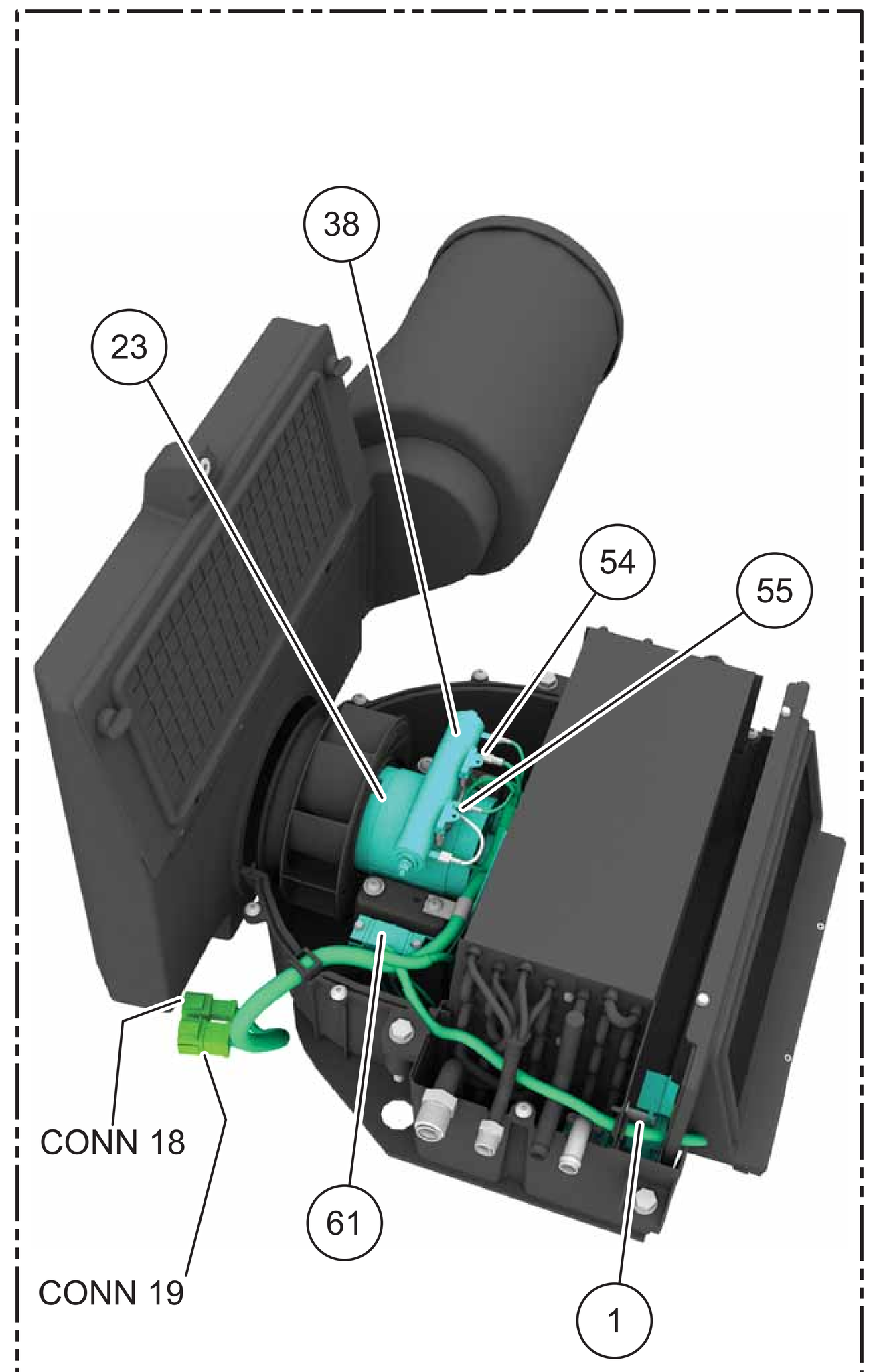
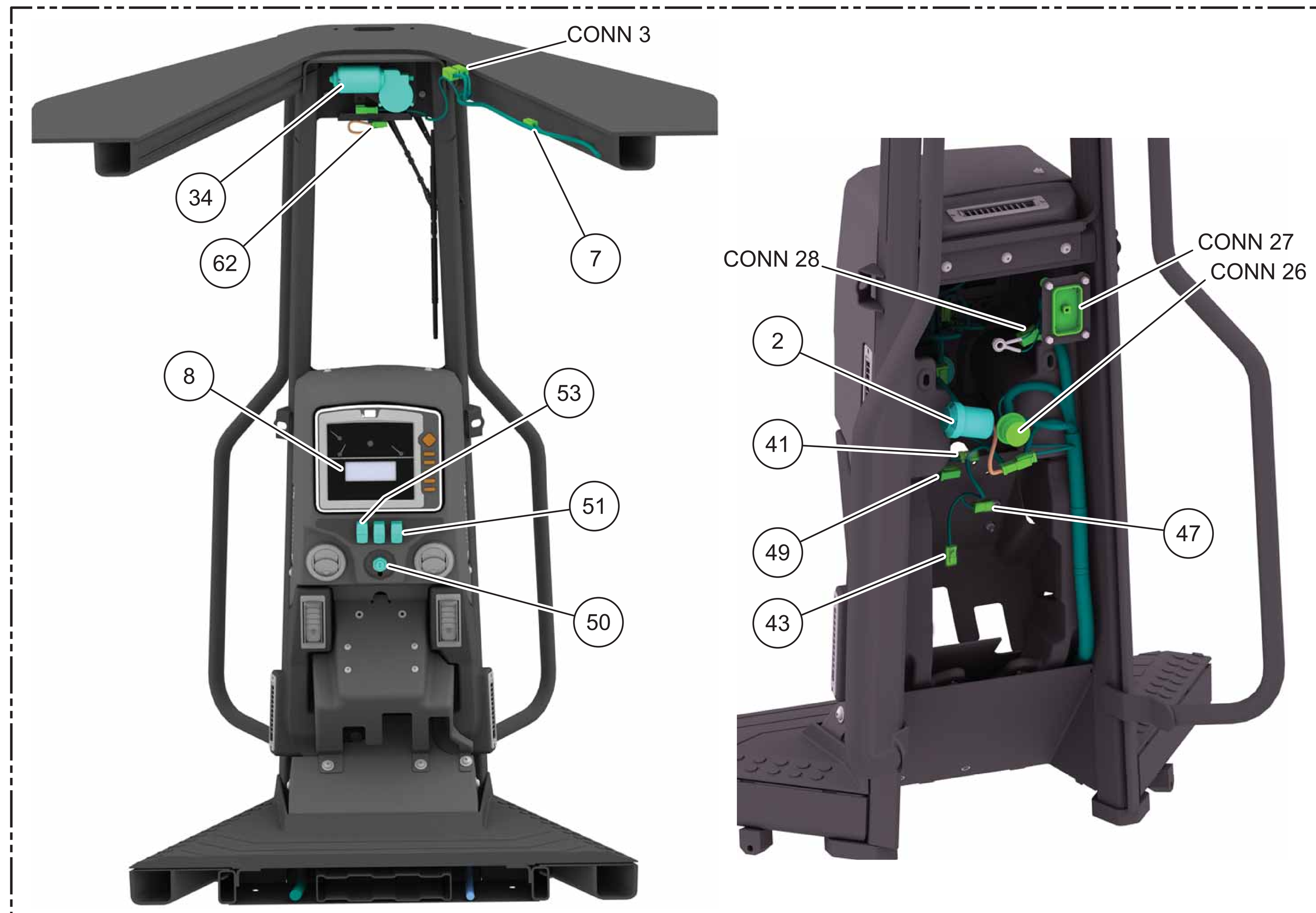
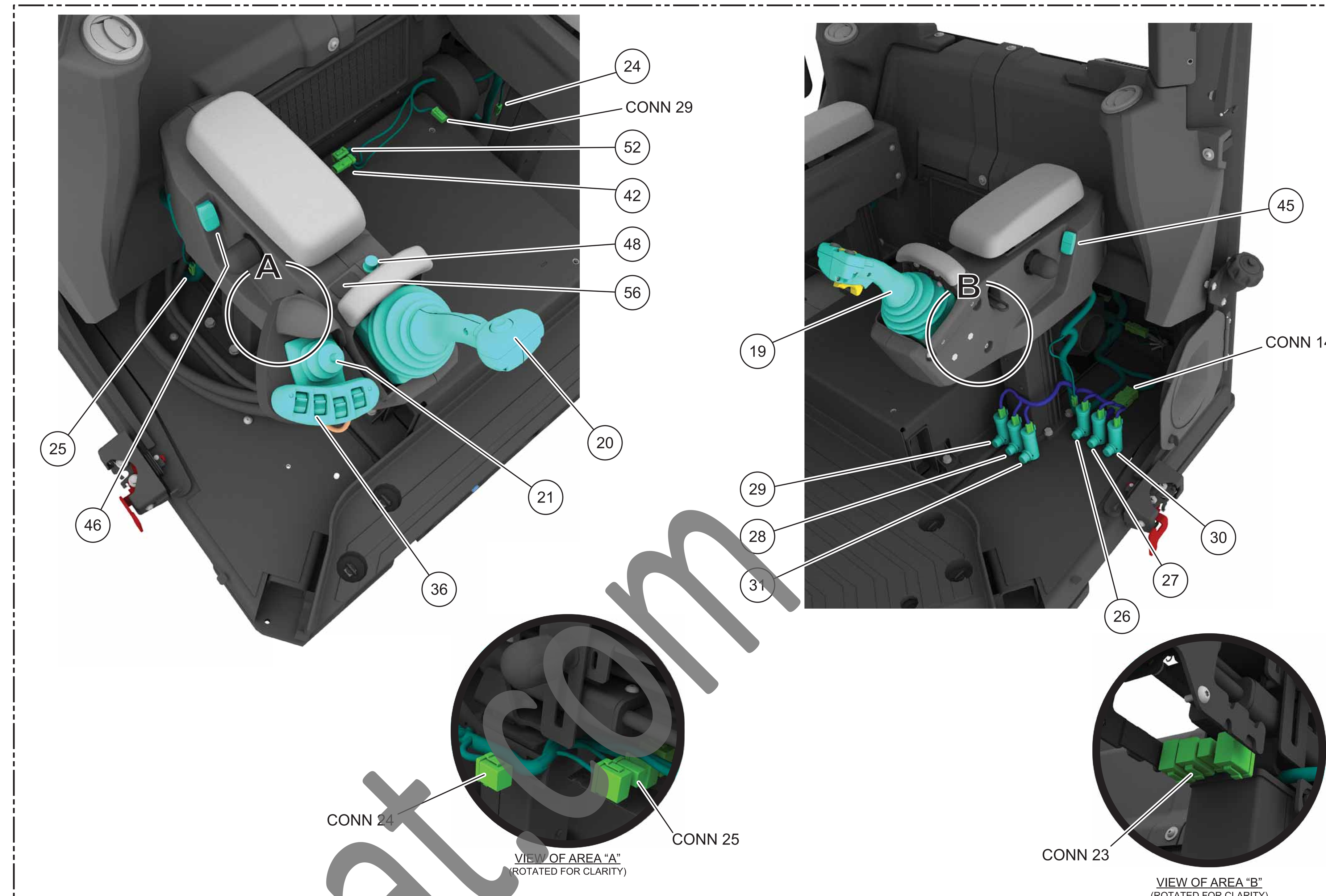


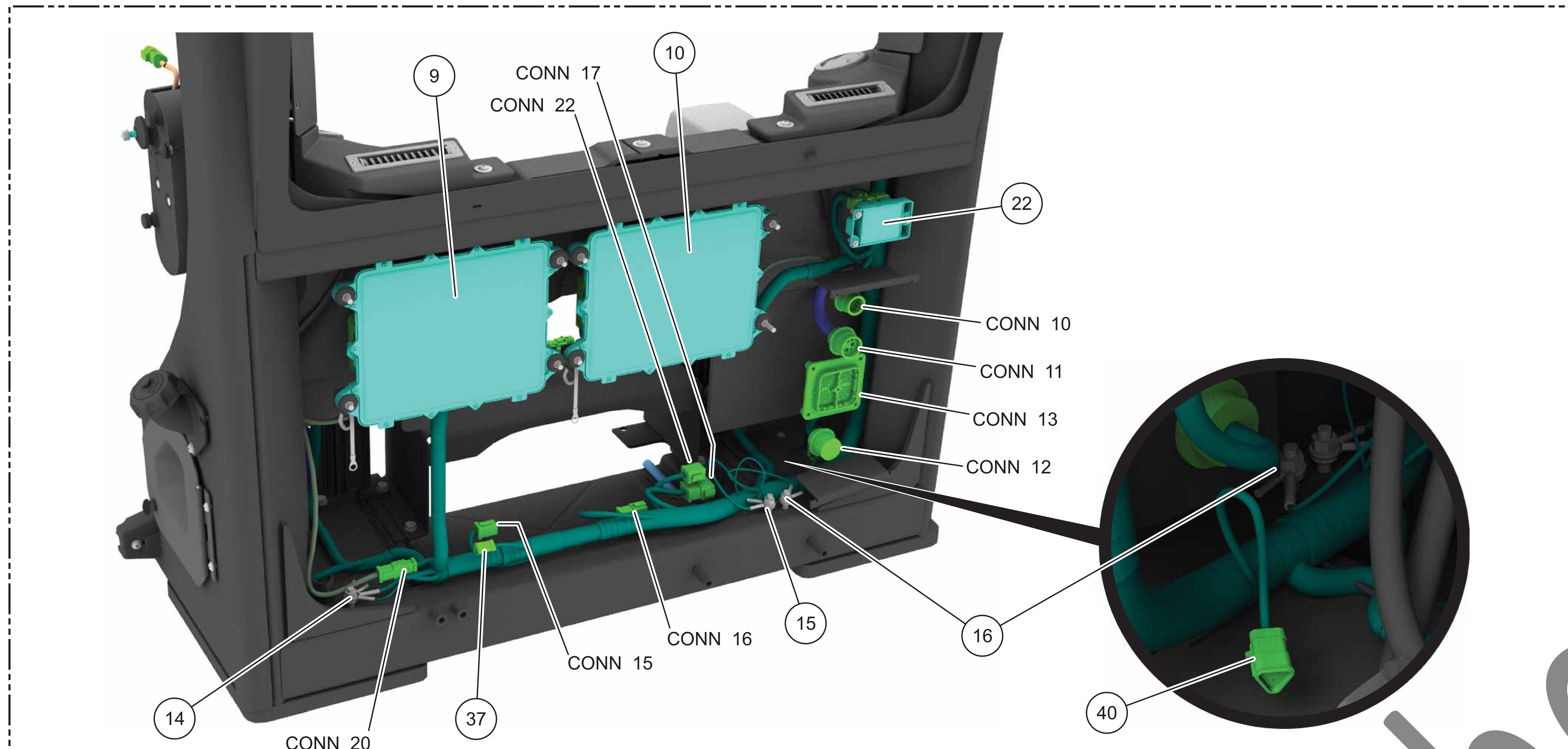
HVAC



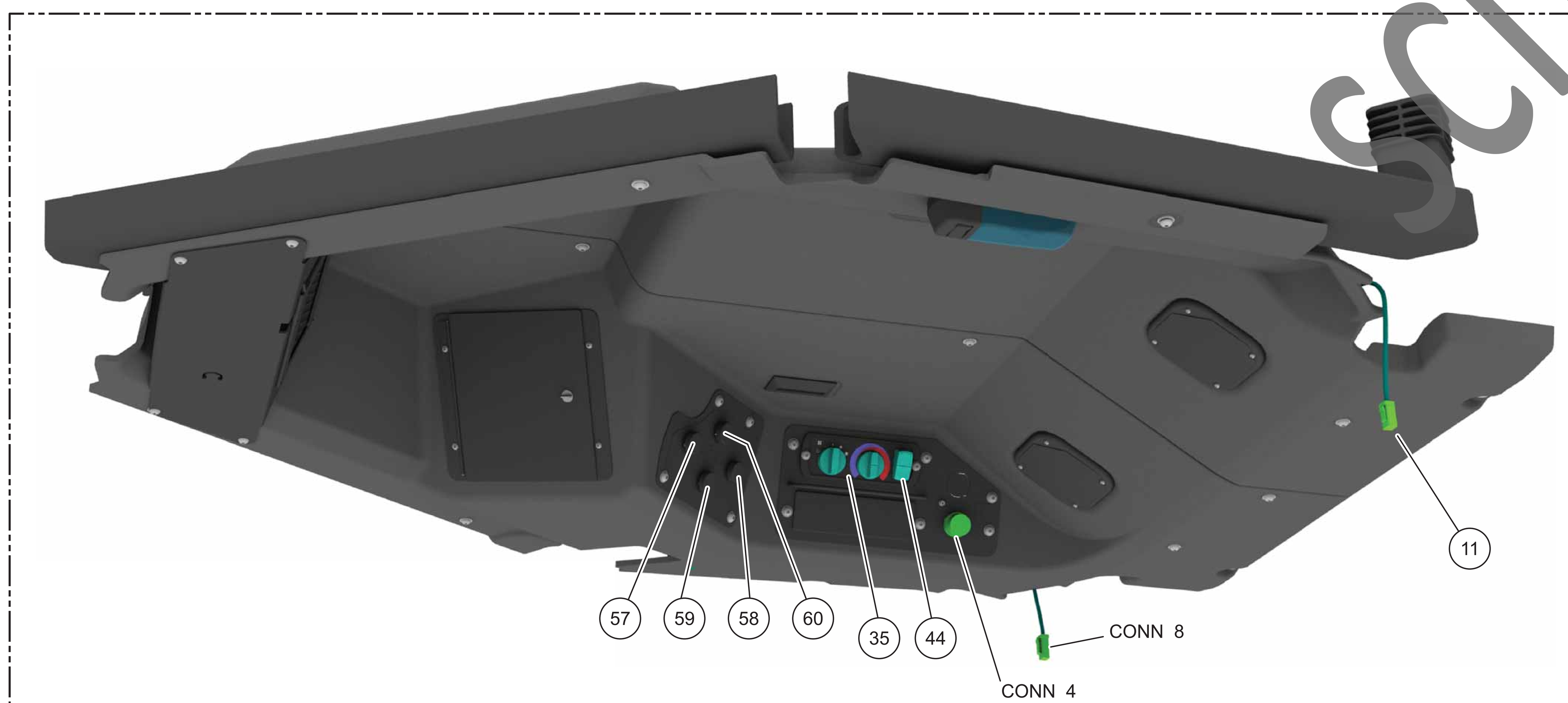
FRONT CONSOLE



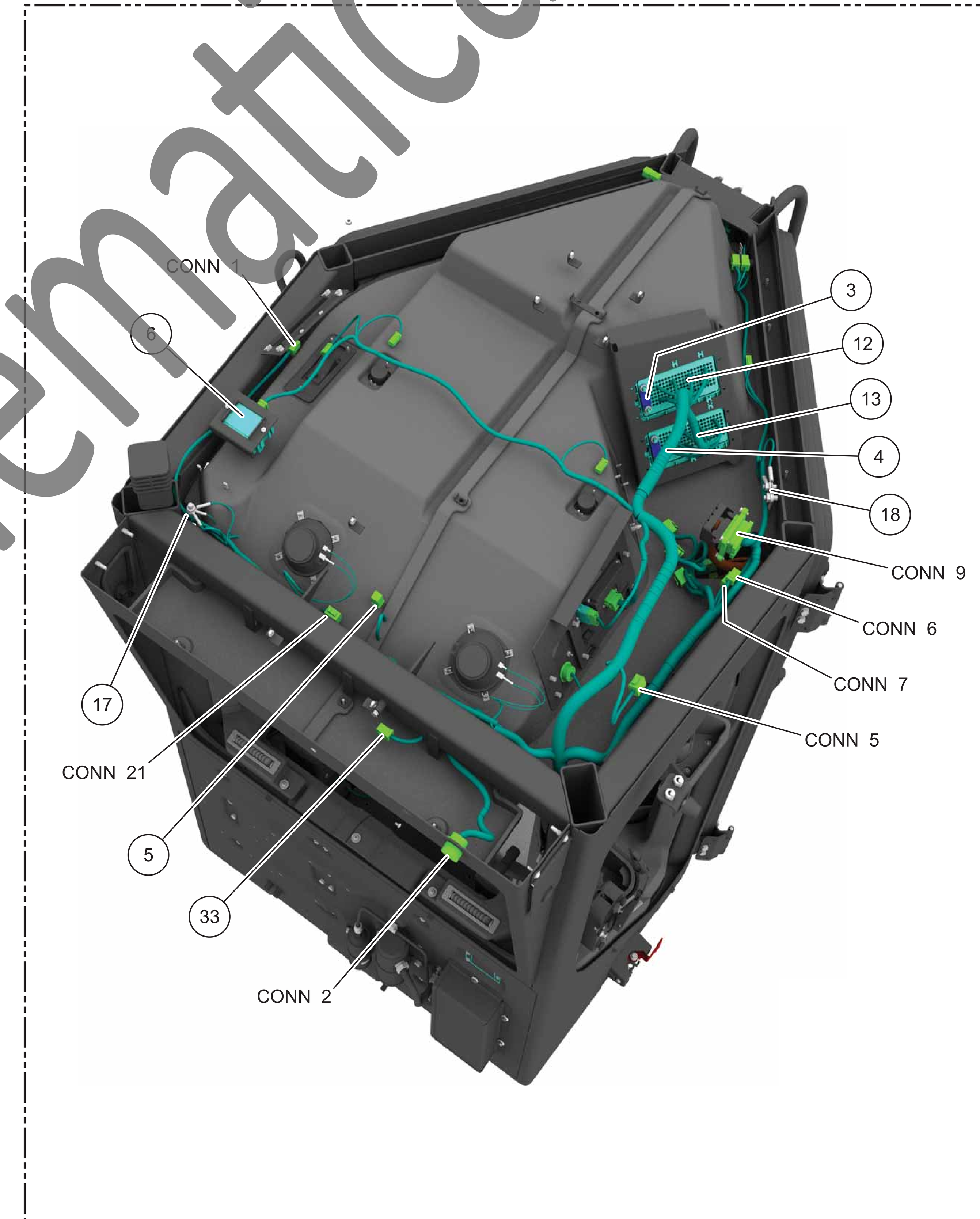
LH AND RH OPERATOR CONSOLES



REAR CAB VIEW



INTERIOR CAB ROOF



EXTERIOR CAB ROOF

LEFT AND RIGHT DOORS

CATERPILLAR®

UENR3921-01
April 2014

Schematic

12M3, 140M3, and 160M3 Motor Grader Electrical System

12M3:	140M3:	160M3:
N9B1-UP	N9D1-UP	N9E1-UP
N9F1-UP	N9G1-UP	N9K1-UP
N9P1-UP	N9J1-UP	N9L1-UP
N9R1-UP	N9M1-UP	N9T1-UP

Volume 1 of 4: Cab

Printed in U.S.A.

UENR3921-01 VOL 1 of 4
42 Page, (Dimensions: 56 inches x 35 inches)

Harness And Wire Electrical Schematic Symbols

Symbols

Pressure Symbol · Temperature Symbol · Level Symbol · Flow Symbol · Circuit Breaker Symbol

Symbols and Definitions

Fuse: A component in an electrical circuit that will open the circuit if too much current flows through it.

Switch (Normally Open): A switch that will close at a specified point (temp, press, etc.). The circle indicates that the component has screw terminals and a wire can be disconnected from it.

Switch (Normally Closed): A switch that will open at a specified point (temp, press, etc.). No circle indicates that the wire cannot be disconnected from the component.

Ground (Wired): This indicates that the component is connected to a grounded wire. The grounded wire is fastened to the machine.

Ground (Case): This indicates that the component does not have a wire connected to ground. It is grounded by being fastened to the machine.

Reed Switch: A switch whose contacts are controlled by a magnet. A magnet closes the contacts of a normally open reed switch; it opens the contacts of a normally closed reed switch.

Sender: A component that is used with a temperature or pressure gauge. The sender measures the temperature or pressure. Its resistance changes to give an indication to the gauge of the temperature or pressure.

Relay (Magnetic Switch): A relay is an electrical component that is activated by electricity. It has a coil that makes an electromagnet when current flows through it. The electromagnet can open or close the switch part of the relay.

Solenoid: A solenoid is an electrical component that is activated by electricity. It has a coil that makes an electromagnet when current flows through it. The electromagnet can open or close a valve or move a piece of metal that can do work.

Magnetic Latch Solenoid: A magnetic latch solenoid is an electrical component that is activated by electricity and held latched by a permanent magnet. It has two coils (latch and unlatch) that make electromagnet when current flows through them. It also has an internal switch that places the latch coil circuit open at the time the coil latches.

Harness and Wire Symbols

Wire, Cable, or Harness Assembly Identification: Includes Harness Identification Letters and Harness Connector Serialization Codes (see sample).

AG-C4
111-7898

L-C12
3E-5179

Part Number: for Connector Plug

Harness Identification Letter(s): (A, B, C, ..., AA, AB, AC, ...)

Harness Connector Serialization Code: The "C" stands for "Connector" and the number indicates which connector in the harness (C1, C2, C3, ...).

Part Number: for Connector Receptacle

Plug

Receptacle

Pin or Socket Number

Deutsch connector: Typical representation of a Deutsch connector. The plug contains all sockets and the receptacle contains all pins.

Sure-Seal connector: Typical representation of a Sure-Seal connector. The plug and receptacle contain both pins and sockets.

Fuse (5 Amps) — 5A

9X-1123 — Component Part Number

325-AG135 PK-14

Harness identification code: This example indicates wire group 325, wire 135 in harness "AG".

Wire Gauge

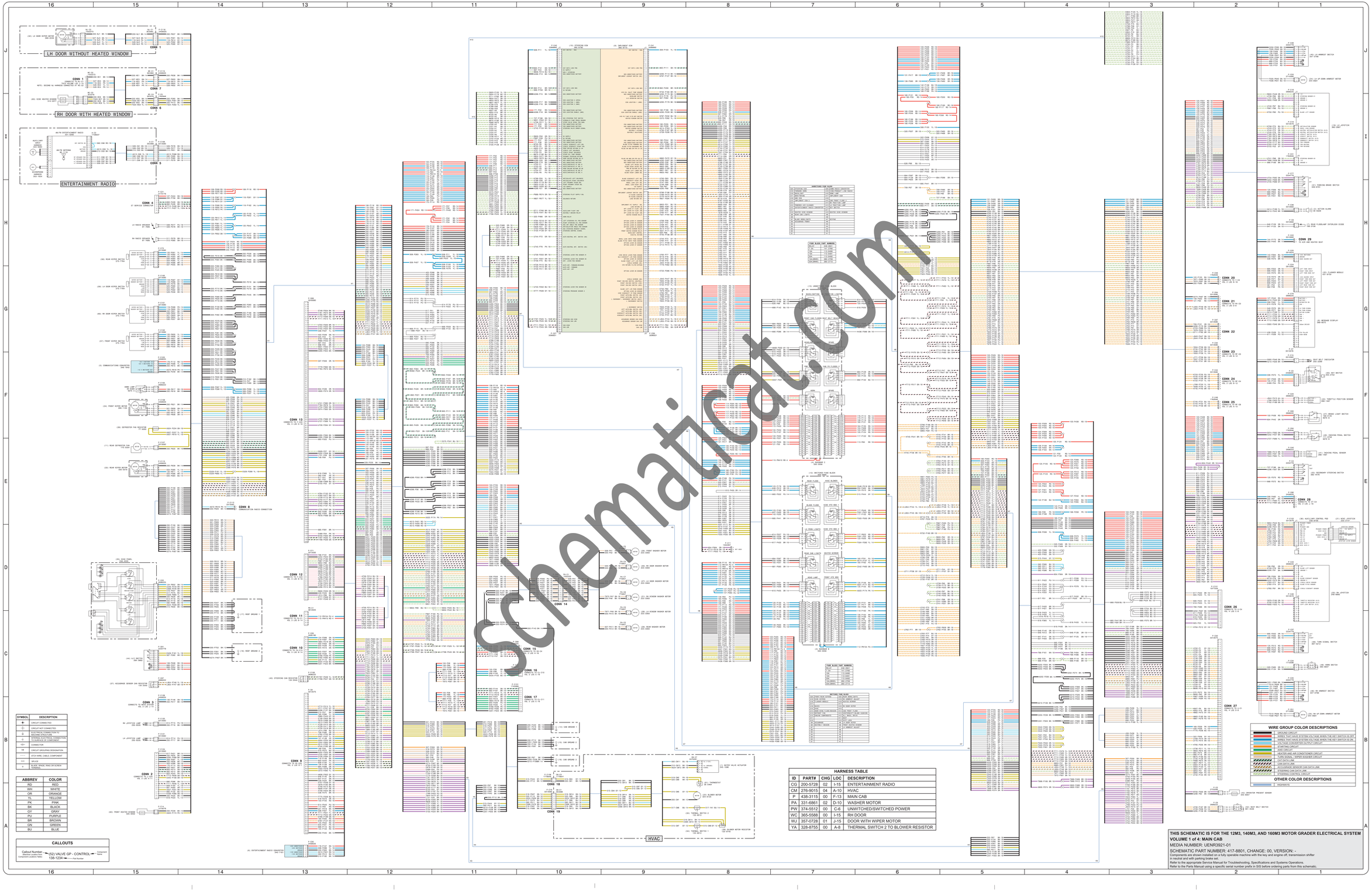
Wire Color

Connector Location	
Connector Number	**Schematic Location**
CONN 1	J-15/J-16
CONN 2	B-15
CONN 3	B-15
CONN 4	H-15
CONN 5	I-15
CONN 6	I-15
CONN 7	J-15
CONN 8	E-14
CONN 9	B-13
CONN 10	C-13
CONN 11	C-13
CONN 12	D-13
CONN 13	F-13
CONN 14	D-10
CONN 15	C-10
CONN 16	C-10
CONN 17	B-10
CONN 18	B-10
CONN 19	A-10
CONN 20	G-2
CONN 21	G-2
CONN 22	G-2
CONN 23	G-2
CONN 24	F-2
CONN 25	F-2
CONN 26	D-2
CONN 27	B-2
CONN 28	E-1
CONN 29	H-1

The connectors shown in this chart are for harness to harness connectors. Connectors that join a harness to a component are generally located at or near the component. See the Component Location Chart.

Component Location		
Component	**Schematic Location**	**Machine Location**
Actuator - Water Valve	B-8	1
Alarm - Action	H-1	2
Bussbar B	C-7	3
Bussbar C	E-7	4
Converter - Communications	F-15	5
Converter - Entertainment Radio	A-13	6
Diode - Rear Floodlamp Interlock	H-1	7
Display - Message	G-1	8
ECM - Implement	J-9	9
ECM - Steering	J-10	10
Fan - Rear Defroster	E-15	11
Fuse Block - Switched	E-7	12
Fuse Block - Unswitched	G-7	13
Ground - Cab 1	B-10	14
Ground - Cab 2	B-10	15
Ground - Cab 3	B-10	16
Ground - Roof 1	C-14	17
Ground - Roof 2	C-14	18
Joystick - LH	I-1	19
Joystick - RH	D-1	20
Joystick - Mini	D-1	21
Module - Flasher	G-1	22
Motor - Blower	A-8	23
Motor - Up-Down Armrest (LH)	J-1	24
Motor - Up-Down Armrest (RH)	B-1	25
Motor - Washer (Front)	D-9	26
Motor - Washer (LH Door)	D-9	27
Motor - Washer (LH Window)	C-9	28
Motor - Washer (Rear)	C-9	29
Motor - Washer (RH Door)	D-9	30
Motor - Washer (RH Window)	D-9	31
Motor - Wiper (LH Door or RH Door)	J-16	32
Motor - Wiper (Rear)	E-15	33
Motor - Wiper (Front)	F-15	34
Panel - HVAC	D-15	35
Pod - Auxiliary Control	E-1	36
Resistor - AccuGrade Sensor CAN	C-15	37
Resistor - Blower Motor	A-8	38
Resistor - Defroster Fan (Not Shown)	F-15	39
Resistor - Steering CAN	C-13	40
Sensor - Inching Pedal (Not Shown)	E-1	41
Sensor - Operator Present	A-2	42
Sensor - Throttle Position (Not Shown)	F-1	43
Switch - A/C	C-15	44
Switch - Armrest (LH)	J-1	45
Switch - Armrest (RH)	C-1	46
Switch - Brake Light (Not Shown)	F-1	47
Switch - Horn	C-1	48
Switch - Inching Pedal (Not Shown)	F-1	49
Switch - Key	F-1	50
Switch - Parking Brake	H-1	51
Switch - Seat Belt	A-2	52
Switch - Secondary Steering	E-1	53
Switch - Thermal 1	A-8	54
Switch - Thermal 2	A-8	55
Switch - Turn Signal	C-1	56
Switch - Wiper (Front)	G-15	57
Switch - Wiper (Rear)	H-15	58
Switch - Wiper (LH Door)	G-15	59
Switch - Wiper (RH Door)	G-15	60
Thermostat	B-8	61
Window - Front Heated	A-15	62
Window - Side Heated	I-16	63

UENR3921-01 VOL 1 of 4
42 Page, (Dimensions: 56 inches x 35 inches)



SYMBOL	DESCRIPTION
┿	CIRCUIT CONNECTED
┼	CIRCUIT NOT CONNECTED
⏚	ELECTRICAL CONNECTION TO MACHINE STRUCTURE
⏚	INTERNAL ELECTRICAL CONNECTION TO SURFACE OF COMPONENT
→)—	CONNECTOR
H#	CIRCUIT GROUPING DESIGNATION
– – –	ATCH WIRE, CABLE, COMPONENT
○–○	SPLICE
○	BLADE, SPADE, RING OR SCREW TERMINAL

ABBREV	COLOR
RD	RED
WH	WHITE
OR	ORANGE
YL	YELLOW
PK	PINK
BK	BLACK
GY	GRAY
PU	PURPLE
BR	BROWN
GN	GREEN
BU	BLUE

CALLOUTS

Callout Number (Machine Location from Component Locations Table) → (52) VALVE GP - CONTROL ← Component Name
138-1234 ← Part Number

HARNESS TABLE

ID	PART#	CHG	LOC	DESCRIPTION
CG	200-5728	02	I-15	ENTERTAINMENT RADIO
CM	276-9015	04	A-10	HVAC
P	438-3115	00	F-13	MAIN CAB
PA	331-6861	02	D-10	WASHER MOTOR
PW	374-5512	00	C-6	UNWITCHED/SWITCHED POWER
WC	365-5588	00	I-15	RH DOOR
WJ	357-0728	01	J-15	DOOR WITH WIPER MOTOR
YA	328-8755	00	A-8	THERMAL SWITCH 2 TO BLOWER RESISTOR

WIRE GROUP COLOR DESCRIPTIONS

▬	GROUND CIRCUIT
🟥	WIRES THAT HAVE SYSTEM VOLTAGE WHEN THE KEY SWITCH IS OFF
🟦	WIRES THAT HAVE SYSTEM VOLTAGE WHEN THE KEY SWITCH IS ON
▬	VOLTAGE CONVERTER OUTPUT CIRCUIT
🟧	STARTING CIRCUIT
🟩	AWD CIRCUIT
🟨	HEATER AND AIR CONDITIONER CIRCUIT
▬	TURN SIGNAL / WIPER WASHER CIRCUIT
▨	CAT DATA LINK
▨	CAN DATA LINK
▨	ACCUGRADE SENSOR CAN DATA LINK
▨	STEERING CAN DATA LINK
▨	STEERING CONTROL CIRCUIT

OTHER COLOR DESCRIPTIONS

▬	HIGHWAYS

THIS SCHEMATIC IS FOR THE 12M3, 140M3, AND 160M3 MOTOR GRADER ELECTRICAL SYSTEM
VOLUME 1 of 4: MAIN CAB
MEDIA NUMBER: UENR3921-01
SCHEMATIC PART NUMBER: 417-8801, CHANGE: 00, VERSION: -

Components are shown installed on a fully operable machine with the key and engine off, transmission shifter in neutral and with parking brake set.

Refer to the appropriate Service Manual for Troubleshooting, Specifications and Systems Operations.

Refer to the Parts Manual using a specific serial number prefix in SIS before ordering parts from this schematic.

CATERPILLAR®
UENR3921-01
April 2014

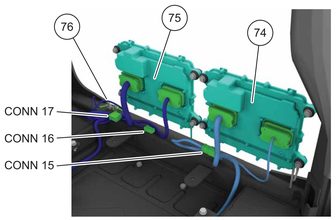
Schematic

12M3, 140M3, and 160M3 Motor Grader Electrical System

12M3:	140M3:	160M3:
N9B1-UP	N9D1-UP	N9E1-UP
N9F1-UP	N9G1-UP	N9K1-UP
N9P1-UP	N9J1-UP	N9L1-UP
N9R1-UP	N9M1-UP	N9T1-UP

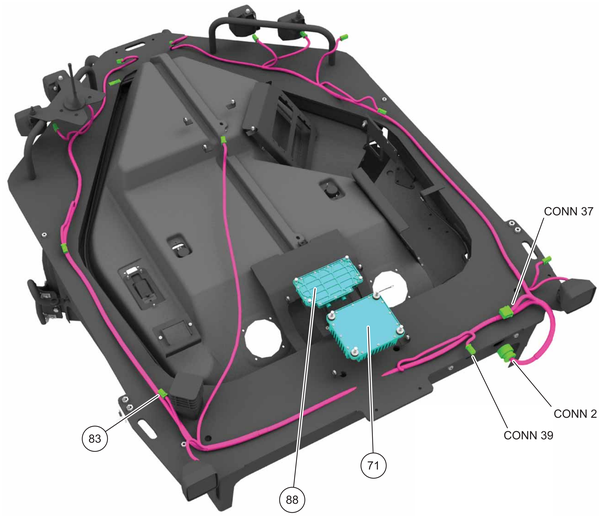
Volume 2 of 4: Additional Cab Components

UENR3921-01 VOL 2 of 4
42 Page, (Dimensions: 56 inches x 35 inches)

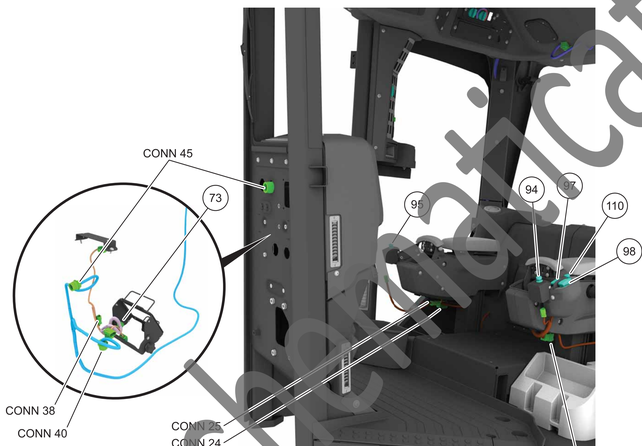


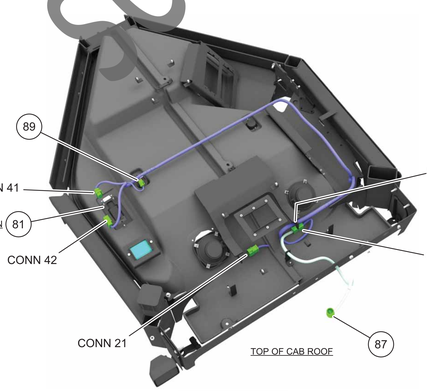
VIEW OF AREA "A"

AWD AND IMPLEMENT 3 ECM



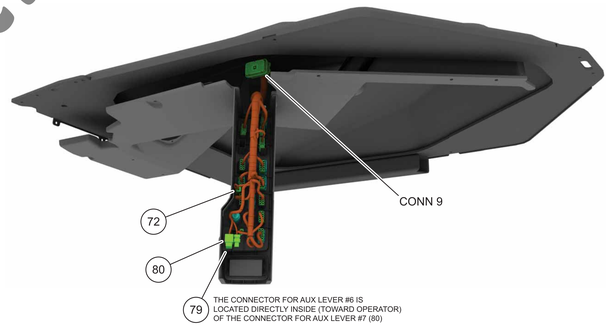
ROOF



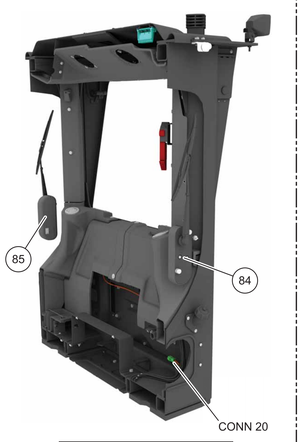


TOP OF CAB ROOF

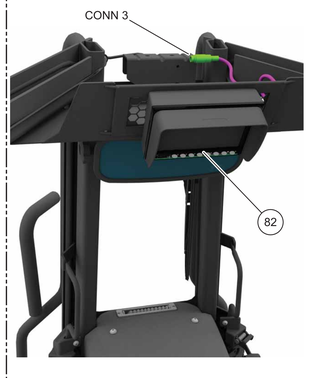
ACCUGRADE



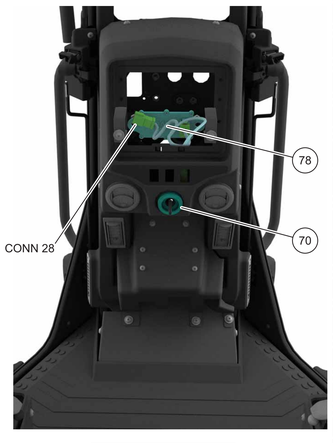
SWITCH PANEL



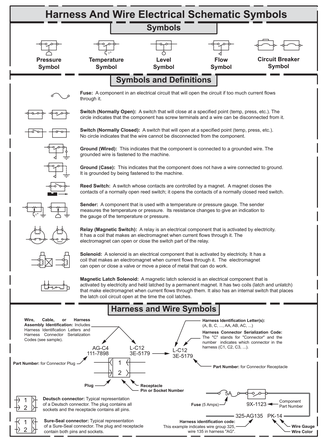
AUXILIARY WIPERS



WAVS SYSTEM



MSS SYSTEM



Component Location		
Component	Schematic Location	Machine Location
Coil - MSS Exciter	J-15	70
Control + Product Link (300)	J-7	71
Diode - Rear Cab Interlock	E-1	72
Display - CAM40	E-10	73
ECM - AWD	F-14	74
ECM - Implement 3	J-14	75
Ground - Cab 1	C-15	76
Ground - Cab 2	H-15	77
Keymaster - MSS	J-15	78
Lever - Auxiliary #6	F-1	79
Lever - Auxiliary #7	F-1	80
Module - Grade Control Power Supply	C-9	81
Module - WAVS Display	J-12	82
Motor - Air Cleaner	F-9	83
Motor - Side Window Wiper (LH)	B-13	84
Motor - Side Window Wiper (RH)	A-13	85
Port - 12V Auxiliary	E-1	86
Radio - CR924	B-10	87
Radio - Product Link Communications (121SR)	I-10	88
Resistor - CAN (GPS)	E-8	89
Sensor - AWD Position Sensor	C-15	90
Switch - Auto Articulation	D-4	91
Switch - Auto Differential Lock	F-4	92
Switch - Autoshift	D-4	93
Switch - Blade Control (LH)	B-11	94
Switch - Blade Control (RH)	B-11	95
Switch - Blade Cushion	H-4	96
Switch - Blade Offset (LH)	C-11	97
Switch - Blade Offset (RH)	C-11	98
Switch - Centershift Pin	J-4	99
Switch - Defrost Fan Blower Speed	I-4	100
Switch - DPF Regeneration	I-4	101
Switch - Floodlight	F-4	102
Switch - Fog Light (Rear)	G-4	103
Switch - Hazard	E-4	104
Switch - Head/Tail Lights	H-4	105
Switch - Headlight Dimmer	I-4	106
Switch - Heated Glass	J-4	107
Switch - Heated Mirrors	H-4	108
Switch - Hydraulic Lockout	E-4	109
Switch - Sideshift Auto/Manual	C-11	110
Switch - Throttle Lock	E-4	111
Switch - Throttle Lock Set	D-4	112
Switch - Variable Shift Control (AWD)	B-15	113
Switch - Warning Beacon	G-4	114
Switch - Work Light	F-4	115

Connector Location	
Connector Number	Schematic Location
CONN 2	H-11
CONN 3	J-14
CONN 5	G-1
CONN 15	H-16
CONN 16	E-16
CONN 17	E-16
CONN 20	B-16
CONN 21	D-8
CONN 23	C-12
CONN 24	C-12
CONN 25	C-12
CONN 35	J-16
CONN 36	H-16
CONN 39	D-16
CONN 37	I-10
CONN 38	D-10
CONN 39	H-9
CONN 40	D-8
CONN 41	C-8
CONN 42	C-8
CONN 43	B-8
CONN 44	B-8
CONN 45	C-5

The connectors shown in this chart are for harness to harness connectors. Connectors that join a harness to a component are generally located at or near the component. See the Component Location Chart.

UENR3921 VOL 2 of 4
42 Page, (Dimensions: 56 inches x 35 inches)

HARNESS TABLE				
ID	PART#	CHG	LOC	DESCRIPTION
CJ	366-9658	02	E-18	AWD
CK	366-9659	02	J-18	IMPLEMENT ECM 3
CT	360-5667	00	L-18	MACHINE SECURITY SYSTEM (MSS)
GR	360-2969	00	A-9	LH GRADE CONTROL POWER MODULE
GT	360-2968	00	B-9	RH GRADE CONTROL POWER MODULE
J	366-9416	03	H-14	ROOF
JA	355-5084	00	G-11	LICENSE PLATE
PE	448-4274	00	J-1	SWITCH PANEL
RF	360-2972	01	B-13	ACCUGRADE POD
RT	296-1067	00	D-10	LIGHT BAR
RU	252-5190	03	E-8	FRONT CHASSIS
RV	374-5511	01	D-7	ACCUGRADE HARNESS
RY	314-2820	02	C-9	ACCUGRADE RADIO
WA	367-9324	00	J-12	PRODUCT LINK
Y	235-6175	03	A-6	WIPER MOTOR

SYMBOL	DESCRIPTION
	CIRCUIT CONNECTED
	CIRCUIT NOT CONNECTED
	ELECTRICAL CONNECTION TO MACHINE STRUCTURE
	INTERNAL ELECTRICAL CONNECTION TO SURFACE OF COMPONENT
	CONNECTOR
H#	CIRCUIT GROUPING DESIGNATION
---	ATCH WIRE, CABLE, COMPONENT
	SPLICE
	BLADE, SPADE, RING OR SCREW TERMINAL

ABBREV	COLOR
RD	RED
WH	WHITE
OR	ORANGE
YL	YELLOW
PK	PINK
BK	BLACK
GY	GRAY
PU	PURPLE
BR	BROWN
GN	GREEN
BU	BLUE

CALLOUTS

Callout Number (Machine Location from Component Locations Table) → (52) VALVE GP - CONTROL ← Component Name
138-1234 ← Part Number

WIRE GROUP COLOR DESCRIPTIONS

- GROUND CIRCUIT
- WIRES THAT HAVE SYSTEM VOLTAGE WHEN THE KEY SWITCH IS OFF
- WIRES THAT HAVE SYSTEM VOLTAGE WHEN THE KEY SWITCH IS ON
- VOLTAGE CONVERTER OUTPUT CIRCUIT
- AWD CIRCUIT
- MACHINE SECURITY CONTROL CIRCUIT
- ACCUGRADE CIRCUIT
- HEATER AND AIR CONDITIONER CIRCUIT
- TURN SIGNAL / WIPER WASHER CIRCUIT
- IMPLEMENT CONTOL CIRCUIT
- IMPLEMENT 3 CONTROL CIRCUIT
- STEERING CONTROL CIRCUIT
- CAT DATA LINK
- CAN DATA LINK
- PRODUCT LINK
- GPS CAN DATA LINK
- ACCUGRADE SENSOR CAN DATA LINK
- ETHERNET

OTHER COLOR DESCRIPTIONS

- HIGHWAYS

NOTE A: POWER LEAD FROM VOLTAGE CONVERTER TO 2-WAY COMMUNICATIONS RADIO SHOULD BE 12 AWG OR LARGER.

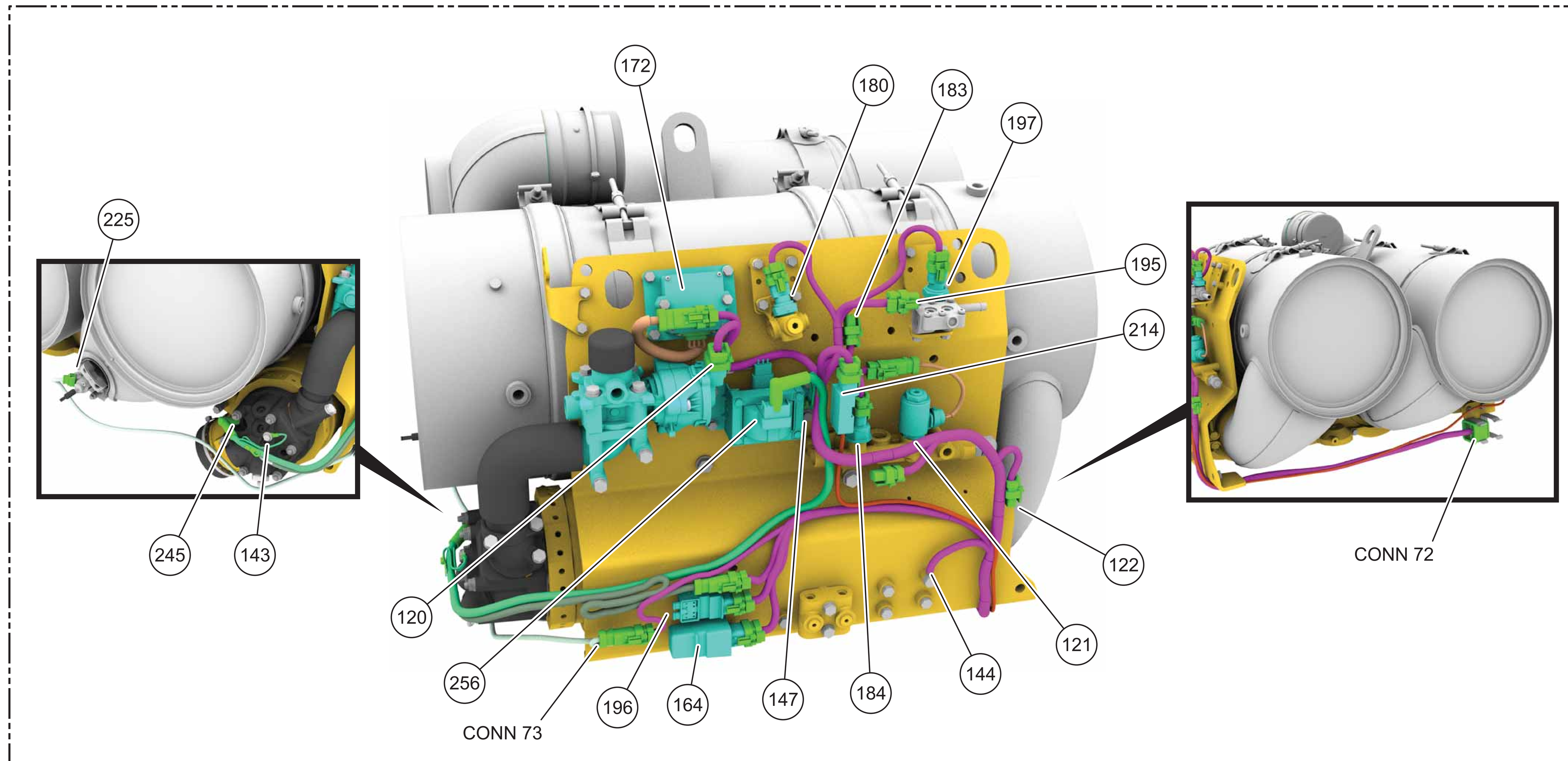
NOTE B: THE SWITCH CONTACT STATE SHOWN OCCURS WHEN PEDAL IS NOT PRESSED.

THIS SCHEMATIC IS FOR THE 12M3, 140M3, AND 160M3 MOTOR GRADER ELECTRICAL SYSTEM
VOLUME 2 of 4: ADDITIONAL CAB COMPONENTS

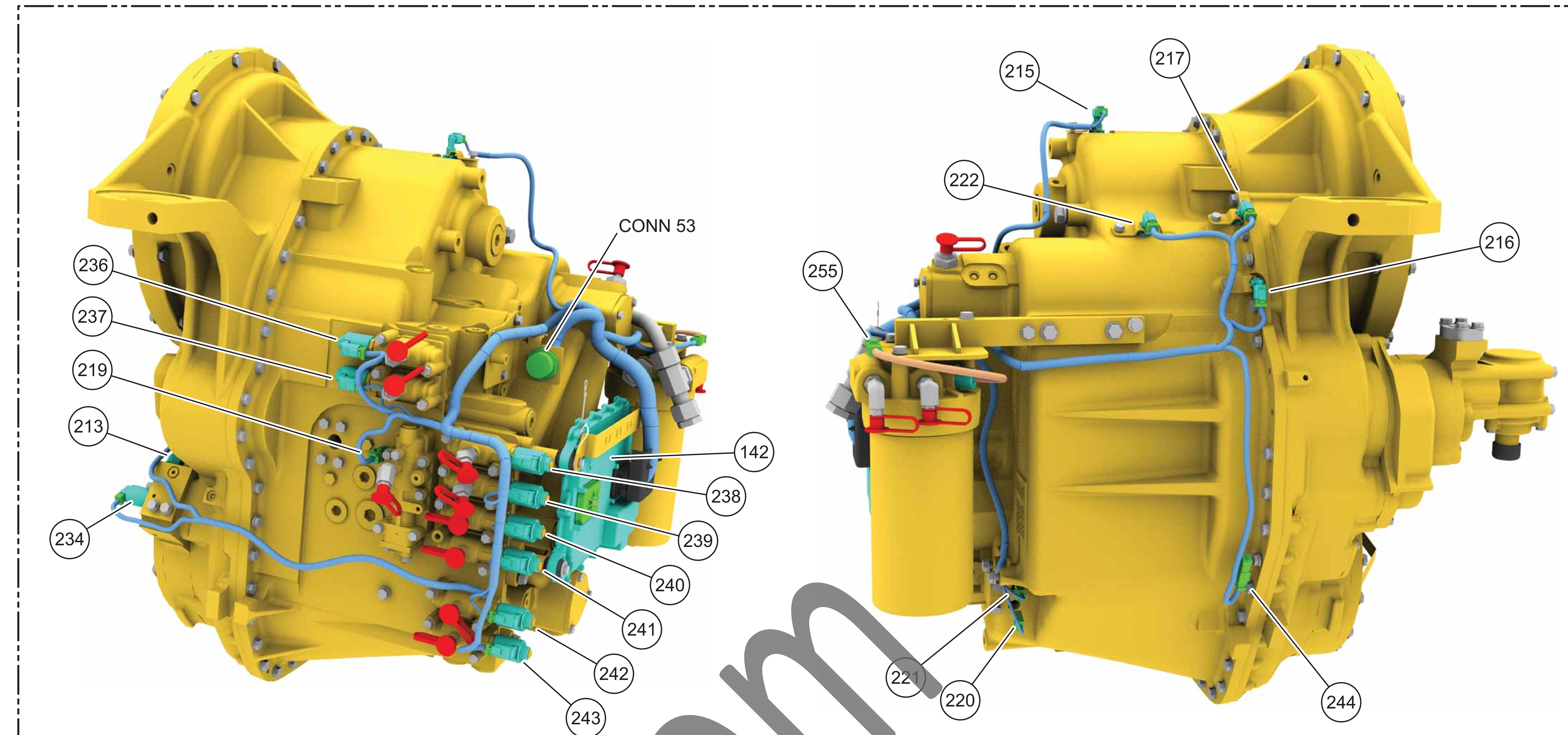
MEDIA NUMBER: UENR3921

SCHEMATIC PART NUMBER: 417-8801, CHANGE: 00, VERSION: -

Components are shown installed on a fully operable machine with the key and engine off, transmission shifter in neutral and with parking brake set.
Refer to the appropriate Service Manual for Troubleshooting, Specifications and Systems Operations.
Refer to the Parts Manual using a specific serial number prefix in SIS before ordering parts from this schematic.



CLEAN EMISSIONS MODULE



TRANSMISSION

CATERPILLAR®

Schematic

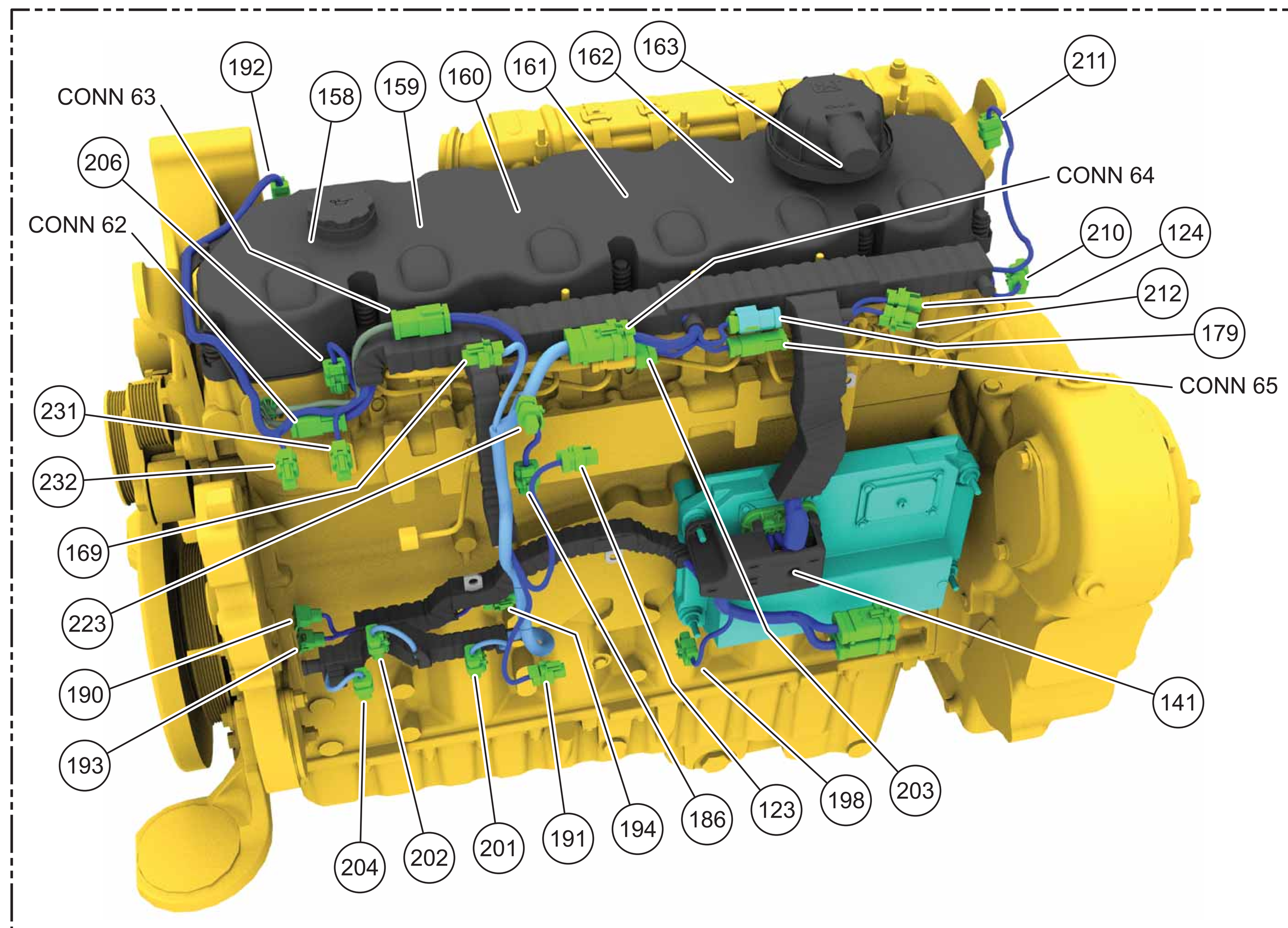
12M3, 140M3, and 160M3 Motor Grader Electrical System

12M3:	140M3:	160M3:
N9B1-UP	N9D1-UP	N9E1-UP
N9F1-UP	N9G1-UP	N9K1-UP
N9P1-UP	N9J1-UP	N9L1-UP
N9R1-UP	N9M1-UP	N9T1-UP

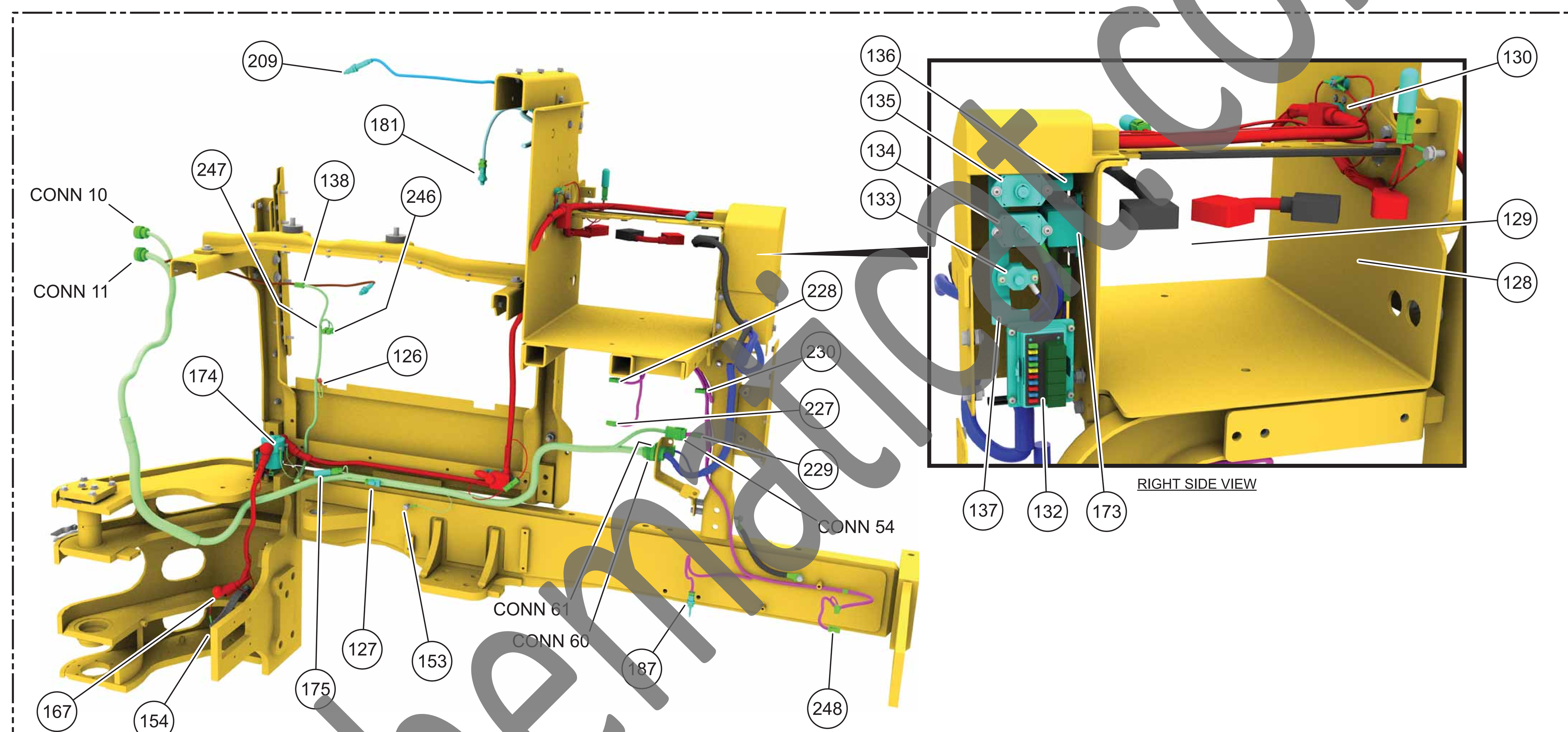
Volume 3 of 4: Chassis

Printed in U.S.A.

UENR3921-01 VOL 3 of 4
42 Page, (Dimensions: 56 inches x 35 inches)



ENGINE



RIGHT REAR FRAME - INSIDE VIEW

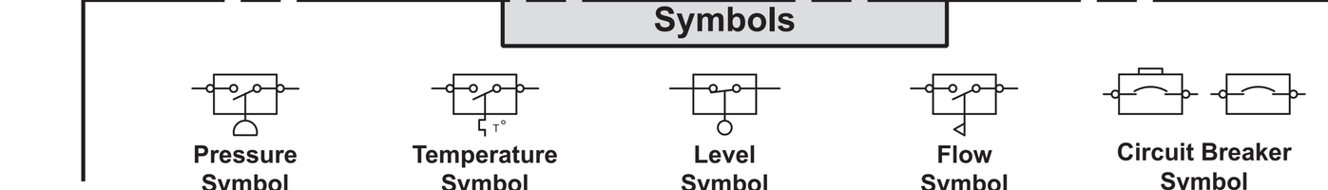
Component Location					
Component	Schematic Location	Machine Location	Component	Schematic Location	Machine Location
Actuator - ARD Air Flow Control	C-2	120	Sensor - Cam Speed	A-9	190
Actuator - ARD Fuel Control 1	C-1	121	Sensor - Charge Air Cooler Outlet Temperature	A-9	191
Actuator - ARD Fuel Control 2	C-1	122	Sensor - Coolant Temperature	B-8	192
Actuator - NRS Flow Balance Valve	C-8	123	Sensor - Crank Speed	A-9	193
Actuator - NRS Valve	C-8	124	Sensor - Crankcase Pressure	D-8	194
Alarm - Backup	I-14	125	Sensor - DPF Delta Pressure	A-1	195
Alternator	E-2	126	Sensor - DPF Intake	B-1	196
Arc Suppressor - A/C	D-3	127	Sensor - DPF Intake Pressure	A-1	197
Battery - 12V 1	F-2	128	Sensor - Engine Oil Pressure	D-8	198
Battery - 12V 2	F-2	129	Sensor - Engine Out NOX	J-11	199
Block - Junction 1	F-1	130	Sensor - Fuel Level	H-8	200
Block - Junction 2	F-3	131	Sensor - Fuel Pressure Filter (Aft)	B-4	201
Block - Rear Fuse	H-3	132	Sensor - Fuel Pressure Filter (Fore)	B-4	202
Breaker - Engine ECM	G-2	133	Sensor - Fuel Rail Pressure	E-8	203
Breaker - Load	G-2	134	Sensor - Fuel Temperature	B-4	204
Breaker - Main	G-2	135	Sensor - Hydraulic Temperature	I-14	205
Bus Bar - Main Relay	F-2	136	Sensor - Intake Manifold Pressure	C-8	206
Bus Bar	G-3	137	Sensor - Main Hydraulic Pressure 1	F-12	207
Compressor - A/C	D-3	138	Sensor - Main Hydraulic Pressure 2	E-12	208
ECM - Aftertreatment	G-6	139	Sensor - NOX Tailpipe	H-4	209
ECM - Engine (J1)	E-12	140	Sensor - NRS Differential Pressure	C-8	210
ECM - Engine (J2)	D-11	141	Sensor - NRS Intake Pressure	B-8	211
ECM - Transmission and Chassis	H-15	142	Sensor - NRS Temperature	C-8	212
Ground - ARD Head	B-1	143	Sensor - Parking Brake Pressure	G-16	213
Ground - CEM	B-2	144	Sensor - SCR Inlet Temperature	B-1	214
Ground - Chassis (Not Shown)	G-6	145	Sensor - Transmission Input Speed 1	I-16	215
Ground - Engine 1 (Not Shown)	E-4	146	Sensor - Transmission Input Speed 2	H-16	216
Ground - Engine 2	B-2	147	Sensor - Transmission Input Speed 3	H-16	217
Ground - Rear Frame 1 (Not Shown)	C-13	148	Sensor - Transmission Oil Pressure	E-12	218
Ground - Rear Frame 2	I-11	149	Sensor - Transmission Oil Temperature	G-16	219
Ground - Rear Frame 3	I-11	150	Sensor - Transmission Output Speed 1	H-16	220
Ground - Rear Frame 4 (Not Shown)	E-3	151	Sensor - Transmission Output Speed 2	H-16	221
Ground - Rear Frame 5	F-2	152	Sensor - Transmission Speed	H-16	222
Ground - Rear Frame 6	D-1	153	Solenoid - ARD Fuel Flow Diverter	B-4	223
Ground - Secondary Steering Motor	E-2	154	Solenoid - Brake Charging	I-4	224
Heater - Injector Line	I-8	155	Solenoid - DEF Injector	D-1	225
Heater - Return to Tank Line	I-8	156	Solenoid - Diff Lock	H-12	226
Heater - Suction Line	I-8	157	Solenoid - Drive Pump (LH Fwd)	B-16	227
Injector 1	B-5	158	Solenoid - Drive Pump (LH Rev)	B-16	228
Injector 2	A-5	159	Solenoid - Drive Pump (RH Fwd)	A-16	229
Injector 3	A-4	160	Solenoid - Drive Pump (RH Rev)	A-16	230
Injector 4	A-4	161	Solenoid - Fuel Pump (Aft)	D-8	231
Injector 5	A-4	162	Solenoid - Fuel Pump (Fore)	D-8	232
Injector 6	A-4	163	Solenoid - Hydraulic Fan	H-4	233
Module - Aftertreatment ID	C-1	164	Solenoid - Parking Brake	G-16	234
Module - Voltage Load Protection	G-4	165	Solenoid - Start Aid	I-6	235
Motor - Engine Fan	I-11	166	Solenoid - Transmission 1	I-16	236
Motor - Secondary Steering	E-2	167	Solenoid - Transmission 2 (Fwd Low)	J-16	237
Motor - Starting	E-3	168	Solenoid - Transmission 3 (Reverse)	J-16	238
Pump - ARD Fuel	B-4	169	Solenoid - Transmission 4 (Second)	J-16	239
Pump - DEF Dosing	J-8	170	Solenoid - Transmission 5 (Third)	I-16	240
Receptacle - Jumpstart	F-3	171	Solenoid - Transmission 6 (First)	I-16	241
Relay - ARD Fuel Nozzle Heater	A-1	172	Solenoid - Transmission 7 (Low Range)	J-16	242
Relay - Main	G-1	173	Solenoid - Transmission 8 (High Range)	I-16	243
Relay - Secondary Steering Motor	E-2	174	Solenoid - Transmission Pump Bypass	J-16	244
Resistor - A/C Thermostat	D-3	175	Spark Plug	B-1	245
Resistor - CAN	A-3	176	Switch - A/C Discharge Pressure	D-3	246
Resistor - CAN C 1	E-12	177	Switch - A/C Suction Pressure	D-3	247
Resistor - CAN C 2	H-8	178	Switch - AWD Filter Bypass (LH)	A-16	248
Resistor - Engine CAN	B-8	179	Switch - AWD Filter Bypass (RH)	A-16	249
Sensor - Aftertreatment Air Pressure	A-1	180	Switch - Disconnect	F-3	250
Sensor - Air Filter Out Pressure	G-4	181	Switch - Engine Shutdown	H-12	251
Sensor - Air Inlet Temperature	G-4	182	Switch - Hydraulic Pilot Supply Filter Bypass	E-12	252
Sensor - ARD Main Fuel Pressure	C-1	183	Switch - Hydraulic Return Filter Bypass	H-4	253
Sensor - ARD Pilot Fuel Pressure	C-1	184	Switch - Service Light	H-12	254
Sensor - Articulation	F-12	185	Switch - Transmission Filter Bypass	H-16	255
Sensor - Atmospheric Pressure	D-8	186	Transformer - ARD Ignition	B-1	256
Sensor - AWD Hydraulic Temperature	A-16	187	Unit - Diesel Exhaust Fluid Control	J-10	257
Sensor - Brake Charge Pressure 1	H-4	188	Unit - WEMA Header	I-8	258
Sensor - Brake Charge Pressure 2	I-4	189	Valve - Coolant Diverter	I-8	259

Connector Location	
Connector Number	Schematic Location
CONN 10	B-14
CONN 11	B-14
CONN 12	B-16
CONN 13	D-16
CONN 50 (Not Shown)	E-16
CONN 51	J-14
CONN 52	J-14
CONN 53	F-14
CONN 54	A-14
CONN 55	J-12
CONN 56	I-12
CONN 57	I-12
CONN 58	B-12
CONN 59	B-12
CONN 60	A-12
CONN 61	A-12
CONN 62	A-7
CONN 63	A-7
CONN 64	B-7
CONN 65	B-7
CONN 66	B-7
CONN 67	E-7
CONN 68	I-6
CONN 69	I-6
CONN 70	H-6
CONN 71	G-6
CONN 72	B-3
CONN 73	D-1

The connectors shown in this chart are for harness to harness connectors. Connectors that join a harness to a component are generally located at or near the component. See the Component Location Chart.

Harness And Wire Electrical Schematic Symbols

Symbols



Symbols and Definitions

Fuse: A component in an electrical circuit that will open the circuit if too much current flows through it.

Switch (Normally Open): A switch that will close at a specified point (temp, press, etc.). The circle indicates that the component has screw terminals and a wire can be disconnected from it.

Switch (Normally Closed): A switch that will open at a specified point (temp, press, etc.). No circle indicates that the wire cannot be disconnected from the component.

Ground (Wired): This indicates that the component is connected to a grounded wire. The grounded wire is fastened to the machine.

Ground (Case): This indicates that the component does not have a wire connected to ground. It is grounded by being fastened to the machine.

Reed Switch: A switch whose contacts are controlled by a magnet. A magnet closes the contacts of a normally open reed switch; it opens the contacts of a normally closed reed switch.

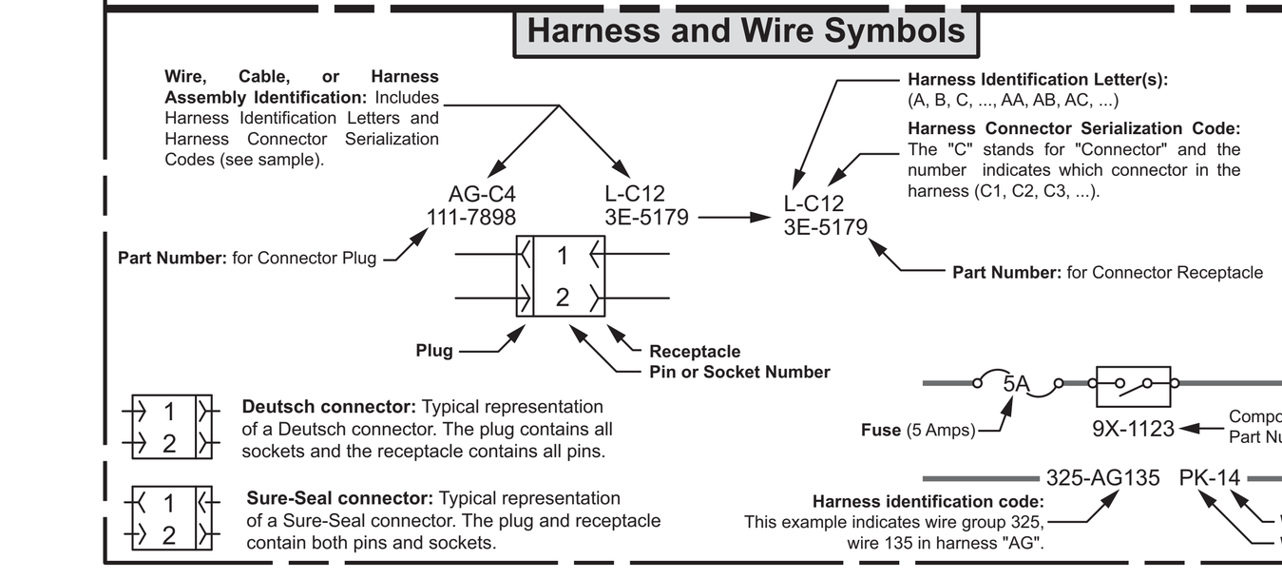
Sender: A component that is used with a temperature or pressure gauge. The sender measures the temperature or pressure. Its resistance changes to give an indication to the gauge of the temperature or pressure.

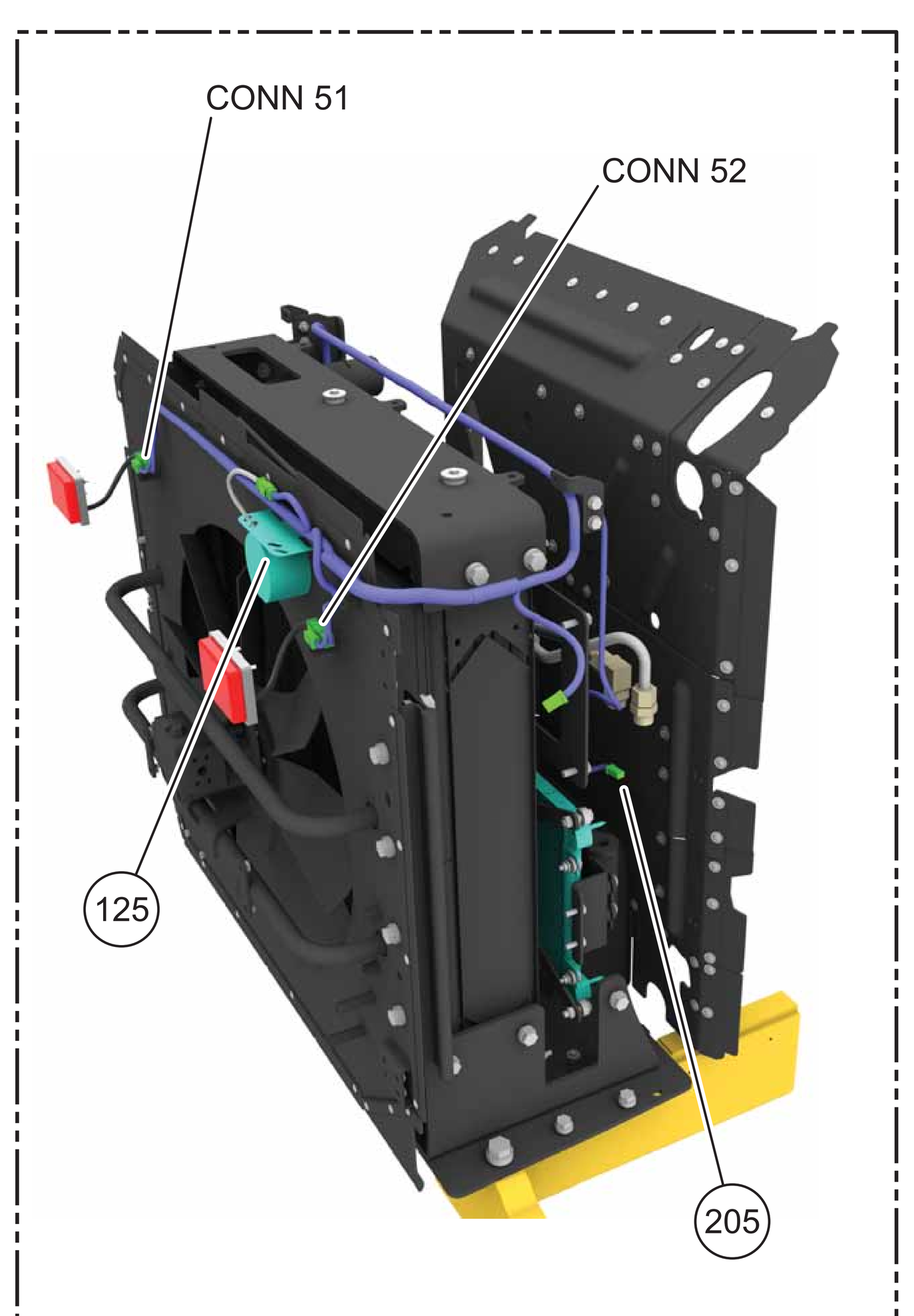
Relay (Magnetic Switch): A relay is an electrical component that is activated by electricity. It has a coil that makes an electromagnet when current flows through it. The electromagnet can open or close the switch part of the relay.

Solenoid: A solenoid is an electrical component that is activated by electricity. It has a coil that makes an electromagnet when current flows through it. The electromagnet can open or close a valve or move a piece of metal that can do work.

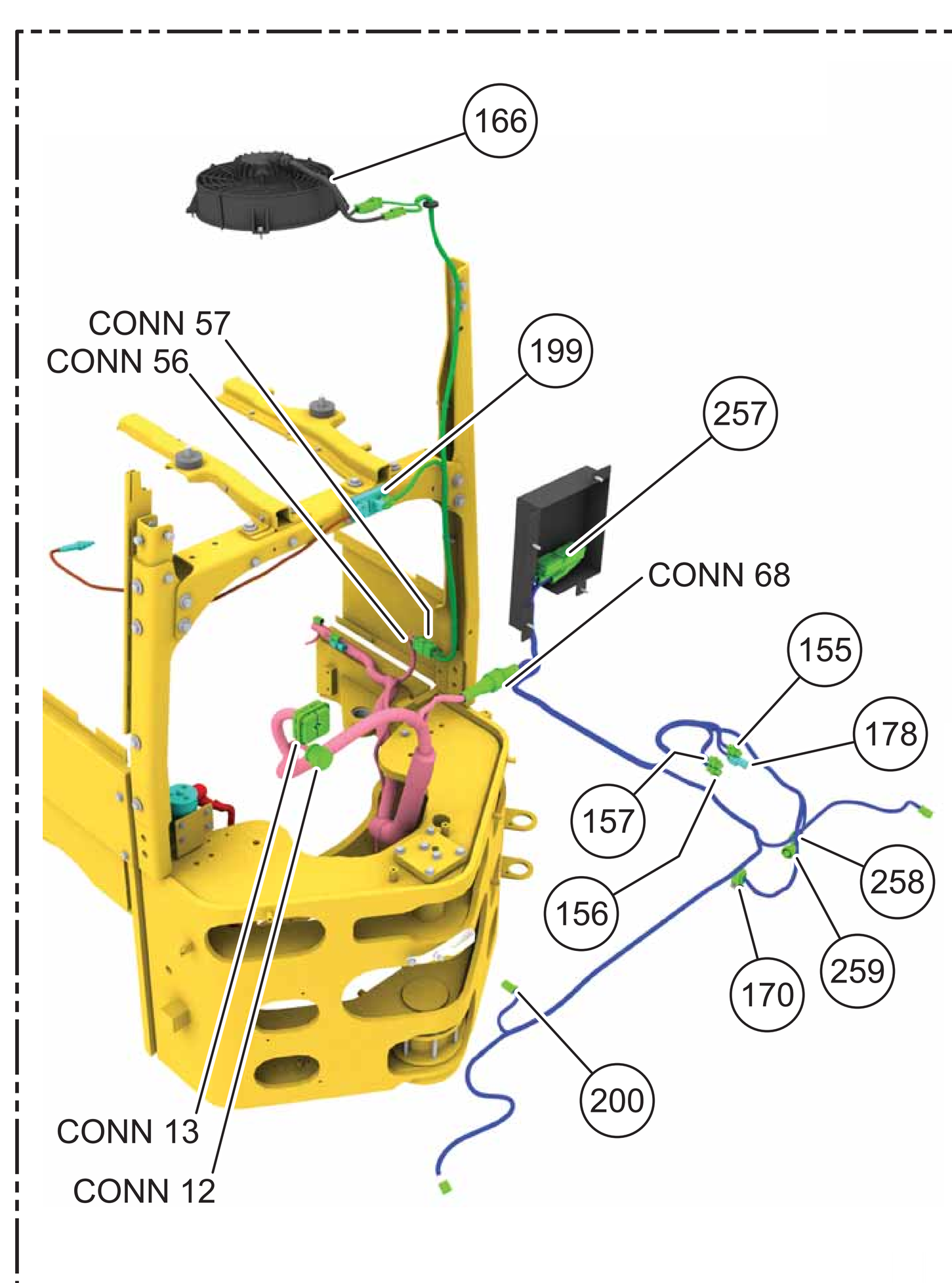
Magnetic Latch Solenoid: A magnetic latch solenoid is an electrical component that is activated by electricity and held latched by a permanent magnet. It has two coils (latch and unlatch) that make electromagnet when current flows through them. It also has an internal switch that places the latch coil circuit open at the time the coil latches.

Harness and Wire Symbols

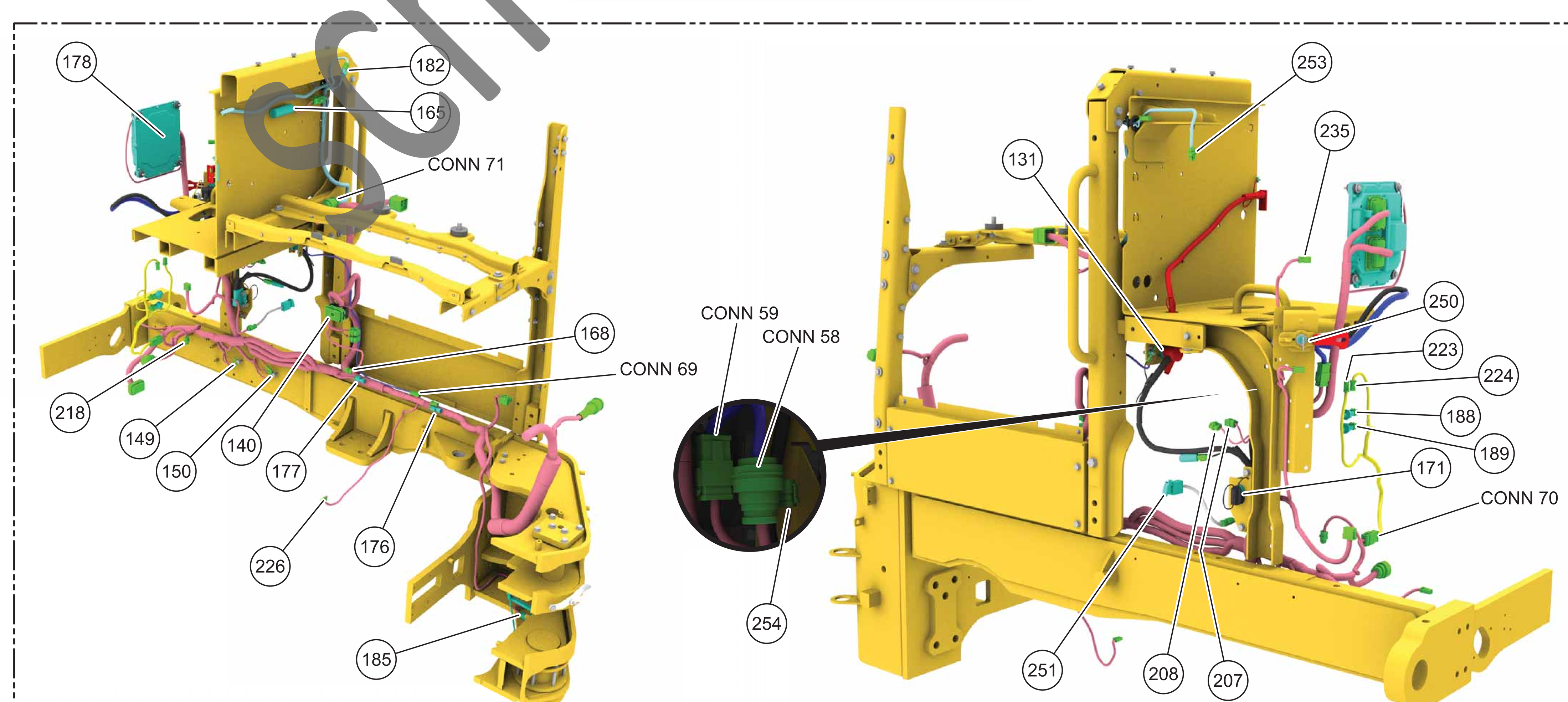




RADIATOR



FRONT OF REAR FRAME



LEFT REAR FRAME

UENR3921-01 VOL 3 of 4

42 Page, (Dimensions: 56 inches x 35 inches)

THIS SCHEMATIC IS FOR THE 12M3, 140M3, AND 160M3 MOTOR GRADER ELECTRICAL SYSTEM

VOLUME 3 of 4: CHASSIS

MEDIA NUMBER: UENR3921

SCHEMATIC PART NUMBER: 417-8806, CHANGE: 00, VERSION: -

Components are shown installed on a fully operable machine with the key and engine off, transmission shifter in neutral and with parking brake set.

Refer to the appropriate Service Manual for Troubleshooting, Specifications and Systems Operations.

Refer to the Parts Manual using a specific serial number prefix in SIS before ordering parts from this schematic.

HARNESS TABLE

ID	PART#	CHG	LOC	DESCRIPTION
AC	348-3645	02	A-14	ALL WHEEL DRIVE SENSORS (ATCH)
AG	348-3640	00	G-12	RADIATOR
EN	378-1050	00	C-7	C9 EXTERNAL ENGINE
F	380-3023	00	D-16	REAR LEFT MAIN FRAME
FA	380-3012	01	A-14	HVAC HARNESS
FC	380-3013	00	H-6	FAN AND BRAKE
FE	380-3006	00	J-12	NOX SENSOR AND ENGINE FAN
FL	346-5904	01	B-7	FUEL
GM	399-4015	00	A-7	INJECTORS WITHOUT BRAKE
M	348-3646	00	I-6	STARTER SWITCH JUMPER
NH	380-3896	00	D-1	DEF INJECTOR
PH	380-5467	00	B-3	AFTERTREATMENT
R	380-3056	01	B-12	REAR CHASSIS
RA	319-5148	00	J-14	LH REAR LIGHTS
RC	319-5147	00	J-14	RH REAR LIGHTS
RF	380-3016	01	H-6	ENGINE BAY
T	351-3540	02	F-14	TRANSMISSION
TF	380-3019	00	I-6	DEF CONTROL

CABLE CHART

AA	236-2340	01	F-2	BATTERY 1 POS TO BATTERY 2 NEG
CC	319-5192	00	F-1	BATTERY 2 POS TO JUNCTION BLOCK 2
EE	8Y-9603	01	E-4	STARTING MOTOR TO ENGINE GROUND
FF	308-9351	01	F-2	BATTERY 1 NEG TO DISCONNECT SWITCH
FG	351-6621	00	F-2	DISCONNECT SWITCH TO REAR FRAME GROUND
GG	360-2077	00	F-3	JUMPSTART RECEPTACLE NEG TO DISCONNECT SWITCH
HH	350-1340	00	F-3	STARTING MOTOR BAT TO JUNCTION BLOCK 2
JJ	347-1835	00	E-2	SECONDARY STEERING RELAY TO ALTERNATOR FUSE
KK	347-1838	00	E-2	SECONDARY STEERING RELAY TO SECONDARY STEERING MOTOR
PP	319-5167	00	E-1	JUNCTION BLOCK 1 TO JUNCTION BLOCK 2
TT	322-3232	00	E-3	STARTING MOTOR TO REAR FRAME GROUND
VV	319-5109	00	F-1	JUNCTION BLOCK 1 TO BUS BAR 1
YJ	347-1839	00	E-1	JUNCTION BLOCK 1 TO ALTERNATOR FUSE
YK	347-1840	00	E-2	ALTERNATOR TO REAR FRAME GROUND
YL	347-1841	00	E-2	ALTERNATOR TO ALTERNATOR FUSE

CALLOUTS

Callout Number (Machine Location from Component Locations Table) → (52) VALVE GP - CONTROL ← Component Name

138-1234 ← Part Number

WIRE GROUP COLOR DESCRIPTIONS

- GROUND CIRCUIT
- WIRES THAT HAVE SYSTEM VOLTAGE WHEN THE KEY SWITCH IS OFF
- WIRES THAT HAVE SYSTEM VOLTAGE WHEN THE KEY SWITCH IS ON
- STARTING CIRCUIT
- START AID CIRCUIT
- TRANSMISSION AND MACHINE CONTROL CIRCUIT
- AWD CIRCUIT
- ACCUGRADE CIRCUIT
- ENGINE CONTROL CIRCUIT
- HEATER AND AIR CONDITIONER CIRCUIT
- TURN SIGNAL / WIPER WASHER CIRCUIT
- CAT DATA LINK
- CAN DATA LINK
- STEERING CAN DATA LINK
- CAN DATA LINK C
- DIESEL EXHAUST FUEL (DEF) CONTROL CIRCUIT
- AFTERTREATMENT CONTROL CIRCUIT

OTHER COLOR DESCRIPTIONS

- HIGHWAYS

SYMBOL	DESCRIPTION
(symbol)	CIRCUIT CONNECTED
(symbol)	CIRCUIT NOT CONNECTED
(symbol)	ELECTRICAL CONNECTION TO MACHINE STRUCTURE
(symbol)	INTERNAL ELECTRICAL CONNECTION TO SURFACE OF COMPONENT
(symbol)	CONNECTOR
H#	CIRCUIT GROUPING DESIGNATION
- - -	ATCH WIRE, CABLE, COMPONENT
(symbol)	SPLICE
(symbol)	BLADE, SPADE, RING OR SCREW TERMINAL

ABBREV	COLOR
RD	RED
WH	WHITE
OR	ORANGE
YL	YELLOW
PK	PINK
BK	BLACK
GY	GRAY
PU	PURPLE
BR	BROWN
GN	GREEN
BU	BLUE

CATERPILLAR®

UENR3921-01
April 2014

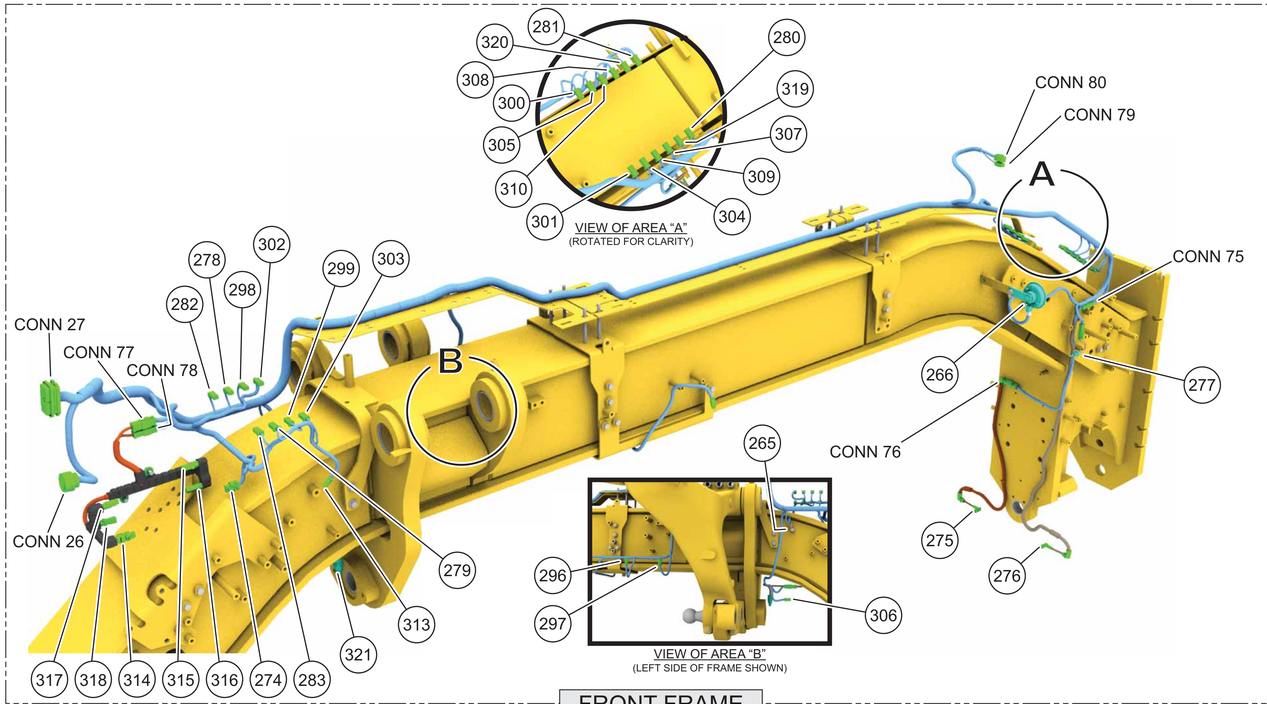
Schematic

12M3, 140M3, and 160M3 Motor Grader Electrical System

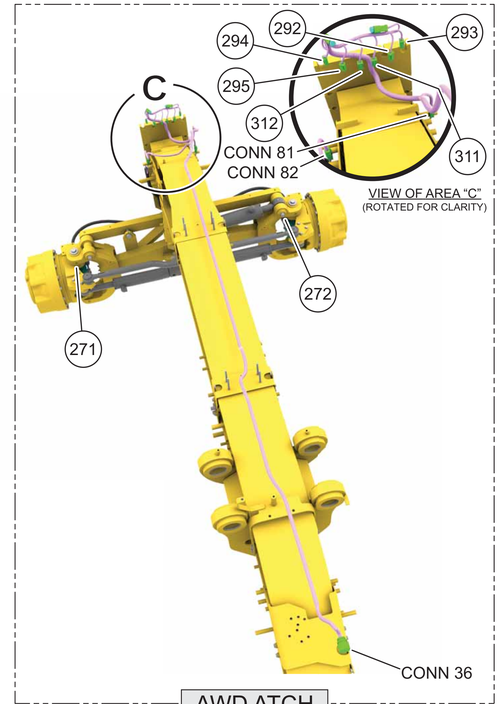
12M3:	140M3:	160M3:
N9B1-UP	N9D1-UP	N9E1-UP
N9F1-UP	N9G1-UP	N9K1-UP
N9P1-UP	N9J1-UP	N9L1-UP
N9R1-UP	N9M1-UP	N9T1-UP

Volume 4 of 4: Additional Chassis Components

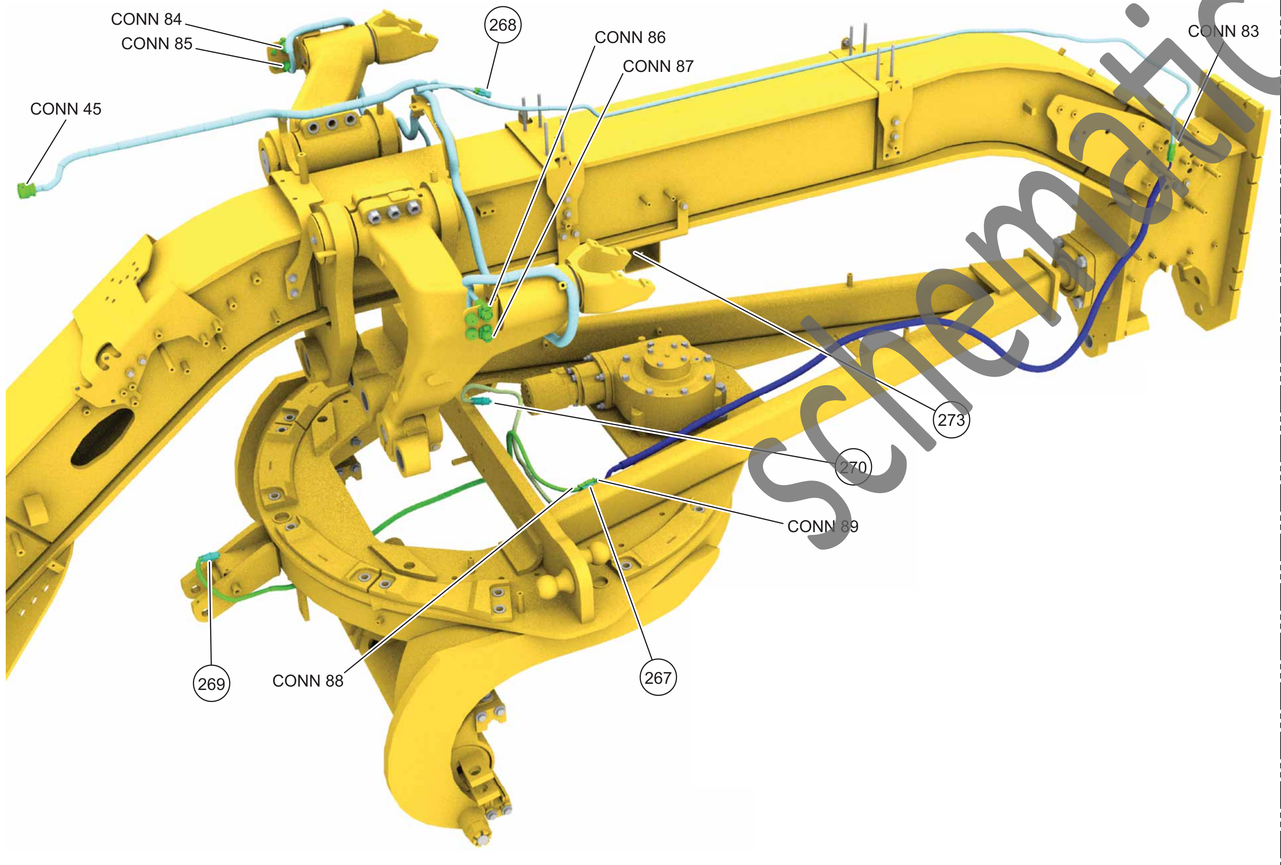
Printed in U.S.A.



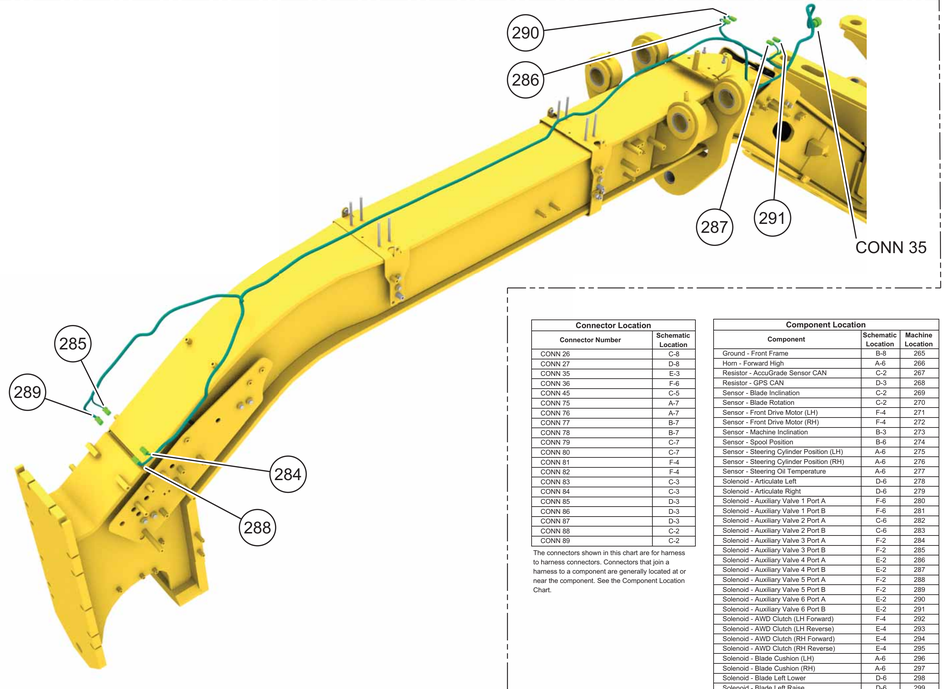
FRONT FRAME



AWD ATCH



ACCUGRADE



AUXILIARY VALVES ATCH

Connector Location

Connector Number	Schematic Location
CONN 26	C-8
CONN 27	D-8
CONN 35	E-3
CONN 36	F-6
CONN 45	C-5
CONN 75	A-7
CONN 76	A-7
CONN 77	B-7
CONN 78	B-7
CONN 79	C-7
CONN 80	C-7
CONN 81	F-4
CONN 82	F-4
CONN 83	C-3
CONN 84	C-3
CONN 85	D-3
CONN 86	D-3
CONN 87	D-3
CONN 88	C-2
CONN 89	C-2

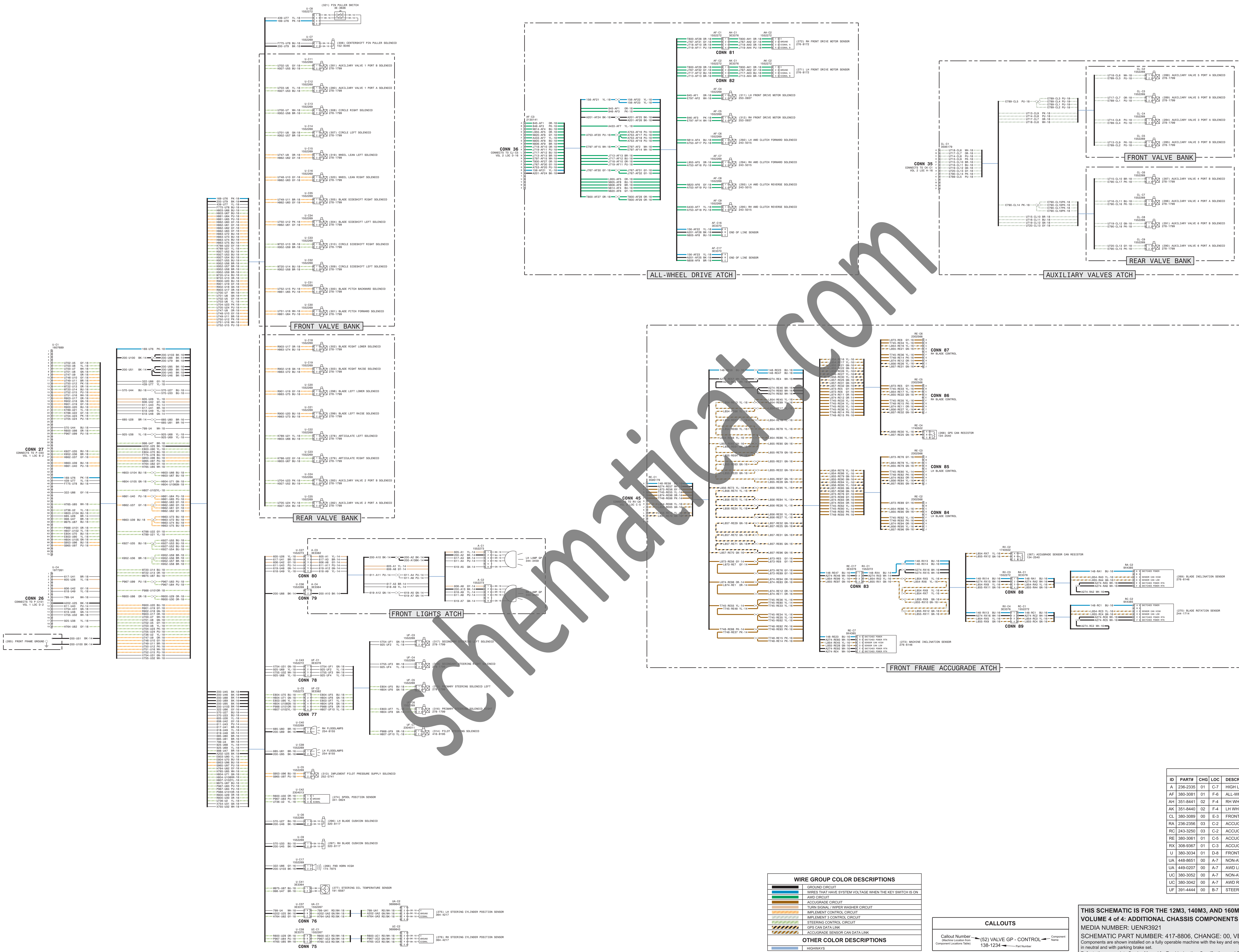
The connectors shown in this chart are for harness to harness connectors. Connectors that join a harness to a component are generally located at or near the component. See the Component Location Chart.

Component Location

Component	Schematic Location	Machine Location
Ground - Front Frame	B-8	265
Horn - Forward High	A-6	266
Resistor - AccuGrade Sensor CAN	C-2	267
Resistor - GPS CAN	D-3	268
Sensor - Blade Inclination	C-2	269
Sensor - Blade Rotation	C-2	270
Sensor - Front Drive Motor (LH)	F-4	271
Sensor - Front Drive Motor (RH)	F-4	272
Sensor - Machine Inclination	B-3	273
Sensor - Spool Position	B-6	274
Sensor - Steering Cylinder Position (LH)	A-6	275
Sensor - Steering Cylinder Position (RH)	A-6	276
Sensor - Steering Oil Temperature	A-6	277
Solenoid - Articulate Left	D-6	278
Solenoid - Articulate Right	D-6	279
Solenoid - Auxiliary Valve 1 Port A	F-6	280
Solenoid - Auxiliary Valve 1 Port B	F-6	281
Solenoid - Auxiliary Valve 2 Port A	C-6	282
Solenoid - Auxiliary Valve 2 Port B	C-6	283
Solenoid - Auxiliary Valve 3 Port A	F-2	284
Solenoid - Auxiliary Valve 3 Port B	F-2	285
Solenoid - Auxiliary Valve 4 Port A	E-2	286
Solenoid - Auxiliary Valve 4 Port B	E-2	287
Solenoid - Auxiliary Valve 5 Port A	F-2	288
Solenoid - Auxiliary Valve 5 Port B	F-2	289
Solenoid - Auxiliary Valve 6 Port A	E-2	290
Solenoid - Auxiliary Valve 6 Port B	E-2	291
Solenoid - AWD Clutch (LH Forward)	F-4	292
Solenoid - AWD Clutch (LH Reverse)	E-4	293
Solenoid - AWD Clutch (RH Forward)	E-4	294
Solenoid - AWD Clutch (RH Reverse)	E-4	295
Solenoid - Blade Cushion (LH)	A-6	296
Solenoid - Blade Cushion (RH)	A-6	297
Solenoid - Blade Left Lower	D-6	298
Solenoid - Blade Left Raise	D-6	299
Solenoid - Blade Pitch Backward	E-6	300
Solenoid - Blade Pitch Forward	E-6	301
Solenoid - Blade Right Lower	D-6	302
Solenoid - Blade Right Raise	D-6	303
Solenoid - Blade Sideshift Left	E-6	304
Solenoid - Blade Sideshift Right	E-6	305
Solenoid - Centershift Pin Puller	F-6	306
Solenoid - Circle Left	F-6	307
Solenoid - Circle Right	F-6	308
Solenoid - Circle Sideshift Left	E-6	309
Solenoid - Circle Sideshift Right	E-6	310
Solenoid - Front Drive Motor (LH)	F-4	311
Solenoid - Front Drive Motor (RH)	F-4	312
Solenoid - Implement Pilot Pressure Supply	B-6	313
Solenoid - Pilot Steering	B-6	314
Solenoid - Primary Steering Left	B-6	315
Solenoid - Primary Steering Right	B-6	316
Solenoid - Secondary Steering Left	B-6	317
Solenoid - Secondary Steering Right	B-6	318
Solenoid - Wheel Lean Left	E-6	319
Solenoid - Wheel Lean Right	E-6	320
Switch - Pin Puller	F-6	321

UENR3921-01 VOL 4 of 4

30 Page, (Dimensions: 39 inches x 28 inches)



SYMBOL	DESCRIPTION
─●─	CIRCUIT CONNECTED
─┼─	CIRCUIT NOT CONNECTED
⏚	ELECTRICAL CONNECTION TO MACHINE STRUCTURE
⏚	INTERNAL ELECTRICAL CONNECTION TO SURFACE OF COMPONENT
→)—	CONNECTOR
H#	CIRCUIT GROUPING DESIGNATION
- - -	ATCH WIRE, CABLE, COMPONENT
○–○	SPLICE
○	BLADE, SPADE, RING OR SCREW TERMINAL

ABBREV	COLOR
RD	RED
WH	WHITE
OR	ORANGE
YL	YELLOW
PK	PINK
BK	BLACK
GY	GRAY
PU	PURPLE
BR	BROWN
GN	GREEN
BU	BLUE

HARNESS TABLE

ID	PART#	CHG	LOC	DESCRIPTION
A	236-2335	01	C-7	HIGH LIGHT BAR
AF	380-3081	01	F-6	ALL-WHEEL DRIVE SOLENOIDS ATCH
AH	351-8441	02	F-4	RH WHEEL SPEED SENSOR
AK	351-8440	02	F-4	LH WHEEL SPEED SENSOR
CL	380-3089	00	E-3	FRONT ATCH
RA	236-2356	03	C-2	ACCUGRADE BLADE INCLINATION SENSOR
RC	243-3250	03	C-2	ACCUGRADE ROTATION SENSOR
RE	380-3061	01	C-5	ACCUGRADE
RX	308-9367	01	C-3	ACCUGRADE BLADE
U	380-3034	01	D-8	FRONT FRAME STEERING
UA	448-8651	00	A-7	NON-AWD LEFT STEERING CYLINDER POSITION SENSOR
UA	449-0207	00	A-7	AWD LEFT STEERING CYLINDER POSITION SENSOR
UC	380-3052	00	A-7	NON-AWD RIGHT STEERING CYLINDER POSITION SENSOR
UC	380-3042	00	A-7	AWD RIGHT STEERING CYLINDER POSITION SENSOR
UF	391-4444	00	B-7	STEERING VALVE

WIRE GROUP COLOR DESCRIPTIONS

(black)	GROUND CIRCUIT
(blue)	WIRES THAT HAVE SYSTEM VOLTAGE WHEN THE KEY SWITCH IS ON
(green)	AWD CIRCUIT
(brown)	ACCUGRADE CIRCUIT
(tan)	TURN SIGNAL / WIPER WASHER CIRCUIT
(orange striped)	IMPLEMENT CONTROL CIRCUIT
(gray striped)	IMPLEMENT 3 CONTROL CIRCUIT
(light green striped)	STEERING CONTROL CIRCUIT
(black/orange striped)	GPS CAN DATA LINK
(brown striped)	ACCUGRADE SENSOR CAN DATA LINK

OTHER COLOR DESCRIPTIONS

(light blue)	HIGHWAYS

CALLOUTS

Callout Number (Machine Location from Component Locations Table) → (52) VALVE GP - CONTROL ← Component Name
138-1234 ← Part Number

THIS SCHEMATIC IS FOR THE 12M3, 140M3, AND 160M3 MOTOR GRADER ELECTRICAL SYSTEM
VOLUME 4 of 4: ADDITIONAL CHASSIS COMPONENTS

MEDIA NUMBER: UENR3921

SCHEMATIC PART NUMBER: 417-8806, CHANGE: 00, VERSION: -

Components are shown installed on a fully operable machine with the key and engine off, transmission shifter in neutral and with parking brake set.

Refer to the appropriate Service Manual for Troubleshooting, Specifications and Systems Operations.

Refer to the Parts Manual using a specific serial number prefix in SIS before ordering parts from this schematic.