Component Identifiers (CID[1]) Module Identifier (MID[2]) Engine and Pump Control (MID No. 069)	
CID	**Component**
91	Throttle Position Signal
96	Fuel Level Sensor
110	Engine Coolant Temperature Sensor
167	Alternator
168	Voltage of the Power Supply (Key Switch)
190	Speed Sensor
248	Cat Data Link
286	Signal for Low Engine Oil Pressure
374	Swing Brake Solenoid
376	Travel Alarm
581	Proportional Reducing Valve for the Power Shift Pressure
586	Engine Speed Dial
587	Feedback Sensor for the Governor Actuator
590	Engine Controller
598	Travel Speed Solenoid
600	Hydraulic Oil Temperature Sensor
1161	Pump Delivery Pressure Sensor (1)
1162	Pump Delivery Pressure Sensor (2)
1525	Straight Travel Solenoid
2002	Action Alarm

Event Identifiers (EID[3])	
EID	**Event**
17	Coolant Overheat
43	Battery Voltage Too Low
50	Battery Voltage Too High
59	Low Coolant Level
95	Fuel Filter is Clogged
100	Engine Oil Pressure is Low
119	Fuel Level is Low
171	Engine Oil Level is Low
179	Abnormal Battery Charge
232	Water Separator Draining Demand
235	Hydraulic Oil Level is Low
236	Hydraulic Oil Filter is Clogged
237	Overload Warning
272	Air Filter is Clogged
600	Hydraulic Oil Overheat
862	Special Filter is Clogged
863	Automatic Greasing Failure

[1] The CID is a diagnostic code that indicates which component is faulty.
[2] The MID is a diagnostic code that indicates which electronic control module
[3] The EID is a code that indicates diagnostic events. 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.

Connector Location		
Connector Number	**Schematic Location**	**Machine Location**
CONN 1 ET Connector	J-10	E
CONN 2	G-9	E
CONN 3	G-9	E
CONN 4	G-9	E
CONN 5	G-9	E
CONN 7	G-8	E
CONN 8	G-7	E
CONN 9	D-11	F
CONN 10	G-6	D
CONN 11	J-5	D
CONN 12	H-5	D
CONN 13	G-5	D
CONN 14	F-5	A
CONN 15	F-5	A
CONN 16	F-4	A
CONN 17	D-6	A
CONN 18	A-4	22
CONN 19	J-2	C
CONN 20	J-2	C
CONN 21	H-3	B
CONN 22	H-2	B
CONN 23	H-2	B
CONN 24	G-1	B
CONN 25	E-2	A
CONN 26	C-2	7
CONN 27	C-3	6
CONN 28	B-3	9
CONN 29	C-9	D
CONN 30	C-8	D
CONN 31	C-7	D
CONN 32	C-8	D
CONN 33	B-9	E
CONN 34	A-8	50
CONN 35	A-8	51
CONN 36	A-7	52

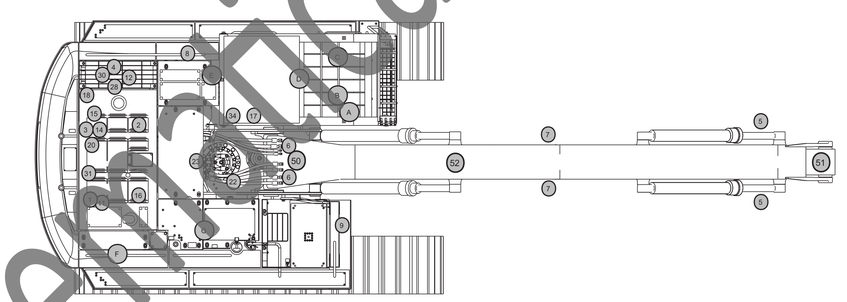
The connectors shown in this chart are for harness to harness connectors. Connectors that join a harness to a component are generally located at or near the component. See the Component Location Chart.

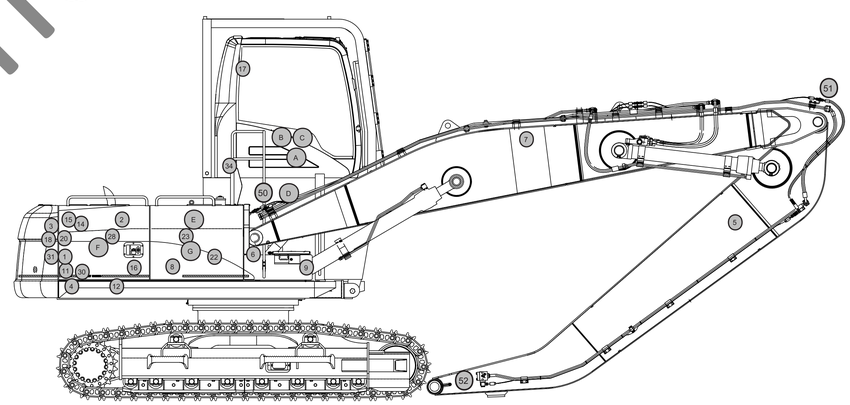
Related Electrical Service Manuals	
Title	**Form Number**
Alternator: 177-9953	SENR4130
Electric Starting Motor: 125-2988	REG00843
Engine/Pump Control:	RENR3814
Starting and Charging:	RENR3823

Wire Description					
Wire Number	**Wire Color**	**Description**	**Wire Number**	**Wire Color**	**Description**
Power Circuits			**Accessory Circuits (Continued)**		
101	RD	Battery (+)	C566	PK	Spare
103	RD	Dome Lamp / Memory	C569	YL	12V 7A Converter To Socket
105	RD	Key Start Switch	E564	PK	12V 7A Converter To Socket
109	RD	Alternator Output (+) Terminal	**Lighting Circuits**		
110	RD	Timer Relay	607	PK	Chassis Lamp Power
112	PU	Main Power Relay	615	YL	Cab Flood Lamps
113	OR	Switch Panel / Radio	616	BU	Atch Stick Lamps
114	RD	Horn	645	RD	Boom Lamp Relay
115	RD	Cab Lamp (RH)	646	RD	Chassis Lamp Relay
118	GY	Wiper / Washer	A623	BU	Chassis Lamp Relay To Diode
120	YL	12V 7A Converter 1	**Control Circuits**		
123	WH	Seat Heater	744	BU	Stem 2 Swing Cancel
124	GN	A/C	745	GY	Harvester Relay 3
127	RD	Cab Lamp (LH)	763	BU	Travel Speed Solenoid
129	BU	Cigar Lighter	788	YL	Engine Speed Pickup
130	RD	Atch Valve Control	A718	PU	AIH Coolant Temperature Sensor
135	BU	12V 7A Converter To Socket	A755	PK	Throttle Position S1
147	PU	Atch Solenoid	A756	BU	Throttle Position S2
149	RD	Boom Lamp	A757	GY	Throttle Position S3
151	GN	Hydraulic Lock Cancel Switch	A758	BR	Throttle Position S4
154	RD	Neutral Start Switch To Relay	A761	PU	Governor Feedback
160	PU	Chassis Lamp	A762	PU	Speed Sensor (+)
169	PK	Backup / Monitor Control	A768	BU	Power Shift Control Sol
175	RD	A/C Blower	A769	GY	Power Shift Control Sol
176	YL	Grapple Relays	A770	PK	Backup Resistor To Backup Governor Switch
179	BU	12V 7A Converter 2	F773	OR	Governor Accel
180	GN	Aux Ckt	F774	WH	Governor Decel
184	RD	Engine / Pump Control	H747	GN	Travel Pressure Switch
189	RD	Timer Relay To Engine Governor Actuator	J709	GN	Cab Lamp Relay Coils
198	PK	Harvester Power	K792	GN	Harvester Relay 1 To Relay 3
Ground Circuits			K796	WH	Cut Threw (30 Thread)
200	BK	Main Chassis	K797	OR	Harvester Color 2
201	BK	Operator Monitor	K798	PU	Harvester Color 1
210	BK	12V 7A Converter Output Gnd	K799	GN	Clamp Arm High Pressure
229	BK	12V 7A Converter Output Gnd	M734	BR	Travel Mode Switch
235	BK	Engine / Pump Control	M736	BU	Governor Command / Backup Switch
Basic Machine Circuits			M737	WH	Flow Limit Solenoid
304	WH	Start Relay Output	M739	YL	PRV Return 2
306	GN	Neutral Start Relay To Start Relay	M740	PK	Travel Straight Solenoid
307	OR	Key Switch To Start Relay	M741	GY	Alarm Cancel Switch
308	YL	Key Switch (On) To Main Relay	M742	PU	AEC Mode Switch
310	PU	Heater Control To Heater Relay	N743	WH	Harvester Relay 3 To Relay 2
320	RD	Horn Relay Coil To Switch	N744	OR	Harvester Relay 4 Output
321	BR	Travel Alarm	877	YL	Heater Relay To Air Heater
322	GY	Warning Horn Fwd	892	BR	Cat Data Link (-)
326	RD	Key Switch (Off) "C" Terminal	893	GN	Cat Data Link (+)
Monitoring Circuits			E853	PU	Grapple Open Solenoid
403	GN	Alternator ® Terminal	E854	GN	Grapple Close Solenoid
405	GY	Engine Oil Switch	E855	WH	Rotate CW Solenoid
410	WH	Action Alarm	E856	GY	Rotate CCW Solenoid
412	BU	Coolant Level Switch	H837	BU	Roller Motors (+24V)
430	BU	Air Cleaner Switch	H838	YL	Pulse Length Sender (Gnd)
487	OR	Hydraulic Oil Filter Switch	H839	WH	Roller Arm Close
491	PK	Hydraulic Oil Temperature Sender	H840	BR	Saw Sensor (Single +)
492	GY	Coolant Temperature Sender	H841	GN	Pulse Length Sender (P1)
495	GN	Fuel Level Sensor	H842	BU	Pulse Length Sender (P2)
496	WH	Hydraulic Oil level Switch	H843	YL	Cross Cut
C468	BU	Engine Oil Level Switch	H844	BR	Roller Arm Open
E472	GN	Atch LH Joystick Rotate CW	H845	WH	Tilt Up
E474	OR	Atch LH Joystick (Not Used)	H846	PK	Tilt Down
H465	GN	Travel Alarm Cancel Indicator	H847	GN	Clamp Arm In
H466	BU	AEC Mode Indicator	H848	WH	Clamp Arm Out
H467	WH	Travel Mode Indicator 1	H849	OR	Knifes Close
H473	BR	Atch Straight Travel Pressure Switch	H850	BR	Knifes Open
H474	GN	Travel Right Pressure Switch	H851	PU	Roller Arm High Pressure
H475	BU	Travel Left Pressure Switch	H852	GN	Saw Bar In
H476	WH	Joystick Pressure Switch	H853	YL	Roller Motor
Accessory Circuits			H854	BU	Knifes High Pressure
501	GN	Wiper - Front (Low)	H855	OR	Cut Threw (25 Thread)
506	PU	Washer Front	H856	BR	Sensor (+ 24V)
508	BU	Radio Speaker - Left	H857	PK	Harvester UREA
508	PU	Radio Speaker - Left	H858	WH	Pulse Diameter Sender (P1)
509	WH	Radio Speaker - Left (Common)	H859	GN	Pulse Diameter Sender (P2)
511	BR	Radio Speaker - Right	H860	YL	Pulse Diameter Sender (Gnd)
512	GN	Radio Speaker - Right (Common)	K844	GY	Atch LH Joystick Grapple Open
530	OR	Washer Right	K848	WH	Atch LH Joystick Hydraulic Lock Signal
546	BU	Rotate CW Relay	K849	YL	Grapple Pressure Switch
547	OR	Rotate CCW Relay	K851	BU	Atch Stem 3 Swing Cancel
548	GY	Grapple Open Relay Coil	K852	GN	Atch Stem 4 Swing Cancel
549	PK	Grapple Close Relay Coil	C903	BU	Harvester Relay 1 Coil
590	GY	Wiper SW To Wiper Control	C904	GN	Harvester Relay 1 to Relay 2 And Relay 3 Coil
592	BU	Radio Power	C905	OR	Harvester Relay Coil 4
A513	RD	Radio Memory Power	G976	BU	Atch Water Separator Level Sensor
A537	PK	Seat Heater	K904	GN	Pump Discharge Pressure Sensor 1
A579	OR	Wiper Motor CCW	K906	GN	Swing Brake Solenoid
A580	BR	Wiper Motor CW	K907	BU	Swing brake Cancel Solenoid
A581	GN	Wiper Motor Reverse	K997	BU	Spare
A582	PU	Wiper Motor Stop	L968	OR	PRV Return 1
A584	BU	Window Limit Switch	L969	WH	Power Shift Control PRV
A586	OR	Wiper SW To Wiper Control	L972	BU	One Touch Low Idle
A588	GN	Hydraulic Lock Signal	L973	GN	Free Swing Switch
C537	GN	A/C Photo Sensor (+) Signal	L975	PK	Heater Control Unit Indicator
C538	OR	A/C Photo Sensor (-) Signal	T967	YL	Pump Discharge Pressure Sensor 2
C560	OR	Spare			

Component Location					
Component	**Schematic Location**	**Machine Location**	**Component**	**Schematic Location**	**Machine Location**
Actuator - Engine Governor	A-12	1	Sender - Coolant Temperature	C-12	14
Air Heater	A-10	2	Sender - Hydraulic Oil Temperature	A-5	G
Alarm - Action	D-2	A	Sensor - A/C Photo	D-1	A
Alarm - Travel	A-5	G	Sensor - AIH Coolant Temperature	C-12	15
Alternator	C-12	3	Sensor - Atch Water Separator Level	J-12	18
Batteries	F-12	4	Sensor - Engine Speed Pickup	A-10	16
Batteries - Attachments	F-12	4	Sensor - Fuel Level	A-5	G
Block - Terminal	G-8	E	Sensor - Pump Discharge Pressure 1	A-6	F
Breaker - Alternator	B-10	E	Sensor - Pump Discharge Pressure 2	A-6	F
Cigar Lighter	D-2	B	Socket - 12V 7A	D-6	A
Control - Engine / Pump	F-9	E	Socket - 12V 7A	D-6	A
Control - Harvester Head	D-8	A	Solenoid - A/C Clutch	B-12	20
Control - Heater Unit	J-7	E	Solenoid - Fine Swing	A-4	22
Control - Wiper	D-2	B	Solenoid - Flow Limit	A-6	F
Converter - 12V 7A	J-6	D	Solenoid - Grapple Close	A-6	F
Converter - 12V 7A	H-6	D	Solenoid - Grapple Open	A-6	F
Diode - Chassis Lamp	F-11	E	Solenoid - Hydraulic Lock	D-12	23
Diode - Main Relay	J-8	E	Solenoid - Power Shift	A-6	F
Diode - Rotate CCW Solenoid	A-4	22	Solenoid - Rotate CCW	A-4	22
Diode - Rotate CW Solenoid	A-4	22	Solenoid - Rotate CW	A-4	22
Diode - Start Relay	H-7	E	Solenoid - Swing Brake	D-12	23
Fuse Base	C-10	E	Solenoid - Travel Speed	D-12	23
Harvester Head	A-7	52	Solenoid - Travel Straight	D-12	D
Heater - Seat	H-1	B	Switch - Air Cleaner	J-12	28
Horn	B-3	6	Switch - Aux Hydraulic Pressure	J-1	D
Horn	E-3	6	Switch - Backup EPR Valve	G-2	B
Joystick - LH Console	J-2	C	Switch - Backup Governor	G-2	B
Joystick - RH Console	H-1	B	Switch - Coolant Level	J-12	30
Lamp - Boom	C-2	7	Switch - Disconnect	A-11	E
Lamp - Chassis	B-2	9	Switch - Engine Oil Level	A-12	31
Lamp - Dome	E-6	17	Switch - Engine Oil Pressure	A-12	31
Lamp - Stick	C-1	5	Switch - Fine Swing Control	D-4	A
Meter - Service	D-2	A	Switch - Grapple Pressure	D-11	F
Monitor	E-1	A	Switch - Hammer Pressure	J-1	D
Motor - Starter	B-12	11	Switch - Harvester Power	D-8	A
Motor - Tilt	B-12	8	Switch - Horn	J-2	B
Motor - Washer	J-12	12	Switch - Hydraulic Oil Filter	A-5	G
Motor - Wiper	D-1	A	Switch - Hydraulic Oil Level	A-5	G
Relay - Boom Lamp	F-11	E	Switch - Joystick Pressure	J-3	D
Relay - Cab Lamp 1	E-11	E	Switch - Key Start	G-1	B
Relay - Cab Lamp 2	B-11	E	Switch - Medium Line Pressure	J-1	D
Relay - Cab Lamp 3	B-11	E	Switch - Neutral Start Limit	J-2	D
Relay - Chassis Lamp	E-11	E	Switch - One Touch Low Idle	H-1	B
Relay - Grapple Close	D-11	E	Switch - Seat Heater	D-4	A
Relay - Grapple Open	E-11	E	Switch - Straight Travel Pressure	H-1	D
Relay - Harvester 1-4	C-9	E	Switch - Throttle Position	G-1	B
Relay - Heater	J-8	E	Switch - Travel Left Pressure	J-1	D
Relay - Horn	D-11	E	Switch - Travel Left Pressure HH	D-7	D
Relay - Hydraulic Lock Solenoid	D-11	E	Switch - Travel Right Pressure	J-1	D
Relay - Main	J-7	E	Switch - Travel Right Pressure HH	D-7	D
Relay - Neutral Start	C-11	E	Switch - Window Limit	E-1	A
Relay - Rotate CCW	C-11	E	Switch Panel	D-3	A
Relay - Rotate CW	D-11	E	Switch Panel - A/C / Heater	D-3	A
Relay - Start	G-7	E	Unit - A/C / Heater	F-5	38
Relay - Timer	J-10	E	Unit - Indicator	G-1	B
Resistor - Backup	J-8	E			

Machine locations are repeated for components located close together.
A = Located inside of cab on right side.
B = Located inside of right console.
C = Located inside of left console.
D = Located under platform.
E = Located around relay panel.
F = Located around pilot manifold.
G =Located around Hydraulic Tank and Fuel Tank.





Machine Harness Connector And Component Locations

Resistor, Sender and Solenoid Specifications			
Part No.	**Component Description**		**Resistance (Ohms)[1]**
4I-5394	Sender:	Hydraulic Oil Temperature	20824 - 25451 @ 0°C (32°F) 6134 - 7496 @ 25°C (77°F) 3989 - 4875 @ 35°C (95°F) 2024 - 2718 @ 50°C (122°F) 973 - 1189 @ 75°C (167°F) 475 - 522 @ 100°C (212°F) 221 - 269 @ 125°C (257°F)
102-8016	Resistor:	Backup	47.0 ± 2.35
107-7056	Solenoid:	Fine swing	34.0 ± 0.5
111-9916	Solenoid:	Power Shift Control	11.7 ± 1.2
121-1491	Solenoid:	Grapple Open Grapple Close Hydraulic Lock Swing Brake Travel Speed Travel Straight	32.0 ± 3.2
163-6700	Sender:	Fuel Level	Empty: 83.5 ± 1.5 Midpoint: 33.8 ± 2.0 Full: 8.0 +1.0 or -0.5
171-0188	Solenoid:	Flow Limit	11.5 ± 0.5

[1] At room temperature unless otherwise noted.

CATERPILLAR®

RENR7089-01
January 2005

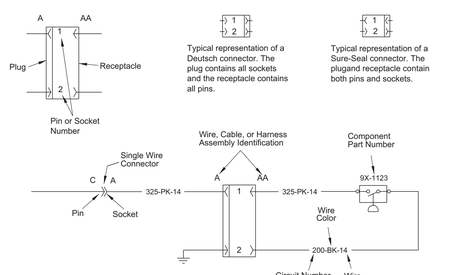
Schematic

320C Forest Swing Machine Electrical System

SAH1-1000
TBR1-1000

Printed in U.S.A.

Harness And Wire Electrical Schematic Symbols



Electrical Schematic Symbols And Definitions

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

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.

CIRCUIT BREAKER (C/B) - A component in an electrical circuit that will open the circuit if too much current flows through it. This does not destroy the circuit breaker and it can be reset to become part of the circuit again.

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 latch 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.

Electrical Schematic Symbols And Definitions

Normally open switch that will close with an increase of a specific condition (temp-press-etc.).

Normally open switch that is closed due to an applied condition, and will open again with a specific decrease in that condition.

Normally closed switch that will open with an increase of a specific condition.

Normally closed switch that is open due to an applied condition, and will close again with a specific decrease in that condition.

The circle indicates that the component has screw terminals and a wire can be disconnected from it.

No circle indicates that the wire cannot be disconnected from the component.

This indicates that the component has a wire connected to it that is connected to ground.

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

Off Machine Switch Specification				
Part No.	**Function**	**Actuate**	**Deactuate**	**Contact Position**
167-3466	Auxiliary Hyd. Pressure (Attachment) Grapple Pressure Hammer Pressure (Attachment) Joystick Pressure Medium Line Pressure (Attachment) Travel Left Pressure Travel Left Pressure (Attachment Harvester) Travel Right Pressure Travel Right Pressure (Attachment Harvester)	490.00 ± 49.00 kPa (71.07 ± 7.11 psi)	290.00 kPa MIN (42.06 psi MIN)	Normally Open

RENR7089-01

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