

Table 6-15. Diagnostic Trouble Code Chart

DTC	Flash Code	Sequence	Fault Message	Fault Description	Check
9927	9	9	GROUND MODULE CONSTANT DATA UPDATE REQUIRED	The Ground Module constant data requires an updated.	
9928	9	9	ENVELOPE CONTROL DISABLED	Envelope Control has been disabled by the user from Access Level 0.	- Envelope Control equipped vehicles only.
99282	9	9	GROUND DISPLAY SOFTWARE VERSION IS IMPROPER	Machine will be put in creep until software updated. The UGM has detected an improper software version on the ground display.	Update Ground Display software or replace the Ground Display
99285	9	9	LSS - FACTORY CALIBRATION ERROR	The load sensor is reporting a factor calibration issue (internal error)  The machine will assume the platform is overloaded.  This fault, once annunciated is latched within a given key cycle.	Possible sensor hardware issue.
9929	9	9	MOMENT CONTROL DISABLED	Moment Control has been disabled by the user from Access Level 0.	- Envelope Control equipped vehicles only.
99296	9	9	PLATFORM DISPLAY SOFTWARE VERSION IMPROPER	Machine will be put in creep until software updated. The UGM has detected an improper software version on the platform display.	Update Platform Display software or replace the Platform Display
9930	9	9	STEER SENSORS NOT CALIBRATED	The Steer Sensors have not been calibrated.	
9931	9	9	BOOM SENSORS NOT CALIBRATED	Machine restricted to in transport position. Boom Sensor not calibrated.	Calibrate Boom Sensors
9932	9	9	LIFT CRACKPOINTS NOT CALIBRATED	The Lift Crackpoints have not been calibrated.	
9933	9	9	TELESCOPE CRACKPOINTS NOT CALIBRATED	The Telescope Crackpoints have not been calibrated.	
9934	9	9	DRIVE CRACKPOINTS NOT CALIBRATED	The Drive Crackpoints have not been calibrated.	
9935	9	9	BLAM SENSOR SUPPLY OUT OF RANGE HIGH	The Boom Angle Sensors supply voltage is high.	- BLAM equipped vehicles only.
9936	9	9	BLAM SENSOR SUPPLY OUT OF RANGE LOW	The Boom Angle Sensors supply voltage is low.	- BLAM equipped vehicles only.
9937	9	9	LENGTH SENSOR REF VOLTAGE HIGH	Fault, once triggered, is maintained within a given key-cycle Machine will be put into Electrical Retrieval Machine will be trapped in transport	Check Wiring, Control Module
9938	9	9	LENGTH SENSOR REF VOLTAGE LOW	Fault, once triggered, is maintained within a given key-cycle Machine will be put into Electrical Retrieval Machine will be trapped in transport	Check Wiring, Control Module
9939	9	9	BLAM HIGH RES A/D FAILURE	The BLAM high resolution analog to digital converter has failed.	- BLAM equipped vehicles only.
9940	9	9	CHASSIS SENSOR SUPPLY OUT OF RANGE HIGH	The Chassis Sensors supply voltage is high.	
9941	9	9	CHASSIS SENSOR SUPPLY OUT OF RANGE LOW	The Chassis Sensors supply voltage is low.	

**Table 6-15. Diagnostic Trouble Code Chart**

DTC	Flash Code	Sequence	Fault Message	Fault Description	Check
9944	9	9	CURRENT FEEDBACK GAINS OUT OF RANGE	The factory set current feedback gains are out of range.	
9945	9	9	CURRENT FEEDBACK CALIBRATION CHECKSUM INCORRECT	The factory set current feedback checksum is not correct.	
99155	9	9	JIB CONTROL MODULE - HIGH RESOLUTION A2D FAILURE		
99156	9	9	JIB CONTROL MODULE - HIGH RESOLUTION A2D REFERENCE LOW		
99157	9	9	JIB CONTROL MODULE - HIGH RESOLUTION A2D REFERENCE HIGH		
99158	9	9	PLATFORM LEVEL ANGLE SENSOR - INTERNAL ERROR		
99159	9	9	JIB LIFT ANGLE SENSOR - INTERNAL ERROR		
99160	9	9	FUNCTIONS LOCKED OUT - JIB CONTROL MODULE SOFTWARE VERSION IMPROPER		
99290	9	9	BLAP SENSOR REFERENCE VOLTAGE HIGH	The BLAP detected high voltage (> 5.4 V) on the reference voltage input.	Verify wiring to the 5V reference input on BLAP module. Verify voltage on 5V reference input
99291	9	9	BLAP SENSOR REFERENCE VOLTAGE LOW	The BLAP detected low voltage (< 4.5 V) on the reference voltage input.	Verify wiring to the 5V reference input on BLAP module. Verify voltage on 5V reference input

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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

$\mu$  = micro = (Displayed Number) / 1,000,000

Example: 1.2 kW = 1200 W

Example: 50 mA = 0.05 A

#### Voltage Measurement

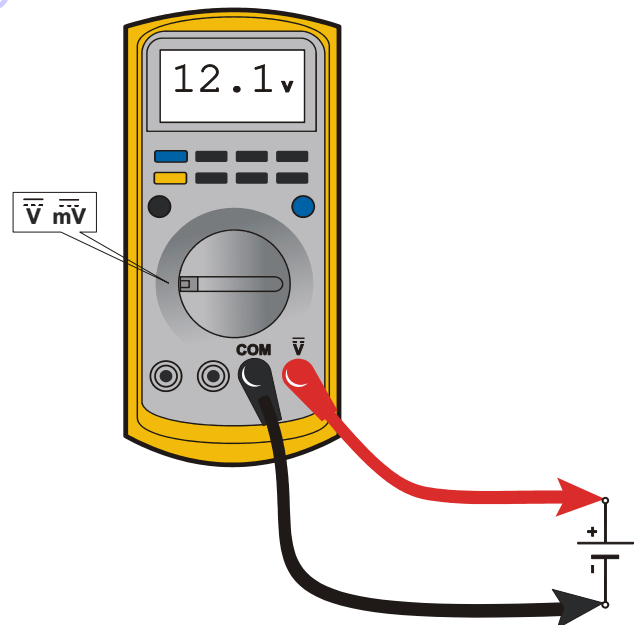
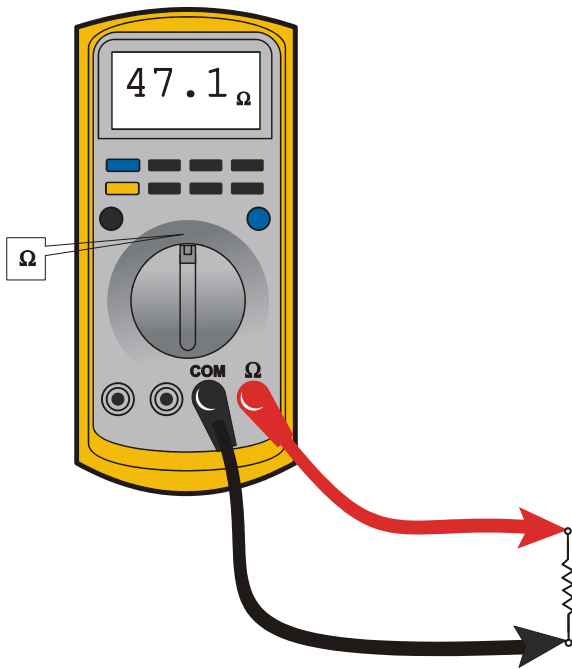


Figure 7-1. Voltage Measurement (DC)

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

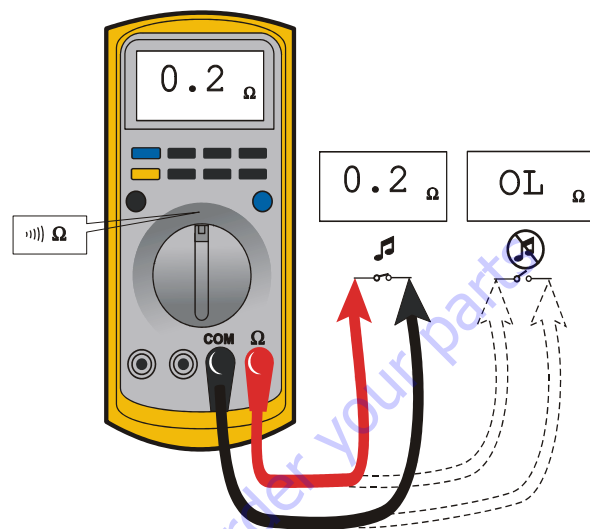
### Resistance Measurement



**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

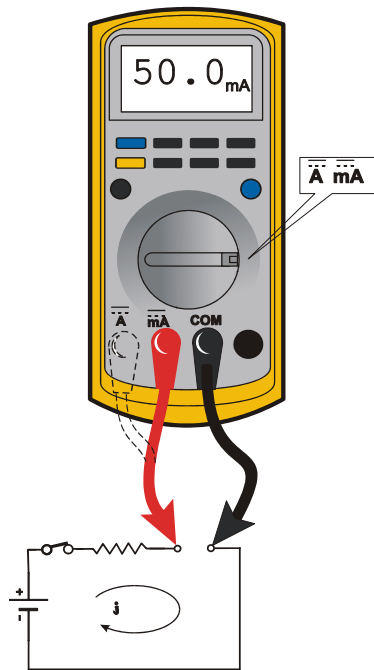
### Continuity Measurement



**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.

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

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

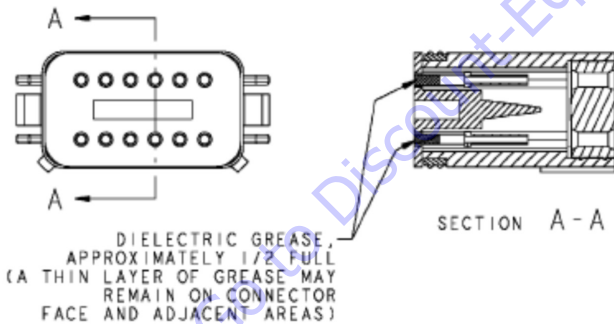
When applied to electrical connections, dielectric grease helps to prevent corrosion of electrical contacts and improper conductivity between contacts from moisture intrusion. Open and sealed connectors benefit from the application of dielectric grease.

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

**Installation of Dielectric Grease**

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

- Use dielectric grease in a tube for larger connection points or apply with a syringe for small connectors.
- Apply dielectric grease to the female contact (fill it approximately 1/2 full; see example below)
- Leave a thin layer of dielectric grease on the face of the connector
- Assemble the connector system immediately to prevent moisture ingress or dust contamination
- 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 female contact. If trapped air prevents the connector from latching, pierce one of the unused wire seals. After assembly, install a seal plug (JLG #4460905) in that location 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 Female Contacts**

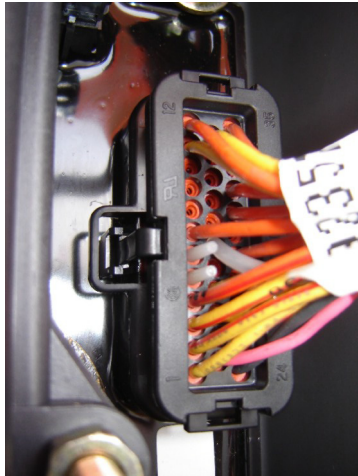
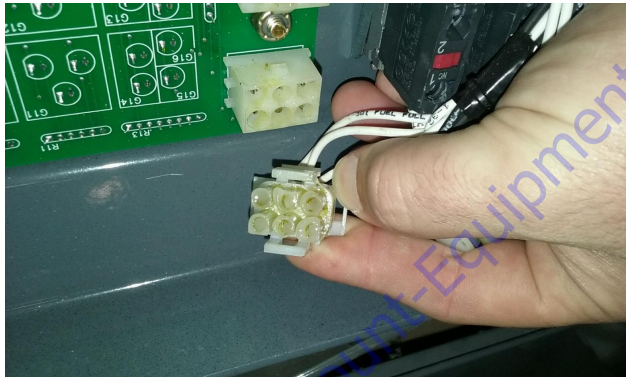


Figure 7-6. Use of Seal Plugs

### 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 1500AJP 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 CONNECTOR'S**

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).



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## 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:

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.).

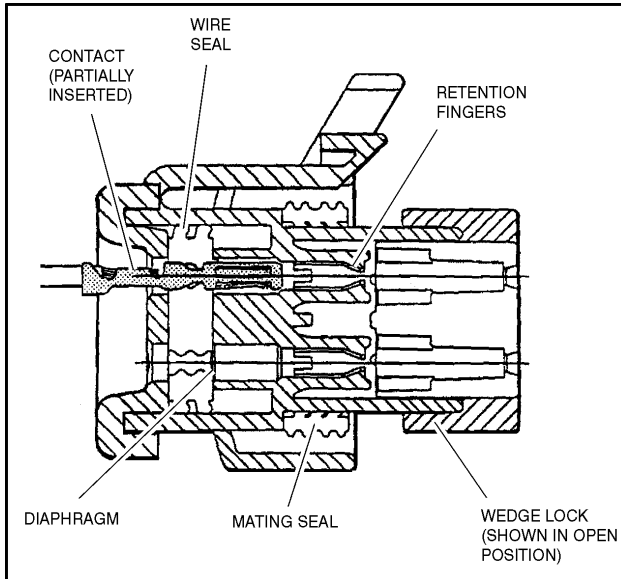


Figure 7-9. Connector Assembly Figure 1

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

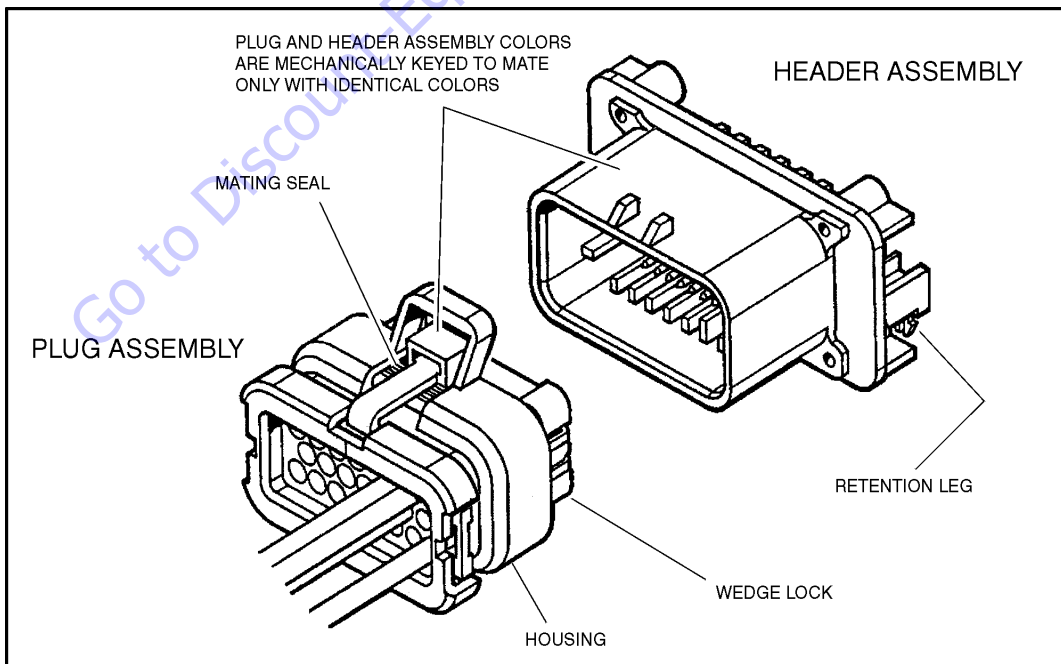


Figure 7-10. AMP Connector

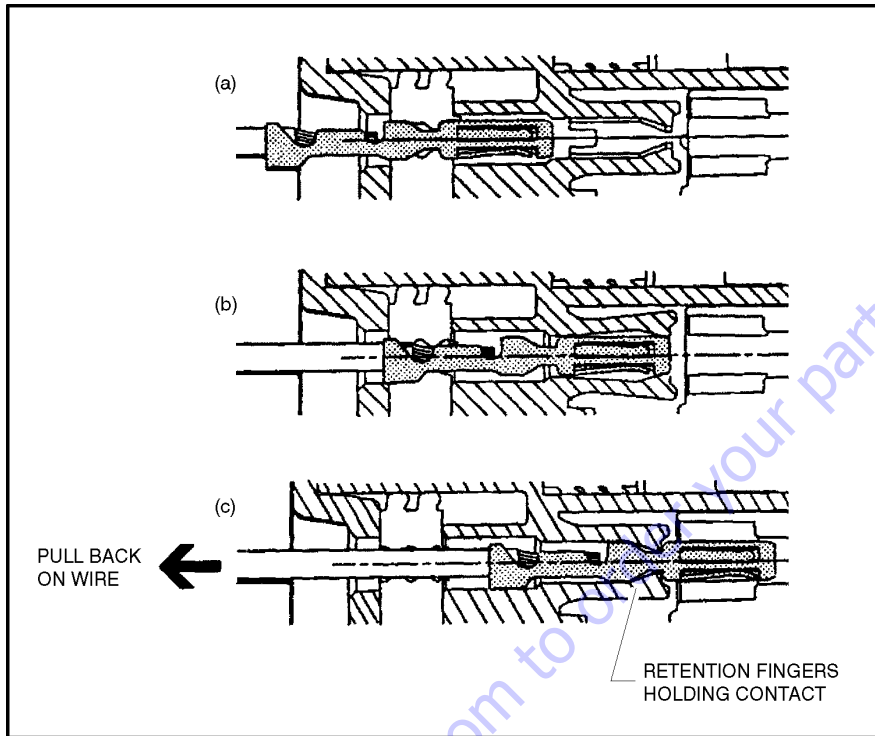


Figure 7-11. Connector Assembly Figure 2

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.).

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

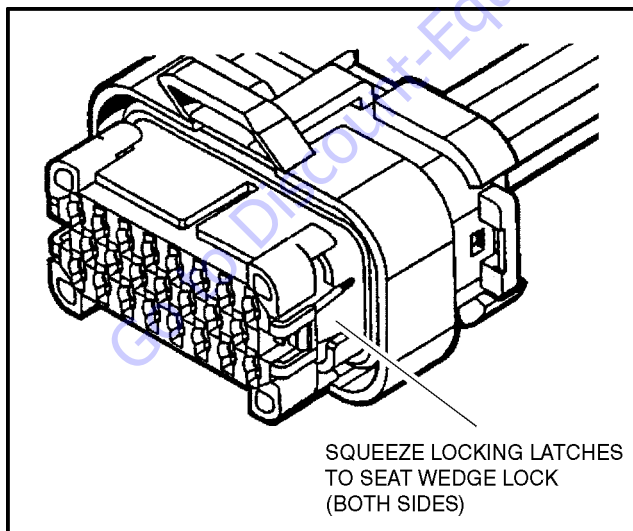


Figure 7-12. Connector Assembly Figure 3

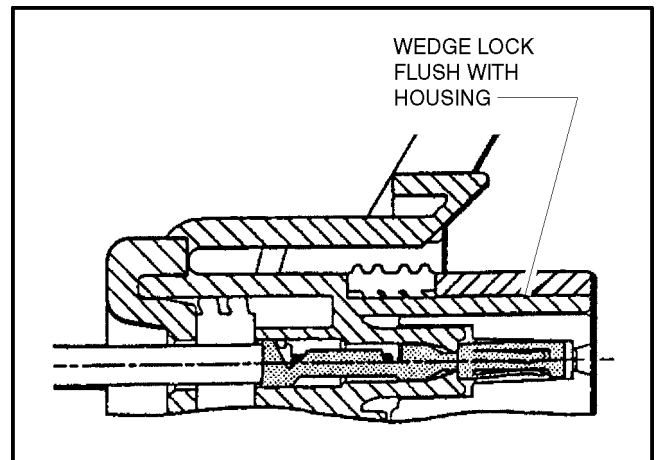


Figure 7-13. Connector Assembly Figure 4

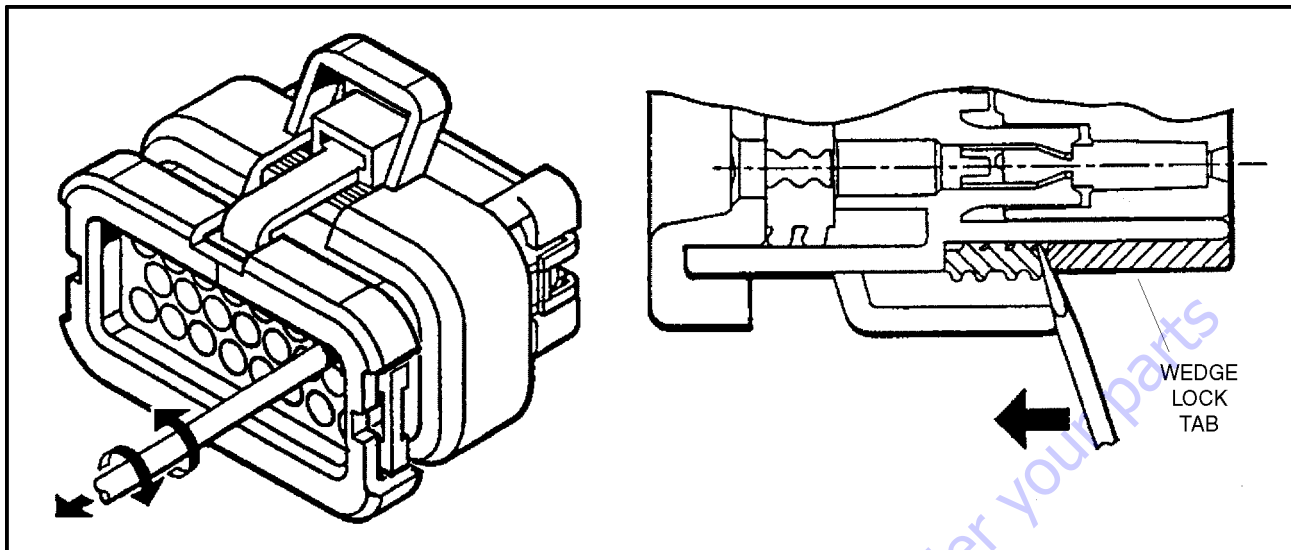


Figure 7-14. Connector Disassembly

### 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.

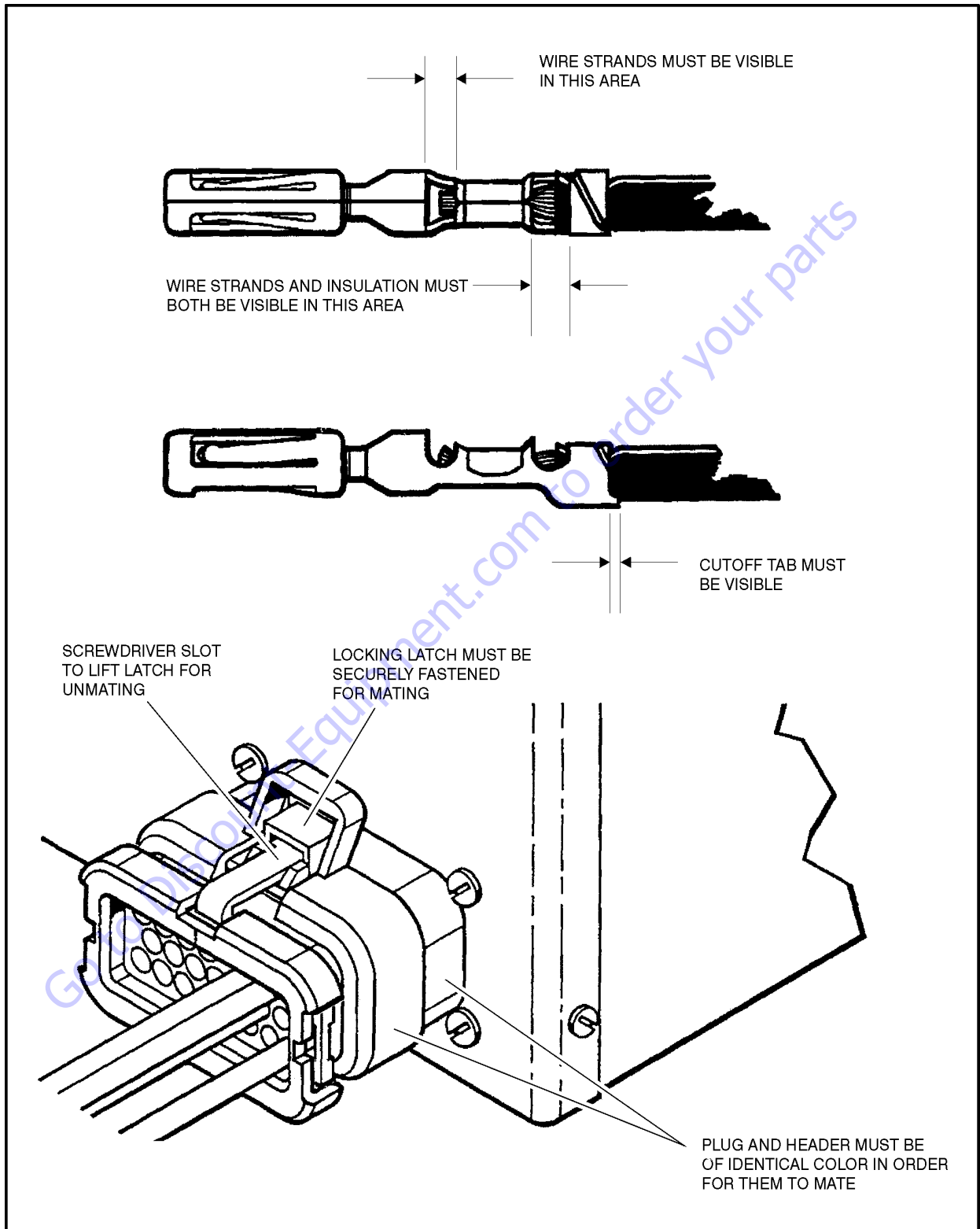


Figure 7-15. Connector Installation

## 7.5 DEUTSCH CONNECTORS

### DT/DTP Series Assembly

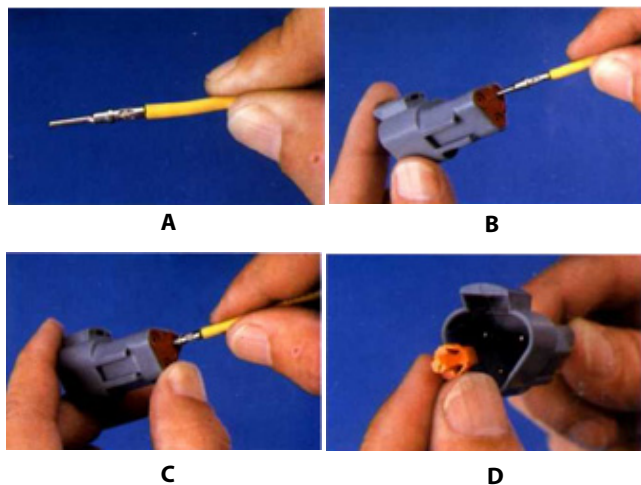


Figure 7-16. DT/DTP Contact Installation

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. They may go in either way.

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

### DT/DTP Series Disassembly

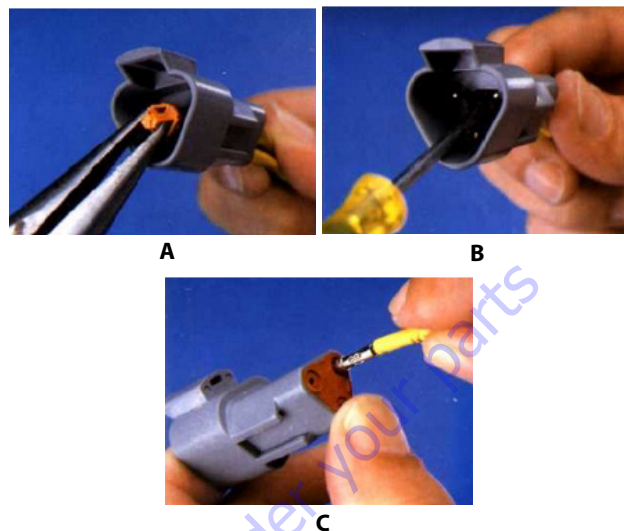
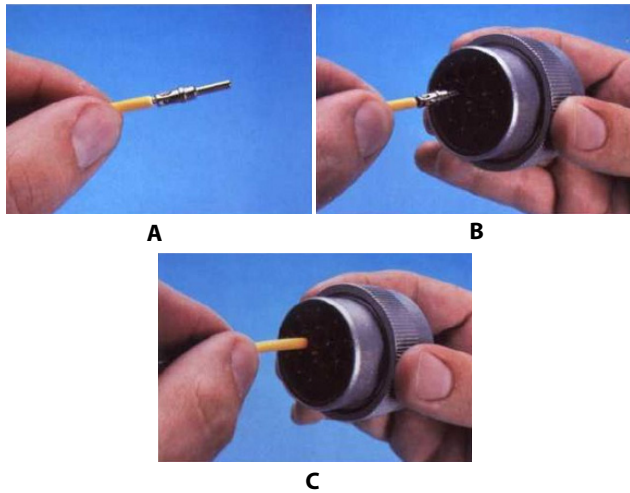


Figure 7-17. DT/DTP Contact Removal

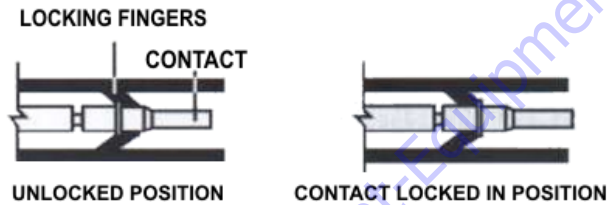
5. Remove wedgelock using needlenose pliers or a hook shaped wire to pull wedge straight out.
6. To remove the contacts, gently pull wire backwards, while at the same time releasing the locking finger by moving it away from the contact with a screwdriver.
7. Hold the rear seal in place, as removing the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

**HD30/HDP20 Series Assembly**



**Figure 7-18. HD/HDP Contact Installation**

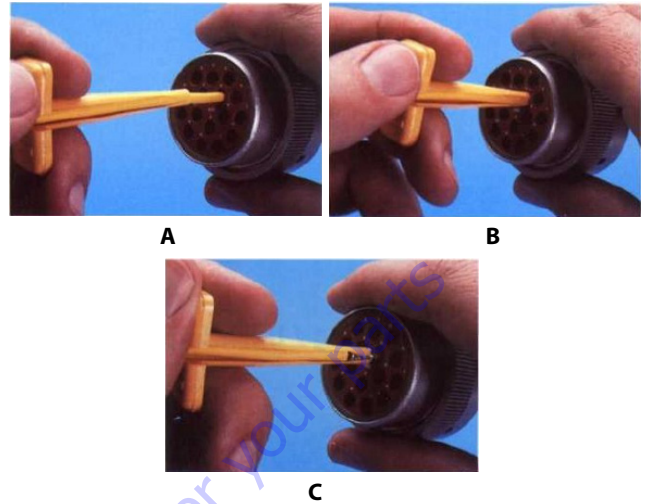
8. Grasp contact about 25mm behind the contact crimp barrel.
9. Hold connector with rear grommet facing you.
10. Push contact straight into connector grommet until a positive stop is felt. A slight tug will confirm that it is properly locked in place.



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

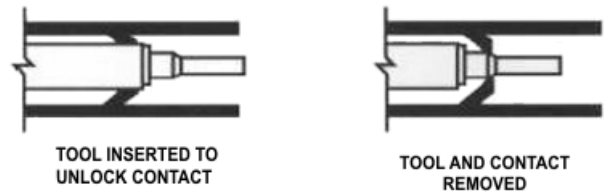
**NOTE:** For unused wire cavities, insert sealing plugs for full environmental sealing

**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**

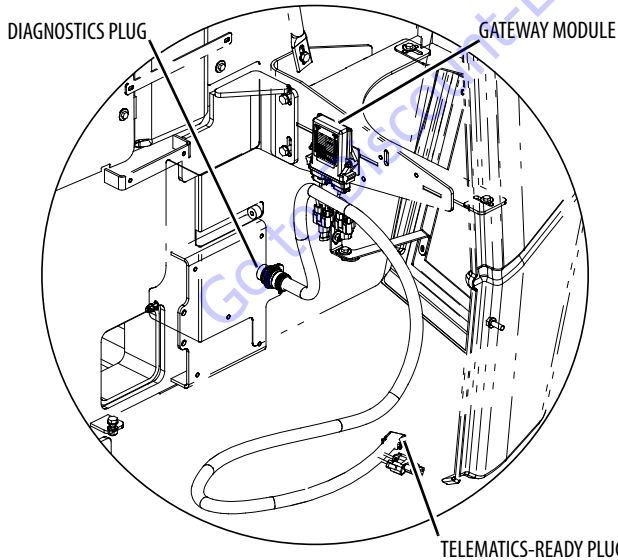
**NOTE:** Do Not twist or insert tool at an angle.



**7.6 TELEMATICS GATEWAY**

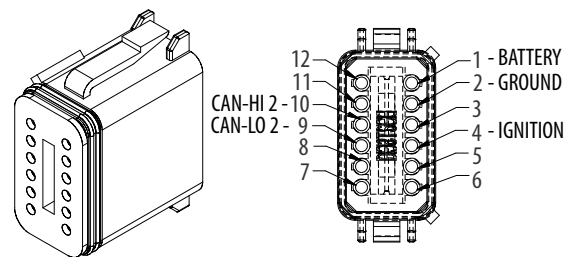
Personnel using machines equipped with an optional telematics gateway will be able to view the following data through their telematics device:

JLG LABEL	DESCRIPTION	UNIT
Engine Speed	Actual engine speed.	RPM
DEF Tank Level (If Equipped)	Indicates the level of DEF (diesel exhaust fluid) within the DEF tank if the machine is equipped with DEF tank. <ul style="list-style-type: none"> <li>• 0% = Empty</li> <li>• 100% = Full</li> </ul>	Percentage (%)
JLG Machine Faults: Active / Not-Active	<ul style="list-style-type: none"> <li>• 00 - No Machine Faults</li> <li>• 01 - Active Machine Fault</li> <li>• 10 - Error</li> <li>• 11 - Not available</li> </ul>	Bit
Total Idle Fuel Used	Total amount of fuel used during vehicle operation during idle conditions.	Liters
Total Idle Hours	Total time of engine operation during idle conditions.	Seconds
Total Engine Hours	Total time of engine operation.	Seconds
Total Fuel Used	Total amount of fuel used during vehicle operation.	Liters
Fuel Rate	Amount of fuel consumed by engine per unit of time.	Liters/Hour
Fuel Level	Ratio of fuel volume to the total volume of the fuel storage container. When a low fuel limit switch is present, the fuel level will indicate "full" until the switch opens, which will then indicate 10% fuel remaining.  When Fuel Level 2 (SPN 38) is not used, Fuel Level 1 represents the total fuel in all fuel storage containers. When Fuel Level 2 is used, Fuel Level 1 represents the fuel level in the primary or left side fuel storage container.	Percentage (%)
DM1 Engine Faults	Shows actual engine fault codes.	N/A



**Telematics-Ready (TCU) Plug**

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



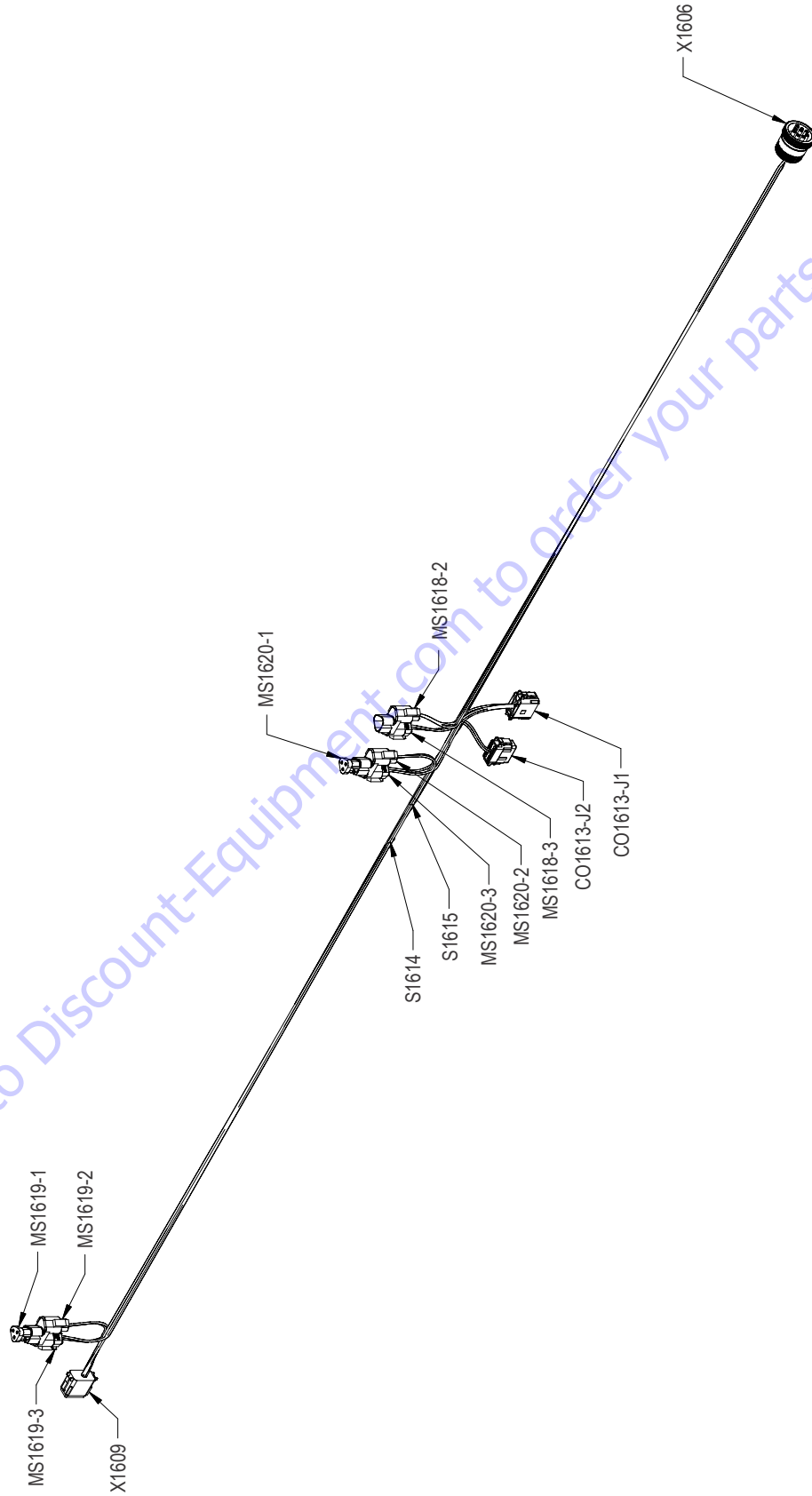


Figure 7-22. Telematics Gateway Harness - Sheet 1 of 3

**SECTION 7 - BASIC ELECTRICAL INFORMATION & ELECTRICAL SCHEMATICS**

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

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

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

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

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

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

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

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

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

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

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

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

**Figure 7-23. Telematics Gateway Harness - Sheet 2 of 3**

**SECTION 7 - BASIC ELECTRICAL INFORMATION & ELECTRICAL SCHEMATICS**

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

**Figure 7-24. Telematics Gateway Harness - Sheet 3 of 3**

## 7.7 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	
Fuse & CB Fuse FC	Fuse	FC
	Fusible Link	
	Circuit Breaker	
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	
	Contactors	
	Power module	
Rocker Switch		SW
Sensor	Angle	SN
	Fuel	
	Length	
	Limit	
	Load	
	Pressure	
	Proximity	
	Speed	
	Temperature	
	Terminals	
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

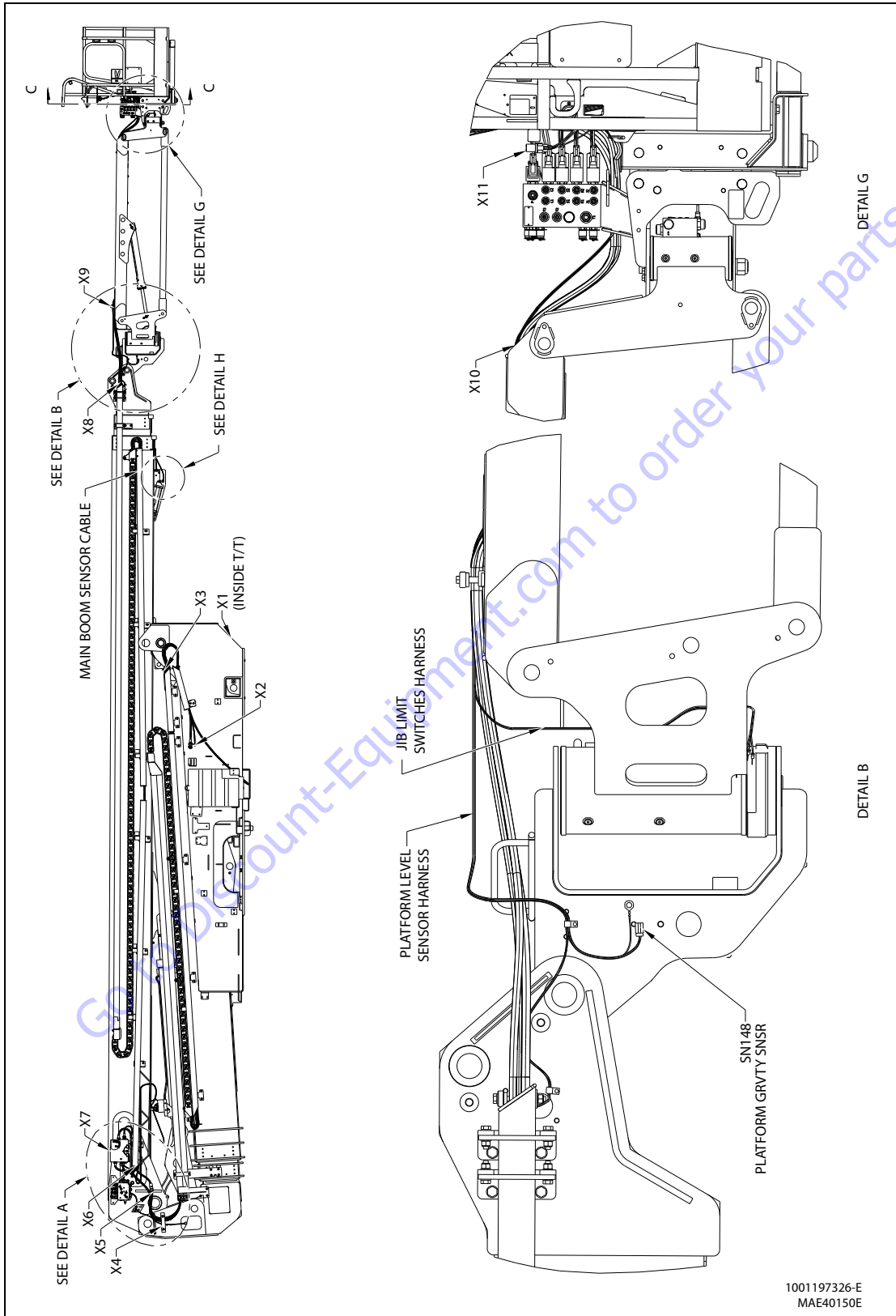


Figure 7-25. Boom Electrical Installation (ANSI) - Sheet 1 of 5

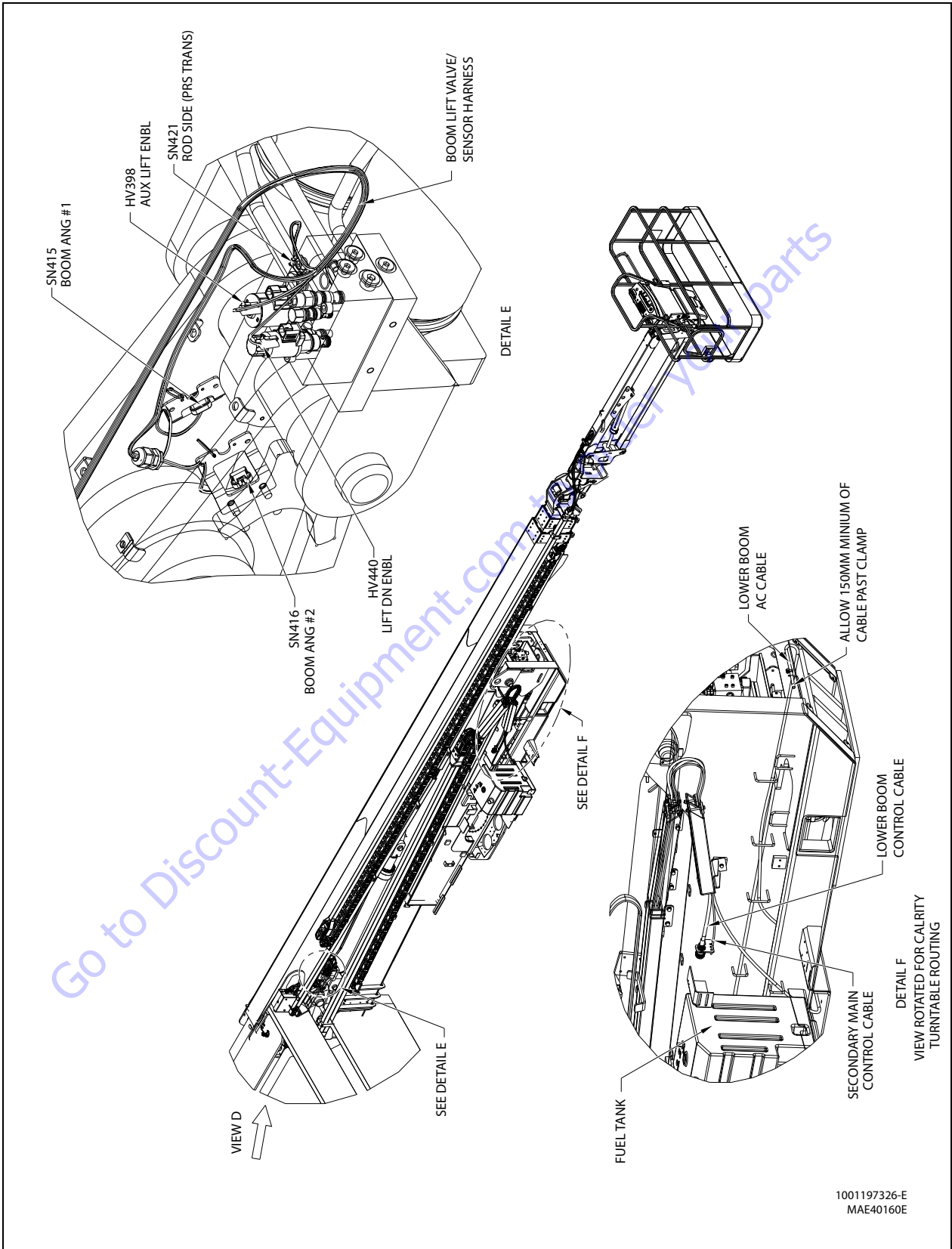
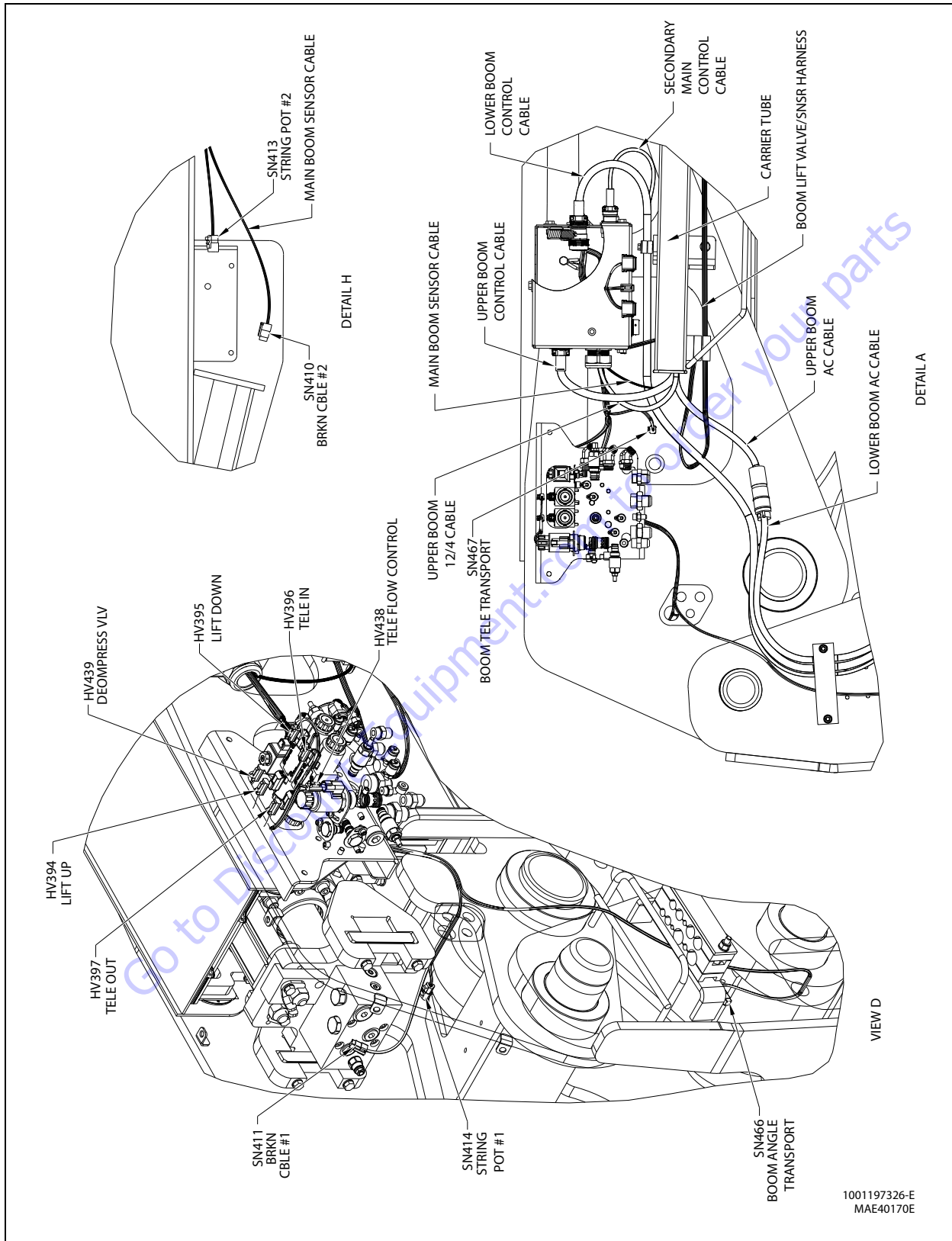


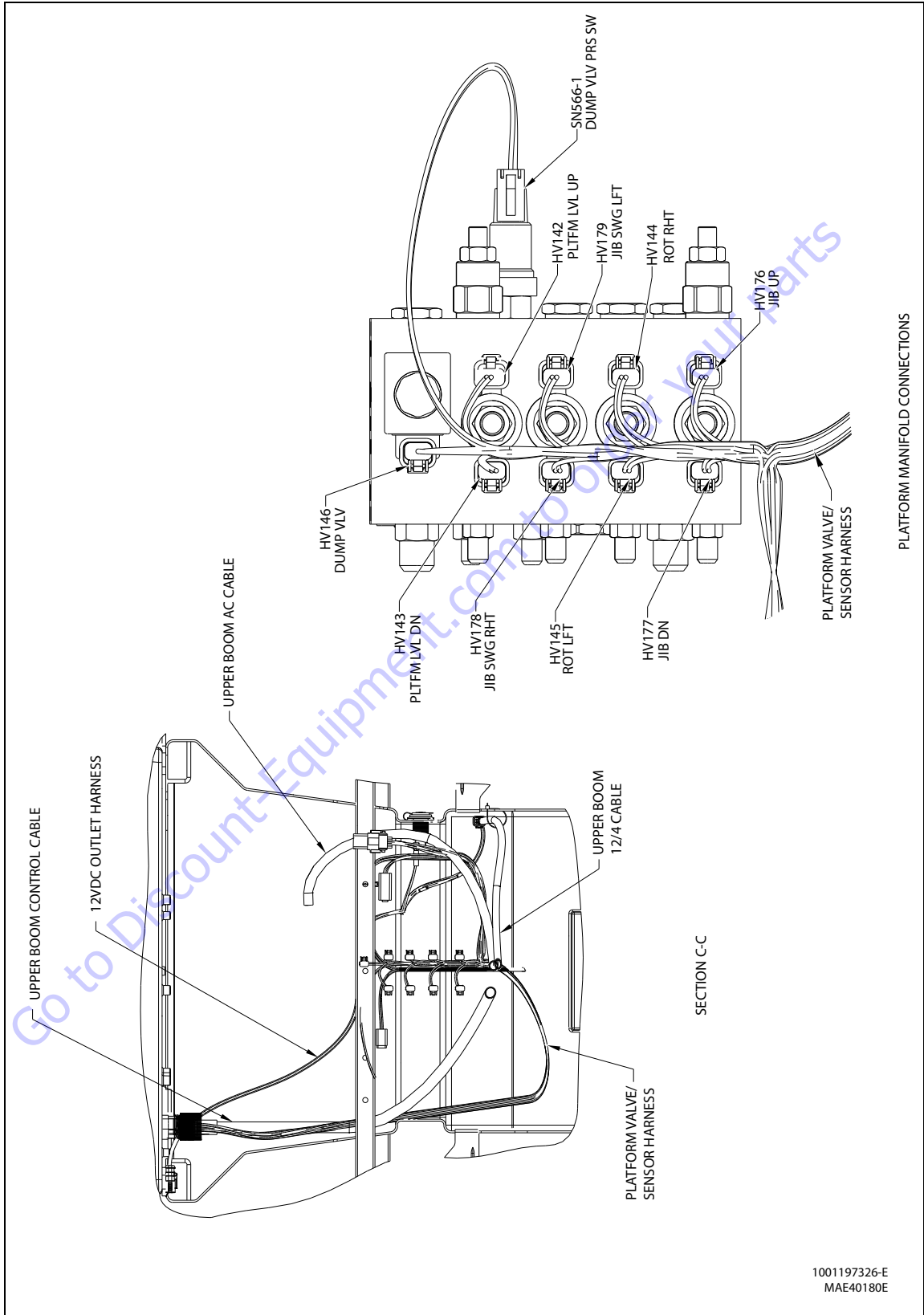
Figure 7-26. Boom Electrical Installation (ANSI) - Sheet 2 of 5



**SECTION 7 - BASIC ELECTRICAL INFORMATION & ELECTRICAL SCHEMATICS**

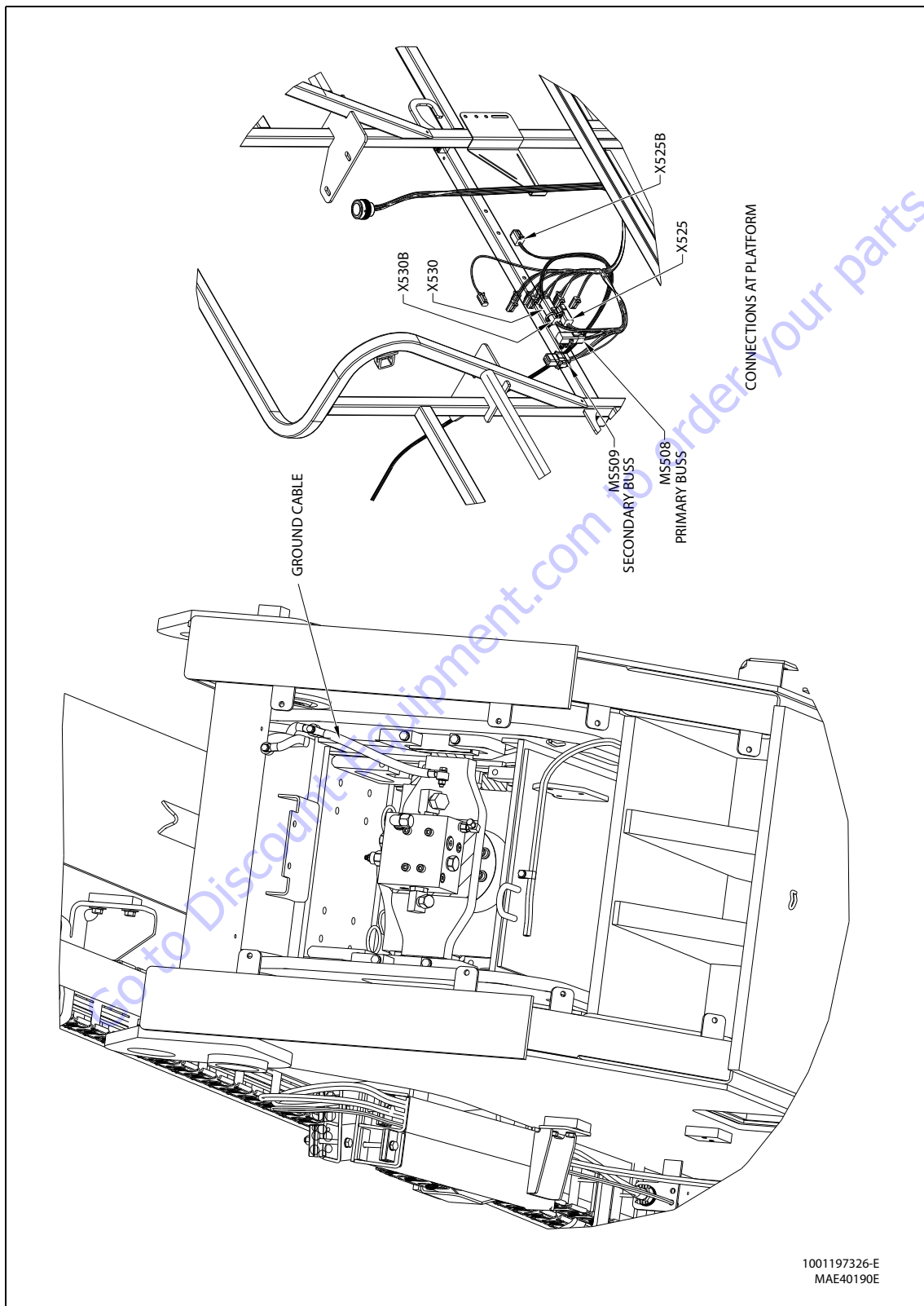


**Figure 7-28. Boom Electrical Installation (ANSI) - Sheet 3 of 5**



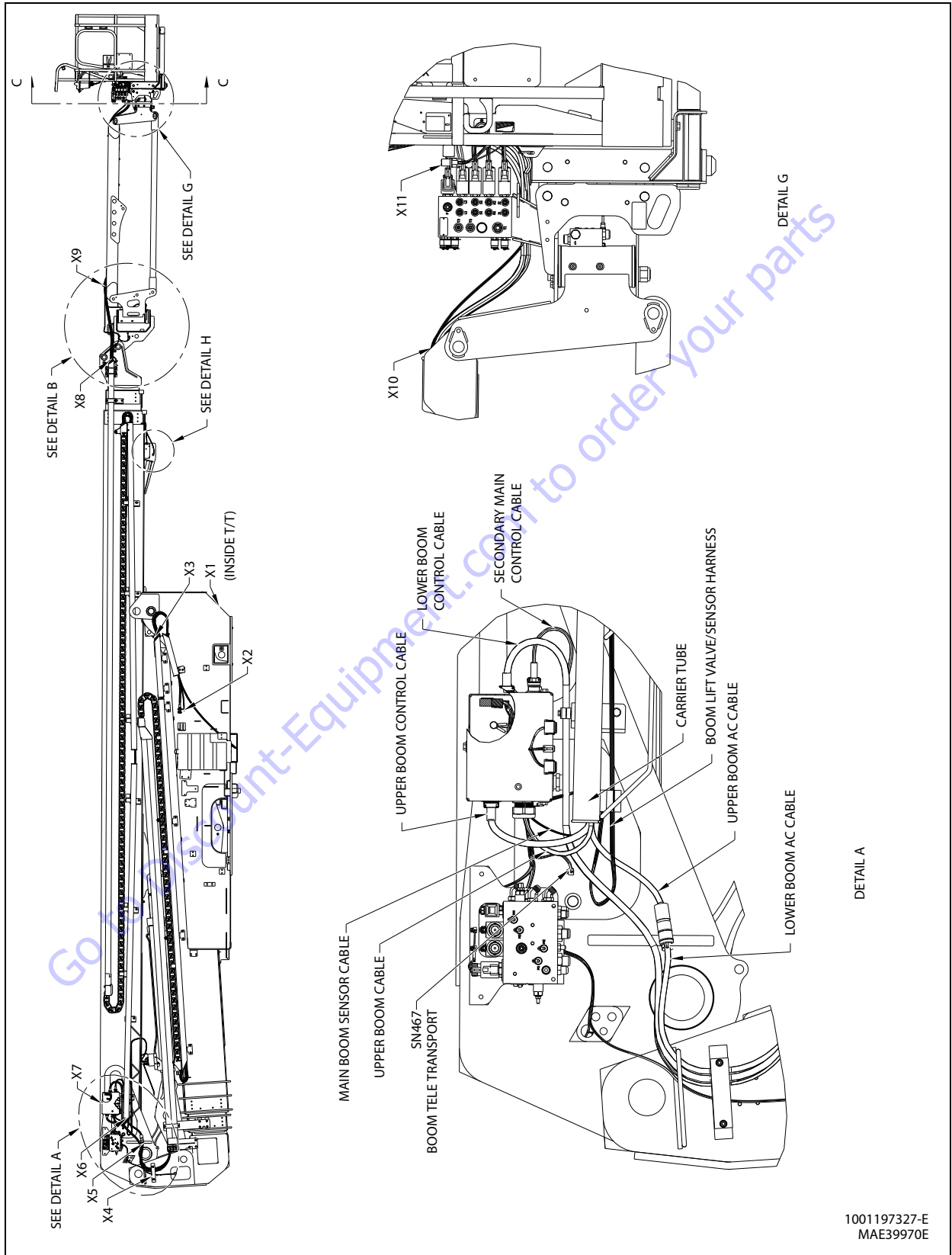
1001197326-E  
MAE40180E

Figure 7-29. Boom Electrical Installation (ANSI) - Sheet 4 of 5



1001197326-E  
MAE40190E

Figure 7-30. Boom Electrical Installation (ANSI) - Sheet 5 of 5



1001197327-E  
MAE39970E

Figure 7-31. Boom Electrical Installation (CE) - Sheet 1 of 5

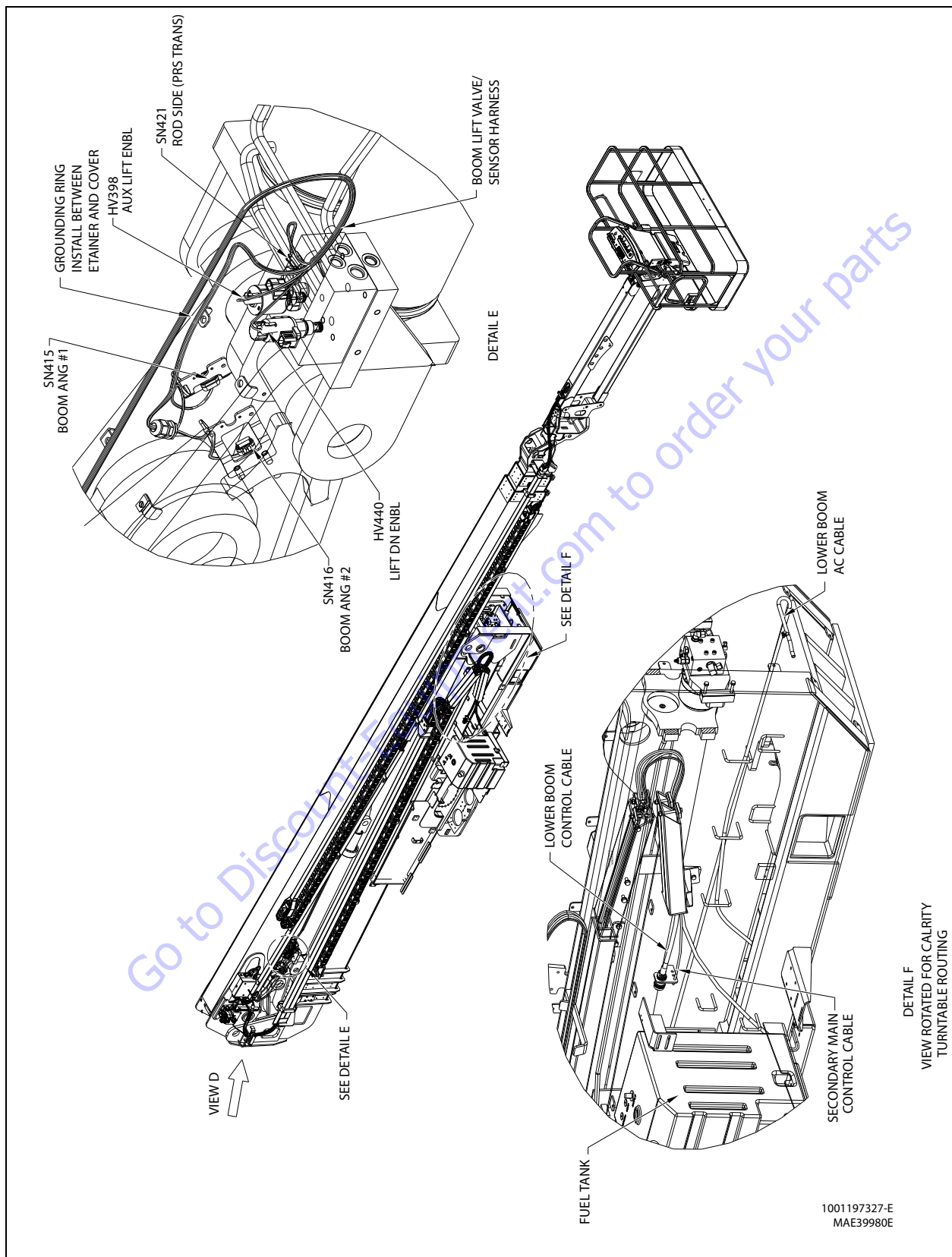
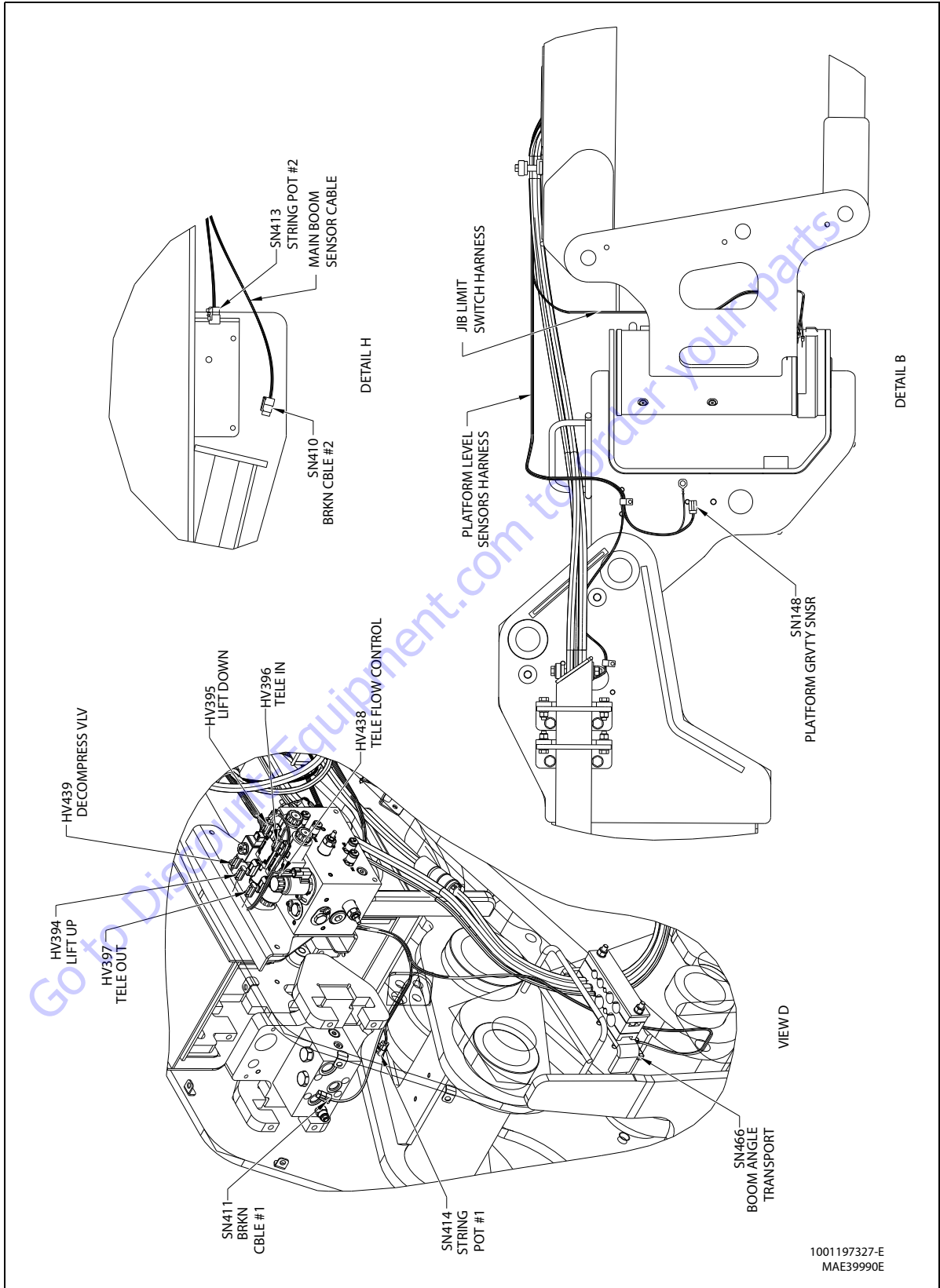


Figure 7-32. Boom Electrical Installation (CE) - Sheet 2 of 5



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Figure 7-33. Boom Electrical Installation (CE) - Sheet 3 of 5

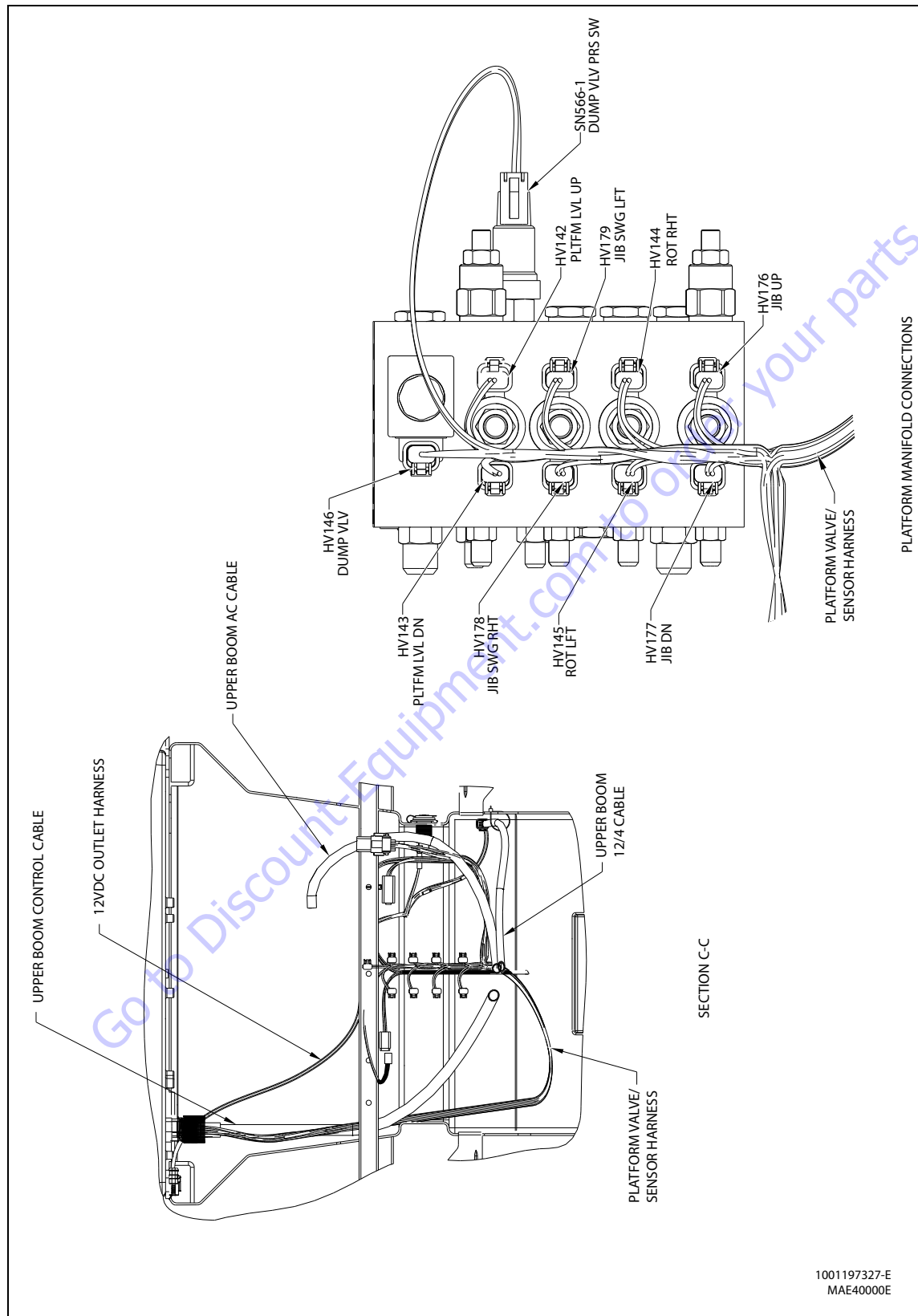


Figure 7-34. Boom Electrical Installation (CE) - Sheet 4 of 5

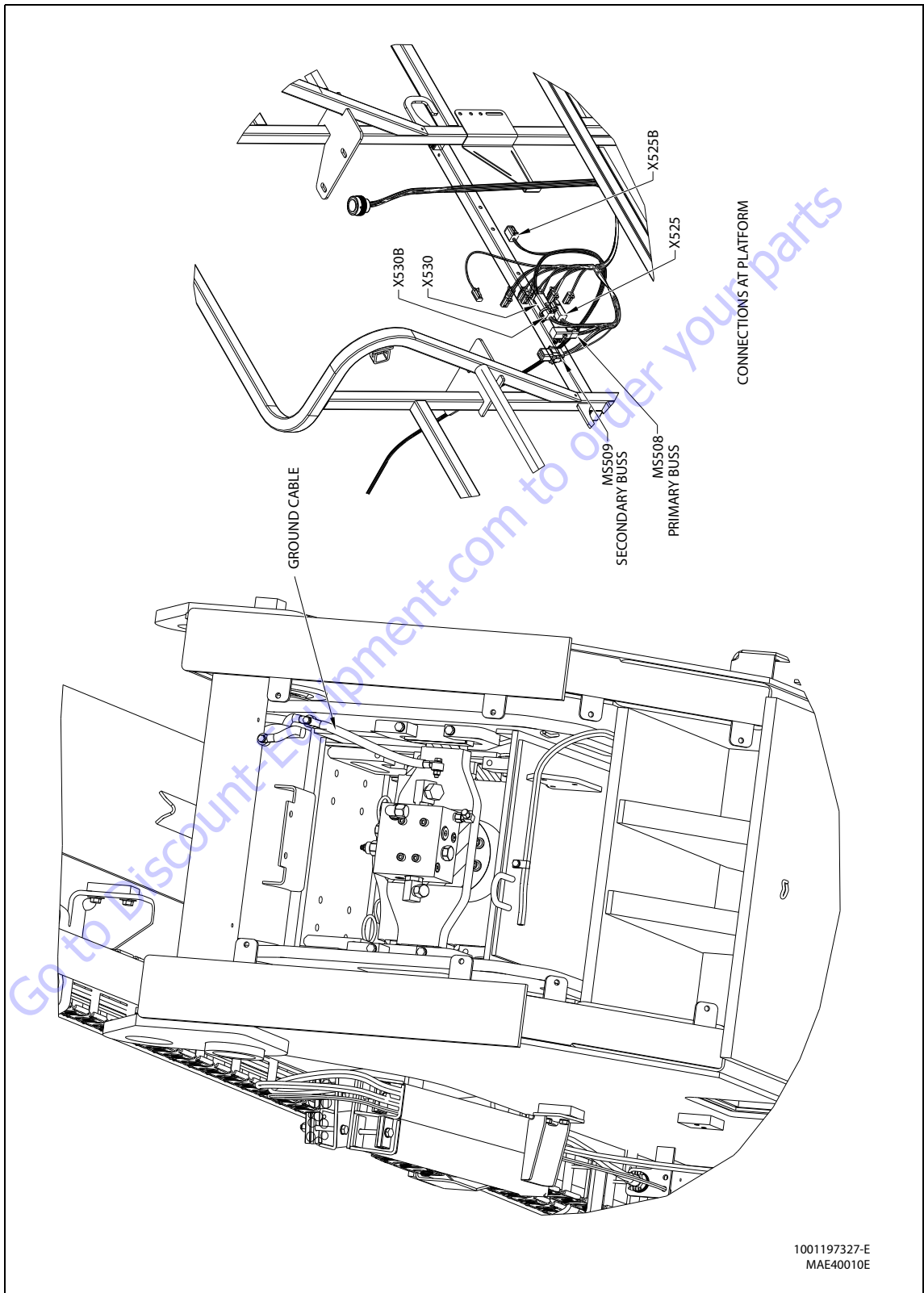


Figure 7-35. Boom Electrical Installation (CE) - Sheet 5 of 5



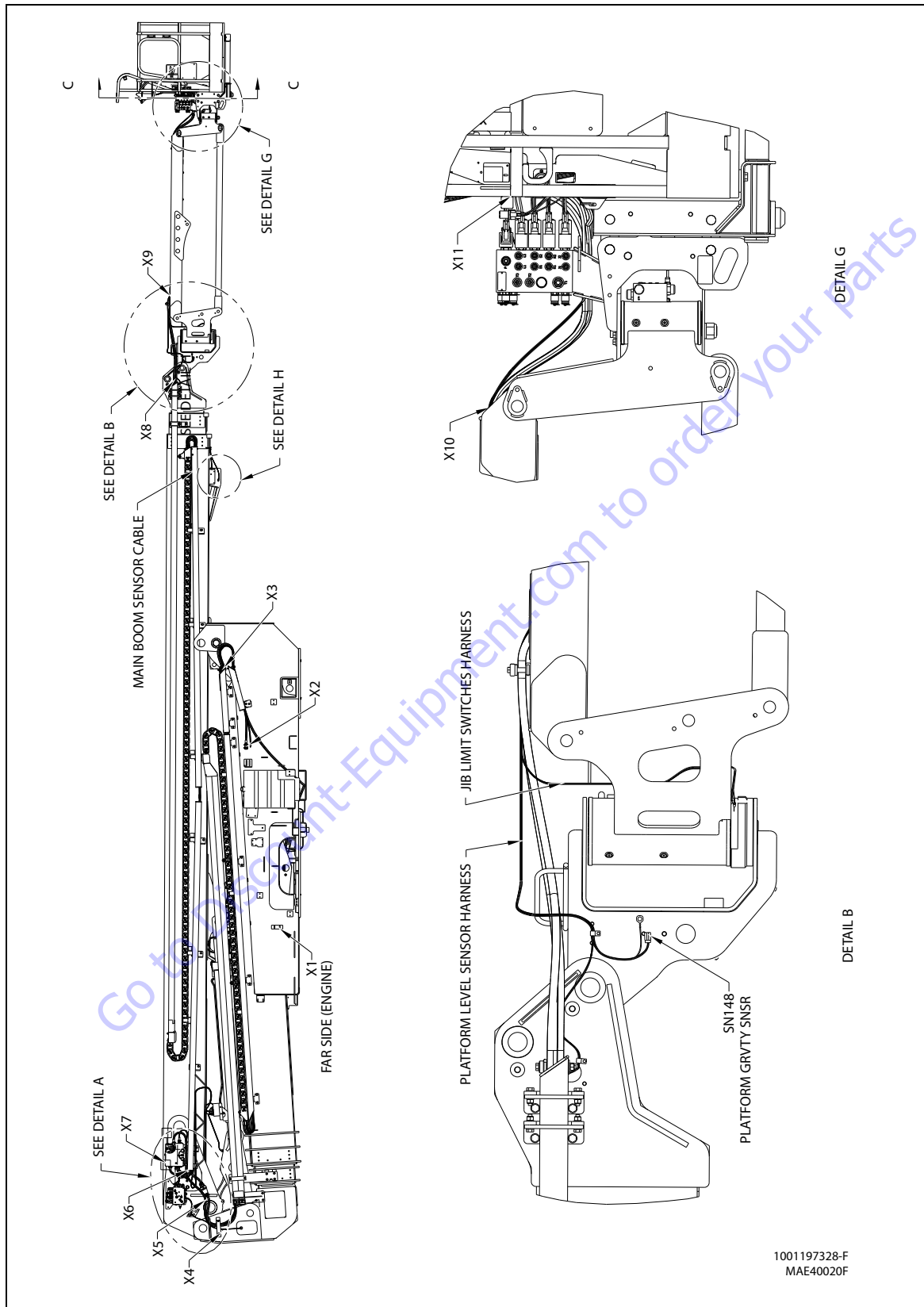


Figure 7-36. Boom Electrical Installation (SkyPower) - Sheet 1 of 6

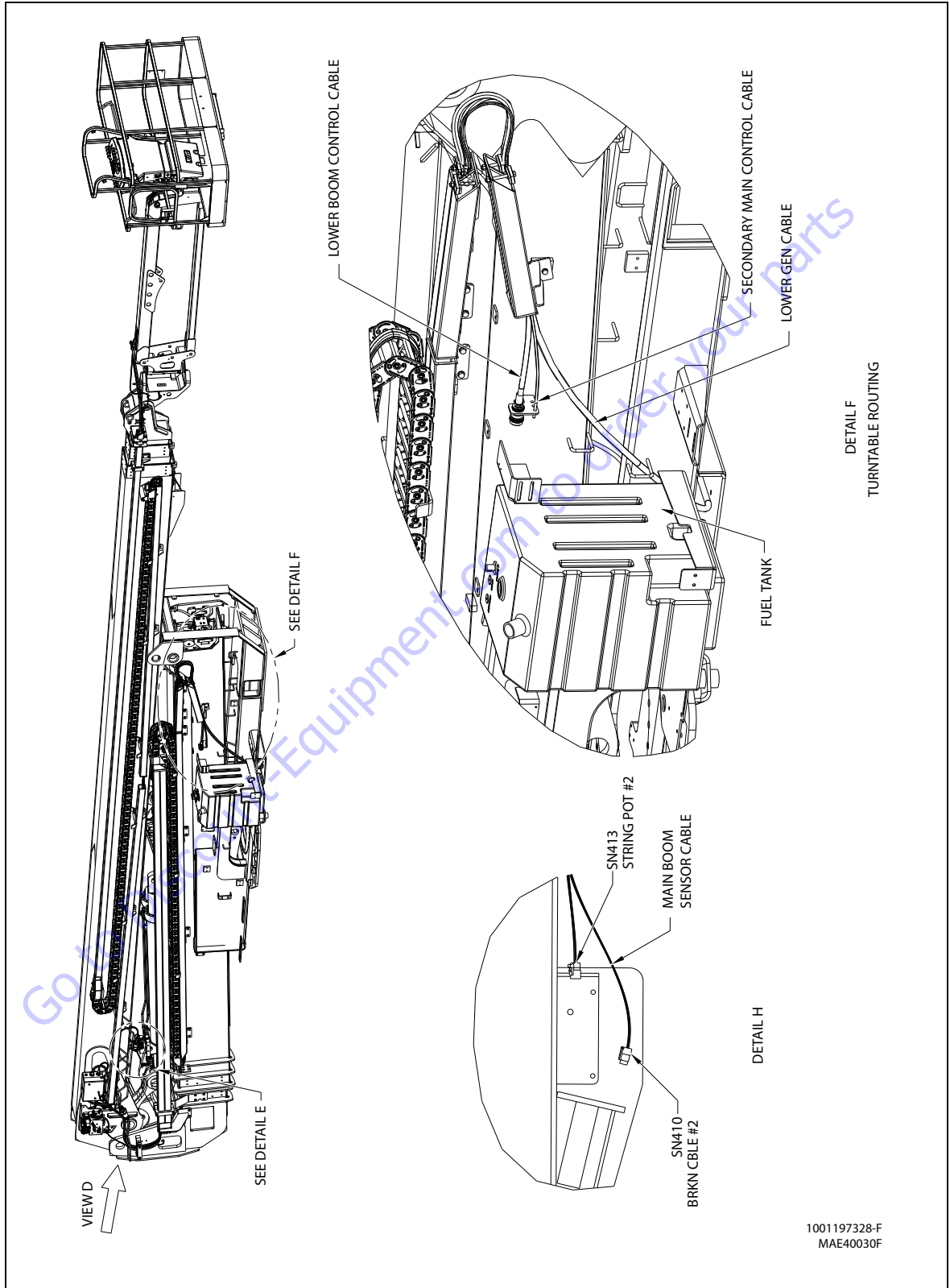


Figure 7-37. Boom Electrical Installation (SkyPower) - Sheet 2 of 6

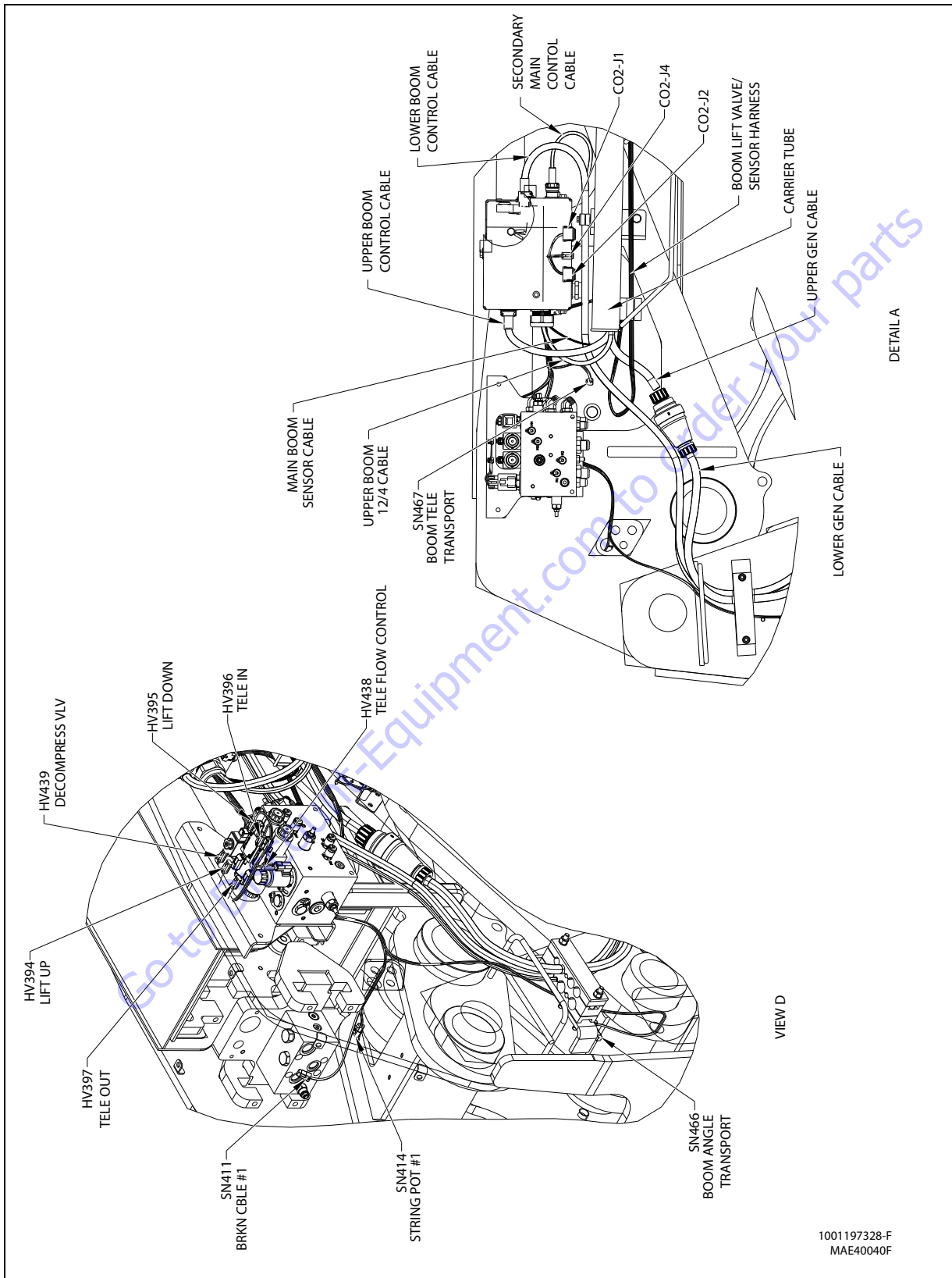


Figure 7-38. Boom Electrical Installation (SkyPower) - Sheet 3 of 6

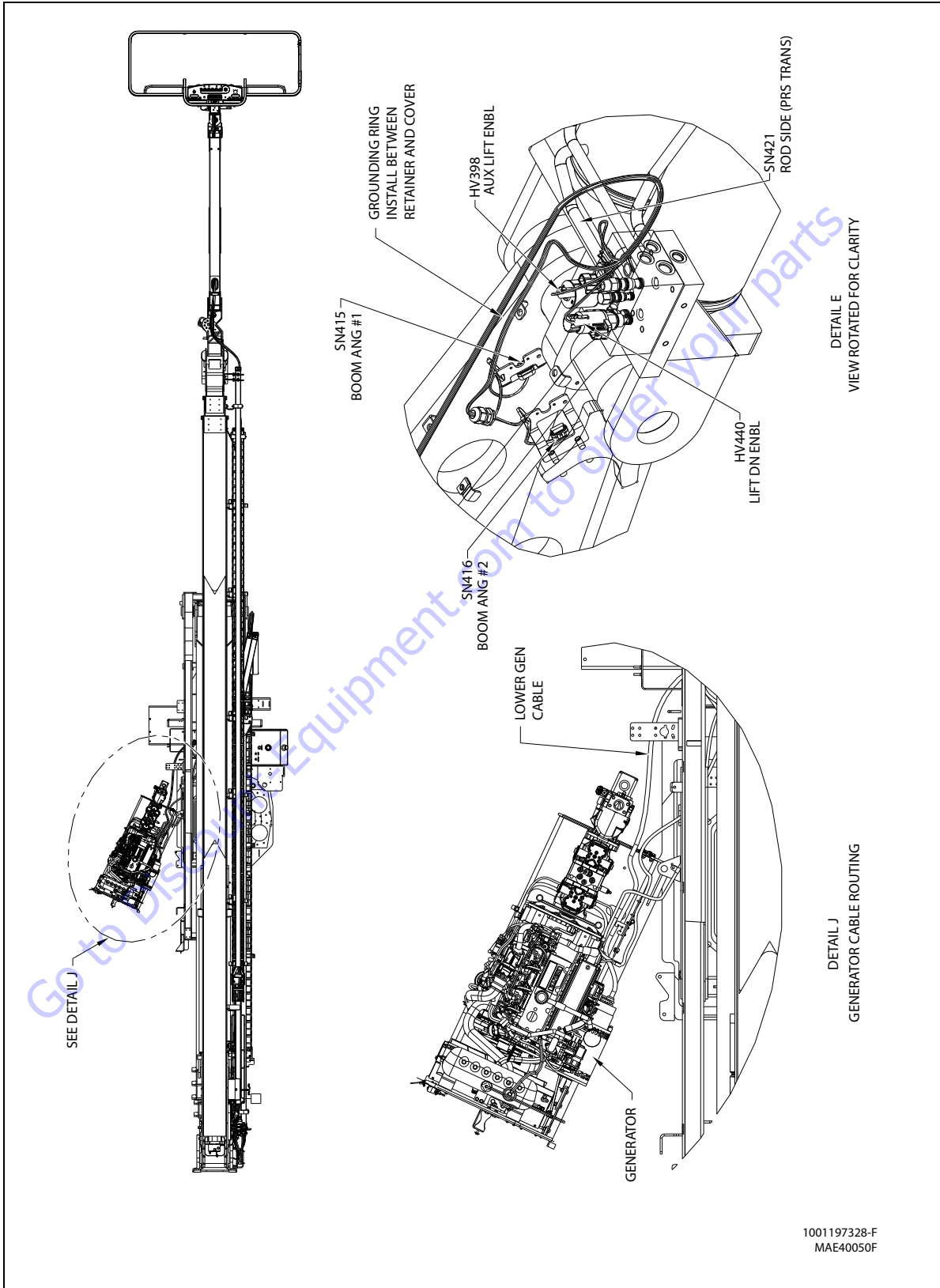


Figure 7-39. Boom Electrical Installation (SkyPower) - Sheet 4 of 6

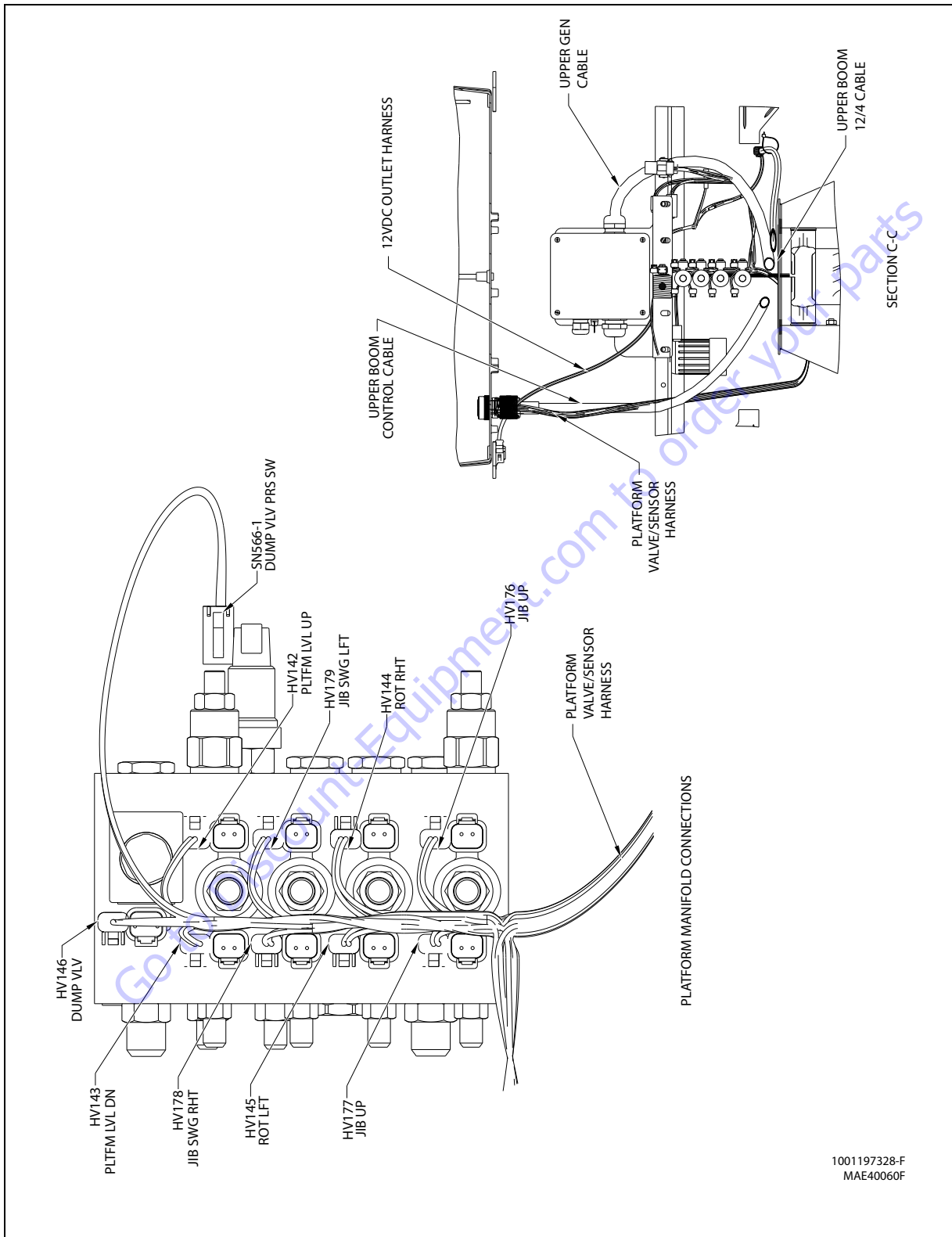
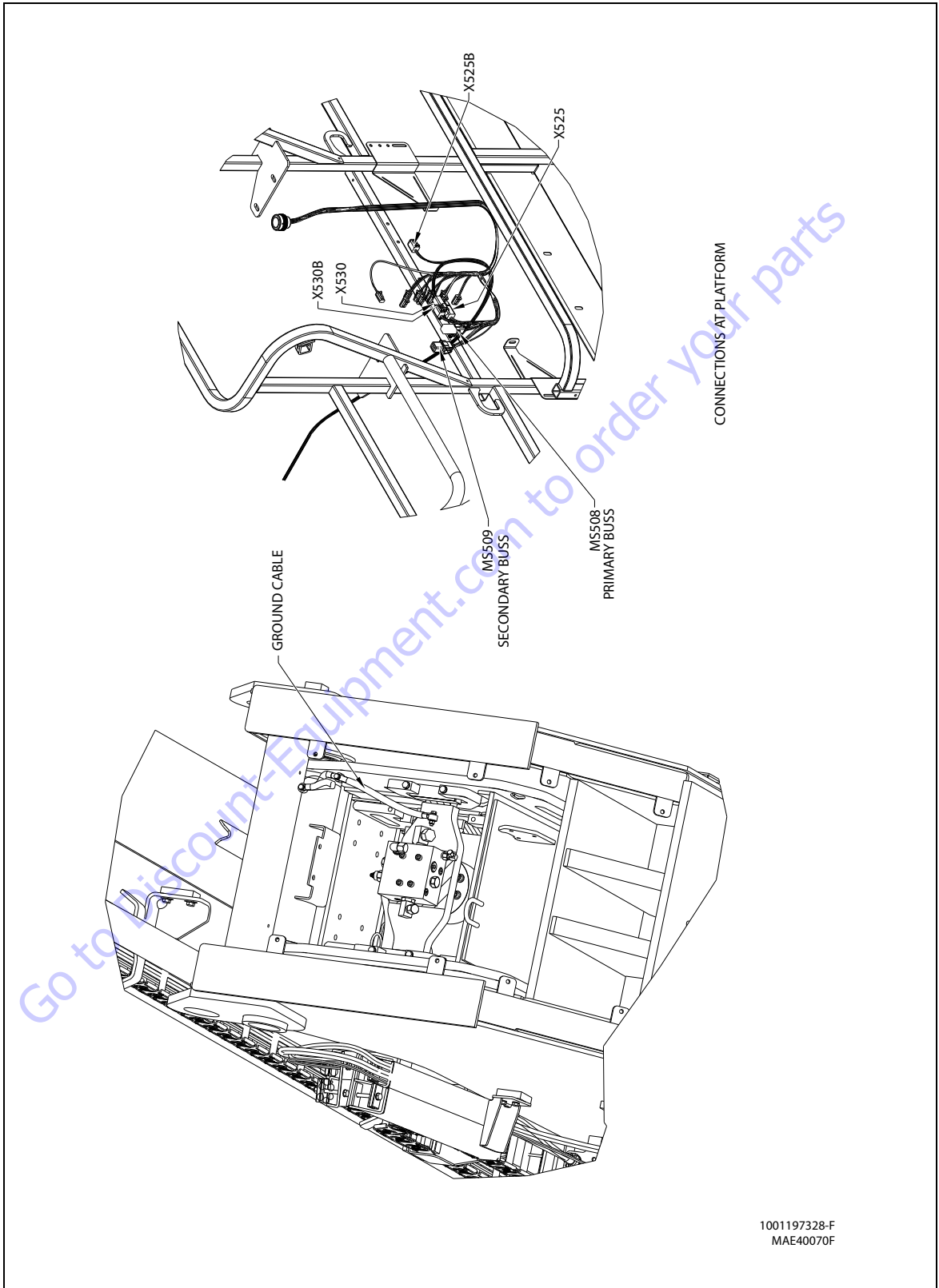


Figure 7-40. Boom Electrical Installation (SkyPower) - Sheet 5 of 6



1001197328-F  
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Figure 7-41. Boom Electrical Installation (SkyPower) - Sheet 6 of 6

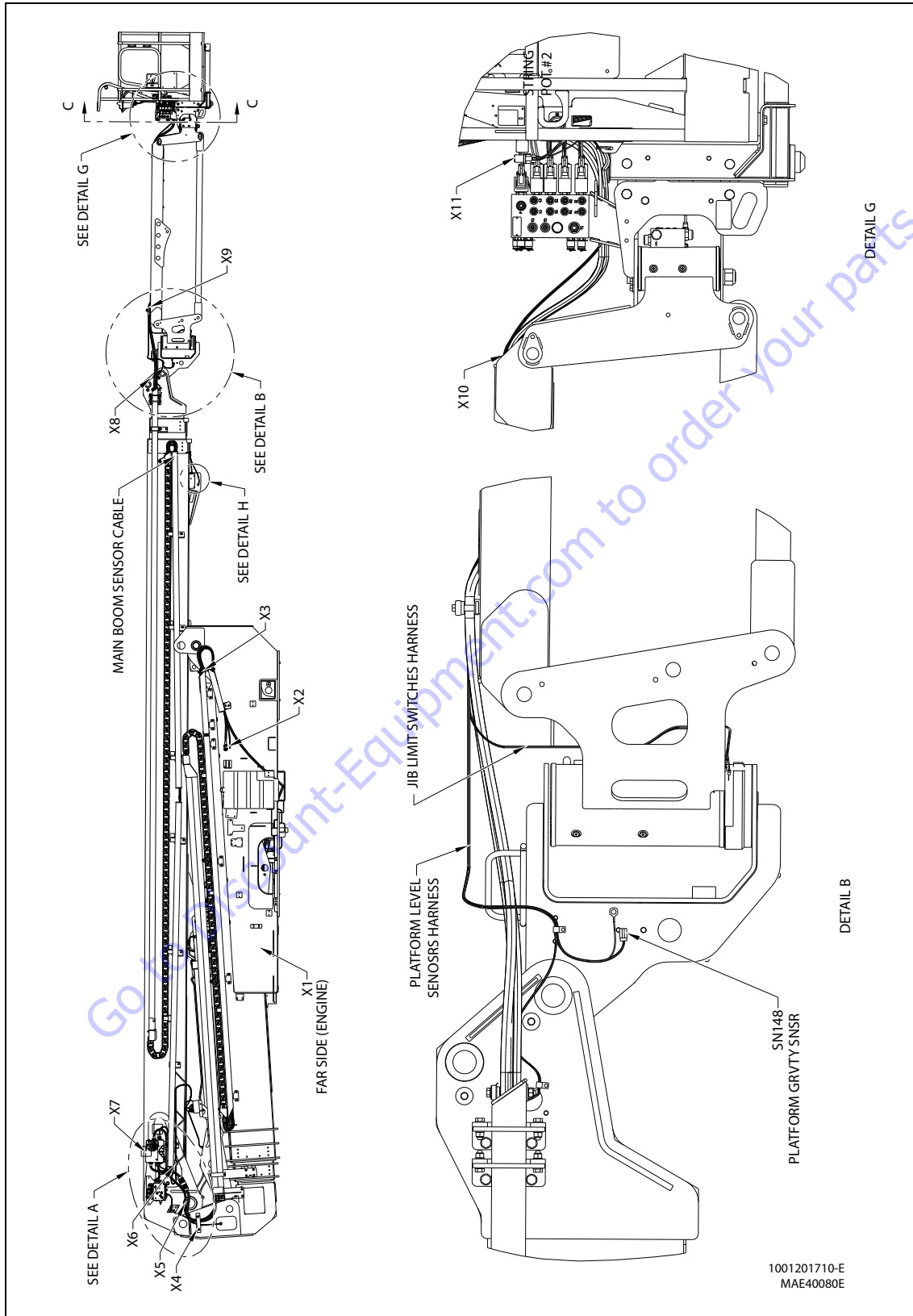


Figure 7-42. Boom Electrical Installation (4000W Generator) - Sheet 1 of 5

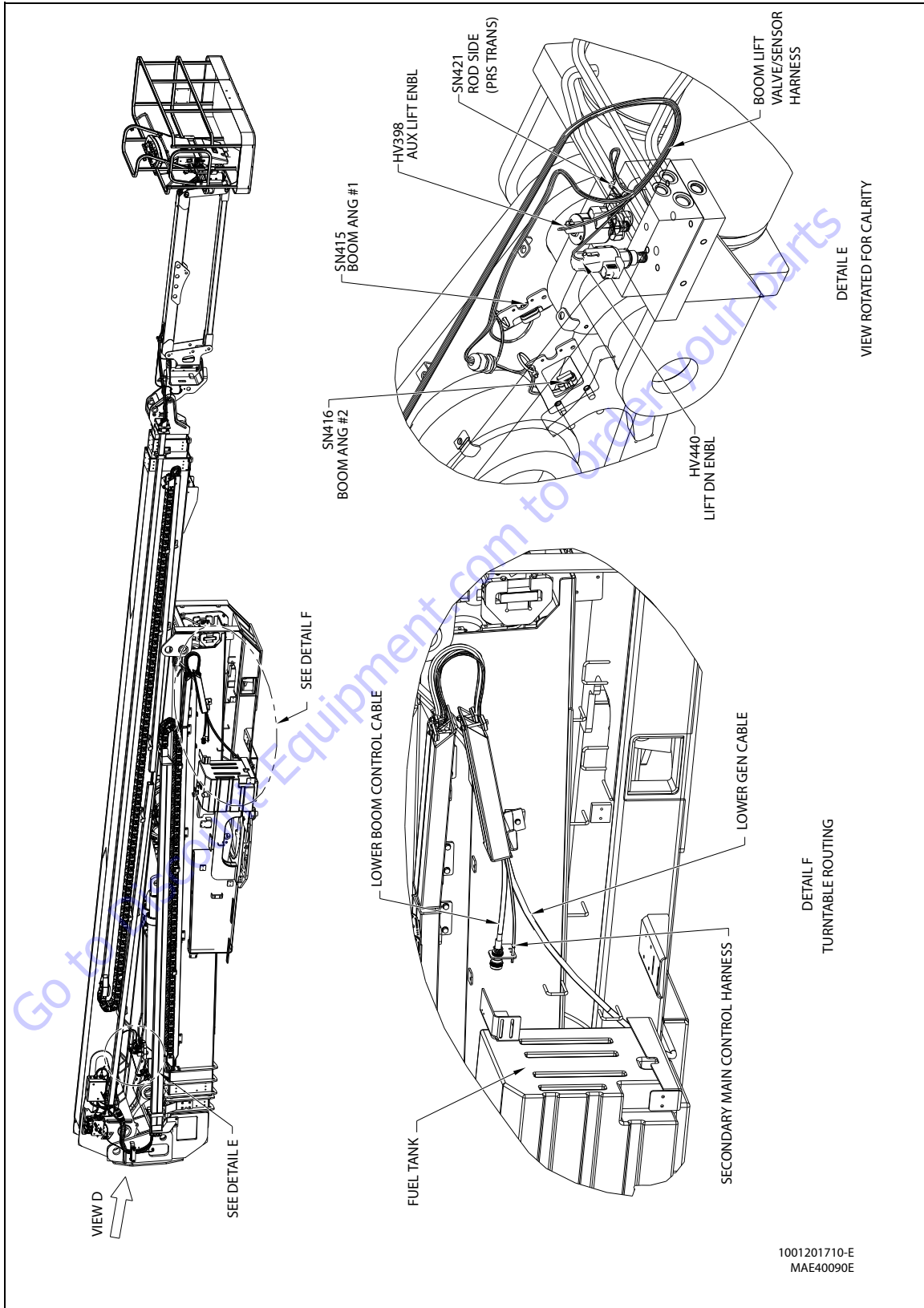


Figure 7-43. Boom Electrical Installation (4000W Generator) - Sheet 2 of 5



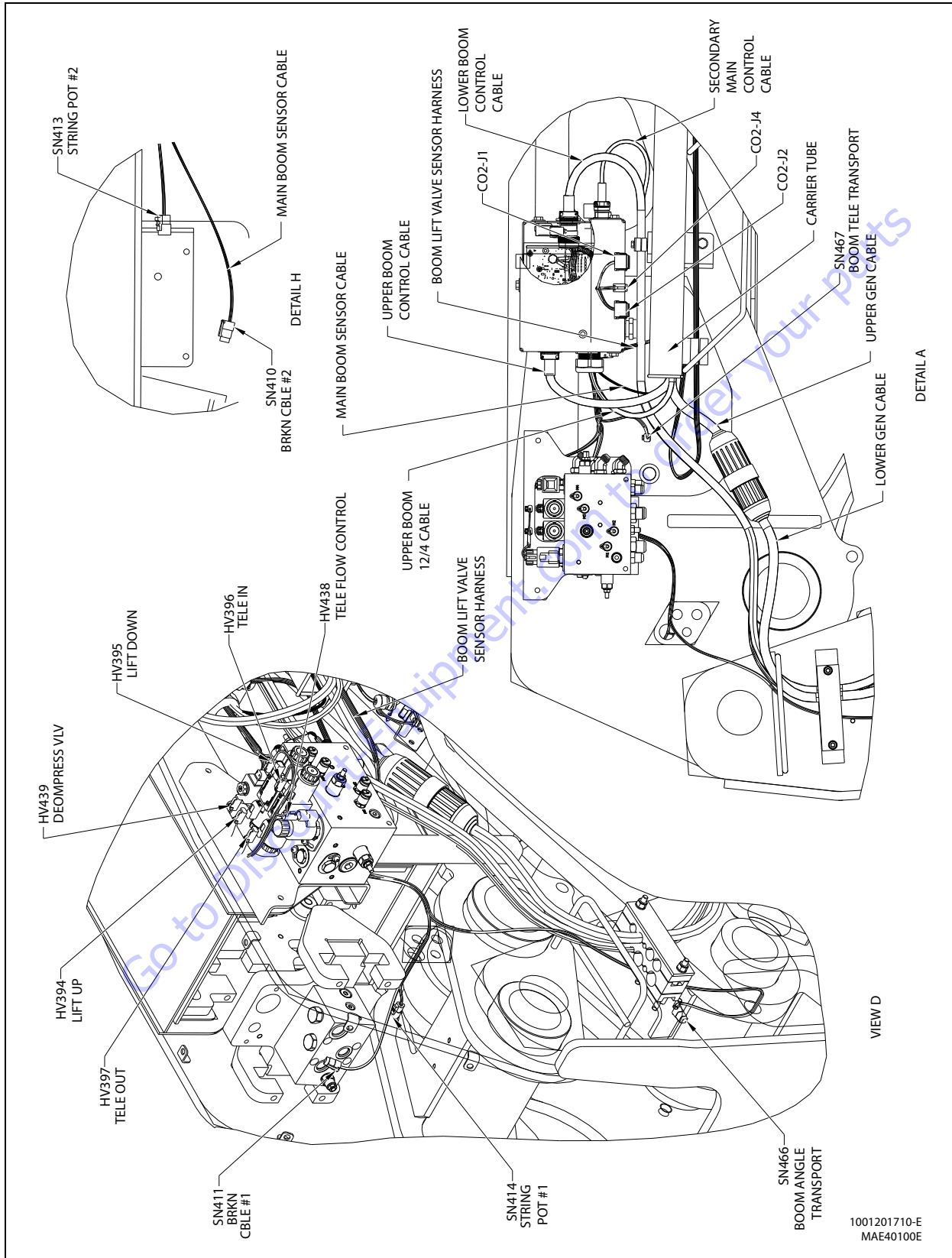


Figure 7-44. Boom Electrical Installation (4000W Generator) - Sheet 3 of 5

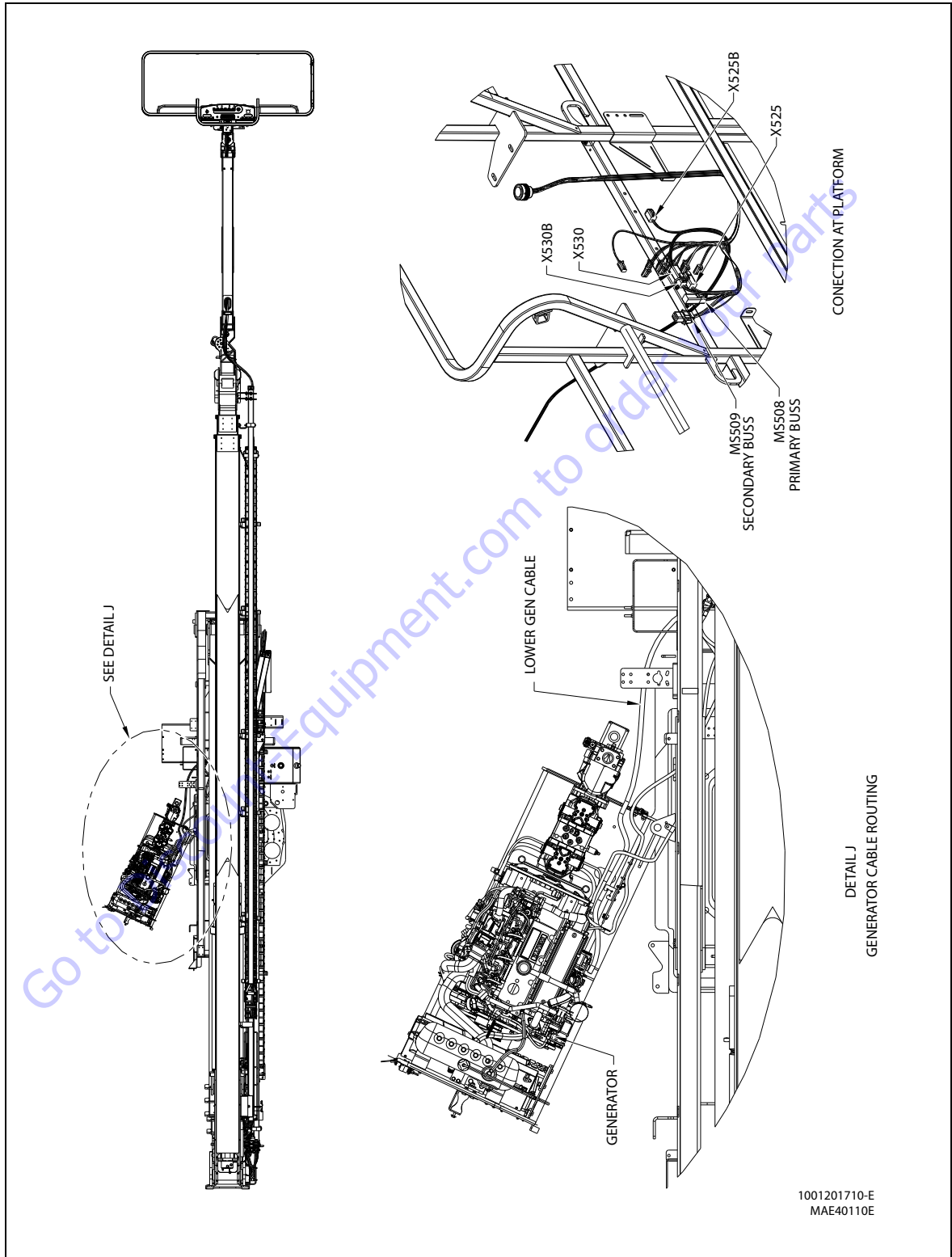


Figure 7-45. Boom Electrical Installation (4000W Generator) - Sheet 4 of 5

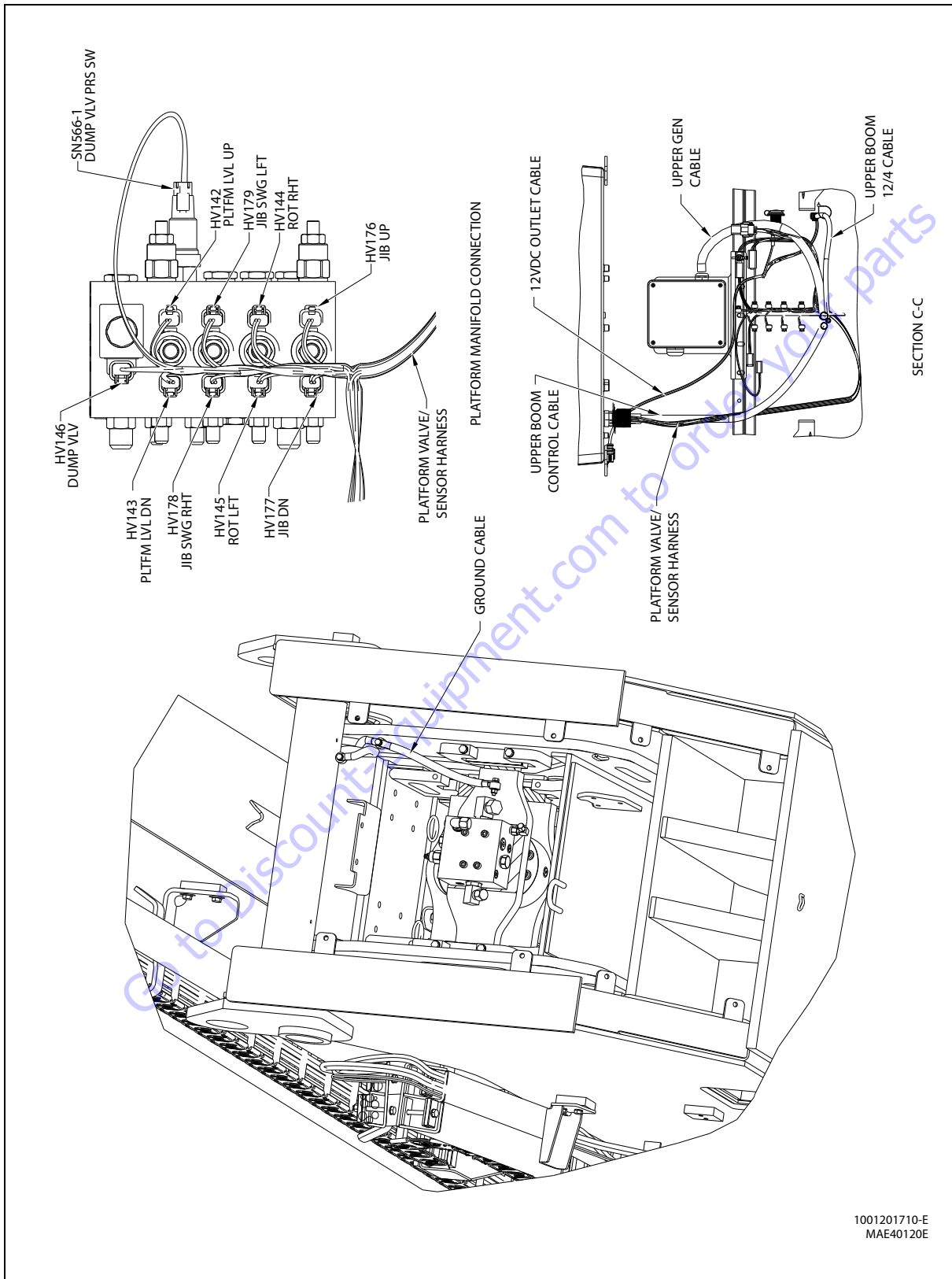


Figure 7-46. Boom Electrical Installation (4000W Generator) - Sheet 5 of 5

1001201710-E  
MAE40120E

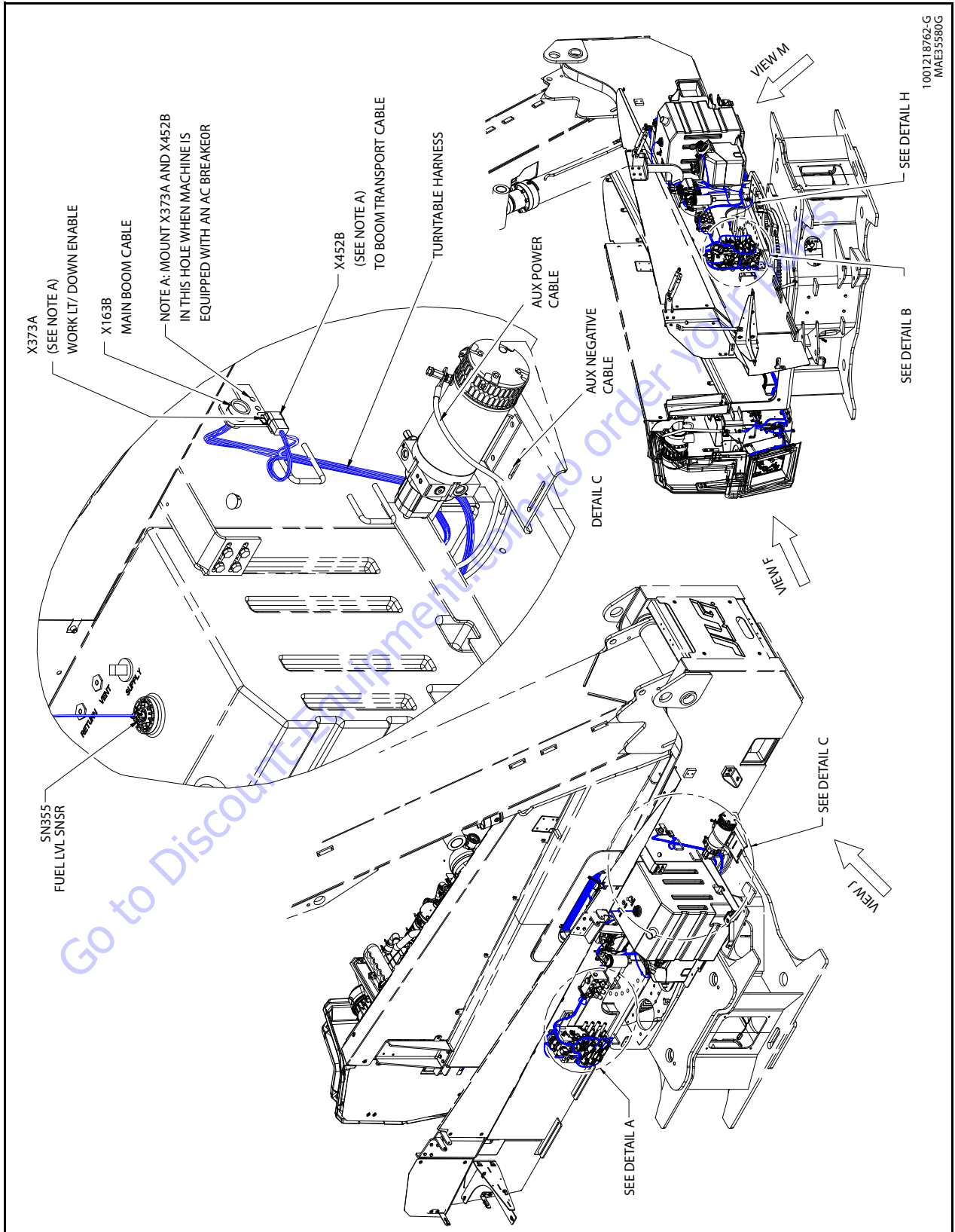
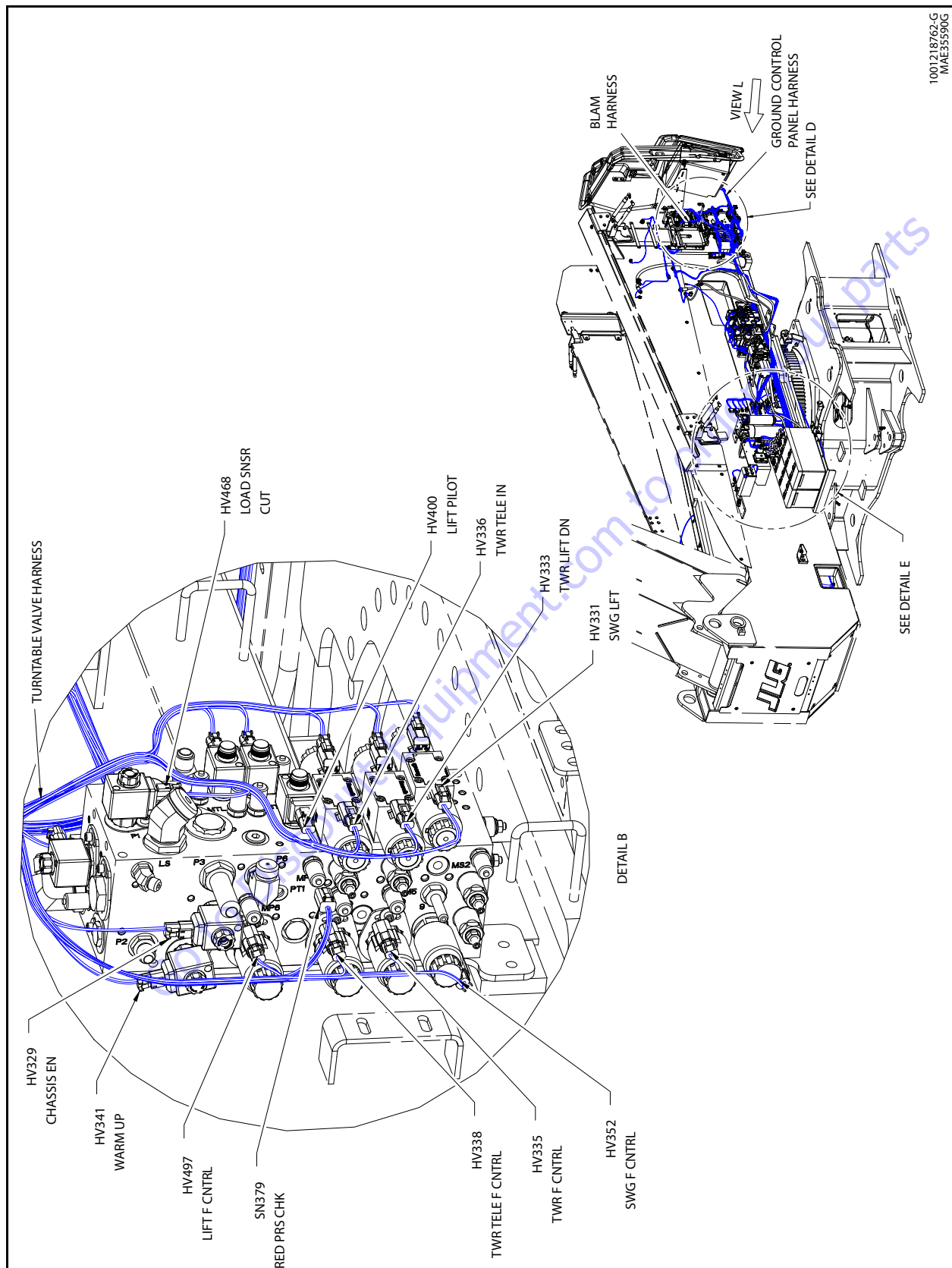
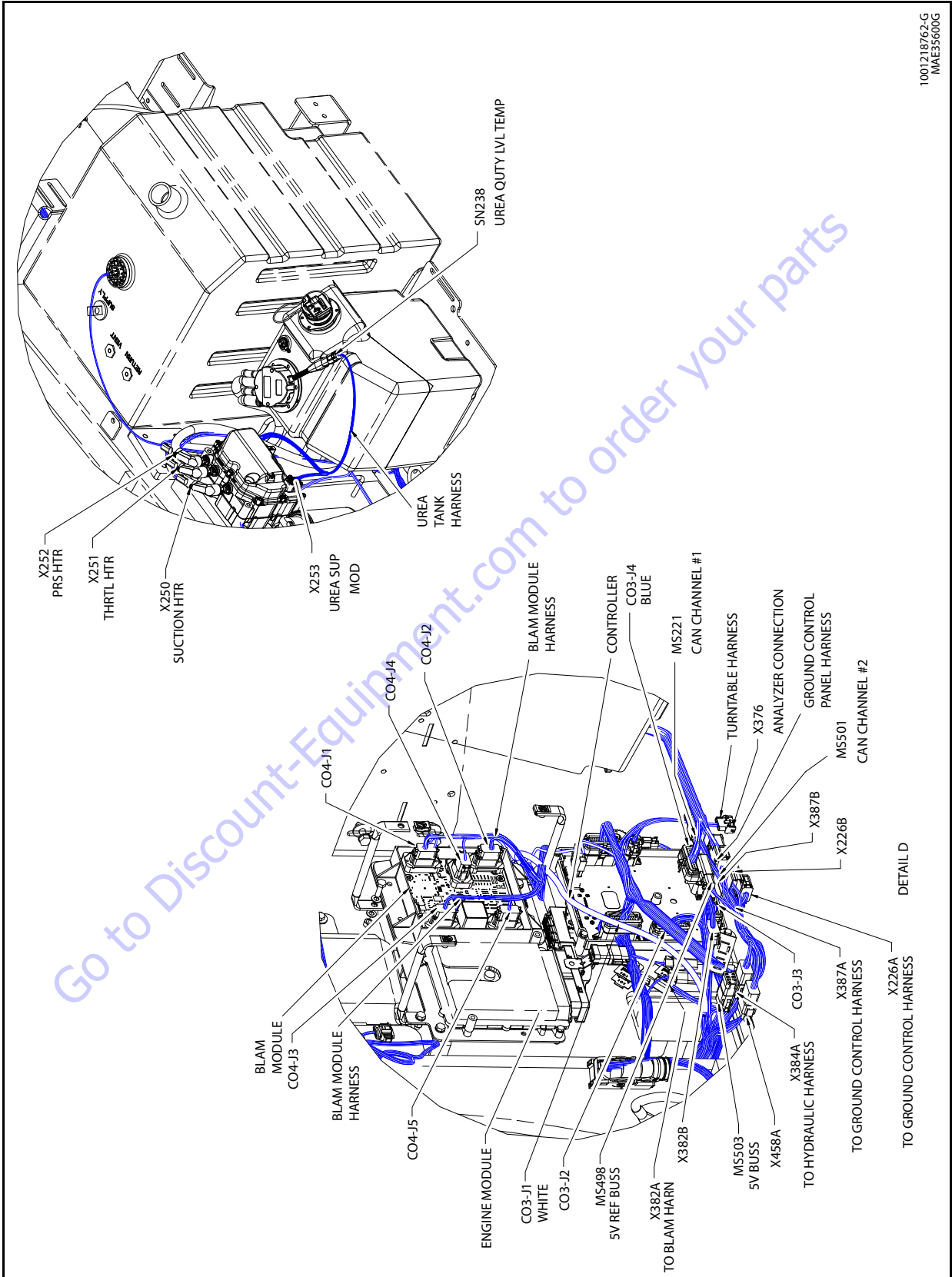


Figure 7-47. Chassis & Turntable Electrical Installation (HRC) - Sheet 1 of 11



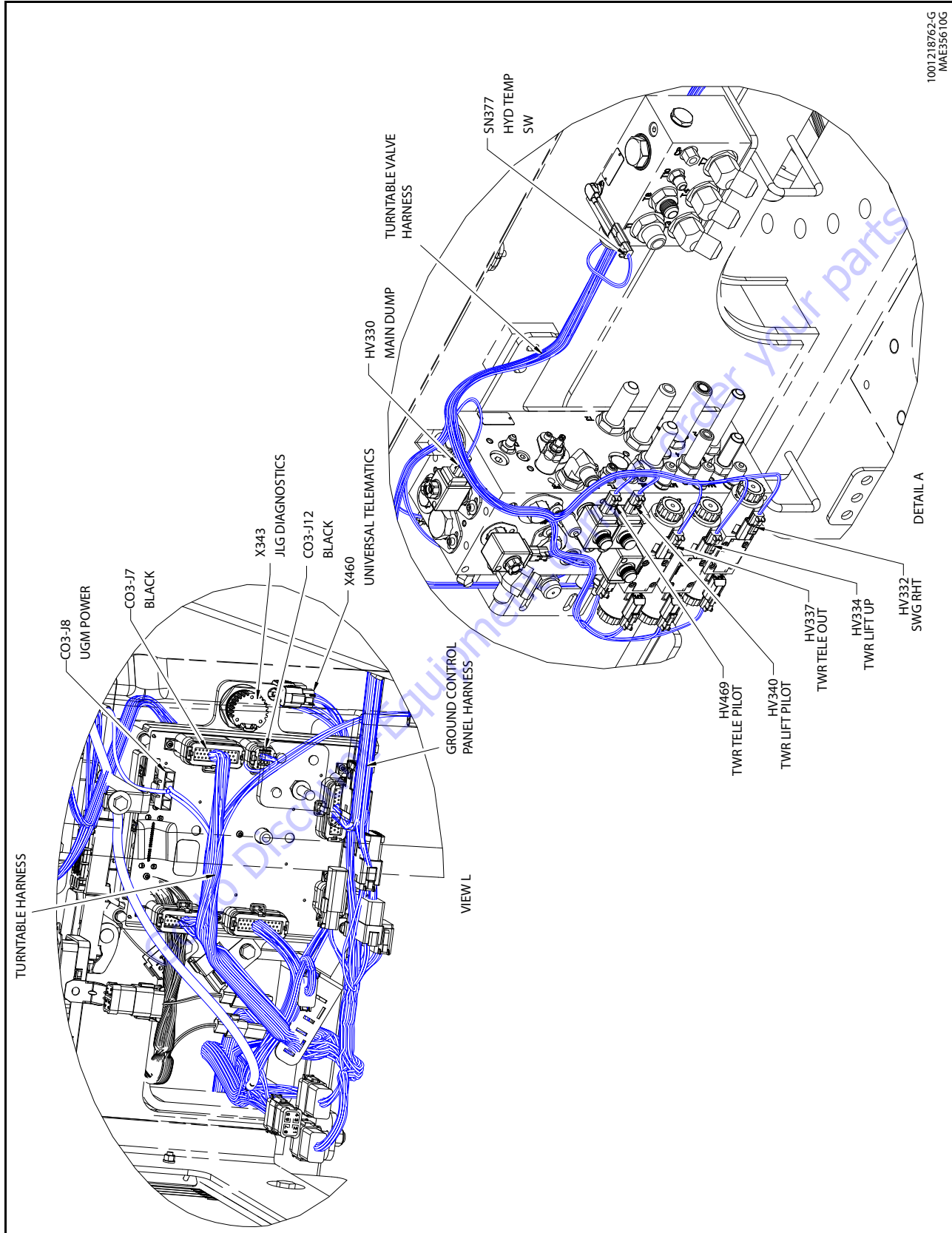
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Figure 7-48. Chassis & Turntable Electrical Installation (HRC) - Sheet 2 of 11



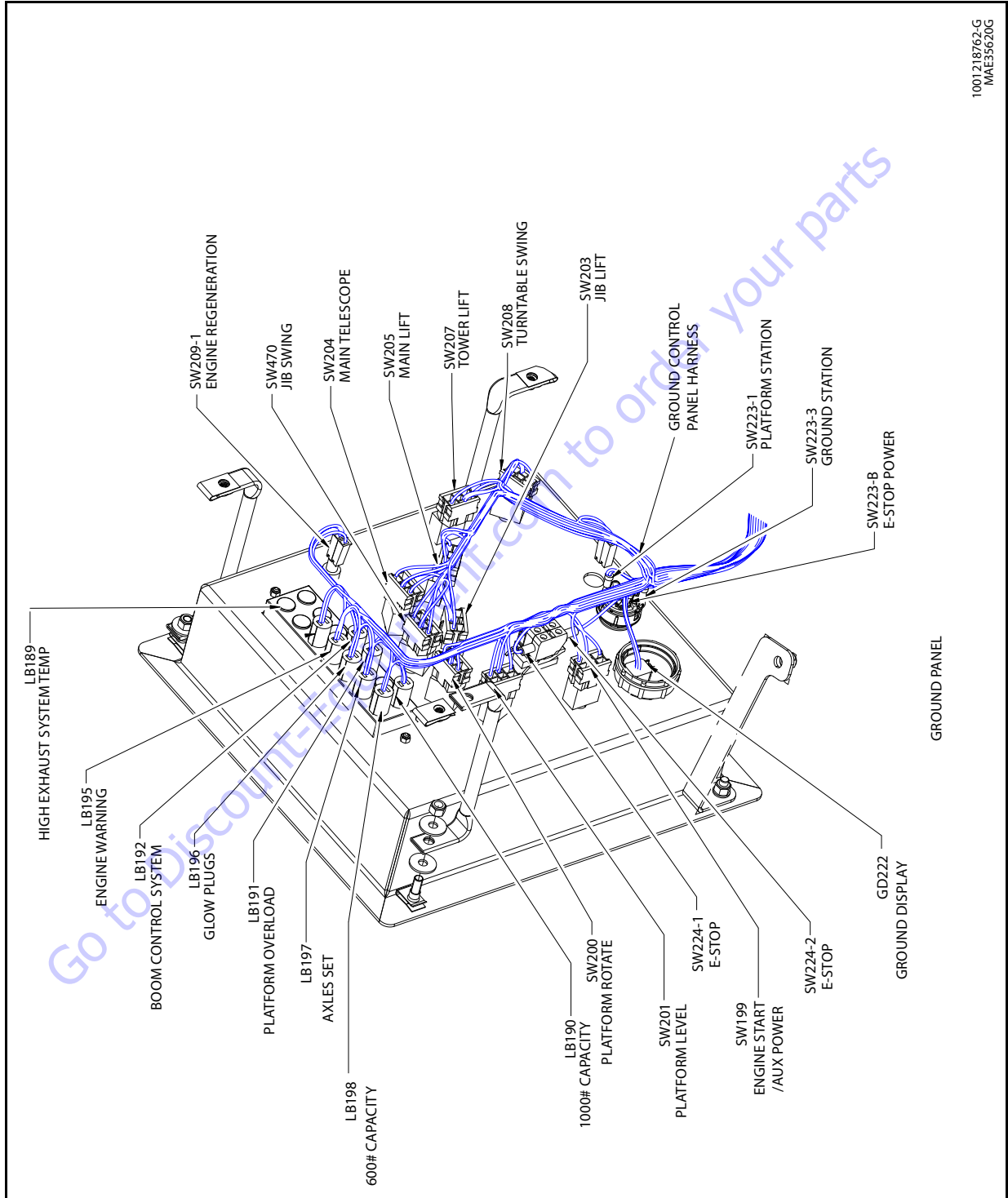
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Figure 7-49. Chassis & Turntable Electrical Installation (HRC) - Sheet 3 of 11



1001218762-G  
MAE35610G

Figure 7-50. Chassis & Turntable Electrical Installation (HIRC) - Sheet 4 of 11



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Figure 7-51. Chassis & Turntable Electrical Installation (HRC) - Sheet 5 of 11



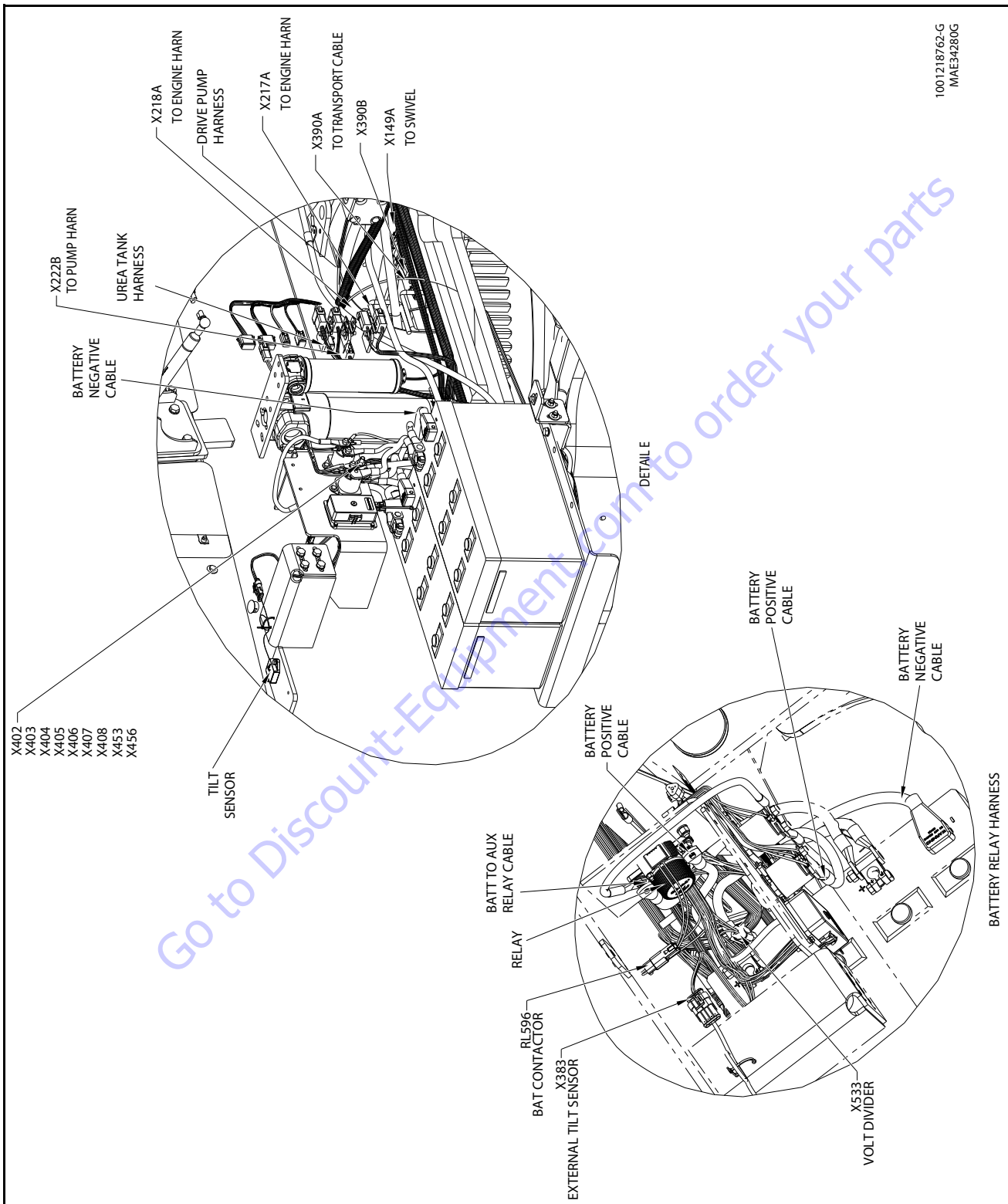
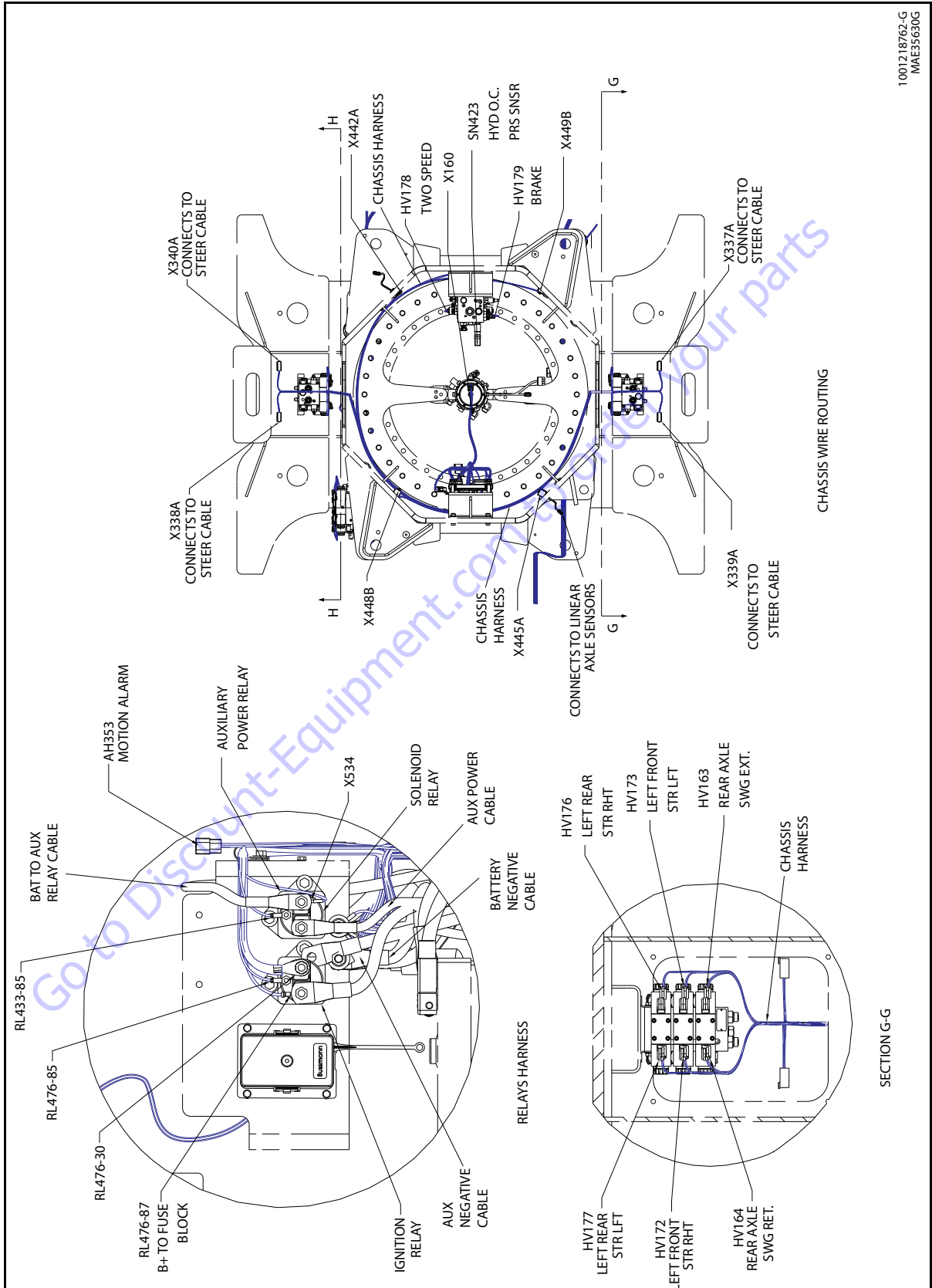


Figure 7-52. Chassis & Turntable Electrical Installation (HRC) - Sheet 6 of 11



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Figure 7-53. Chassis & Turntable Electrical Installation (HRC) - Sheet 7 of 11

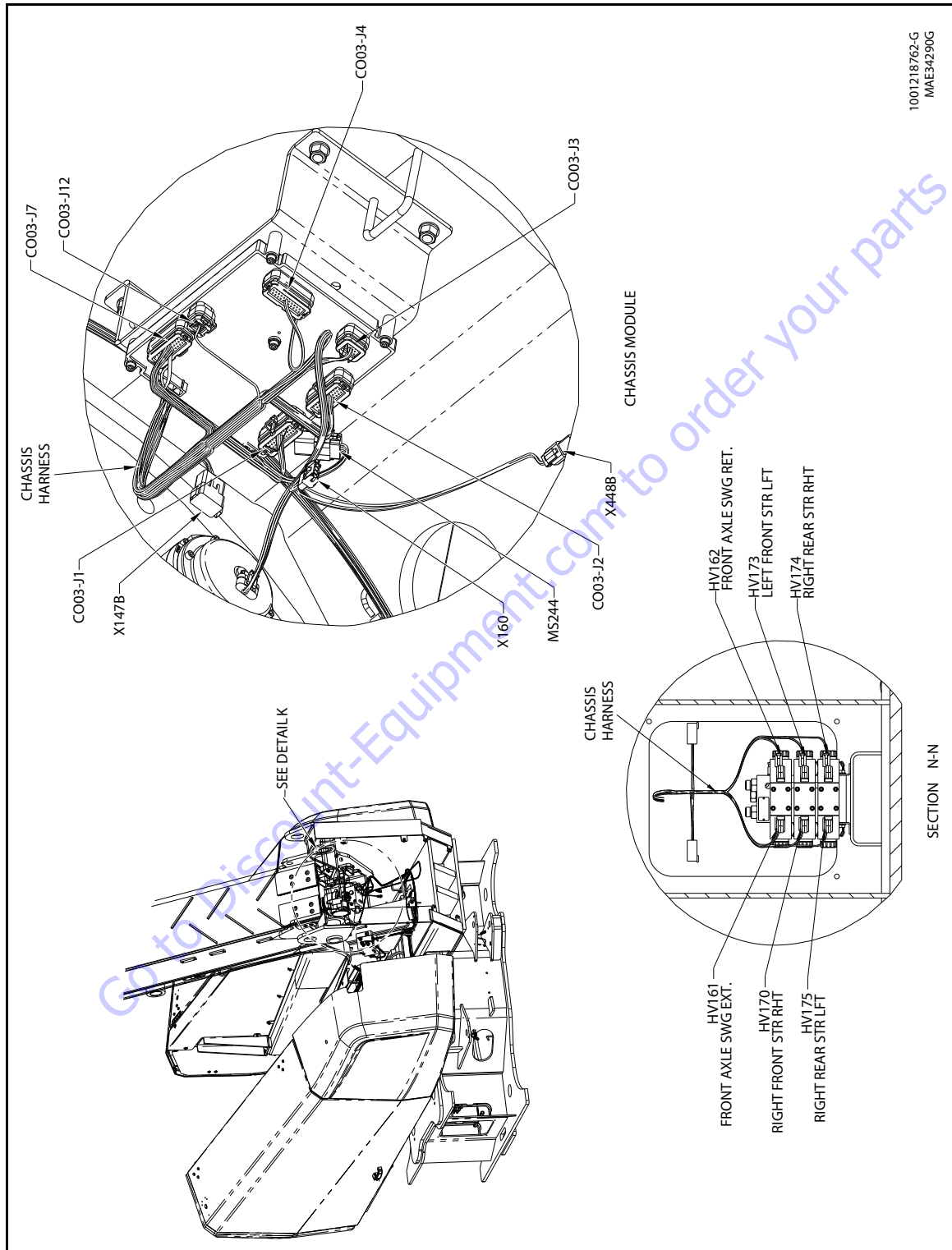


Figure 7-54. Chassis & Turntable Electrical Installation (HRC) - Sheet 8 of 11

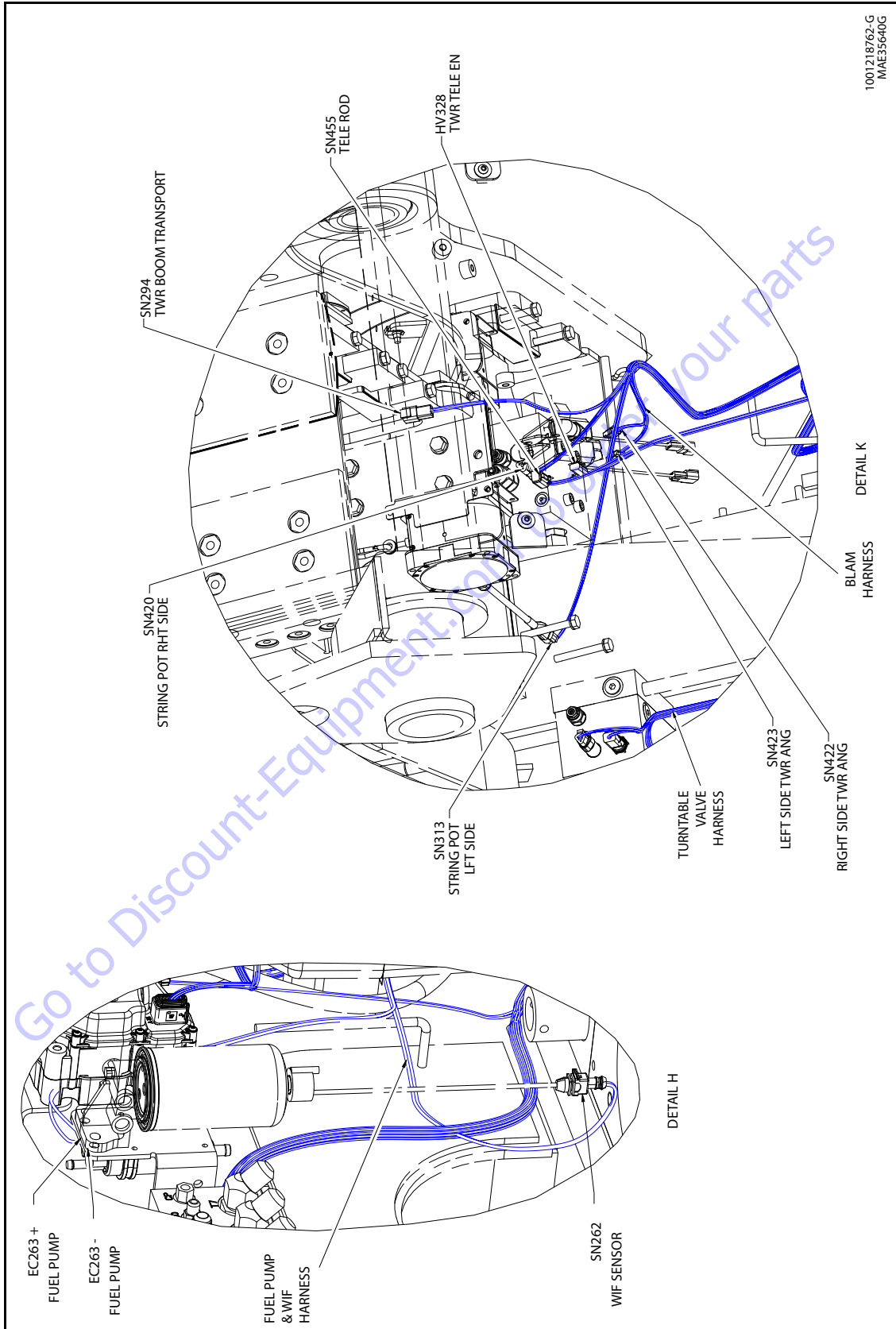


Figure 7-55. Chassis & Turntable Electrical Installation (HRC) - Sheet 9 of 11

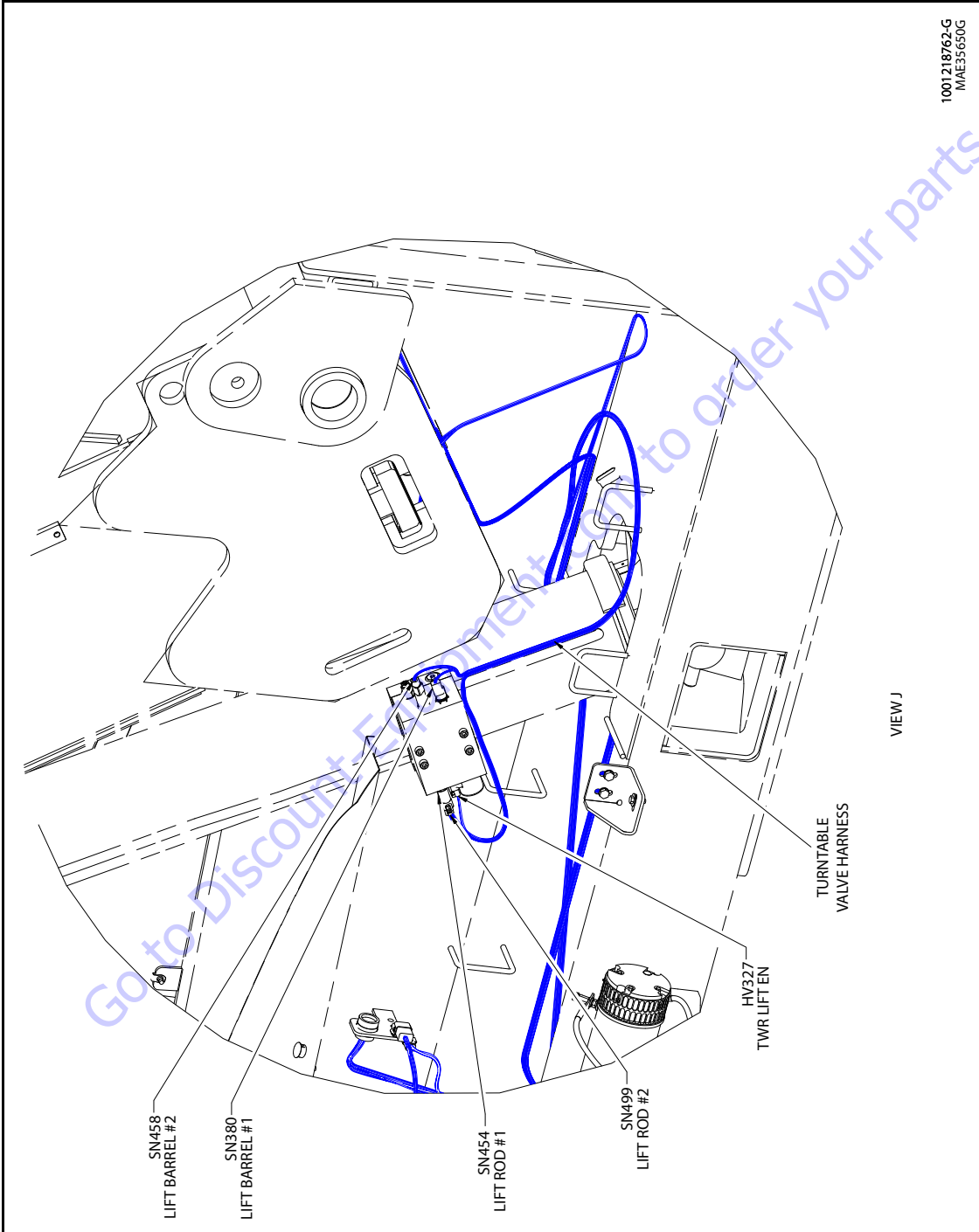


Figure 7-56. Chassis & Turntable Electrical Installation (HRC) - Sheet 10 of 11

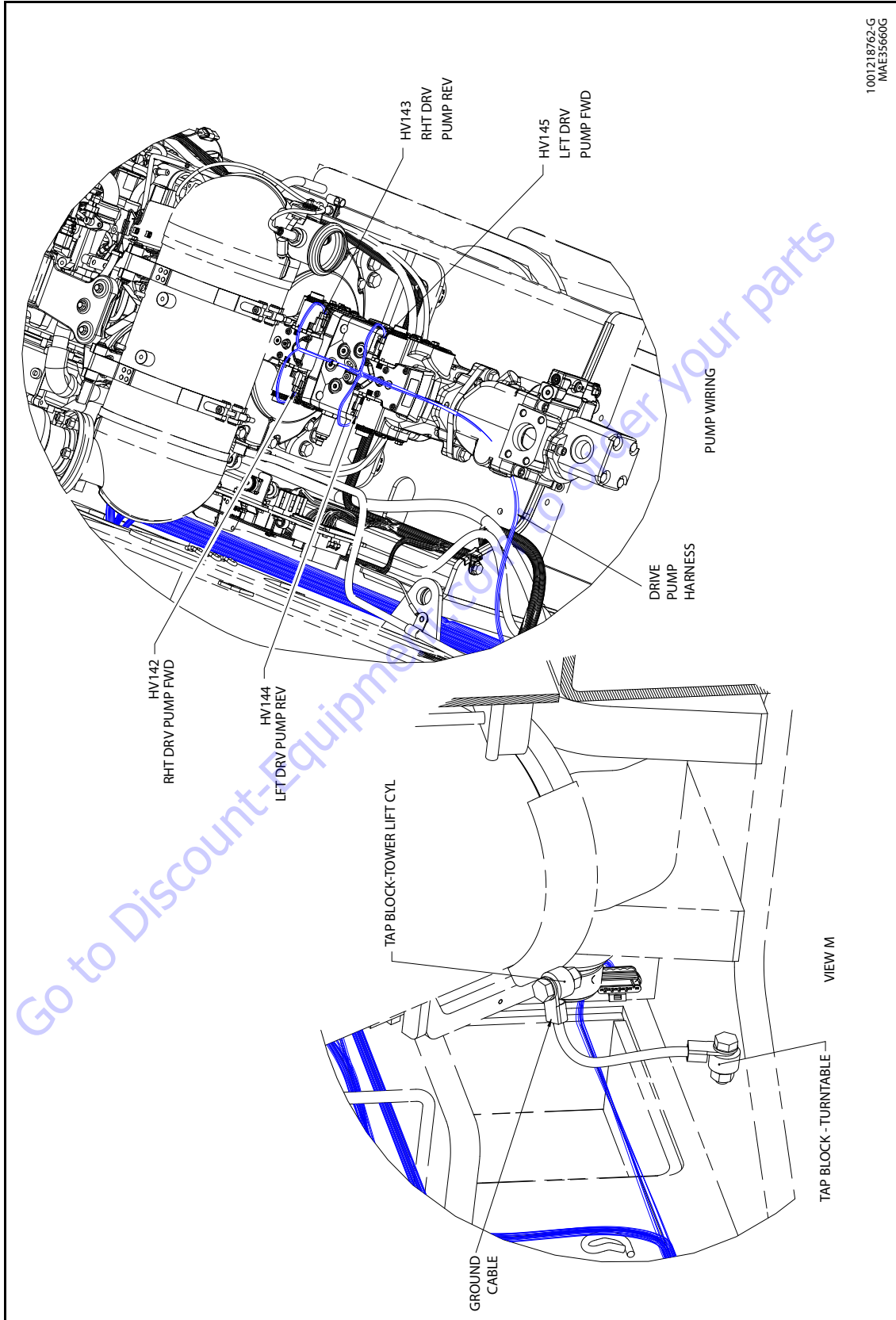


Figure 7-57. Chassis & Turntable Electrical Installation (HRC) - Sheet 11 of 11

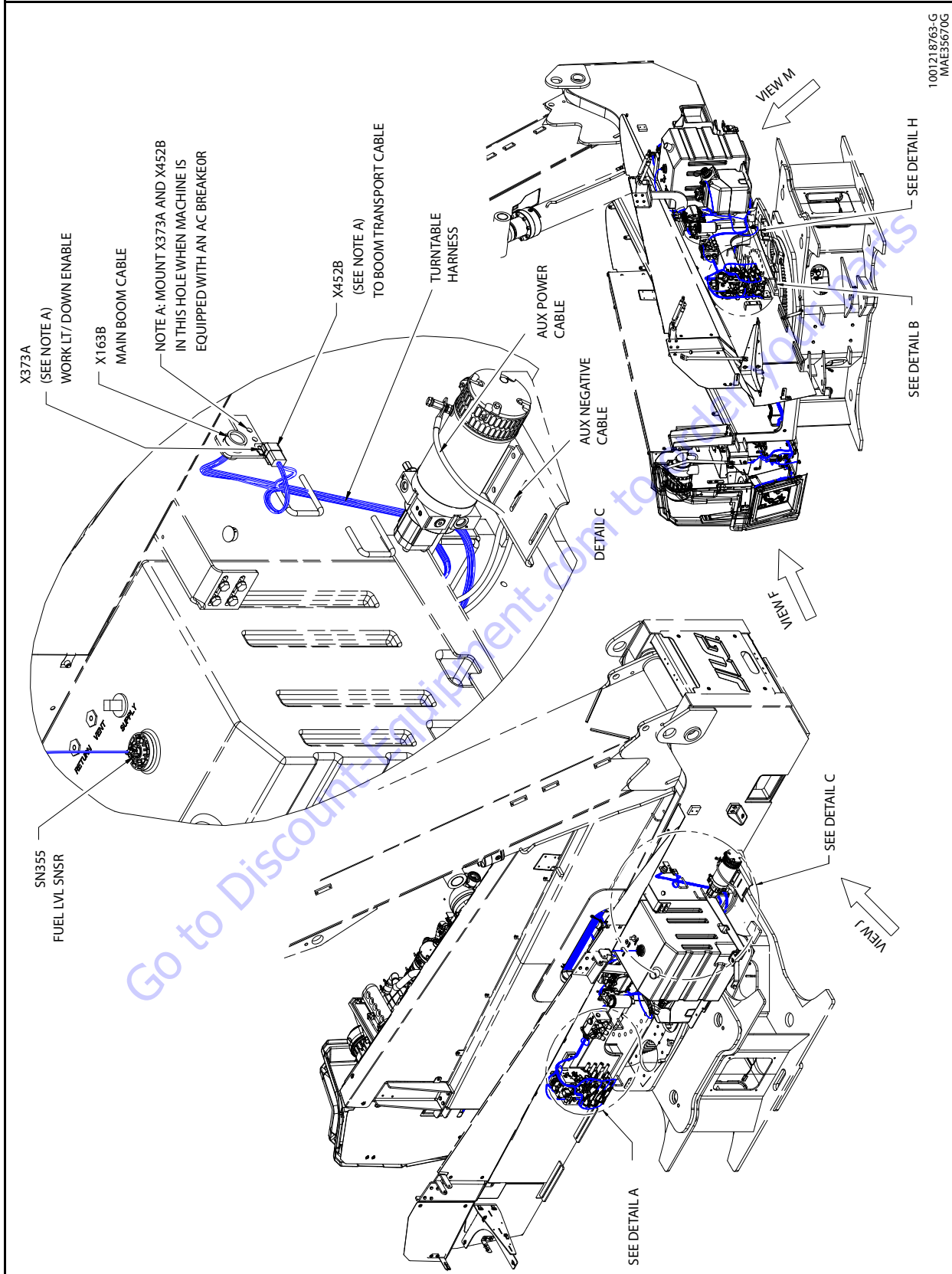
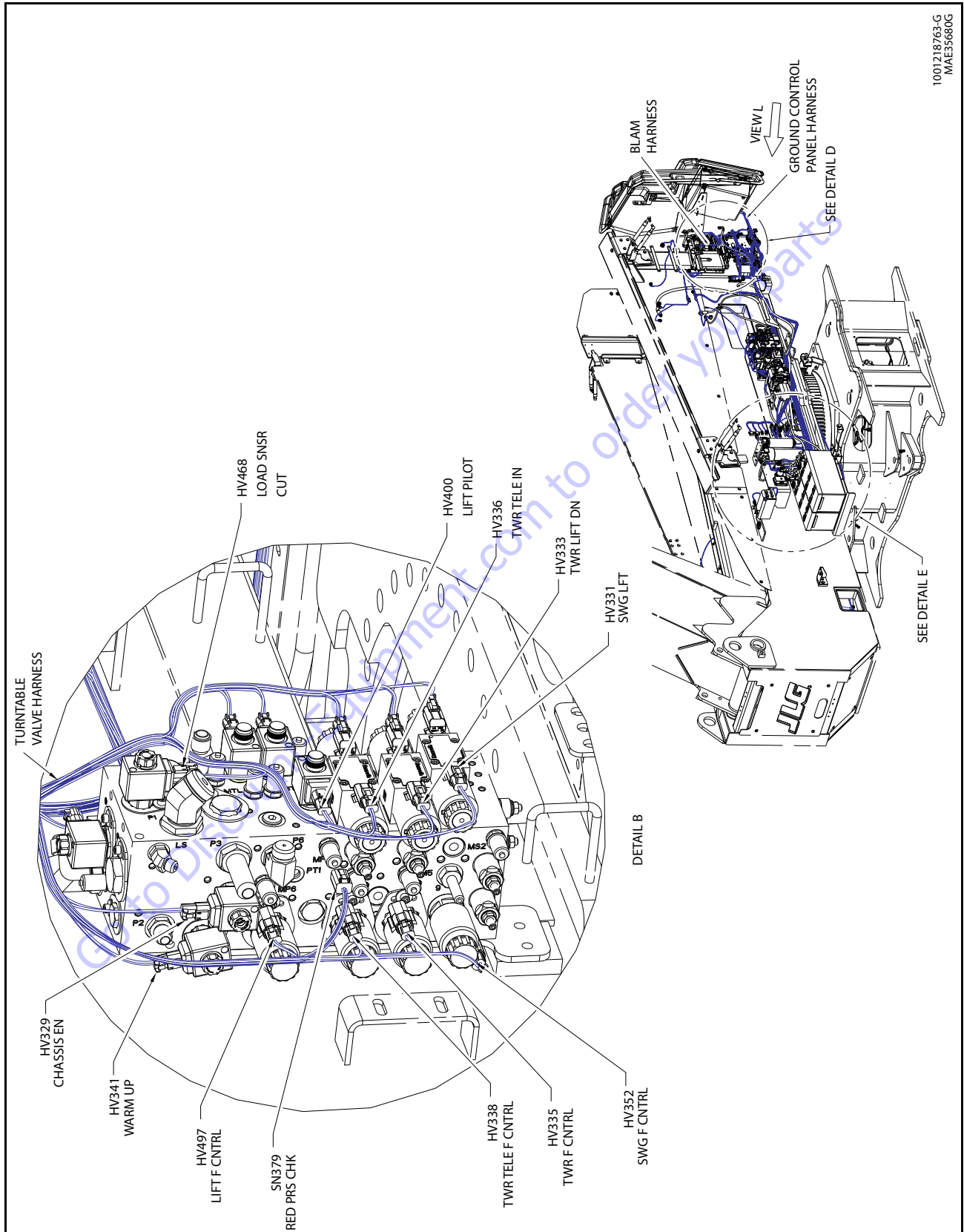


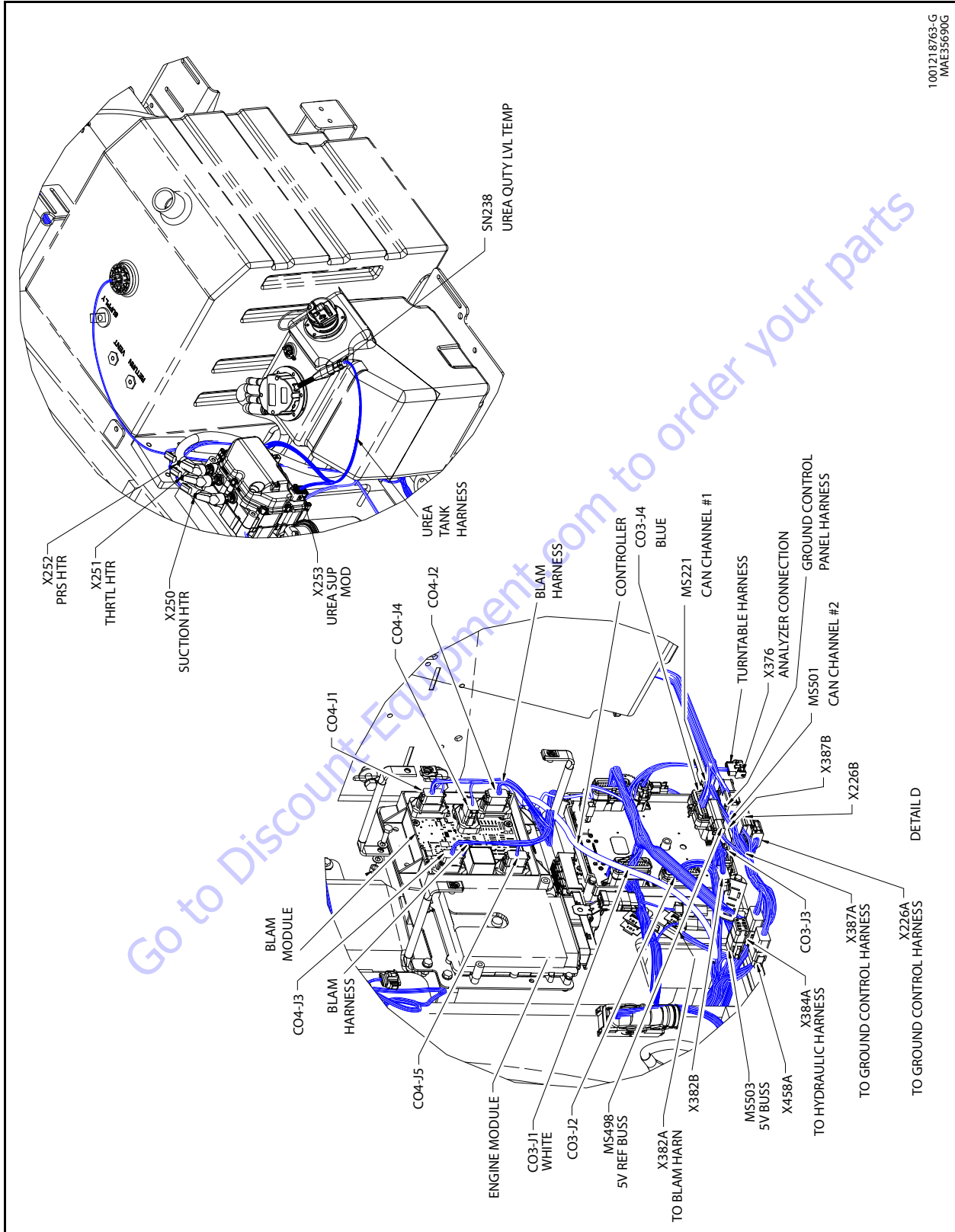
Figure 7-58. Chassis & Turntable Electrical Installation (CE) - Sheet 1 of 11



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Figure 7-59. Chassis & Turntable Electrical Installation (CE) - Sheet 2 of 11





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MAY35690G

Figure 7-60. Chassis & Turntable Electrical Installation (CE) - Sheet 3 of 11