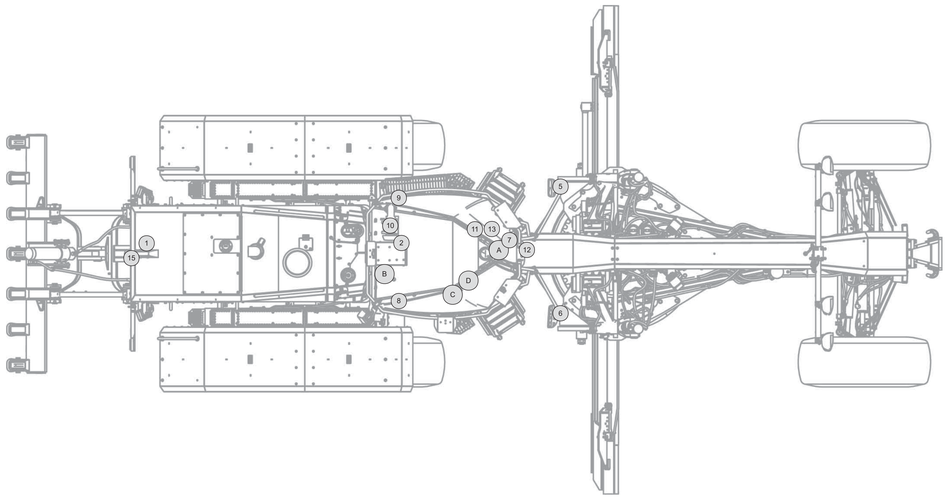
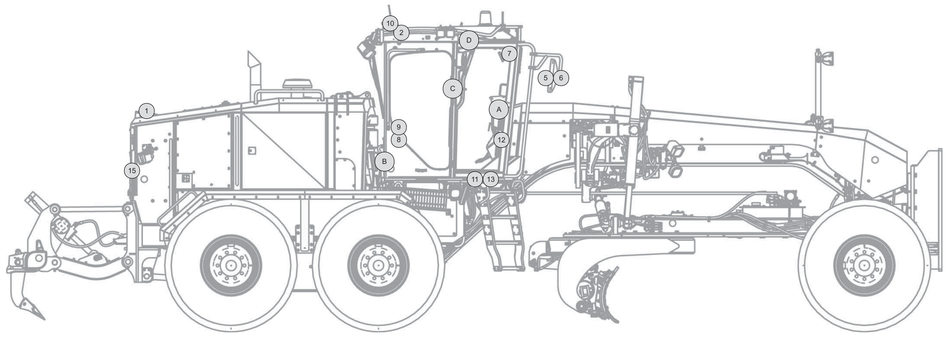




Machine Harness Connector and Component Locations

Component Location - Volume 1		
Component	Schematic Location	Machine Location
Camera - Rear Vision	C-8	1
Coil - MSS Exciter ATCH	C-8	A
Controller - AWD	F-11	E
Controller - Product Link ATCH	H-7	2
Controller- Implement #3	I-11	B
Ground - Cab 1	H-12	A
Ground - Cab 2	D-12	E
Lever - Auxiliary 6	G-3	C
Lever - Auxiliary 7	G-3	C
Messenger	F-3	C
Keyreader - MSS ATCH	D-8	A
Mirror - Heated L ATCH	F-7	5
Mirror - Heated R ATCH	F-7	6
Monitor - Rear Vision	C-6	7
Motor - Air Cleaner	E-7	8
Motor - Side Wiper L	I-8	9
Motor - Side Wiper R	I-8	10
Port - 12 Volt Auxiliary	F-3	C
Radio - Product Link ATCH	H-8	2
Resistor - CAN	F-3	D
Switch - Auto Shift On / Off	C-5	C
Sensor - AWD Control Dial	G-12	C
Switch - AWD	G-12	C
Switch - Beacon	F-5	C
Switch - Blade Cushion	G-5	C
Switch - Cab Flood Lamp	E-5	C
Switch - Center Shift Pin	I-5	C
Switch - Defrost Fan	H-5	C
Switch - Differential Lock Floor	F-5	11
Switch - Dimmer	G-5	C
Switch - Flood Lamps	E-5	C
Switch - Hazard	D-5	C
Switch - Head / Tail Lamps	G-5	C
Switch - Heated Mirror	G-5	C
Switch - Heated Side Window	H-5	C
Switch - Implement Lockout	E-5	C
Switch - Regeneration	H-5	C
Switch - Snow Wing Flood	F-5	C
Switch - Throttle Lock Mode	D-5	C
Switch - Throttle Set	D-5	C

Machine locations are repeated for components located close together.
A = Located below or inside dash.
B = Located inside rear covered compartment.
C = Located on right-hand cab column.
D = Located in Headliner.

Connector Locations - Volume 1		
Connector Number	Schematic Location	Machine Location
CONN 1	I-13	B
CONN 2	H-13	12
CONN 3	E-13	B
CONN 4	E-13	B
CONN 5	E-13	B
CONN 6	I-10	13
CONN 7	F-10	B
CONN 8	D-9	A
CONN 9	G-9	14
CONN 10	E-7	15
CONN 11	H-3	B

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 Identifiers (CID*) Module Identifier (MID*) AWD Control (MID No. 075)	
CID	Component
0041	8 Volt DC Supply
0168	Electrical System Voltage
0517	AWD Mode Switch
0600	AWD Hydraulic Oil Temperature
2188	Left Forward Clutch Solenoid
2189	Left Reverse Clutch Solenoid
2190	Right Forward Clutch Solenoid
2191	Right Reverse Clutch Solenoid
2194	AWD Control Dial
2293	Left Front Drive Motor Solenoid
2294	Right Front Drive Motor Solenoid
2295	Left Front Drive Pump Forward Solenoid
2296	Left Front Drive Pump Reverse Solenoid
2297	Right Front Drive Pump Forward Solenoid
2298	Right Front Drive Pump Reverse Solenoid
2319	Left Motor Speed Sensor 1
2320	Left Motor Speed Sensor 2
2321	Right Motor Speed Sensor 1
2322	Right Motor Speed Sensor 2
Implement Control #3 (MID No. 147)	
CID	Component
0041	8 VDC Sensor Power Supply
0168	Electrical System Voltage
0247	SAE J1939 Data Link
0248	Cat Data Link
0262	5 Volt Sensor DC Power Supply
0296	Transmission / Chassis ECM
0358	Implement Pilot Pressure Supply Solenoid
0490	Hydraulic Lockout Switch
0588	Monitoring System Display
0990	Engine Electronic Control Module
0597	Main Hydraulic Pump Discharge Pressure
0600	Hydraulic Oil Temperature Sensor
0615	Machine Articulation Angle Position Sensor
0967	Machine Application
1326	Location Code
1471	Steering Control Position Sensor 1
1472	Steering Control Position Sensor 2
1473	Steering Control Position Sensor 3
1482	10 Volt Sensor DC Power Supply
1558	Electrical Implement Control 2
2113	Operator Present Switch
2143	Electronic Implement Control 3
2146	Articulation Lever Position Sensor
2147	Automatic Neutral Articulation Switch
2150	Blade Left Lift Lever Position Sensor
2151	Blade Right Lift Lever Position Sensor
2152	Wheel Lean Control Position Sensor
2153	Blade Pitch Control Position Sensor
2154	Blade Side Shift Lever Position Sensor
2155	Circle Drive Lever Position Sensor
2156	Circle Side Shift Control Position Sensor
2160	Blade Left Raise Solenoid Valve
2161	Blade Right Raise Solenoid Valve
2162	Blade Left Lower Solenoid Valve
2163	Blade Right Lower Solenoid Valve
2165	Blade Side Shift Left Solenoid Valve
2166	Blade Side Shift Right Solenoid Valve
2167	Circle Left Solenoid Valve
2168	Circle Right Solenoid Valve
2169	Circle Side Shift Left Solenoid Valve
2170	Circle Side Shift Right Solenoid Valve
2171	Articulation Left Solenoid Valve
2172	Articulation Right Solenoid Valve
2173	Wheel Lean Left Solenoid Valve
2174	Wheel Lean Right Solenoid Valve
2181	Blade Pitch Forward Solenoid Valve
2182	Blade Pitch Backward Solenoid Valve
2200	Left Steering Cylinder Position Sensor
2201	Right Steering Cylinder Position Sensor
2202	Steering Valve Control Module
2203	Steering Valve Control Module - Spool Position Sensor
2204	Auxiliary Lever 1 Position Sensor
2205	Auxiliary Lever 2 Position Sensor
2206	Auxiliary Lever 3 Position Sensor
2207	Auxiliary Lever 4 Position Sensor
2208	Auxiliary Lever 5 Position Sensor
2209	Auxiliary Lever 6 Position Sensor
2210	Auxiliary Lever 7 Position Sensor
2211	Auxiliary Valve 1 - Port A Solenoid
2212	Auxiliary Valve 1 - Port B Solenoid
2213	Auxiliary Valve 2 - Port A Solenoid
2214	Auxiliary Valve 2 - Port B Solenoid
2215	Auxiliary Valve 3 - Port A Solenoid
2216	Auxiliary Valve 3 - Port B Solenoid
2217	Auxiliary Valve 4 - Port A Solenoid
2218	Auxiliary Valve 4 - Port B Solenoid
2219	Auxiliary Valve 5 - Port A Solenoid
2220	Auxiliary Valve 5 - Port B Solenoid
2221	Auxiliary Valve 6 - Port A Solenoid
2222	Auxiliary Valve 6 - Port B Solenoid
2223	Auxiliary Valve 7 - Port A Solenoid
2224	Auxiliary Valve 7 - Port B Solenoid
2252	Machine Articulation Angle Sensor 2
2650	Steering Valve Control Module Power Supply

*The CID is a diagnostic code that indicates which circuit is faulty.
*The MID is a diagnostic code that indicates which electronic control module processed the fault.

Failure Mode Identifiers (FMI)*	
FMI No.	Failure Description
0	Data valid but above normal operational range.
1	Data valid but below normal operational range.
2	Data erratic, intermittent, or incorrect.
3	Voltage above normal or shorted high.
4	Voltage below normal or shorted low.
5	Current below normal or open circuit.
6	Current above normal or grounded circuit.
7	Mechanical system not responding properly.
8	Abnormal frequency, pulse width, or period.
9	Abnormal update.
10	Abnormal rate of change.
11	Failure mode not identifiable.
12	Bad device or component.
13	Out of calibration.
14	Parameter failures.
15	Parameter failures.
16	Parameter not available.
17	Module not responding.
18	Sensor supply fault.
19	Condition not met.
20	Parameter failures.

*The FMI is a diagnostic code that indicates what type of failure has occurred.

Event Codes Implement Control	
E0192	Steering System Malfunction
E0256	Steering Output Detected in the Wrong Direction
E0257	Steering Output Detected with No Command.
E0258	No Steering Detected with Command Given.
E0258	No Steering Detected with Command Given.
E0263	Low Main Pump Pressure
E0455	Hydraulic Pilot Supply Oil Filter Plugged
E0560	Secondary Steer Pump No Response
E0562	Steering Lever Has Not Been Aligned to Wheel Steering Angle
E0598	Steering Limited due to Cold Hydraulic Oil
E0599	Gear Too High for Steering with Cold Oil
E0795	Machine Speed Excessive for Machine Articulation Angle
E0796	Machine Articulation Angle Limited Due to Machine Speed
E0861	Clock Manual Alignment Required
E0878	High Hydraulic Oil Temperature
E0879	Invalid Articulation Response Detected

Related Electrical Service Manuals	
Title	Form Number
AWD Control	REN99094
Implement Control #3:	REN99013

Resistor, Sender and Solenoid Specifications		
Part No.	Component Description	Resistance (Ohms)*
134-2640	Resistor Can	120 ± 12

* At room temperature unless otherwise noted.

CATERPILLAR®

KENR9044-02
January 2013

KENR9044-02 VOL 1 of 4
36 Page, (Dimensions: 48 inches x 35 inches)

Schematic

120M Series 2 Motor Grader Electrical System

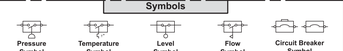
120M2:
M921-UP
M9C1-UP
M9H1-UP
R9N1-UP
R9W1-UP

Volume 1 of 4: Cab

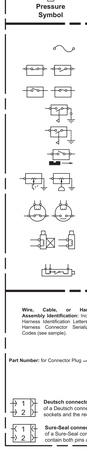
Printed in U.S.A.

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.

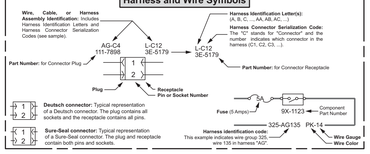
Sender: A component that is used with a temperature or pressure gauge. The sender measures the temperature or pressure. Its resistance changes to give an indication to the gauge of the temperature or pressure.

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



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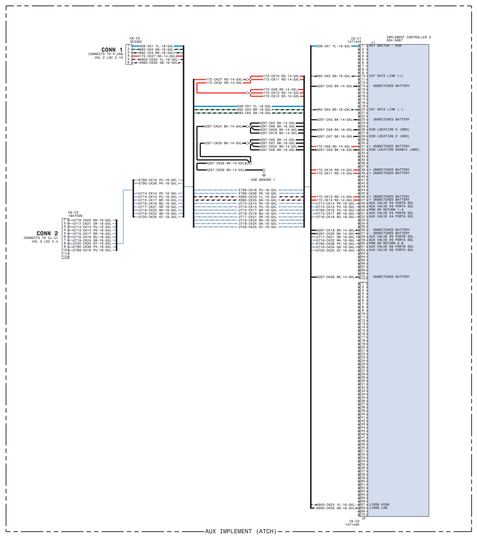
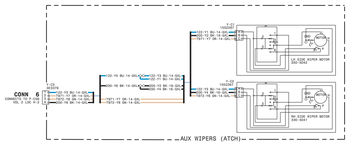
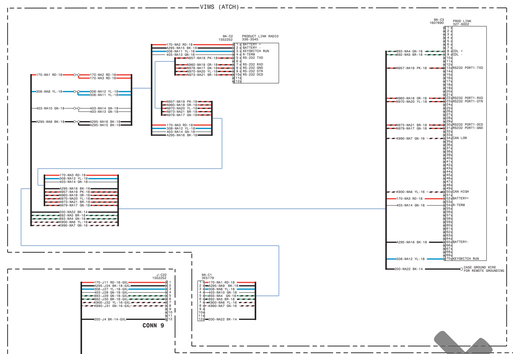
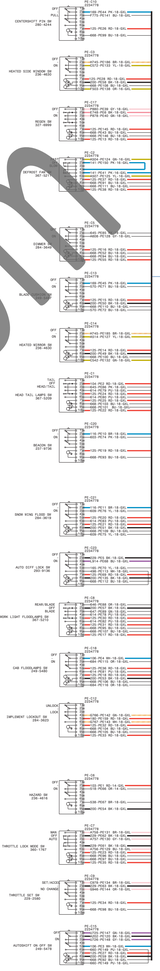
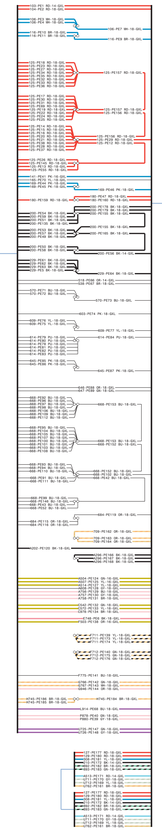
36 Page, (Dimensions: 48 inches x 35 inches)

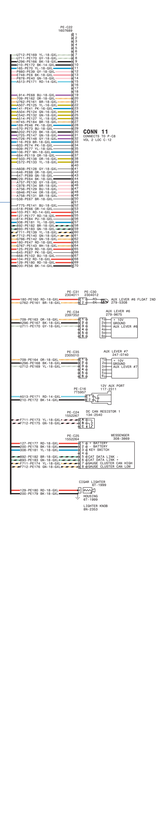


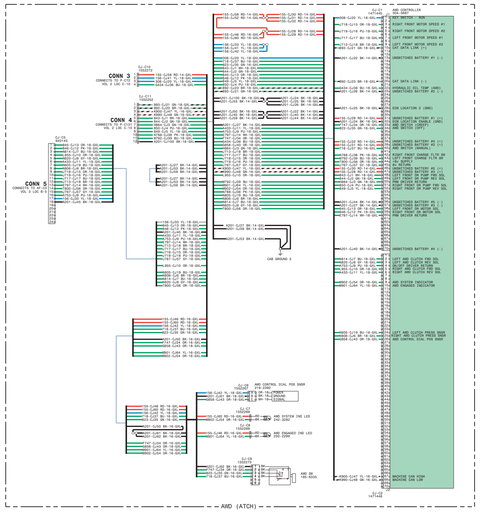


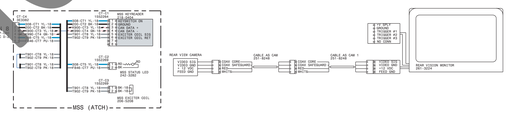












SYMBOL	DESCRIPTION
⏚	CIRCUIT CONNECTED
⏚	CIRCUIT NOT CONNECTED
⏚	ELECTRICAL CONNECTION TO MACHINE STRUCTURE
⏚	INTERNAL ELECTRICAL CONNECTION TO SURFACE OF COMPONENT
⊣⊢	CONNECTOR
⊣⊢	CIRCUIT GROUPING DESIGNATION
⊣⊢	ATCH WIRE, CABLE, COMPONENT
⊣⊢	SPLICE
⊣	BLADE, SPADE, RING OR SCREW TERMINAL

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

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
- START AID CIRCUIT
- TRANSMISSION AND CHASSIS CONTROL CIRCUIT
- AWD CIRCUIT
- MACHINE SECURITY CONTROL CIRCUIT
- ENGINE CONTROL CIRCUIT
- HEATER AND AIR CONDITIONER CIRCUIT
- TURN SIGNAL / WIPER WASHER CIRCUIT
- CAT DATA LINK
- CAN DATA LINK
- PRODUCT LINK
- IMPLEMENT CONTROL CIRCUIT 1
- GAUGE CAN DATA LINK
- IMPLEMENT CONTROL CIRCUIT 3
- IMPLEMENT CONTROL CIRCUIT 2

OTHER COLOR DESCRIPTIONS

- HIGHWAYS

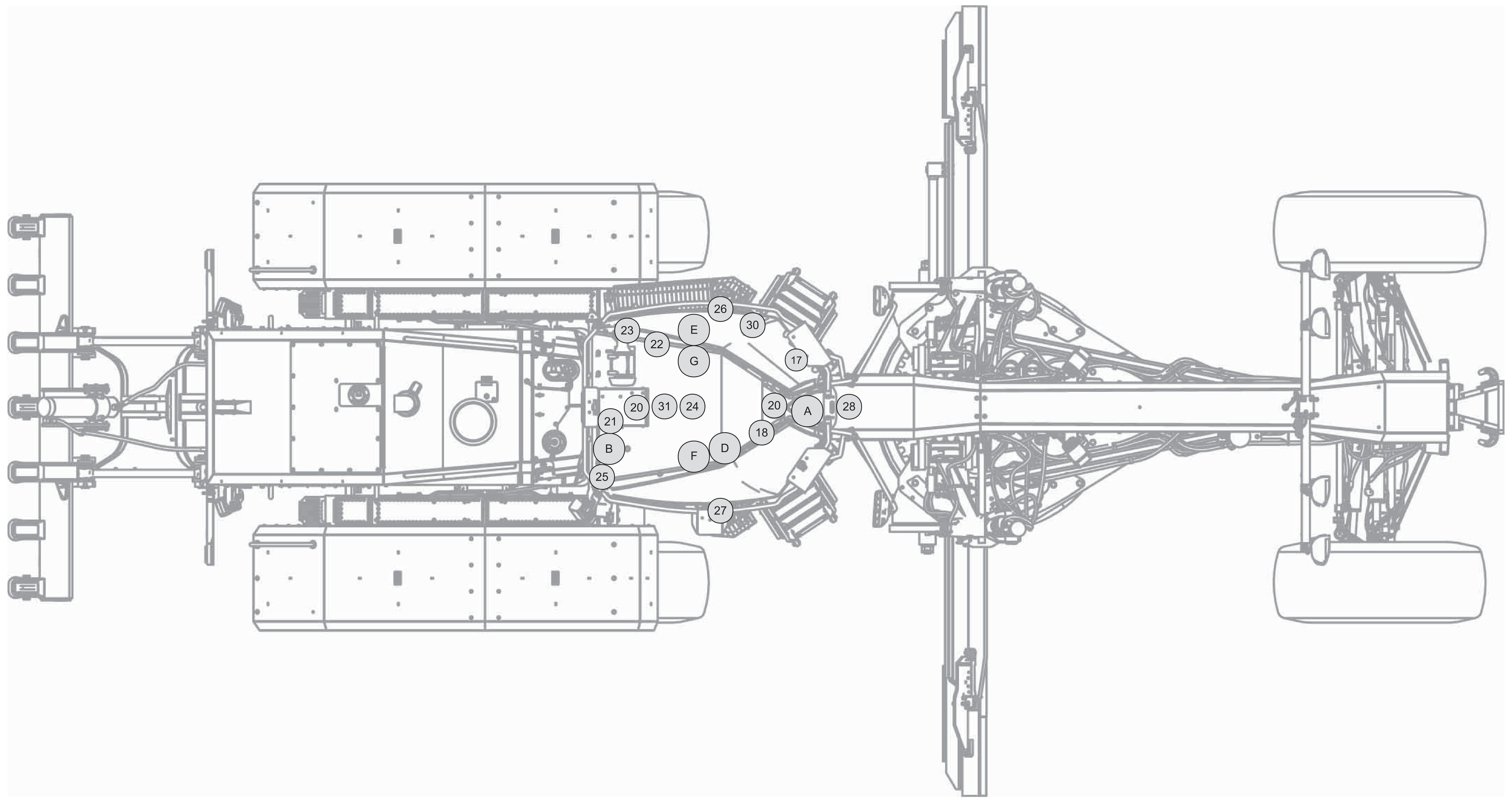
NOTE A: POWER LEAD FROM VOLTAGE CONVERTER TO 2-WAY COMMUNICATIONS RADIO SHOULD BE 12 AWG OR LARGER.

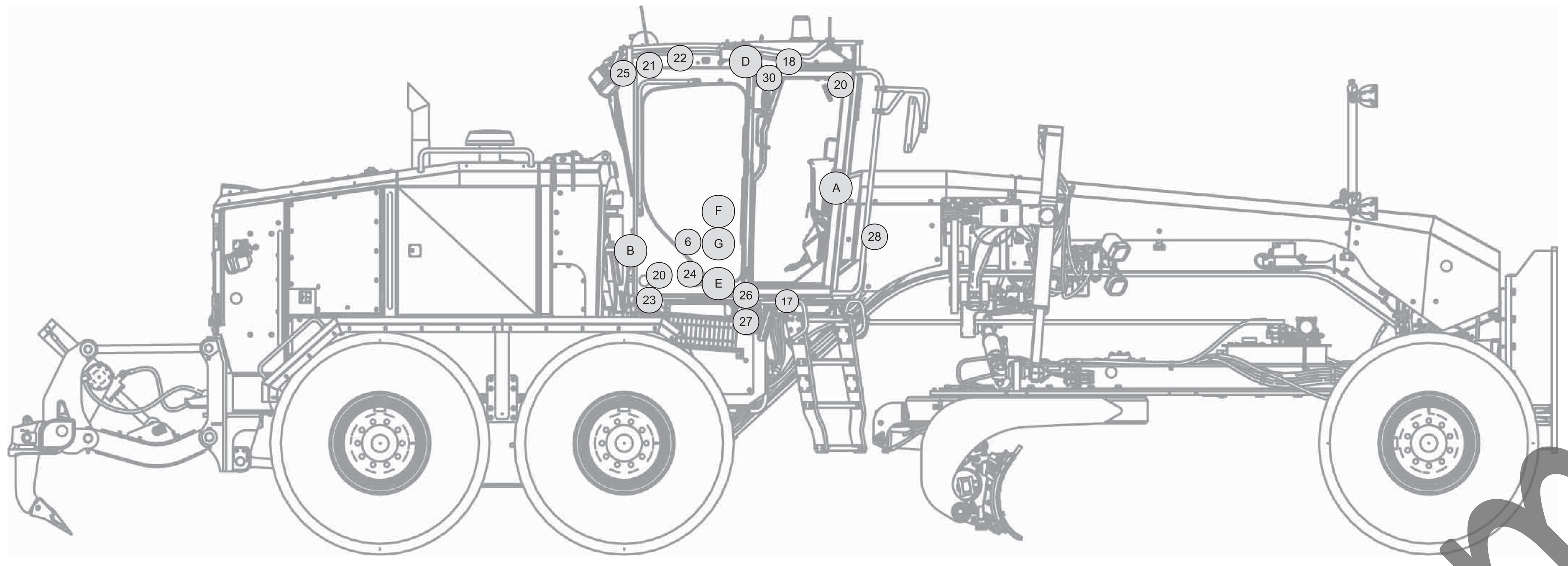
NOTE D: THE SWITCH CONTACT STATE SHOWN OCCURS WHEN PEDAL IS NOT PRESSED.

HARNESS AND CABLE CHART

ID	PART#	CHG	ATCH	LOC	DESCRIPTION
J	314-3282	04	STD	F-10	ROOF GROUP
Y	235-6175	03	ATCH	I-10	AUX WIPERS
CJ	324-0484	04	ATCH	F-13	AWD CONTROL
CK	326-4208	04	ATCH	J-13	IMPLEMENT CONTROL
CT	238-8813	01	ATCH	D-9	MSS
JA				E-7	LISCENSE PLATE HARNESS
PE	324-0482	06	STD	H-3	SWITCH PANEL HARNESS
WA	261-9391	02	ATCH	G-8	PRODUCT LINK

THIS SCHEMATIC IS FOR THE 120M SERIES 2 MOTOR GRADER ELECTRICAL SYSTEM
VOLUME 1 of 4: CAB
MEDIA NUMBER: KENR9044-02
SCHEMATIC PART NUMBER: 354-4211, CHANGE: 02, 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.





Machine Harness Connector and Component Locations

Component Location - Volume 2					
Component	**Schematic Location**	**Machine Location**	**Component**	**Schematic Location**	**Machine Location**
Actuator - Water Valve	C-11	20	Relay - Flood Cab	F-7	B
Alarm - Action	G-1	A	Relay - Flood Rear	E-7	B
Cluster - Dash	E-1	A	Relay - Headlamp	F-7	B
Control - Implement #1	I-9	B	Relay - HVAC Blower	E-7	B
Control - Implement #2	I-10	B	Relay - Heated Mirror	D-7	B
Converter - Communications	H-13	21	Relay - Horn	F-7	B
Converter - Entertainment Radio	J-12	A	Relay - LH Position	D-7	B
Diode - Rear Flood Interlock	G-1	B	Relay - Power Air Cleaner	F-7	B
Ground - Cab 1	C-10	E	Relay - RH Position	G-7	B
Ground - Cab 2	C-10	E	Relay - Side Heated Window 1	E-7	B
Ground - Cab 3	C-10	E	Relay - Side Heated Window 2	D-7	B
Ground - Roof 1	C-14	D	Resistor - Blower	B-11	20
Ground - Roof 2	C-14	D	Resistor - Accugrade CAN	C-13	D
Joystick - LH	I-1	G	Resistor - Defrost Fan	G-13	21
Joystick - Mini	D-1	F	Resistor - CAN	G-1	A
Joystick - RH	D-1	F	Resistor - Front Heated Window	E-13	A
Module - Flasher	G-1	B	Resistor - Gauge Cluster CAN	F-1	D
Module - Regeneration Indicator	H-1	A	Resistor - Side Heated Window	F-12	30
Motor - Blower	B-10	20	Sensor - Inching Pedal	E-1	A
Motor - Rear Defroster	G-13	25	Sensor - Throttle Position	E-1	A
Motor - Up/Down Armrest LH	I-1	G	Switch - A/C	D-13	D
Motor - Up/Down Armrest RH	B-1	F	Switch - Armrest LH	I-1	G
Motor - Washer Door LH	D-9	E	Switch - Armrest RH	B-1	F
Motor - Washer Door RH	D-9	E	Switch - Brake Light	E-1	A
Motor - Washer Front	D-9	E	Switch - Brake Pedal	E-1	A
Motor - Washer Rear	D-9	E	Switch - Horn	C-1	F
Motor - Washer Window LH	D-9	E	Switch - Inching Pedal	E-1	A
Motor - Washer Window RH	D-9	E	Switch - Key	E-1	A
Motor - Wiper Door LH	F-13	26	Switch - Operator Present	J-1	31
Motor - Wiper Door RH	F-12	27	Switch - Park Brake Op	G-1	A
Motor - Wiper Front	G-13	28	Switch - Secondary Steer	E-1	A
Motor - Wiper Rear	G-13	21	Switch - Thermal 1	B-10	20
Panel - HVAC Operator	D-13	D	Switch - Thermal 2	B-10	20
Pod - Auxiliary Control	D-1	F	Switch - Turn Signal	C-1	F
Relay - AccuGrade Enable	D-7	B	Switch - Wiper Door LH	H-13	D
Relay - Backlight	G-7	B	Switch - Wiper Door RH	H-13	D
Relay - Front Heated Window	D-7	B	Switch - Wiper Front	H-13	D
Relay - Differential Lock	F-7	B	Switch - Wiper Rear	I-13	D
Relay - Dimmer	F-7	B	Thermostat	B-10	20
Relay - Flood Blade	E-7	B			

Machine locations are repeated for components located close together.
A = Located below or inside dash.
B = Located inside rear covered compartment.
D = Located in Headliner.
E = Located inside or near fuse panel.
F = Located inside right console.
G = Located inside or near left console.

Connector Location - Volume 2		
Connector Number	**Schematic Location**	**Machine Location**
CONN 1	F-13	B
CONN 3	C-12	B
CONN 4	C-10	B
CONN 6	H-2	17
CONN 7	B-14	18
CONN 8	B-5	A
CONN 11	C-12	B
CONN 12	C-14	20
CONN 13	F-13	30
CONN 14	G-14	D
CONN 15	F-14	22
CONN 16	B-5	E
CONN 17	H-13	B
CONN 18	G-13	B
CONN 19	F-13	B
CONN 20	C-10	23
CONN 21	A-12	B
CONN 22	A-12	B
CONN 23	J-2	24
CONN 24	A-5	B
CONN 25	G-2	A
CONN 26	G-2	A
CONN 27	G-2	A
CONN 28	H-3	A
CONN 29	H-2	28
CONN 30	G-1	A

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.

Resistor Specifications		
Part No.	**Component Description**	**Resistance (Ohms)[1]**
7T-4003	Resistor: Defrost Fan	10 ± 0.5
125-9740	Resistor: Blower	A-C: 2 ± 0.1 B-C: 1 ± 0.05 C-D: 0.36 ± 0.018
134-2540	Resistor: CAN / AccuGrade CAN	120 ± 12

[1] At room temperature unless otherwise noted.

Off Machine Switch Specification				
Part No.	**Function**	**Actuate**	**Deactuate**	**Contact Position**
3E-5464	Thermostat	-1.1 ± 0.8°C (30 ± 1.4°F)	2.2 ± 0.8°C (36 ± 1.4°F)	Normally Closed

Implement Control #1 (MID No. 082) Implement Control #2 (MID No. 147)	
CID	**Component**
0041	8 VDC Sensor Power Supply
0168	Electrical System Voltage
0247	SAE J1939 Data Link
0248	Cat Data Link
0262	5 Volt Sensor DC Power Supply
0296	Transmission / Chassis Control
0358	Implement Pilot Pressure Supply Solenoid
0490	Hydraulic Lockout Switch
0588	Monitoring System Display
0590	Engine Electronic Control Module
0597	Main Hydraulic Pump Discharge Pressure
0600	Hydraulic Oil Temperature Sensor
0615	Machine Articulation Angle Position Sensor
0967	Machine Application
1326	Location Code
1471	Steering Control Position Sensor 1
1472	Steering Control Position Sensor 2
1473	Steering Control Position Sensor 3
1482	10 Volt Sensor DC Power Supply
1558	Electrical Implement Control 2
2113	Operator Present Switch
2143	Electronic Implement Control 3
2146	Articulation Lever Position Sensor
2147	Automatic Neutral Articulation Switch
2150	Blade Left Lift Lever Position Sensor
2151	Blade Right Lift Lever Position Sensor
2152	Wheel Lean Control Position Sensor
2153	Blade Pitch Control Position Sensor
2154	Blade Sideshift Lever Position Sensor
2155	Circle Drive Lever Position Sensor
2156	Circle Sideshift Control Position Sensor
2160	Blade Left Raise Solenoid Valve
2161	Blade Right Raise Solenoid Valve
2162	Blade Left Lower Solenoid Valve
2163	Blade Right Lower Solenoid Valve
2165	Blade Sideshift Left Solenoid Valve
2166	Blade Sideshift Right Solenoid Valve
2167	Circle Left Solenoid Valve
2168	Circle Right Solenoid Valve
2169	Circle Sideshift Left Solenoid Valve
2170	Circle Sideshift Right Solenoid Valve
2171	Articulation Left Solenoid Valve
2172	Articulation Right Solenoid Valve
2173	Wheel Lean Left Solenoid Valve
2174	Wheel Lean Right Solenoid Valve
2181	Blade Pitch Forward Solenoid Valve
2182	Blade Pitch Backward Solenoid Valve
2200	Left Steering Cylinder Position Sensor
2201	Right Steering Cylinder Position Sensor
2202	Steering Valve Control Module
2203	Steering Valve Control Module Spool Position Sensor
2204	Auxiliary Lever 1 Position Sensor
2205	Auxiliary Lever 2 Position Sensor
2206	Auxiliary Lever 3 Position Sensor
2207	Auxiliary Lever 4 Position Sensor
2208	Auxiliary Lever 5 Position Sensor
2209	Auxiliary Lever 6 Position Sensor
2210	Auxiliary Lever 7 Position Sensor
2211	Auxiliary Valve 1 - Port B Solenoid
2212	Auxiliary Valve 1 - Port A Solenoid
2213	Auxiliary Valve 2 - Port B Solenoid
2214	Auxiliary Valve 2- Port A Solenoid
2215	Auxiliary Valve 3 - Port B Solenoid
2216	Auxiliary Valve 3 - Port A Solenoid
2217	Auxiliary Valve 4 - Port B Solenoid
2218	Auxiliary Valve 4 - Port A Solenoid
2219	Auxiliary Valve 5 - Port B Solenoid
2220	Auxiliary Valve 5 - Port A Solenoid
2221	Auxiliary Valve 6 - Port B Solenoid
2222	Auxiliary Valve 6 - Port A Solenoid
2223	Auxiliary Valve 7 - Port B Solenoid
2224	Auxiliary Valve 7 - Port A Solenoid
2252	Machine Articulation Angle Sensor 2
2650	Steering Valve Control Module Power Supply
2258	Left Blade Control Mode Switch
2259	Right Blade Control Mode Switch
2260	SS Blade Control Mode Switch
2261	Left Desired Grade Offset Switch
2262	Right Desired Grade Offset Switch
2828	Main Hydraulic Pump Pressure Sensor #1
2829	Main Hydraulic Pump Pressure Sensor #2
2954	Unknown Implement Control

[1] The CID is a diagnostic code that indicates which circuit is faulty.

[2] The MID is a diagnostic code that indicates which electronic control module diagnosed the fault.

Failure Mode Identifiers (FMI)[1]	
FMI No.	**Failure Description**
0	Data valid but above normal operational range.
1	Data valid but below normal operational range.
2	Data erratic, intermittent, or incorrect.
3	Voltage above normal or shorted high.
4	Voltage below normal or shorted low.
5	Current below normal or open circuit.
6	Current above normal or grounded circuit.
7	Mechanical system not responding properly.
8	Abnormal frequency, pulse width, or period.
9	Abnormal update.
10	Abnormal rate of change.
11	Failure mode not identifiable.
12	Bad device or component.
13	Out of calibration.
14	Parameter failures.
15	Parameter failures.
16	Parameter not available.
17	Module not responding.
18	Sensor supply fault.
19	Condition not met.
20	Parameter failures.

[1]The FMI is a diagnostic code that indicates what type of failure has occurred.

Event Codes Implement Control	
E0192	Steering System Malfunction
E0256	Steering Output Detected in the Wrong Direction
E0257	Steering Output Detected with No Command.
E0258	No Steering Detected with Command Given.
E0258	No Steering Detected with Command Given.
E0263	Low Main Pump Pressure
E0455	Hydraulic Pilot Supply Oil Filter Plugged
E0560	Secondary Steer Pump No Response
E0562	Steering Lever Has Not Been Aligned to Wheel Steering Angle
E0598	Steering Limited due to Cold Hydraulic Oil
E0599	Gear Too High for Steering with Cold Oil
E0795	Machine Speed Excessive for Machine Articulation Angle
E0796	Machine Articulation Angle Limited Due to Machine Speed
E0861	Clock Manual Alignment Required
E0878	High Hydraulic Oil Temperature
E2085	Invalid Articulation Response Detected

KENR9044-02
January 2013

Schematic

120M Series 2 Motor Grader Electrical System

120M2:
M921-UP
M9C1-UP
M9H1-UP
R9N1-UP
R9W1-UP

Volume 2 of 4: Cab Continued

Printed in U.S.A.

KENR9044-02 VOL 2 of 4
36 Page, (Dimensions: 48 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.

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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.

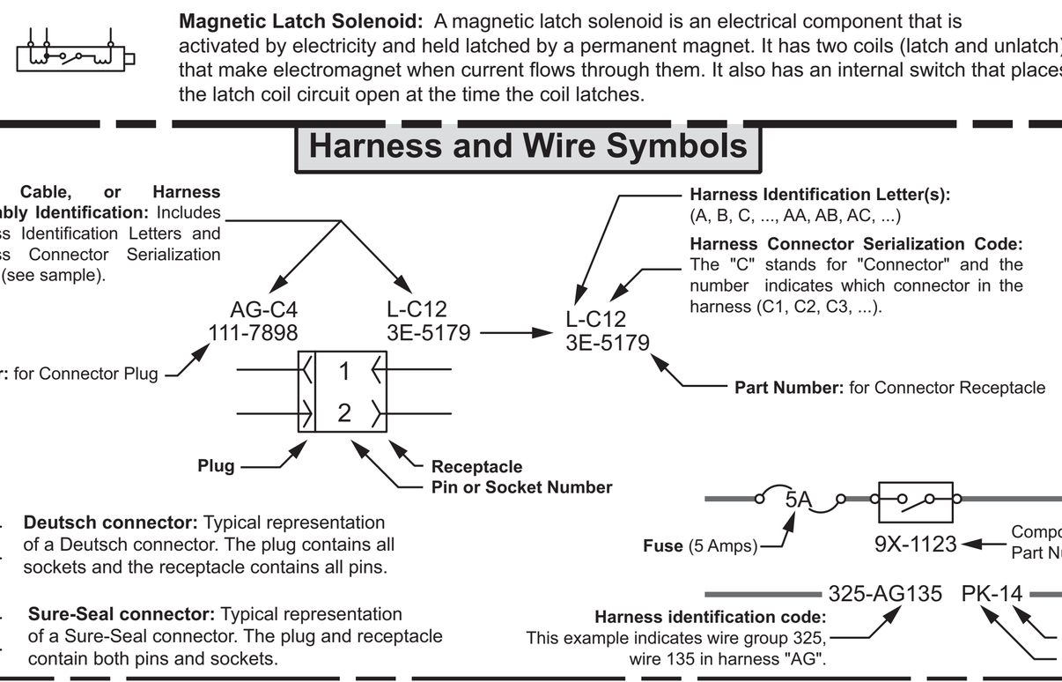
Sender: A component that is used with a temperature or pressure gauge. The sender measures the temperature or pressure. Its resistance changes to give an indication to the gauge of the temperature or pressure.

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



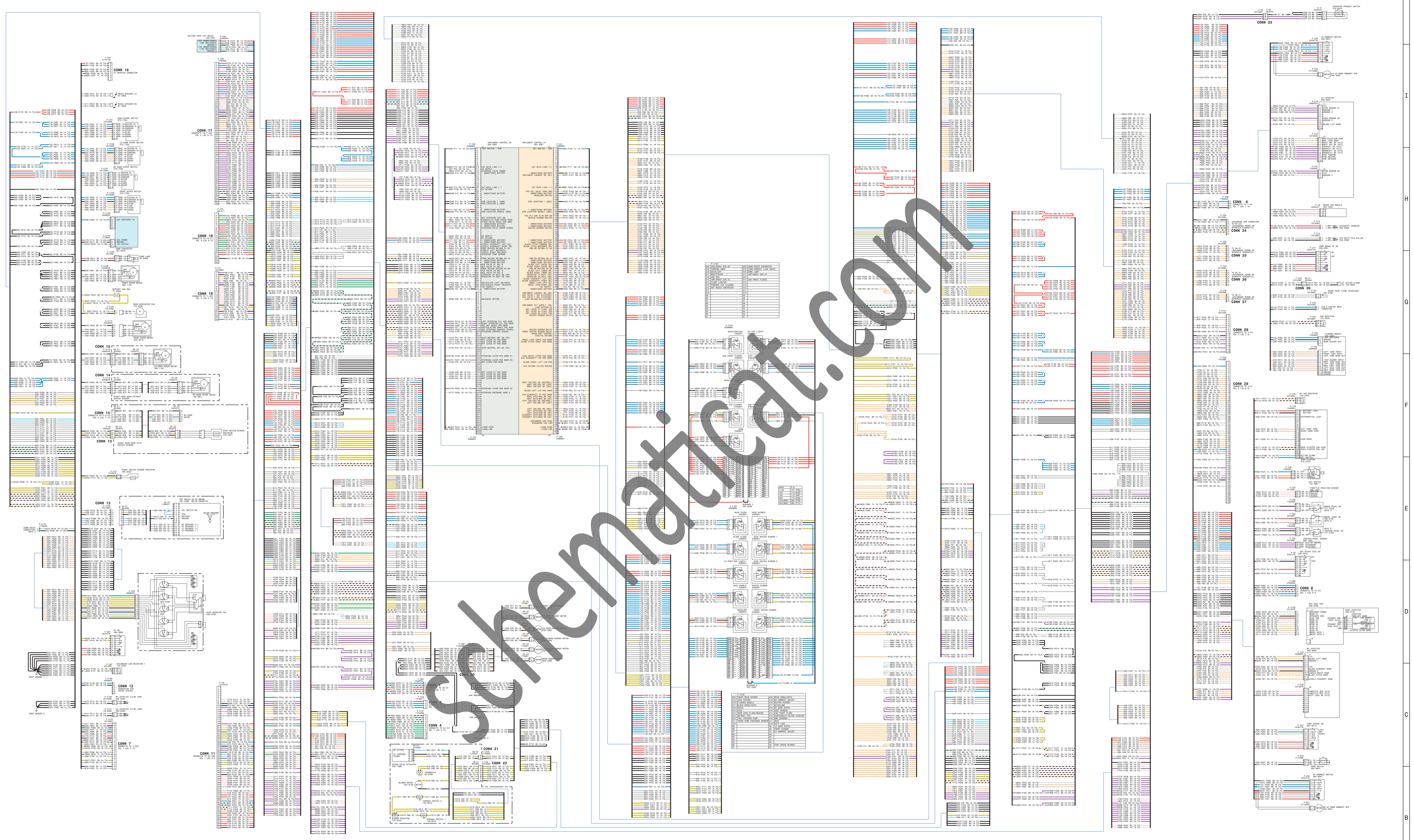
Deutsch connector: Typical representation of a Deutsch connector. The plug contains all sockets and the receptacle contains all pins.

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

Related Electrical Service Manuals	
Title	**Form Number**
Implement Control:	RENR9013

KENR9044-02 VOL 2 of 4

36 Page, (Dimensions: 48 inches x 35 inches)



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
- START AID CIRCUIT
- TRANSMISSION AND CHASSIS CONTROL CIRCUIT
- AWD CIRCUIT
- ENGINE CONTROL CIRCUIT
- HEATER AND AIR CONDITIONER CIRCUIT
- TURN SIGNAL / WIPER WASHER CIRCUIT
- CAT DATA LINK
- CAN DATA LINK
- ACCUGRADE CAN DATA LINK
- IMPLEMENT CONTROL CIRCUIT 1
- IMPLEMENT CONTROL CIRCUIT 2

OTHER COLOR DESCRIPTIONS

- HIGHWAYS

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 CHART

ID	PART#	CHG	ATCH	LOC	DESCRIPTION
E	285-2372	00	STD	J-2	OPERATOR PRESENT SWITCH
P	360-2986	01	STD	I-12	MAIN CAB
CG	200-5728	02	ATCH	E-13	RADIO ADAPTER
CM	276-9015	03	STD	B-10	HVAC UNIT HARNESS
PA	331-6861	02	STD	D-10	WIPER MOTOR HARNESS
PG	363-1345	00	STD	G-1	ALARM JUMPER
WC	361-2492	01	STD	F-13	RH DOOR HARNESS
WJ	296-4924	04	ATCH	F-13	RH DOOR MOTOR
WK	296-4924	04	ATCH	F-13	LH DOOR MOTOR

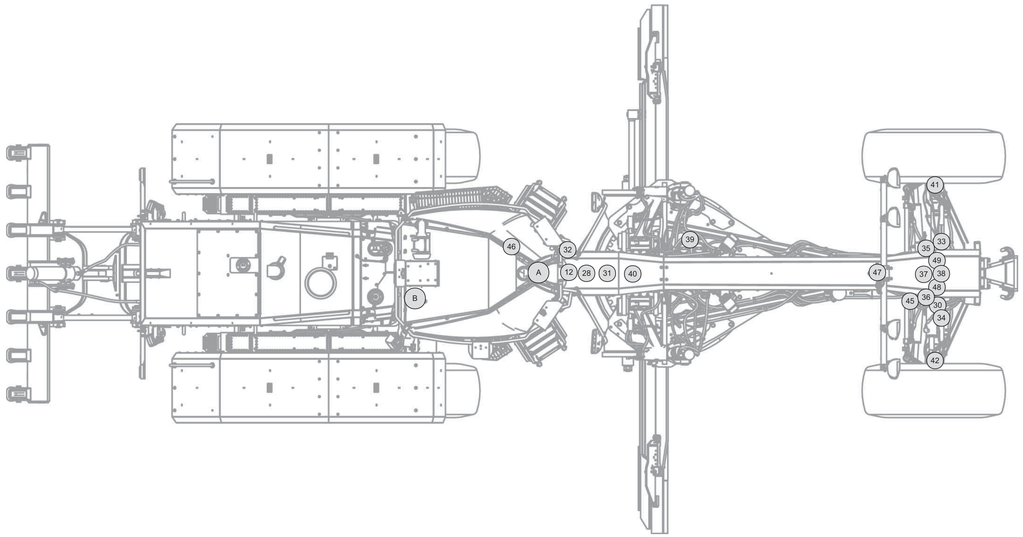
THIS SCHEMATIC IS FOR THE 120M SERIES 2 MOTOR GRADER ELECTRICAL SYSTEM
VOLUME 2 of 4: CAB CONTINUED

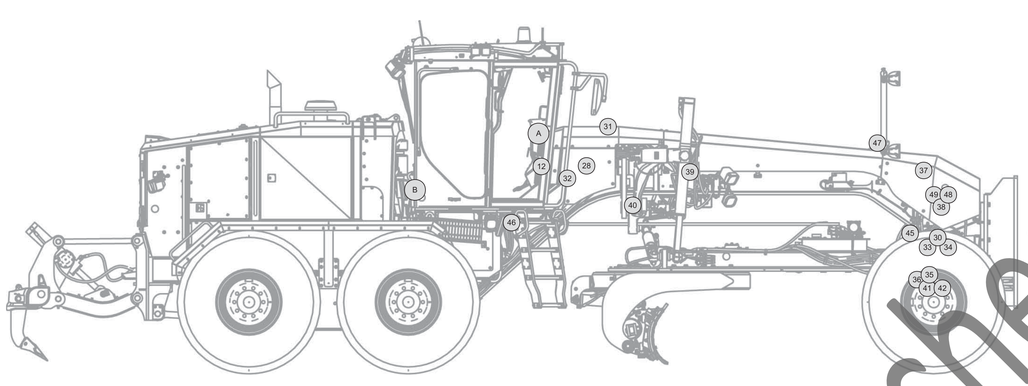
MEDIA NUMBER: KENR9044-02

SCHEMATIC PART NUMBER: 354-4211, CHANGE: 02, 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.





Machine Harness Connector and Component Locations

Component Location - Volume 3

Component	Schematic Location	Machine Location	Component	Schematic Location	Machine Location
Horn - Forward (High)	C-6	30	Solenoid - AWD Clutch Reverse L ATCH	B-4	38
Module - Steering Control Valve	D-6	31	Solenoid - AWD Clutch Reverse R ATCH	B-4	38
Resistor - Steer Valve Pull-up	C-6	31	Solenoid - Blade Cushion L	C-6	39
Sender - Fuel Level ATCH	D-5	32	Solenoid - Blade Cushion R	C-6	39
Sensor - Front Drive Motor L ATCH	A-3	33	Solenoid - Blade Lower L	C-7	31
Sensor - Front Drive Motor R ATCH	A-3	34	Solenoid - Blade Lower R	C-7	31
Sensor - Steer Cylinder Position L	C-5	35	Solenoid - Blade Pitch Backward	C-7	37
Sensor - Steer Cylinder Position R	C-5	36	Solenoid - Blade Pitch Forward	C-7	37
Solenoid - Articulate L	B-7	31	Solenoid - Blade Raise L	C-7	31
Solenoid - Articulate R	B-7	31	Solenoid - Blade Raise R	C-7	31
Solenoid - Auxiliary Valve 1 A	D-7	37	Solenoid - Blade Side Shift L	D-7	37
Solenoid - Auxiliary Valve 1 B	D-7	37	Solenoid - Blade Side Shift R	D-7	37
Solenoid - Auxiliary Valve 2 A	B-7	31	Solenoid - Center Shift Pin Puller	E-7	40
Solenoid - Auxiliary Valve 2 B	B-7	31	Solenoid - Circle L	D-7	37
Solenoid - Auxiliary Valve 3 A ATCH	C-3	37	Solenoid - Circle R	D-7	37
Solenoid - Auxiliary Valve 3 B ATCH	C-3	37	Solenoid - Circle Side Shift L	C-7	37
Solenoid - Auxiliary Valve 4 A ATCH	C-3	31	Solenoid - Circle Side Shift R	D-7	37
Solenoid - Auxiliary Valve 4 B ATCH	C-3	31	Solenoid - Front Drive Motor L ATCH	B-4	41
Solenoid - Auxiliary Valve 5 A ATCH	C-3	37	Solenoid - Front Drive Motor R ATCH	B-4	42
Solenoid - Auxiliary Valve 5 B ATCH	D-3	37	Solenoid - Secondary Steering L	B-7	37
Solenoid - Auxiliary Valve 6 A ATCH	C-3	31	Solenoid - Secondary Steering R	B-7	37
Solenoid - Auxiliary Valve 6 B ATCH	C-3	31	Solenoid - Wheel Lean L	D-7	37
Solenoid - AWD Clutch Forward L ATCH	B-4	38	Solenoid - Wheel Lean R	D-7	37
Solenoid - AWD Clutch Forward R ATCH	B-4	38	Switch - Pin Pulled Indicator	E-7	40

Machine locations are repeated for components located close together.

Connector Locations - Volume 3

Connector Number	Schematic Location	Machine Location
CONN 2	C-4	12
CONN 5	B-5	B
CONN 28	C-9	A
CONN 29	D-9	28
CONN 31	C-6	30
CONN 32	C-6	45
CONN 33	D-6	46
CONN 34	D-6	47
CONN 35	D-6	47
CONN 36	A-4	48
CONN 37	A-4	49

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.

A = Located below or inside dash.
B = Located inside rear covered compartment.

CATERPILLAR®

KENR9044-02
January 2013

Schematic

120M Series 2 Motor Grader Electrical System

120M2:
M921-UP
M9C1-UP
M9H1-UP
R9N1-UP
R9W1-UP

Volume 3 of 4: Chassis

Printed in U.S.A.

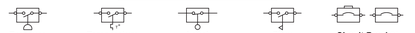
Resistor, Sender and Solenoid Specifications

Part No.	Component Description		Resistance (Ohms)[1]
240-7193	Resistor:	Steer Valve Pull-Up	500 ± 25
269-1021	Sender	Fuel Level	Empty Stop 239-255 Full Stop 25-29
152-8346	Solenoid:	Center Shiftpin Puller	32.6 ± 1.6
243-5015	Solenoid:	AWD Clutch Forward / Reverse - Left / Right	3.5 ± 1.8
254-3414	Solenoid:	Secondary Steer Left / Right	2.2 ± 0.2
278-1799	Solenoid:	Articulate Left / Right Auxiliary Valve 1 - 6 Blade Pitch Forward / Backward Blade Raise / Lower - Left / Right Blade Side Shift Left / Right Circle Left / Right Circle Side Shift Left / Right Wheel Lean Left / Right	8.7 ± 0.4

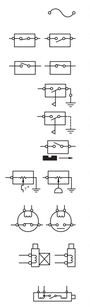
[1] At room temperature unless otherwise noted.

Harness And Wire Electrical Schematic Symbols

Symbols



Symbols and Definitions



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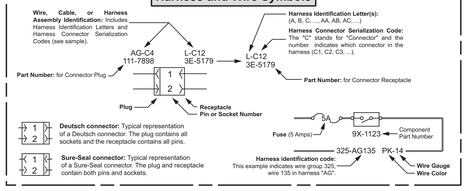
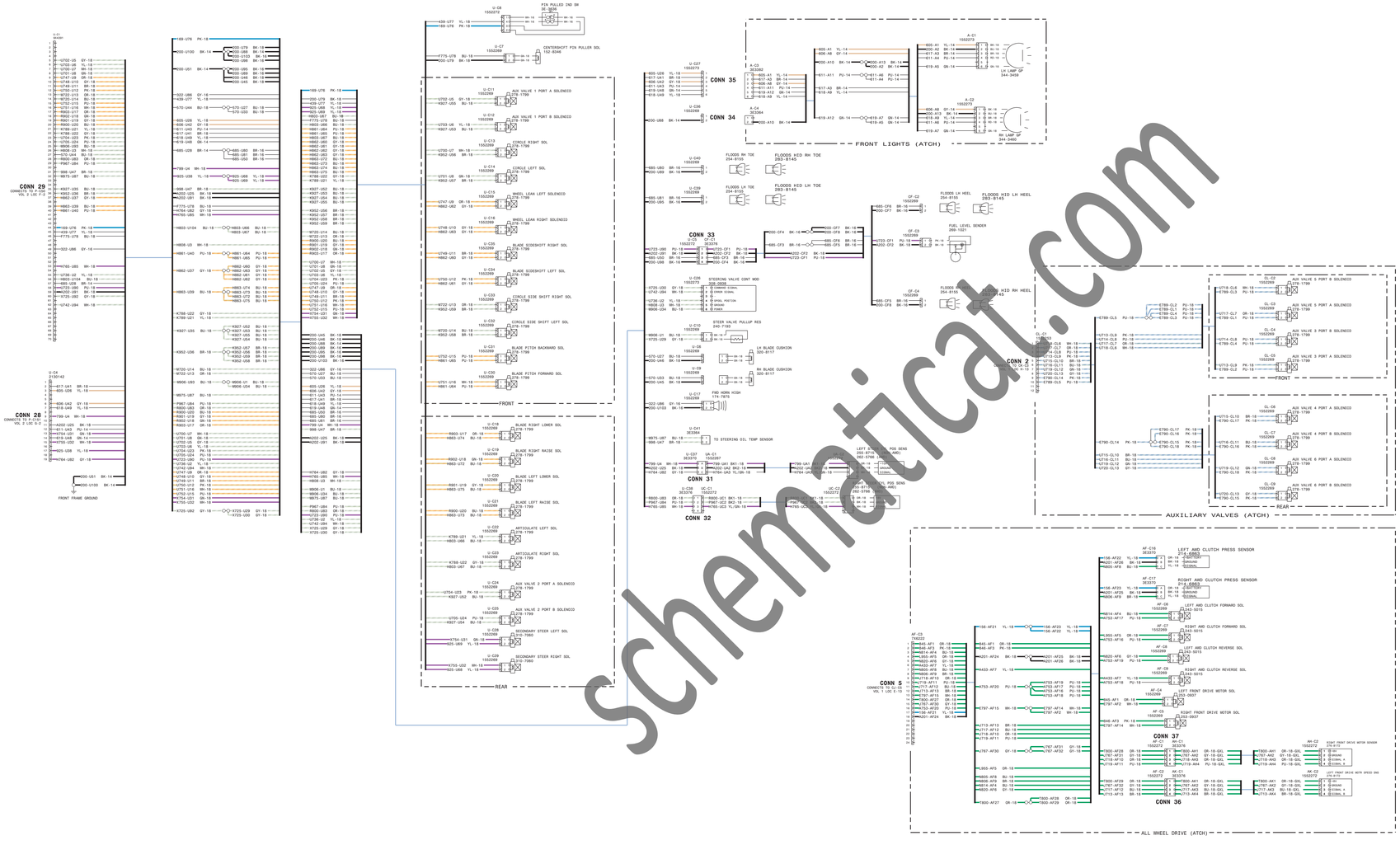
Harness and Wire Symbols



KENR9044-02 VOL 3 of 4
20 Page, (Dimensions: 39 inches x 24 inches)

KENR9044-02 VOL 3 of 4

20 Page, (Dimensions: 39 inches x 24 inches)



WIRE GROUP COLOR DESCRIPTIONS

	GROUND CIRCUIT
	WIRES THAT HAVE SYSTEM VOLTAGE WHEN THE KEY SWITCH IS ON
	TRANSMISSION AND CHASSIS CONTROL CIRCUIT
	AWD CIRCUIT
	TURN SIGNAL CIRCUIT
	IMPLEMENT CONTROL CIRCUIT 1
	IMPLEMENT CONTROL CIRCUIT 3
	IMPLEMENT CONTROL CIRCUIT 2

OTHER COLOR DESCRIPTIONS

	HIGHWAYS

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

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

HARNESS & CABLE CHART

ID	PART#	CHG	ATCH	NOTE	LOC	SHEET	DESCRIPTION
A	238-2335	01	ATT		L-11	SHEET 1	COMBINATION HEAD LAMP
E	364-0612	00	STD		D-11	SHEET 2	ENGINE
F	369-1000	00	STD		F-11	SHEET 2	REAR LEFT MAIN FRAME
R	351-6602	00	STD		I-2	SHEET 2	POWER DISTRIBUTION
T	352-1478	02	STD		C-14	SHEET 2	TRANSMISSION SOL
U	351-6605	00	STD		F-7	SHEET 1	FRONT FRAME
AD	348-3645	02	ATT		H-14	SHEET 2	AWD REAR
AF	314-7467	02	ATT		E-2	SHEET 1	AWD FRONT FRAME
AG	348-3640	00	STD		G-14	SHEET 2	RADIATOR GRILL
AH	351-6607	01	ATT		D-1	SHEET 1	RIGHT AWD SPEED SENSOR
AK	351-6606	01	ATT		D-1	SHEET 1	LEFT AWD SPEED SENSOR
CF	308-9323	00	STD		I-4	SHEET 1	FUEL LEVEL SENDER
CL	314-7466	01	ATT		G-2	SHEET 1	FRONT HYD ATTACH
FA	369-1001	00	STD		B-15	SHEET 2	REAR RIGHT MAIN FRAME
FG	319-5099	01	STD		H-13	SHEET 2	DEMAND FAN AND BRAKE CHARGE
FE	348-3644	01	STD		J-13	SHEET 2	ENGINE ENCLOSURE FAN
FJ	351-6604	00	STD		H-9	SHEET 2	
FH	379-2654	00	STD		E-5	SHEET 2	CCEM HARNESS
RA	319-5148	00	ATT		L-18	SHEET 2	LEFT REAR STOP/TAIL/TURN LAMP
RC	319-5147	00	ATT		K-18	SHEET 2	RIGHT REAR STOP/TAIL/TURN LAMP
RF	348-3647	00	STD		E-8	SHEET 2	SERVICE CENTER
UA	355-5082	00	ATT		G-4	SHEET 2	LEFT STEERING CYLINDER POSITION SENSOR (AWD)
UB	355-5078	00	STD		G-4	SHEET 1	LEFT STEERING CYLINDER POSITION SENSOR (NON-AWD)
UC	355-5083	00	ATT		F-4	SHEET 1	RIGHT STEERING CYLINDER POSITION SENSOR (AWD)
UC	355-5079 CABLE ASS.	00	STD		F-4	SHEET 2	RIGHT STEERING CYLINDER POSITION SENSOR (NON-AWD)
AA	236-2340	01	STD		H-2	SHEET 2	BTRY 1 POS TO BATT 2 NEG
CG	319-5152	00	STD		H-2	SHEET 2	BTRY 2 POS TO POWER MOD
EE	BY-9603	01	STD		G-4	SHEET 2	STARTER MOT TO ENGINE GND
FF	308-9351	01	STD		H-3	SHEET 2	BTRY 1 NEG TO DISCONNECT SWITCH
GG	319-5166	01	STD		G-2	SHEET 2	JUMP START RECEPTACLE
HH	355-5076	00	ATT		G-5	SHEET 2	B+ PASS THRU TO STARTER (HEF)
HH	355-5075	00	ATT		G-5	SHEET 2	B+ PASS THRU TO STARTER (SOMT)
HH	322-3235	02	ATT		G-5	SHEET 2	B+ PASS THRU TO STARTER (SOMT)
JJ	351-6610	00	STD		I-4	SHEET 2	B+ PASS THRU TO SEC STEER RLY AND ALTERNATOR FUSE
KK	351-6613	00	STD		I-5	SHEET 2	SEC STEER RLY TO SEC STEER MTR
LL	134-3355	01	STD		I-5	SHEET 2	SEC STEER MTR TO GND
PP	319-5167	00	STD		H-7	SHEET 2	BTRY BOX LUG TO LUG
RG	322-3226	00	STD		J-8	SHEET 2	101 WIRE
TT	322-3224	00	STD		G-4	SHEET 2	STARTER MOT TO FRAME (HEF)
TT	322-3232	00	ATT		G-4	SHEET 2	STARTER MOT TO FRAME (SOMT)
VV	319-5109	00	STD		H-1	SHEET 2	B+ PASS THRU TO POWER BOX B+ BUSS BAR
XX	134-3344	00	STD		G-3	SHEET 2	DISCONNECT TO GND
YJ	347-1939	00	STD		H-6	SHEET 2	ALTERNATOR TO BATT BOX
YK	351-6612	00	STD		E-3	SHEET 2	ALTERNATOR GROUND
YL	351-6611	00	STD		E-3	SHEET 2	ALTERNATOR FUSE TO ALTERNATOR B+ (150 AMP)
YL	351-6614	00	ATT		E-3	SHEET 2	ALTERNATOR FUSE TO ALTERNATOR B+ (280 AMP)

NOTE A: TWISTED PAIRS WIRES MUST BE AT LEAST 1 TURN PER 25 MM

NOTE B: STD TWO SPEED WIPERS

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

THIS SCHEMATIC IS FOR THE 120M SERIES 2 MOTOR GRADER ELECTRICAL SYSTEM
VOLUME 3 of 4: CHASSIS
MEDIA NUMBER: KENR9044-02
SCHEMATIC PART NUMBER: 354-4214, 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.

Component Identifiers (CID[1]) Module Identifier (MID[2]) Transmission & Chassis Control (MID No. 027)	
CID	Component
0041	8V DC Sensor Power Supply
0070	Parking Brake Switch
0096	Fuel Level Sensor
0144	Backup Alarm Relay
0168	Electrical System Voltage
0177	Transmission Oil Temperature Sensor
0247	SAE J1939 Data Link
0248	Cat Data Link
0262	5 Volt Sensor DC Power Supply
0368	Transmission Auto / Manual Switch
0420	Secondary Steering Relay
0444	Starter Motor Relay
0573	Inching Pedal Position Sensor
0585	Transmission Output Speed Sensor 1
0588	Monitoring System Display
0590	Engine ECM
0596	Implement ECM
0615	Machine Articulation Angle Position
0621	Downshift Switch
0622	Upshift Switch
0623	Directional Switch
0627	Park Brake Pressure Switch
0669	Transmission Input Speed Sensor
0673	Transmission Output Speed Sensor 3
0674	Transmission Intermediate Speed Sensor 1
0675	Transmission Intermediate Speed Sensor 2
0681	Parking Brake Solenoid Valve
0967	Machine Application
1326	Location Code
1401	Transmission Clutch Solenoid 1
1402	Transmission Clutch Solenoid 2
1403	Transmission Clutch Solenoid 3
1404	Transmission Clutch Solenoid 4
1405	Transmission Clutch Solenoid 5
1406	Transmission Clutch Solenoid 6
1407	Transmission Clutch Solenoid 7
1408	Transmission Clutch Solenoid 8
1471	Steering Control Position Sensor 1
1472	Steering Control Position Sensor 2
1473	Steering Control Position Sensor 3
1482	10 Volt Sensor DC Power Supply
1484	Inching Pedal Switch
1674	Solenoid Return 1
1960	Ignition Key Reader
1961	Service Brake Accumulator Pressure
2113	Operator Present Switch
2175	Secondary Steer Left Solenoid
2176	Secondary Steer Right Solenoid
2199	Secondary Steering Request Signal Line From Imp ECM
2200	Left Steering Cylinder Position Sensor
2201	Right Steering Cylinder Position Sensor
2252	Machine Articulation Angle Sensor 2
2304	Differential Lock Relay
2742	Brake Accumulator Pressure
2987	Brake Charge Pressure #1
2988	Brake Charge Pressure #2
3035	Battery Cable Shield
3210	Transmission Pump Bypass Solenoid

[1] The CID is a diagnostic code that indicates which circuit is faulty.

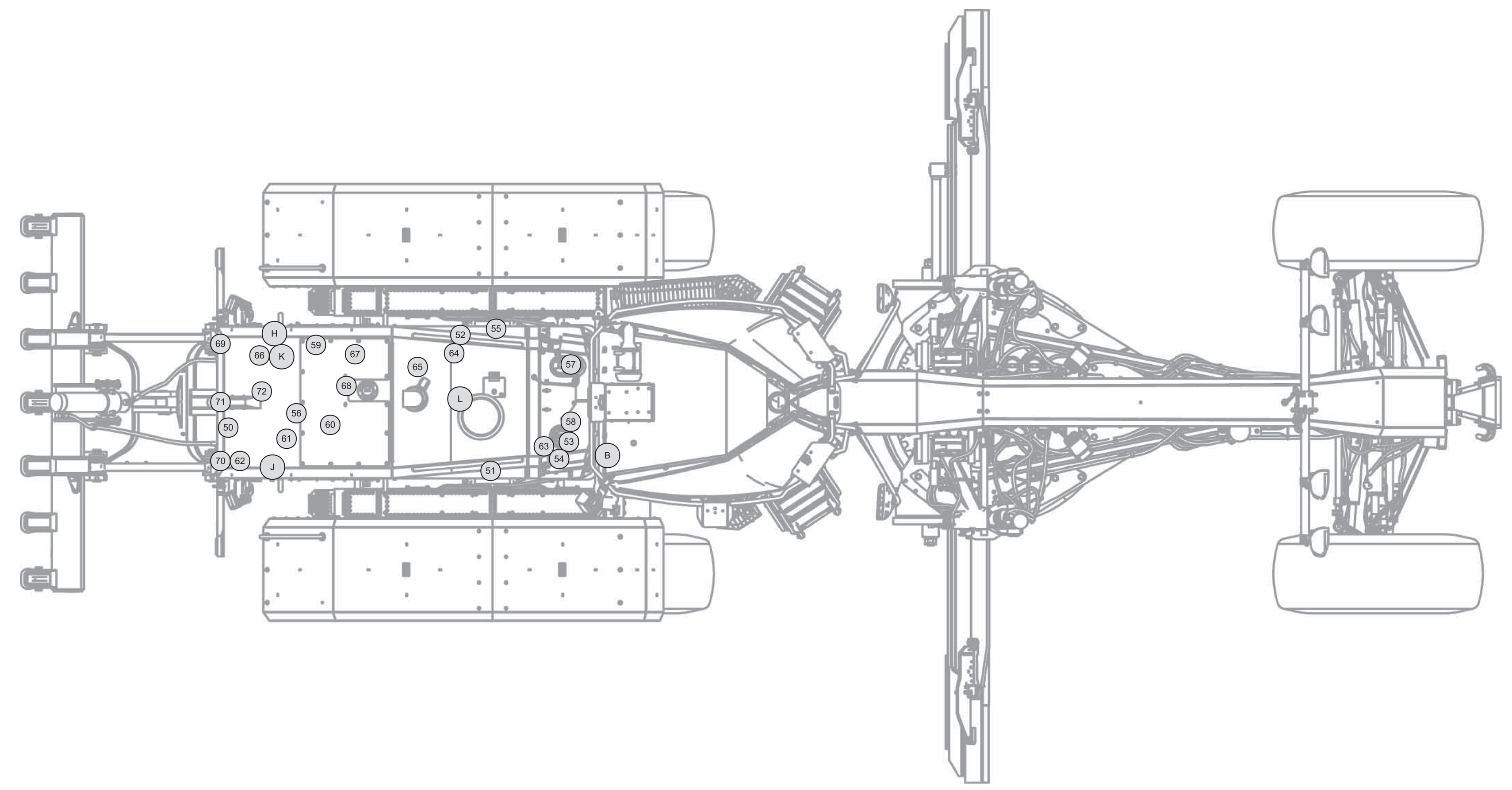
[2] The MID is a diagnostic code that indicates which electronic control module diagnosed the fault.

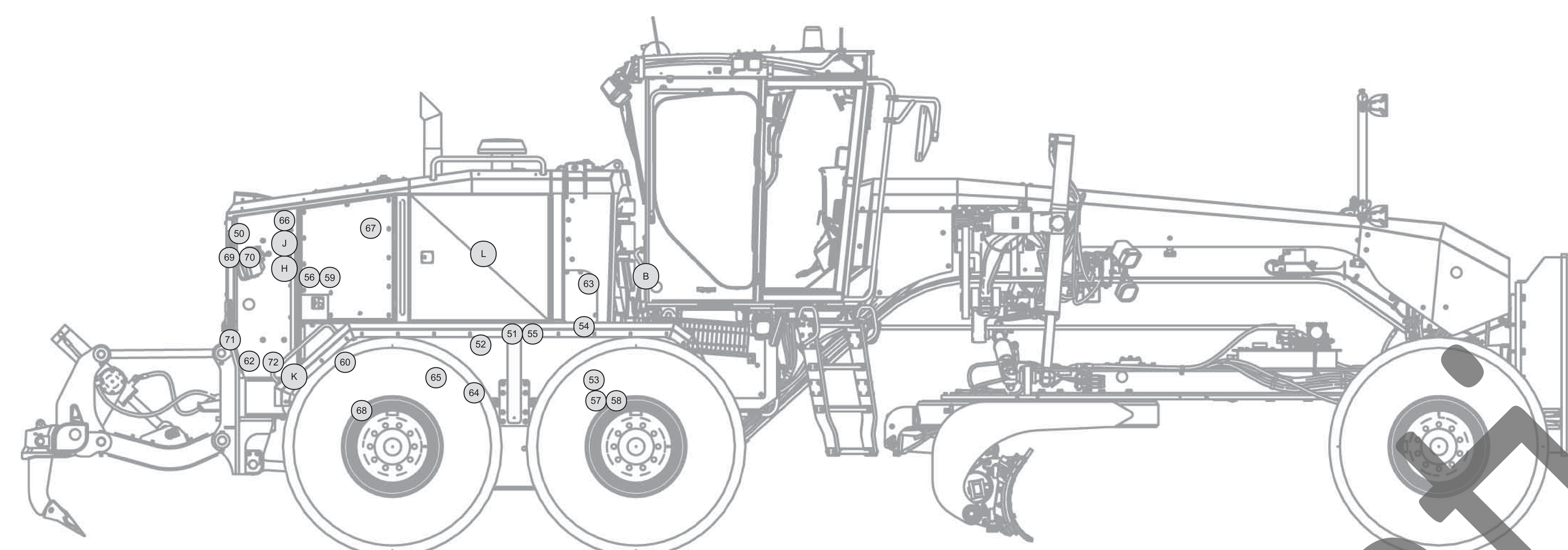
Failure Mode Identifiers (FMI)[1]	
FMI No.	Failure Description
0	Data valid but above normal operational range.
1	Data valid but below normal operational range.
2	Data erratic, intermittent, or incorrect.
3	Voltage above normal or shorted high.
4	Voltage below normal or shorted low.
5	Current below normal or open circuit.
6	Current above normal or grounded circuit.
7	Mechanical system not responding properly.
8	Abnormal frequency, pulse width, or period.
9	Abnormal update.
10	Abnormal rate of change.
11	Failure mode not identifiable.
12	Bad device or component.
13	Out of calibration.
14	Parameter failures.
15	Parameter failures.
16	Parameter not available.
17	Module not responding.
18	Sensor supply fault.
19	Condition not met.
20	Parameter failures.

[1]The FMI is a diagnostic code that indicates what type of failure has occurred.

Event Codes Transmission & Chassis Control	
Event Code	Condition
0284	Low Brake Pressure
0329	Transmission Filter Plugged
0490	Parking Brake ON
0627	Parking Brake Abuse
0795	Machine Speed Excessive For Machine Articulation Angle
0877	High Transmission Oil Temperature

Event Codes Engine Control	
Event Code	Condition
E096	Fuel Pressure Is High
E172	Inlet Air Is Restricted
E194	Exhaust Temperature Is High
E198	Low Fuel Pressure
E265	Shutdown (Ground Level)
E360	Oil Pressure Is Low
E361	Coolant Temperature Is High
E362	Engine Overspeeds
E363	Fuel Temperature Is High
E390	Fuel Filter Is Restricted
E441	Idle Speed Is High
E539	Intake Manifold Air Temperature Is High





Machine Harness Connector and Component Locations

Component Location - Volume 4					
Component	Schematic Location	Machine Location	Component	Schematic Location	Machine Location
Actuator - ARD Air Flow	E-3	L	Sensor - Air Filter Out Pressure	D-7	L
Actuator - ARD Fuel Pressure 1 Control	D-3	L	Sensor - Air Inlet Temperature	D-7	L
Alarm - Backup	H-16	50	Sensor - ARD Exhaust Gas Temperature	E-3	L
Alternator	E-7	L	Sensor - ARD Fuel Pressure 1 (Pilot)	D-3	L
Battery - 2 (TUV)	I-4	H	Sensor - ARD Secondary Air Pressure	E-3	L
Battery 1	G-7	H	Sensor - Barometric Pressure	C-7	L
Battery 2	G-6	H	Sensor - Brake Accumulator 1	F-10	56
Breaker - Engine Control	H-7	J	Sensor - Brake Accumulator 2	G-10	56
Breaker - Engine Fan	H-7	J	Sensor - Cam Speed	C-7	L
Breaker - Load	G-7	J	Sensor - Charge Air Cooler Outlet Temp	G-10	56
Breaker - Main	G-7	J	Sensor - Crank Speed	C-7	L
Bus Bar - Passthru (TUV)	H-3	H	Sensor - DPF 1 Intake Temperature	E-2	L
Buss Bar - Main Relay	H-7	J	Sensor - DPF Differential Pressure	B-3	L
Buss Bar 1	G-7	J	Sensor - DPF Intake Pressure 1	D-3	L
Control - Engine (J1 Connector)	E-10	L	Sensor - EGR Differential Pressure	B-7	L
Control - Engine (J2 Connector)	D-10	L	Sensor - EGR Intake Pressure	B-7	L
Control - Transmission and Chassis	I-14	K	Sensor - EGR Temperature	B-7	L
Diode - AC Arc Suppressor	F-7	63	Sensor - Engine Coolant Temperature	C-7	L
Diode - Differential Lock Solenoid	D-11	52	Sensor - Engine Fuel Temperature	D-7	L
Diode - Secondary Steering Arc Suppressor	E-6	51	Sensor - Engine Fuel Temperature	D-7	L
Fuse - Alternator	F-5	H	Sensor - Engine Oil Pressure	B-7	L
Ground - ARD Head	D-3	L	Sensor - Fuel Rail Pressure	B-7	L
Ground - CEM	D-3	L	Sensor - Intake Air Manifold pressure	C-7	L
Ground - Engine 1	F-8	L	Sensor - Intake Air Manifold Temperature	C-7	L
Ground - Engine 2	D-3	L	Sensor - Machine Articulation Angle 1	E-11	57
Ground - Rear Frame 1	E-14	K	Sensor - Machine Articulation Angle 2	E-11	58
Ground - Rear Frame 2	E-13	K	Sensor - Main Hydraulic Pump Discharge	D-11	59
Ground - Rear Frame 3	C-12	K	Sensor - Pressure Transmission Pump	E-11	59
Ground - Rear Frame 4	A-12	K	Sensor - Soot	E-5	L
Ground - Rear Frame 5	F-8	L	Sensor - Speed Int Transmission 1	F-16	60
Ground - Rear Frame 6	G-7	H	Sensor - Speed Int Transmission 2	F-16	60
Ground - Secondary Steering	F-6	53	Sensor - Speed Tranmission Out 1	E-16	61
Ground - Secondary Steering (TUV)	H-1	H	Sensor - Speed Tranmission Out 2	E-16	61
Ground - TUV 1	I-3	H	Sensor - Speed Transmission Input	F-16	60
Ground - TUV 2	I-4	H	Sensor - Steer Pump	F-11	59
Ground - TUV 3	I-3	H	Sensor - Temperature AWD Hydraulic	A-16	K
Ground - TUV 4	H-1	H	Sensor - Temperature Oil Hydraulic	I-16	62
Heater - ARD Fuel Nozzle	D-4	L	Sensor - Temperature Oil Transmission	E-16	K
Injector 1	B-9	L	Solenoid - AC Clutch	F-7	63
Injector 2	B-9	L	Solenoid - Brake Charging	G-11	56
Injector 3	A-9	L	Solenoid - Differential Lock	E-11	64
Injector 4	A-9	L	Solenoid - Fuel Pump Control Valve	D-7	L
Injector 5	A-9	L	Solenoid - Fuel Pump Control Valve	D-7	L
Injector 6	A-9	L	Solenoid - Hydraulic Fan	G-10	56
Isolation Lug - RH (TUV)	I-2	H	Solenoid - Implement Pilot Pressure Supply	D-11	59
Isolation Lug - RH (TUV2)	I-2	H	Solenoid - LT Drive Pump Fwd	B-16	K
Isolation Lug 1	G-6	H	Solenoid - LT Drive Pump Rev	B-16	K
Isolation Lug 2	G-7	H	Solenoid - Park Brake	E-16	65
Module - Secondary Steering	F-6	53	Solenoid - RT Drive Pump Fwd	B-16	K
Motor - CRS Fuel Lift	H-16	L	Solenoid - RT Drive Pump Rev	B-16	K
Motor - Engine Fan	G-10	L	Solenoid - Start Aid	E-5	66
Motor - Secondary Steering	F-6	53	Solenoid - Transmission 1 (Fwd High)	G-16	K
Motor - Secondary Steering (TUV)	H-1	53	Solenoid - Transmission 2 (Fwd Low)	G-16	K
Motor - Starting	F-8	L	Solenoid - Transmission 3 (Reverse)	G-16	K
Motor - Starting (TUV)	I-3	L	Solenoid - Transmission 4 (2nd)	G-16	K
Receptacle - Jump Start	G-7	H	Solenoid - Transmission 5 (3rd)	F-16	K
Receptacle - Jump Start (TUV)	I-3	H	Solenoid - Transmission 6 (1st)	F-16	K
Relay - AC Clutch	I-8	J	Solenoid - Transmission 7 (Low Range)	G-16	K
Relay - ARD Fuel Nozzle Heater	D-3	L	Solenoid - Transmission 8 (High Range)	F-16	K
Relay - Back Up Alarm	I-8	J	Solenoid - Transmission Pump Bypass	G-16	K
Relay - CRS Fuel Pump	I-8	J	Solenoid - Turbo Waste Gate	A-8	L
Relay - Fuel Transfer Pump	I-8	J	Spark Plug	D-3	L
Relay - Main	H-7	J	Switch - Disconnect	G-7	H
Relay - Secondary Steering	J-8	J	Switch - Engine Shut Down	E-11	H
Relay - Secondary Steering (TUV)	H-3	J	Switch - Filter Bypass AWD LH	A-16	K
Relay - Secondary Steering Motor	F-6	54	Switch - Filter Bypass AWD RH	A-16	K
Resistor - AC Thermostat Pull Down	F-7	51	Switch - Filter Bypass Hydraulic Pilot Supply	E-11	67
Resistor - Aftertreatment CAN 1	B-7	L	Switch - Filter Bypass Transmission	E-16	K
Resistor - Aftertreatment CAN 2	D-5	L	Switch - Hydraulic Return Bypass	E-7	L
Resistor - Can 1	E-11	55	Switch - Pressure AC High	E-7	63
Resistor - TUV 1	I-3	H	Switch - Pressure AC Low	F-7	63
Resistor - TUV 2	I-4	H	Switch - Pressure Parking Brake	E-16	68
Resistor - TUV 3	H-1	H	Transformer - ARD Ignition Primary	D-3	L
Resistor - TUV 4	J-4	H	Valve - Engine Intake Throttle	A-8	L
Sensor - Aftertreatment 1 NRS Temperature	E-2	L	Valve - NRS	A-8	L

Machine locations are repeated for components located close together.
B = Located inside rear covered compartment.
H = Located inside service center.
J = Located in power box.
K = Located on the transmission box.
L = Located on or around engine.

Connector Location - Volume 4		
Connector Number	Schematic Location	Machine Location
CONN 17	C-14	B
CONN 18	B-14	B
CONN 19	B-14	B
CONN 40	J-15	69
CONN 41	I-15	70
CONN 42	J-14	71
CONN 43	A-14	G
CONN 44	G-13	K
CONN 45	H-11	L
CONN 46	H-11	L
CONN 47	G-11	72
CONN 48	B-11	L
CONN 49	B-11	L
CONN 50	B-11	L
CONN 51	E-8	L
CONN 52	E-8	L
CONN 53	D-6	L
CONN 54	D-5	L
CONN 55	H-4	H
CONN 56	H-2	H

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.

Resistor and Solenoid Specifications		
Part No.	Component Description	Resistance (Ohms)[1]
134-2540	Resistor: CAN (All)	120 ± 12
240-7193	Resistor: A/C Thermostat Pull-down	500 ± 25
189-8627	Solenoid: Hydraulic Fan	5 ± 0.3
201-0950	Solenoid: Implement Pilot Supply	41.9 ± 2.1
239-1134	Solenoid: Start Aid	20
244-3114	Solenoid: Transmission 1 - 8	8.7 ± 0.4
245-3555	Solenoid: Differential Lock	30 ± 1.5
248-5523	Solenoid: Parking Brake	30 ± 1.5

[1] At room temperature unless otherwise noted.

Off Machine Switch Specification				
Part No.	Function	Actuate	Deactuate	Contact Position
114-5333	A/CHigh/LowPressure	275-1750kPa[1](39.9±253.8psi)	170-2800kPa[1](24.6±406.1psi)	Normally Open[2]
149-6371	A/C Low Pressure	103.4 ± 13.8 kPa (15 ± 2 psi)	34.5 ± 7 kPa (5 ± 1 psi)	Normally Open
229-1537	Parking Brake Pressure	2100 kPa MAX (304.5 psi MIN)	1750 ± 108 kPa (253.8 ± 15.6 psi)	A-C Normally Closed A-B Normally Closed
275-1253	Fuel Pressure	103.4 +20.7 / -13.8 kPa (14.9 +3 / -2 psi)	69 kPa MIN (10 psi MIN)	Normally Closed

[1] With increasing pressure the closed condition can be maintained up to 2800 kPa (405 psi), with decreasing pressure the closed condition can be maintained down to 170 kPa (25psi).

[2] Contact position at the contacts of the harness connector.

CATERPILLAR®

KENR9044-02
January 2013

Schematic

120M Series 2 Motor Grader Electrical System

120M2:
M921-UP
M9C1-UP
M9H1-UP
R9N1-UP
R9W1-UP

Volume 4 of 4: Chassis Continued and Engine

Printed in U.S.A.

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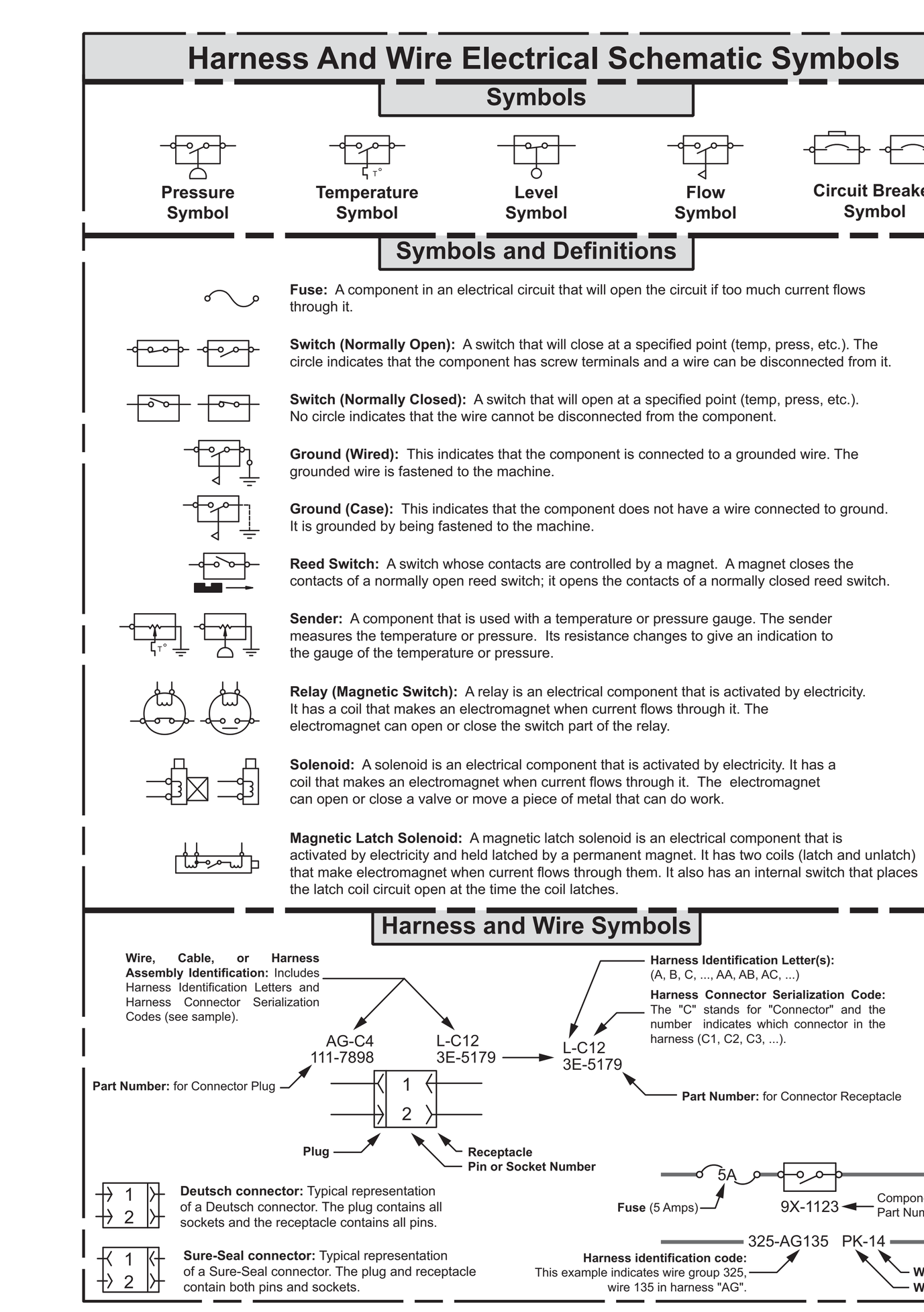
42 Page, (Dimensions: 56 inches x 35 inches)


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).
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, ...).
AG-C4
111-7898
L-C12
3E-5179
L-C12
3E-5179
Part Number: for Connector Plug
Part Number: for Connector Receptacle
1
2
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.
5A
Fuse (5 Amps)
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

Related Electrical Service Manuals	
Title	Form Number
Alternator: 177-9953	SENR4130
Electric Starting Motor: 207-1556	SENR3581
Engine Control:	RENR9333
Transmission & Chassis Control:	RENR9013

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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
o-o	SPLICE
o	BLADE, SPADE, RING OR SCREW TERMINAL

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
- START AID CIRCUIT
- TRANSMISSION AND CHASSIS CONTROL CIRCUIT
- AWD CIRCUIT
- MACHINE SECURITY CONTROL CIRCUIT
- ENGINE CONTROL CIRCUIT
- HEATER AND AIR CONDITIONER CIRCUIT
- TURN SIGNAL / WIPER WASHER CIRCUIT
- CAT DATA LINK
- CAN DATA LINK
- IMPLEMENT CONTROL CIRCUIT 1
- AFTERTREATMENT CAN
- AFTERTREATMENT CIRCUIT
- IMPLEMENT CONTROL CIRCUIT 2

OTHER COLOR DESCRIPTIONS

- HIGHWAYS

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

THIS SCHEMATIC IS FOR THE 120M SERIES 2 MOTOR GRADER ELECTRICAL SYSTEM

VOLUME 4 of 4: CHASSIS CONTINUED

MEDIA NUMBER: KENR9044-02

SCHEMATIC PART NUMBER: 354-4214, 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.