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Fluids and Lubricants	1002
Metric Conversion Chart	1003
Loctite Product Chart	

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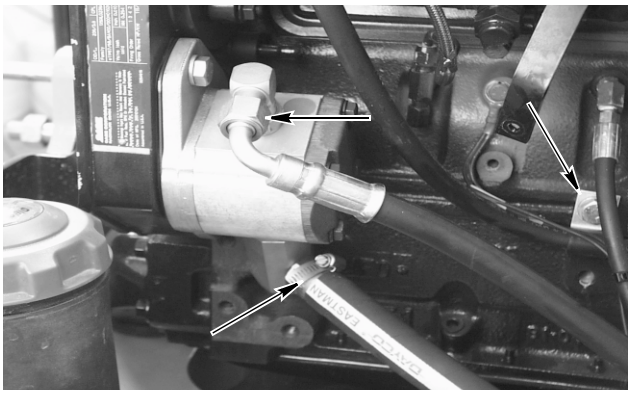
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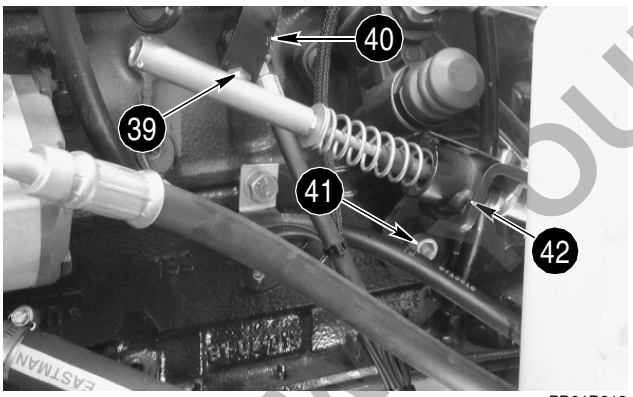
STEP 77



BD01D215

Install clamp to secure fuel return hose to engine. Turn on vacuum pump connected to hydraulic reservoir. Remove caps from fittings and plugs from hoses. Connect hoses to brake pump following tags installed during removal. Remove and discard tags. Turn off and disconnect vacuum pump from hydraulic reservoir.

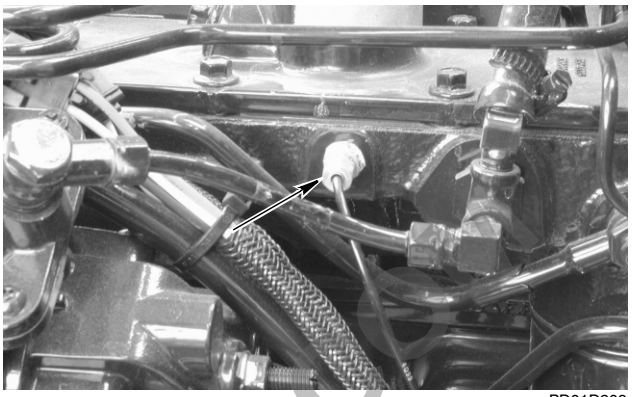
STEP 78



BD01D212

Position throttle bracket with throttle cable and ball joint attached on engine. Install two washers and socket head bolts (41) to secure throttle bracket (42) to engine. Connect ball joint (39) to throttle lever (40) and secure with nut and washer.

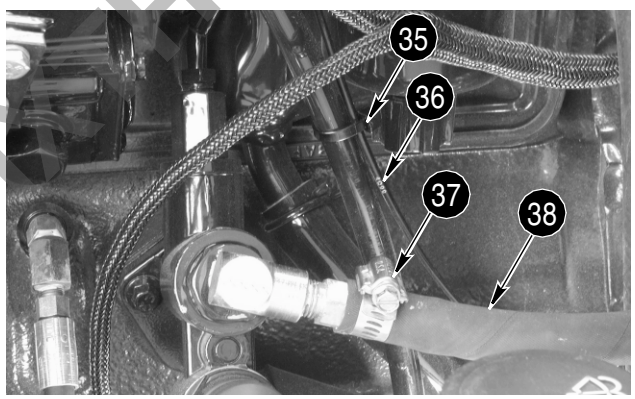
STEP 79



BD01D209

If equipped, connect ether start nozzle to intake manifold.

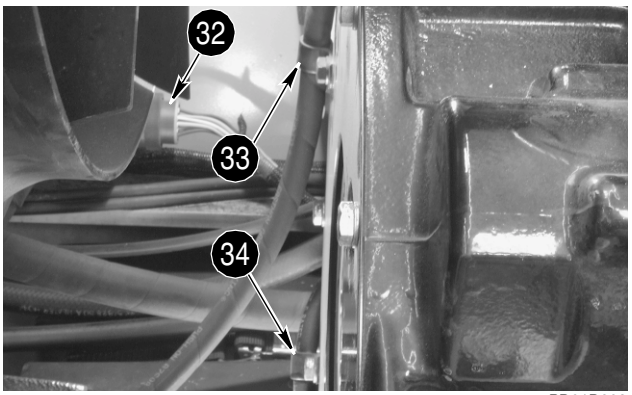
STEP 80



BD01D210

Remove cap from fitting and plug from hose. Connect fuel supply hose (38) to primer pump following tag installed during removal. Position and tighten clamp (37). Remove and discard tag. Install a new tie strap (35) to secure ether start tube (36).

STEP 81

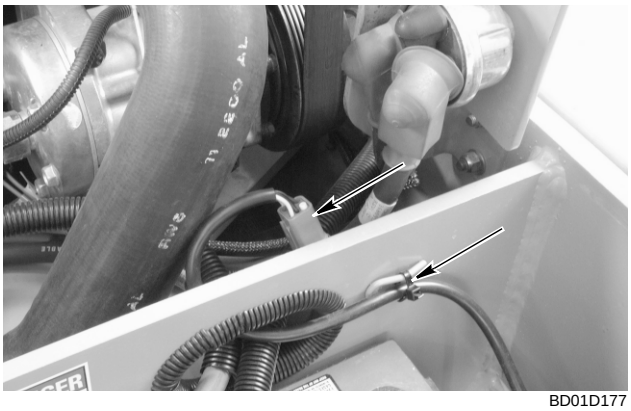


BD01D208

Position fuel return hose and secure using two clamps (34). Position fuel supply hose and secure using clamp (33). Connect engine wiring harness connector (32) to transmission wiring harness bulkhead connector.

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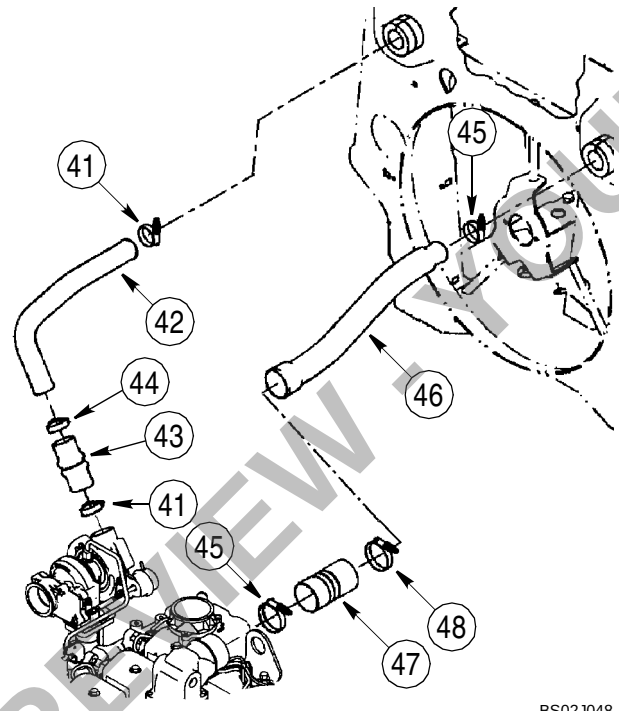
STEP 126



BD01D177

Connect rear chassis wiring harness connector to combination lamp connector following tag installed during removal. Install new tie strap to secure LH rear combination lamp wire. Remove and discard tags. Repeat this step for RH rear combination lamp.

STEP 127



BS02J048

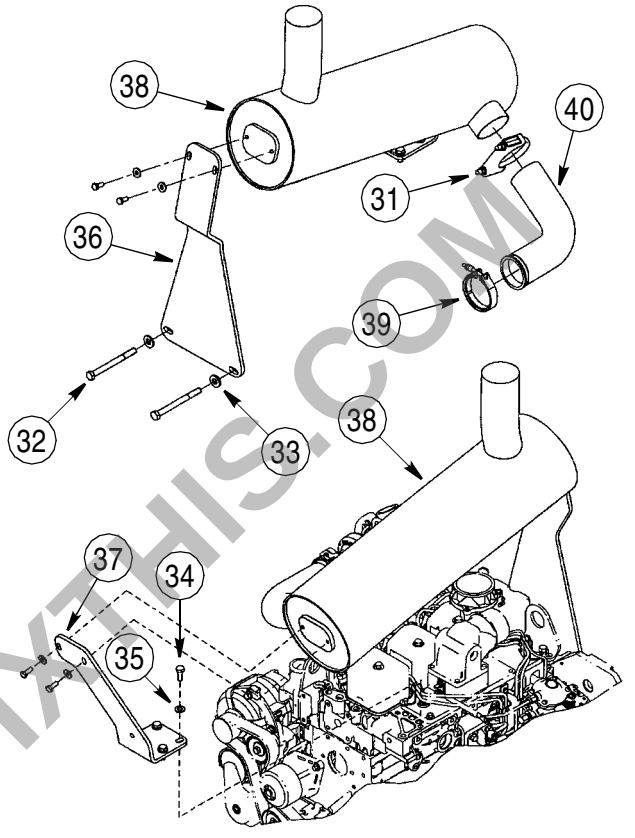
41. CLAMP
42. TUBE
43. HOSE
44. CLAMP
45. CLAMP
46. TUBE
47. HOSE
48. CLAMP

Install tube (46) and hose (47) as an assembly. Tighten two clamps (45) to a torque of 10.1 to 11.3 Nm (90 to 100 lbs-inch).

STEP 128

Install tube (42) and hose (43) as an assembly. Tighten two clamps (41) to a torque of 10.1 to 11.3 Nm (90 to 100 lbs-inch).

STEP 129



BS02J046

31. CLAMP
32. BOLT
33. WASHER
34. BOLT
35. WASHER
36. FRONT BRACKET
37. REAR BRACKET
38. MUFFLER
39. CLAMP
40. EXHAUST TUBE ELBOW

Put clamp (39) on exhaust tube elbow (40). Install exhaust tube elbow and clamp on turbocharger. Do not tighten clamp at this time.

STEP 130

Install and support muffler (38) and brackets (36 and 37) on engine while connecting muffler to exhaust tube elbow (40). Install two washers (35) and bolts (34) finger tight.

STEP 131

At front of engine, install two washers (33) and bolts (32) to secure muffler front mounting bracket (36). Tighten bolts (32) to a torque of 118 to 133 Nm (87 to 98 lb-ft). Tighten bolts (34) to a torque of 68 to 77 Nm (50 to 56 lb-ft).

STEP 132

Install clamp (31). Tighten clamp (31) to a torque of 20 to 25 Nm (15 to 18 lb-ft). Tighten clamp (39) to a torque of 4.8 to 5.2 Nm (42.5 to 46 lb-ft).

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Wire Identification Codes

21C Bk - 1.0

- 21C — Wire Name
- Bk — Wire Color
- 1.0 — Wire Size (mm^2)

Wire Size (mm^2)				
	0.8 mm	1.0 mm	2.0 mm	5.0 mm

Wire Color				
Bk = Black	DU = Dark Blue	S = Gray	LG = Light Green	K = Pink
T = Tan	W = White	N = Brown	G = Green	U = Blue
LU = Light Blue	Or = Orange	R = Red	P = Purple	Y = Yellow

Wire Identification			From Connector		To Connector	
Wire	**Circuit**	**Color, Size, and Material**	**Connector**	**Cavity**	**Connector**	**Cavity**
13M_A	Fuel Sol Hold In	Or-1.0-SXL	139M Disconnect-Engine	B	230F Fuel Sol Disconnect	1
13P_A	Ign Rel 1 Out	Or-1.0-SXL	47F Ignition Relay #1	87	18F Fuse Block	A1
13P_B	Ign Rel 1 Out	Or-1.0-SXL	47F Ignition Relay #1	87	18F Fuse Block	P1
13R	Ign Rel 2 Out (5 Way)	Or-1.0-SXL	48F Ignition Relay #2	87	18F Fuse Block	F1
13V	Voltmeter Relay Out	Or-1.0-SXL	58F Volt Meter Relay	87	18F Fuse Block	V1
14	Alternator D+	LG-1.0-SXL	154 Alternator	1	94M Eng-Trans	5
14_A	Alternator D+	LG-1.0-SXL	22M Cab-Transmission	2	94F Eng-Trans	5
14_B	Alternator D+	LG-0.8-SXL	22F Cab-Transmission	2	215F Alternator Resistor	1
18A	Rear Fld Lts Fuse Pwr	Or-2.0-SXL	32F Light Switch	B	18F Fuse Block	A2’
18B	High Beam LH	Or-1.0-SXL	1 Cab-Frnt Chas	G	6 Lights LH	3
18B_A	High Beam LH	Or-0.8-SXL	1F Cab-Frnt Chas	G	18F Fuse Block	B2’
18C	High Beam RH	Or-1.0-SXL	1 Cab-Frnt Chas	Q	8 Lights RH	3
18C_A	High Beam Fused Pwr	Or-0.8-SXL	1F Cab-Frnt Chas	Q	18F Fuse Block	C2’
18C_B	High Beam Fused Pwr	Or-0.8-SXL	13F Cab-Pedestal	15	18F Fuse Block	C2’
18C_C	High Beam Telltale	Or-0.8-SXL	76 Instrument Cluster	15	13M Pedestal-Cab	15
18D	Low Beam LH	Or-1.0-SXL	1 Cab-Frnt Chas	O	6 Lights LH	2
18D_A	Low Beam LH	Or-0.8-SXL	1F Cab-Frnt Chas	O	18F Fuse Block	D2’
18E	Low Beam RH	Or-1.0-SXL	1 Cab-Frnt Chas	P	8 Lights RH	2
18E_A	Low Beam RH	Or-0.8-SXL	1F Cab-Frnt Chas	P	18F Fuse Block	E2’
18F	Position LH	Or-1.0-SXL	1 Cab-Frnt Chas	F	6 Lights LH	4
18F_A	Left Tail	Or-1.0-SXL	125 LH Rear Comb Lt	3	21M Rear-Cab	5
18F_D	Left Tail Pos	Or-0.8-SXL	21F Cab-Rear	5	18F Fuse Block	F2’
18F_E	Left Tail Pos	Or-0.8-SXL	1F Cab-Frnt Chas	F	18F Fuse Block	F2’
18G	Position RH	Or-1.0-SXL	1 Cab-Frnt Chas	E	8 Lights RH	4
18G_A	Right Tail	Or-1.0-SXL	127 RH Rear Comb Lt	3	SPL_E8 SPL_E8	1
18G_C	Lic Plate Light	Or-1.0-SXL	128F Rear-Hood	A	SPL_E8 SPL_E8	1
18G_D	RH Tail Lic Lts	Or-1.0-SXL	21M Rear-Cab	9	SPL_E8 SPL_E8	1
18G_E	Lic Plate Light	Or-1.0-SXL	168 Lic Plate Light	A	128M Lic/Backup Alarm	A
18G_F	RH Tail Lic Lts	Or-0.8-SXL	21F Cab-Rear	9	18F Fuse Block	G2’
18G_G	Position RH	Or-0.8-SXL	1F Cab-Frnt Chas	E	18F Fuse Block	G2’

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53 – Parking Brake Solenoid		
Check Points	**Reading**	**Possible Cause of Bad Reading**
Terminal for wire 0 to ground	Continuity	Bad ground circuit.
NOTE: *Put the master disconnect switch and ignition switch in ON position. Put parking brake switch in OFF position.*		
Terminal 1 for wire 52P to ground	24 volts	Bad parking brake relay (52). Also check circuit 52P
NOTE: *If the readings are good, replace the parking brake solenoid (53).*		

54 – Pilot Pressure Solenoid		
Check Points	**Reading**	**Possible Cause of Bad Reading**
Terminal for wire 0 to ground	Continuity	Bad ground circuit.
NOTE: *Put the master disconnect switch and the ignition switch in the ON position. Make sure the pilot control switch (48) is OFF.*		
Terminal A for wire 53P to ground	24 volts	Bad pilot control relay (51), also check circuit 53P.
NOTE: *If the readings are good, replace the pilot pressure solenoid (54).*		

55 – Fan Reversing Switch (Option)		
Check Points	**Reading**	**Possible Cause of Bad Reading**
Terminal for wire 0_DAF to ground	Continuity	Bad ground circuit.
NOTE: *Put the master disconnect switch and the ignition switch in the ON position.*		
Terminal for wire 19P_B to ground	24 volts	Check fuse P, ignition relay No. 1, and wires 19P_A and 13P_B.
NOTE: *Put fan reversing switch in ON position (hold rocker in momentary position).*		
Terminal for wire 52_A to ground	24 volts	Bad fan reversing switch.
NOTE: *Put five position rotary lamp switch in position 3 or higher.*		
Terminal for wire 49_U to ground	24 volts	Check five position rotary lamp switch. If LEDs in fan reversing switch are not ON with 24 volts at check point, replace fan reversing switch.

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CAV	WIRE IDENT	CIRCUIT
A1	13P_A Or-1.0	Ign Relay 1 Out (5 Way)*
B1		Ign Relay 1 (5 Way)
C1		Ign Relay 1 (5 Way)
D1		Ign Relay 1 (5 Way)
E1		Ign Relay 1 (5 Way)
F1	13R Or-1.0	Ign Relay 2 Out (5 Way)*
G1		Ign Relay 2 (5 Way)
H1		Ign Relay 2 (5 Way)
J1		Ign Relay 2 (5 Way)
K1		Ign Relay 2 (5 Way)
L1	12P_A Or-1.0 12P_B Or-1.0	ACC Relay
M1	12K_A Or-1.0	ACC Power
N1	12P_B Or-1.0	ACC Relay
P1	13P_B Or-1.0	Ign Relay 1 Out (2 Way)*
R1		Ign Relay 1 (2 Way)
S1	13D Or-1.0	Delay Power (2 Way)*
T1		Time Delay Module (2 Way)
U1	1_Q R-1.0	Dome Light Horn Power
V1	13V Or-1.0	Voltmeter Relay Out
W1	1_R R-3.0	Cigar Lighter Power
X1		Power (4 Way)
Y1		Power (4 Way)
Z1	1_U R-3.0	B+ Power (4 Way)*
A1’		Power (4 Way)
B1’		Hi Low Relay 13 (2 Way)
C1’	41H K-2.0	High Beam Signal (2 Way)*
D1’		Hi Low Relay 13 (2 Way)
E1’	41L_A K-2.0	Low Beam Signal (2 Way)*
F1’		Rotary Lamp Switch (2 Way)
G1’	41T_A K-1.0	Tail Light Sw Power (2 Way)*
A2	19A_N Or-0.8 19A_P Or-0.8	Cab Switched Power
B2	19B_A Or-0.8	Turn Signal Power
C2	19C_A Or-1.0 19C_D Or-1.0	Pilot Ride Cntrl Fused Power
D2	19D_A Or-1.0	Park Brake Rel Fused Power
E2	19E Or-1.0	Ether Start Rel Fused Power
F2	19F Or-1.0	Eng Shutdown Rel Fused Pwr
G2	19G Or-2.0	Blower Switch Fused Power
H2	19H Or-1.0	Backup Alarm Rel Fuse Power
J2	19J_A Or-1.0	Front Wip Wash Fused Power
K2	19K_A Or-1.0	Rear Wip Wash Fused Power
L2	19L Or-1.0	Access to Fuse L (3 Way)*
M2	19M_A Or-0.8	Sec Str Accessory

CAV	WIRE IDENT	CIRCUIT
N2	19N_B Or-1.0 19N_A Or-1.0	Acces Seat Fused Pwr (3 Way)*
P2	19P_A Or-1.0	Fan Rev Pin Eng Fused Power
R2	19R_A Or-0.8	Sec Str Ignition
S2	19S Or-0.8	Instr Cluster Fused Del Power
T2	19T_A Or-0.8 19T_B Or-0.8	Time Delay Fused Power
U2	19U_A Or-1.0 19U_B Or-1.0	Dome Lt Horn Fused Power
V2	19V Or-0.8	Cluster Main Fused Power
W2	19W Or-1.0	Cigarette Lighter Fused Power
X2	19X Or-1.0	Beacon Sw Fused Power
Y2		None
Z2	19Z Or-1.0	Frnt Flood Illum Fused Power
A2’	18A Or-2.0	Rear Fld Lts Fuse Power
B2’	18B_A Or-0.8	High Beam LH
C2’	18C_A Or-0.8 18C_B Or-0.8	High Beam Fused Power
D2’	18D_A Or-0.8	Low Beam LH
E2’	18E_A Or-0.8	Low Beam RH
F2’	18F_D Or-0.8 18F_E Or-0.8	Left Tail Pos
G2’	18G_F Or-0.8 18G_G Or-0.8	Right Tail Pos Lic
1	19N_B Or-1.0	Acces Seat Fused Pwr (3 Way)*
2		None
3		None
4		None
5	19L Or-1.0	Access to Fuse L (3 Way)*
6		None
7		Access to Fuse N (3 Way)
8		None
9		None
10		None
11		Access to Fuse L (3 Way)
12		None
13		Access to Fuse N (3 Way)
14		None
15		None
16	19W Or-1.0	Cigarette Lighter Fused Power
17		Access to Fuse L (3 Way)
18		None

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2 – Master Disconnect Switch

Check Points	Reading	Possible Cause of Bad Reading
NOTE: *Disconnect cables from both terminals of master disconnect switch (main contact). Put master disconnect switch in ON position.*		
Between terminals of master disconnect switch	Continuity	If there is no continuity, the master disconnect switch (2) is bad.
NOTE: *Put the master disconnect switch in the OFF position.*		
Between terminals of master disconnect switch	Open Circuit	If there is continuity, the master disconnect switch is bad.
NOTE: *Use the same method to check the master disconnect switch (auxiliary contact).*		

3 – Engine Fuel Solenoid

Check Points	Reading	Possible Cause of Bad Reading
NOTE: *Disconnect connector 133M from fuel solenoid (3).*		
Between housing of fuel solenoid and ground	Continuity	Bad ground connection.
Between terminal 1 of fuel solenoid and ground	12.7 ohms at 20°C (68°F) (Nominal)	Bad fuel solenoid.
NOTE: *Put the master disconnect switch in the ON position and the ignition switch in the ON position.*		
Terminal for wire 13M to ground	24 volts	Check wire 13M and circuits 13C and 13K, also check circuit to batteries. Bad master disconnect switch (2) or ignition switch (13).
NOTE: *If the readings are good, replace the fuel solenoid (3).*		

4 – Alternator

Check Points	Reading	Possible Cause of Bad Reading
Between housing of alternator and ground	Continuity	Bad ground connection.
NOTE: *Put the master disconnect switch in the ON position.*		
Between the B+ terminal of alternator and ground	24 volts	Check circuit to positive post of left battery. Bad master disconnect switch.
Between terminal for wire 30 and ground	24 volts	Bad wire 30.
NOTE: *Put the ignition switch in the ON position.*		
Between the B+ terminal of alternator and ground	24 volts	Check circuit to positive post of left battery.
Terminal for wire 14 to ground	20 volts	Check circuit 14, 75 ohm resistor, and diode module. Bad fuse R. Check ignition relay No. 1, and 12.5 ampere circuit breaker A.
NOTE: *If the readings are good, see Section 4007 to repair the alternator (4).*		

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96 – Radio Power Converter (24 volts to 12 volts) (Option)

Check Points	Reading	Possible Cause of Bad Reading
Terminal for wire 0_PD to ground	Continuity	Bad ground circuit.
NOTE: *Put master disconnect switch and ignition switch in ON position. Turn radio on.*		
Terminal for wire 65C to ground	12 volts	Check fuse L and circuit 19L. Bad radio power converter (96).

97 – Left Speaker (Option)

Check Points	Reading	Possible Cause of Bad Reading
NOTE: *Disconnect connector from left speaker (97). Put master disconnect switch and ignition switch in ON position. Turn radio (94) on. Put balance control for RH and LH speakers to center position.*		
Pin A in wiring harness connector 112M to ground	Voltage	Bad circuit between the left speaker (97) and the radio or a bad radio (94).
Pin B in wiring harness connector 112M to ground	Continuity	Bad circuit between the left speaker (97) and the radio (94).
NOTE: *If the readings are good, replace the left speaker (97).*		

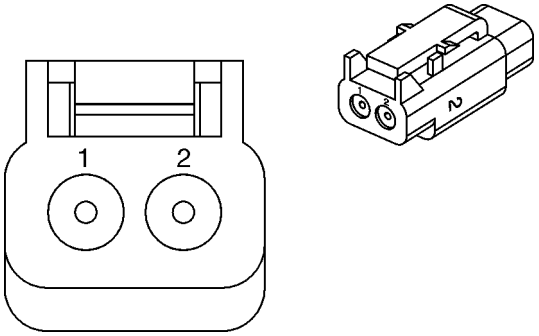
98 – Right Speaker (Option)

Check Points	Reading	Possible Cause of Bad Reading
NOTE: *Disconnect connector from right speaker (98). Put master disconnect switch and ignition switch in ON position. Turn radio (94) on. Put balance control for RH and LH speakers to center position.*		
Pin A in wiring harness connector 111M to ground	Voltage	Bad circuit between the right speaker (98) and the radio or a bad radio (94).
Pin B in wiring harness connector 111M to ground	Continuity	Bad circuit between the right speaker (98) and the radio (94).
NOTE: *If the readings are good, replace the right speaker (98).*		

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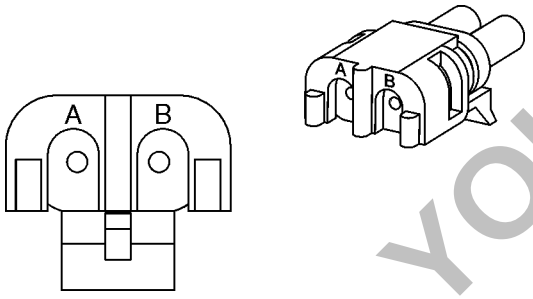
CONNECTOR 88 - BRAKE PRESSURE WARNING SWITCH TO REAR CHASSIS HARNESS



222135A1

CAV	WIRE IDENT	CIRCUIT
A	33P Y-1.0	Low Brake Press Warning
B	0_N Bk-1.0	Brake Press Warning Switch

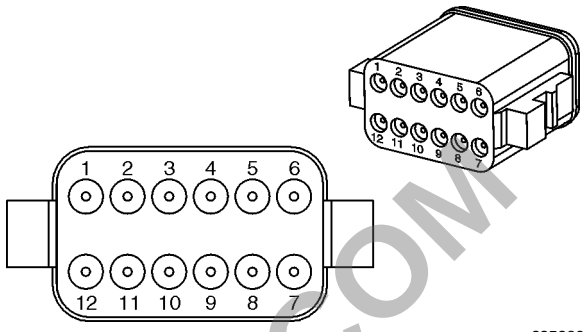
CONNECTOR 89M - PILOT PRESSURE SOLENOID TO CAB MAIN HARNESS



245482C1

CAV	WIRE IDENT	CIRCUIT
A	53P_A W-0.8	Pilot Control Signal
B	0_DB Bk-0.8	CAN Pilot Solenoid Ground

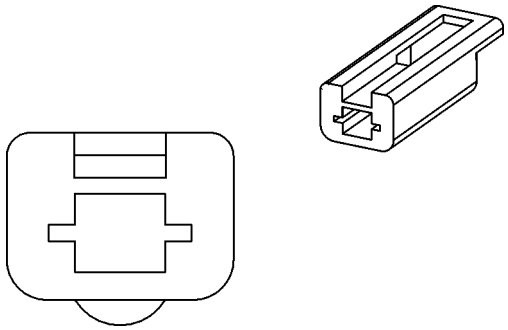
CONNECTOR 90M - SECONDARY STEERING MODULE TO SECONDARY STEERING HARNESS



225389C1

CAV	WIRE IDENT	CIRCUIT
1	19R_C Or-1.0	Secondary Steering Ignition
2	51_A W-1.0	Secondary Steer Mtr Rel
3	1_W R-1.0	Secondary Steer Module B+
4	0_CE Bk-1.0	Secondary Steer Chassis Grnd
5		None
6		None
7	19M_C Or-1.0	Secondary Steer Accessory
8	35X_D Y-1.0	Secondary Steer Low Press Sig
9	51P_A W-1.0	Secondary Steer High Press
10		None
11	0_CA Bk-1.0	Secondary Steer Signal Grnd
12	0_CB Bk-1.0	Secondary Steer Signal Grnd

CONNECTOR 92 - ETHER START SWITCH TO PEDESTAL HARNESS



739070C1

CAV	WIRE IDENT	CIRCUIT
1	25T_A LU-0.8 25T_B LU-0.8	Neutral Signal

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3. The warning alarm sounds for 3 seconds.
4. The yellow caution master indicator turns on.

Red Zone:

NOTE: *The machine must not be operated when the temperature is in the red zone.*

1. Hydraulic oil temperature continues to increase 110° C and above (230° F and above).
2. The indicator bar flashes.
3. The warning alarm sounds continuously.
4. The red stop master indicator turns on.
5. Stop the machine and correct the problem.

Voltmeter Gauge

The voltmeter gauge is shown as an indicator bar with a green or yellow zone.

Green Zone:

Indicates normal operating range:

A. 26 to 32 volts above low idle = normal operating range.

B. 18 to 24 volts stopped or at low idle = low to normal battery charge.

C. 18 to 24 volts at above low idle = problem in charging system.

Yellow Zone:

Voltage has increased or decreased:

A. 0 to 18 volts stopped or at low idle = very low battery charge.

B. 32 volts and above = problem in charging system (overcharging).

1. The indicator bars flash.
2. The warning alarm sounds for 3 seconds.
3. The yellow caution master indicator turns on.
4. Stop the machine and correct the problem.

Fuel Level Gauge

The fuel level gauge is shown as an indicator bar with a green or yellow zone.

Green Zone:

Indicates normal operating range, 5 percent and above.

Yellow Zone:

The tank is almost empty, 5 percent and below.

1. The indicator bars flash.
2. The warning alarm sounds for 3 seconds.
3. The yellow caution master indicator turns on.

Engine Oil Pressure Gauge

The engine oil pressure gauge is shown as an indicator bar with a green, yellow, or red zone.

Green Zone:

Indicates normal operating pressure, 140 kPa (20 psi) and above low idle.

Yellow Zone:

1. Engine oil pressure has decreased, 100 to 140 kPa (15 to 20 psi).
2. The indicator bars flash.
3. The warning alarm sounds for 3 seconds.
4. The yellow caution master indicator turns on.

Red Zone:

NOTE: *The machine must not be operated when the oil pressure is in the red zone.*

1. Engine oil pressure continues to decrease below a safe operating pressure, 0 to 100 kPa (0 to 15 psi).
2. The indicator bar flashes.
3. The warning alarm sounds continuously.
4. The red stop master indicator turns on.
5. Stop the machine and correct the problem.

Engine Coolant Temperature

The engine coolant temperature gauge is shown as an indicator bar with a green, yellow, or red zone.

Green Zone:

Indicates normal operating temperature, 20° to 105° C (68° to 221° F).

Yellow Zone:

1. Engine coolant temperature has decreased 20° C or below (68° or below), or increased 105° to 110° C (221° to 230° F).
2. The indicator bars flash.
3. The warning alarm sounds for 3 seconds.
4. The yellow caution master indicator turns on.

Red Zone:

NOTE: *The machine must not be operated when the temperature is in the red zone.*

1. Engine coolant temperature continues to increase, 110° C or above (230° F or above).

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GENERAL INSPECTION AND TESTING

1. Park the machine on a level surface and lower the attachments to the floor.

2. Apply the parking brake and stop the engine.

3. Make sure all of the controls are in the NEUTRAL position.

4. Make sure that the batteries are fully charged and that all wiring harness leads are connected.

5. Turn all accessories OFF.

6. Make sure there is no oil or grease on the alternator drive belt and the alternator drive belt is tight.

7. If the alternator still does not operate correctly, troubleshoot the alternator, refer to Section 4002.

8. Make sure the parking brake is applied.

9. Make sure the master disconnect switch is in the ON position.

10. Adjust the controls for the tester as follows:

    A. Move the load control to the OFF position.

    B. Select the volt range that will measure 24 volts.

    C. Select the ampere range that will measure 100 amperes.

    D. Put the volt lead selector in the EXT. position.

11. Connect the tester to the batteries (1), refer to Figure 1, as follows:

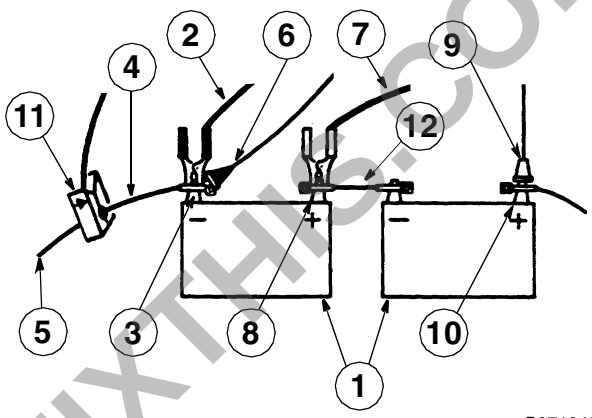
    A. Connect the negative load lead of the tester (2) to the negative battery post (3) of the 12 volt battery (1) that is connected to the master disconnect switch (5).

    B. Connect the negative voltmeter lead of the tester (6) to the same negative battery post (3).

    C. Connect the positive load lead of the tester (7) to the positive battery post (8) of the same battery.

    D. Connect the positive voltmeter lead of the tester (9) to the positive battery post (10) of the other battery.

    E. Fasten the ammeter clamp of the tester (11) around the negative battery cable (4). The point of the arrow on the ammeter clamp must be toward the battery.



1. 12 VOLT BATTERY
2. NEGATIVE LOAD LEAD OF TESTER
3. NEGATIVE BATTERY POST
4. NEGATIVE BATTERY CABLE
5. TO MASTER DISCONNECT SWITCH
6. NEGATIVE VOLTMETER LEAD OF TESTER
7. POSITIVE LOAD LEAD OF TESTER
8. POSITIVE BATTERY POST
9. POSITIVE VOLTMETER LEAD OF TESTER
10. POSITIVE BATTERY POST
11. AMMETER CLAMP
12. JUMPER CABLE

Figure 1. TESTER CONNECTIONS

12. Start the engine and run the engine at full throttle.

NOTE: *Do not apply a load to the battery for more than 15 seconds at one time. After 15 seconds, turn the load control to the OFF position for 60 seconds before applying the load again.*

13. Adjust the load control of the tester to get the maximum ammeter indication. Read the ammeter and voltmeter. Make a record of the ammeter and the voltmeter indications.

14. Turn the load control to the OFF position.

15. Decrease the engine speed and stop the engine.

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AUXILIARY STEERING SYSTEM MOTOR TEST

Test Equipment

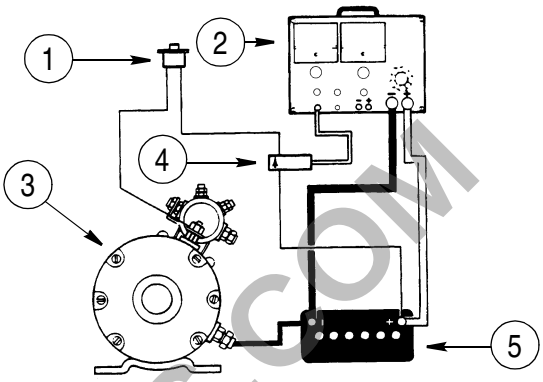
1. A 24 volt battery that is fully charged.

NOTE: *A 24 volt battery system (two 12 volt batteries in a series) is used for this test. A 12 volt battery system will cause damage to the auxiliary steering motor.*

2. A remote starter switch.
3. A tachometer to check the armature speed.
4. A Sun Electric VAT-33 Starting and Charging System Tester.

Test Procedure

1. Remove the connector that is between the terminals on the magnetic switch and the auxiliary steering motor.
2. Remove the auxiliary steering motor from the auxiliary steering pump.
3. Remove the drive coupling from the auxiliary steering motor (3).
4. Connect the auxiliary steering motor (3), remote starter switch (1) and tester (2) to the 24 volt battery system (5) as illustrated in Figure 3.
5. Push the button on the remote starter switch (1) and look at the voltmeter in the tester.
6. Turn the load control (8) until the voltmeter (7) indicates 24 volts. Refer to figure 4. Look at the ammeter (6) in the tester. Make a record of the ammeter indication.
7. Hold the tachometer against the armature shaft. Look at the tachometer. Make a record of the indication.
8. Release the button on the remote starter switch (1).



B790852

1. REMOTE STARTER SWITCH
2. TESTER
3. AUXILIARY STEERING MOTOR
4. AMMETER CLAMP
5. 24 VOLT BATTERY SYSTEM



B795328

6. AMMETER
7. VOLTMETER
8. LOAD CONTROL

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POWER TRAIN

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Wheels and Tires	6006
Transmission Control Valve	6007

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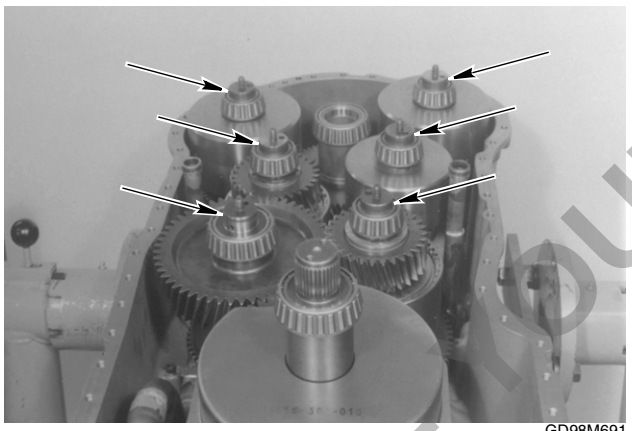
STEP 159



GD98M690

Apply Loctite 243 to the socket head screws and install the screws. Tighten the screws to a torque of 23 Nm (204 lb-in).

STEP 160



GD98M691

Install rectangular rings in grooves of clutch shafts. Apply grease to rings and align rings.

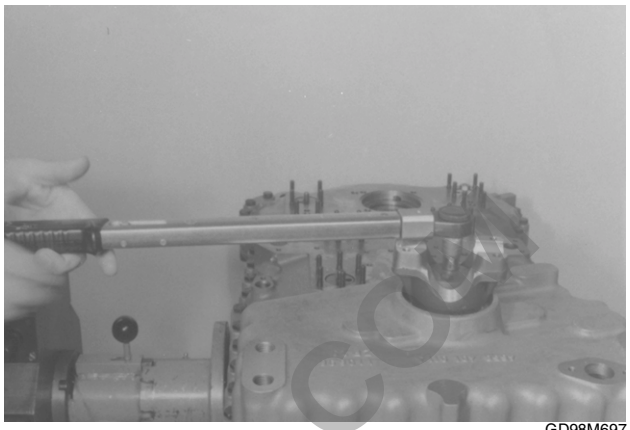
STEP 161



GD98M696

Position shaft seal with sealing lip facing oil chamber. Apply grease to sealing lip. Use CAS2869 transmission output shaft seal installation tool to install seal.

STEP 162



GD98M697

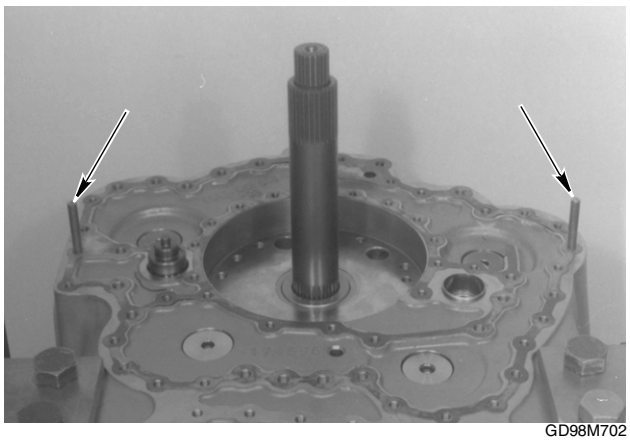
Heat the output flange to about 90° C (194° F). Apply Loctite 574 to the contact area and assemble the flange with the washers and hex head screws. Tighten the screws to a torque of 34 Nm (301 lb-in). Bend corner of lock plate over hex head screws.

STEP 163

Repeat Steps 161 and 162 to install shaft seal and output flange on converter side.

NOTE: *The following steps are for the assembly of the oil feed housing and transmission pump.*

STEP 164



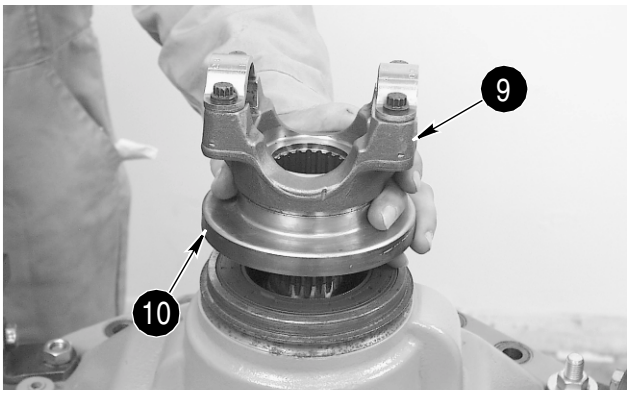
GD98M702

Install two alignment studs and install the gasket.

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STEP 170

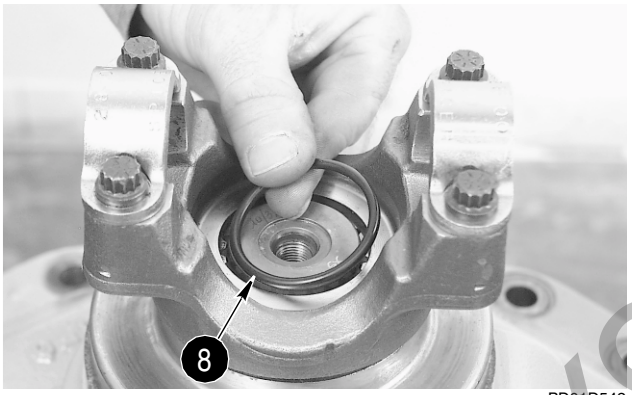


BD01D543

9. AXLE FLANGE 10. COVER

Install cover (10) and axle flange (9).

STEP 171

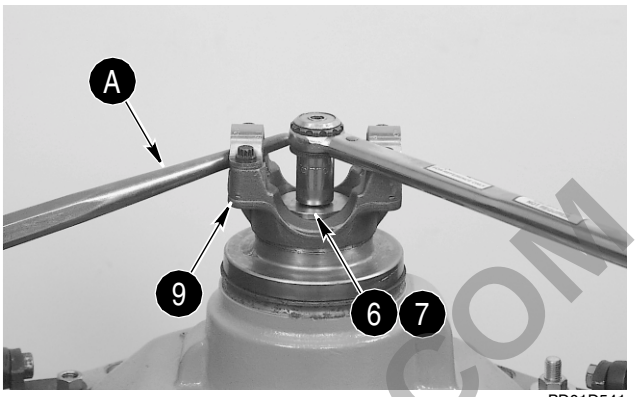


BD01D542

8. O-RING

Install new O-ring (8).

STEP 172

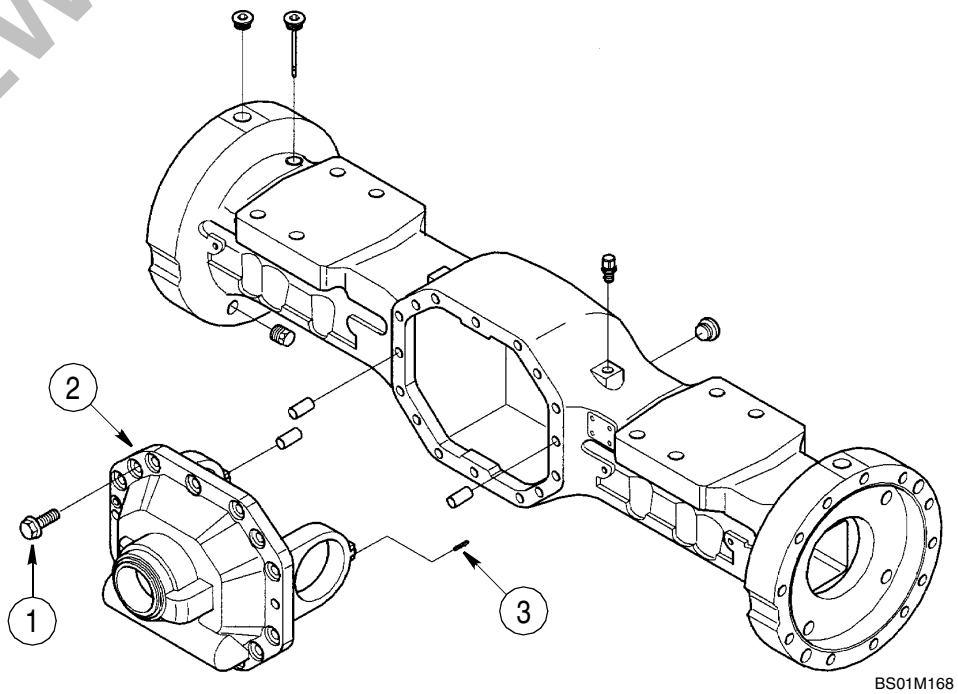


BD01D541

6. BOLT 9. AXLE FLANGE
7. WASHER A. PRYBAR

Reposition differential carrier. Apply Loctite 270 to threads of bolt (6). Install washer (7) and bolt. Using prybar (A) to prevent axle flange from turning, tighten bolt to a torque of 139 Nm (102.5 lb-ft).

Installation



BS01M168

1. BOLT
2. DIFFERENTIAL CARRIER
3. LOCKING PIN

FRONT AXLE

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STEP 78



BD00M303

1. O-RING

Install a new O-ring on the wheel end cover.

STEP 79



BD02D153

Install the cover into the wheel end.

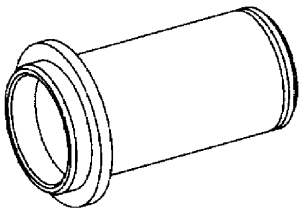
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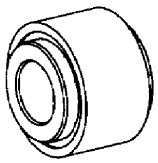
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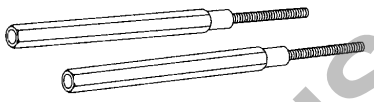
SPECIAL TOOLS



CAS2803 TRANSMISSION TORQUE CONVERTER SEAL INSTALLATION TOOL

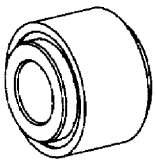


CAS2807 TRANSMISSION INPUT/OUTPUT SHAFT SEAL INSTALLATION TOOL



CAS2885 TRANSMISSION VALVE ADJUSTMENT TOOL SET

CAS2869 TRANSMISSION OUTPUT SHAFT SEAL INSTALLATION TOOL (621 MODEL ONLY)



BS02C093 THRU 096

CAS40075 TRANSMISSION TOOL KIT

SPECIAL TORQUES

Screws Securing End Housings to Valve Housing	5.5 Nm (48 lb-in)
Screws Securing Pressure Regulator Locating Plates	5.5 Nm (48 lb-in)
Screws Securing Covers to End Housings	5.5 Nm (48 lb-in)
Valve Housing Plugs	6 Nm (53 lb-in)
Screws Securing Distribution Plate to Valve Housing	9.5 Nm (84 lb-in)

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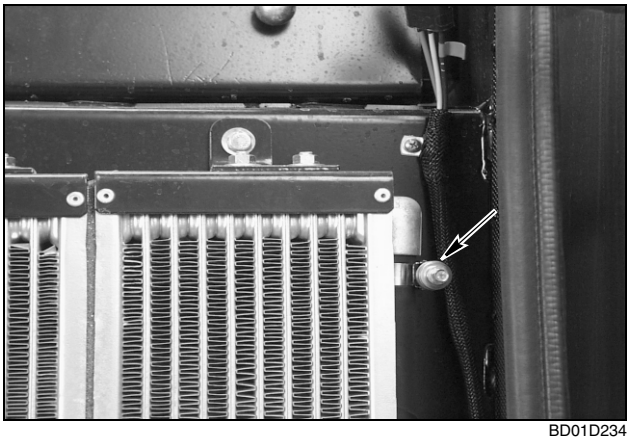
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STEP 164



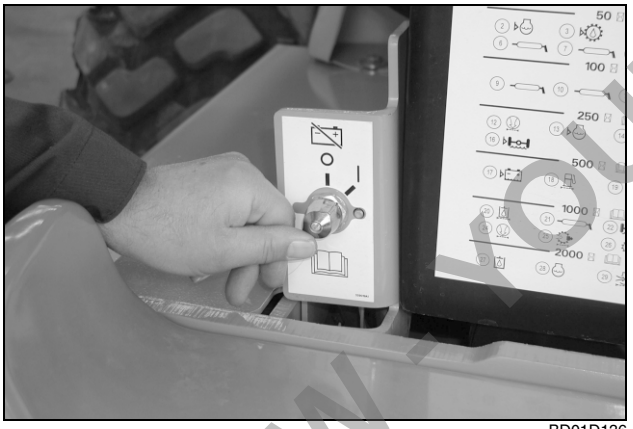
BD01D234

Connect the hose to the top of the oil cooler.

STEP 165

Fill the hydraulic reservoir with hydraulic oil. See Section 1002 for the correct hydraulic oil.

STEP 166



BD01D136

Place the master disconnect switch in the ON position.

STEP 167

Start the engine and run the engine at low idle for two minutes. Stop the engine and check for hydraulic oil leakage at the ports on the oil cooler.

STEP 168



BD01D230

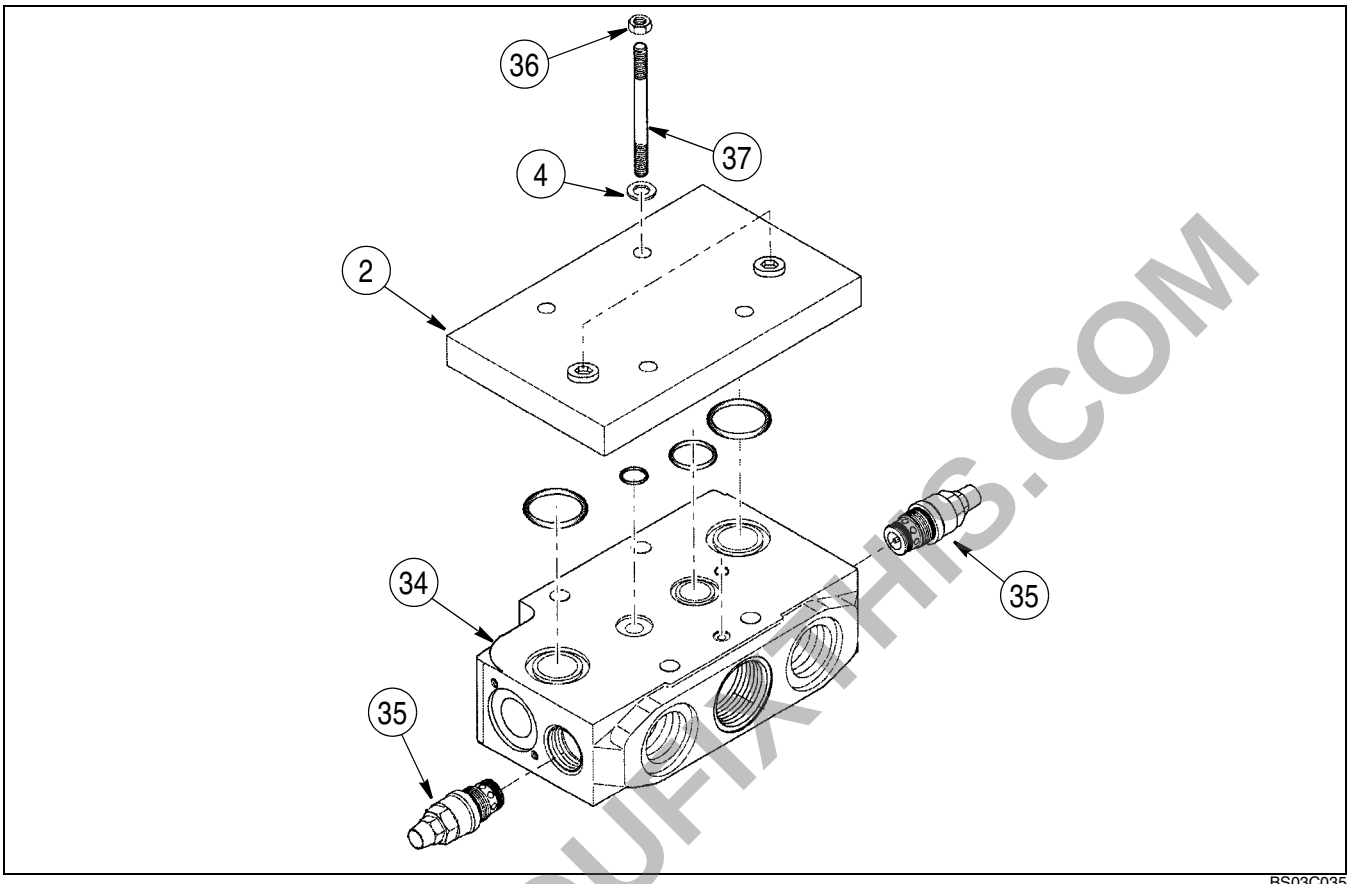
Install the shield and tighten the two bolts holding the shield.

STEP 169

Check the level of the hydraulic oil in the reservoir and add hydraulic oil as required.

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BS03C035

36. NUT 37. STUD

4 SPOOL MOUNTING CONFIGURATION

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1. Close the shutoff valve A by turning it all the way to the left (counterclockwise), refer to the illustration on page 10.
2. Open valve B by turning it out all the way to the left (counterclockwise).
3. Close valve C by turning it all the way to the right (clockwise).
4. Close the gauge valve D by turning it all the way to the right (clockwise).
5. Connect the charging hose to the nitrogen supply tank.
6. SLOWLY turn valve A clockwise while watching the high pressure gauge. Stop turning valve A when the needle on the gauge reaches 31 bar (450 psi).

NOTE: *If the needle goes over the needed pressure, quickly open and close valve D and check the pressure setting again.*

The charging kit is now ready to be installed on the accumulator.

7. Remove the two cap screws (3) and the protection bracket (2) from the body (1) on the accumulator, refer to the illustrations on pages 7 and 9.
8. Remove the valve cap from the pressure valve (4) on the accumulator.
9. Back off the needle valve on the accumulator end of the charging hose by turning it counterclockwise to the maximum amount. This prevents nitrogen from escaping from the accumulator when the charging hose is attached to the accumulator gas charging valve, refer to the illustration on page 10.
10. Install the charging hose fitting onto the accumulator pressure valve (4), refer to the illustrations on pages 7 and 9.
11. Tighten the needle valve by turning it clockwise. Slowly open the gauge valve D and observe the reading on the gauge. This reading is the nitrogen pressure level inside the accumulator, refer to illustration on page 10.
12. Open the shutoff valve A on the nitrogen supply tank. While observing the pressure on the gauge, slightly open the needle valve on the accumulator charge hose. By regulating the needle valve, fill the accumulator to 31 bar (450 psi). Close the needle valve. Close the shutoff valve A on the nitrogen supply tank.
13. Close valve B by turning to the right (clockwise). After a few minutes, check the accumulator for leakage.
14. Back off the needle valve on the accumulator end of the charging hose by turning it counterclockwise the maximum amount. This will prevent nitrogen from escaping from the accumulator as the hose is removed. Remove the charging hose from the accumulator pressure valve (4), refer to the illustrations on pages 7 and 9.
15. Install the valve cap onto the pressure valve (4) on the accumulator.
16. Install the protection bracket (2) over the pressure valve (4) and secure it with cap screws (3).
17. Remove the charging hose from the nitrogen supply tank, refer to the illustration on page 10.

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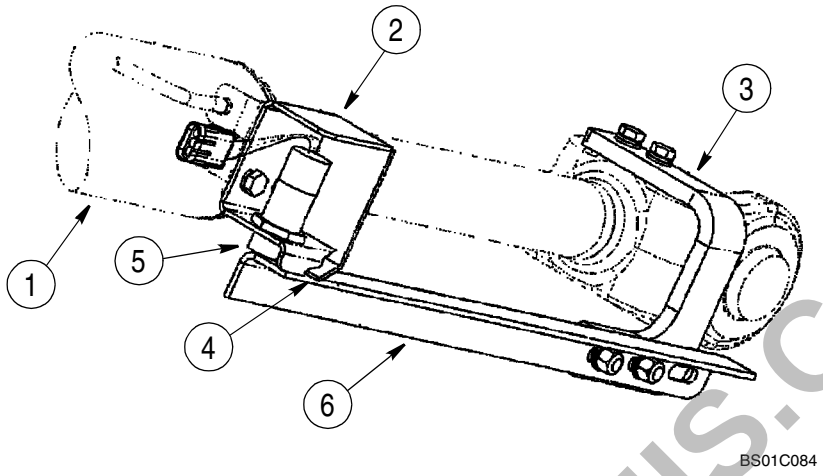
Expansion Valve Not Operating - Indications:

A. Discharge air from evaporator warm or cool - not cold. B. Condensation or frost on expansion valve outlet. C. Inlet end of expansion valve is warm.	→	1. Expansion valve outlet with condensation or frost is an indication of a restriction in the expansion valve. Replace expansion valve. See Section 9004. 2. Inlet end of expansion valve is warm (not hot), indicating expansion valve is not completely open. If the valve is stuck closed, there will be little or no flow of refrigerant through the valve. Replace expansion valve. See Section 9004.

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RETURN TO DIG ADJUSTMENT (XT MODELS)



1. BUCKET CYLINDER (LEFT HAND SIDE)
2. PROXIMITY SWITCH MOUNTING BRACKET
3. TARGET MOUNTING BRACKET
4. PROXIMITY SWITCH GUARD
5. PROXIMITY SWITCH
6. TARGET BAR

RETURN TO DIG ADJUSTMENT ILLUSTRATION XT MODELS

IMPORTANT: *Before adjusting the return-to-dig, make sure that the target bar on the bucket linkage is not damaged. Slowly roll back and dump the bucket and make sure that the target bar stays the same distance from the switch. The switch mounting bracket protects the switch. Make sure the target bar cannot touch the switch when the bucket is dumped.*

1. Park the machine on a level surface. Raise the lift arms until they are approximately horizontal and dump the bucket. Lower the bucket until the bucket edge is on the ground.
2. Apply the parking brake and stop the engine.
3. Loosen the bolts holding the target mounting bracket (3) to the bucket cylinder clevis. Align the target mounting bracket (3) parallel to the bucket cylinder (1) and tighten the bolts. Refer to the illustration on this page.
4. Loosen the bolts holding the target bar (6) to the target mounting bracket (3). Align the target bar (6) parallel to the bucket cylinder (1) and tighten the bolts.
5. Loosen the bolts holding the proximity switch mounting bracket (2) to the bucket cylinder (1). Position the proximity switch (5) face parallel to the target bar (6) and tighten the bolts.
6. Adjust the proximity switch (5) out towards the target bar (6) until an air gap of 3.5 to 5.0 mm (1/8 to 3/16 inch) is obtained. Torque the jam nut to 6 to 7.5 Nm (4.5 to 5.5 pound-feet).

NOTE: *The proximity switch (5) must not protrude past the proximity switch guard (4).*

7. Start the engine, position the bucket to the correct digging angle and stop the engine.
8. Loosen the bolts holding the target bar (6) to the target mounting bracket (3). Slide the target bar (6) away from the proximity switch (5) until the face of the proximity switch (5) is completely uncovered.
9. Align the target bar (6) parallel to the bucket cylinder (1) and tighten the bolts.
10. Turn the ignition switch to the ON position. Do NOT start the engine.
11. Place the bucket control lever in the ROLLBACK position.
12. Loosen the bolts holding the target bar (6) to the target mounting bracket (3).
13. Slide the target bar (6) slowly towards the proximity switch (5), until the bucket control lever returns to the center position. Tighten the bolts holding the targe bar (6).
14. Check to make sure that the 3.5 to 5.0 mm (1/8 to 3/16 inch) gap is still maintained.
15. Start the engine.
16. Place the detent switch in the ON position and set the return to travel/float detent switch to the return to travel position.
17. Raise the lift arms to approximately the horizontal position and put the bucket in the fully dumped position.
18. Place the loader control lever in the ROLLBACK position and verify that the electromagnet holds it in that position until the end of the target bar (6) passes in front of the proximity switch (5).
19. Lower the lift arms to the ground and verify that the bucket is at the correct digging angle.

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