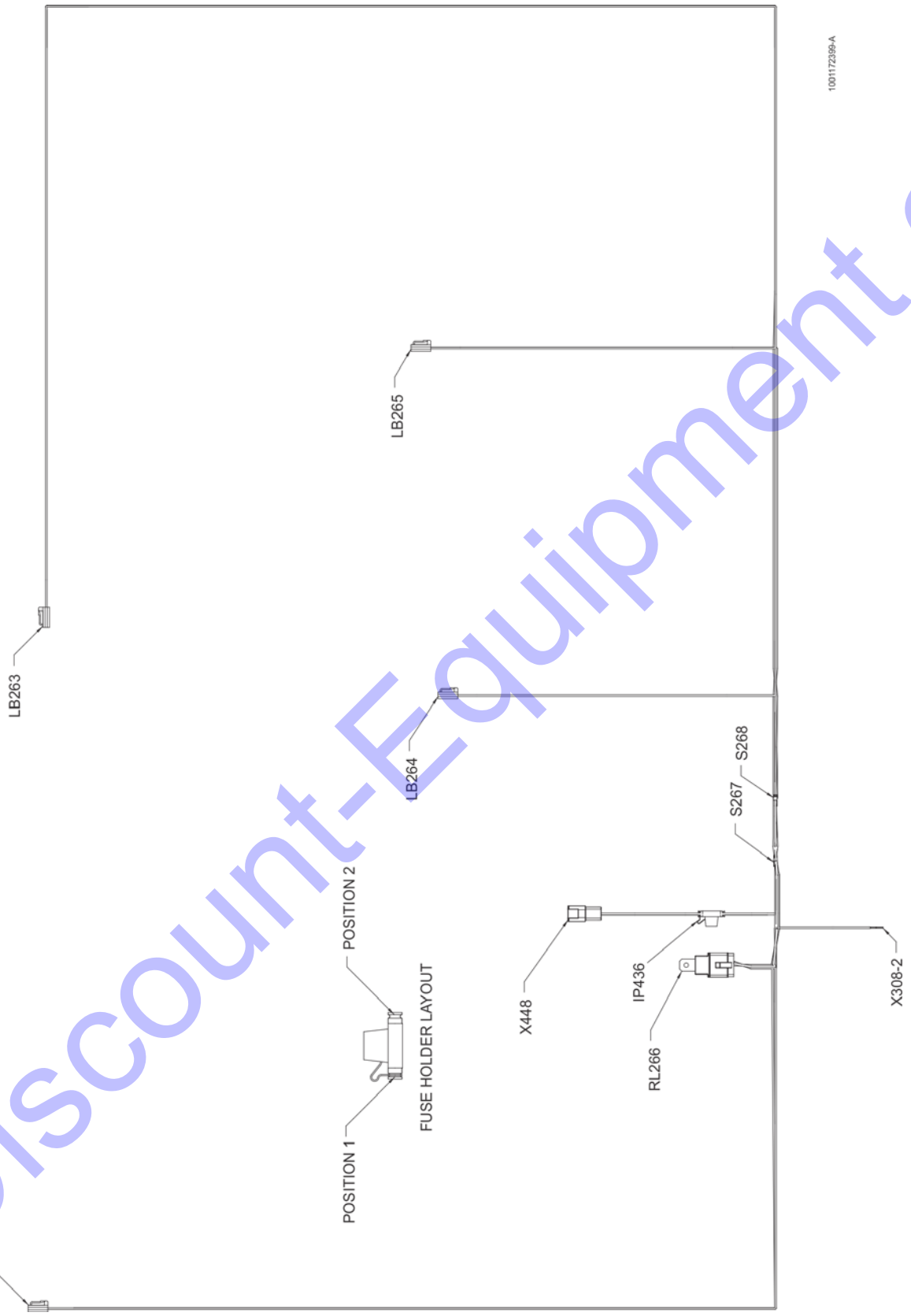


Figure 7-109. Head and Tail Light Harness - Sheet 1 of 2

LB262					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	BLK	1-22-1 GND	18 AWG	GXL	S268 (1)
2	YEL/RED	3-12-1 LIGHT	18 AWG	GXL	S267 (1)

LB263					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	BLK	1-22-2 GND	18 AWG	GXL	S268 (2)
2	YEL/RED	3-12-2 LIGHT	18 AWG	GXL	S267 (2)

LB264					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	BLK	1-22-3 GND	18 AWG	GXL	S268 (2)
2	YEL/RED	3-12-3 LIGHT	18 AWG	GXL	S267 (2)

LB265					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	BLK	1-22-4 GND	18 AWG	GXL	S268 (2)
2	YEL/RED	3-12-4 LIGHT	18 AWG	GXL	S267 (2)

X448					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	ORN	SEE NOTE 5	12 AWG	N/A	IP436 (1)
2	BLK	1-22 LIGHT GND	14 AWG	GXL	S268 (1)

RL266					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	RED	3-11 LIGHT PWR	14 AWG	GXL	IP436 (2)
2	BLK	1-22-5 GND	18 AWG	GXL	S268 (1)
3					
4	RED	3-12 LIGHT PWR	14 AWG	GXL	S267 (1)
5	WHT	88-2 LIGHTING	18 AWG	GXL	X308-2 (1)

IP436					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	ORN	SEE NOTE 5	12 AWG	N/A	X448 (1)
2	RED	3-11 LIGHT PWR	14 AWG	GXL	RL266 (1)

X308-2					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	88-2 LIGHTING	18 AWG	GXL	RL266 (5)

S267					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	RED	3-12 LIGHT PWR	14 AWG	GXL	RL266 (4)
1	YEL/RED	3-12-1 LIGHT	18 AWG	GXL	LB262 (2)
2	YEL/RED	3-12-2 LIGHT	18 AWG	GXL	LB263 (2)
2	YEL/RED	3-12-3 LIGHT	18 AWG	GXL	LB264 (2)
2	YEL/RED	3-12-4 LIGHT	18 AWG	GXL	LB265 (2)

S268					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	BLK	1-22 LIGHT GND	14 AWG	GXL	X448 (2)
1	BLK	1-22-1 GND	18 AWG	GXL	LB262 (1)
1	BLK	1-22-5 GND	18 AWG	GXL	RL266 (2)
2	BLK	1-22-2 GND	18 AWG	GXL	LB263 (1)
2	BLK	1-22-3 GND	18 AWG	GXL	LB264 (1)
2	BLK	1-22-4 GND	18 AWG	GXL	LB265 (1)

Figure 7-110. Head and Tail Light Harness - Sheet 2 of 2

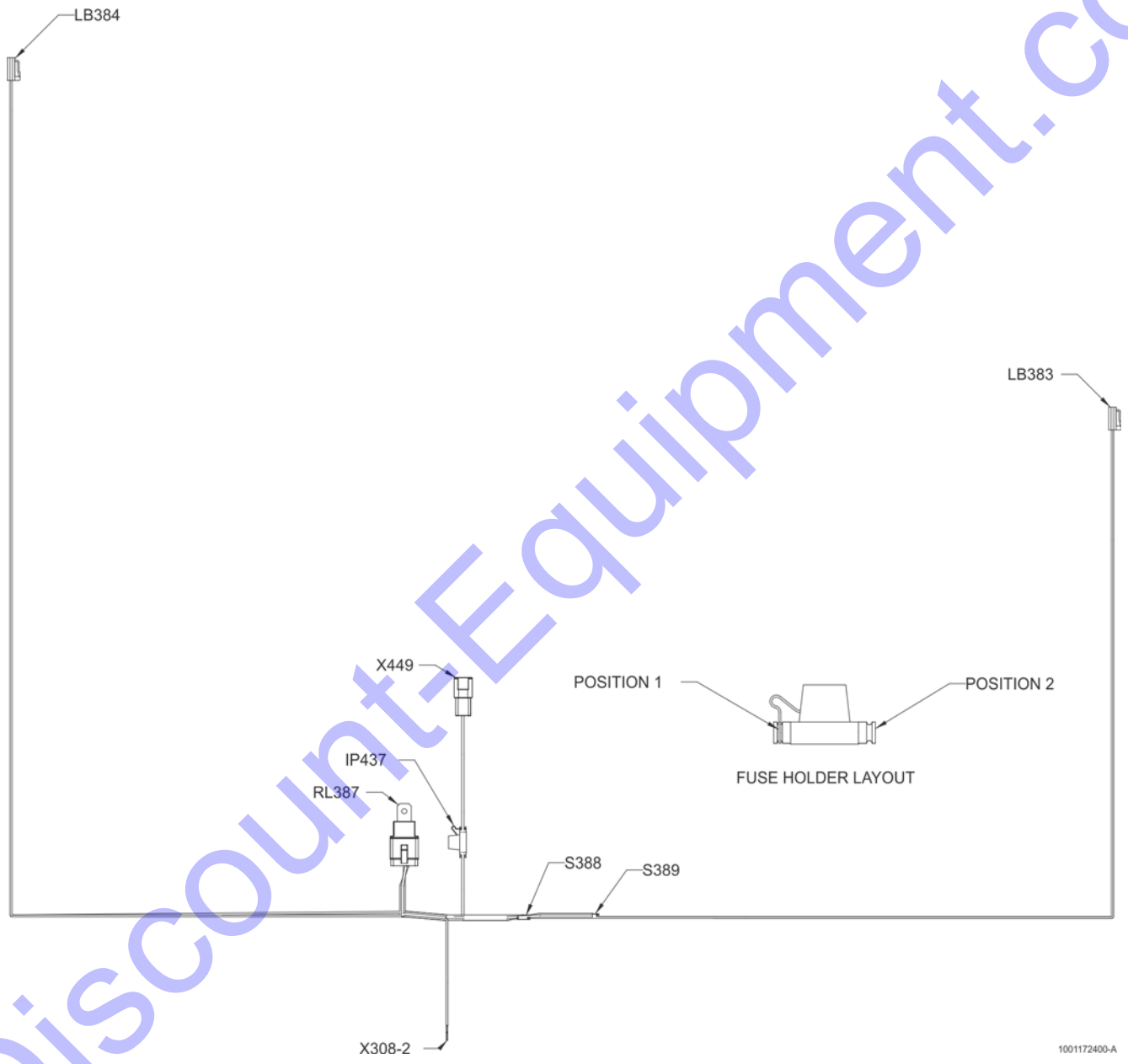


Figure 7-111. Chassis Lights Harness - Sheet 1 of 2

LB383					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	BLK	1-22-4 GND	18 AWG	GXL	S389 (2)
2	YEL/RED	3-12-4 LIGHT	18 AWG	GXL	S388 (2)

LB384					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	BLK	1-22-1 GND	18 AWG	GXL	S389 (1)
2	YEL/RED	3-12-1 LIGHT	18 AWG	GXL	S388 (1)

RL387					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	RED	3-11 LIGHT PWR	14 AWG	GXL	IP437 (2)
2	BLK	1-22-5 GND	18 AWG	GXL	S389 (1)
3					
4	RED	3-12 LIGHT PWR	14 AWG	GXL	S388 (1)
5	WHT	88-2 LIGHTING	18 AWG	GXL	X308-2 (1)

X449					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	ORN	SEE NOTE 5	12 AWG	N/A	IP437 (1)
2	BLK	1-22 LIGHT GND	14 AWG	GXL	S389 (1)

IP437					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	ORN	SEE NOTE 5	12 AWG	N/A	X449 (1)
2	RED	3-11 LIGHT PWR	14 AWG	GXL	RL387 (1)

S388					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	RED	3-12 LIGHT PWR	14 AWG	GXL	RL387 (4)
1	YEL/RED	3-12-1 LIGHT	18 AWG	GXL	LB384 (2)
2	YEL/RED	3-12-4 LIGHT	18 AWG	GXL	LB383 (2)

S389					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	BLK	1-22 LIGHT GND	14 AWG	GXL	X449 (2)
1	BLK	1-22-1 GND	18 AWG	GXL	LB384 (1)
1	BLK	1-22-5 GND	18 AWG	GXL	RL387 (2)
2	BLK	1-22-4 GND	18 AWG	GXL	LB383 (1)

X308-2					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	88-2 LIGHTING	18 AWG	GXL	RL387 (5)

Figure 7-112. Chassis Lights Harness - Sheet 2 of 2

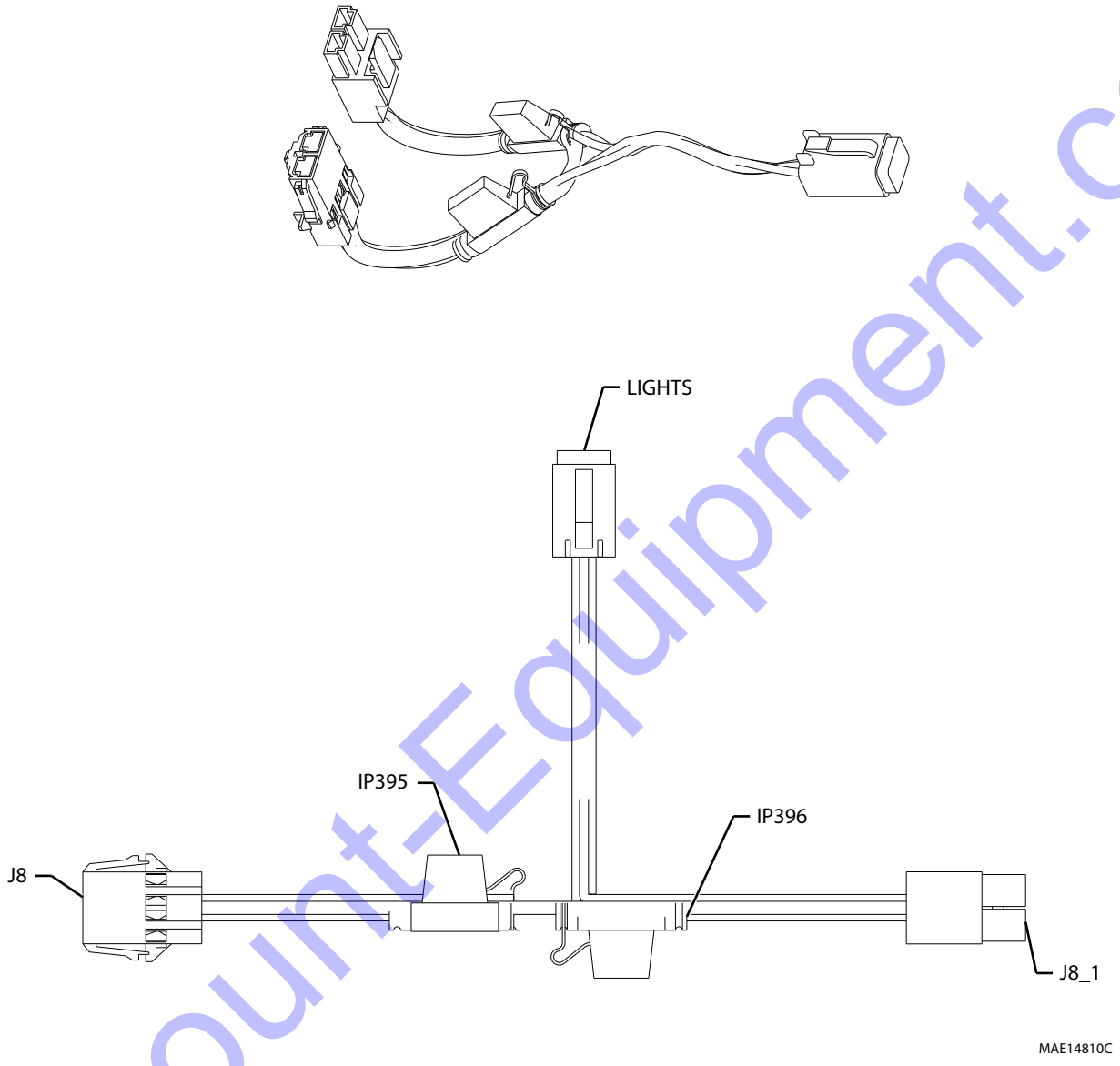


Figure 7-113. Platform Work Light Harness - Sheet 1 of 2

J8_1						
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	TO
1	BLK	-	12 AWG	GXL	4460887	J8 (1)
1	BLK	-	16 AWG	GXL	4460887	LIGHTS (3)
2	YEL/RED	-	12 AWG	GXL	4460887	J8 (2)
2	-	FUSE HOLDER			4460887	IP396 (2)

IP396						
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	TO
1	-	FUSE HOLDER			N/A	LIGHTS (4)
2	-	FUSE HOLDER			N/A	J8_1 (2)

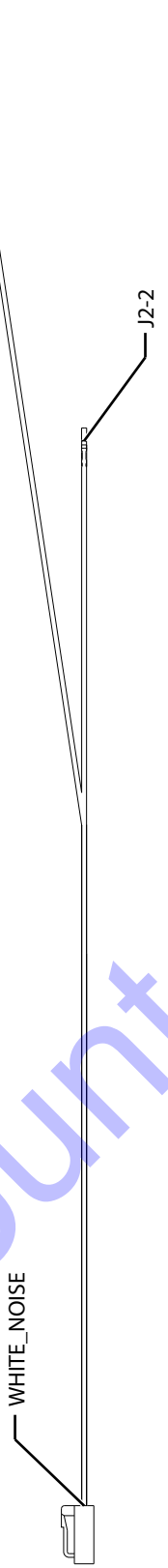
LIGHTS						
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	TO
1	BLK	-	16 AWG	GXL	4460465	J8 (1)
2	-	FUSE HOLDER			4460465	IP395 (1)
3	BLK	-	16 AWG	GXL	4460465	J8_1 (1)
4	-	FUSE HOLDER			4460465	IP396 (1)

IP395						
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	TO
1	-	FUSE HOLDER			N/A	LIGHTS (2)
2	-	FUSE HOLDER			N/A	J8 (2)

J8						
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	TO
1	BLK	-	12 AWG	GXL	1001120477	J8_1 (1)
1	BLK	-	16 AWG	GXL	1001120477	LIGHTS (1)
2	YEL/RED	-	12 AWG	GXL	1001120477	J8_1 (2)
2	-	FUSE HOLDER			1001120477	IP395 (2)

MAE14820C

Figure 7-114. Platform Work Light Harness - Sheet 2 of 2



WHITE_NOISE

CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	SEAL P/N	TO
1	WHT	WHITE NOISE	18 AWG	GXL			J2-2 (2)
2	BLK	NOISE GND	18 AWG	GXL			J1-4 (4)

J2-2

CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	SEAL P/N	TO
2	WHT	WHITE NOISE	18 AWG	GXL			WHITE_NOISE (1)

J1-4

CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	SEAL P/N	TO
4	BLK	NOISE GND	18 AWG	GXL			WHITE_NOISE (2)

MAE16420B

Figure 7-115. White-Noise Harness

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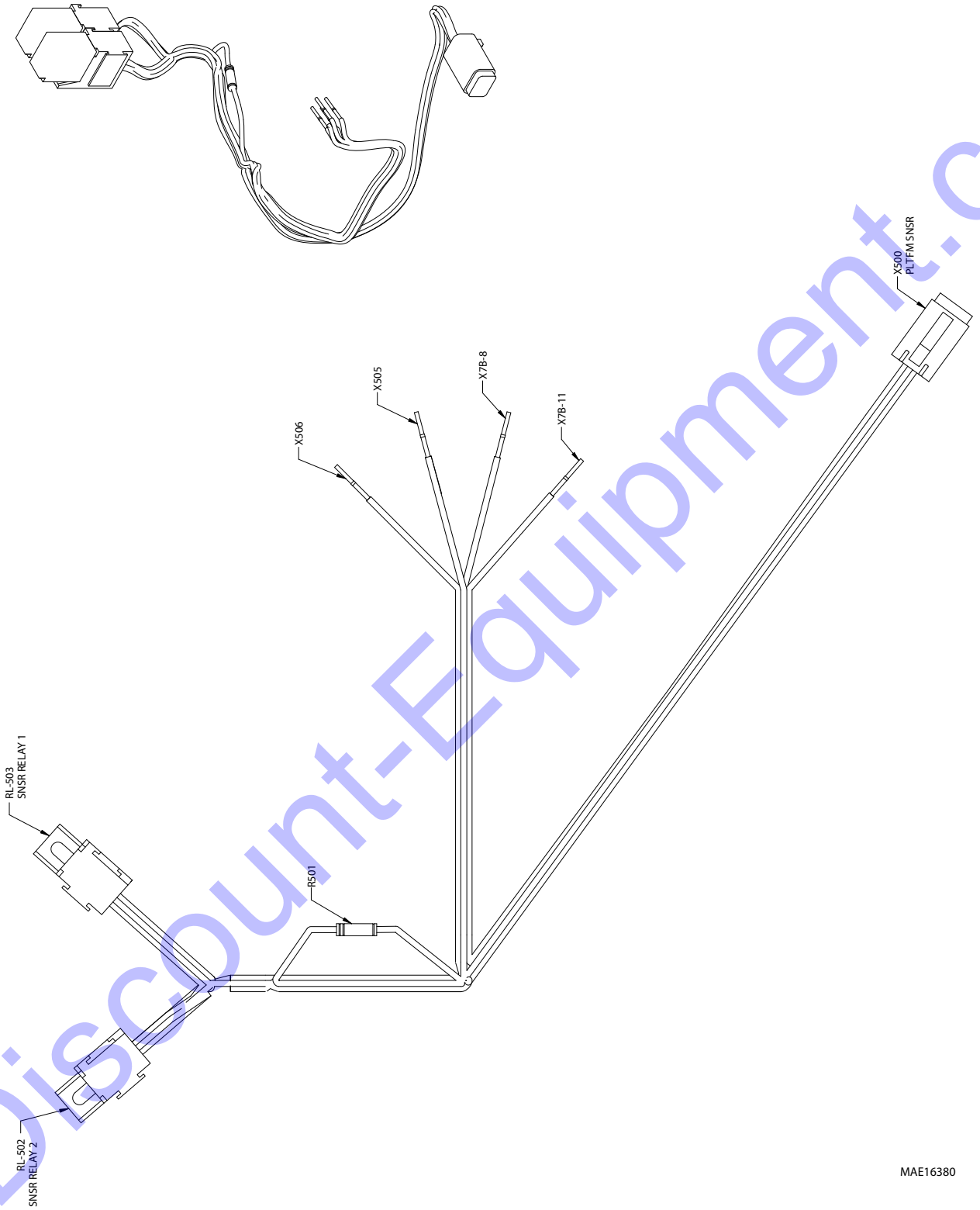

Figure 7-116. SkyGuard Harness - Sheet 1 of 2

X506							
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	SEAL P/N	TO
1	WHT	P1	18 AWG	GXL			RL-503 (87)

X505							
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	SEAL P/N	TO
1	WHT	P2	18 AWG	GXL			R501 (1)
1	WHT	P9	18 AWG	GXL			RL-503 (30)

X7B-8							
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	SEAL P/N	TO
1	WHT	P6	18 AWG	GXL			X500 (2)

X7B-11							
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	SEAL P/N	TO
1	WHT	P3	18 AWG	GXL			RL-502 (87)

X500 - PLTFM SNSR							
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	SEAL P/N	TO
1	WHT	P10	18 AWG	GXL	4460465		R501 (2)
2	WHT	P6	18 AWG	GXL	4460465		X7B-8 (1)
3	WHT	P4	18 AWG	GXL	4460465		RL-502 (86)
4	WHT	P5	18 AWG	GXL	4460465		RL-502 (85)

RL-502 - SNSR RELAY 2							
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	SEAL P/N	TO
30	WHT	P9-1	18 AWG	GXL	1001116720		RL-503 (30)
85	WHT	P5	18 AWG	GXL	1001116720		X500 (4)
85	WHT	P5-1	18 AWG	GXL	1001116720		RL-503 (85)
86	WHT	P4	18 AWG	GXL	1001116720		X500 (3)
86	WHT	P4-1	18 AWG	GXL	1001116720		RL-503 (86)
87	WHT	P3	18 AWG	GXL	1001116720		X7B-11 (1)
87a							

RL-503 - SNSR RELAY 1							
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	SEAL P/N	TO
30	WHT	P9	18 AWG	GXL	1001116720		X505 (1)
30	WHT	P9-1	18 AWG	GXL	1001116720		RL-502 (30)
85	WHT	P5-1	18 AWG	GXL	1001116720		RL-502 (85)
86	WHT	P4-1	18 AWG	GXL	1001116720		RL-502 (86)
87	WHT	P1	18 AWG	GXL	1001116720		X506 (1)
87a							

R501							
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TERMINAL P/N	SEAL P/N	TO
1	WHT	P2	18 AWG	GXL	N/A		X505 (1)
2	WHT	P10	18 AWG	GXL	N/A		X500 (1)

MAE16390

Figure 7-117. SkyGuard Harness - Sheet 2 of 2

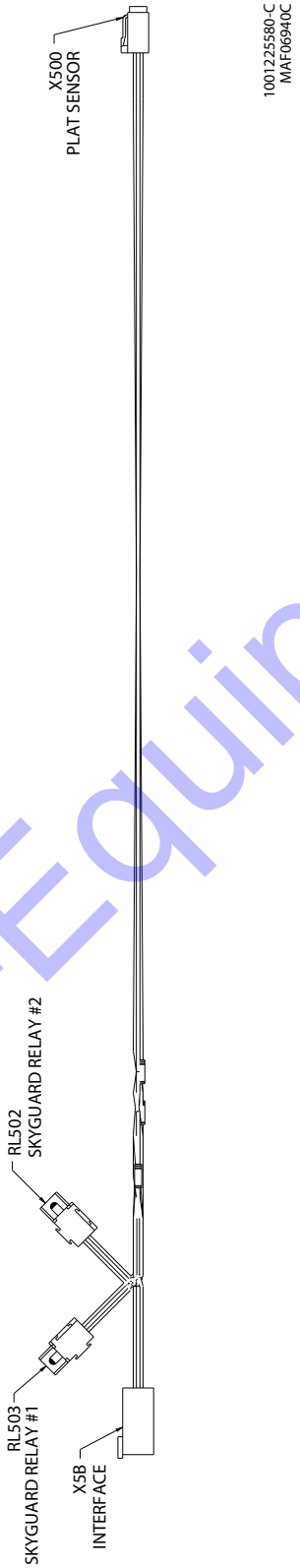

Figure 7-118. Generator to Platform Interface Harness - Sheet 1 of 3

X5B - INTERFACE					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	P2	18 AWG	GXL	IP114 (1)
2	WHT	P6	18 AWG	GXL	X500 (2)
3					
4	WHT	P1	18 AWG	GXL	RL503 (87)
5	WHT	P3	18 AWG	GXL	RL502 (87)
6					

RL503 - SKYGUARD RELAY #1					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
30	WHT	P9-1	18 AWG	GXL	IP114 (1)
85	WHT	P5-1	18 AWG	GXL	S191 (1)
86	WHT	P4-1	18 AWG	GXL	S192 (1)
87	WHT	P1	18 AWG	GXL	X5B (4)
87A					

RL502 - SKYGUARD RELAY #2					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
30	WHT	P9-2	18 AWG	GXL	IP114 (1)
85	WHT	P5-2	18 AWG	GXL	S191 (1)
86	WHT	P4-2	18 AWG	GXL	S192 (1)
87	WHT	P3	18 AWG	GXL	X5B (5)
87a					

X500 - PLAT SENSOR					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	P10	18 AWG	GXL	IP114 (2)
2	WHT	P6	18 AWG	GXL	X5B (2)
3	WHT	P4	18 AWG	GXL	S192 (2)
4	WHT	P5	18 AWG	GXL	S191 (2)

1001225580-C
MAF06950C

Figure 7-119. Generator to Platform Interface Harness - Sheet 2 of 3

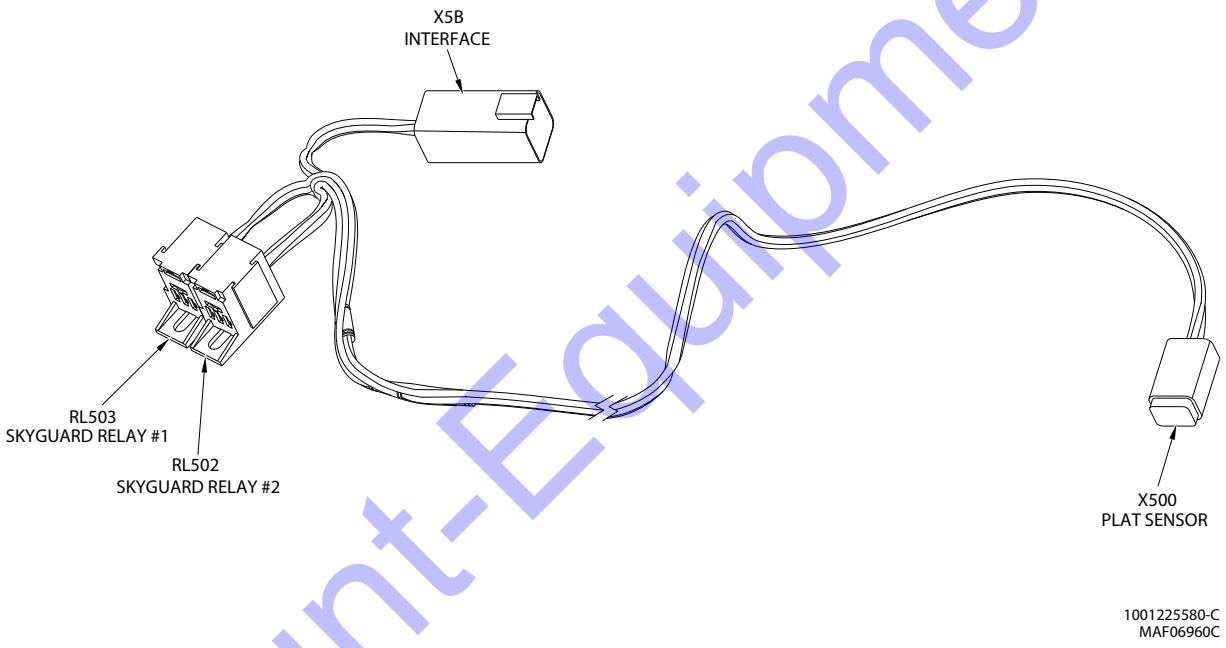

Figure 7-120. Generator to Platform Interface Harness - Sheet 3 of 3

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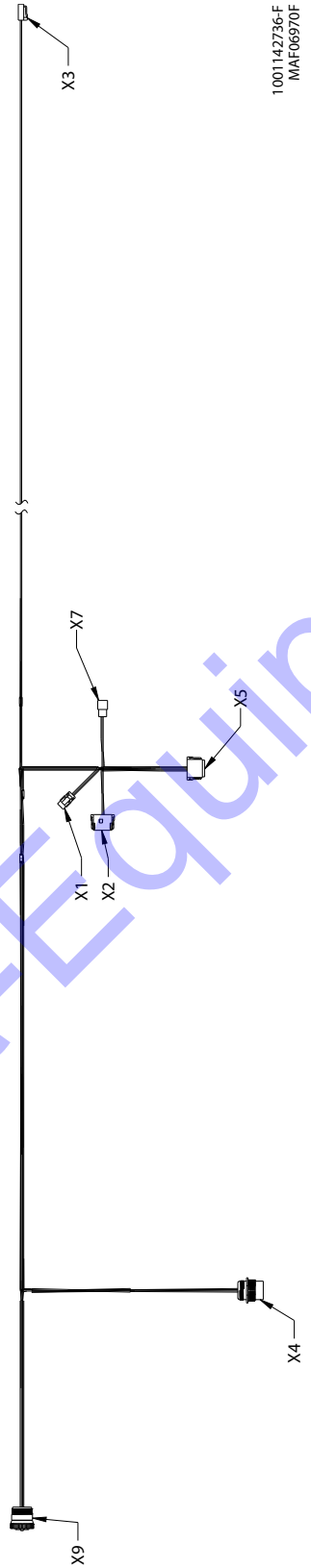

Figure 7-121. Alert Beacon Option Harness - Sheet 1 of 3

X9					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
A	BLK	GROUND	18 AWG	GXL	S2 (2)
B	RED	BATTERY	18 AWG	GXL	X4 (B)
C	YEL	CAN HIGH	18 AWG	J1939 CABLE	X5 (12)
D	GRN	CAN LOW	18 AWG	J1939 CABLE	X5 (10)
E	SHLD	CAN SHIELD	18 AWG	J1939 CABLE	X5 (8)
F					
G					
H	WHT	IGNITION	18 AWG	GXL	S3 (2)
J					

X4					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
A	BLK	GROUND	18 AWG	GXL	S2 (2)
B	RED	BATTERY	18 AWG	GXL	X9 (B)
C	YEL	CAN HIGH	18 AWG	J1939 CABLE	X5 (2)
D	GRN	CAN LOW	18 AWG	J1939 CABLE	X5 (4)
E	SHLD	CAN SHIELD	18 AWG	J1939 CABLE	X5 (6)
F					
G					
H	WHT	IGNITION	18 AWG	GXL	S3 (2)
J					

X1					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	WHT	IGNITION	18 AWG	GXL	S3 (1)
2	BLK	GROUND	18 AWG	GXL	S1 (2)
3					
4					
5					
6					
7	RED	BEACON PWR	18 AWG	GXL	X3 (1)
8					
9					
10					
11					
12					

X2					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1					
2					
3					
4					
5					
6					
7					
8					
9	YEL	CAN HIGH	18 AWG	J1939 CABLE	X5 (1)
10	GRN	CAN LOW	18 AWG	J1939 CABLE	X5 (3)
11	SHLD	CAN SHIELD	18 AWG	J1939 CABLE	X5 (5)
12					

X7					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
A	YEL	CAN HIGH	18 AWG	J1939 CABLE	X5 (11)
B	GRN	CAN LOW	18 AWG	J1939 CABLE	X5 (9)
C	SHLD	CAN SHIELD	18 AWG	J1939 CABLE	X5 (7)

X5					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	YEL	CAN HIGH	18 AWG	J1939 CABLE	X2 (9)
2	YEL	CAN HIGH	18 AWG	J1939 CABLE	X4 (C)
3	GRN	CAN LOW	18 AWG	J1939 CABLE	X2 (10)
4	GRN	CAN LOW	18 AWG	J1939 CABLE	X4 (D)
5	SHLD	CAN SHIELD	18 AWG	J1939 CABLE	X2 (11)
6	SHLD	CAN SHIELD	18 AWG	J1939 CABLE	X4 (E)
7	SHLD	CAN SHIELD	18 AWG	J1939 CABLE	X7 (C)
8	SHLD	CAN SHIELD	18 AWG	J1939 CABLE	X9 (E)
9	GRN	CAN LOW	18 AWG	J1939 CABLE	X7 (B)
10	GRN	CAN LOW	18 AWG	J1939 CABLE	X9 (D)
11	YEL	CAN HIGH	18 AWG	J1939 CABLE	X7 (A)
12	YEL	CAN HIGH	18 AWG	J1939 CABLE	X9 (C)

X3					
CONN POS	WIRE COLOR	WIRE LABEL	GAUGE	JACKET	TO
1	RED	BEACON PWR	18 AWG	GXL	X1 (7)
2	BLK	GROUND	18 AWG	GXL	S1 (1)

1001142736-F
MAF06980F

Figure 7-122. Alert Beacon Option Harness - Sheet 2 of 3

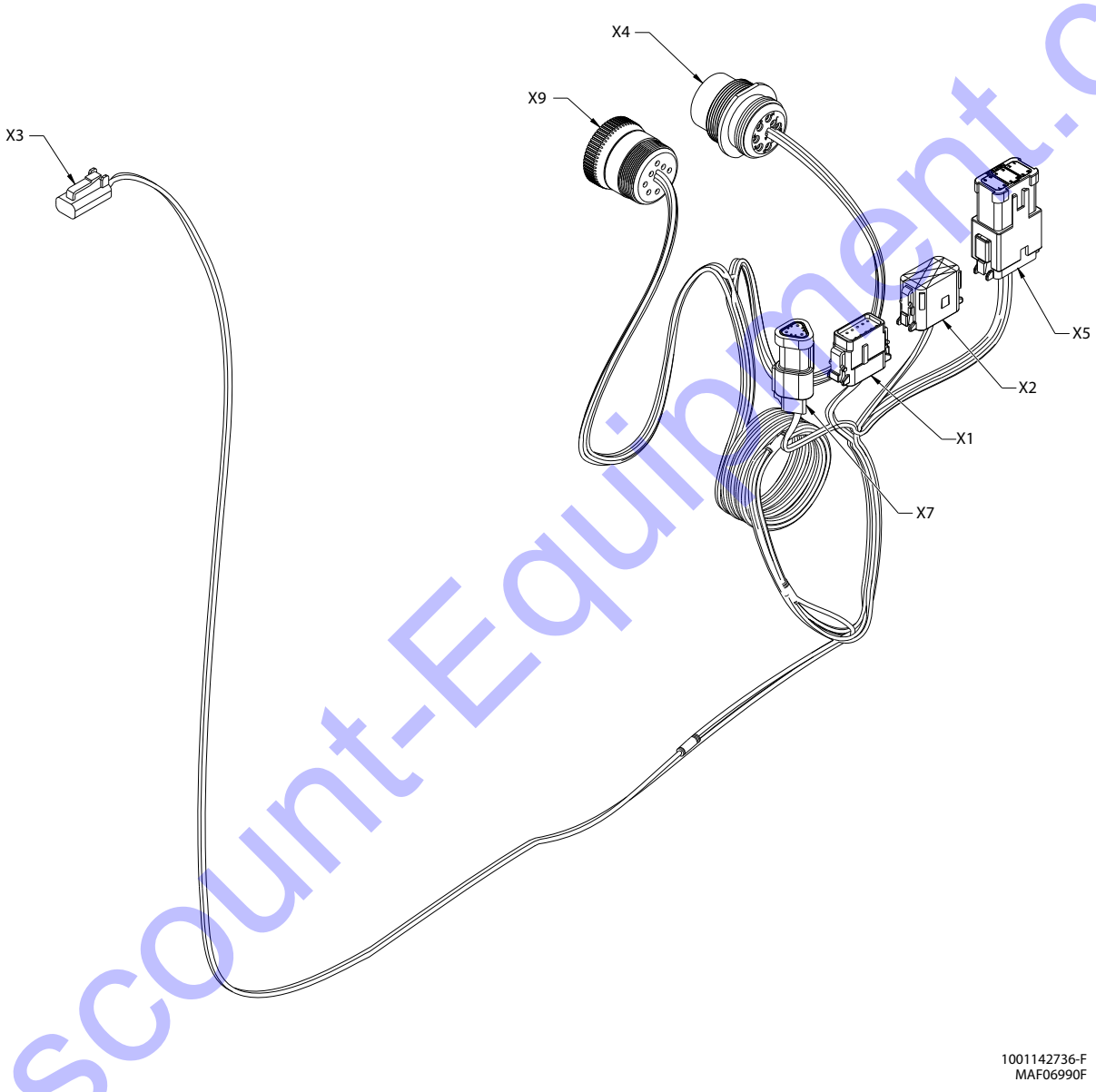

Figure 7-123. Alert Beacon Option Harness - Sheet 3 of 3

SHEET 2: PLATFORM CONSOLE

CONSOLE BOX HARNESS

SHEET 3: PLATFORM AND BOOM COMPONENTS

PLATFORM TO BOOM HARNESS
L.S.S HARNESS
LOWER BOOM HARNESS

SHEET 4: CHASSIS, TURN-TABLE, AND UGM

MAIN VALVE HARNESS
TURN-TABLE HARNESS

SHEET 5: GROUND USER INTERFACE, FUNCTION PUMP & MOTORS, CRIBBING

GROUND PANEL HARNESS
CRIBBING HARNESS

SHEET 6: GENSET AND CHARGER

ENGINE HARNESS
GENERATOR HARNESS
CHARGER HARNESS

SHEET 7: TRACTION SYSTEM

TRACTION SYSTEM HARNESS

SHEET 8: T/T HARNESS, ASSISTANT BATTERY, SECURITY LOCK, CLEAR SKY

TURN-TABLE HARNESS
CLEAR SKY HARNESS
SECURITY LOCK HARNESS
INVERTER HARNESS

SHEET 9: LIGHTING, INVERTER, COLD WEATHER PACKAGE

HEAD/TAIL LIGHT HARNESS
CHASSIS WORK LIGHT HARNESS
PLATFORM WORK LIGHT HARNESS
WHITE NOISE HARNESS
INVERTER CABLE NEG 1001173071, INVERTER CABLE BAT POS
INVERTER CABLE CONTATACTOR POS

SHEET 10: SKYGUARD (NON CE)

SKYGUARD HARNESS W/ BEACON
SKYGUARD HARNESS W/O BEACON
HARNESS,GEN 2 PLAT INTERFACE
HARNESS,ALERT BEACON OPTION

SHEET 11: SKYGUARD (CE)

CONSOLE BOX HARNESS

1001156395-K
MAE14830K

Figure 7-124. Electrical Schematic - Sheet 1 of 21

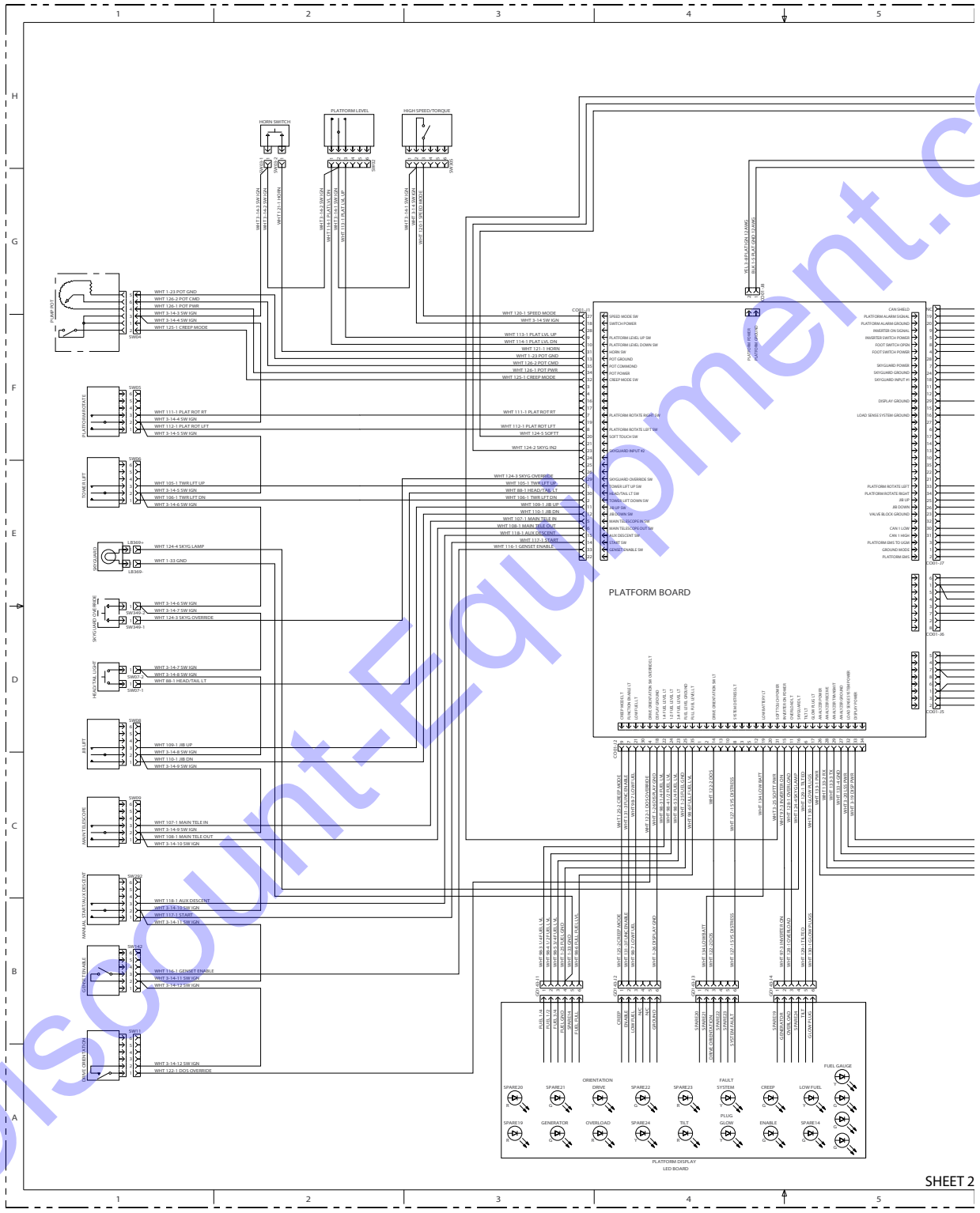

Figure 7-125. Electrical Schematic - Sheet 2 of 21

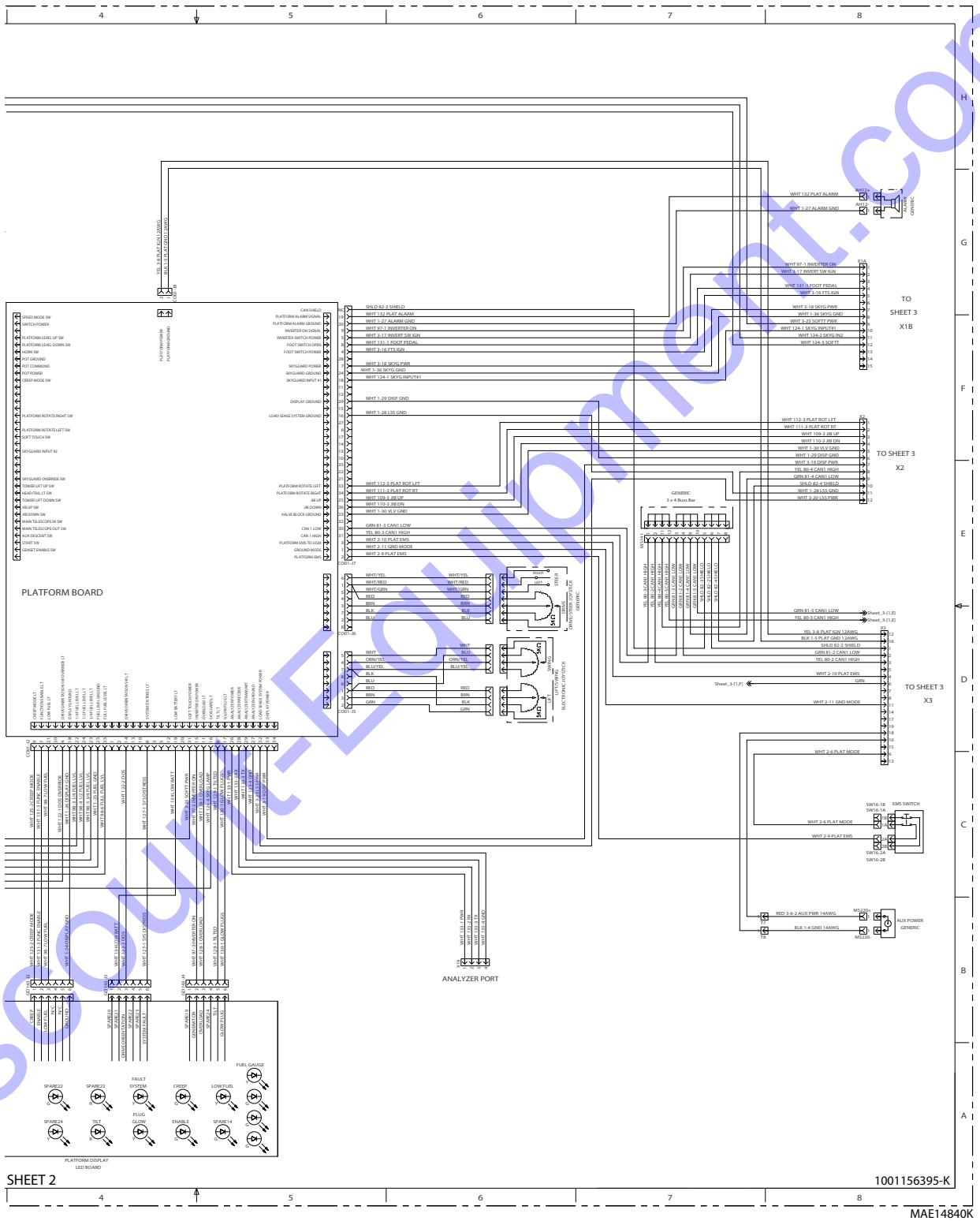

Figure 7-126. Electrical Schematic - Sheet 3 of 21

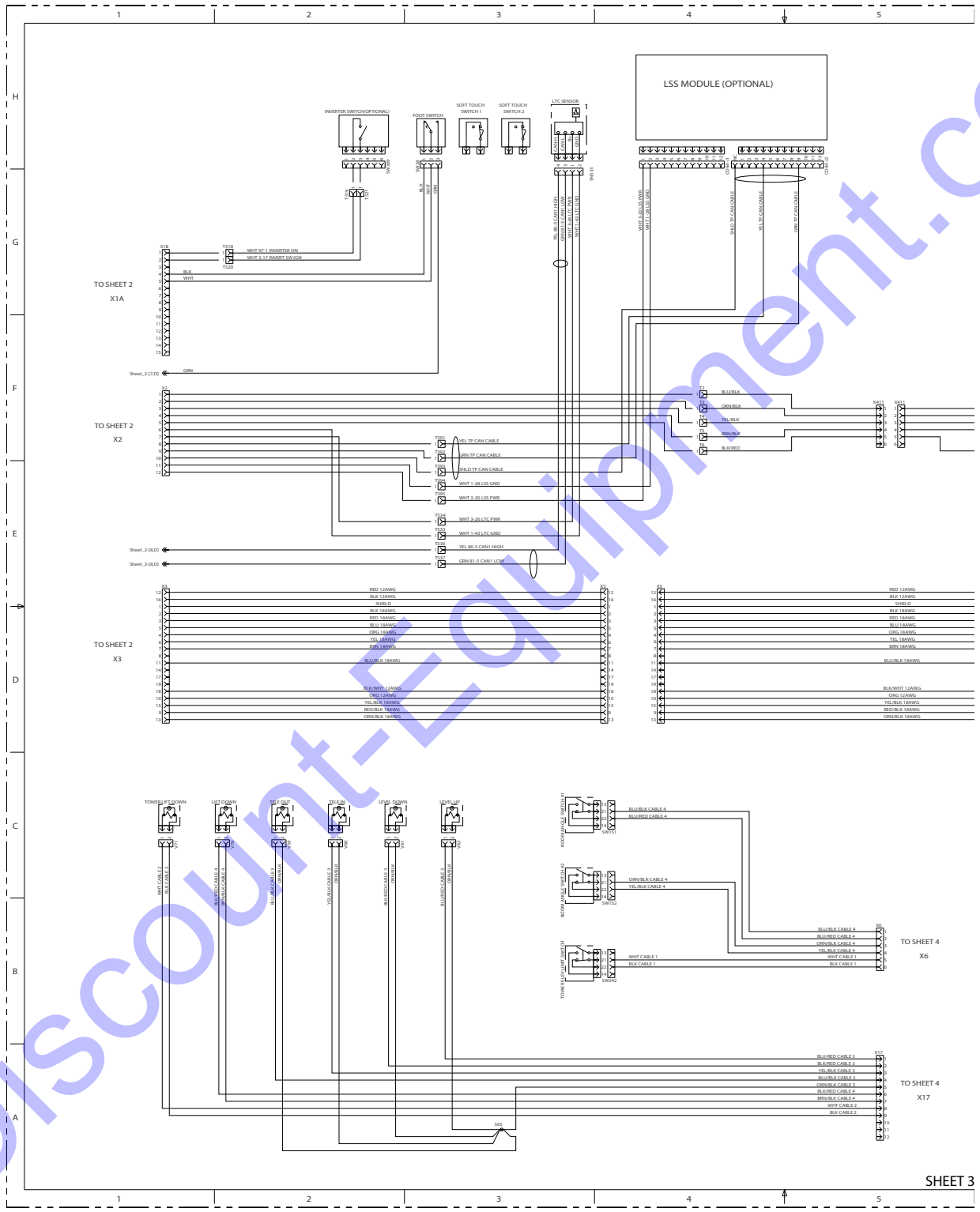

Figure 7-127. Electrical Schematic - Sheet 4 of 21

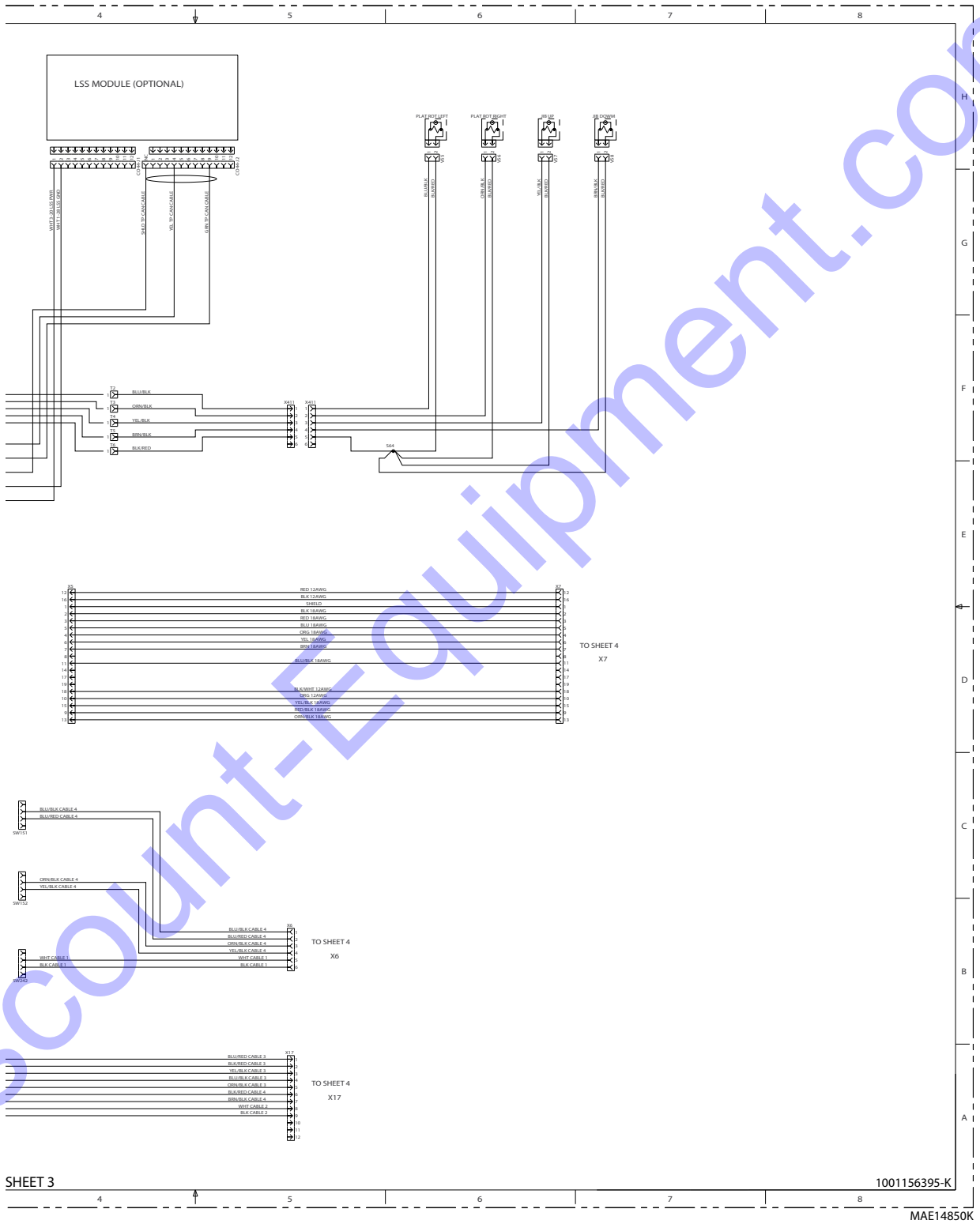

Figure 7-128. Electrical Schematic - Sheet 5 of 21

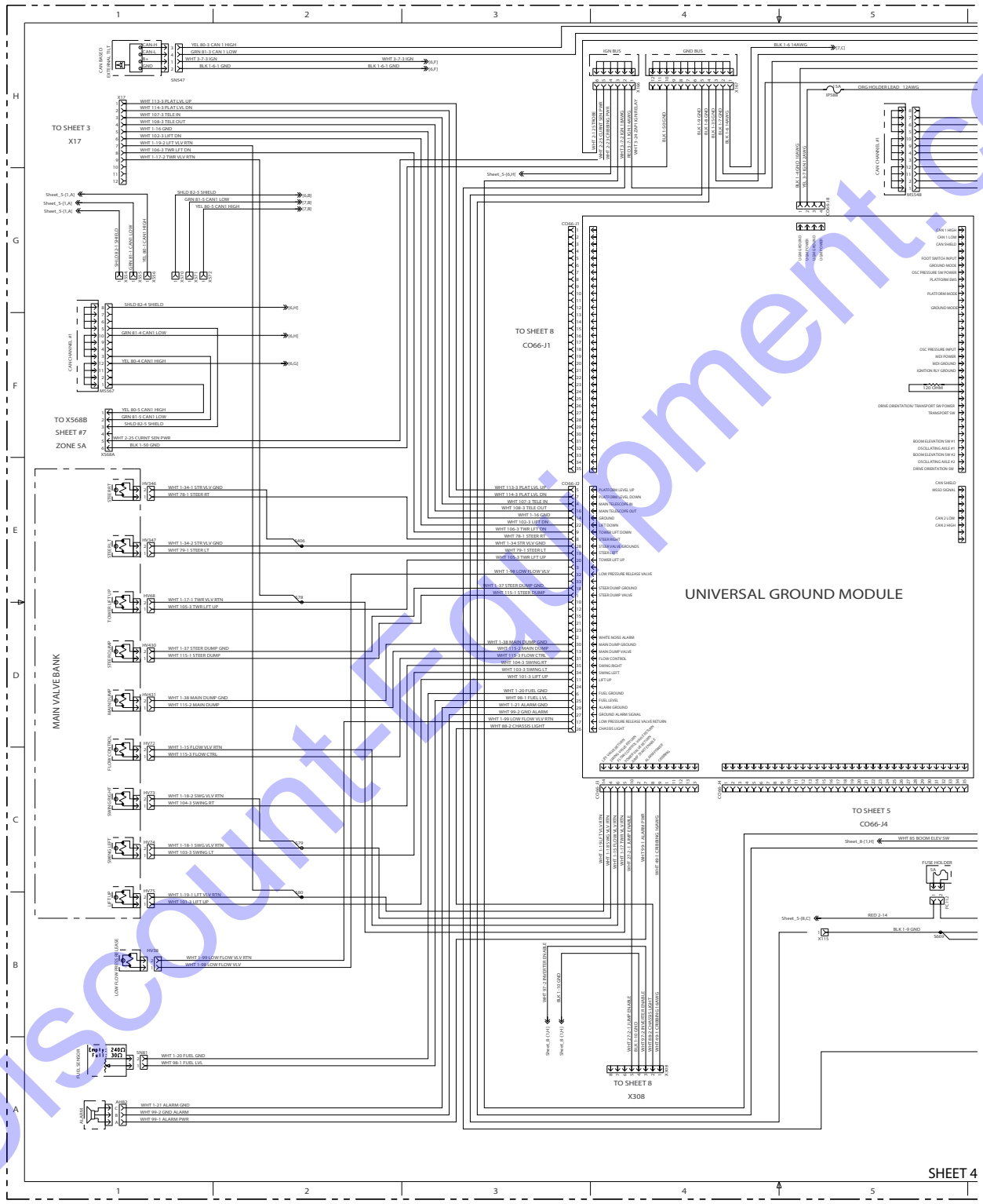

Figure 7-129. Electrical Schematic - Sheet 6 of 21

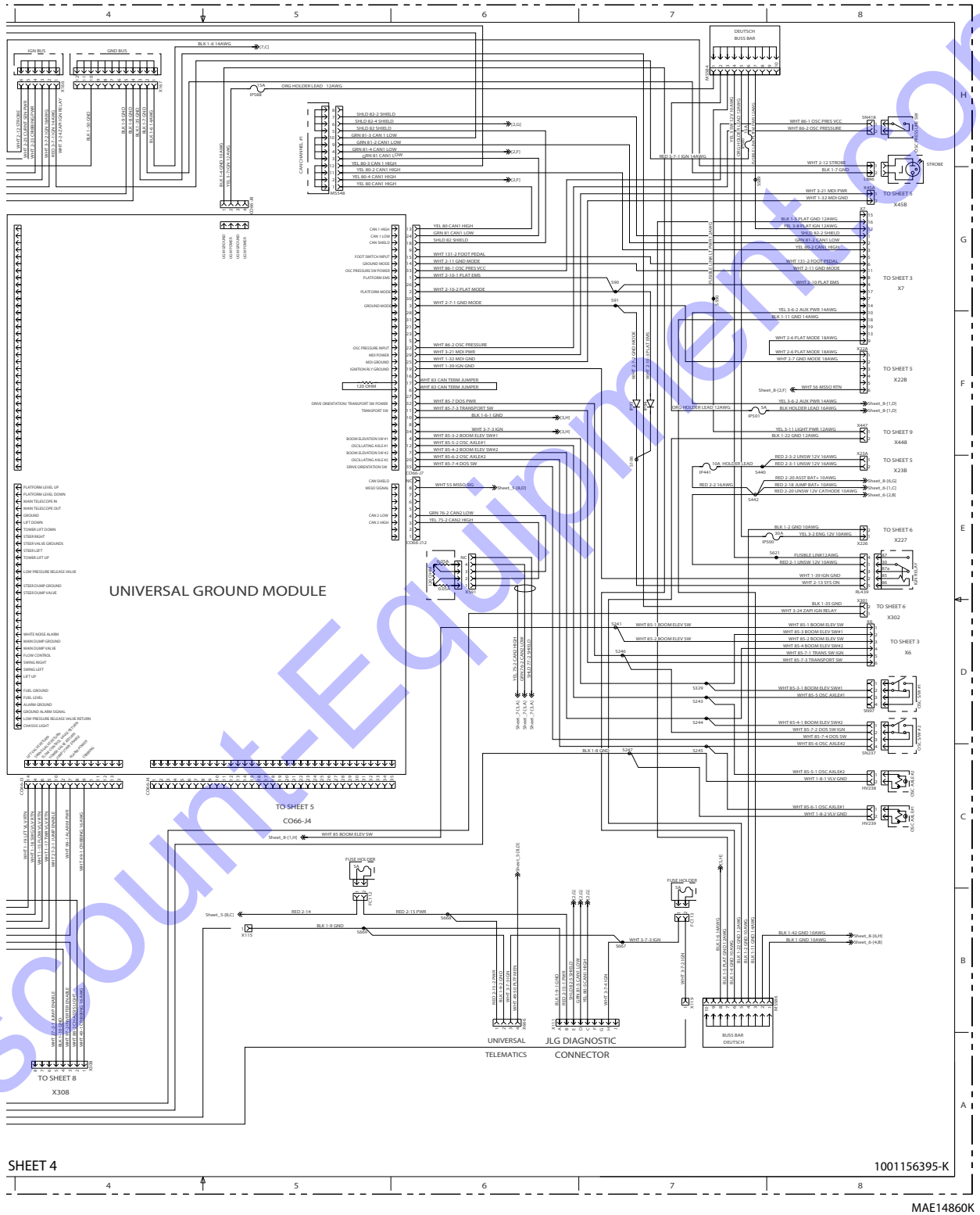

Figure 7-130. Electrical Schematic - Sheet 7 of 21

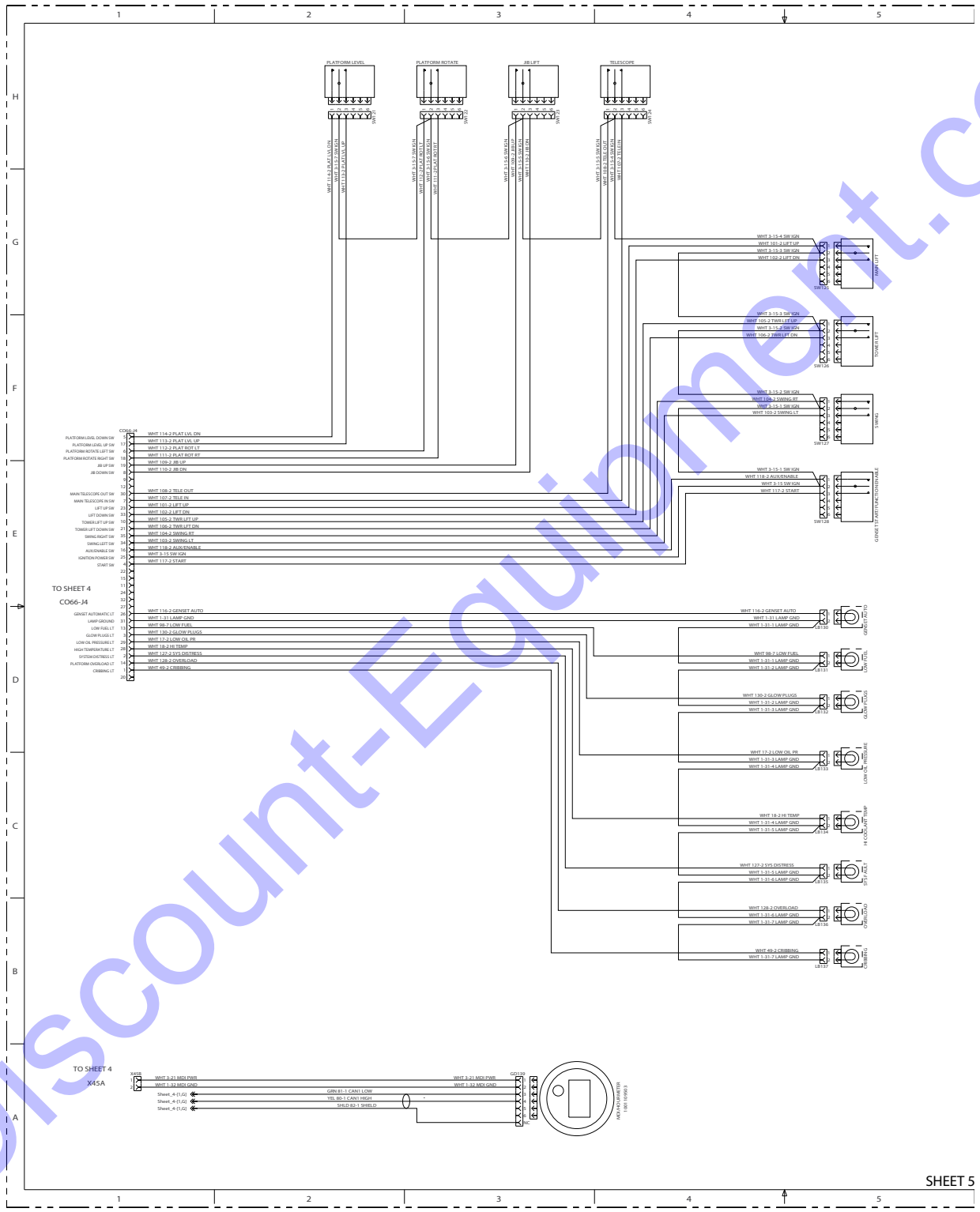

Figure 7-131. Electrical Schematic - Sheet 8 of 21

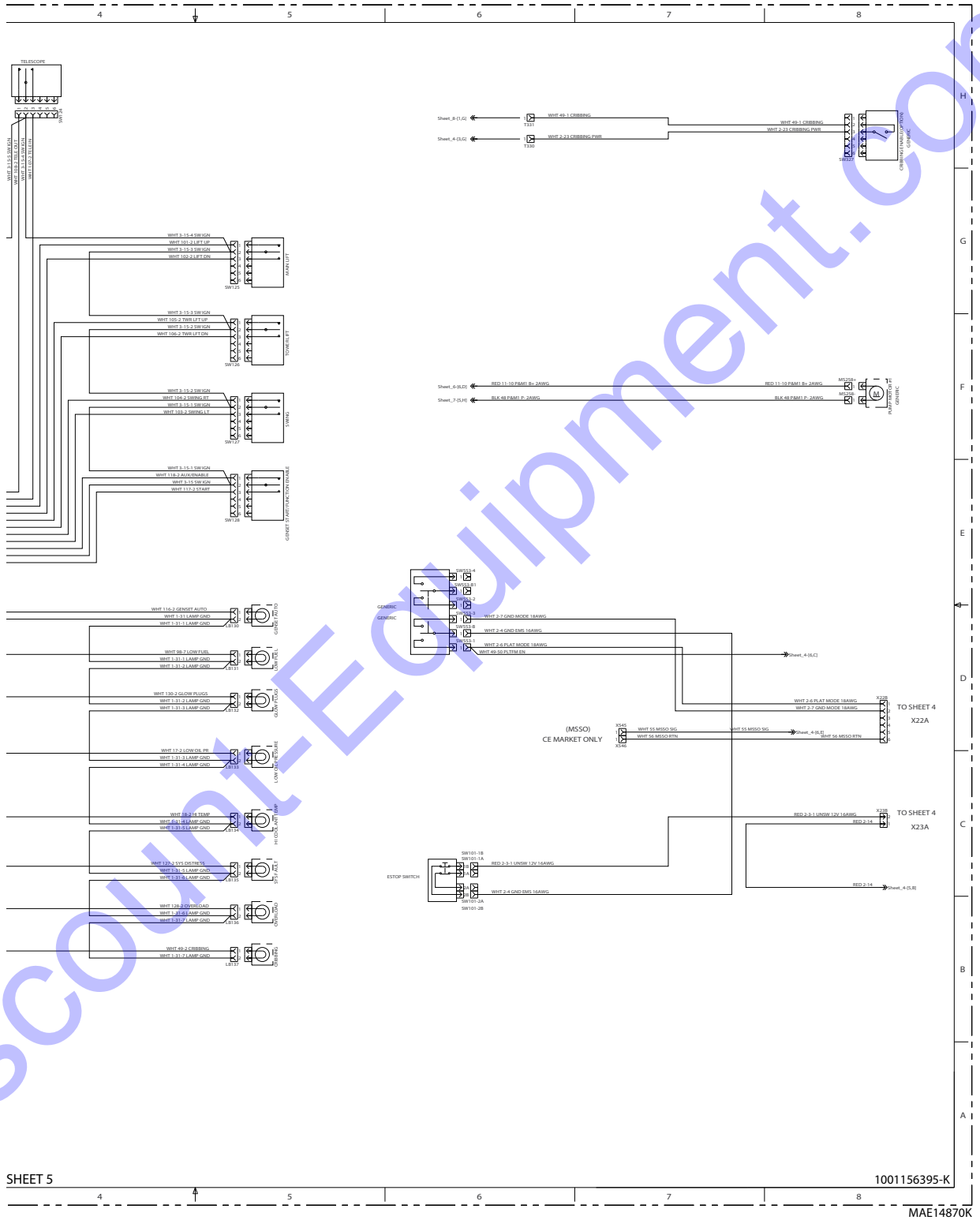

Figure 7-132. Electrical Schematic - Sheet 9 of 21

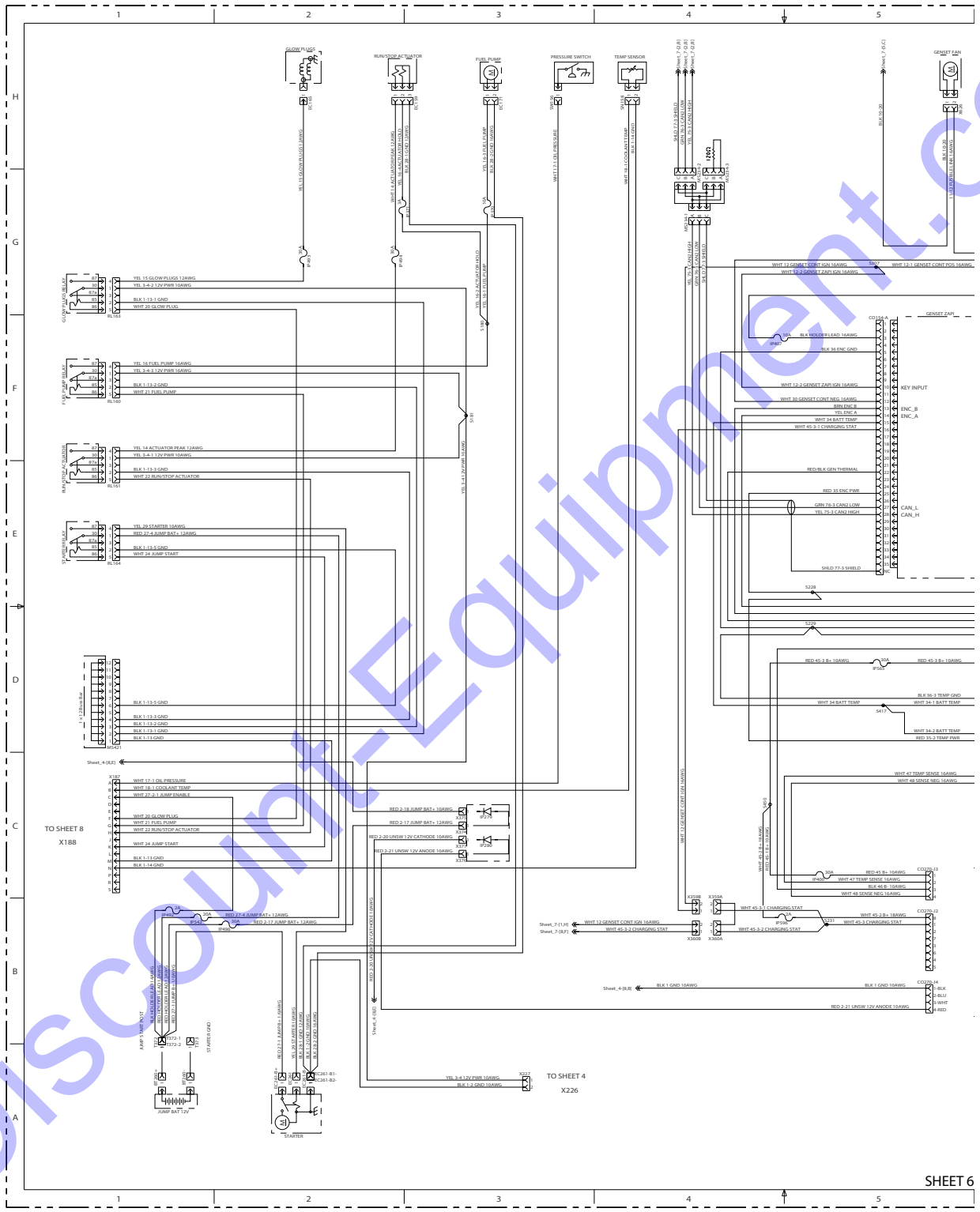

Figure 7-133. Electrical Schematic - Sheet 10 of 21

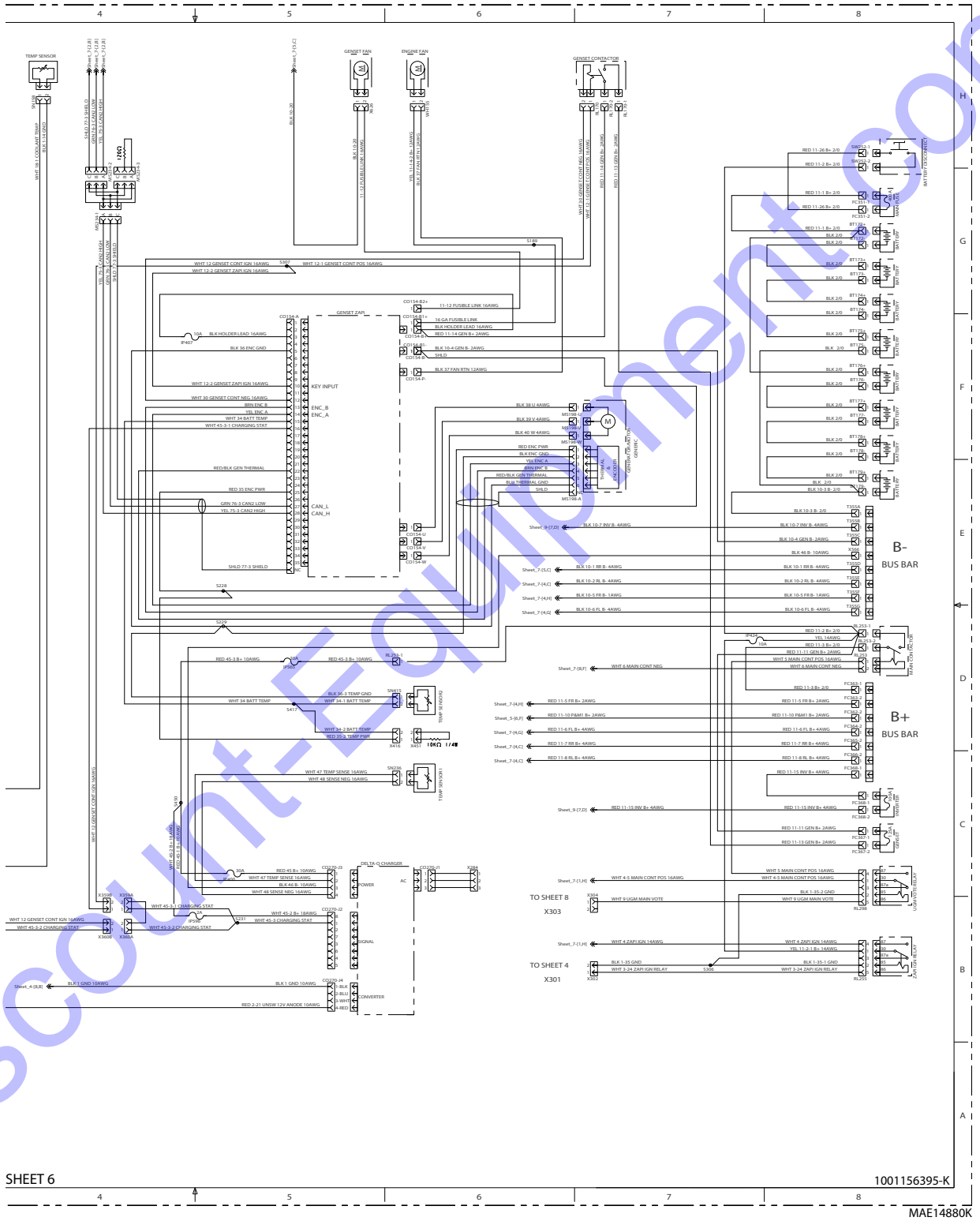

Figure 7-134. Electrical Schematic - Sheet 11 of 21

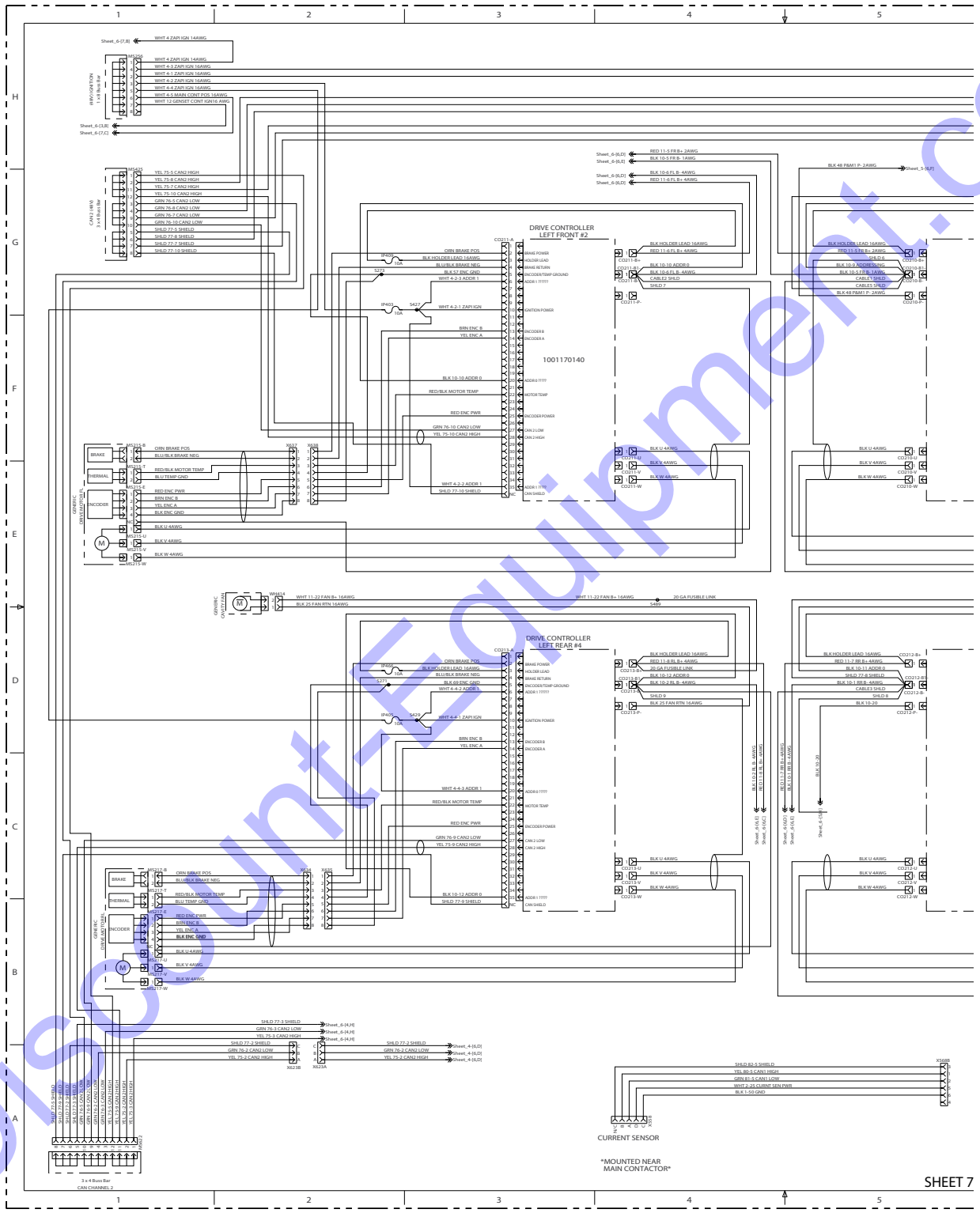

Figure 7-135. Electrical Schematic - Sheet 12 of 21

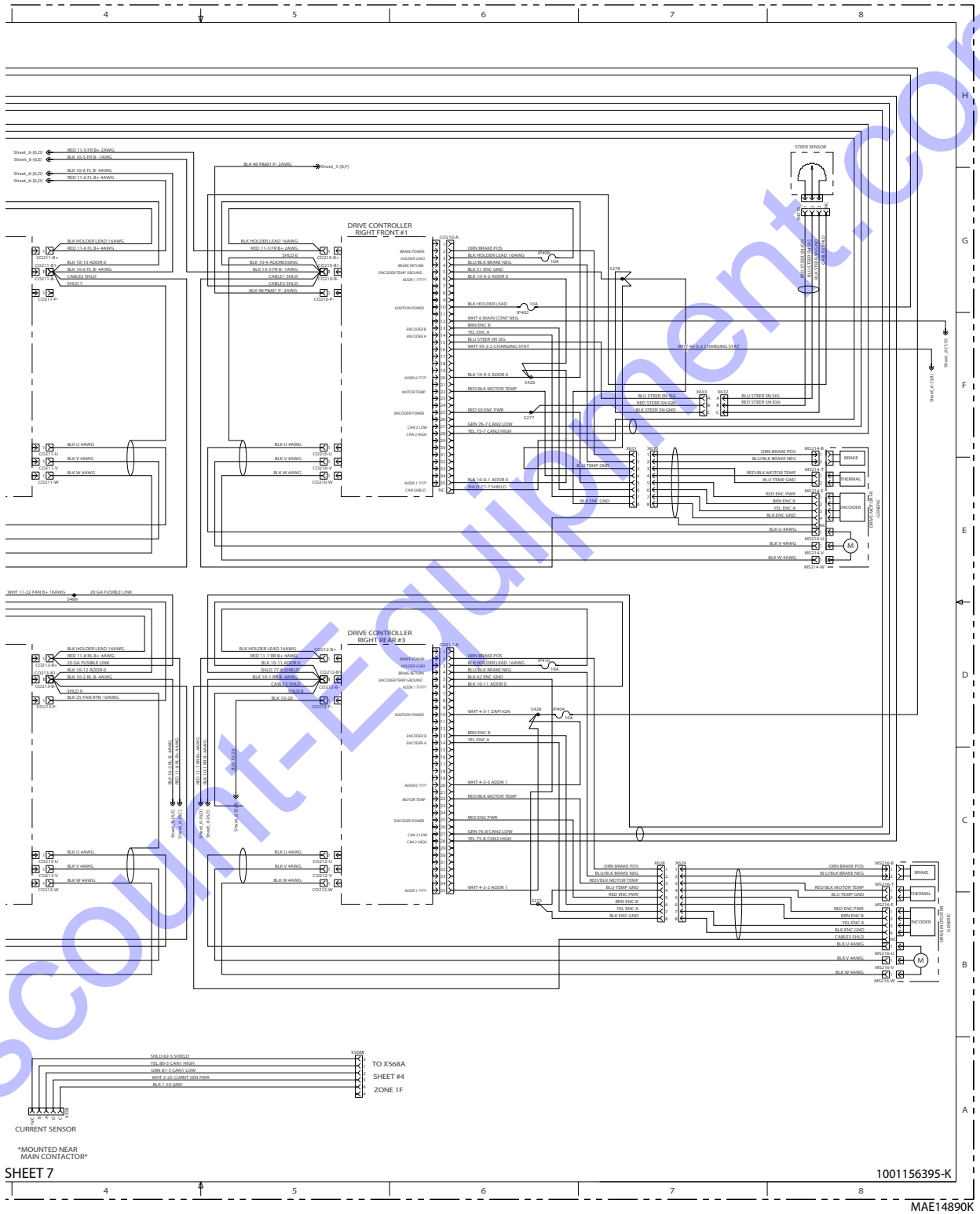

Figure 7-136. Electrical Schematic - Sheet 13 of 21

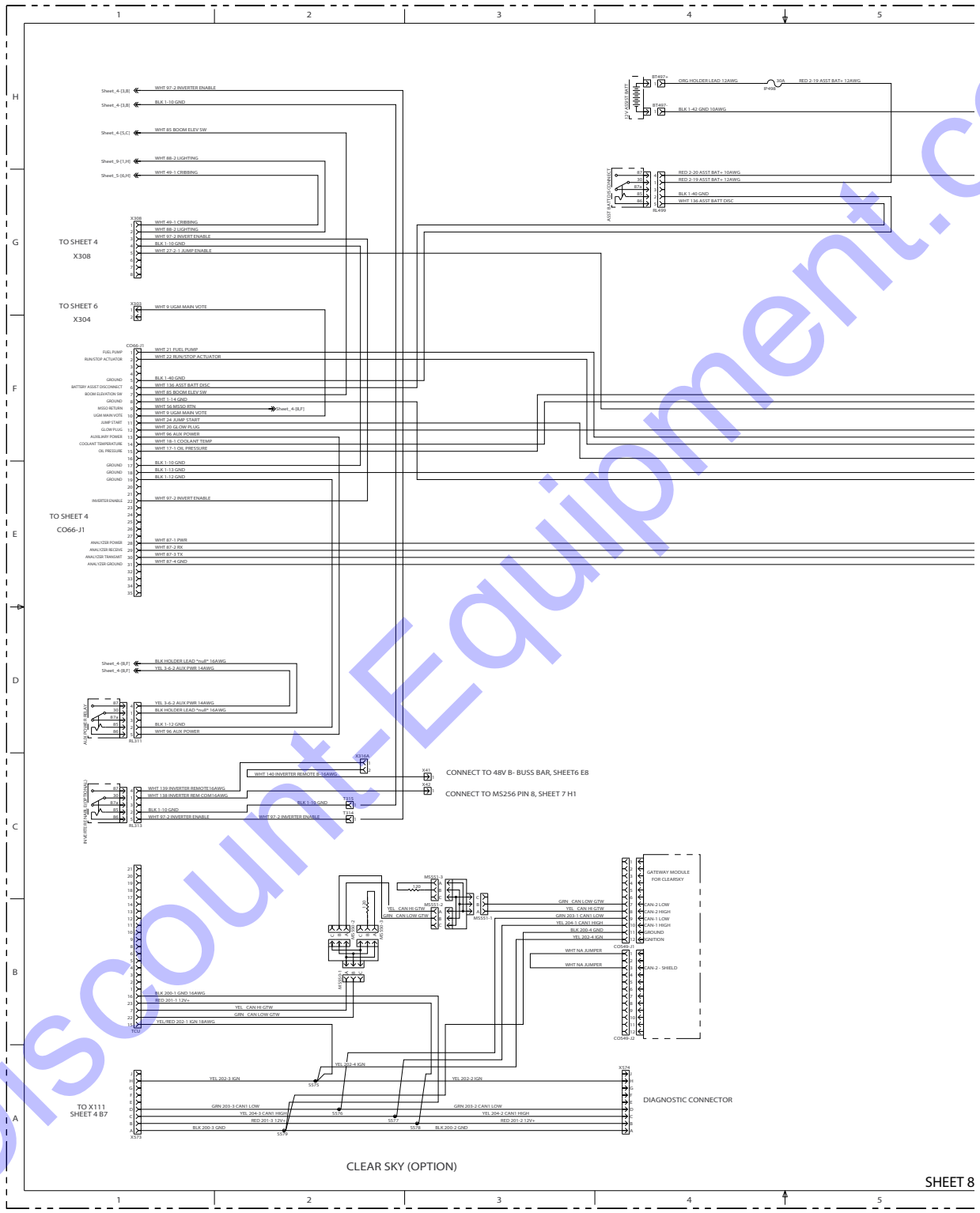

Figure 7-137. Electrical Schematic - Sheet 14 of 21

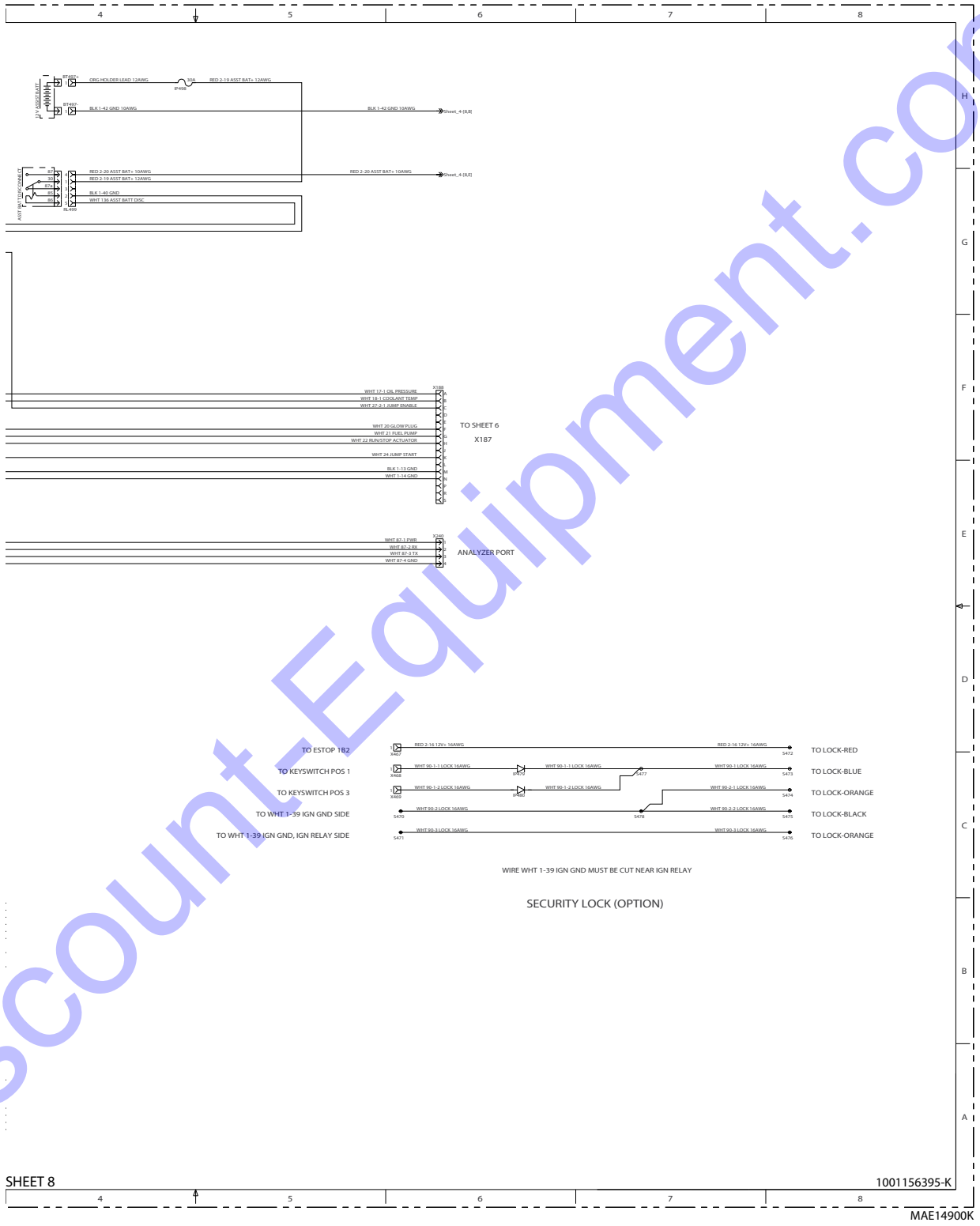

Figure 7-138. Electrical Schematic - Sheet 15 of 21

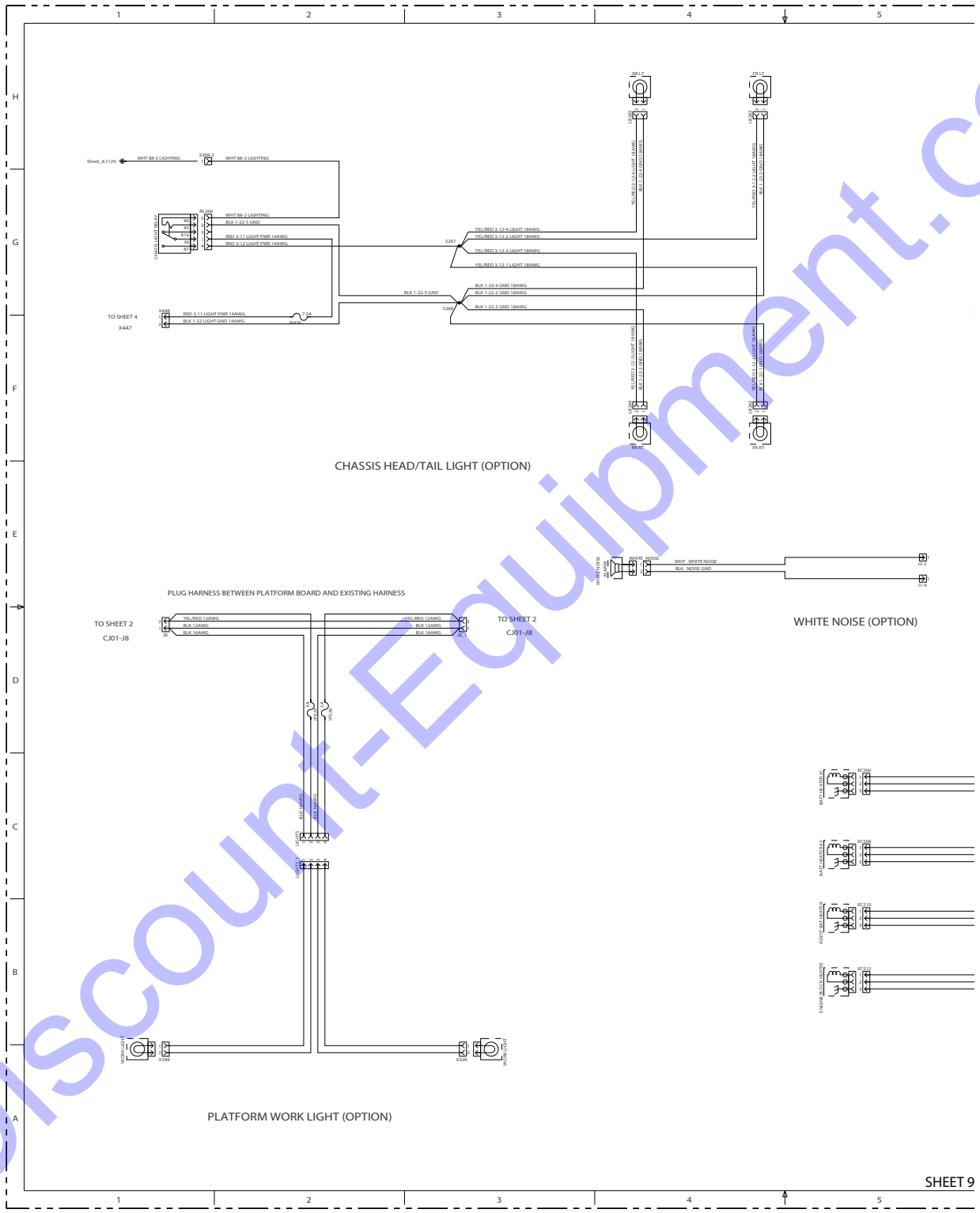

Figure 7-139. Electrical Schematic - Sheet 16 of 21

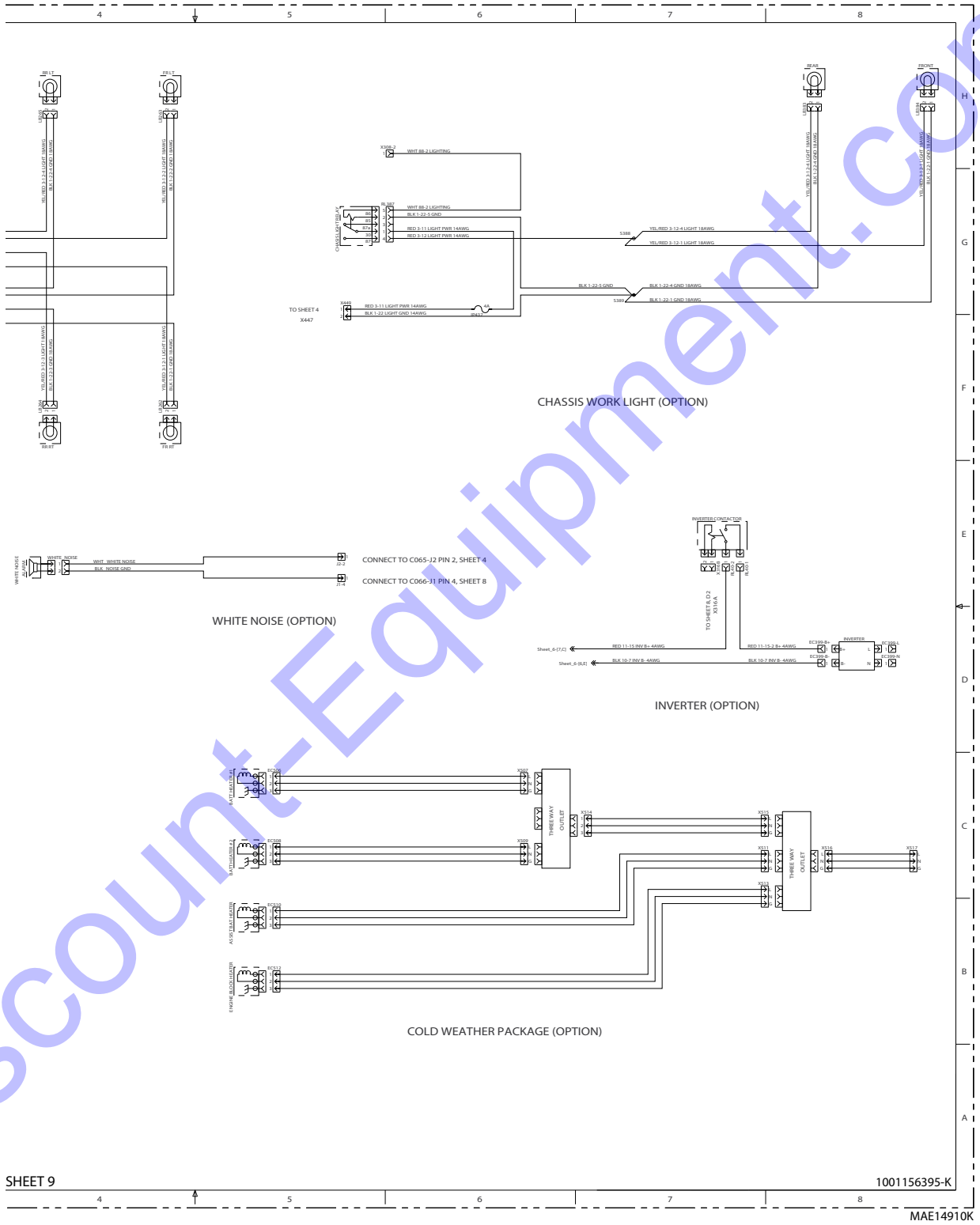

Figure 7-140. Electrical Schematic - Sheet 17 of 21

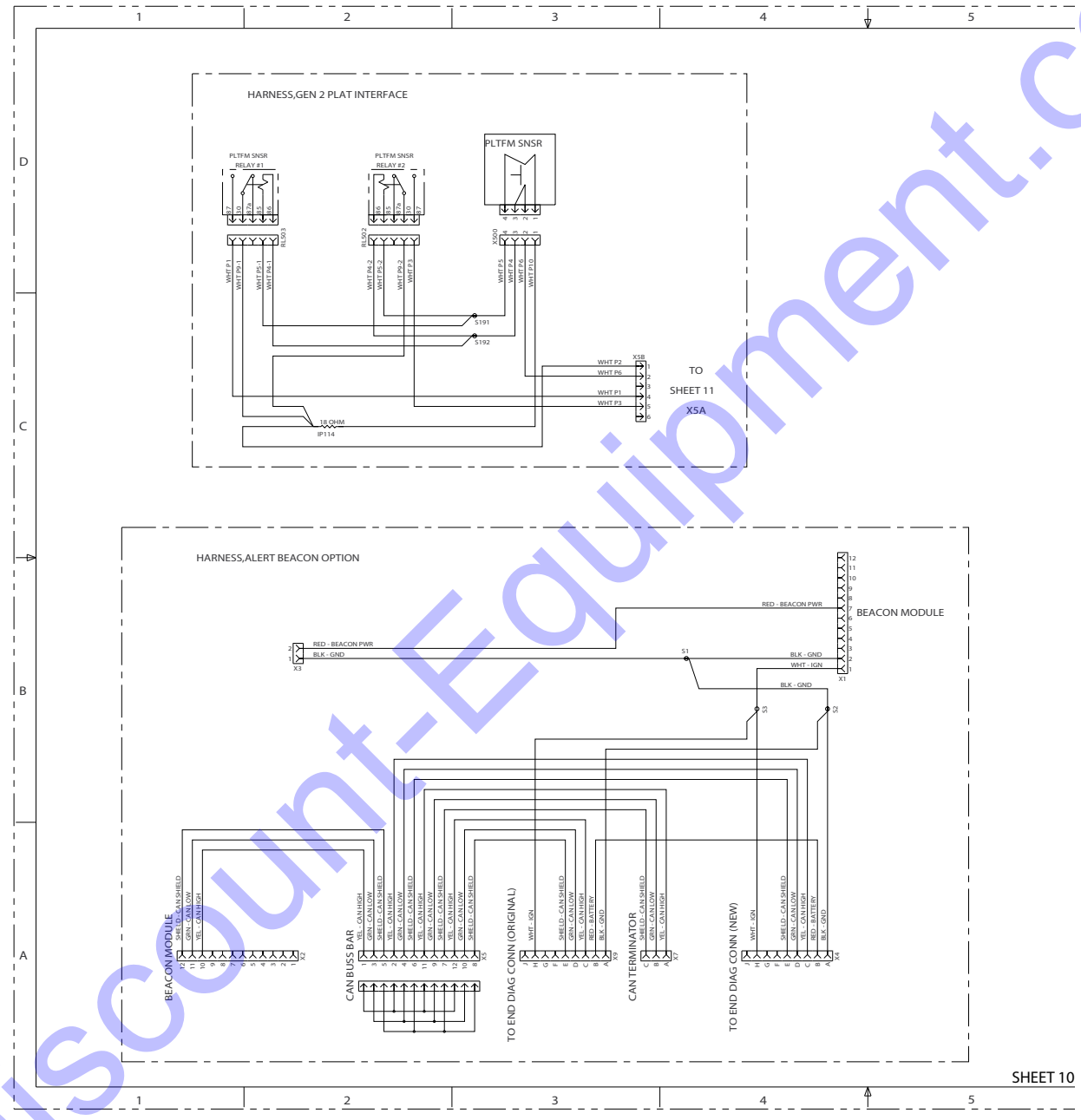

Figure 7-141. Electrical Schematic - Sheet 18 of 21

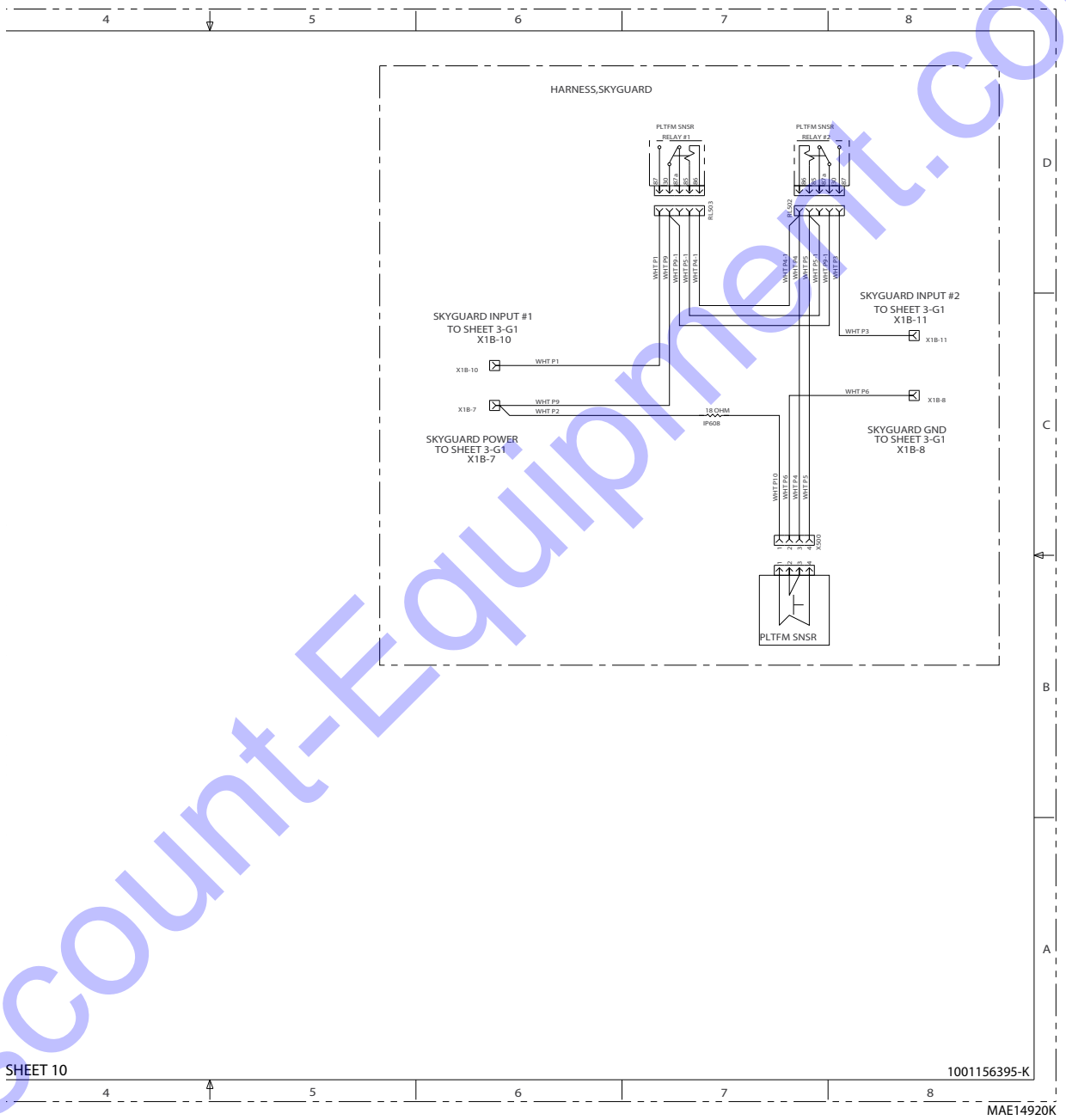

Figure 7-142. Electrical Schematic - Sheet 19 of 21

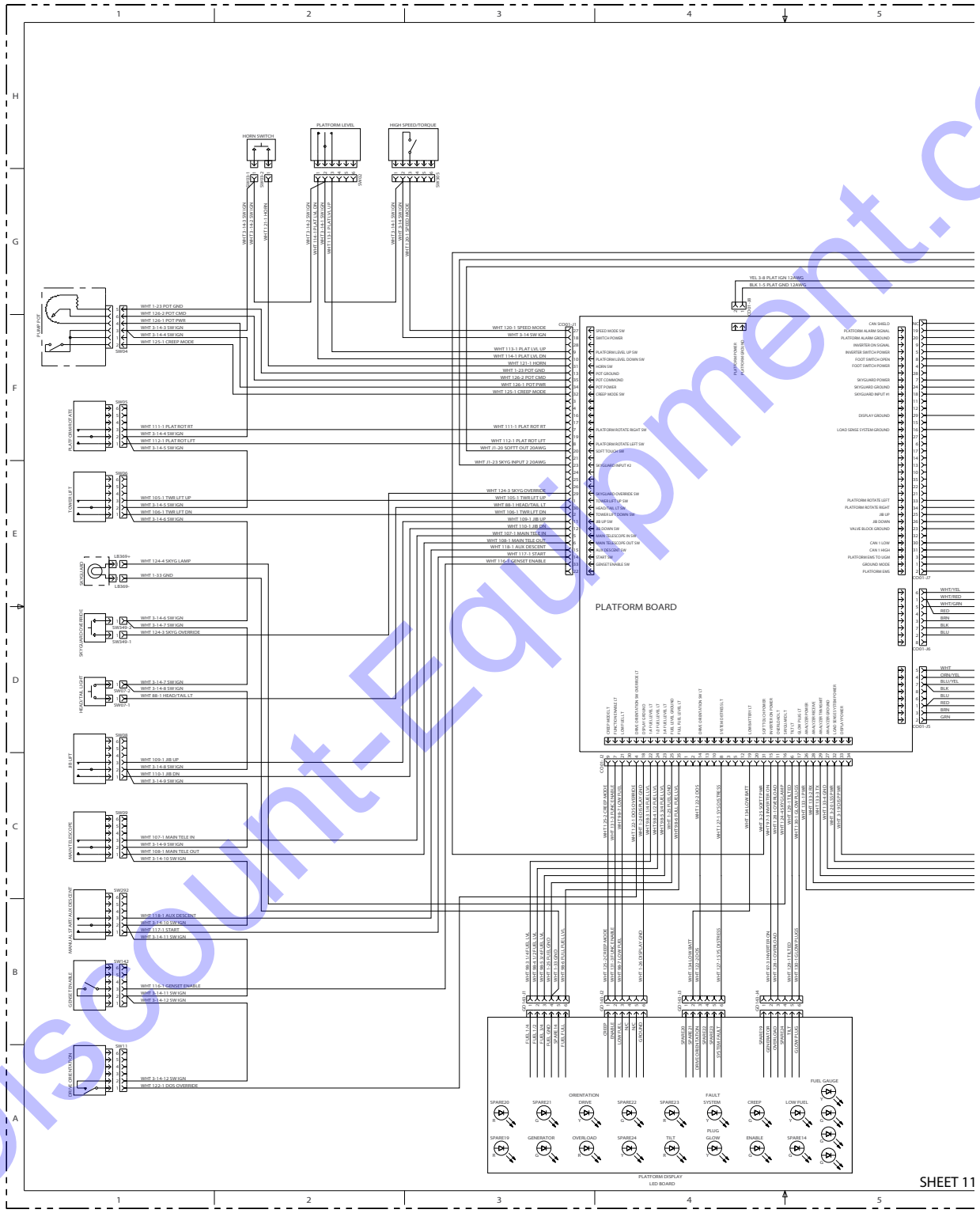

Figure 7-143. Electrical Schematic - Sheet 20 of 21

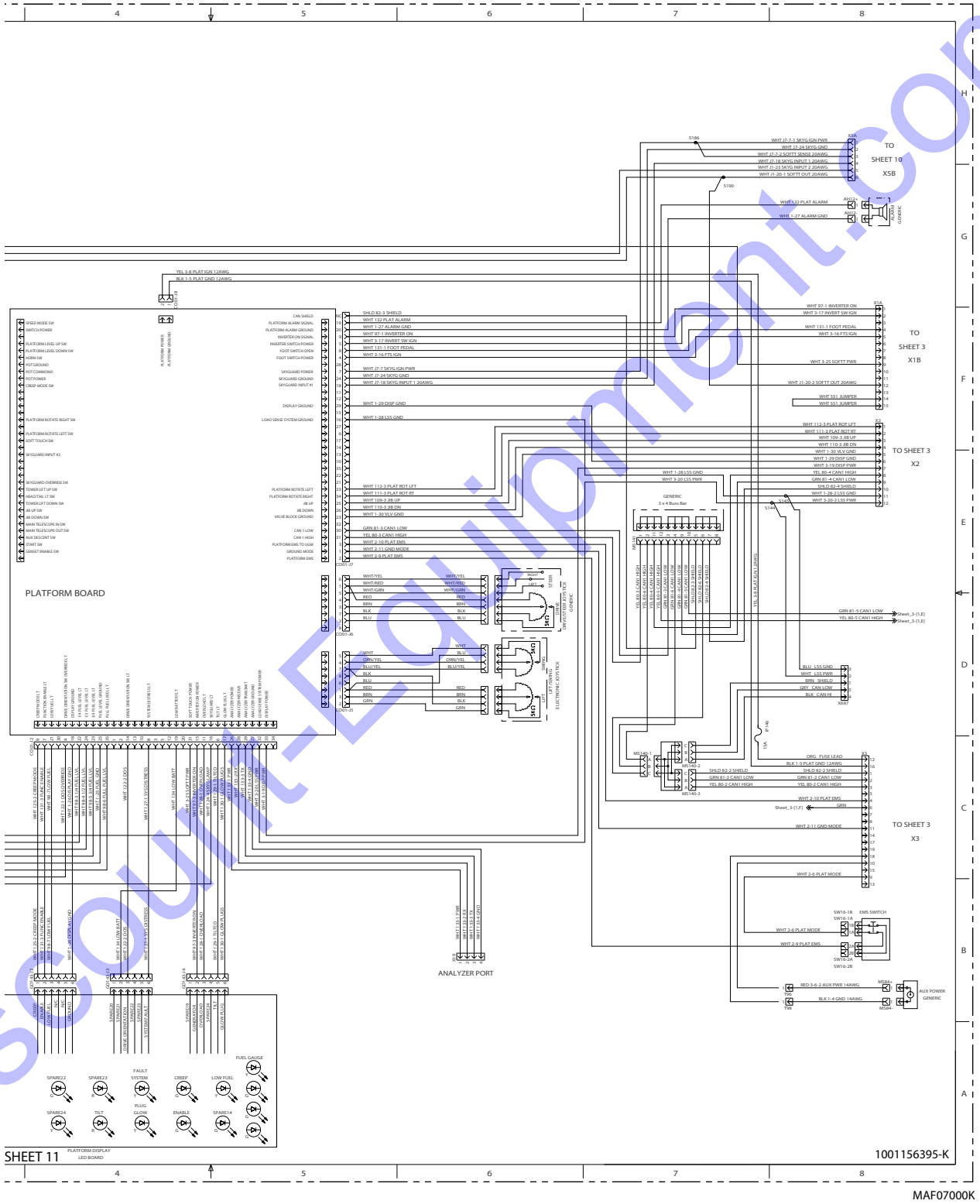

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Figure 7-144. Electrical Schematic - Sheet 21 of 21

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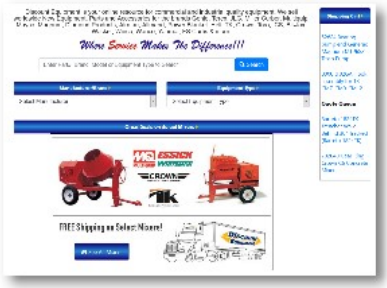

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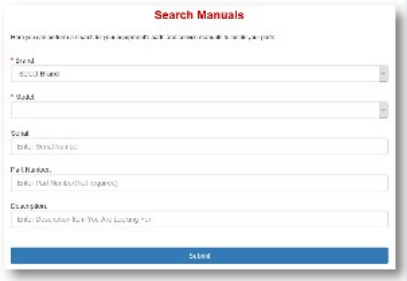

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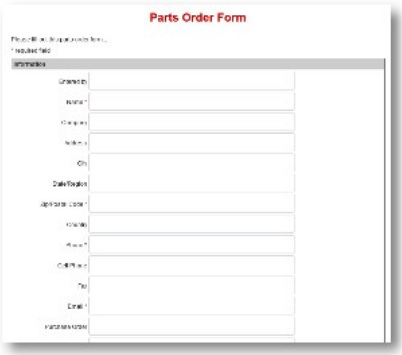

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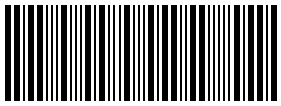

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