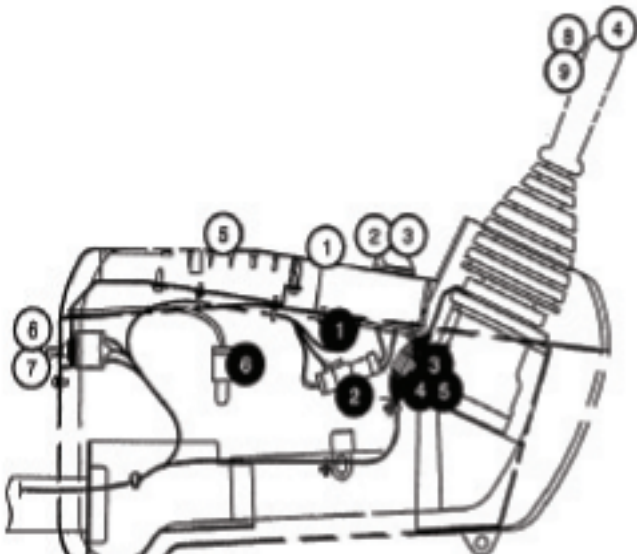
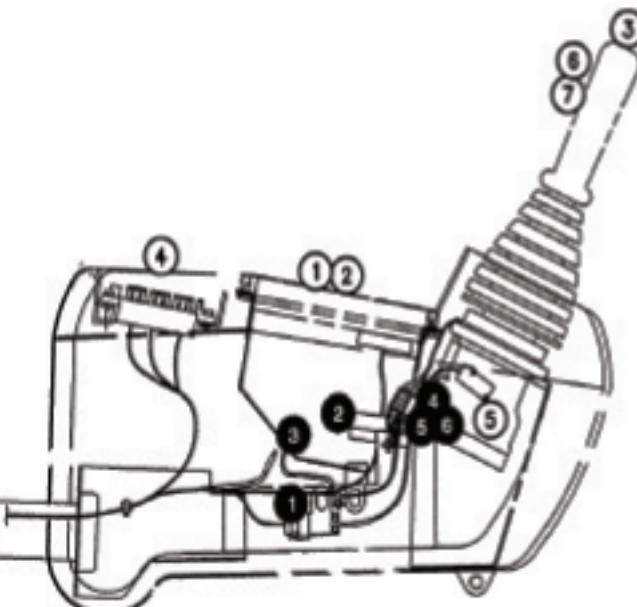


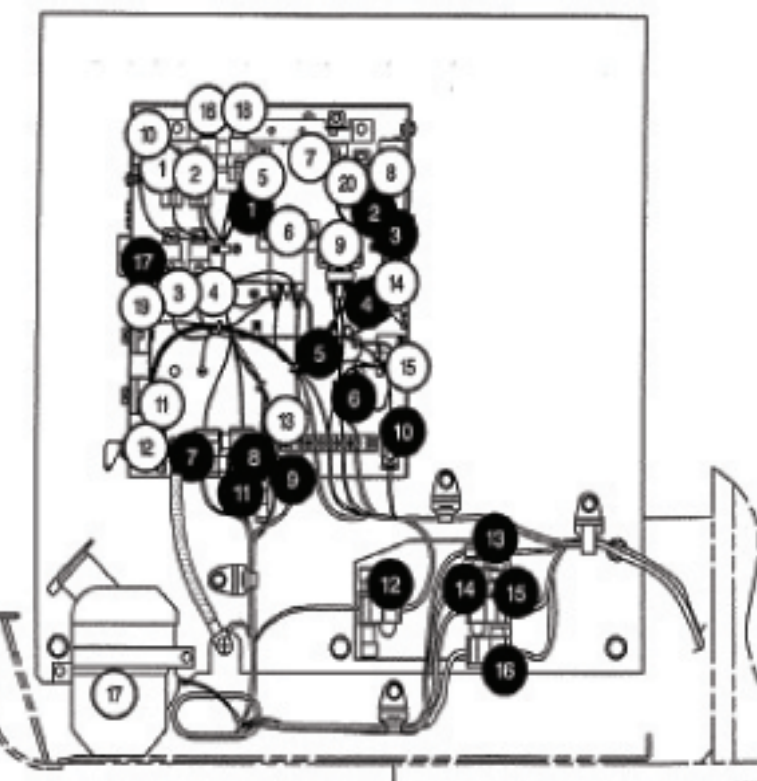
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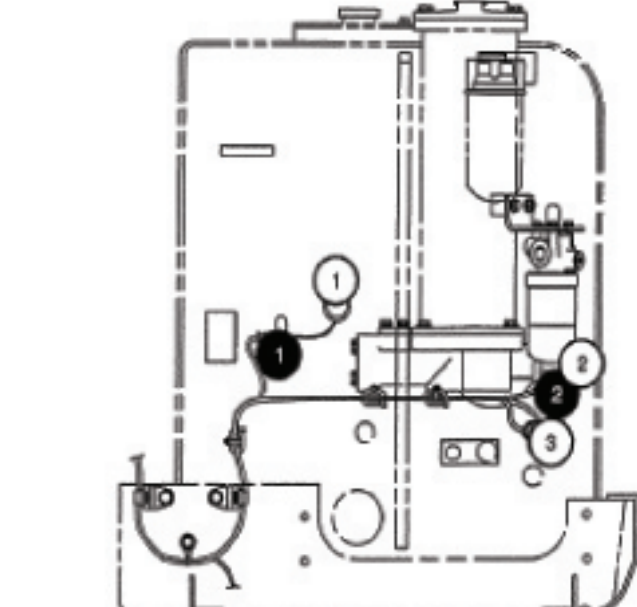
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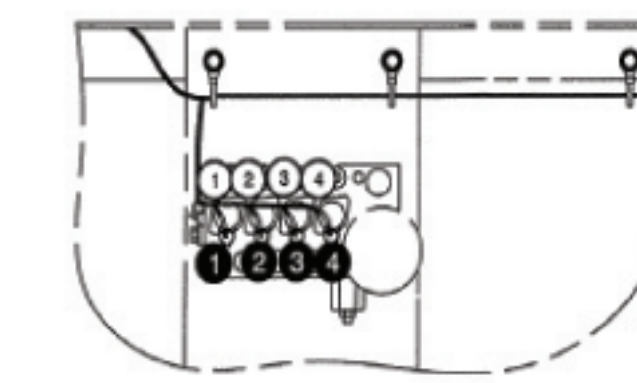
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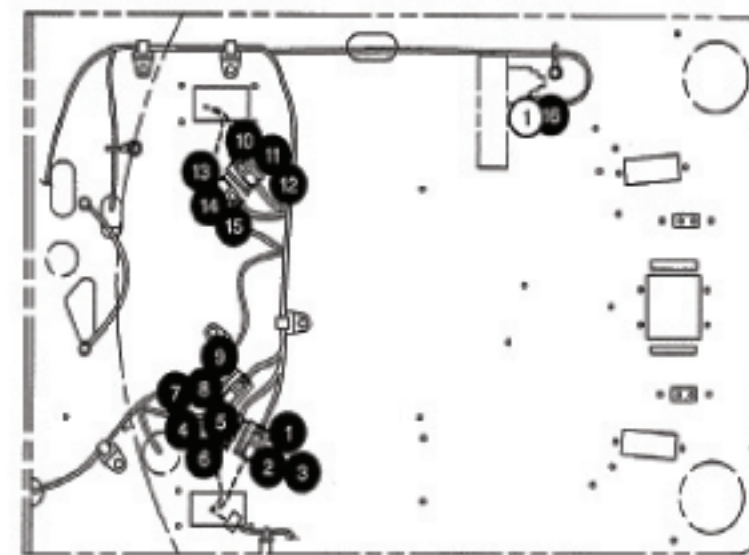


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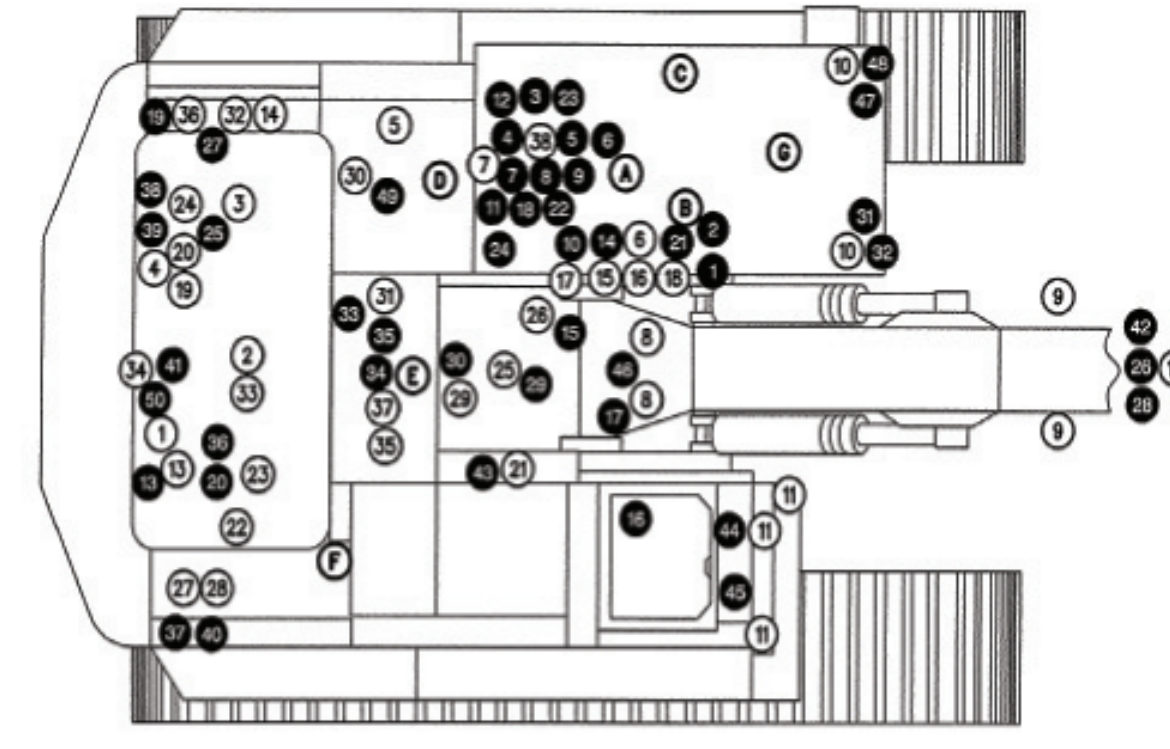
Component Location					
Vehicle Location	Components	Schematic Location	Vehicle Location	Components	Schematic Location
10	A/C Switch Panel	H-3	36	Sender, Hyd Oil Temp	A-7
1	Actuator- Governor	A-9	5A	Sensor- A/C Photo	F-1
2	Air Heater	C-8	20	Sensor- A/H Coolant Temp	C-9
3	Alarm- Travel	G-9	21	Sensor- Fuel Level	A-5
4	Alternator	B-9	22	Sensor- Pump/Discharge Press	B-6
9A	Antenna	C-6	23	Sensor- Speed	B-9
5	Battery	H-8, H-9	24	Solenoid- A/C Clutch	C-9
13D	Block- Terminal	F-8	25	Solenoid- Fine Swing	D-7
11D	Breaker- AL	L-8	26	Solenoid- Grapple	E-7
19D	Breaker- Main	L-8	1G	Solenoid- Hyd Lock	H-1
6	Controller	C-6	1F	Solenoid- Level Finish	A-7
7	Converter	C-6	27	Solenoid- Rotate CCW	A-8
3B	Diag- Engine Speed	E-3	28	Solenoid- Rotate CW	A-8
4C	Fuse- Block	H-4, S, 6	29	Solenoid- Swing Brake	D-7
1C	Heater Switch Panel	H-3	2F	Solenoid- Travel Speed	A-7
8	Horn	A-3	3F	Solenoid- Trenching	A-7
9	Lamp- Boom	A-2	6A	Speaker	B-6
10	Lamp- Cab	G-1	30	Switch- Air Cleaner	H-9
11	Lamp- Chassis	A-4	6B	Switch- Backup	E-5
7A	Lamp- Dome	B-5	31	Switch- Boom Raise Press	D-7
12	Lamp- Sock	A-1, B-1	32	Switch- Coolant Level	H-9
21	Lighter- Cigar	E-1	12D	Switch- Disconnect	L-8
3A	Master- Service	F-1	33	Switch- Engine Oil Level	A-8
1A	Monitor	F-1	34	Switch- Engine Oil Press	B-9
13	Motor- Starter	B-9	5B	Switch- Fine Swing Control	D-7
14	Motor- Tie	F-9	8B	Switch- Grapple Close	F-2
17D	Motor- Washer	H-8, H-9	6C	Switch- Grapple Open	L-1
4A	Motor- Wiper	C-5	3C	Switch- Horn	L-1
2C, 10A	Radio- 12V DC	L-2, C-6	2E	Switch- Hyd Oil Filter	A-5
2D	Relay- Boom Lamp	L-7	1E	Switch- Hyd Oil Level	A-5
3D, 16D, 18D	Relay- Cab/Chassis Lamp	L-7, H-7, B	35	Switch- Implement Press	D-7
20D	Relay- Fan	L-7	5C	Switch- Neutral Start	L-1
AD	Relay- Grapple Close	C-3	4B	Switch- One Touch Low Idle	F-2
AB	Relay- Grapple Open	C-2	1B	Switch- Panel	F-2
9D	Relay- Heater	F-7	36	Switch- Refrigerant Low Press	L-9
1D	Relay- Horn	L-7	9B	Switch- Rotate CCW	F-2
4D	Relay- Hyd Lock Sol	L-7	7C	Switch- Rotate CW	L-1
6D	Relay- Main	G-7	7B	Switch- Speed Change	D-5
7D	Relay- Neutral Start	F-7	2B	Switch- Starter	E-3
17	Relay- Rotate CCW	C-3	37	Switch- Travel Press	G-1
18	Relay- Rotate CW	C-2	38	Unit- A/C	A-8
14D	Relay- Start Cont	E-8	38	Unit- Heater	G-6
15D	Relay- Starter	E-8	5D	Unit- Heater Control	H-7
8D	Relay- Timer	E-7	4F	Valve- Proportional Reducing	A-7
10D	Resistor- Backup	L-7	6A	Wiper Control	E-1
19	Sender- Coolant Temp	B-6			

Machine locations are repeated for components located close together.

- A = Inside of cab
- B = Inside of R.H. console
- C = Inside of L.H. console
- D = Around relay panel
- E = Around hydraulic oil tank
- F = Around pilot manifold
- G = Around platform



AREA G E00348



Machine Harness Connector And Component Locations

Schematic

320B LL Forest Swing Machine Electrical System

6LS1-UP
9JS1-UP

Real Time Error Codes	
Code	Description of Problems
1301	Engine of pressure is too low
1302	Engine coolant temperature is too high
1303	Hydraulic oil temperature is too high
1304	Air filter is clogged
1305	Battery voltage is not normal
2201	Governor actuator feedback sensor circuit is open or shorted to battery voltage
2202	Governor actuator feedback sensor circuit is shorted to body ground
2201	Governor actuator feedback signal is not stable
2302	Governor actuator feedback signal deviates
2303	Governor actuator does not move
2304	Calibration data error
3201	Monitor RAM is not normal
4101	Electric power supply to the controller is too much (43 volts)
4102	Over-current in proportional reducing valve
4103	Proportional reducing valve circuit is open
4104	Monitor power supply (digital output) over current
4105	Over-current in digital output (trenching solenoid)
4106	Over-current in digital output (fine control solenoid)
4107	Over-current in digital output (travel speed change solenoid)
4108	Over-current in digital output (travel alarm)
410A	Over-current in digital output (swing brake solenoid)
4201	Alarm sensor 2 (digital output) over current
4201	Engine speed is not normal
4202	Engine coolant temperature sensor is shorted to body ground
4203	Hydraulic oil temperature sensor is shorted to body ground
4204	PWM sensor of pump delivery pressure is shorted to body ground
4207	PWM sensor of pump delivery pressure is open in circuit
420A	Fuel sensor is shorted to body ground
420B	Fuel sensor is open or shorted to battery voltage
420C	Electric power supply is too low (below 23 volts)
420A	Electric power supply is too high (above 32 volts)
420E	Engine speed dial is not in one of the 10 specified positions
4301	Data mismatch 1 between alternator and speed sensor (alternator is abnormal)
4302	Data mismatch 2 between alternator and speed sensor (speed sensor is abnormal)
4303	Engine stalls
AD01	Monitor communication is not normal
AD02	Monitor takes too much time to respond to controller's signal
AD03	Communication is abnormal in controller

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Related Electrical Service Manuals	
Title	Form Number
Engine/Pump Control	SEN9201

HARNES CONNECTOR LOCATION CHART							
Connectors	Connector No. And Vehicle Location	Harness And/Or Components	Schematic Location	Connectors	Connector No. And Vehicle Location	Harness And/Or Components	Schematic Location
4 Contacts	CONN22	A- 143-1588	F-4	40 Contacts	CONN74	R- 143-1583	B-2
	CONN23	T- 143-1588	B-3		CONN75	K- 128-8572	F-2
	CONN24	N- 143-1592	B-3		CONN76	29	H-3
	CONN25	C- 138-5156	E-7		CONN77	3	H-6
	CONN26	Timer Relay	E-7		CONN78	11D	C-2
	CONN27	B- 143-1587	A-4		CONN79	3D	C-5
	CONN28	Grapple Solenoid	E-7		CONN80	10A	F-4
	CONN29	3D	E-7		CONN81	10A	F-4
	CONN30	B- 143-1587	A-4		CONN82	10A	F-4
	CONN31	S- 125-4873	B-4		CONN83	10A	F-4
3 Contacts	CONN40	A- 143-1588	G-8	CONN84	B- 143-1587	A-8	
	CONN41	T- 143-1588, U- 143-1589	G-8	CONN85	10D	H-4	
	CONN42	C- 138-5156	E-7	CONN86	10D	H-4	
	CONN43	H- 143-1587	L-1	CONN87	10D	H-4	
	CONN44	T- 143-1588, U- 143-1589	G-8	CONN88	10D	H-4	
	CONN45	H- 143-1587	L-1	CONN89	10D	H-4	
	CONN46	Coolant Level Switch	H-9	CONN90	10D	H-4	
	CONN47	B- 143-1587	A-5	CONN91	10D	H-4	
	CONN48	Pump Discharge Press Sensor	B-6	CONN92	10D	H-4	
	CONN49	B- 143-1587	A-5	CONN93	10D	H-4	
CONN50	Hyd Oil Filter Switch	A-5	CONN94	10D	H-4		
2 Contacts	CONN51	A- 143-1588	D-2	CONN95	10D	H-4	
	CONN52	A- 143-1588	D-2	CONN96	10D	H-4	
	CONN53	D- 128-7336	L-1	CONN97	10D	H-4	
	CONN54	A- 143-1588, W- 138-5185	A-7	CONN98	10D	H-4	
	CONN55	A- 143-1588	L-9	CONN99	10D	H-4	
	CONN56	A- 143-1588	G-6	CONN100	10D	H-4	
	CONN57	A- 143-1588	H-1	CONN101	10D	H-4	
	CONN58	Hyd Lock Solenoid	H-1	CONN102	10D	H-4	
	CONN59	A- 143-1588	G-9	CONN103	10D	H-4	
	CONN60	T- 143-1588, U- 143-1589	G-9	CONN104	10D	H-4	
2 Contacts	CONN61	C- 138-5156	E-7	CONN105	10D	H-4	
	CONN62	3D	E-7	CONN106	10D	H-4	
	CONN63	C- 138-5156	E-7	CONN107	10D	H-4	
	CONN64	Timer Relay	F-8	CONN108	10D	H-4	
	CONN65	C- 138-5156	H-7	CONN109	10D	H-4	
	CONN66	Diode	G-9	CONN110	10D	H-4	
	CONN67	B- 143-1587	A-7	CONN111	10D	H-4	
	CONN68	Travel Alarm	B-2	CONN112	10D	H-4	
	CONN69	R- 143-1593	A-4	CONN113	10D	H-4	
	CONN70	B- 143-1587	A-7	CONN114	10D	H-4	

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.

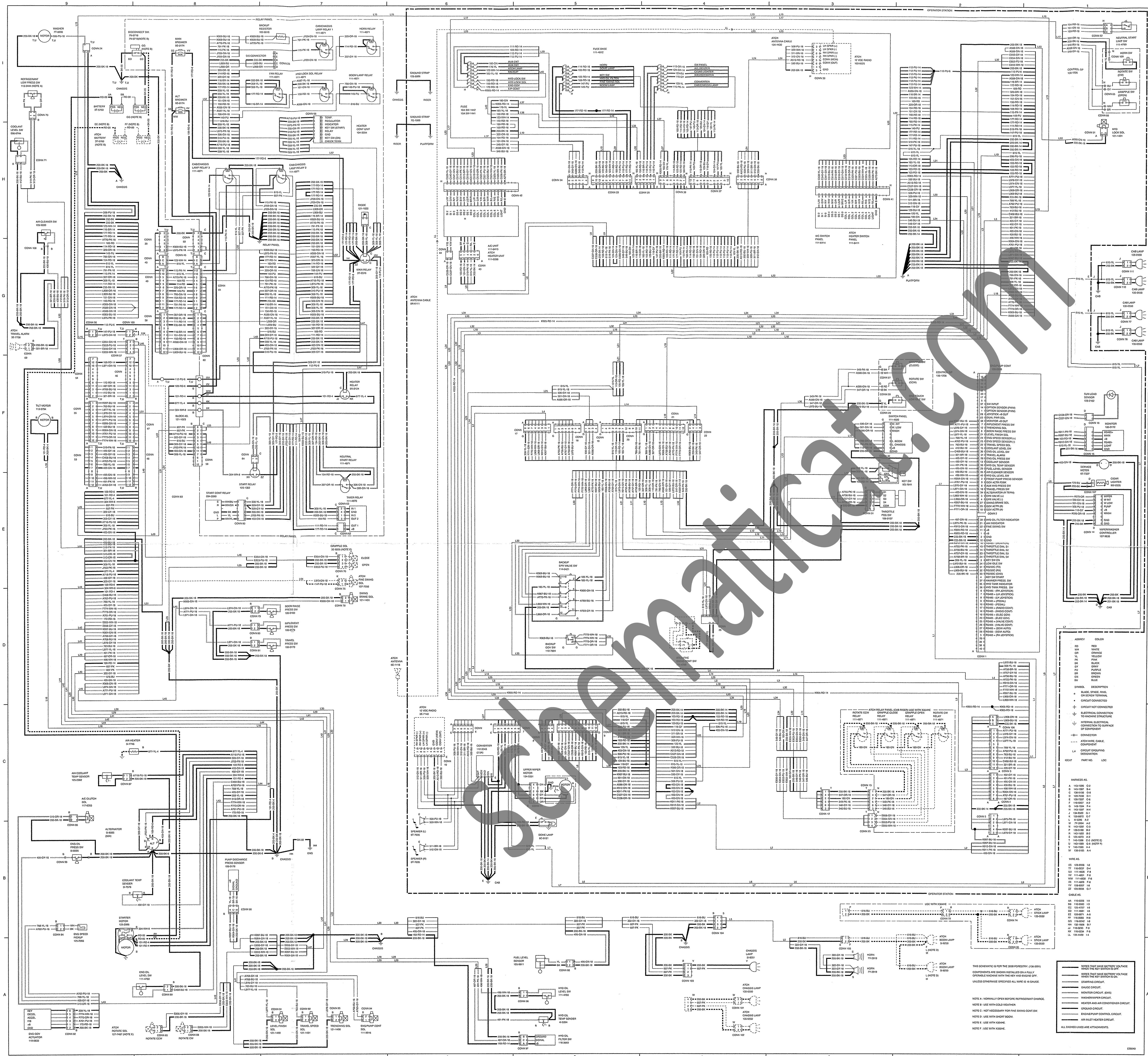
HARNES CONNECTOR LOCATION CHART								
Connectors	Connector No. And Vehicle Location	Harness And/Or Components	Schematic Location	Connectors	Connector No. And Vehicle Location	Harness And/Or Components	Schematic Location	
40 Contacts	CONN115	A- 143-1588	D-2	8 Contacts	CONN115	U- 138-7337	C-6	
	CONN116	10A	F-2		CONN116	EA	12V DC Radio	F-5
	CONN117	10A	F-2		CONN117	EA	12V DC Radio	F-5
	CONN118	10A	F-2		CONN118	EA	12V DC Radio	F-5
	CONN119	10A	F-2		CONN119	EA	12V DC Radio	F-5
	CONN120	10A	F-2		CONN120	EA	12V DC Radio	F-5
	CONN121	10A	F-2		CONN121	EA	12V DC Radio	F-5
	CONN122	10A	F-2		CONN122	EA	12V DC Radio	F-5
	CONN123	10A	F-2		CONN123	EA	12V DC Radio	F-5
	CONN124	10A	F-2		CONN124	EA	12V DC Radio	F-5
12 Contacts	CONN125	A- 143-1588, U- 143-1589	F-8	7 Contacts	CONN125	EA	F-1	
	CONN126	B- 143-1587	A-8		CONN125	EA	F-1	
	CONN127	10D	H-4		CONN126	EA	F-1	
	CONN128	10D	H-4		CONN127	EA	F-1	
	CONN129	10D	H-4		CONN128	EA	F-1	
	CONN130	10D	H-4		CONN129	EA	F-1	
	CONN131	10D	H-4		CONN130	EA	F-1	
	CONN132	10D	H-4		CONN131	EA	F-1	
	CONN133	10D	H-4		CONN132	EA	F-1	
	CONN134	10D	H-4		CONN133	EA	F-1	
9 Contacts	CONN135	A- 143-1588	F-9	6 Contacts	CONN135	EA	F-1	
	CONN136	B- 143-1587	A-8		CONN135	EA	F-1	
	CONN137	10D	H-4		CONN136	EA	F-1	
	CONN138	10D	H-4		CONN137	EA	F-1	
	CONN139	10D	H-4		CONN138	EA	F-1	
	CONN140	10D	H-4		CONN139	EA	F-1	
	CONN141	10D	H-4		CONN140	EA	F-1	
	CONN142	10D	H-4		CONN141	EA	F-1	
	CONN143	10D	H-4		CONN142	EA	F-1	
	CONN144	10D	H-4		CONN143	EA	F-1	
8 Contacts	CONN145	A- 143-1588	F-9	5 Contacts	CONN145	EA	F-1	
	CONN146	B- 143-1587	A-8		CONN145	EA	F-1	
	CONN147	10D	H-4		CONN146	EA	F-1	
	CONN148	10D	H-4		CONN147	EA	F-1	
	CONN149	10D	H-4		CONN148	EA	F-1	
	CONN150	10D	H-4		CONN149	EA	F-1	
	CONN151	10D	H-4		CONN150	EA	F-1	
	CONN152	10D	H-4		CONN151	EA	F-1	
	CONN153	10D	H-4		CONN152	EA	F-1	
	CONN154	10D	H-4		CONN153	EA	F-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.

HARNES CONNECTOR LOCATION CHART							
Connectors	Connector No. And Vehicle Location	Harness And/Or Components	Schematic Location	Connectors	Connector No. And Vehicle Location	Harness And/Or Components	Schematic Location
40 Contacts	CONN155	U- 138-7337	C-6	Bullet Terminal	CONN155	H- 143-1587	L-1
	CONN156	EA	F-1		CONN156	EA	F-1
	CONN157	EA	F-1		CONN157	EA	F-1
	CONN158	EA	F-1		CONN158	EA	F-1
	CONN159	EA	F-1		CONN159	EA	F-1
	CONN160	EA	F-1		CONN160	EA	F-1
	CONN161	EA	F-1		CONN161	EA	F-1
	CONN162	EA	F-1		CONN162	EA	F-1
	CONN163	EA	F-1		CONN163	EA	F-1
	CONN164	EA	F-1		CONN164	EA	F-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.

Resistor, Sender and Solenoid Specifications			
Part No.	Component Description	Resistance (Ohms)<	



Wire Number	Wire Color	Description	Wire Number	Wire Color	Description
101	RD	Bat (+)	A588	GN	Safety Sol Relay to Sol
103	YL	Aux Ckt	C513	OR	Blower Motor (Med Low)
105	BK	Key Sw	C514	PK	Power to Cont 12V
109	OR	Alt Output (+) Term.	C515	BR	Serial Communication (A)
111	YL	Aux Ckt	C516	GY	Serial Communication (B)
112	PU	Main Power Relay Output	C517	GN	Ambient Temp Sensor
113	OR	Oil Pan Press Sw to Switch	C518	WH	Cab Temp Sensor
114	GN	Warning Horn (Forward)	C519	OR	Heater Coil Temp (Water)
115	PK	Aux Ckt	C520	PK	Evaporator Coil Temp (Air)
116	BR	Aux Ckt	C521	GLB	GLB
118	GY	Aux Ckt	C523	BK	GLB
120	YL	Aux Ckt	C524	WH	GLB
123	WH	Aux Ckt	C525	YL	GLB
124	GN	A/C	C529	BR	Blower Motor (Thermal Fuse)
129	BU	Aux Ckt	C536	PK	Operator A/C On Lamp
147	PU	Aux Ckt	C537	GN	A/C Photo Sensor - Sig
149	PU	Aux Ckt	C538	OR	A/C Photo Sensor - Sig
150	OR	Bat (+)	C539	YL	A/C Cont Sw #1
151	GN	Aux Ckt	C540	GN	A/C Cont Sw #2
154	WH	Aux Ckt	C541	GN	A/C Cont Sw #3
158	GN	Aux Ckt			Lighting Circuits
172	GN	Aux Ckt	607	PK	Flood Lamp - Front
176	OR	Aux Ckt	615	YL	Cab Flood Lamp
177	OR	Main Breaker	616	BU	Boom Flood Lamp
180	GN	Aux Ckt			Control Circuits
185	YL	Aux Ckt	763	BU	Torque Converter Sw
189	WH	Aux Ckt	786	GN	Eng Speed Cont - Hi Press Sw
			788	YL	Eng Speed Cont - Lo Sw
200	BK	Main Chassis	791	PK	Eng Speed Cont - Lo Sol
201	BK	Op Mon Panel	791	PU	Start Aid Coolant Sensor Signal
235	BK	E/P Ckt Gnd	A755	PK	Throttle Sw #1
A270	BK	Operator Panel Sw Gnds.	A756	BU	Throttle Sw #2
			A757	GY	Throttle Sw #3
			A758	BR	Throttle Sw #4
304	WH	Starter Relay No. 1 Output	A761	PU	Electronic Pump Cont Throttle Ground
306	GN	Starter Relay Coil to Key Sw	A761	PU	Electronic Pump Cont Eng Speed Ground
307	OR	Key Sw to Relay Start Sw	A762	PU	Electronic Pump Cont Eng Speed Ground
308	YL	Main Power Relay Ckt	A768	BU	Pump Cont Valve #1 (+)
309	GY	Alternator (R) Term.	A769	GN	Pump Cont Valve #2 (-)
310	PU	Start Aid Sw to Start Aid Sol	A770	PK	Electronic Pump Cont Bypass Sw to Resistor
320	OR	Horn Relay Coil to Sw	A771	PU	Flood Sw
321	BR	Travel Alarm	F771	OR	Backup Sw
322	BY	Warning Horn (Forward)	F772	WH	Backup Sw
330	YL	Start Relay to Safety Relay	F773	OR	Governor Accel
			F774	WH	Governor Decel
403	GN	Alternator (+) Term.	J773	PK	Alternator L Term. To Safety Relay
405	GY	Oil Pan Press. (Lo Sensing)	J789	GN	Cab Chassis Lamp Throttle Ground
412	BU	Op Mon Cool Flow	877	YL	Glow Plug Magnetic Sw to Glow Plug
430	BU	Op Mon Air Filter	E853	PU	Grapple Tong Open Sol
487	OR	Hot Oil Flow Sw	E854	GN	Grapple Tong Close Sol
491	PK	Hot Oil Temp Sensor	E855	WH	Grapple Rotate CW Sol
492	GY	Coolant Temp Sensor Signal	E856	GY	Grapple Rotate CCW Sol
495	GN	Fuel Level Signal	K904	GN	Pump Discharge - Signal
496	WH	Op Mon Panel Hyd Oil Level	K905	BU	Pump Discharge - #1
C468	BU	Engine Oil Level	K906	GN	Pump Discharge - Signal
			K907	BU	Swing Brake Sol - #1
501	GN	Wiper - Front (Lc)	K909	BU	Backup Sw - #2
506	PU	Wiper - Front	K911	PK	E/P Controller - RS485 (+)
508	PU	Radio Speaker - Left (Common)	K912	GN	E/P Controller - RS485 (-)
509	WH	Radio Speaker - Left (Common)	K915	GN	Fine Swing Sw - E/P Controller
511	BR	Radio Speaker - Right	K997	BU	-V Sensor
512	GN	Radio Speaker - Right (Common)	L901	OR	Controller RS-232C TX
513	OR	A/C Compressor/Refrigerant Pressure Sw	L909	BU	Controller RS-232C RX
519	PK	Thermostat to Refrigerant Press. Sw	L968	OR	E/P Ckt PS Valve (-)
546	BU	Aux Hyd. - Rotate CW	L969	WH	E/P Ckt PS Valve (+)
547	OR	Aux Hyd. - Rotate CCW	L970	GY	Fine Swing Ckt Relay to Sol Valve
548	GY	Aux Hyd. - Open	L971	GN	Fine Swing Ckt Relay to Sol Valve
549	PK	Aux Hyd. - Close	L972	BU	Low Life Sw
550	GY	Wiper Sw to Intermittent Module	L973	GN	Fine Swing Ckt Relay to Sol Valve
592	BU	DC/DC Converter Power Output	L974	GN	Electronic Pump Ckt Boom Press Sw
A513	RD	DC/DC Converter Memory Output	L975	PK	Start Aid Cont Lamp 1 Output
A579	OR	Wiper Motor	L977	YL	Trembling Sol
A586	OR	Wiper Sw to Wiper Cont	L978	GY	Level Finish Sol
A587	YL	Power Window Cont to Safety Sol Relay			

Electrical Schematic Symbols And Definitions

- Normally Open switch** - A 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** - A switch that will open with an increase of a specific condition. No circle indicates that the wire cannot be disconnected from the component.
- Grounded** - This indicates that the component has a wire connected to it that is connected to ground.
- Grounded by fastening** - 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

- Pin Socket** - Symbol for a pin socket connection.
- Wire Color** - Symbol for wire color identification.
- Wire, Cable, or Harness Assembly Identification** - Symbol for assembly identification.
- Component Part Number** - Symbol for part number identification.
- Single Wire Connector** - Symbol for a single wire connector.
- Circuit Number Identification** - Symbol for circuit number identification.
- Wire Gauge** - Symbol for wire gauge identification.
- Plug** - Symbol for a plug connection.
- Receptacle** - Symbol for a receptacle connection.
- Ground Connector** - Symbol for a ground connector.
- Pin or Socket Number** - Symbol for pin or socket number identification.

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

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