Diagnostic Code Conversion		
Code Flashed	CID - FMI	Description
11	N/A	No diagnostics active
12	N/A	No logged diagnostic codes
21-28	641-648F05	Transmission Solenoid' open circuit
31-38	641-648F06	Transmission Solenoid' short to ground
41-48	641-648F03	Transmission Solenoid' short to battery
52	637 F06	Backup alarm short to ground
58	688 F06	VHP solenoid short to ground
59	688 F03	VHP solenoid short to battery
61	688 F02	Shift lever input invalid
62	688 F03	Shift lever open circuit/short to +battery
63	269 F00	Sensor supply voltage above normal
64	269 F01	Sensor supply voltage below normal
65	701F02	Transmission Output Speed Signal (TOS) incorrect
68	168 F01	System voltage below normal
71	520 F02	Invalid transmission configuration code
72	268 F02	Check programmable parameters
73	764 F05	Transmission indicator lamp open circuit
74	764 F06	Transmission indicator lamp short to ground
75	764 F03	Transmission indicator lamp short to +battery
76	177 F03	Transmission oil temperature sender short to +battery or open circuit
77	177 F04	Transmission oil temperature sender short to ground
81	868 F05	Auto/Manual lamp open circuit
82	868 F06	Auto/Manual lamp short to ground
83	868 F03	Auto/Manual lamp short to +battery

The last digit in the CID number identifies the solenoid.
Solenoid 1 is Solenoid A, Solenoid 2 is Solenoid B, ect.

Connector Location[1]		
Connector Number	Schematic Location	Machine Location
CONN 1	B-15	27[2]
CONN 2	C-15	27[3]
CONN 3	D-15	27
CONN 4	D-15	27
CONN 5	E-15	27
CONN 6	F-14	36
CONN 7	A-13	37
CONN 8	B-13	37
CONN 9	B-13	37
CONN 10	D-13	37
CONN 11	D-13	37
CONN 12	B-12	10
CONN 13	E-12	37
CONN 14	E-12	37
CONN 15	A-10	38
CONN 16	C-10	33
CONN 17	D-10	39
CONN 18	D-10	39
CONN 19	D-10	39
CONN 2O	A-9	C
CONN 21	B-9	38
CONN 22	B-9	38
CONN 23	E-9	39
CONN 24 Service Tool	A-8	C
CONN 25	B-8	38
CONN 26	D-8	39
CONN 27	D-8	39
CONN 28	D-8	39
CONN 29	D-8	39
CONN 30	A-7	30
CONN 31	A-7	31
CONN 32	B-7	10
CONN 33	B-7	38
CONN 34	B-7	38
CONN 35	F-7	20
CONN 36	F-7	20
CONN 37	A-6	40
CONN 38	C-6	17
CONN 39	C-6	17
CONN 40	C-6	17
CONN 41	D-6	17
CONN 42	E-6	17
CONN 43	E-6	17
CONN 44	E-6	17
CONN 45	C-5	40
CONN 46	C-5	40
CONN 47	C-5	40
CONN 48	F-3	17
CONN 49	F-3	17
CONN 50	C-6	17

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
[1] Location Chart.
[2] 120 ES machine ONLY.
[3] 143 and 163 series machines ONLY.

Wire Description					
Wire Number	Wire Color	Description	Wire Number	Wire Color	Description
		Power Distribution Circuits			**Accessory Circuits**
101	RD	Bat (+)	500	BR	Wiper - Front (Park)
102	BU	Hd Lmp	501	GN	Wiper - Front (Low)
103	YL	Tail Lamps	502	OR	Wiper - Front (Hi)
105	BR	Key Sw	503	BR	Wiper - Rear (Park)
107	WH	Eng Shut	504	YL	Wiper - Rear (Low)
108	BU	Dome Lamp	505	BU	Wiper - Rear (Hi)
109	OR	Alt Output (+) Term.	506	PU	Washer - Front
112	PU	Main Power Rly Output	507	WH	Washer - Rear
113	OR	Opr Mon Panel B+ Switched	508	PU	Radio Speaker - Left
114	GN	Warning Horn (Forward)	509	WH	Radio Speaker - Left (Common)
115	PK	Light Bar	511	BR	Radio Speaker - Right
116	BR	Rear Floods	512	GN	Radio Speaker - Right (Common)
118	GY	Upper Wiper/Washer	513	OR	A/C Compressor/Refrigerant Pressure SW
119	PK	Rear Wiper/Washer	515	GY	Blower Motor (Hi)
122	BU	Air Dryer	516	GN	Blower Motor (Medium)
124	GN	A/C	517	BU	Blower Motor (Low)
126	PK	Xmsn Ctrl	521	YL	A/C SW To Refrigerant SW
129	BU	Cigar Lighter	522	WH	A/C Clutch To Thermostat SW
130	GN	Stop Lamps	537	GN	Turn Signal SW To Flasher
134	YL	Suppl Steer	556	WH	Differential Lock
135	BU	Converter to Radio	570	BU	Blade Cushion Sol
136	GN	Suppl Steer	575	YL	Wiper - Aux (Park)
141	PK	Front Defroster	576	PK	Wiper - Aux (Low)
144	GN	Beacon	577	PU	Wiper - Aux (Hi)
147	PU	Converter	578	BU	Washer - Aux
149	PU	Blade Floods	584	YL	Wiper SW Jumper
151	GN	Rear Defroster	592	BU	DC/DC Converter Power Output
152	YL	Lower Wiper/Washer	593	GN	Condensor Fan Relay To Motors
158	BR	A/C Condenser Motors	597	PU	A/C Hi Press. Cooloid SW To Low Press. SW
160	PU	ASH Lamp	A503	PK	Front Defroster Fan (Low)
165	YL	Diff Lock	A504	GN	Rear Defroster Fan (Low)
169	PK	Blade Control	A506	OR	Front Defroster Fan (Hi)
173	YL	Turn Signals	A507	YL	Rear Defroster Fan (Hi)
176	OR	Converter	A513	PK	DC/DC Converter Memory Output
		Ground Circuits			**Lighting Circuits**
200	BK	Main Chassis	600	BR	Dash Lamp Basic
201	BK	Operator Monitor Return	601	GY	Dash Lamp Hi
202	BK	KMSN Ctrl	603	PK	Rotary Beacon
276	BK	KMSN Ctrl Ident Code 0	604	OR	Stop Lamp
277	BK	KMSN Ctrl Ident Code 1	605	YL	Turn Lamp - Left
278	BK	KMSN Ctrl Ident Code 2	606	GY	Turn Lamp - Right
		Basic Machine Circuits	608	GN	Flood Lamp - Rear
301	BU	Starter No. 1 Sol	609	YL	Flood Lamp - Side
304	WH	Starter Relay No. 1 Output	611	PU	Head Lamp Hi
306	GN	Starter Relay Coil To Neut Start SW Or Key SW	614	PU	Park/Tail/Dash/Lamp
307	OR	Key SW To Neut Start SW	619	GN	Head Lamp Lo
308	YL	Main Power Relay Coil	629	PK	Aux Head Lamp
310	PU	Start Aid SW To Start Aid Sol			**Control Circuits**
311	WH	Start Aid Sol To Temp SW	727	GN	Suppl Steer Motor Relay
321	BR	Bckp Alarm Lamp Travel Alarm	728	BU	Suppl Steer Cont SW
322	GY	Warning Horn (Forward)	751	GN	XMSN Shift Sol No. 1 Or 3
326	PU	Key SW "C" Term.	752	YL	XMSN Shift Sol No. 2
327	PK	Shutdown Sol	754	BU	XMSN Shift Sol No. 3 Or 1
334	BU	Start Aid Sol #2	755	OR	XMSN Shift Sol No. 4 Or 5
373	GN	Start Aid Switch To Timer	795	YL	Dual Hp Sol
		Monitoring Circuits	F769	BU	AWD To Inch Pedal SW
403	GN	Alternator (R) Term.	F775	BU	Centershift Solenoid
404	YL	Opr Mon Hyd Oil Temp.	892	BR	Start Mod Right (-) Port/CAT Data Link (-)
405	GY	Opr Mon Oil Press. (Low Setting)	893	GN	Start Mod Right (+) Port/CAT Data Link (+)
406	PU	Opr Mon Coolant Temp	F843	YL	Inching Pedal
408	WH	Opr Mon System Air Press.	G858	OR	AWD Agressiveness Cont Lever
409	OR	Opr Mon Neut	900	PU	XMSN Shift Sol No. 4
410	WH	Opr Mon Action Alarm	901	WH	XMSN Shift Sol No. 6
411	PK	Opr Mon Master	902	BR	XMSN Shift Sol No. 7
413	BR	Opr Mon Fuel Press.	903	GY	XMSN Shift Sol No. 8
415	GN	Opr Mon Test SW	921	WH	XMSN Sol No 1 Or 3 Return
417	GY	Primary Star SW	977	YL	CST Autoshift- Auto/Manual SW 1
419	YL	Opr Mon Parking Brake	E937	PU	MG MESH CNTL - Redundant Neutral
439	YL	Lamp Indicator	E938	OR	MG MESH CNTL - First Gear
441	OR	Eng Coolant Temp Gage	E939	WH	MG MESH CNTL - Second Gear
447	PK	Fuel Level Gage	E940	BU	MG MESH CNTL - Third Gear
449	BU	Sndsm Sender (Signal No. 1)	E941	YL	MG MESH CNTL - Fourth Gear
450	YL	Tach Sender (+)	E942	GN	MG MESH CNTL - Fifth Gear
462	YL	Suppl Steer Motor Indicator	E943	BR	MG MESH CNTL - Sixth Gear
467	WH	System Fault (Xmsn)	E944	GY	MG MESH CNTL - Seventh Gear
485	YL	Opr Mon Panel AWD Fault	E945	PU	MG MESH CNTL - Eighth Gear
488	WH	Alt SW To Air SW Jumper	E946	OR	MG MESH CNTL - Forward Direct
498	WH	Diff. Lock Indicator	E947	WH	MG MESH CNTL - Reverse Direct
A429	YL	Articulation Indicator	E948	BU	MG MESH CNTL - Park
G434	BU	AWD Hydraulic Temp Sensor (was B426)	E949	YL	MG MESH CNTL - Neutral
G460	GN	Transmission Temperature SW	E975	PU	MESH Lamp
			M917	PK	TOS Sensor +
			M918	GN	TOS Sensor -
			M998	OR	Transmission Autoshift Mode

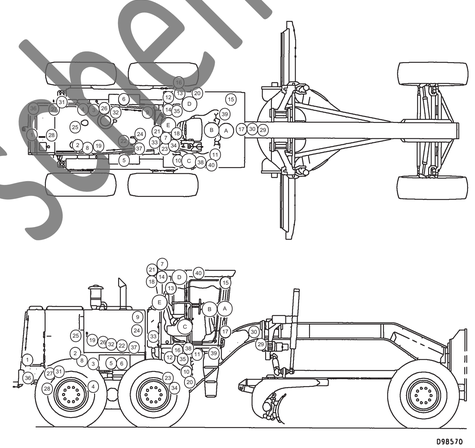
Related Electrical Service Manuals	
Title	Form Number
Alternator (6N-9294 35A): STD Consist No. 3T-8352 Consist No. 7N-9720 Consist No. 9G-4574	SENR4978 SENR2082 SENR4130
Alternator (100-5047 50A): ATT	SENR2082
Electronic Monitoring System	SENR2945
Electronic Transmission Shift Control	SENR9167
Starting And Charging Systems	SENR2947
Startino Motor: (106-8555) Consist No. 6V-5207 Consist No. 6V-5023 Consist No. 6V-5226	SENR3581 SENR3536 SENR4975

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.

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

Component Location		
Component	Schematic Location	Machine Location
Alarm - Action	B-B	C
Alarm - Backup	F-15	1
Alternator (35A STD)	D-14	2
Arc - Suppressor	E-14	3
Battery	C-14	5,6
Beacon	C-10	7
Beacon	A-12	7
Breaker - Alternator (35A)	D-13	8
Breaker - Convertor (15A)	F-11	13
Breaker - Headlamp (15A)	D-10	B
Breaker - Lightbar (15A)	D-10	B
Control - AIH Timer	D-8	B
Control - Engine Shutdown	E-13	9
Control - Neutral Start	A-6	10
Control - Supplement Steer	E-13	9
Control - Transmission	A-7	11
Converter - Voltage	F-8, F-10	12
Converter - Voltage	F-12	13
Flasher	E-10	B
Fuses	D-9	B
Fuses	E-10	B
Fuses (10A)	B-5	C
Gauge - Articulation	F-5	A
Gauge - Engine Coolant Temperature	F-5	A
Gauge - Fuel Level	E-5	A
Gauge - Speedometer	F-5	A
Gauge - System Air Pressure (Left)	E-5	A
Gauge - System Air Pressure (Right)	E-5	A
Gauge - Tachometer	E-5	A
Lamp - AIH Indicator	D-5	A
Lamp - C Shift Pin	E-5	A
Lamp - Cold Temperature	E-5	A
Lamp - Diff Unlock	E-5	A
Lamp - High Beam Indicator	D-6	A
Lamp - Master Action	E-5	A
Lamp - Transmission A/M	D-6	A
Lamp - Turn Indicator (Left)	E-5	A
Lamp - Turn Indicator (Right)	E-4	A
Meter - Service	E-10	B
Monitor - Electronic Monitoring System (EMS)	E-6	A
Motor - Blower	A-12	15
Motor - Blower (A/C group)	B-10	14
Motor - Blower (Heater group)	A-10	E
Motor - Blower/Defroster	E-4	15
Motor - Starter	C-13	19
Motor - Supplemental Steer	F-13	20
Motor - Washer (Front Lower)	F-6	16
Motor - Washer (Rear Upper)	F-6	16
Motor - Washer (Rear)	F-6	16
Motor - Wiper (Front Lower)	C-4	17
Motor - Wiper (Front Upper)	D-4	17
Motor - Wiper	B-11	18
Motors - Condenser	B-11	21
Relay-Condenser	C-10	21
Relay - Main	D-14	8
Relay - Start	D-13	8
Relay - Supplemental Steer	F-13	22
Resistor - Blower Speed	A-11	E
Resistor - Blower Speed	E-4	E
Resistor - Blower Speed (A/C)	B-11	15
Resistor - Blower Speed (Heater)	A-11	E
Resistor - Panel Lamp Dimmer	E-9	B
Sender- Articulation	C-12	23
Sender- Engine Coolant Temp	A-14	24
Sender - Fuel Level	A-13	25
Sensor-Engine Speed	B-14	26
Sensor - Transmission Oil Temp	E-15	27
Sensor - Transmission Speed	D-15	28
Solenoid - A/C Clutch	A-13	22
Solenoid - Centershift	B-3	29
Solenoid - Differential Unlock	E-14	4
Solenoid - Dual Horsepower	A-13	22
Solenoid - Dual HP/Shutdown	A-12	22
Solenoid - Engine Shutdown	D-13	22
Solenoid - Forward Horn	F-3	10
Solenoid - Park Brake	B-11	10
Solenoid - Start Aid	A-13	25
Solenoids - Blade Cushion	E-2	30
Solenoids - Transmission Valve (8)	D-15, E-15	27
Switch - A/C Refrigeration	A-13	22
Switch - Air Dryer	F-14	31
Switch - Autoshift	A-9	C
Switch - Beacon	B-5	C
Switch - Beacon	B-10	C
Switch - Blower (A/C)	B-10	C
Switch - Blower (Heater)	A-10	C
Switch - Brake Air Pressure	A-2	11
Switch - Brake Air Pressure	A-2	11
Switch - Centershift Indicator	B-3	29
Switch - Centershift Pin	B-9	C
Switch - Cushion Blade	B-9	C
Switch - Defroster (Front)	A-5	C
Switch - Defroster (Rear)	B-5	C
Switch - Differential Unlock	D-9	B
Switch - Disconnect	C-14	6
Switch - Engine Coolant Temp (Monitor)	B-14	24
Switch - Engine Coolant Temp (Start Aid)	A-14	24
Switch - Engine Oil Pressure	C-13	32
Switch - Flood Lamps	D-8	B
Switch - Forward Horn	E-9	B
Switch - Fuel Pressure	B-13	24
Switch - Head/Tail Lamp	E-8	B
Switch - Headlamp Dimmer	D-9	B
Switch - Hydraulic Oil Temperature	B-11	33
Switch - Inching Pedal Pressure	C-15	27
Switch - Key Start	B-9	C
Switch - Light Bar Low Beam	E-8	B
Switch - Monitor (EMS) Test	E-8	B
Switch - Panel Lamp Dimmer	E-9	B
Switch - Park Brake Pressure	B-11	34
Switch - Primary Steer	F-13	35
Switch - Start Aid/Monitor Test	A-9	C
Switch - Stop/lamp Pressure	B-13	24
Switch - Supplemental Steer Test	E-8	B
Switch-Tail Lamp	D-8	B
Switch - Transmission Direction & Speed	A-8	C
Switch - Turn Signal	D-9	B
Switch - Wiper (Front Lower)	A-4	C
Switch - Wiper (Front Upper)	B-4	C
Switch - Wiper (Rear)	A-4	C
Thermostat (A/C)	B-11	15

Machine locations are repeated for components located close together.
A = Operator's compartment (Dash).
B = Operator's compartment (Steering console).
C = Operator's compartment (Right side console).
D = Operator's compartment (Headliner).
E = Operator's compartment (Under seat).



Machine Harness Connector And Component Locations

Off Machine Switch Specification				
Part No.	Function	Actuate	Deactuate	Contact Position
8T-9793	Engine Coolant Temperature	107.0 ± 3.0°C (224.6 ± 5.4 °F)	93.00 °C (199.4 °F)	Normally Closed
3E-2033	Brake/Park Brake Air Pressure	640 kPa MAX (92.0 psi MAX)	530 ± 40 kPa (77.0 ± 6.0 psi)	Normally Open
8C-3569	Coolant Temperature (Start Aid)	38±3°C (100.4° ± 5.4°F)	27°C MIN (80.6°F MIN)	Normally Closed
8T-8640	Steering Press	1206 kPa MAX (175 psi MAX)	700 ± 103 kPa (101.5 ± 15 psi)	1-2 NO 1-3 NC
9X-0378	Engine Oil Pressure	62.0 kPa MAX (9.0 psi MAX)	38 ±20 kPa (5.5 ± 3.0 psi)	Normally Open
115-7103	Fuel Pressure (EMS)	93 ± 21 kPa (13.5 ± 3.0 psi)	69 ± 21 kPa (10.0 ± 3.0 psi)	Normally Closed
111-7088	Inching Pedal Pressure	75.0 kPa MAX (10.9 psi MAX)	50.0 kPa MIN (7.3 psi MIN)	Normally Open
114-5334	Refrigerant Pressure (A/C)	2755±1750kPa[1] (40 to 255 psi)	-	Normally Open [2]
125-9352	Stop Lamp Pressure	83kPa MAX (12 psi MAX)	48 ± 20 kPa MIN (7 ± 3 psi MIN)	Normally Open
131-4135	Hydraulic Oil Temperature	102±3°C (215.6 ± 5.4°F)	90°C (194.0 °F)	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.

Resistor, Sender and Solenoid Specifications		
Part No.	Component Description	Resistance (Ohms)[1]
3T-3123	Resistor - Panel Dimmer	25.0 ± .3
7T-4003	Resistor - Power	10.0± 0.5
9G-1950	Resistor - Blower Speed	Overall 2.00 ± .10 Tap 1.00 ± .05
7N-8532	Senders: Engine Coolant Temp Converter Temp	54°C (130°F) - 560 to 716 110°C (230°F) - 72 to 82
3E-1906	Solenoid - A/C Clutch	17.6 ± 0.6
7T-6517	Solenoid - Blade Cushion	20.1 ± 1.0
8T-8808	Solenoid - Centershift	34.3 ± 1.7
111-0570	Solenoid - Dual HP	31.1 ± 2.4
7T-9073	Solenoid - Differential Unlock	33.6 ± 1.0
3E-6424	Solenoid - Dual HP Push Coil- Pull Coil	4.2 ± 0.42 16.1 ± 1.61
3E7985	Solenoid - Engine Shutdown Start (Latch) CoilStop (Unlatch) Coil	1.55 ± 0.15 10.3 ± 1.03
7T-9074	Solenoid - Forward Horn/ParkBrake	55.17 ± 5.77
9G-4365	Solenoid - Start Aid	6.0
9W-2739	Solenoid - Transmission	31 ± 3

[1] At room temperature

CATERPILLAR®

RENR1424-01
August 2004

Schematic

120H, 135H, Motor Grader (NA Version)
120H Motor Grader (Australian Version)
Electrical System

120H:
4MK404-UP
2AN104-UP
6YN1-UP

135H:
BDJ1-UP
3YK267-UP

Printed in U.S.A.

Electrical Schematic Symbols And Definitions

Pressure Symbol
Temperature Symbol
Level Symbol
Flow Symbol
Circuit Breaker Symbol

Normally open switch that will close with an increase of a specific condition (temp-press-etc.). The circle indicates that the component has screw terminals and a wire can be disconnected from it.

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

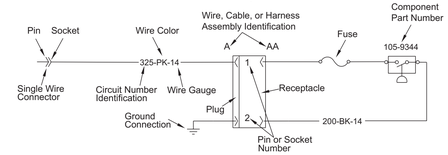
Reed Switch - A switch whose contacts are controlled by a magnet. A magnet closes the contacts of a normally open reed switch; it opens the contacts of a normally closed reed switch.

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.

Harness And Wire Symbols



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

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

RENR1424-01

20 Page, Color