521F
Wheel Loader
Tier II

Service Manual

Print No. 47476327

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DIESEL FUEL SYSTEM

Use No. 2 diesel fuel in the engine of this machine. The use of other fuels can cause the loss of engine power and high fuel consumption.

In very cold temperatures, a mixture of No. 1 and No. 2 diesel fuels is temporarily permitted. See the following Note.

NOTE: *See your fuel dealer for winter fuel requirements in your area. If the temperature of the fuel lowers below the cloud point (wax appearance point), wax crystals in the fuel will restrict the fuel filter and cause the engine to lose power or not start.*

The diesel fuel used in this machine must meet the specifications as shown below in, “Specifications for Acceptable No. 2 Diesel Fuel”, or Specification (ASTM-D-975) of the American Society for Testing and Materials.

Fuel Storage

If you keep fuel in storage for a period of time, you can get foreign material or water in the fuel storage tank. Many engine problems are caused by water in the fuel.

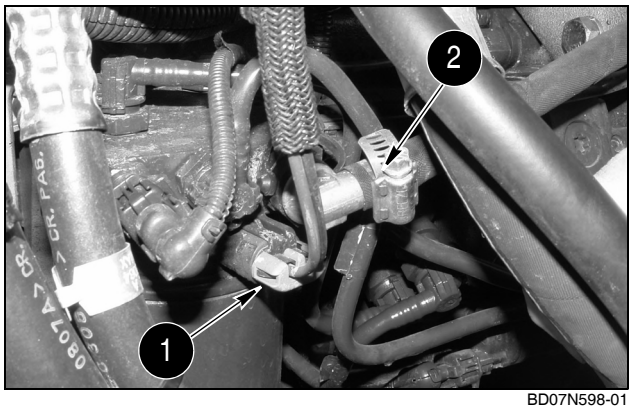
Keep the fuel storage tank outside and keep the fuel as cool as possible. Remove water from the storage container at regular periods of time.

Fill the fuel tank at the end of the daily operating period to prevent condensation in the fuel tank.

Specifications for Acceptable No. 2 Diesel Fuel

API gravity, minimum	34
Flash point, minimum	60°C (140°F)
Cloud point (wax appearance point), maximum	-20°C (-5°F) See Note above
Pour point, maximum	-26°C (-15°F) See Note above
Distillation temperature, 90% point	282 to 338°C (540 to 640°F)
Viscosity, at 38°C (100°F)	
Centistokes	2.0 to 4.3
Cetane number, minimum	43 (45 to 55 for winter or high altitudes)
Water and sediment, by volume, maximum	0.05%

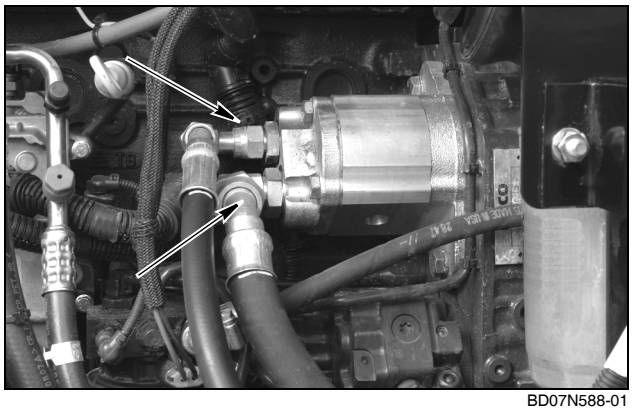
STEP 36



BD07N598-01

Tag and disconnect the fuel filter heater wires (1), disconnect the fuel line (2) from the fuel filter head, plug the line and cap the fitting.

STEP 37



BD07N588-01

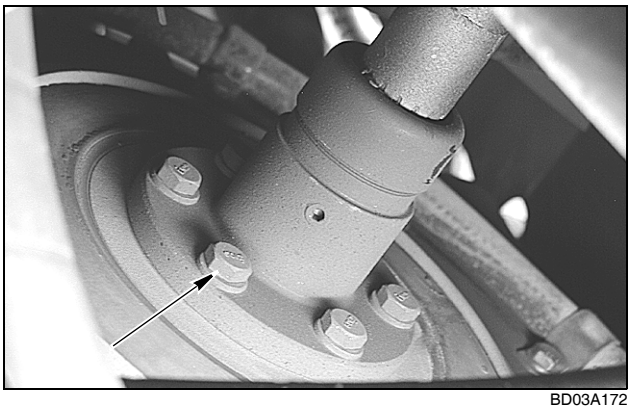
Connect and turn on vacuum pump to hydraulic reservoir. Tag and remove the hydraulic lines from the brake system pump, plug the lines and cap the fittings.

STEP 38

BD07N589-01

Remove the lower cover for the drive shaft.

STEP 39



BD03A172

Remove the drive shaft bolts from the flywheel. Move the drive shaft clear of the flywheel.

STEP 40

Connect suitable lifting equipment to engine lifting brackets. Take up all slack in lifting equipment. Remove the engine mounting bolts and lift the engine enough to gain access to the drain hose, pull the engine oil drain hose with the engine.

STEP 41

Slowly raise engine from rear chassis. Be sure all harness connections and hoses have been disconnected and are clear of the engine. Remove engine from machine.

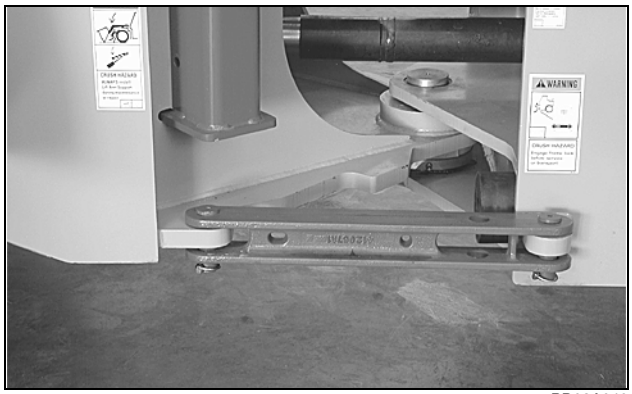
RADIATOR

Removal

STEP 1

Park loader on level surface and lower bucket to ground. Apply parking brake and shut down engine.

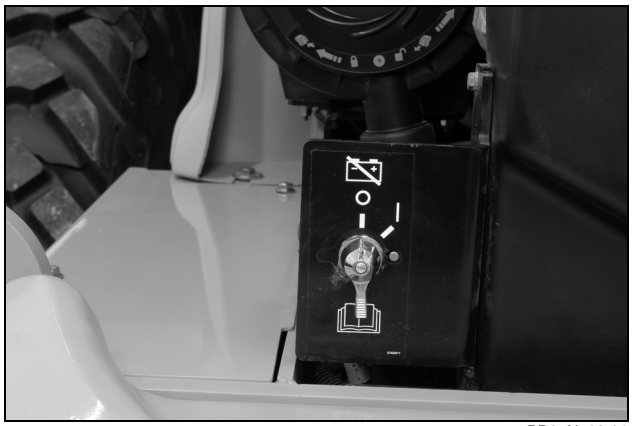
STEP 2



BD03A040

Put articulation lock in LOCKED position.

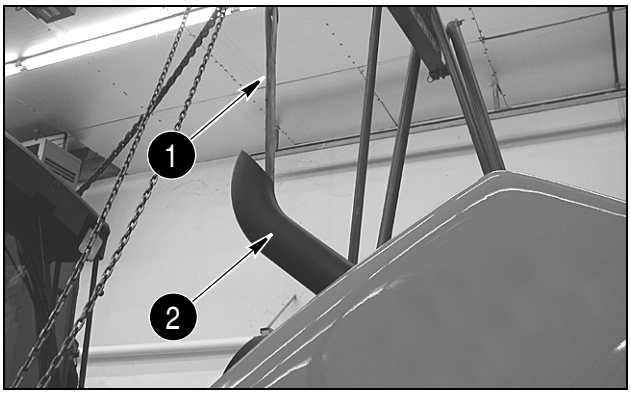
STEP 3



BD07N563-01

Put master disconnect switch in OFF position.

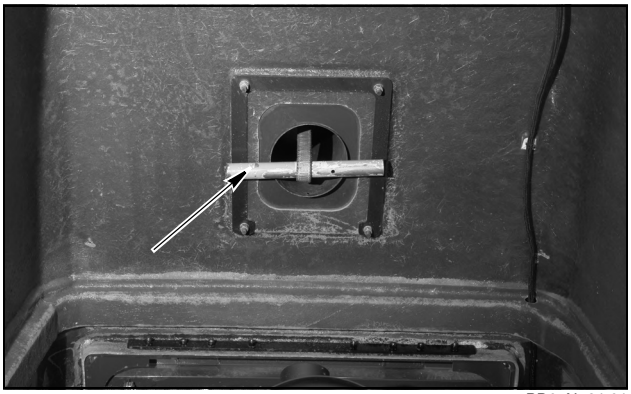
STEP 4



BD03A231

Double up a nylon lifting strap (1) and slide through the exhaust stack (2) on the hood.

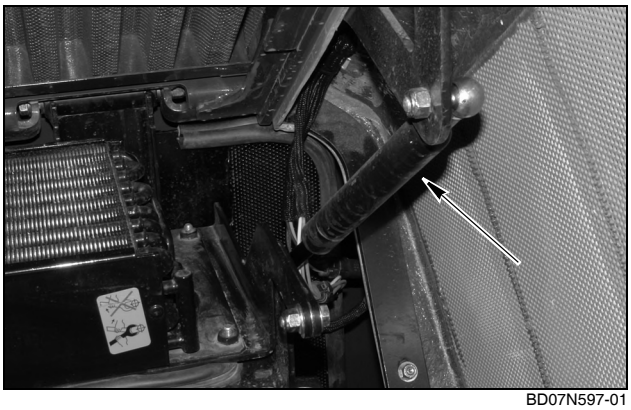
STEP 5



BD07N564-01

Place a solid steel bar through the strap, raise the hood and release tension on the lifting motor.

STEP 6



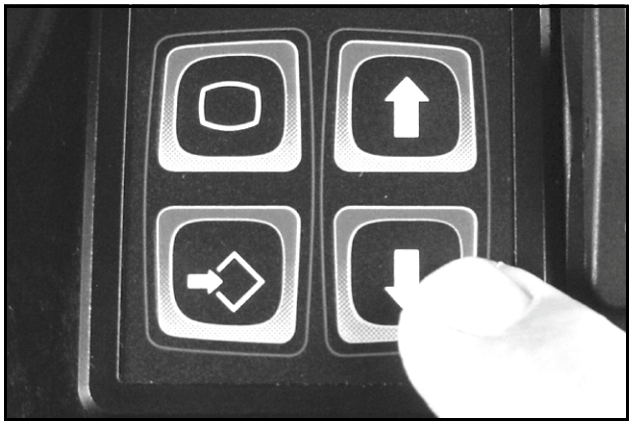
BD07N597-01

Remove the right front lift cylinder from the hood. Repeat the procedure for the left hand side.

INSTRUMENT CLUSTER DISPLAYS

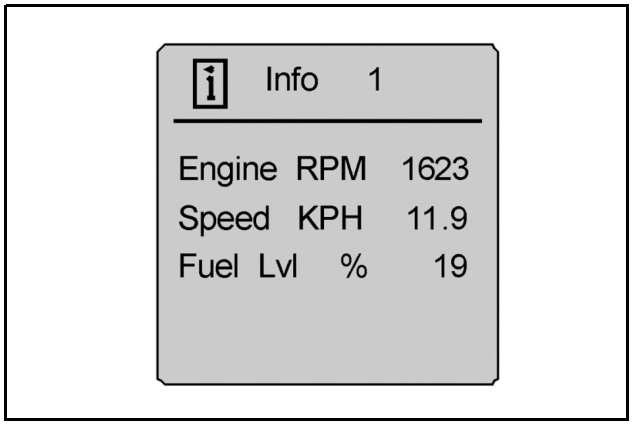
1. With the engine running, press the up or down key and scroll through the information screens and trip screens. The following sequence is using the down key only.

NOTE: *Pressing the escape key will return the LCD back to the normal driving screen.*



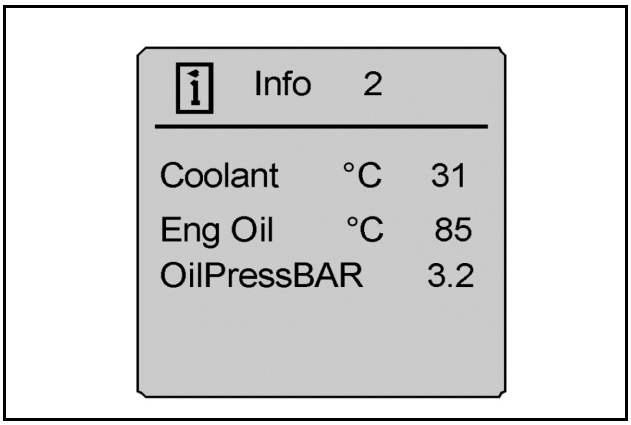
BD06F188

2. From the driving screen push the down arrow, as shown.



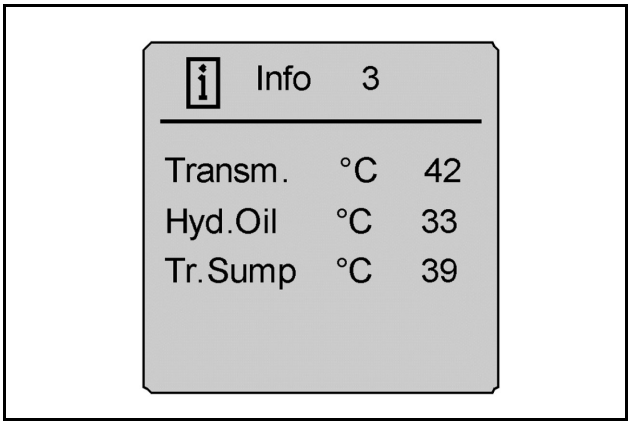
BD06F183

3. **Info 1** is the first information screen using the down arrow from the driving screen. It displays engine RPM's, speed, and fuel level.



BD06F027

4. **Info 2** will be displayed next. The Info 2 screen will display coolant temperature, engine oil temperature in either Fahrenheit or Celsius, as well as oil pressure.



BD06F184

5. Push the down button again for the Info 3 screen. This screen displays the temperature in Fahrenheit or Celsius of the transmission oil, hydraulic oil, sump oil.

AFTERCOOLER REMOVAL

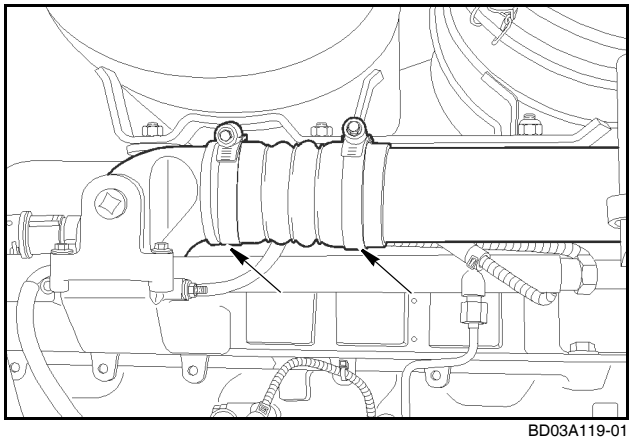
Removal

STEP 1

W110R400

Loosen clamps and remove turbocharger outlet components. Loosen clamps and remove air cooler inlet hose.

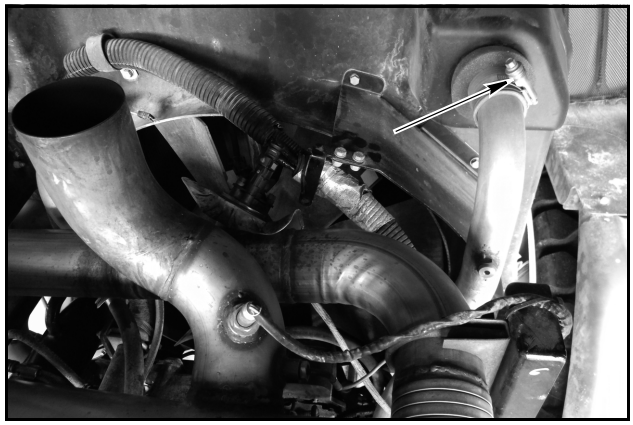
STEP 2



BD03A119-01

Loosen clamps and remove Intake hose.

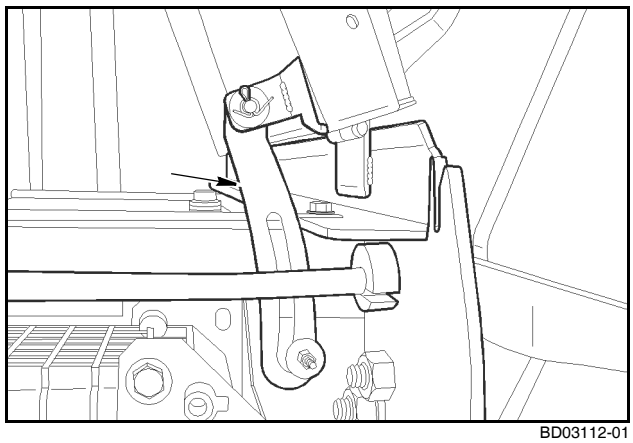
STEP 3



W110R399

Loosen clamps and remove air cooler outlet hose.

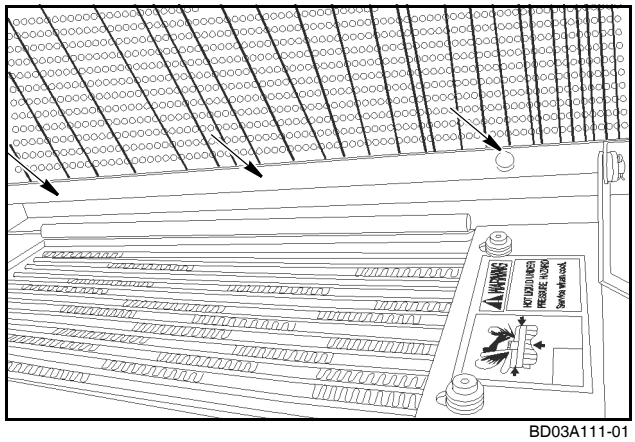
STEP 4



BD03112-01

Raise air conditioning/air cooler cover. Support cover with appropriate lifting device. Remove cover support latch.

STEP 5

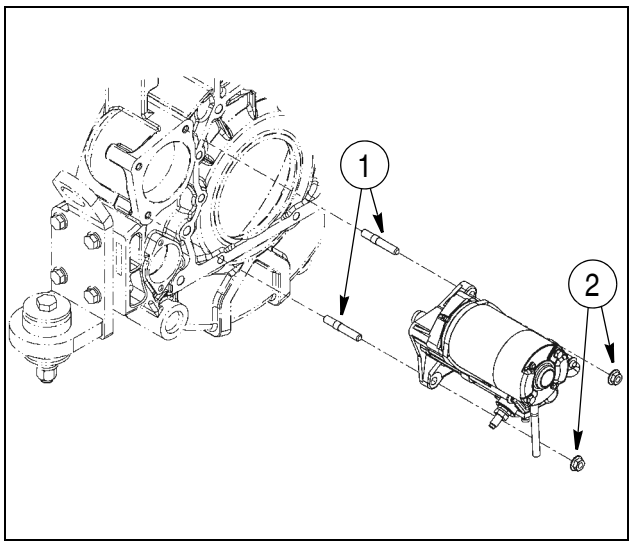


BD03A111-01

Remove three cover mounting bolts and lift cover off.

Installation

STEP 6

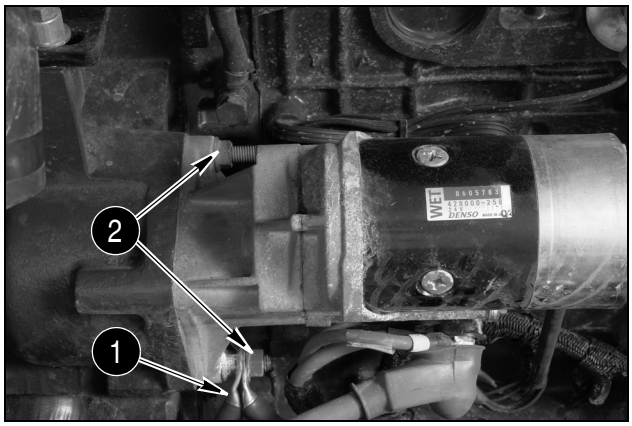


BC05G047

1. STUDS
2. NUTS

Apply Loctite 747 primer to studs and holes, apply 2 drops of Loctite 271 to each hole and stud. Immediately install and torque studs to 19 to 29 Nm (14 to 21 pound-feet). Allow adhesive to cure for 20 minutes before installing starter.

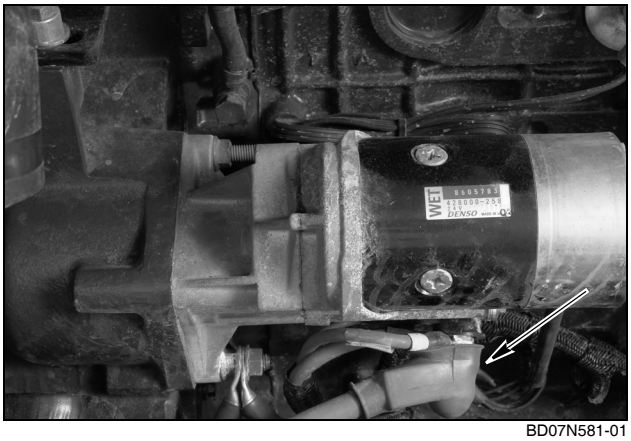
STEP 7



BD07N581-01

Position the starter on the machine, attach the ground cable and ground strap (1). Torque the two nuts (2) to 40 to 50 Nm (29 to 37 pound-feet).

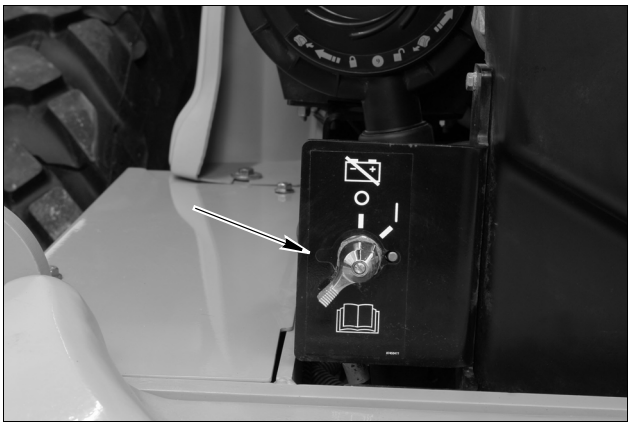
STEP 8



BD07N581-01

Install and tighten the wires on the starter solenoid. Remove and discard tags.

STEP 9



BD07N562-01

Place the master disconnect switch in the ON position. Lower the engine compartment hood.

NOTES

Wire Identification Codes

21C Bk - 1.0

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 Name

Wire Identification			From Connector		To Connector	
Wire	**Circuit**	**Color, Size, and Material**	**Connector**	**Cavity**	**Connector**	**Cavity**
0 SL	GROUND	Bk 0.8 GXL	JSS_RLY, Relay K2	87A	SPL_JSS_9, Ultrasonic	A
0 SM	GRND, Joystick	Bk 0.8 GXL	JSS_CNT, JSS Controller	10	SPL_JSS_20, Ultrasonic	A
0 SN	GRND, Joystick	Bk 0.8 GXL	SPL_JSS_20, Ultrasonic	A	JSS_CNT, JSS Controller	11
0 SP	GRND, Joystick	Bk 0.8 GXL	SPL_JSS_14, Ultrasonic	A	R1, Resistor	CS0
0 SR	GRND, Joystick	Bk 0.8 GXL	SPL_JSS_14, Ultrasonic	A	JSS_CNT, JSS Controller	15
0 SS	GRND, Joystick	Bk 0.8 GXL	JSS_197F, Main_Cab_FNR	1	FNR_RLY, Relay K2	87A
0 ST	GRND, Joystick	Bk 0.8 GXL	FNR_RLY, Relay K2	85	SPL_JSS_9, Ultrasonic	A
0 SU	GRND, Joystick	Bk 0.8 GXL	SPL_JSS_20, Ultrasonic	A	SPL_JSS_9, Ultrasonic	A
12ACC	Ignition Switch ACC Power	W 0.8 GXL	S-KEY, Ignition Switch	4	SPL-ACC, Ultrasonic	A
12ACC B	ACC PRM control Power	W 0.8 GXL	SPL-ACC, Ultrasonic	A	PRM-B1, PRM Signal	A
12ACC C	Power Converter PRM Control Power	W 0.8 GXL	SPL-ACC, Ultrasonic	A	PRM-A2, PRM Signal	A
12V	12V Pwr To Outlet 1	Or 1.0 GXL	PO1, Power Outlet	A	ECD, Elect Center B	1
12V A	12V Pwr To Outlet 2	Or 1.0 GXL	PO2, Power Outlet	A	ECD, Elect Center B	2
12V B	12V Fused Pwr to Radio	Or 1.0 GXL	CAB-RF, Cab to Roof Conn.	N	ECD, Elect Center B	9
12V C	12V Switched Power	Or 2.0 GXL	CNV, 24V to 12V Pwr Conver	5	SPL-12V, Ultrasonic	A
12V D	Plug 1 12V Switched Power	Or 1.0 GXL	SPL-12V, Ultrasonic	A	ECD, Elect Center B	1
12V E	Plug 2 12V Switched Power	Or 1.0 GXL	SPL-12V, Ultrasonic	A	ECD, Elect Center B	2
12V F	Radio 12V Switched Power	Or 1.0 GXL	SPL-12V, Ultrasonic	A	ECD, Elect Center B	9
12V G	2 Way Radio 12V Switched Pwr	Or 1.0 GXL	SPL-12V, Ultrasonic	A	ECD, Elect Center B	10
12V H	12V Fused Power to Radio	Or 0.8 GXL	ROOF, Roof to Cab Conn.	N	SPL-RAD, Ultrasonic	A
12V HA	12V Fused Power to Radio	Or 0.8 GXL	SPL-RAD, Ultrasonic	A	RAD, Radio Power	7
12V HB	12V Fused Power to Radio	Or 0.8 GXL	SPL-RAD, Ultrasonic	A	RAD, Radio Power	4
13A	EVGT Relay	OR 0.8 TXL	EVGT_4, EVGT	D	EDC7, ENGINE Controller	51
13B	EVGT Relay PWR	OR 1.0 GXL	Turbo, ENG DASH_Turbo	6	EVGT_4, EVGT	B
13C	Fuel Shutoff Fused Power	Or 1.0 SXL	DC3, Fuel Solenoid Disc	1	DISC, Disconnect Engine	A
13C A	Fuel Shutoff Fused Power	Or 1.0 SXL	ENG-D, Disc Harness	A	ENG, Engine Cab	21
13C B	Fuel Shutoff Fused Power	Or 1.0 SXL	CAB-E, Cab Engine	21	ECA, Elect Center A	A9
13K	Ignition Switch Pwr	Or 1.0 GXL	S-KEY, Ignition Switch	3	SPL_SD2,	A

Wire Identification Codes

21C Bk - 1.0

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 Name

Wire Identification			From Connector		To Connector	
Wire	**Circuit**	**Color, Size, and Material**	**Connector**	**Cavity**	**Connector**	**Cavity**
25N	Trans Sol Valve Y4	LU 0.8 TXL	TRANS, Cab Transmission	19	TRC, Trans Control	4
25N A	Trans Sol Valve Y4	LU 0.8 TXL	CAB-T, Cab Transmission	19	TECM, Trans	55
25P	Trans Sol Valve Y5	LU 0.8 TXL	TRANS, Cab Transmission	20	TRC, Trans Control	5
25P A	Trans Sol Valve Y5	LU 0.8 TXL	CAB-T, Cab Transmission	20	TECM, Trans	9
25R	Reverse Signal	LU 0.8 TXL	TS1, Transmission Shifter	C	TECM, Trans	64
25R A	TC Lockup Sol Power	LU 0.8 TXL	TECM, Transmission	50	Cab T, Cab-Transmission	15
25R B	TC Lockup Sol Power	LU 1.0 SXL	YLS, TC Lockup Valve	1	Trans, Transmission-Cab	15
25S	Output Sw Power VPS1	LU 0.8 TXL	TRANS, Cab Transmission	22	TRC, Transmission Control	7
25S A	Output Sw Power VPS1	LU 0.8 TXL	CAB-T, Cab Transmission	22	SPL D12, Ultrasonic	A
25S B	Output Sw Power VPS1	LU 0.8 TXL	SPL D12 Ultrasonic	A	TECM, Trans	12
25S C	Output Sw Power VPS1	LU 0.8 TXL	SPL D12 Ultrasonic	A	TECM, Trans	13
25T	Neutral Signal	LU 0.8 GXL	SPL-NEU, Ultrasonic	A	ECB, Elect Center B	D3
25T A	TC Lockup Sol Gnd	W 0.8 TXL	SPL_D19, Ultrasonic	A	Cab T, Cab-Transmission	25
25T B	Neutral Signal	LU 0.8 GXL	TS1, Transmission Shifter	D	SPL-NEU, Ultrasonic	A
25T C	Neutral Signal	LU 0.8 TXL	SPL-NEU, Ultrasonic	A	TECM, Trans	67
25W	3rd And 4th Gear Signal	LU 0.8 TXL	TS2, Transmission Shifter	B	TECM, Trans	65
25Y	Trans Kick Down Signal	LU 0.8 GXL	TS2, Transmission Shifter	D	SPL D11, Ultrasonic	A
25Y A	Trans Kick Down Signal	LU 0.8 TXL	SPL D11, Ultrasonic	A	TECM, Trans	22
25Y B	Trans Kick Down Signal	LU 0.8 GXL	197F, Main Cab FNR	6	SPL D11, Ultrasonic	A
25Y C	Trans Kick Down Signal	LU 0.8 GXL	20M, Trans Kick Down	2	197M, FNR Main Cab	6
25Y D	Trans Kick Down Signal	LU 0.8 GXL	KD_Diode, Diode Assy	C	JSS 197M, FNR Main Cab	6
25Y E	Trans Kick Down Signal	LU 0.8 GXL	Cab Fnr, Main Cab Fnr	6	KD Diode, Diode Assy	B
25Y F	Trans Kick Down Signal	LU 0.8 GXL	KD Diode, Diode Assy	A	JSS 197F, Main Cab FNR	6
25Y G	Trans Kick Down Signal	LU 0.8 GXL	21M, Trans Kick-Down	2	Arm FNR, FNR-Main Cab	6
25Z	1st And 4th Gear Signal	LU 0.8 TXL	TS2, Transmission Shifter	C	TECM, Trans	63
26E A	Trans Enable Signal	LU 0.8 TXL	STE, Trans Enable Switch	3	TECM, Trans	31
26F A	FNR Forward Signal	LU 0.8 GXL	197M, FNR Main Cab	2	SFNR, FNR Switch	6
26F B	FNR Forward Signal	LU 0.8 TXL	197F, Main Cab FNR	2	TECM, Trans	20
26F C	FNR Forward Signal	LU 0.8 GXL	FWD Diode, Diode Assy	C	JSS 197M, FNR-Main Cab	2
26F D	FNR Forward Signal	LU 0.8 GXL	JSS 197F, Main Cab FNR	2	FWD Diode, Diode Assy	A
26F E	FNR Forward Signal	LU 0.8 GXL	Cab FNR, Main Cab FNR	2	FWD Diode, Diode Assy	B

Wire Identification Codes

21C Bk - 1.0

Wire Name

Wire Color

Wire Size (mm^2)

0.8 mm	1.0 mm	2.0 mm	5.0 mm

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**
52AU	Fan Reverse Auto	W 0.8 TXL	SFC, Fan Control Switch	3	AIC-2, Adv Instrument Cluster 2	8
52A A	Fan Reverse Relay Out	W 1.0 GXL	CAB-E, Cab Engine	22	ECB, Elect Center B	D8
52A B	Fan Reverse Relay Out	W 1.0 SXL	ENG, Engine Cab	22	YFR, Fan Rev Solenoid Option	1
52C	Parking Brake Solenoid LSD	W 0.8 TXL	AIC-1, Adv Instrument Cluster 1	14	ECB, Elect Center B	B10
52J	Fan Control Switch Jumper	W 0.8 GXL	SFC, Fan Control Switch	4	SFC, Fan Control Switch	2
52M	Fan Reverse Manual	W 0.8 TXL	SFC, Fan Control Switch	6	AIC-2, Adv Instrument Cluster 2	7
52P	Parking Brk Relay Out	W 1.0 SXL	BTM_C, CAB Bottom BULKHD	M	YPB, Park Brake Solenoid	1
52P A	Parking Brk Relay Out	W 0.8 GXL	Cab_B, Cab BTM BULKHEAD	M	SPL-PB, Ultrasonic	A
52P B	Parking Brk Relay Out	W 0.8 GXL	SPL-PB, Ultrasonic	A	ECB, Elect Center B	D10
53A	RTD Switch Power	W 0.8 GXL	SRTD, Detent Switch	3	EM, RTD Height Control RTT	3
53B	RTD Signal	W 1.0 SXL	FRONT, Cab Front Chassis	12	PXF, RTD	A
53B A	RTD Control Signal	W 1.0 SXL	PXM, RTD	A	PXT, RTD	A
53B B	RTD Control Signal	W 0.8 GXL	EM, RTD Height Control RTT	4	CAB-F, Cab Front Chassis	12
53C A	Pilot Control Solenoid LSD	W 0.8 TXL	AIC-1, Adv Instrument Cluster 1	20	ECD, Elect Center D	B6
53P A	Pilot Control Relay Out	W 0.8 GXL	SPL-D25, Ultrasonic	A	YPP, Pilot Pressure Solenoid	A
53P B	Pilot Control Relay Out	W 0.8 GXL	SFL, Return to Travel Switch	2	SPL-D25, Ultrasonic	A
53P C	Pilot Control Relay Out	W 1.0 GXL	SPL-D25, Ultrasonic	A	ECD, Elect Center D	D6
53P D	Pilot Control Relay Out	W 0.8 GXL	SHC, Height Control Switch	2	SPL-D25, Ultrasonic	A
53P E	Pilot Control Relay Out	W 0.8 GXL	SRTD, Detent Switch	2	SPL-D25, Ultrasonic	A
53P F	Pilot Control Relay Out	W 0.8 GXL	CAB-F, Cab Front Chassis	9	SPL-D25, Ultrasonic	A
53P G	Pilot Control Relay Out	W 1.0 SXL	FRONT, Cab Front Chassis	9	SPL-A3, Ultrasonic	A
53P H	Pilot Control Relay Out	W 1.0 SXL	SPL-A3, Ultrasonic	A	PXF, RTD	C
53P I	Pilot Control Relay Out	W 1.0 SXL	PXM, RTD	C	PXT, RTD	C
53P J	Pilot Control Relay Out	W 1.0 SXL	SPL-A3, Ultrasonic	A	PXH, Height Control RTT	C
54A	Height Control Switch Power	W 0.8 GXL	SHC, Height Control Switch	6	EM, RTD Height Control RTT	2
54B	Height RTT Control Signal	W 1.0 SXL	FRONT, Cab Front Chassis	11	PXH, Height Control RTT	A
54B A	Height RTT Control Signal	W 0.8 GXL	CAB-F, Cab Front Chassis	11	SPL-D1, Ultrasonic	A
54B B	Height RTT Control Signal	W 0.8 GXL	EM, RTD Height Control RTT	5	SPL-D1, Ultrasonic	A
54B C	Height RTT Control Signal	W 0.8 GXL	SFL, Return to Travel Switch	6	SPL-D1, Ultrasonic	A

1 – Starting Relay

Located in the right side of the engine compartment on cooling fan housing, open engine compartment to gain access.

Check Points	Correct Reading	Possible Cause of Bad Reading
Terminal for wire 0-GB to ground	Continuity	Bad ground circuit.
NOTE: *Put the master disconnect switch in the ON position.*		
Terminal for wire 1-Z to ground	24 volts	Check circuit to batteries.
NOTE: *Put the transmission in NEUTRAL. Have another person hold the ignition switch in the START position.*		
Terminal for wire 21D to ground	24 volts	Check crank control relay (4), also check circuit 21D.
Terminal for wire 1-BB to ground	24 volts	Bad starting relay.

2 – Resistor

Located in the cab access panel for fuses and relays.

NOTE: *Turn master disconnect switch off, disconnect terminals from resistor.*

Check Points	Correct Reading	Possible Cause of Bad Reading
Between terminals of resistor	75 ohms	Bad resistor.

3 – Alternator

Located on left side of engine, open engine compartment to gain access.

Check Points	Correct 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 1-BA and ground	24 volts	Bad wire 1-BA.
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 ECA-F4. Check power relay module A, and 105 ampere circuit breaker in engine compartment of machine.
NOTE: *If the readings are good, repair or replace the alternator.*		

24 – Electronic Diesel Control

Located on right side of engine, open engine compartment to gain access.

Check Points	Correct Reading	Possible Cause of Bad Reading
NOTE: *Put the ignition switch in the OFF position. Put the master disconnect switch in the OFF position. Disconnect connector EDC7.*		
Terminal for wire 0-BE pin 5 to ground	Continuity	Bad ground circuit.
Terminal for wire 0-BF pin 6 to ground	Continuity	Bad ground circuit.
Terminal for wire 0-BD pin 10 to ground	Continuity	Bad ground circuit.
Terminal for wire 0-BC pin 11 to ground	Continuity	Bad ground circuit.
NOTE: *Put the master disconnect switch in the ON position. Put the ignition switch in the ON position.*		
Terminal for wire 18J-C pin 2 to ground	24 volts	Bad fuse ECM-F2, bad wire 18J.
Terminal for wire 18J-B pin 3 to ground	24 volts	Bad fuse ECM-F2, bad wire 18J.
Terminal for wire 18J-D pin 8 to ground	24 volts	Bad fuse ECM-F2, bad wire 18J.
Terminal for wire 18J-E pin 9 to ground	24 volts	Bad fuse ECM-F2, bad wire 18J.
NOTE: *Use diagnostic service tool for additional tests on EDC7.*		

42 – Rollback Jumper (Option)

Located inside of front frame.

Check Points	Correct Reading	Possible Cause of Bad Reading
Between terminals A and B on switch	Continuity	Bad rollback jumper.

43 – Fan PWM Solenoid (Option)

Located on fan control valve.

Check Points	Correct Reading	Possible Cause of Bad Reading
NOTE: *Disconnect wiring harness connector YFN from fan PWM solenoid.*		
Between pins A and B of fan PWM solenoid	26 to 32 ohms	Bad fan reversing solenoid.
Pin B of wiring harness connector YFN to ground	Continuity	Bad ground circuit.
NOTE: *In the options menu of the instrument cluster select auto for the fan. Stall the transmission to raise transmission temperature to high operating range.*		
Pin A of wiring harness connector YFN to ground	24 volts	Bad instrument cluster. Also check wire 56.

44 – Fan Reversing Solenoid (Option)

Located on fan control valve.

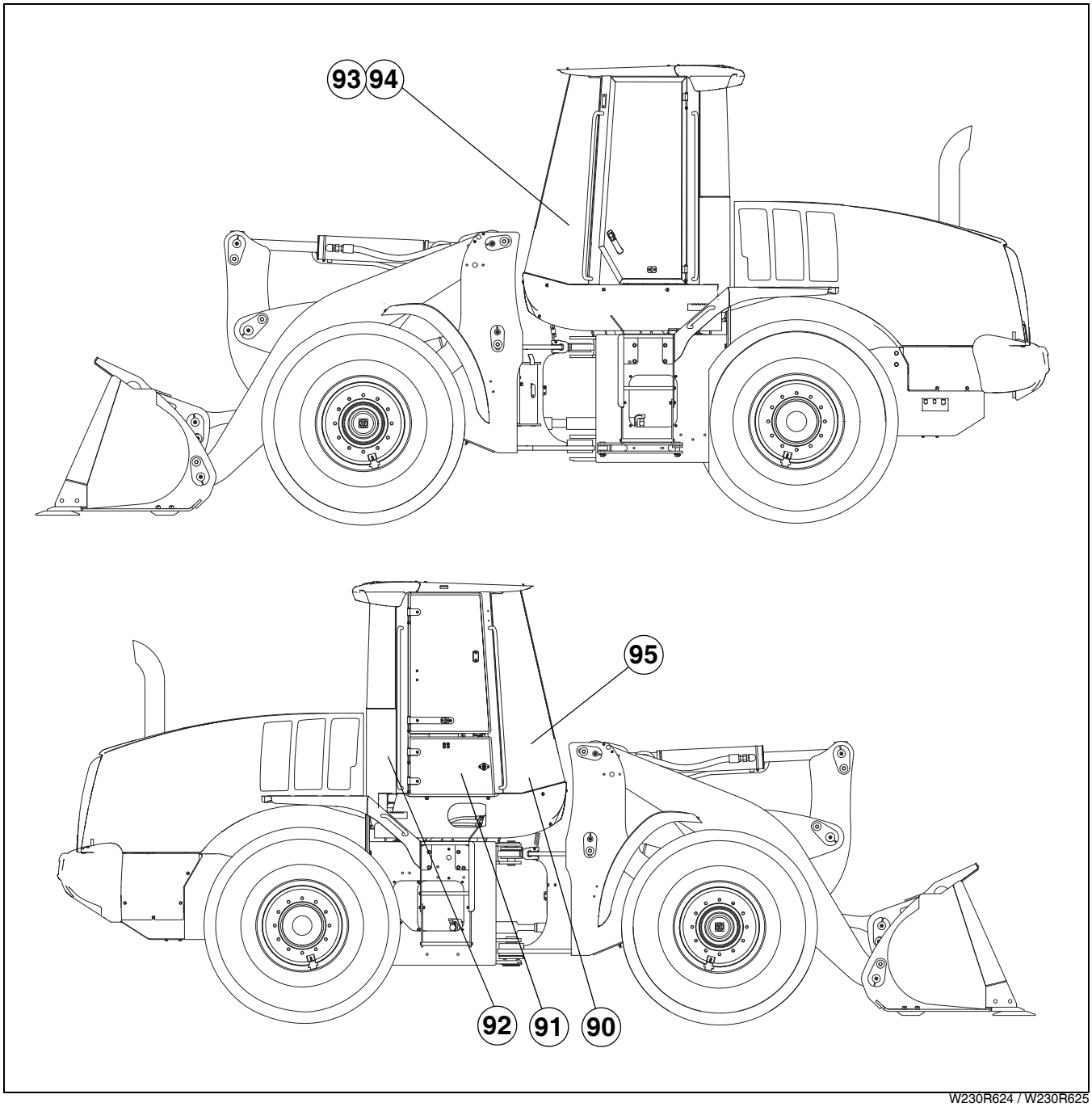
Check Points	Correct Reading	Possible Cause of Bad Reading
NOTE: *Disconnect wiring harness connector YFR from fan reversing solenoid.*		
Between pins 1and 2 of fan reversing solenoid	36 to 42 ohms	Bad fan reversing solenoid.
Pin 2 of wiring harness connector YFR to ground	Continuity	Bad ground circuit.
NOTE: *Put the master disconnect switch and the ignition switch in the ON position. Put fan reversing switch in ON position (hold rocker in momentary position).*		
Pin 1 of wiring harness connector YFR to ground	24 volts	Bad fan reversing switch. Also check wire 52-A.

71 – Instrument Cluster Connector 2

Located on instrument cluster.

Check Points	Correct Reading	Possible Cause of Bad Reading
NOTE: *Disconnect the connector AIC-2 from the instrument cluster and SW-PD from the switch pad.*		
Connector terminal AIC-2 5 to ground	Continuity	Bad brake warning pressure switch (69). Also check circuit 33P-A and ground circuit at brake warning pressure switch.
Connector terminal AIC-2 11 to ground	Continuity	Bad secondary steering pressure switch (118). Also check circuit 35X and ground circuit at pressure switch.
Connector terminal SW-PD 5 to ground	Open Circuit	Bad air filter restriction switch (66). Also check circuit 31F-A.
Connector terminal SW-PD 4 to ground	Open Circuit	Bad hydraulic filter restriction switch (72). Also check circuit 31H-A.
Connector terminal AIC-2 15 and 22 to ground.	Continuity	Bad ground circuit. Check wires 0-DB and 0-D-A.
Connector terminal AIC-2 4 to ground	Open Circuit	Bad redundant brake switche(s) (75) (76). Also check circuit 33R.
NOTE: *Put the master disconnect switch and the ignition switch in the ON position.*		
Connector terminal AIC-2 14 and 20 to ground	24 volts	Bad fuse ECD-F8. Also check circuit 19S-C and 19S-D.
Connector terminal AIC-2 21 to ground	24 volts	Bad fuse ECA-F3. Also check circuit 19E-A. Also check power relay module C (13).
NOTE: *Put the blower switch in any position other than OFF and thermostat switch fully clockwise.*		
Connector terminal 10 to ground	24 volts	Check fuse G, blower switch, thermostat switch, and A/C low pressure switch. Also check circuits 61R, 61A, and 61T.
NOTE: *Put the driving lamp switch in position four or five. Put the high/low beam switch in HIGH BEAM position.*		
Connector terminal SW-PD 1 to ground	24 volts	Check high/low beam switch, driving lamp switch, and fuse ECB-F3 and F4. Also check circuit 41H-D.
NOTE: *Put the turn signal switch in the LEFT TURN position.*		
Connector terminal AIC-2 9 to ground	24 volts on and off every 1-2 seconds	Check fuse ECA-F8, turn signal switch, and flasher module. Also check, circuit 45A-A to flasher module, and circuit 45L-D from flasher module to instrument cluster.
NOTE: *Put the turn signal switch in the RIGHT TURN position.*		
Connector terminal AIC-2 10 to ground	24 volts on and off every 1-2 seconds	Check fuse ECA-F8, turn signal switch, and flasher module. Also check, circuit 45B-A to flasher module, and circuit 45R-E from flasher module to instrument cluster.
NOTE: *Press pilot control switch to turn ON switch LED.*		
Connector terminal AIC-2 18to ground	24 volts	Bad pilot control switch or fuse ECA-F5. Also check wire 31L and circuit 19A.

LIGHTS - 02



W230R624 / W230R625

90. BRAKE LIGHTS SWITCH
91. BRAKE LIGHTS RELAY
92. FLASHER MODULE
93. HAZARD SWITCH
94. TURN SIGNAL, HIGH-LOW BEAM, AND HORN SWITCH
95. DRIVING LIGHTS SWITCH

NOTE: *The battery must be at full charge and all connections clean and tight before doing any testing of the electrical system. Use a Multimeter for the following tests.*

100 – Right Hand Rear Combination Lamp (North America Only)

Located on the right rear of the machine.

Check Points	Correct Reading	Possible Cause of Bad Reading
NOTE: *Disconnect wiring harness connector LRR-N from RH rear combination lamp connector.*		
Combination lamp connector pin A to pin D	Continuity	Bad stop lamp bulb.
Combination lamp connector pin C to pin D	Continuity	Bad turn lamp bulb.
Combination lamp connector pin B to pin D	Continuity	Bad tail lamp bulb.
NOTE: *Connect wiring harness connector LRR-N to RH rear combination lamp connector.*		
Terminal for wire 0-BT-N to ground	Continuity	Bad ground circuit.
NOTE: *Put master disconnect switch and ignition switch in ON position. Have another person press and hold down the brake pedal.*		
Terminal for wire 44A-GN to ground	24 volts	Check brake lamps relay (91). Also check circuit 44 to brake lamps relay (91).
NOTE: *Put turn signal lever in RIGHT turn position.*		
Terminal for wire 45R-BN to ground	Intermittent 24 volts	Check the turn signal switch (94) and flasher module (92). Also check circuit 45R to flasher module.
NOTE: *Put driving lamp switch (95) in position 2 or 3.*		
Terminal for wire 18G-CN to ground	24 volts	Check fuse ECB-F8 and lamp switch (95). Also check circuit 18G.
NOTE: *If all readings are good, and lamps still do not turn ON replace the RH rear combination lamp.*		

110 – Rear Wiper Motor

Located in top of rear cab head liner.

Check Points	Correct Reading	Possible Cause of Bad Reading
Terminal for wire 0-MA to ground	Continuity	Bad ground circuit.
NOTE: *Make sure the rear wiper and washer switch (107) is in the OFF position.*		
Between terminals for wires 68C-A and 68L-A	Continuity	Bad rear wiper and washer switch (107).
NOTE: *Put the master disconnect switch and the ignition switch in the ON position.*		
Terminal for wire 19K-D to ground	24 volts	Check fuse ECA-F13, also check circuit 19K.
NOTE: *Put the rear wiper and washer switch (107) in the ON position.*		
Terminal for wire 68C-A to ground	24 volts	Bad rear wiper and washer switch (107).
Terminal for wire 68L-A to ground	0 volt	Bad rear wiper and washer switch (107).
NOTE: *If the readings are good, replace the rear wiper motor.*		

111 – Rear Washer Pump Motor

Located in left side engine compartment.

Check Points	Correct Reading	Possible Cause of Bad Reading
Terminal for wire 0-BL to ground	Continuity	Bad ground circuit.
NOTE: *Put master disconnect switch and ignition switch in ON position. Depress and hold rear wiper and washer switch (107) in WASH position.*		
Terminal for wire 68W-A to ground	24 volts	Bad rear wiper and washer switch (107) Also check wires 68W-A and 68W.
NOTE: *If the readings are good, replace the rear washer pump motor.*		

112 – Front Washer Pump Motor

Located in left side engine compartment.

Check Points	Correct Reading	Possible Cause of Bad Reading
Terminal for wire 0-B to ground	Continuity	Bad ground circuit.
NOTE: *Put the master disconnect switch and the ignition switch in the ON position. Connect volt meter to check point then push down on front wiper and washer switch (108).*		
Terminal for wire 63W-A to ground	24 volts	Bad front wiper and washer switch (108), also check circuit 63W.
NOTE: *If the readings are good, replace the front washer pump motor.*		

124 – Right Speaker (Option)

Located in the cab.

Check Points	Correct Reading	Possible Cause of Bad Reading
NOTE: *Disconnect connector from right speaker. Put master disconnect switch and ignition switch in ON position. Turn radio (123) on. Put balance control for RH and LH speakers to center position.*		
Pin 1 in wiring harness connector RSPK to ground	Voltage	Bad circuit between the right speaker and the radio or a bad radio (123).
Pin 2 in wiring harness connector RSPK to ground	Continuity	Bad circuit between the right speaker and the radio (123).
NOTE: *If the readings are good, replace the right speaker.*		

125 – Left Speaker (Option)

Located in the cab.

Check Points	Correct Reading	Possible Cause of Bad Reading
NOTE: *Disconnect connector from left speaker. Put master disconnect switch and ignition switch in ON position. Turn radio (123) on. Put balance control for RH and LH speakers to center position.*		
Pin 1 in wiring harness connector LSPK to ground	Voltage	Bad circuit between the left speaker and the radio or a bad radio (123).
Pin 2 in wiring harness connector LSPK to ground	Continuity	Bad circuit between the left speaker and the radio (123).
NOTE: *If the readings are good, replace the left speaker.*		

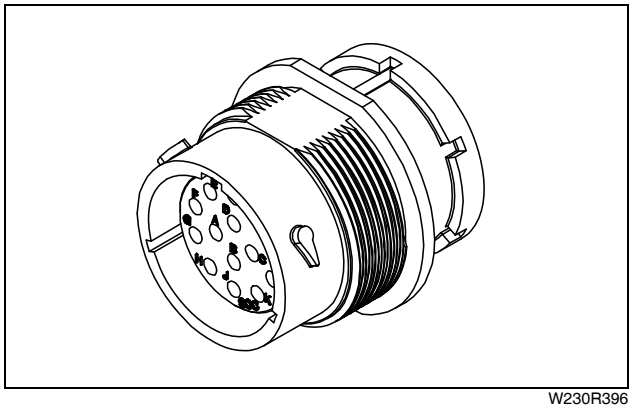
150 – Air Conditioning Switch		
Check Points	**Correct Reading**	**Possible Cause of Bad Reading**
NOTE: *Remove connector from AC switch.*		
Between terminal 1 and 2 on AC switch	Continuity with switch on.	Bad AC switch.

151 – Control Panel Lights		
Check Points	**Correct Reading**	**Possible Cause of Bad Reading**
NOTE: *Remove connector from Control panel lights.*		
Between terminal 1 and 2 on light.	Continuity	Bad light(s).

152 – Water Valve Potentiometer		
Check Points	**Correct Reading**	**Possible Cause of Bad Reading**
NOTE: *Remove connector from Water valve potentiometer.*		
Between terminals measure resistance change.	Resistance change	Bad potentiometer.

153 – Air Recirculating Switch		
Check Points	**Correct Reading**	**Possible Cause of Bad Reading**
NOTE: *Remove connector on Air recirculating switch.*		
Between terminals 1 and 2.	Continuity with switch on.	Bad recirculating switch.

CAB B, CAB BTM BULKHEAD



W230R396

CAV	WIRE IDENT	CIRCUIT
A	22D	PEDAL SENSOR GRND
B	22B	PEDAL SENSOR +5V
C	22C	PEDAL POS SIGNAL
J	44-A	BRK LT CTRL PWR
K	1-DR	BRK LT SW PWR
L	33P-A	BRK WARN PRESS LOW
M	52P-A	PARK BRK RLY OUT

CAB FNR, MAIN CAB FNR

CAV	WIRE IDENT	CIRCUIT
1	19B-B	TRANS ENA SW PWR
2	26F-E	FNR FORWARD SIGNAL
3	26N-E	FNR NEUTRAL SIGNAL
4	26R-E	FNR REVERSE SIGNAL
5	32J-H	TRANS ENABLE LT SIG
6	25Y-E	NONE

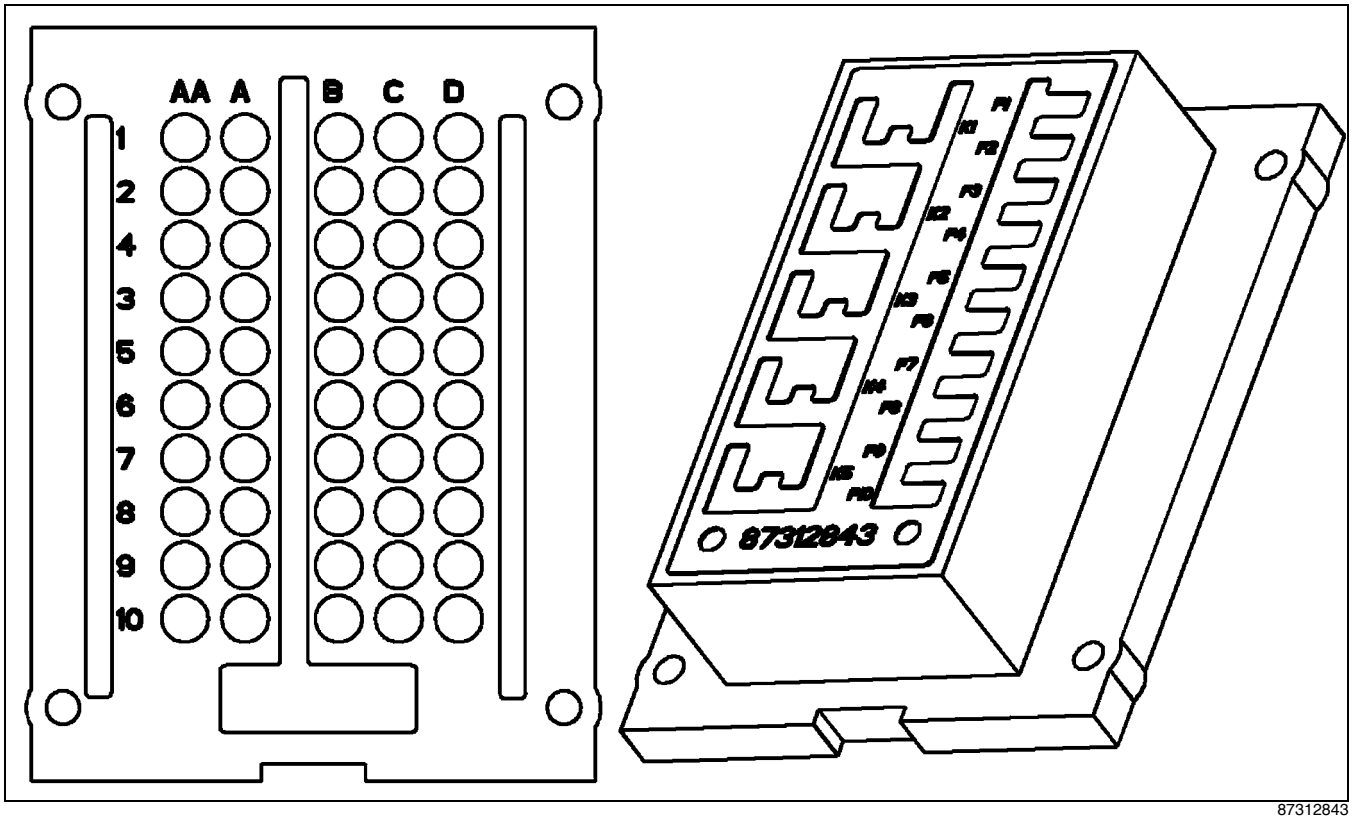
CAB E, CAB-ENGINE

CAV	WIRE IDENT	CIRCUIT
1	36F-A	FUEL LEVEL ANALOG
2	61C	AC RELAY OUT
3	21G	EDC7 CRANK CTRL RLY
4	21H	CRANK CTRL RLY LSD
5	36C-A	RADITAOR COOL TEMP SGNL
6	0-DF	CRANK REQUEST RLY CTRL GND
11	21F	EDC7 DIGITAL GND
13	CAN-LL	CAN2 LO, EDC
14	CAN-HM	CAN2 HI, EDC
15	21D-A	STARTER RLY SIGNAL
17	0-DX	AIC SENSOR GND
19	0-DW	AIC POWER GND
20	0-DB	AIC POWER GND RED
21	13C-B	FUEL SHUTOFF FUSED PWR
22	52A-A	FAN REVERSE RLY OUT
23	56	FAN CONTROL PWM
24	68W	REAR WSHR PUMP
25	63W	FNT WASHER PUMP
26	14-AB	ALTERNATOR D+
27	21E-B	KEY SWITCH CRANK
28	31F-A	AIR FLTR REST SW SGNL
29	61R-B	AC RELAY CONTROL
30	61A-B	TRINARY PRESS SW INPUT
31	20G-B	EDC7 ISO-K INTERFACE

CAB F, CAB FRONT CHAS

CAV	WIRE IDENT	CIRCUIT
2	45L-C	LEFT TURN SGNL
3	45R-D	RIGHT TURN SGNL
5	18G-G	RH POSN/TAIL FUSED PWR
6	18B-A	LH HIGH BEAM FUSED PWR
9	53P-F	PILOT CTRL RLY OUT
10	18F-E	LH POSN/TAIL FUSED PWR
11	54B-A	HC-RTT CTRL SGNL
12	53B-B	RTD CTRL SIGNAL
13	64-A	HORN POWER
14	18D-A	LH LOW BEAM FUSED PWR
15	18E-A	RH LOW BEAM FUSED PWR
16	18C-A	RH HIGH BEAM FUSED PWR
17	57-A	PIN ENGAGE SOL PWR
18	58-C	RIDE CTRL SOL PWR

ECC, ELECT CNTR C



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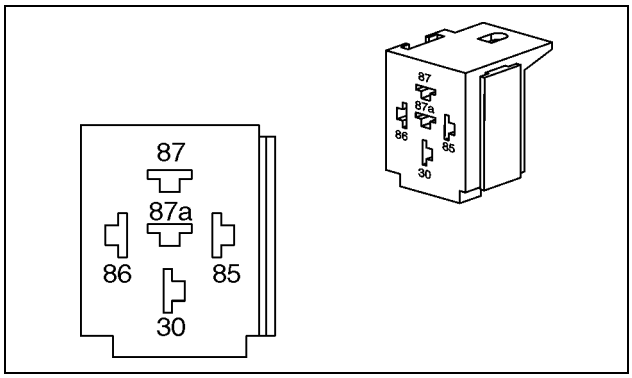
CAV	WIRE IDENT	CIRCUIT
A1	12V-D	PLUG 1 12V SW PWR
A2	12V-E	PLUG 2 12V SW PWR
A3	41H-B	HIGH BEAM LH PWR
A4	41H-C	HIGH BEAM RH PWR
A5	41L-C	LOW BEAM RH PWR
A6	41L-B	LOW BEAM LH PWR
A7	41T-B	POSN LIGHTS LH SW PWR
A8	41T-A	POSN LIGHTS RH SW PWR
A9	12V-F	RADIO 12V SW PWR
A10	12V-G	2 WAY RADIO 12V SW PWR
AA1	12V	12V PWR TO OUTLET 1
AA2	12V-A	12V PWR TO OUTLET 2
AA3	18B-A	LH HIGH BEAM FUSED PWR
AA4	18C-A	RH HIGH BEAM FUSED PWR
AA5	18E-A	RH LOW BEAM FUSED PWR
AA6	18D-A	LH LOW BEAM FUSED PWR
AA7	18F-C	LH POSN/TAIL FUSED PWR
AA8	18G	RH POSN/TAIL FUSED PWR
AA9	12V-B	12V FUSED PWR TO RADIO
B1	0-EW	POWER RELAY GND
B2	0-EV	IGN LATCH GND
B3	21K-B	IGN SW START SIGNAL

CAV	WIRE IDENT	CIRCUIT
B4	0-DE	NEUT START RLY CTRL GND
B5	21F	EDC7 DIGITAL GND
B6	0-DF	CRANK REQUEST RLY CTRL GND
B7	19P-E	FAN REV RLY FSD PWR
B8	52	FAN REVERSER LSD
B9	19D-C	PARK BRK RLY FSD PWR
B10	52C	PARK BRAKE SOL LSD
C2	0-EA	PWR RELAY GND
D1	13K-B	IGN PWR LATCH B+
D2	0-ET	POWER RELAT GND
D3	25T	NEUTRAL SIGNAL
D4	21C	NEUT START RLY OUTPUT
D5	21C-A	NEUT START RLY OUTPUT
D6	21E	KEY SWITCH CRANK
D7	19P-D	FAN REV RLY FSD PWR
D8	52A-A	FAN REVERSE RLY OUT
D9	19D-B	PARK BRK RLY FSD PWR
D10	52P-B	PARK BRK RLY OUT

RLY, RELAY K2



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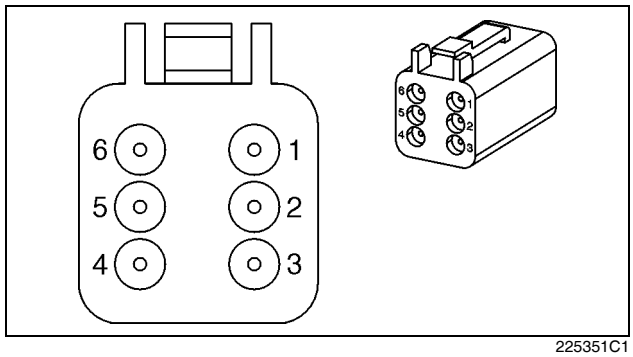
CAV	WIRE IDENT	CIRCUIT
30	51PW-P	JSS POWER
85	51D-B	GRND, RELAY CNTL
86	51B-E	B+, JSS
87	51B-G	B+, JSS
87A	0-SL	GROUND

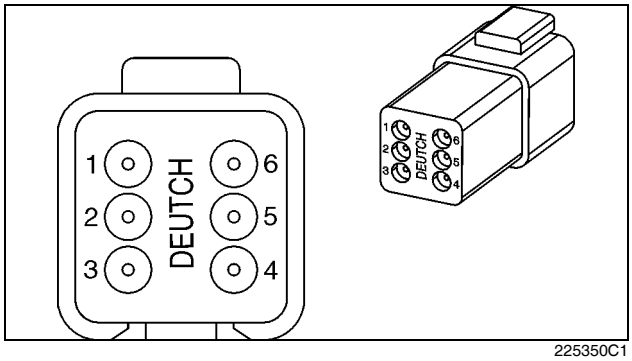
JSS 197M, FNR-MAIN CAB



225351C1

CAV	WIRE IDENT	CIRCUIT
1	19B-A	FNR SW FUSED PWR
2	26F-C	FNR FORWARD SIGNAL
3	26N-C	FNR NEUT SIGNAL
4	16R-C	FNR REVERSE SIGNAL
5	32J-F	TRANS ENABLE INDICTION
6	25Y-D	TRANS KICK DOWN SIGNAL

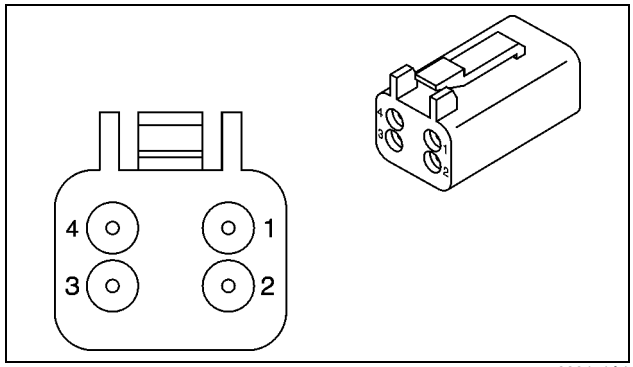
JSS 197F, MAIN CAB FNR



225350C1

CAV	WIRE IDENT	CIRCUIT
1	0-SS	GRND, JOYSTICK
2	26F-D	FNR FORWARD SIGNAL
3	26N-D	FNR NEUT SIGNAL
4	26R-D	FNR REVERSE SIGNAL
5	32J-G	TRANS ENABLE INDICTION
6	25Y-F	TRANS KICK DOWN SIGNAL

JSS VALVE, JSS HYD VALVE



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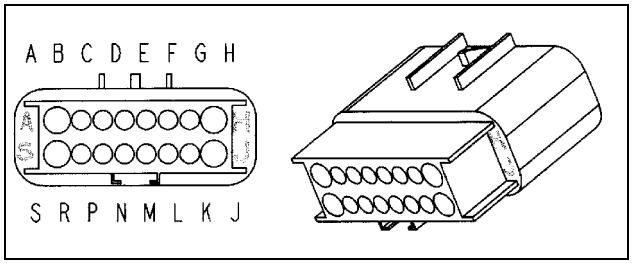
CAV	WIRE IDENT	CIRCUIT
1	51L	JOYSTICK SIGNAL
2	51J-C	JSS ALARM
3	0-AT	GRND, JSS VLV
4	51S-J	JSS OKAY PWR

ROOF, ROOF TO CAB CONNECTION



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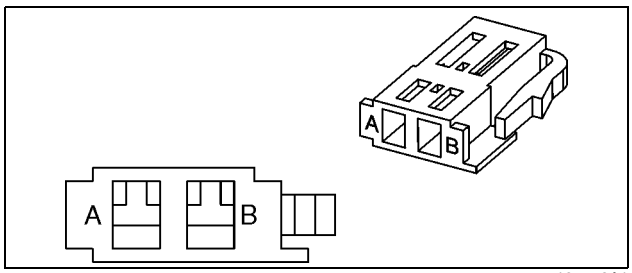
CAV	WIRE IDENT	CIRCUIT
A	0-MV	FONT WORK LIGHT GND
B	0-MH	REAR WORK LIGHT GND
C	43-B	DOME LT AUTO MODE
D	19U-C	DOME LT FSD PWR
E	46-D	BEACON SW PWR
F	0-MN	ROOF GROUNDS
G	0-MK	ROOF GROUNDS
H	42C-F	FNT WRK LTS FUSE PWR
J	19K-D	REAR WPR MOTOR FSD PWR
K	68C-A	REAR WPR PARK CTRL
L	68L-A	REAR WPR SW PWR
M	0-EN	RADIO GND
N	12V-H	12V FUSED PWR TO RADIO
P	19U-F	DOOR SW FSD PWR
R	43S-B	DOOR OPEN SGNL
S	42R-F	REAR WRK LTS FUSE PWR

CONNECTOR RSPK - RIGHT SPEAKER



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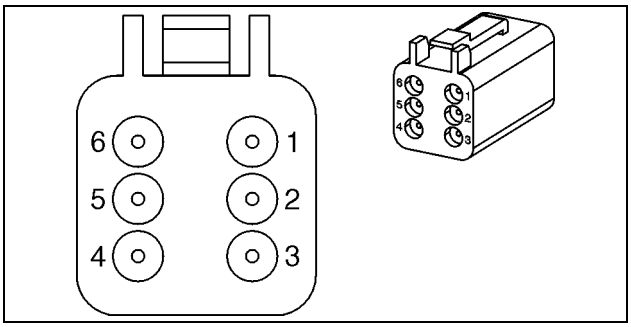
CAV	WIRE IDENT	CIRCUIT
A	65R	RIGHT SPEAKER SIGNAL
B	0-PB	RIGHT SPEAKER GROUND

CONNECTOR RTHP - THROTTLE PEDAL



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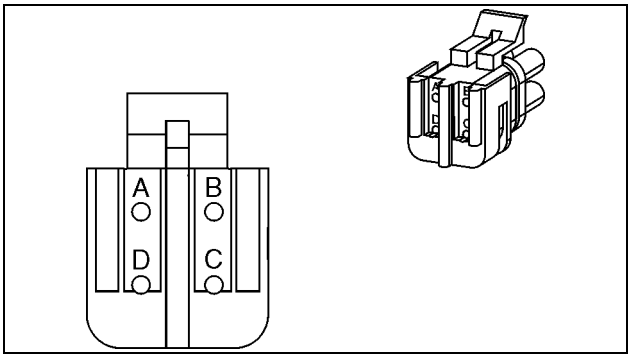
CAV	WIRE IDENT	CIRCUIT
1	21F-D	EDC7 DIGITAL GROUND
2		NOT USED
3		NOT USED
3	24B-A	THROTTLE SIGNAL
4		NOT USED
4	24R-A	THROTTLE POS. SENS GND
5		NOT USED
5	24S-A	THROTTLE SUPPLY
6	24L-A	LOW IDLE SWITCH

RVS DIODE, DIODE ASSY

CAV	WIRE IDENT	CIRCUIT
A	26R-D	FNR REVERSE SIGNAL
B	26R-E	FNR REVERSE SIGNAL
C	16R-C	FNR REVERSE SIGNAL

CONNECTOR RWM - REAR WIPER MOTOR



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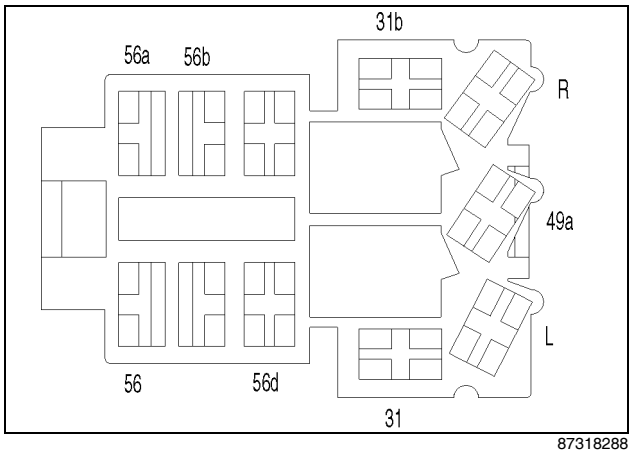
CAV	WIRE IDENT	CIRCUIT
A		NOT USED
B	68L-A	REAR WIPER SWITCH PWR
C	19K-D	REAR WIPER MOTR FUS PWR
D	68C-A	REAR WIPER PARK CONTROL

CONNECTOR SRHSTLK - RH STALK SWITCH



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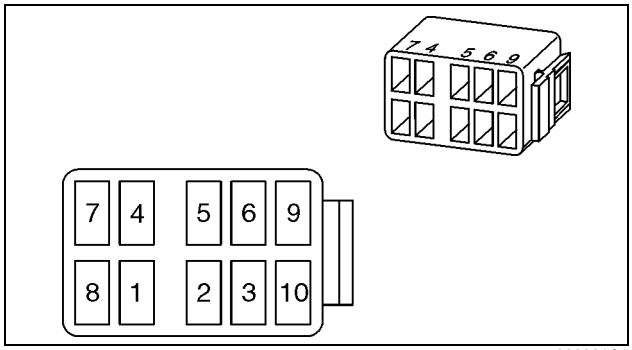
CAV	WIRE IDENT	CIRCUIT
31b	64C	HORN RELAY CONTROL
49a	19B	TURN SIGNAL FUSED POWER
56a	41H-A	HIGH BEAM POWER
56b	41L-A	LOW BEAM POWER
56d	19Z-C	HIGH BEAM FLASH FUS PWR
31	0-EP	HORN SWITCH GROUND
56	41J	DRIVE LIGHTS POWER
L	45A-A	LEFT TURN SWITCH POWER
R	45B-A	RIGHT TURN SWITCH POWER

CONNECTOR SRTD - DETENT SWITCH



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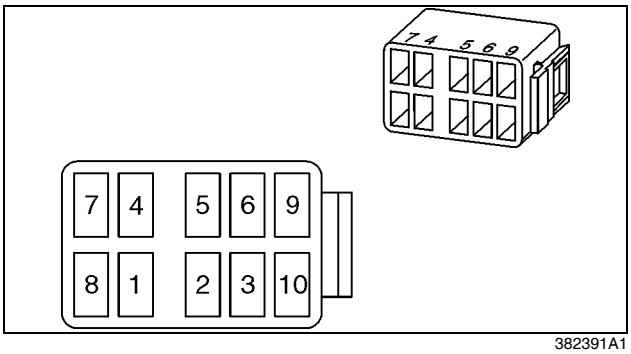
CAV	WIRE IDENT	CIRCUIT
1		NOT USED
2	53P-E	PILOT CONTROL RELAY OUT
3	53A	RTD SWITCHED POWER
4		NOT USED
5		NOT USED
6		NOT USED
7	0-B4	BACK LIGHT GROUND
8	49-J	BACK LIGHT POWER
9		NOT USED
10		NOT USED

CONNECTOR SRWP - REAR WIPER SWITCH



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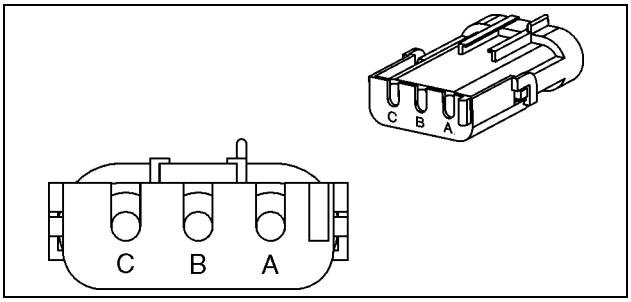
CAV	WIRE IDENT	CIRCUIT
1	68C	REAR WIPER PARK CONTROL
2	68L	REAR WIPER SW PWR
3	19K-A	REAR WIPER SW FUSED PWR
4		NOT USED
5	19K-B	REAR WIPER SW FUSED PWR
6	68W	REAR WASHER PUMP
7	0-B23	BACK LIGHT GROUND
8	49-C	BACK LIGHT POWER
9		NOT USED
10		NOT USED

SSD, SEC STR DIODE



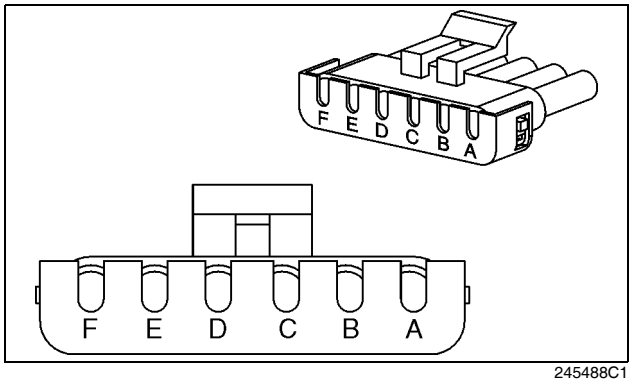
245485C1

CAV	WIRE IDENT	CIRCUIT
A	0-CH	SEC STR FLYBACK GND
B	0-CG	SEC STR FLYBACK GND
C	51-D	SEC STR FLYBACK

115, GRID HTR PWR

CAV	WIRE IDENT	CIRCUIT
1	1-BE	GRID HTR PWR

CONNECTOR 140M - DIODE MODULE



245488C1

CAV	WIRE IDENT	CIRCUIT
A	63H-C	FRONT WIPER HIGH RYL OUT
B	63L-C	FRONT WIPER LOW RYL OUT
C	0-EE	DIODE SUPPRESSION GNDS
D	58-D	RIDE CONTROL SOLENOID PWR
E		NOT USED
F	68L-C	REAR WIPER SWITCH PWR

193, STARTER RELAY

CAV	WIRE IDENT	CIRCUIT
1	1-BB	STRTR SOL PWR

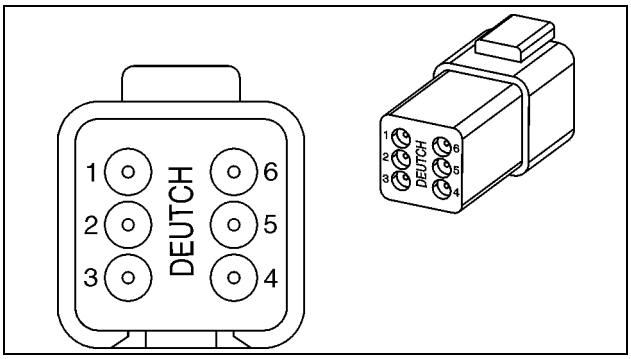
194, STARTER SIGNAL

CAV	WIRE IDENT	CIRCUIT
1	1-BB	STRTR SOL PWR

195, STARTER RELAY POWER

CAV	WIRE IDENT	CIRCUIT
1	1-Z	STRTR RLY BAT PWR

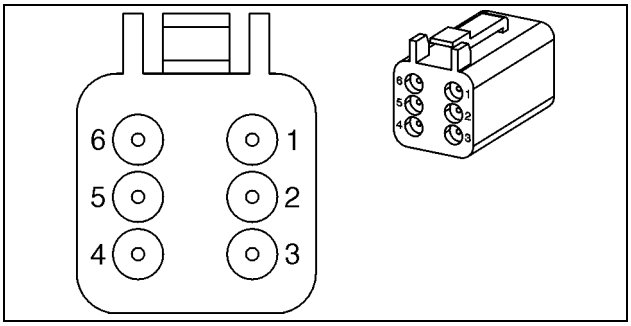
CONNECTOR 197F - MAIN CAB FNR



225350C1

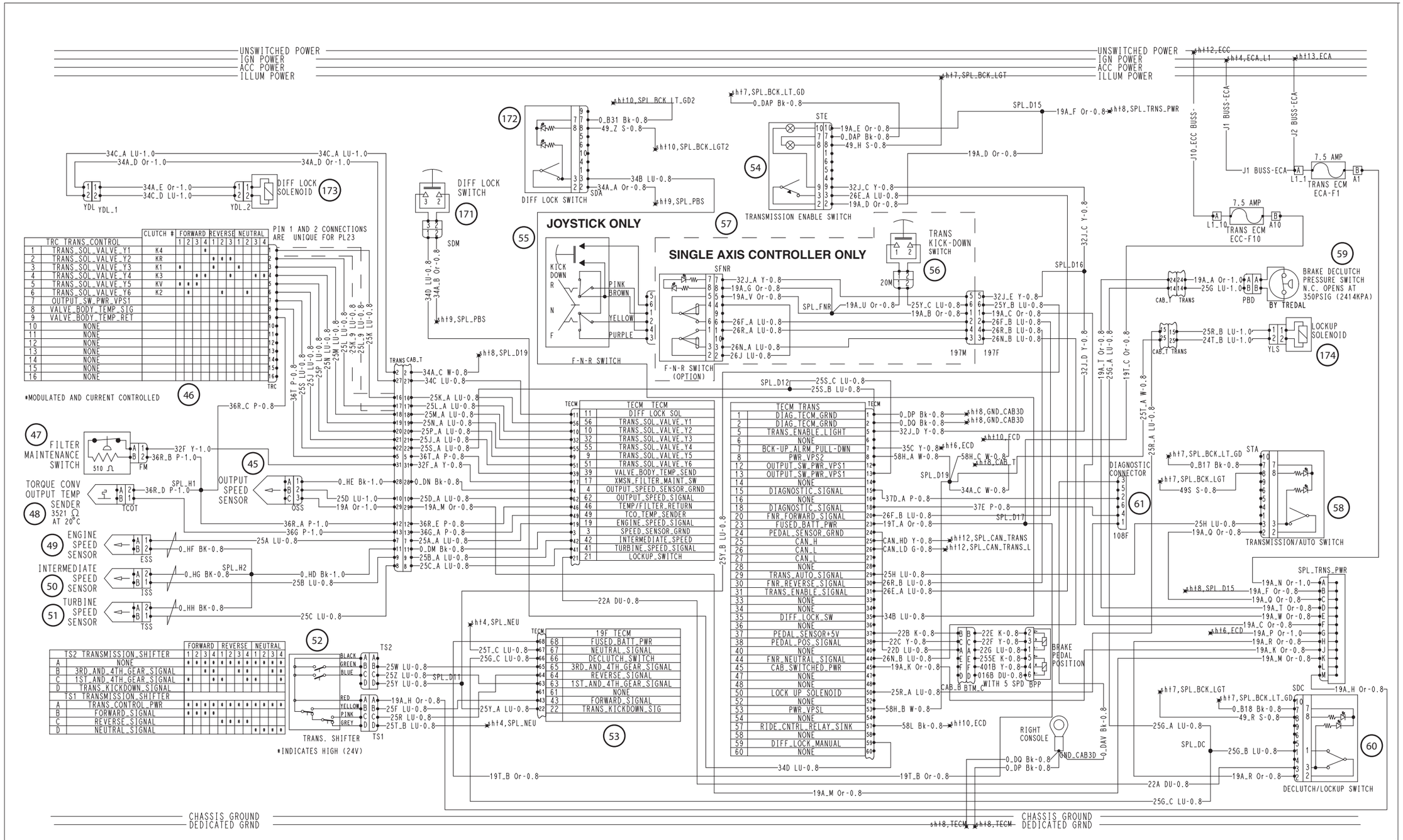
CAV	WIRE IDENT	CIRCUIT
1	19A-C	FNR SWITCH FUSED POWER
2	26F-B	FNR FORWARD SIGNAL
3	26N-B	FNR NEUTRAL SIGNAL
4	26R-B	FNR REVERSE SIGNAL
5	32J-E	TRANS ENABLE INDIC LAMP
6	25Y-B	TRANS KICK DOWN SIGNAL

CONNECTOR 197M - FNR MAIN CAB



225351C1

CAV	WIRE IDENT	CIRCUIT
1	19A-B	FNR SWITCHED FUSED POWER
2	26F-A	FNR FORWARD SIGNAL
3	26N-A	FNR NEUTRAL SIGNAL
4	26R-A	FNR REVERSE SIGNAL
5	32J-A	TRANS ENABLE INDIC LAMP
6	25Y-C	TRANS KICK DOWN SIGNAL


UNSWITCHED POWER
IGN POWER
ACC POWER
ILLUM POWER
TRC TRANS_CONTROL
1 TRANS_SOL_VALVE_Y1
2 TRANS_SOL_VALVE_Y2
3 TRANS_SOL_VALVE_Y3
4 TRANS_SOL_VALVE_Y4
5 TRANS_SOL_VALVE_Y5
6 TRANS_SOL_VALVE_Y6
7 OUTPUT_SW_PWR_VPS1
8 VALVE_BODY_TEMP_SIG
9 VALVE_BODY_TEMP_RET
10 NONE
11 NONE
12 NONE
13 NONE
14 NONE
15 NONE
16 NONE
CLUTCH # K4 KR K1 K3 KV K2
FORWARD REVERSE NEUTRAL
PIN 1 AND 2 CONNECTIONS ARE UNIQUE FOR PL23
*MODULATED AND CURRENT CONTROLLED
46
47 FILTER MAINTENANCE SWITCH 510 Ω FM
48 TORQUE CONV OUTPUT TEMP SENDER 3521 Ω AT 20°C TCOT
49 ENGINE SPEED SENSOR ESS
50 INTERMEDIATE SPEED SENSOR ISS
51 TURBINE SPEED SENSOR TSS
45 OUTPUT SPEED SENSOR OSS
DIFF LOCK SOLENOID 173
DIFF LOCK SWITCH 171
172 DIFF LOCK SWITCH
SDM
JOYSTICK ONLY
55
KICK DOWN R N F
PINK BROWN YELLOW PURPLE
F-N-R SWITCH
SINGLE AXIS CONTROLLER ONLY
57
SFNR
F-N-R SWITCH (OPTION)
54 TRANSMISSION ENABLE SWITCH
STE
TRANS KICK-DOWN SWITCH 56
20M
197M 197F
TRANS CAB_T
TECM TECM
11 DIFF_LOCK_SOL
56 TRANS_SOL_VALVE_Y1
10 TRANS_SOL_VALVE_Y2
32 TRANS_SOL_VALVE_Y3
55 TRANS_SOL_VALVE_Y4
9 TRANS_SOL_VALVE_Y5
51 TRANS_SOL_VALVE_Y6
39 VALVE_BODY_TEMP_SEND
17 XMSN_FILTER_MAINT_SW
4 OUTPUT_SPEED_SENSOR_GRND
62 OUTPUT_SPEED_SIGNAL
46 TEMP/FILTER_RETURN
49 TCO_TEMP_SENDER
19 ENGINE_SPEED_SIGNAL
3 SPEED_SENSOR_GRND
42 INTERMEDIATE_SPEED
41 TURBINE_SPEED_SIGNAL
21 LOCKUP_SWITCH
TECM TRANS
1 DIAG_TECM_GRND
2 DIAG_TECM_GRND
5 TRANS_ENABLE_LIGHT
6 NONE
7 BCK-UP_ALRM_PULL-DWN
8 PWR_VPS2
12 OUTPUT_SW_PWR_VPS1
13 OUTPUT_SW_PWR_VPS1
14 NONE
15 DIAGNOSTIC_SIGNAL
16 NONE
18 DIAGNOSTIC_SIGNAL
20 FNR_FORWARD_SIGNAL
23 FUSED_BATT_PWR
24 PEDAL_SENSOR_GRND
25 CAN_H
26 CAN_L
27 CAN_L
28 NONE
29 TRANS_AUTO_SIGNAL
30 FNR_REVERSE_SIGNAL
31 TRANS_ENABLE_SIGNAL
33 NONE
34 NONE
35 DIFF_LOCK_SW
36 NONE
37 PEDAL_SENSOR+5V
38 PEDAL_POS_SIGNAL
40 NONE
44 FNR_NEUTRAL_SIGNAL
45 CAB_SWITCHED_PWR
47 NONE
48 NONE
50 LOCK_UP_SOLENOID
52 NONE
53 PWR_VPSL
54 NONE
57 RIDE_CNTRL_RELAY_SINK
58 NONE
59 DIFF_LOCK_MANUAL
60 NONE
19F TECM
68 FUSED_BATT_PWR
67 NEUTRAL_SIGNAL
66 DECLUTCH_SWITCH
65 3RD_AND_4TH_GEAR_SIGNAL
64 REVERSE_SIGNAL
63 1ST_AND_4TH_GEAR_SIGNAL
61 NONE
43 FORWARD_SIGNAL
22 TRANS_KICKDOWN_STG
TS2 TRANSMISSION_SHIFTER
A NONE
B 3RD_AND_4TH_GEAR_SIGNAL
C 1ST_AND_4TH_GEAR_SIGNAL
D TRANS_KICKDOWN_SIGNAL
TS1 TRANSMISSION_SHIFTER
A TRANS_CONTROL_PWR
B FORWARD_SIGNAL
C REVERSE_SIGNAL
D NEUTRAL_SIGNAL
FORWARD REVERSE NEUTRAL
*INDICATES HIGH (24V)
52 TS2 TS1 TRANS. SHIFTER
BLACK GREEN BLUE RED YELLOW PINK GREY
53
DIAGNOSTIC CONNECTOR 61 108F
STA
TRANSMISSION/AUTO SWITCH 58
SPL_TRNS_PWR
BRAKE PEDAL POSITION
CAB_B BTM_C
WITH 5 SPD BPP
RIGHT CONSOLE
GND_CAB3D
SDC
DECLUTCH/LOCKUP SWITCH 60
BRAKE DECLUTCH PRESSURE SWITCH N.C. OPENS AT 350PSIG (2414KPA)
BY TREDAL PBD
LOCKUP SOLENOID 174
J10_ECC BUSS-
J1 BUSS-ECA
J2 BUSS-ECA
7.5 AMP
TRANS ECM ECA-F1
TRANS ECM ECC-F10
CHASSIS GROUND
DEDICATED GRND

W270R562

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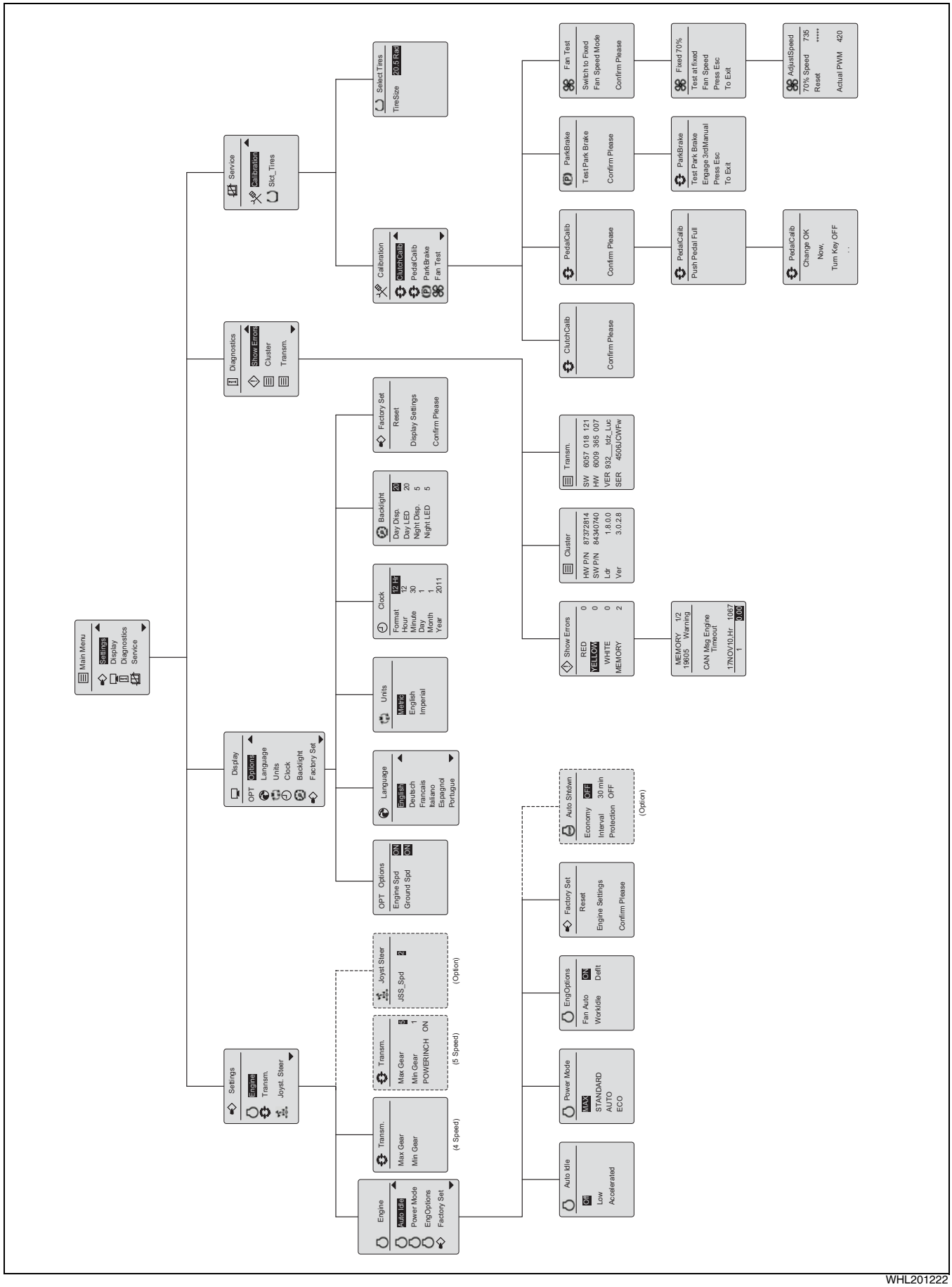
Main Menu
Settings
Display
Diagnostics
Service
Settings
Engine
Transm.
Joyst. Steer
Engine
Auto Idle
Power Mode
EngOptions
Factory Set
Auto Idle
On
Low
Accelerated
Power Mode
MAX
STANDARD
AUTO
ECO
EngOptions
Fan Auto ON
Workidle Delt
Factory Set
Reset
Engine Settings
Confirm Please
Auto Shtdwn
Economy OFF
Interval 30 min
Protection OFF
(Option)
Transm.
Max Gear
Min Gear
(4 Speed)
Transm.
Max Gear 5
Min Gear 1
POWERINCH ON
(5 Speed)
Joyst Steer
JSS_Spd 2
(Option)
Display
OPT Options
Language
Units
Clock
Backlight
Factory Set
OPT Options
Engine Spd ON
Ground Spd ON
Language
English
Deutsch
Francais
Italiano
Espagnol
Portugue
Units
Metric
English
Imperial
Clock
Format 12 H
Hour 12
Minute 30
Day 1
Month 1
Year 2011
Backlight
Day Disp. 20
Day LED 20
Night Disp. 5
Night LED 5
Factory Set
Reset
Display Settings
Confirm Please
Diagnostics
Show Errors
Cluster
Transm.
Show Errors
RED 0
YELLOW 0
WHITE 0
MEMORY 2
MEMORY 1/2
19805 Warning
CAN Msg Engine
Timeout
17NOV10,Hr 1967
1 100
Cluster
HW P/N 87372814
SW P/N 84340740
Ldr 1.8.0.0
Ver 3.0.2.8
Transm.
SW 6057 018 121
HW 6009 365 007
VER 932_ tdz_Luc
SER 4506JCWFw
Service
Calibration
Slct_Tires
Select Tires
TireSize 20.5 R4
Calibration
ClutchCalib
PedalCalib
ParkBrake
Fan Test
PedalCalib
Confirm Please
PedalCalib
Push Pedal Full
PedalCalib
Change OK
Now,
Turn Key OFF
ClutchCalib
Confirm Please
ParkBrake
Test Park Brake
Confirm Please
ParkBrake
Test Park Brake
Engage 3rdManual
Press Esc
To Exit
Fan Test
Switch to Fixed
Fan Speed Mode
Confirm Please
Fixed 70%
Test at fixed
Fan Speed
Press Esc
To Exit
AdjustSpeed
70% Speed 735
Reset ****
Actual PWM 420

WHL201222

CODE	DEFINITION	POSSIBLE STEPS FOR REPAIR
1836	JSS controller, board temperature, out of limits temperature on the JSC board is <-40C or >+85C;	Check ambient temperature or short circuit at JSC power outputs
1837	JSS controller, switched power, out of limits switched power supply at JSC Pin3 is out of limit;	Check elect connection for electrical transients, burst or drifts.
1838	Neutral switch out of range	Check wiring, installation, and proper functioning of neutral switch. See electrical schematics and section 5009 for details.
1839	Joystick steering is not calibrated	See electrical schematics and section 5009 for details.
1841	JSS valve internal error, spool position not accurate or signal voltage out of range	Check wiring, installation, and proper functioning of JSS valve. See electrical schematics and section 5009 for details.
1842	JSS valve Pin2 (alarm signal) open circuit	Check wiring, installation, and proper functioning of JSS valve. See electrical schematics and section 5009 for details.
1843	Pilot pressure switch open when HSS is deactivated. High pilot pressure on JSS valve even when JSS is not active.	Pilot dump valve stuck close or short to power on valve power supply. Or open circuit on JSS pilot pressure switch lines or JSC/Pin8.
1844	Pilot pressure switch short to ground	Check wiring, installation, and proper functioning of pilot pressure switch. See electrical schematics and section 5009 for details.
1845	Pilot pressure switch stays closed (Input JSC8+1) although JSS is activated. With low pilot pressure on JSS valve no steering with JSS possible.	Error is displayed when JSS active and Pilot pressure stays low. Pilot dump valve stuck open or open circuit or short to ground on JSS valve power supply (valve connector Pin4). Or short to power on JSS pilot pressure switch lines or input JSC/Pin8.
1846	Standard steering orbit or tank pressure transducer switch short to power or short to ground	Check wiring, installation, and proper functioning of switch. See electrical schematics and section 5000 for details.
1847	JSC Model type not available, no model type information available in JSC, probably missing information from AIC	No information available at time of print.
1850	JSS joystick Pins2, 4, or 6 short to ground, short to battery or open circuit, or JSS joystick internal failure.	Check wiring, installation, and proper functioning of JSS joystick. See electrical schematics and section 5009 for details.
1852	JSS joystick Pins5 open circuit, or JSS joystick internal failure	Check wiring, installation, and proper functioning of JSS joystick. See electrical schematics and section 5009 for details.
1860	CAN timeout of C5.E detected by JSC	No information available at time of print.
1861	CAN timeout of AIC detected by JSC controller	No information available at time of print.
1863	Internal malfunction transmission controller. TCU message JSS F-N-R disabled or JSS F-N-R not activated.	No information available at time of print.

CODE	DEFINITION	DESCRIPTION AND POSSIBLE STEPS FOR REPAIR
3145	Terminal 15 - No signal	NOTICE: Fault Code 3145 is stored historical information. For multiple occurrences of this fault proceed with the following tests. NOTE: See engine repair manual for electrical schematic information. When available use special tool 380040185 harness diagnostic/repair kit. Cause: 1. Faulty reading from component. 2. Connectors not mated fully, pins not pushed into connector fully, bent pin or broken wire at rear of connector. 3. Wiring or circuits open. 4. Wiring or circuits shorted. 5. Connector pins corroded or dirty.
3147	Oil temperature sensor signal above normal range	Check oil temperature sensor for accuracy and check oil system.
3148	Coolant temperature sensor dynamic test - Failure (Minimum temperature raise not reached).	See engine manual for details.
3154	Grid heater relay short-circuit to battery	Short circuit of wiring to external source or inside relay. Check wiring or replace relay
3155	Grid heater relay short-circuit to ground	Short circuit of wiring to ground or inside relay. Check wiring or replace relay
3156	Grid heater relay no load	Broken or disconnected wiring or defective relay. Check wiring or replace relay
3157	Engine dataset information was not available from EDC in required time	See engine manual for details.
3158	Engine dataset does not match dataset registered for this machine	See engine manual for details.
3160	Fan actuator - Short circuit to battery	See engine manual for details.
3161	Fan actuator signal low	No information available at time of print.
3162	Fan actuator - Open load	See engine manual for details.
3163	Fan actuator - Temperature too high	See engine manual for details.
3166	Fuel filter heater relay - Short circuit to battery	See engine manual for details.
3167	Fuel filter heater relay - Short circuit to ground.	See engine manual for details.
3168	Fuel filter heater relay - Open load.	See engine manual for details.
3169	Fuel filter heater relay - Signal not plausible.	See engine manual for details.

CODE	DEFINITION	DESCRIPTION AND POSSIBLE STEPS FOR REPAIR
3370	Info: Torque limitation due to engine protection (against excessive torque, Engine overspeed and overheat)	See engine manual for details.
3371	Info: Torque limitation due to fuel quantity limitation because of injection system errors.	See engine manual for details.
3512	DCU State monitoring - DCU not ready in time	See engine manual for details.

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STEERING BACK PRESSURE VALVE

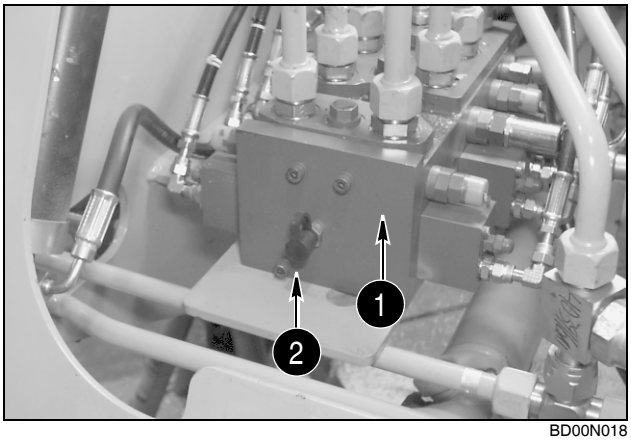
Removal

1. Remove the fill cap for the hydraulic reservoir to release pressure in the reservoir, attach a vacuum pump to the reservoir, start the pump.
2. Disconnect hoses (2) and (5) from the pressure relief valve.
3. Remove the nuts, bolts and spacers from the pressure relief valve, remove the valve from the machine.

Installation

1. Install the valve, bolts, spacers and nuts onto the machine, tighten the bolts.
2. Install new O-rings onto the fittings of the hoses, install and tighten the hoses.
3. Stop the vacuum pump, install and tighten the reservoir filler cap.
4. Start and run the machine at low idle, turn the steering wheel from full left lock to full right lock holding the steering over relief.
5. Stop the machine and check for leaks.
6. Check fluid level in hydraulic reservoir. Add oil as required. See Section 1002 for specifications.

6. Make sure that the temperature of the hydraulic oil is at least 52° C (125° F).
7. To measure the temperature of the oil using the instrument panel:
   A. Press the program switch (left side of the program/reset switch).
   B. Press the up count switch to function 008.
   C. Return the program switch to the **OFF** (center) position.
8. Apply the parking brake.
9. Start and run the engine at full throttle.
10. Hold the bucket control lever in the rollback position.
11. Hold the lift lever in the “FLOAT” position.
12. Continue holding until the specified temperature of the oil is reached.
13. Stop the engine.
14. Remove the cap on the hydraulic reservoir to release any pressure in the hydraulic system.



BD00N018

1. LOADER CONTROL VALVE
2. PUMP PRESSURE TEST PORT

15. Remove the dust cap from the test port (2).
16. Connect a 345 bar (5000 psi) pressure gauge to the test port (2) on the front of the loader control valve (1).

NOTE: *Make sure when you connect the pressure gauge that you do so in a manner that you can read the pressure gauge while sitting in the operators seat.*

17. Start the engine and operate the machine at full throttle.
18. With the articulation lock still in place, turn and hold the steering wheel for a hard right turn.
19. Continue holding the steering wheel, and read the pressure gauge.
20. The pressure gauge must indicate 239 to 243 bar (3465 to 3523 psi). If the pressure is not correct, adjust the steering relief valve.

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3rd F-N-R SWITCH ON THE ARMREST (left-hand side)

For the joystick steering system it is necessary to integrate a third F-N-R switch in the current operating logic of the gearbox. For this purpose the software of the control unit of the transmission (TCU) is able to turn the F-N-R switch on the armrest ON/OFF when the JSS is activated.
It is therefore necessary for the TCU control unit to generate a new CAN message stating JSS F-N-R enabled/disenabled.
The software in the transmission control unit (TCU) has to be compatible with systems with and without the joystick steering system. This means that all the current TCU functions will remain unchanged.

Position of the F-N-R switches in the cab

1. Main F-N-R (current) located on the gear lever of the steering column;
2. AUX F-N-R (current) incorporated on the equipment control joystick (or console on right-hand side);
3. AUX JSS F-N-R (new) incorporated on the armrest on the left-hand side.

PROCEDURES FOR TURNING ON / OFF

Among the three F-N-R activation devices, the one on the gear lever of the steering column has priority over the other two auxiliary ones, which must be enabled, each one with a specific enabling signal and according to a specific activation procedure. If enabled, the JSS F-N-R auxiliary switch located on the left-hand side armrest has priority over the F-N-R auxiliary switch on the right.

Main F-N-R lever activation procedure

- The main F-N-R lever on the steering column is always active;
- the main F-N-R switch has priority over all the other auxiliary F-N-R switches;
- one of the auxiliary F-N-R switches can be enabled only if the main switch is in neutral.

Activation procedure for auxiliary JSS F-N-R (left-hand side)

The auxiliary JSS F-N-R switch is incorporated in the armrest on the left-hand side that is an integral part of the JSS:
- the auxiliary JSS F-N-R switch will be enabled with the activation of the JSS;
- when the JSS is activated, a message is sent via CAN to the gearbox control unit;
- this will cause activation of the auxiliary JSS switch as well as starting the JSS F-N-R enabling procedure;
- in order to enable the auxiliary JSS switch, it is necessary to check the position of the switch;
  - if the auxiliary JSS F-N-R switch is in neutral, enabling will take place directly;
  - if the auxiliary JSS F-N-R switch is not in neutral, enabling will not take place directly, but the software will check the status of the JSS F-N-R switch. Indeed, only at the moment when the JSS F-N-R switch is in the neutral position will its enabling be confirmed (without pressing the JSS activation switch again);
- during activation of the JSS a message is sent via CAN stating “JSS ON”;
- the auxiliary JSS F-N-R switch is disenabled when the JSS is disenabled;
- when turning off the JSS a message is sent via CAN stating “JSS OFF”.

Turning JSS ON

- Press the JSS system ON button:
  - **a.** armrest on left-hand side lowered;
  - **b.** equipment locking switch disenabled;
  - **c.** low JSS piloting pressure;
  - **d.** JSS joystick in neutral;
  - **e.** no error in the JSS;
  - **f.** main F-N-R gear control lever in neutral;
  - **g.** vehicle stationary (speed less than or equal to 1.5 km/h).

Turning JSS OFF

1. Using the steering wheel;
2. gear lever on the steering column / main F-N-R switch not in neutral;
3. armrest on left-hand side lowered;
4. JSS enabling button OFF;
5. errors in the JSS system;
6. engine OFF.

W190-4R093

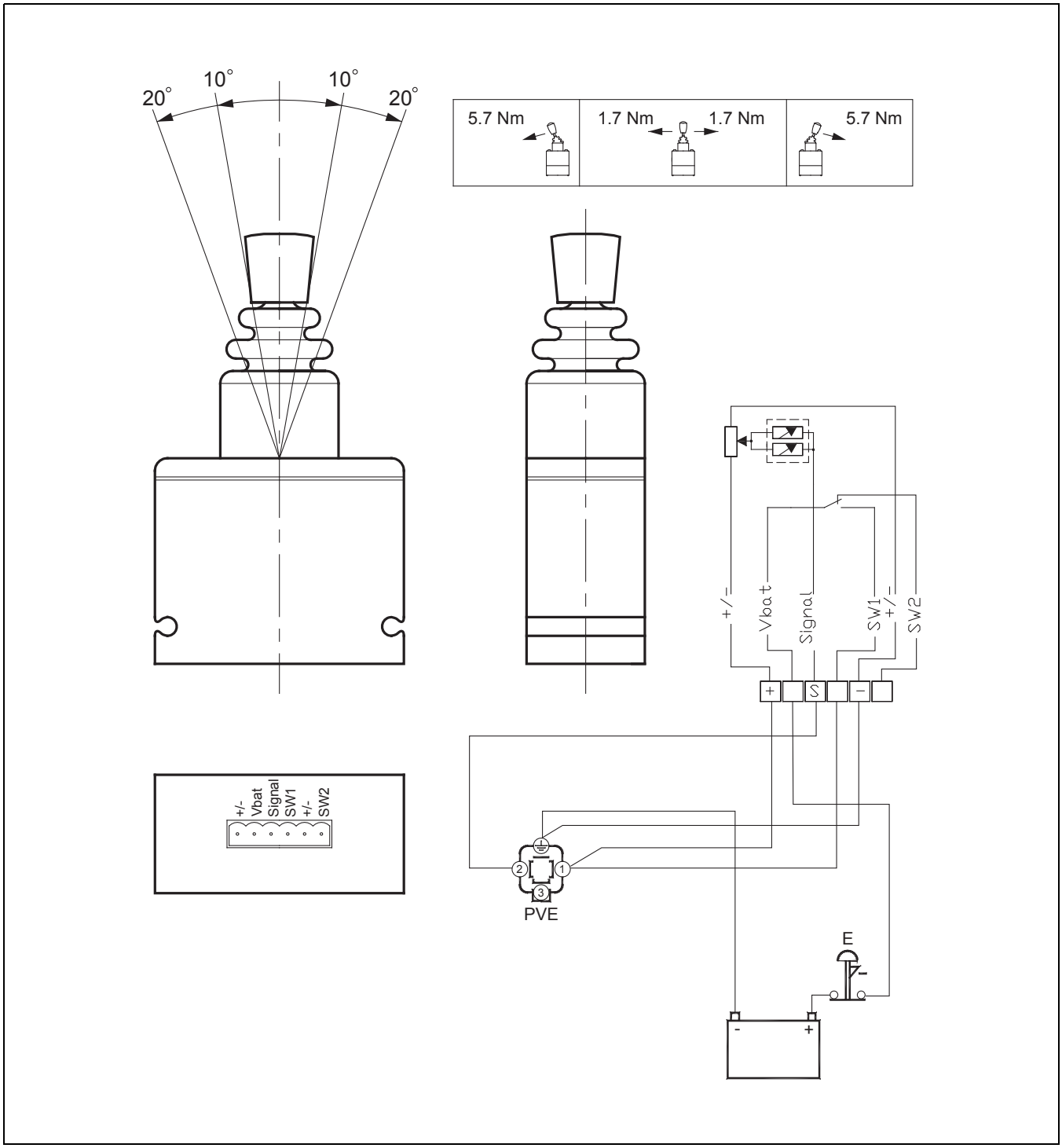


Illustration of the Joystick Steering PVRES

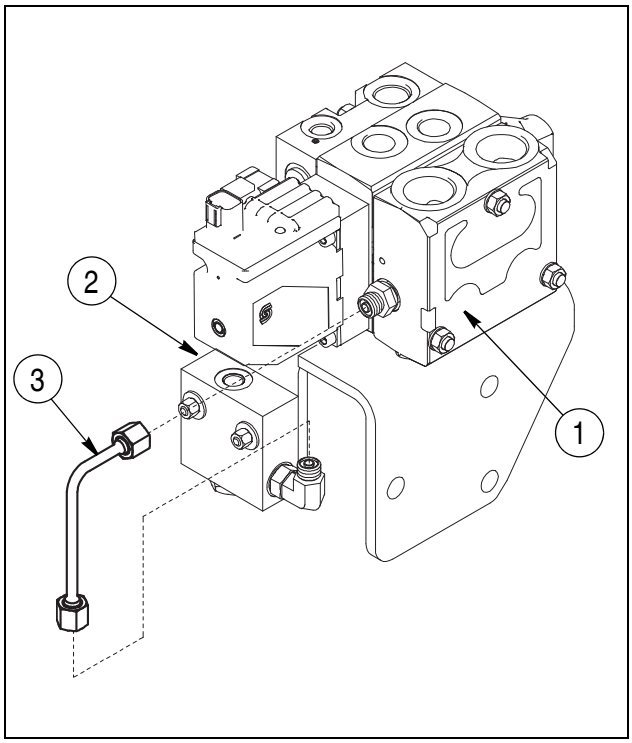
STEERING VALVES PVG32 AND PVFC

Removal

STEP 1

Remove all dirt and grease from the steering valves and adjacent areas.

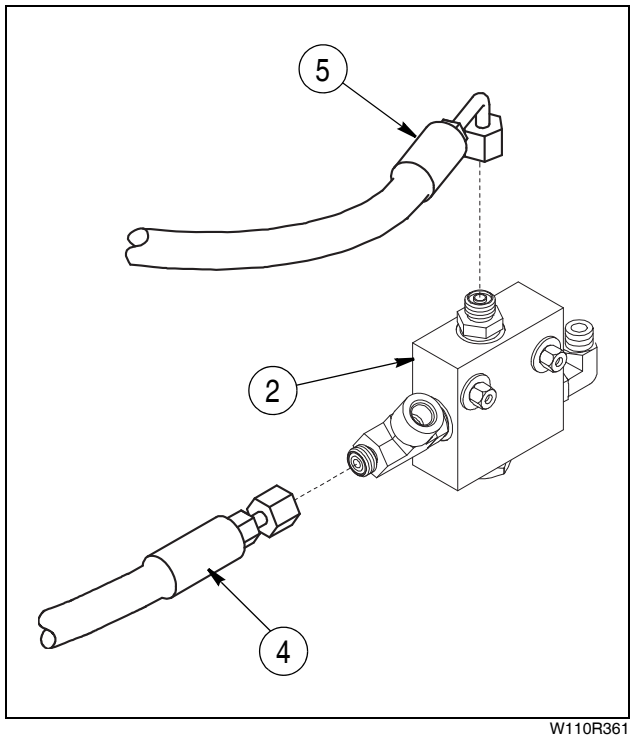
STEP 2



W110R360

Detach the rigid steering pipe LS (3) from the valve PVG32 (1) and from the valve PVFC (2).

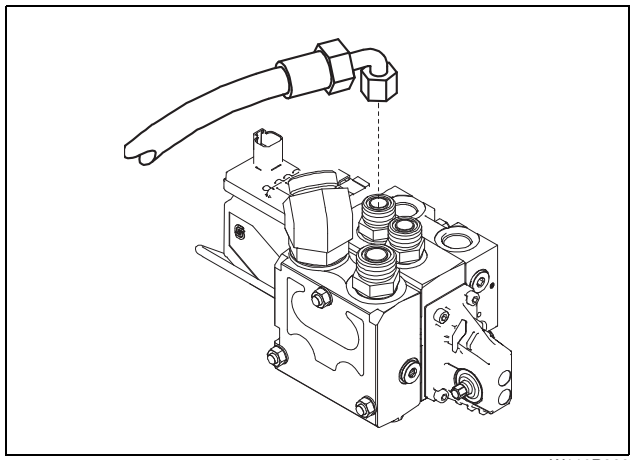
STEP 3



W110R361

Disconnect the tie flexible hose (4) from the valve PVFC (2), with the solenoid valve of the emergency steering assembly and the flexible hose (5) coming from the tool distributor. Plug the flexible hoses in order to avoid oil spillage and the fittings to prevent debris from getting inside.

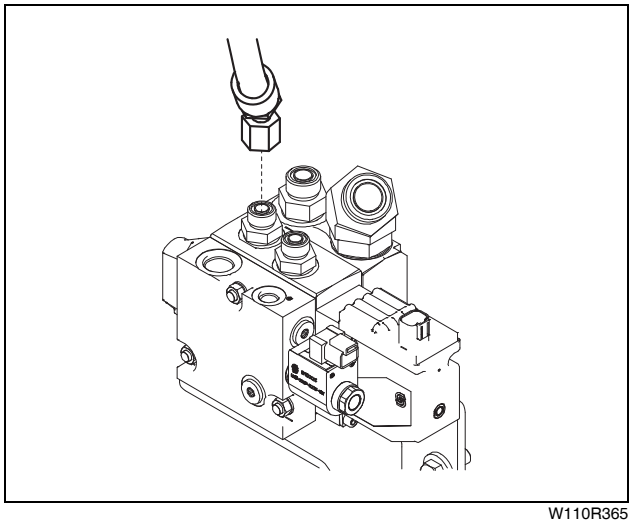
STEP 4



W110R362

Disconnect the suction flexible hose of the solenoid valve of the emergency steering assembly from the valve PVG32.

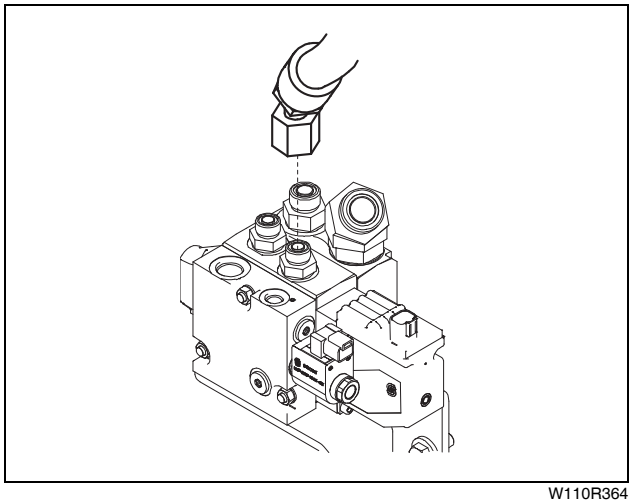
STEP 32



W110R365

Connect the stem side steering cylinder line supply flexible hose on the joint installed on the valve PVG32.
Tighten the pipe to a torque of 60 Nm.

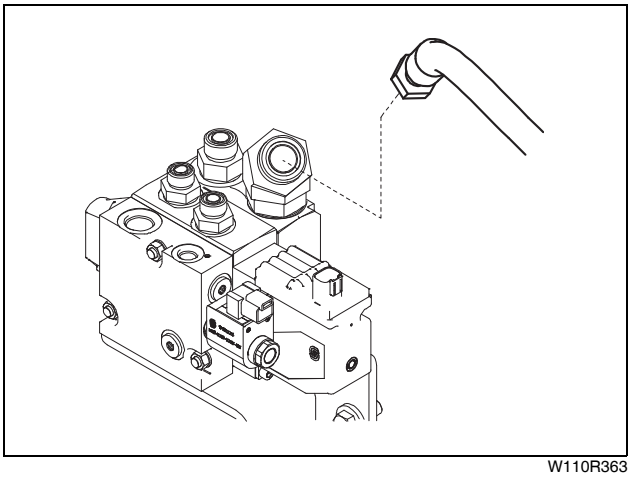
STEP 33



W110R364

Connect the bottom side steering cylinder line supply flexible hose.
Tighten to a torque of 60 Nm.

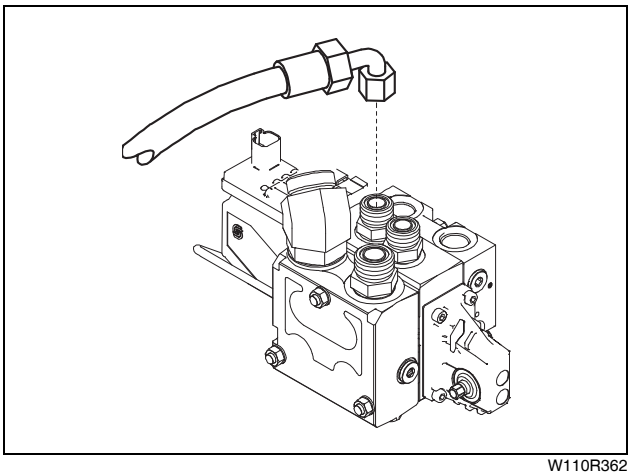
STEP 34



W110R363

Connect and tighten the outlet flexible hose to a torque of 125 Nm.

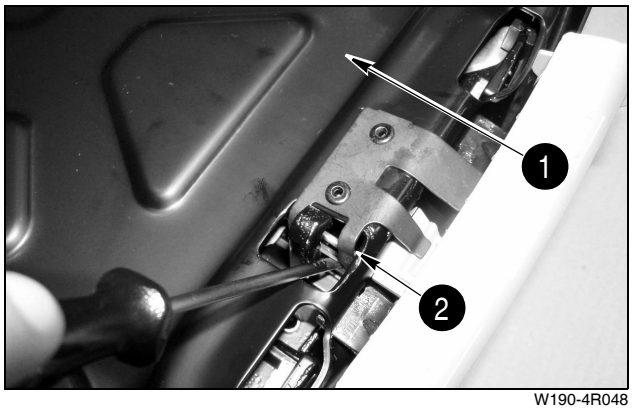
STEP 35



W110R362

Connect the suction flexible hose of the solenoid valve of the emergency steering assembly.
Tighten the pipe to a torque of 60 Nm.

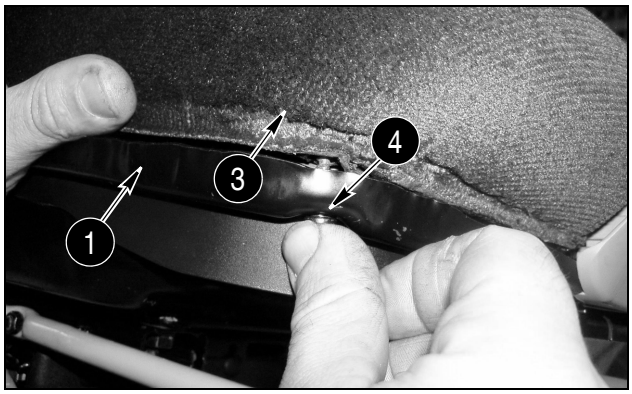
STEP 29



W190-4R048

Lock the seat cushion support plate (1) by restoring the correct bend in the aluminium tongue (2). In this phase, take great care since the aluminium tongue (2) has greatly reduced thickness and so therefore avoid breaking it so as not to jeopardize seat operation.

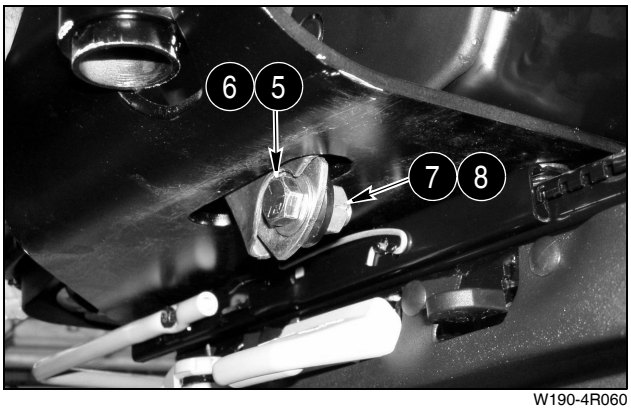
STEP 30



W190-4R059

Install the seat cushion (3) on the support plate (1) and secure it with the screws (4, qty. 4) complete with washers.

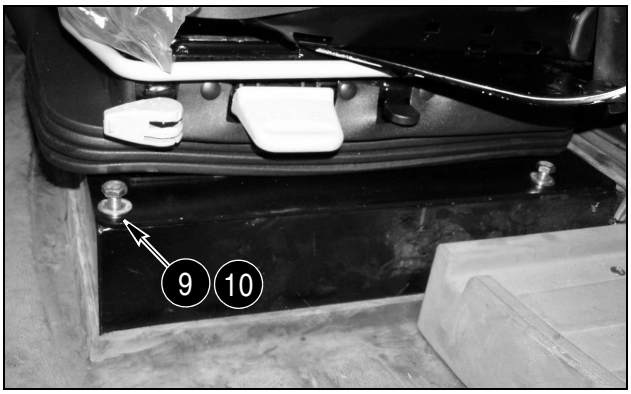
STEP 31



W190-4R060

Install the support for fastening to the safety belt by inserting the screw (5) and the washer (6), the nut (7) and the washer (8). Tighten the nut to a torque of between 47 and 68 Nm.
Carefully check that the seat belt mounting hardware is tight and the seat belt is not cut or frayed.

STEP 32



W190-4R061

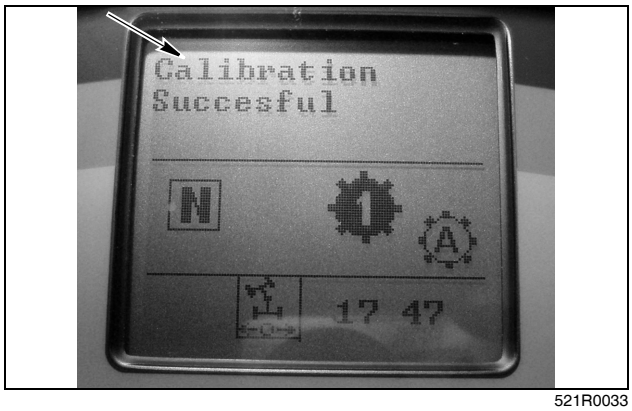
Using a hoist equipped with lifting straps, sling the seat and position it inside the cab.
Connect the wiring harness to the operator's seat (if equipped with air seat option). Install the seat on the base and secure it with the four screws (9) complete with washers (10). Tighten the screws to a torque of between 73 and 87 Nm.
Carefully check that the tightening torque of the screws fastening the operator's seat is as prescribed and that the parts are not worn or damaged.

STEP 10

521R0032

After this operation the display will show a screen with the wording "**O. K.**". The display will automatically show the screen with the wording "**Joyst Full Right**" "**Release when WL starts moving**", the operator must then repeat **Step 9** twice.

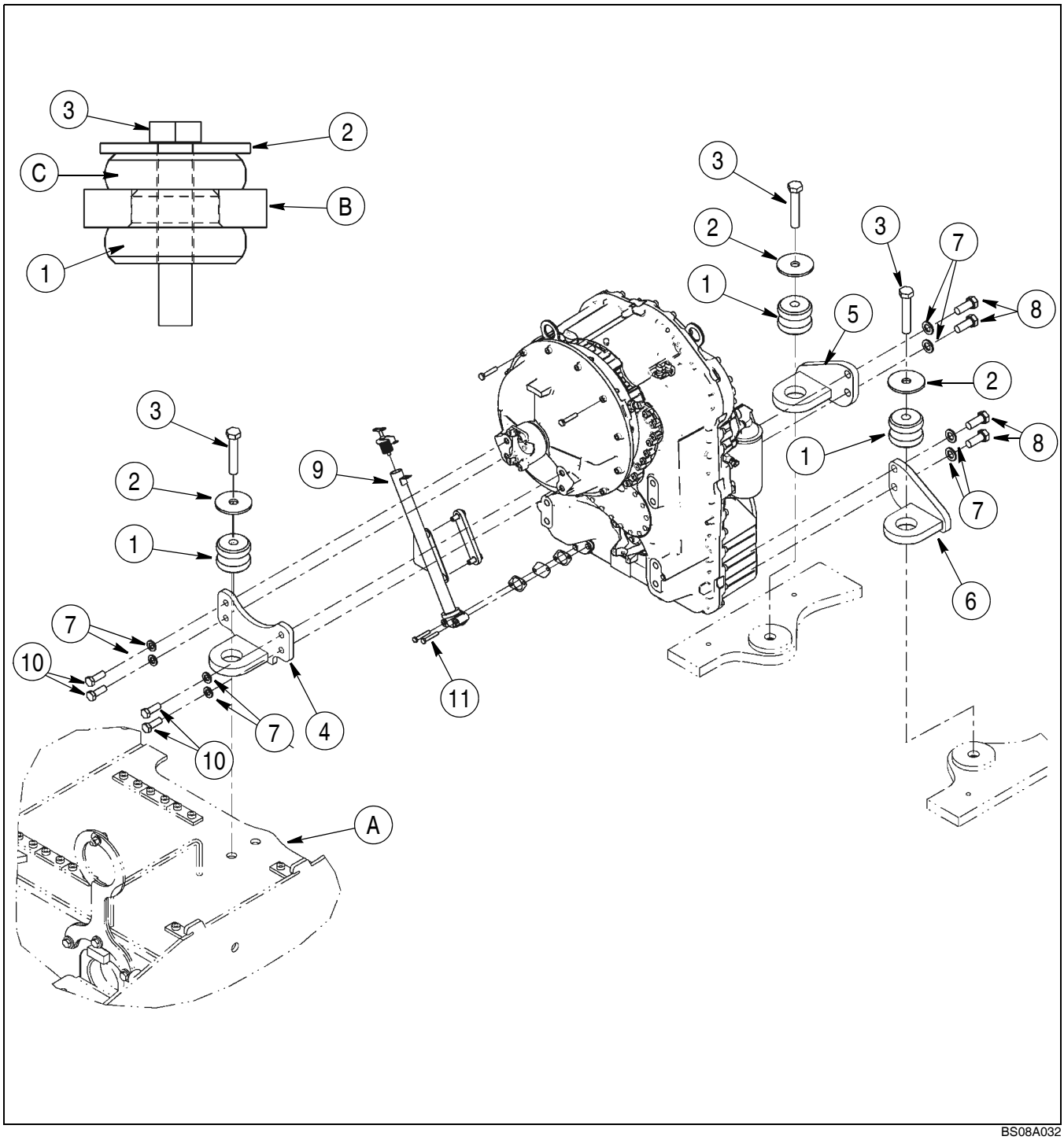
STEP 11



521R0033

The display will show a screen with the wording "**Calibration Successful**" indicating the success of the calibration procedure.

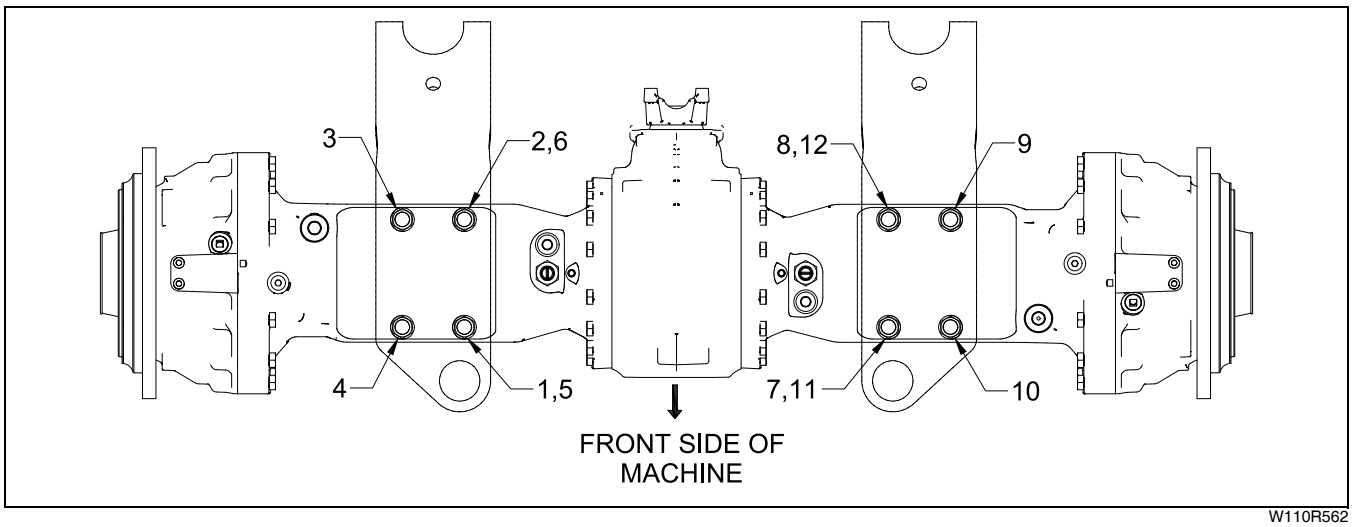
Transmission Mounting



BS08A032

1. ISOLATOR
2. WASHER
3. ISOLATOR BOLT M22X120 (*)
4. TOP MOUNTING BRACKET
5. LEFT MOUNTING BRACKET
6. RIGHT MOUNTING BRACKET
7. WASHER
8. BOLT M20X50 (**)
9. TRANSMISSION FILL TUBE
10. BOLT M16X45 TORQUE 251-319 Nm (185-235 lbs-ft)
11. BOLT M8X50 TORQUE 17-33 Nm (12-24 lbs-ft)
A. REAR CHASSIS TRUNNION
B. MOUNTING BRACKET
C. ISOLATOR (SMALLER PIECE ON TOP)

(*) Torque 890-1000 Nm (655-735 lbs-ft)
(**) Torque 480-590 Nm (355-435 lbs-ft)



W110R562

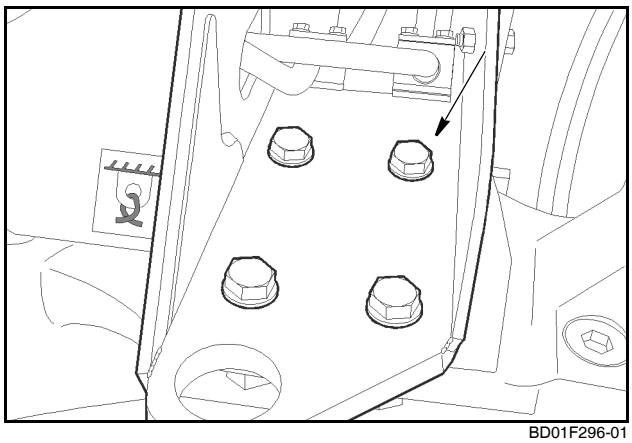
FRONT AXLE TORQUE SEQUENCE

Installation

STEP 14

Carefully move front axle under machine and raise against mounting pads on machine.

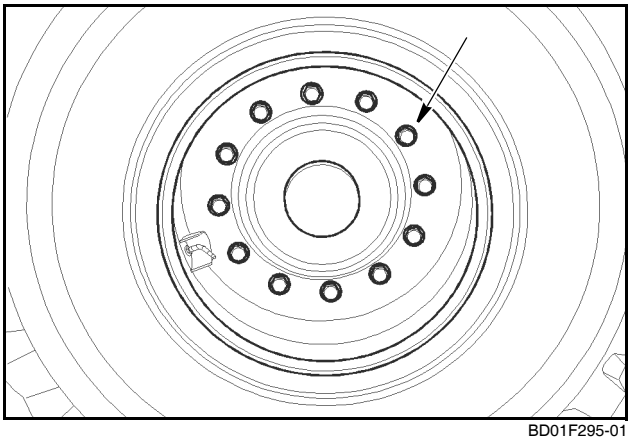
STEP 15



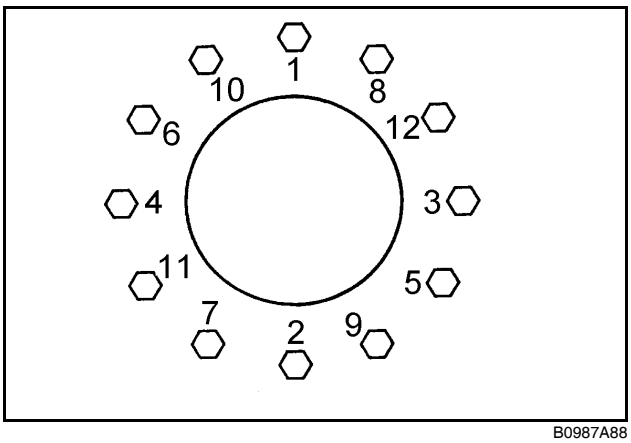
BD01F296-01

Apply one drop of engine oil to threads prior to assembly. Install washers, bolts, and nuts to secure front axle to machine. Tighten bolts to a torque of 783 to 857 Nm (577 to 632 pound feet) using torque sequence shown.

STEP 16



BD01F295-01



B0987A88

Install both wheels on front axle and secure. Tighten bolts to a preliminary torque of 298 Nm (230 pound feet) in sequence indicated; then tighten to a torque of 640 to 720 Nm (475 to 530 pound feet) in same sequence.

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Downshifting in Manual Mode

The transmission can be downshifted in the manual mode without reducing engine speed or machine speed.

If 1st gear is selected from 3rd or 4th gear, the transmission will downshift into 2nd gear for 1.2 seconds and then will shift into 1st gear.

Downshift Button

The downshift button is located on front of the joystick control lever in machines with a single lever configuration, and on top of the control tower in machines with a three lever configuration.

With the number of different ways the downshift button functions, the operator can tailor the use of the machine to the application at hand.

Automatic Mode

In the Automatic Mode, the downshift button only shifts down. The downshift button allows the operator to downshift through the entire range of gears. This is useful in long haul applications or roading.

Each time the button is pushed the transmission will instantly downshift one gear from 4th to 3rd, then from 3rd to 2nd, and then from 2nd to 1st.

The transmission will automatically downshift and then upshift, as needed, to the last gear that was selected with the downshift button.

Example: *If the downshift button was used to shift from 4th to 3rd gear, the transmission will automatically shift from 3rd down and then back up to 3rd again. It will not shift into 4th until the transmission has been returned to the full range automatic mode.*

The transmission will return to the full range automatic mode when:

A. Another gear is selected.

B. The shifter is moved into neutral and then into forward or reverse.

C. The autoshift switch is recycled.

Manual Mode

In the manual mode, the downshift button toggles between 1st and 2nd gear. The manual mode is useful in short haul operations. In this mode, the downshift button functions in two ways in 1st and 2nd gear.

When the operator is in 2nd gear and pushes the downshift button, the transmission instantly shifts into 1st gear. When the operator pushes the downshift button again, the transmission upshifts into 2nd gear.

If the machine is in 2nd gear and the downshift button is pushed, the transmission instantly shifts into 1st gear. When the operator shuttles the shifter, the transmission upshifts back into 2nd gear.

Cold Start Protection System

The transmission has a cold start protection system. When the transmission sump temperature is minus 10° C (14° F), the Transmission ECM will keep the transmission in neutral.

When the transmission sump temperature warms up to minus 10° C (14°F) (within approximately one minute), the machine will operate in all gears.

Brake Pedal Transmission Declutch

A transmission declutch feature concentrates more engine power on the loader when digging in heavy or tough conditions, providing smoother stops and starts. Total disconnection of the transmission from the engine is prevented. This feature will function in 1st, 2nd, or 3rd gear only. It will not function in 4th gear.

When the transmission declutch switch is in the on position and the brake pedal is pushed, the Transmission ECM reduces the pressure to the transmission forward or reverse clutch.

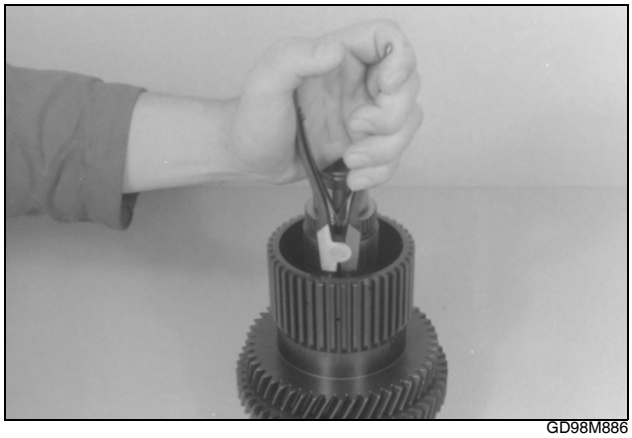
The Transmission ECM will not completely disconnect the clutch from the engine, but gradually reduces the forward or reverse clutch pressure down to a lower level.

When the brake pedal is released, the Transmission ECM gradually increases the forward or reverse clutch back up to system clutch pressure.

If the direction is changed while the transmission is declutched, the selected forward or reverse clutch will be filled and maintain a low pressure until the brake pedal is released. Then the selected forward or reverse clutch pressure will gradually increase up to system clutch pressure.

TABLE OF CONTENTS

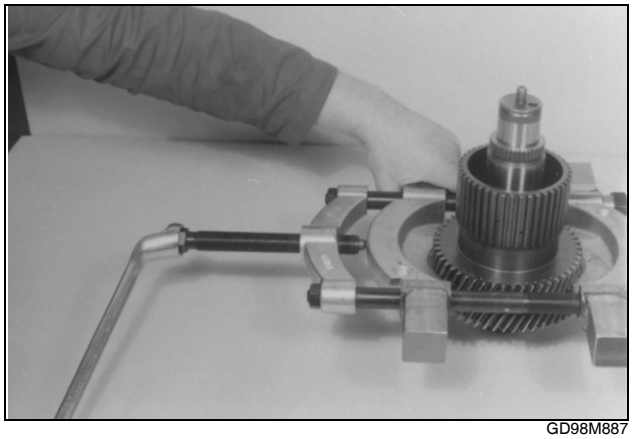
STEP 46



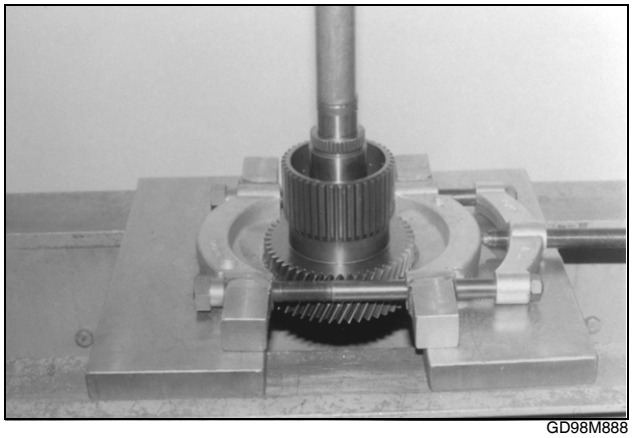
GD98M886

Remove the snap ring.

STEP 47



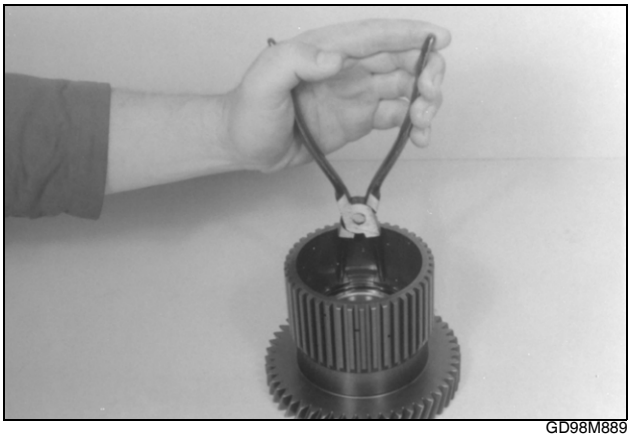
GD98M887



GD98M888

Press the idler gear from the shaft using a bearing separator. Remove released needle bearing.

STEP 48

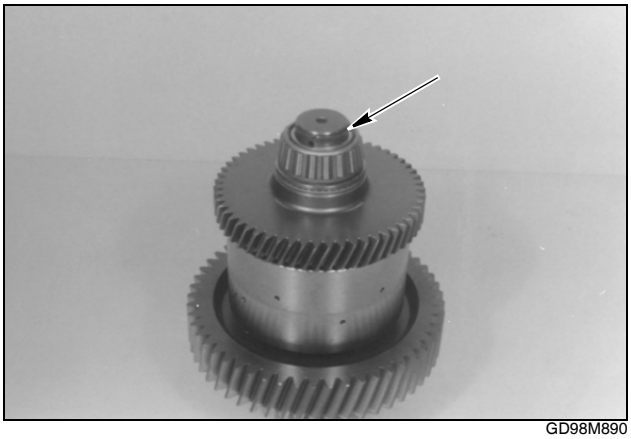


GD98M889

Remove the snap ring and remove the ball bearing.

NOTE: *The following steps are for disassembly of clutch K3. Disassembly of clutches K1 and K2 is similar*

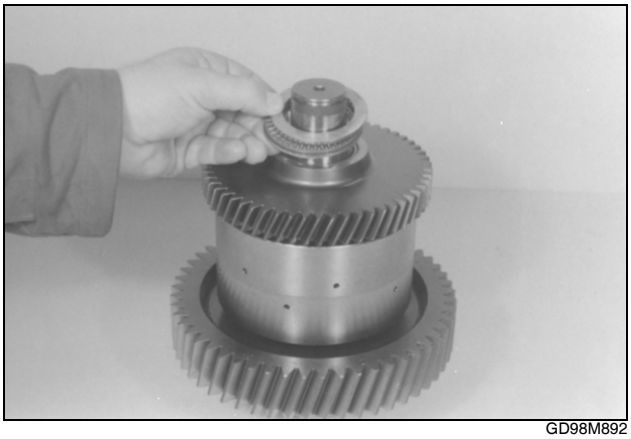
STEP 49



GD98M890

Remove the rectangular ring. Pull the tapered roller bearing from the shaft.

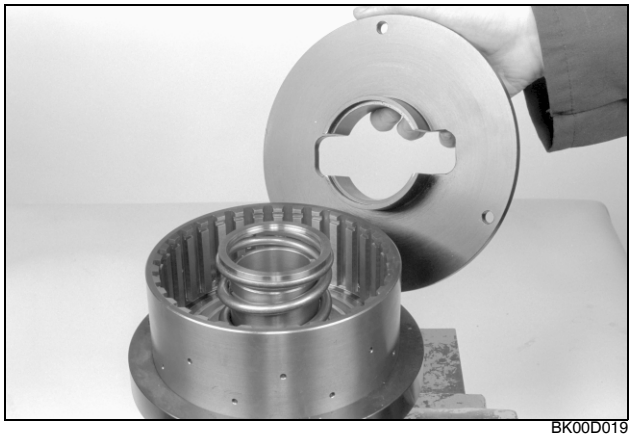
STEP 50



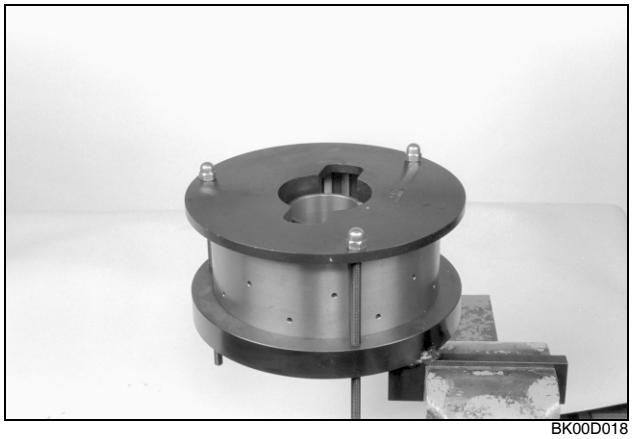
GD98M892

Remove the thrust washer, thrust bearing, and thrust washer.

STEP 99



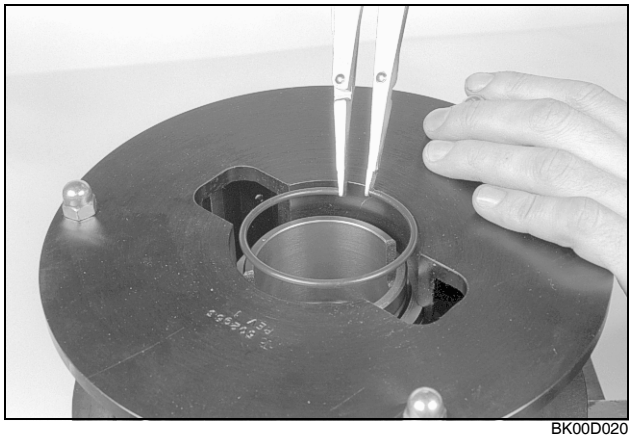
BK00D019



BK00D018

Install compression spring and two spring cups in clutch disc carrier. Preload compression spring using 380001556 clutch pack holder and spring compressor tool.

STEP 100

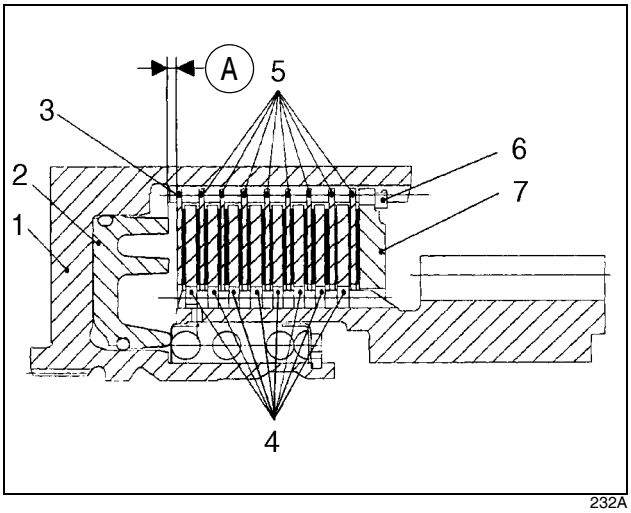


BK00D020

Install the snap ring.

NOTE: *The following steps are for K1, K2 and K3 clutches. The assembly of clutches K1, K2, and K3 is identical.*

STEP 101



232A

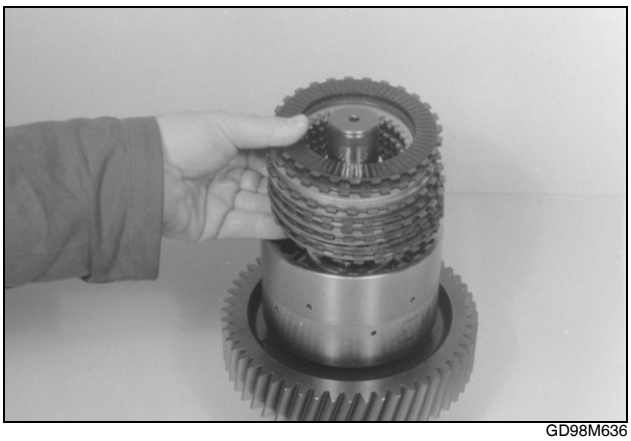
1. PLATE CARRIER
2. PISTON
3. OUTER PLATE - ONE-SIDED COATED
4. INNER PLATES
5. OUTER PLATES - COATED ON BOTH SIDES
6. SNAP RING
7. END SHIM

A. RUNNING CLEARANCE 2.1 TO 2.3 MM (0.083 TO 0.090 IN)

Install clutch disc plates in K1, K2, and K3 clutch disc carriers in position and sequence shown above. Install outer plate (3) with steel faced side facing piston. Install two outer and inner plates each on the end shim side.

NOTE: *Snap rings of different thickness are available for adjustment of the running clearance. To ensure correct adjustment, do not apply oil to clutch discs until after adjustment is completed.*

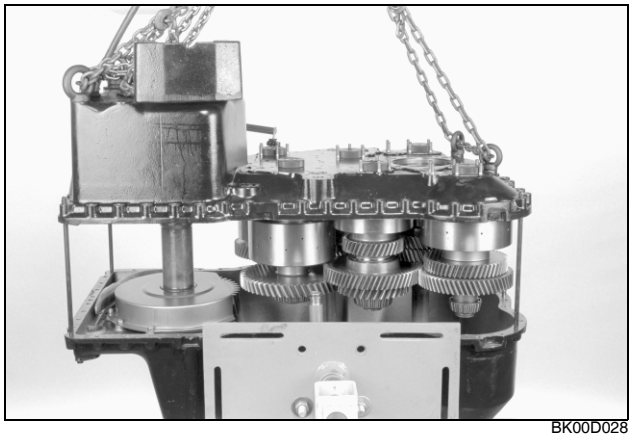
STEP 102



GD98M636

Install the clutch disc pack.

STEP 153



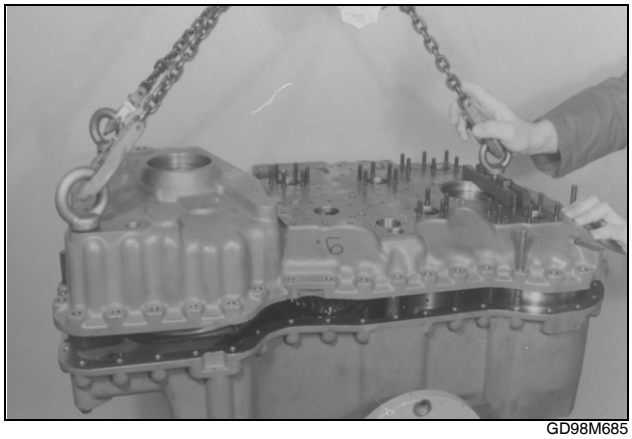
BK00D028

Install output gear and shaft in transmission housing. Install alignment screws. Carefully lower the cover and clutches into the gear box housing.

STEP 154

Remove 380001557 clutch assembly holding knob set.

STEP 155

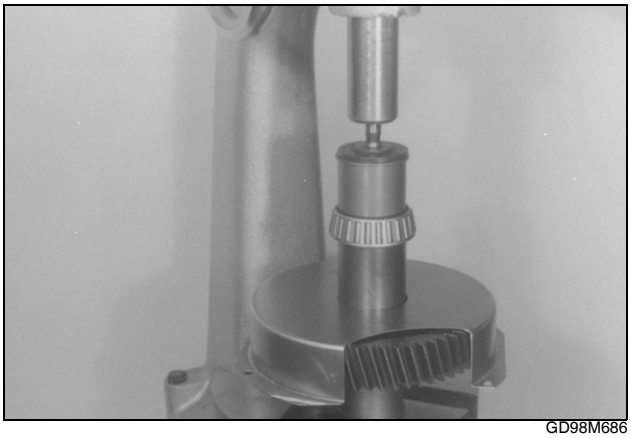


GD98M685

Separate the housing cover from the gearbox, using a lifting device.

NOTE: *The following steps are for the reassembly of the output shaft.*

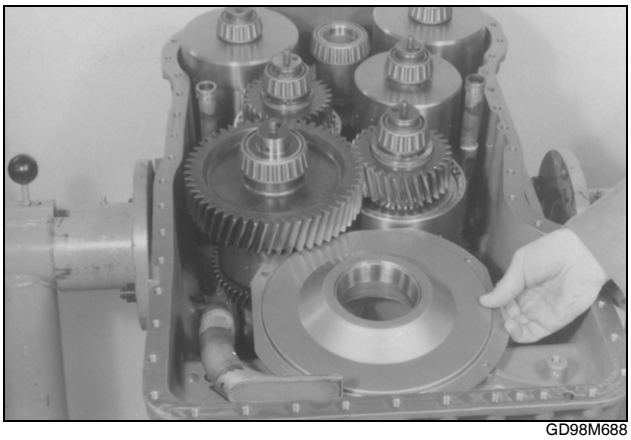
STEP 156



GD98M686

Install screen sheet on output shaft. Press front and rear bearings on output shaft until contact with shoulder of output shaft is made.

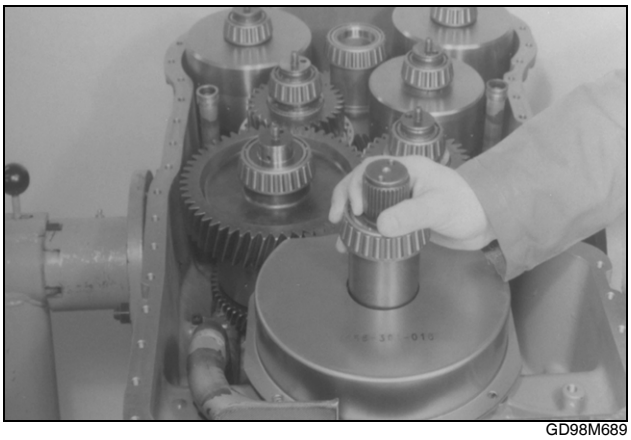
STEP 157



GD98M688

Install the screening plate.

STEP 158

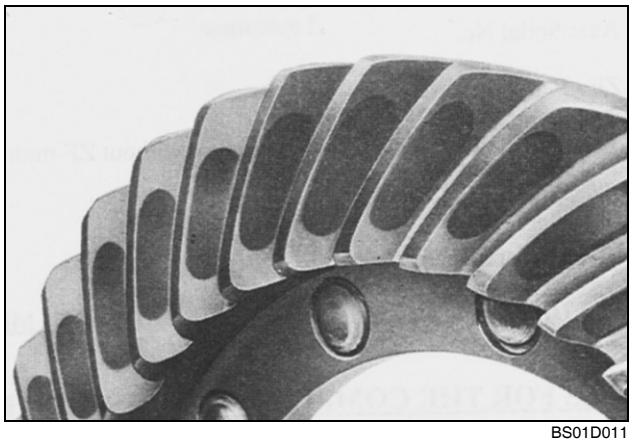


GD98M689

Install the output shaft.

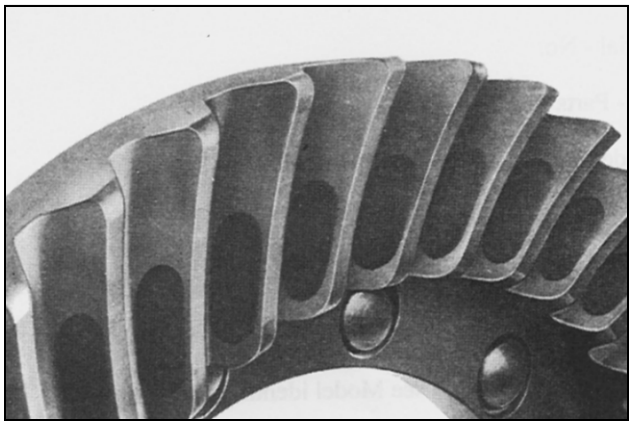
GEAR TOOTH CONTACT PATTERNS

Ideal Tooth Contact Pattern



BS01D011

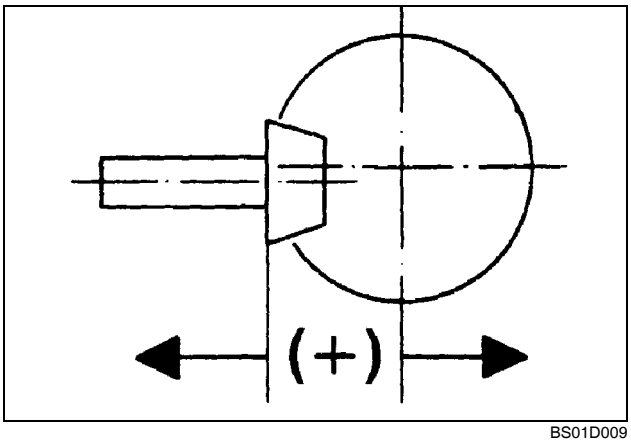
COAST SIDE (CONCAVE)



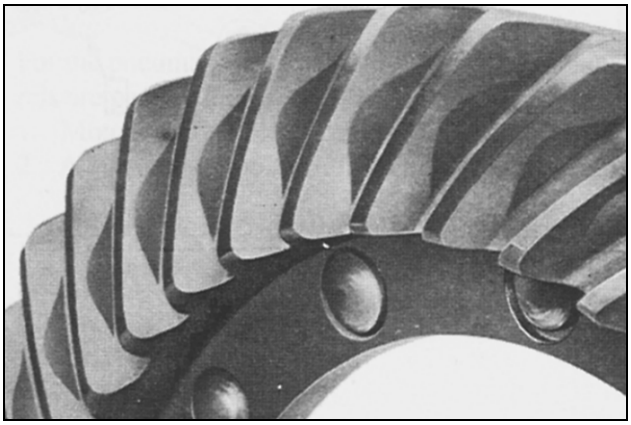
BS01D012

DRIVE SIDE (CONVEX)

Pinion Distance Must Be Increased

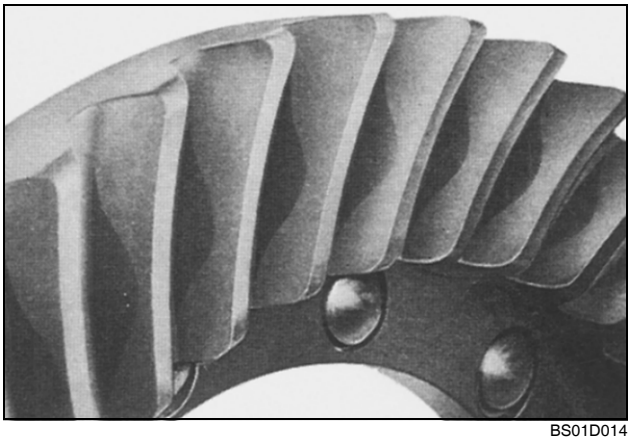


BS01D009



BS01D013

COAST SIDE (CONCAVE)



BS01D014

DRIVE SIDE (CONVEX)

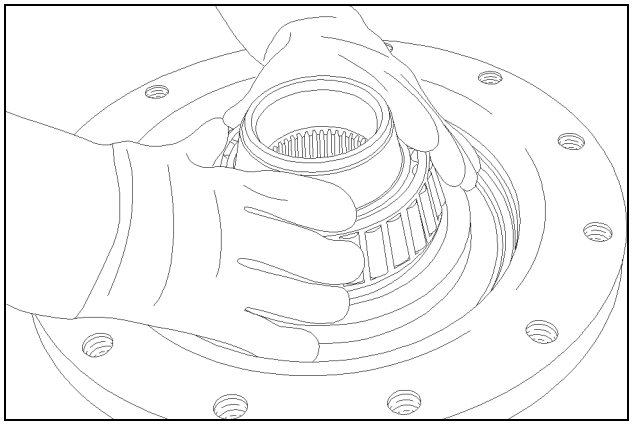
Assembly

NOTE: *Tools and axle shown in the following photographs may appear slightly different than the tools and axle you may have. The use of the tools and disassembly/assembly of axle is the same regardless of appearance.*

STEP 42

WARNING: *Always wear heat protective gloves to prevent burning your hand when handling heated parts.*

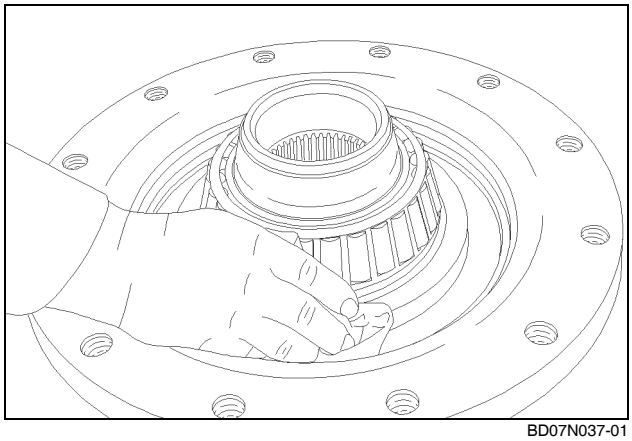
SM121A



BD07N040-01

Heat the wheel end shaft outer bearing to 120° C (248° F) in a bearing oven. Wearing heat resistant gloves or mittens, install the bearing on the wheel end shaft until the bearing is against the shoulder on the wheel end shaft.

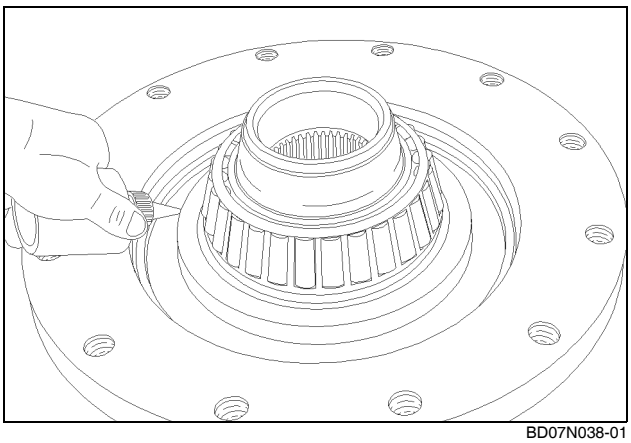
STEP 43



BD07N037-01

Clean mounting surface of seal ring area on wheel end.

STEP 44



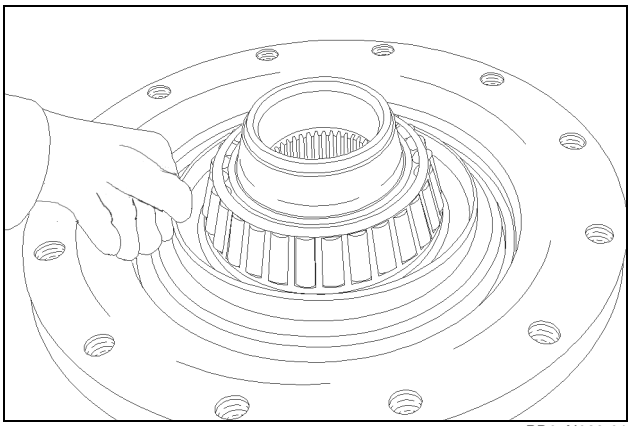
BD07N038-01

Apply Loctite 574 to the seal ring mounting surface.

STEP 45

WARNING: *Always wear heat protective gloves to prevent burning your hand when handling heated parts.*

SM121A



BD07N039-01

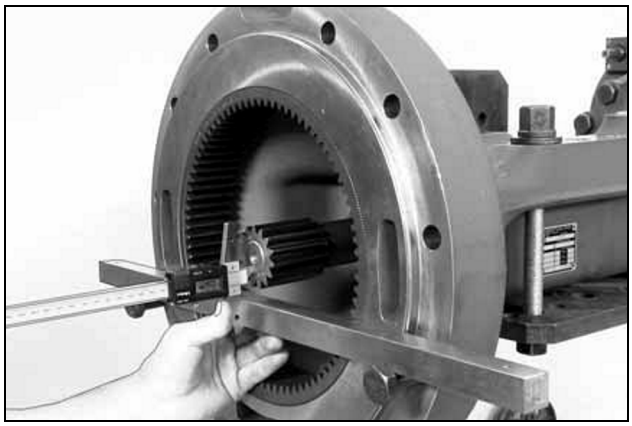
Heat the seal ring to approximately 120° C (248° F), place the face seal ring on the wheel end shaft.

STEP 81

BD08B033-01

Install the sun gear onto the stub shaft with out the shims.

STEP 82



BD08B034-01

Determine dimension B from the face of the sun gear to the mounting face of the axle housing.

Example:

Dimension B . . . . . 100.20 mm (3.95 inch)

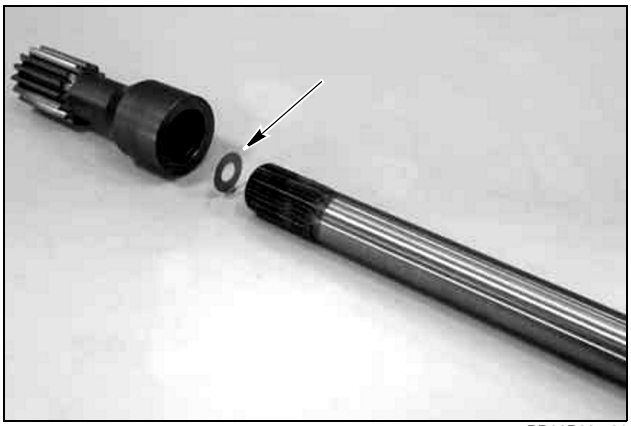
STEP 83

Subtract dimension A from dimension B. Then subtract 1.30 mm (0.05 inch) from the difference. The difference is the required shim size.

Example:

Dimension B	100.20 mm (3.94 inch)
Dimension A	– 97.90 mm (3.85 inch)
Difference	2.30 mm (0.09 inch)
Required end play	– 1.30 mm (0.05 inch)
Difference = shim size	**1.00 mm (0.04 inch)**

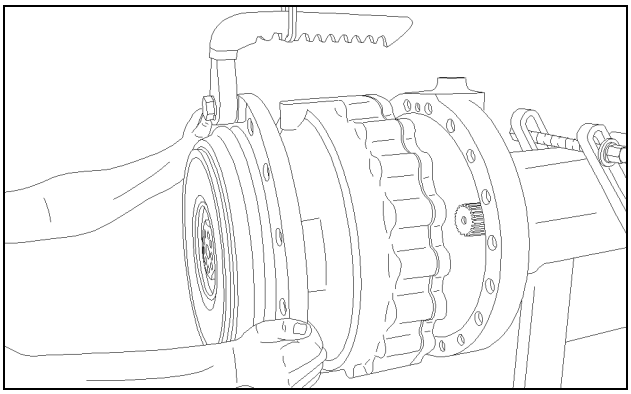
STEP 84



BD08B035-01

Install the sun gear shaft into the stub shaft with the determined shim set. (size as determined in Step 83) into the sun gear shaft with grease.

STEP 85

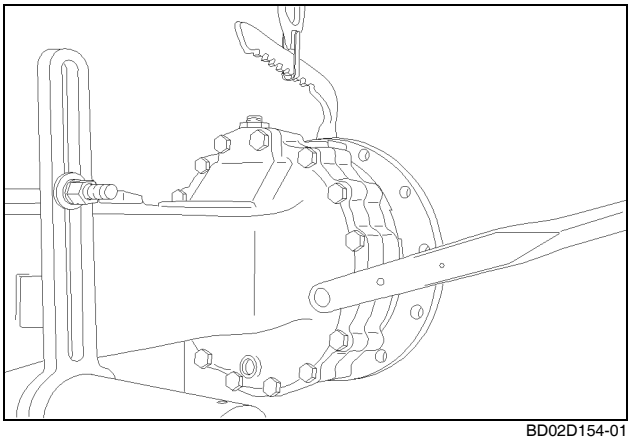


BD06G072-01

Use lifting bracket, and install the assembled wheel end onto the axle housing.

NOTE: *Turn the input flange to align splines of the stub shaft into the sun gear.*

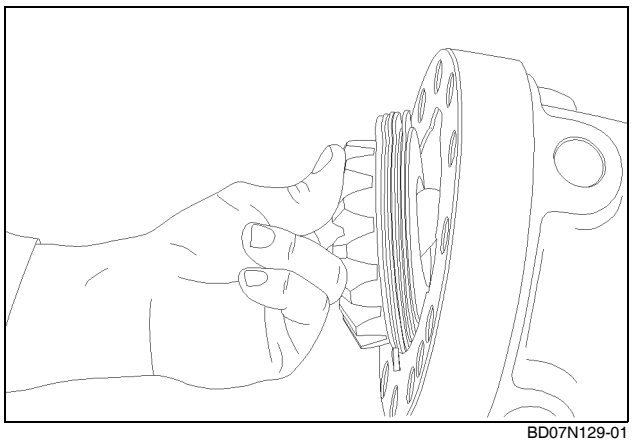
STEP 86



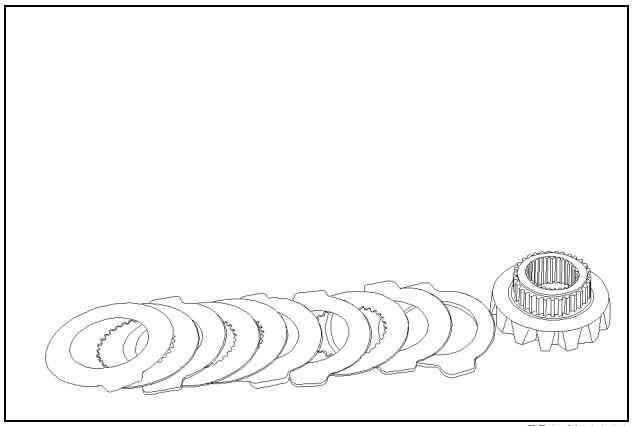
BD02D154-01

Install the washers and bolts to secure the wheel end to the axle housing. Tighten the bolts to a torque of 390 Nm (287.7 pound feet).

STEP 125



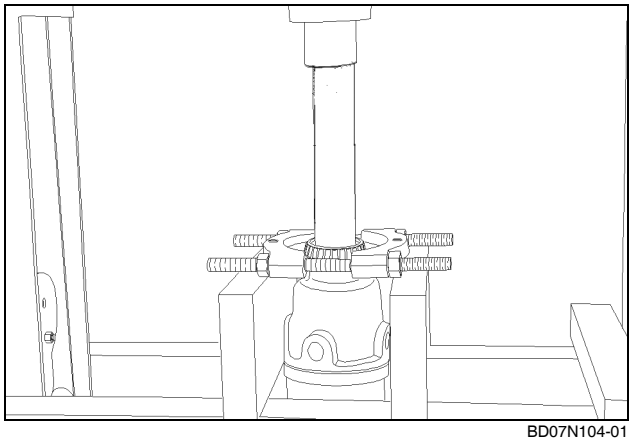
BD07N129-01



BD07N114-01

Remove the inner set of clutch plates, thrust washer, and bevel gear from the differential housing.

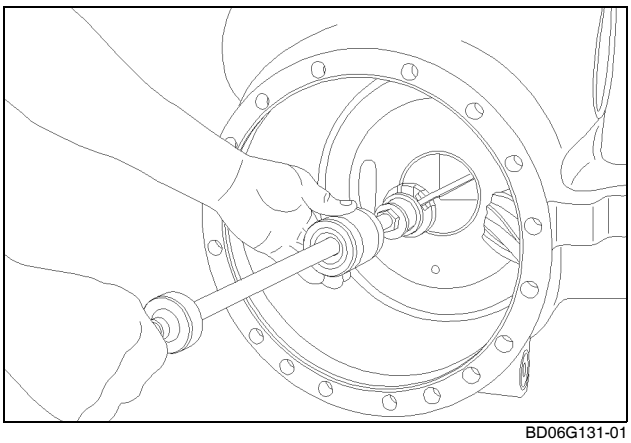
STEP 126



BD07N104-01

If required, remove bearing from differential housing using a bearing puller and a press.

STEP 127

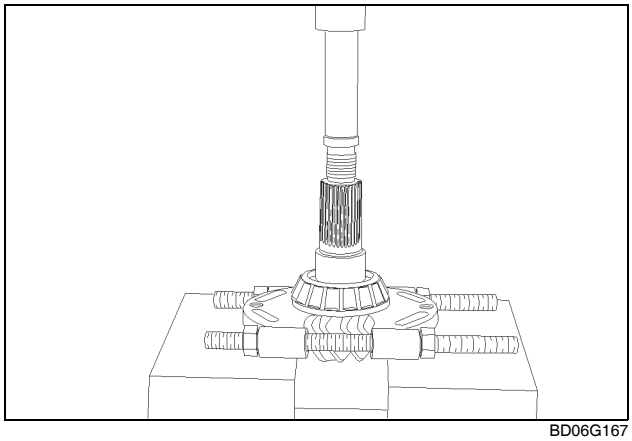


BD06G131-01

Pull the bearing cups and shims from both axle housings.

NOTE: *Make sure to identify the shims into which axle housing they were removed.*

STEP 170

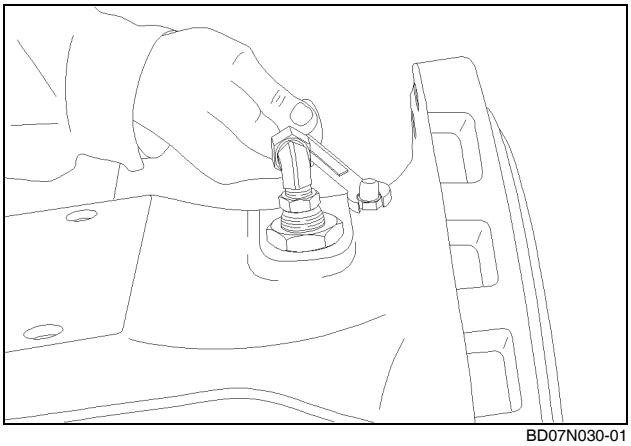


BD06G167

Remove inner bearing from the drive pinion using a suitable tool and a press.

Brake Tube Removal

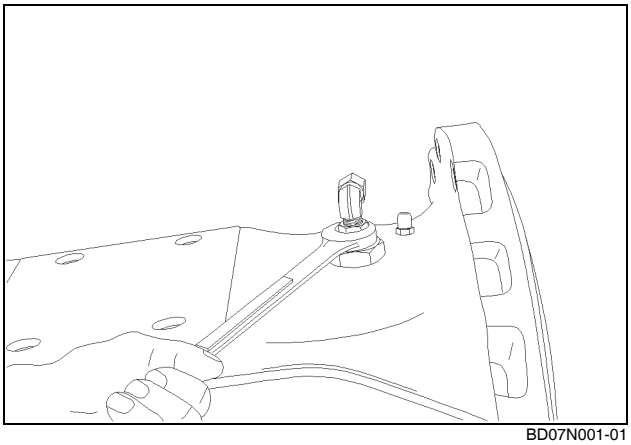
STEP 171



BD07N030-01

Remove the plug with the breather installed from the axle housing on the differential end.

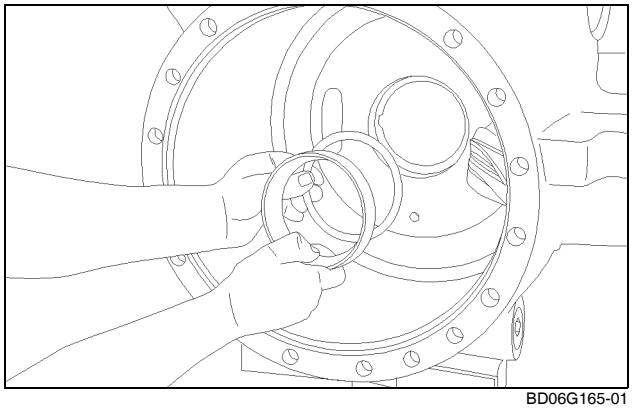
STEP 172



BD07N001-01

Remove fitting from the brake tube on the axle housing on the differential end of the axle.

STEP 202

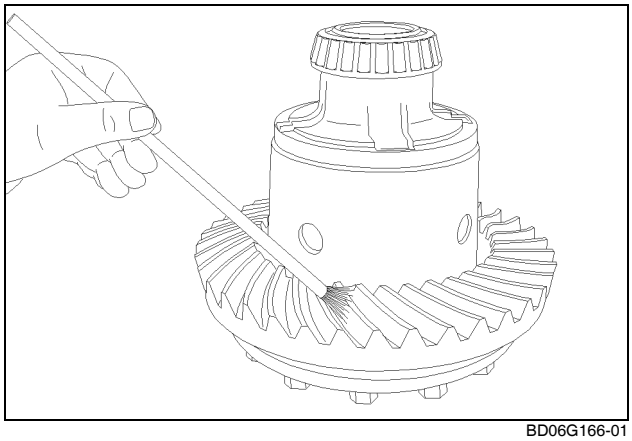


BD06G165-01

Insert shim B- 1.10 mm (0.043 inch) and install the bearing outer ring with a suitable tool until seated in axle housing.

Contact Pattern Check

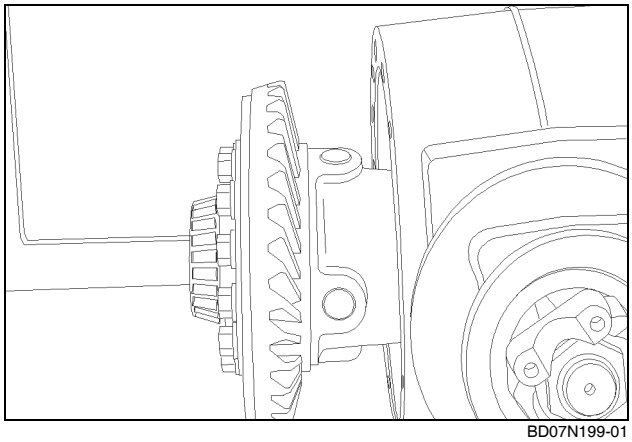
STEP 203



BD06G166-01

Apply marking ink on several teeth of the ring gear.

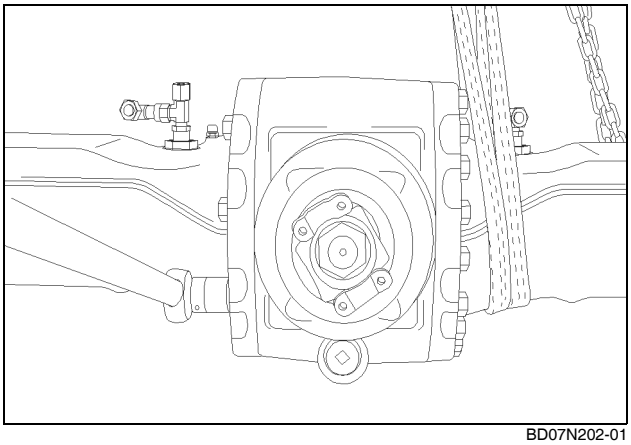
STEP 204



BD07N199-01

Position the differential assembly in the axle drive housing.

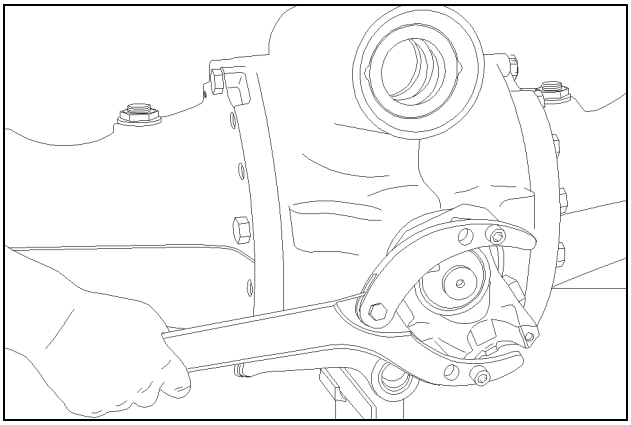
STEP 205



BD07N202-01

Position the axle housing on the drive housing, install 4 bolts, top center, bottom center, front center, rear center, torque bolts evenly to 390 Nm (285 pound feet).

STEP 206

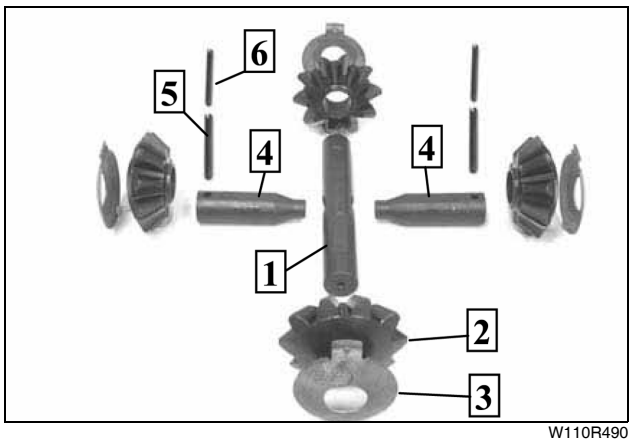


BD06G169-01

Roll the input pinion several times in both directions over the ring gear. Remove the differential and compare the contact pattern with examples on page 4 and page 5.

If the tooth contact pattern differs, the wrong shim size was selected in Step 187. Remove differential and repeat Steps 184 though 187.

STEP 21



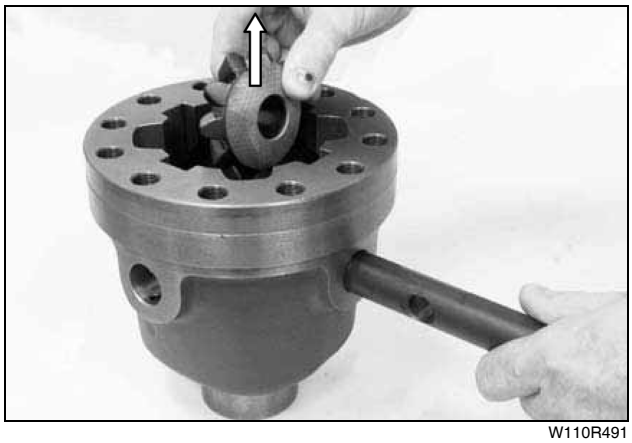
W110R490

Legend to figure-no. W110R490 ... figure-no. W110R491:

Differential spider - single parts:

1 = Spider shaft (one part)
2 = Spider gear (4x)
3 = Thrust washer (4x)
4 = Spider shaft (split version)
5 = Slotted pin (2x)
6 = Slotted pin (2x)

STEP 22

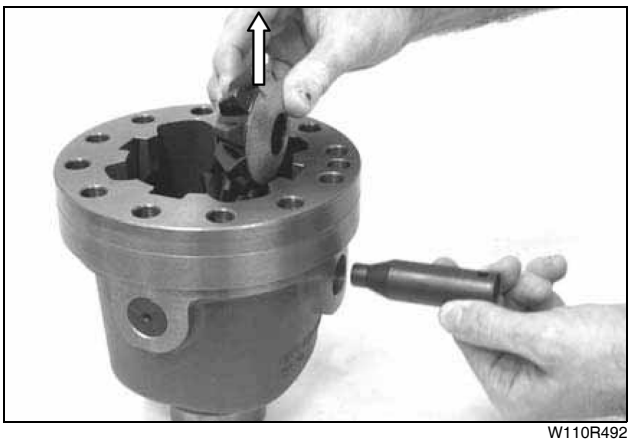


W110R491

Insert one-part spider shaft (1) into hole/differential (without slotted pin location hole) thereby mounting two spider gears (2) with thrust washers (3).

NOTE: *Insert thrust washers with tabs showing upwards - see arrow - and being located in recess.*

STEP 23



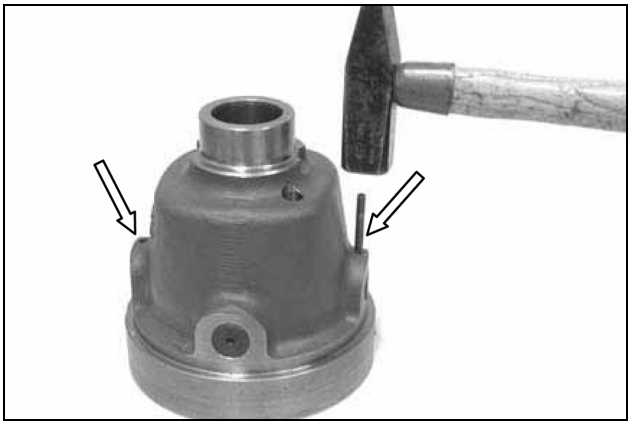
W110R492

Install split spider shaft (4) with spider gears (2) and thrust washers (3).

NOTE: *Insert thrust washers with tabs showing upwards - see arrow - and being located in recess.*

NOTE: *Pay attention to installation position of spider shaft/halves - slotted pin/location holes of spider shaft towards diff. carrier.*

STEP 24



W110R493

Fix spider shaft half (arrows) with double-slotted pins.

NOTE: *Install double-slotted pins – always with slots in a 180° offset position to each other.*

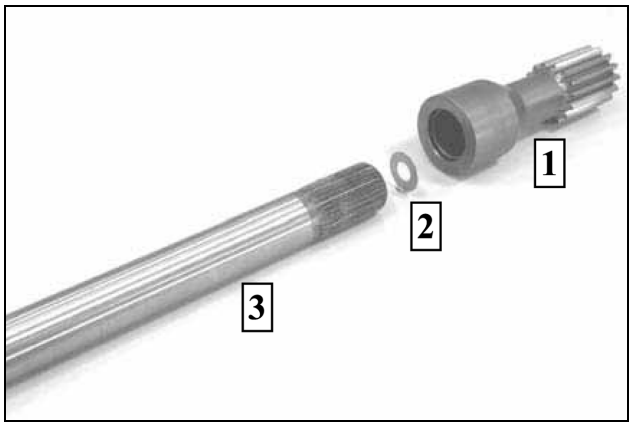
STEP 55

W110R524

Disassemble differential.
Compare contact pattern to examples - see chapter „0“, page 0/4 … 0/5.

NOTE: *If contact pattern differs considerably, use a suitable shim for correction.*

STEP 56

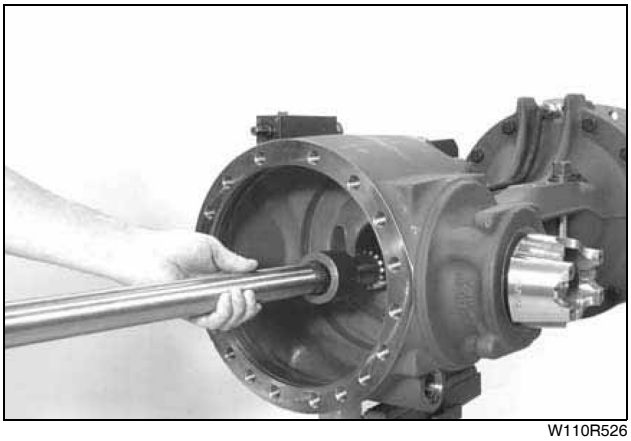


W110R525

If disassembled:

Insert shim(s) (2) into sun gear shaft (1) and mount stub shaft (3).

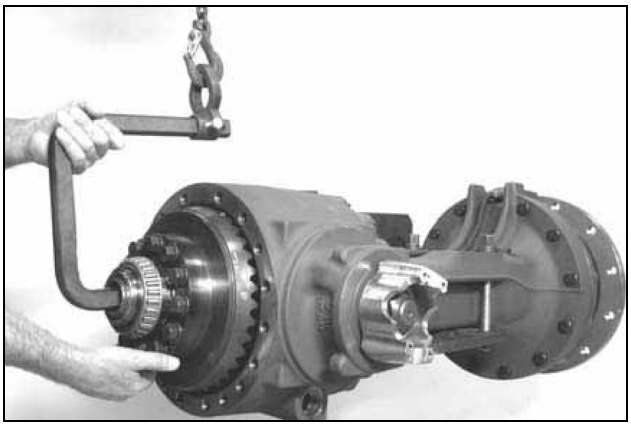
STEP 57



W110R526

Insert preassembled stub shafts into both outputs (considering allocation to the correct output side).

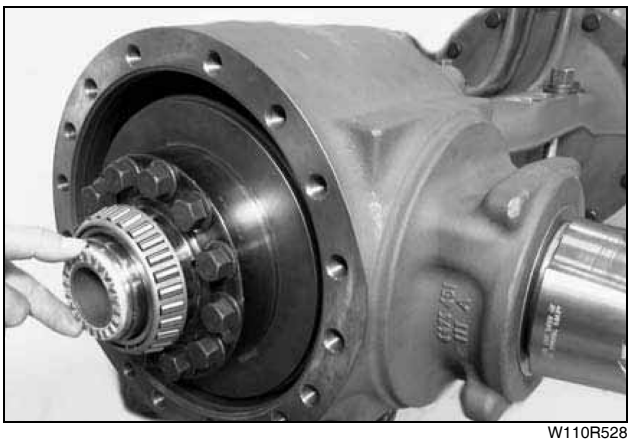
STEP 58



W110R527

Remount differential - by mounting stub shaft into gearing of axle bevel gear (differential).

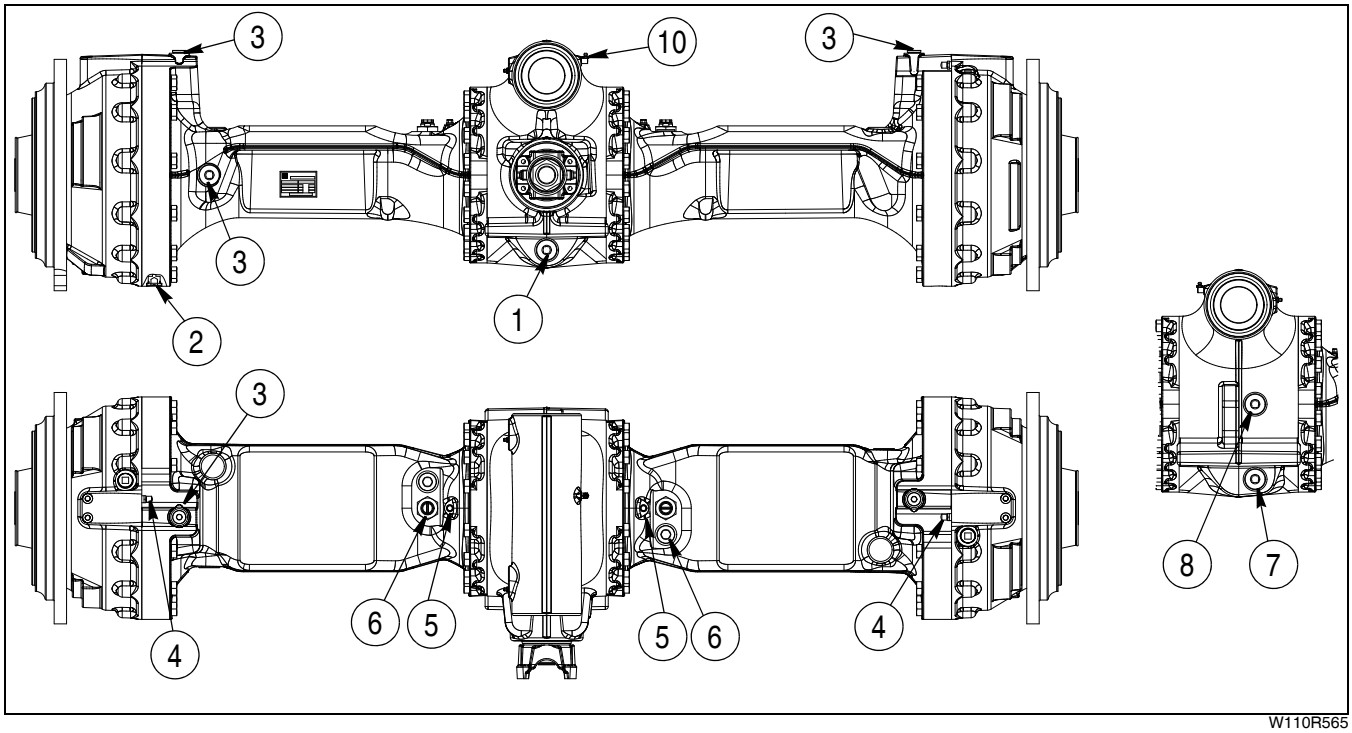
STEP 59



W110R528

Position axial roller ring on differential and fix by means of grease (assembly aid).

LUBRICATION

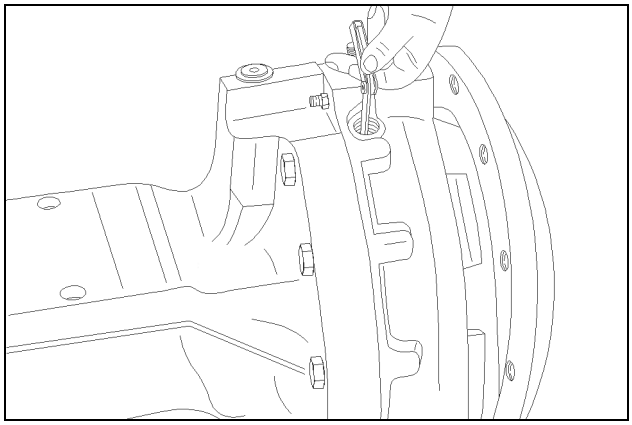


W110R565

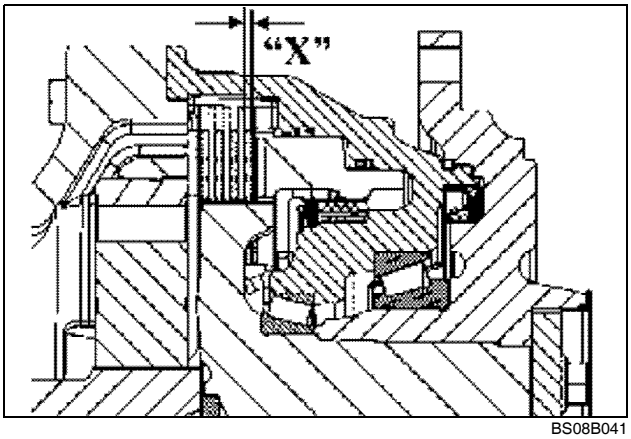
1. OIL DRAIN HOLE (AXLE HOUSING)
2. OIL DRAIN HOLE (OUTPUTS)
3. OIL FILL PLUG & OIL LEVEL CHECK
4. BRAKE BLEEDER
5. BREATHER
6. BRAKE INLET
7. PLUG
8. OIL FILLER & OVER FLOW
9. WEAR CHECK DISK BRAKE
10. GREASE NIPPLE

NOTE: *Refer to section 1002 of this service manual for proper lubricant.*

WEAR MEASUREMENT ON MULTI-DISC BRAKE



BD07N211-01



BS08B041

NOTE: *A wear measurement on the multi-disc brake must be made at least once a year. Wear measurement should also be made if brake noise is heard, if braking power is reduced, or anytime it is suspected that braking function is impaired.*

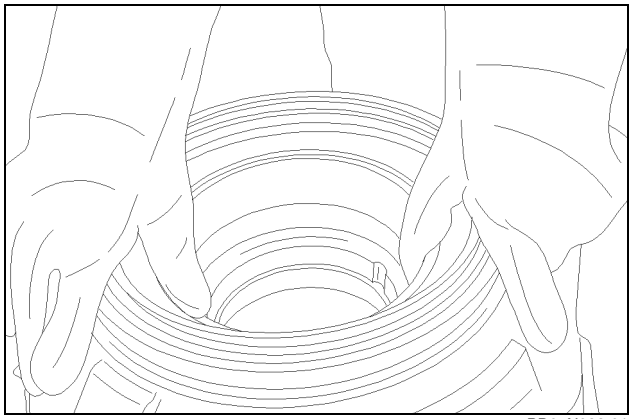
Wear measurement must be made on both wheel end sides.

Remove plug, actuate brake and determine dimension (X) using a thickness gauge. If dimension (X) is less than or equal to 4.0 mm (0.16 inch) the lined discs on both output sides must be replaced. Replace O-ring when installing the plug. Tighten plug to a torque of 50 Nm (37 pound feet).

STEP 47

WARNING: *Always wear gloves to prevent frostbite to your hands when handling frozen parts.*

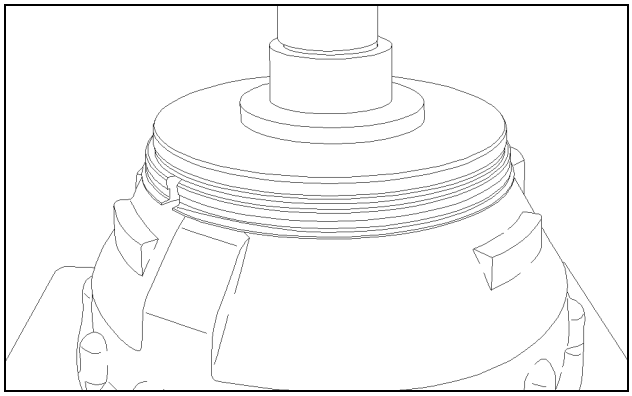
SM118A



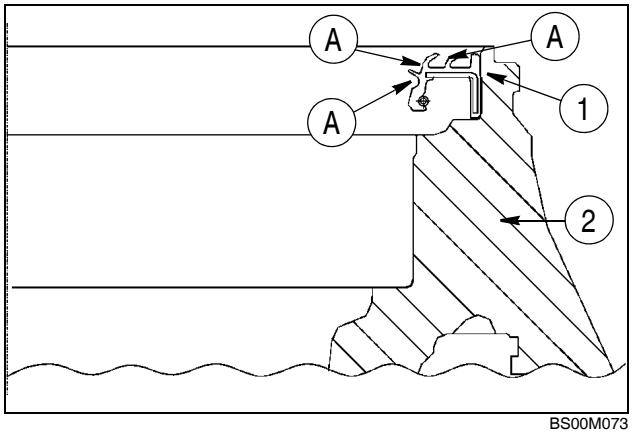
BD07N082-01

Freeze new outer bearing cup in dry ice for several hours. Install bearing cup in brake housing.

STEP 48



BD06G032-01

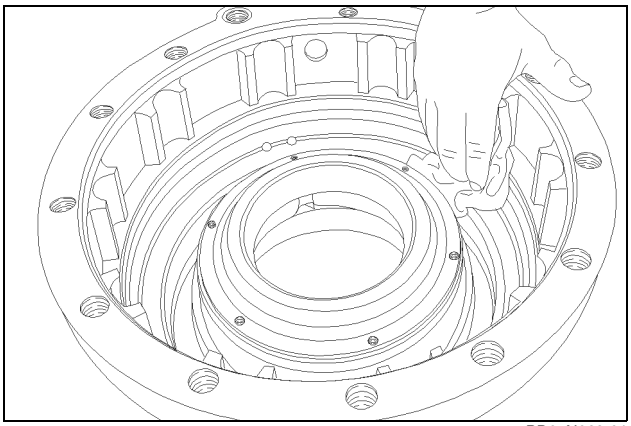


BS00M073

1. FACE SEAL 2. BRAKE HOUSING A GREASE

Wet the outer diameter of the face seal with a solution of 50% water and 50% mineral spirits. Use a suitable seal installer to install the face seal with the seal lip positioned as shown. Apply grease to seal as indicated by (A) above.

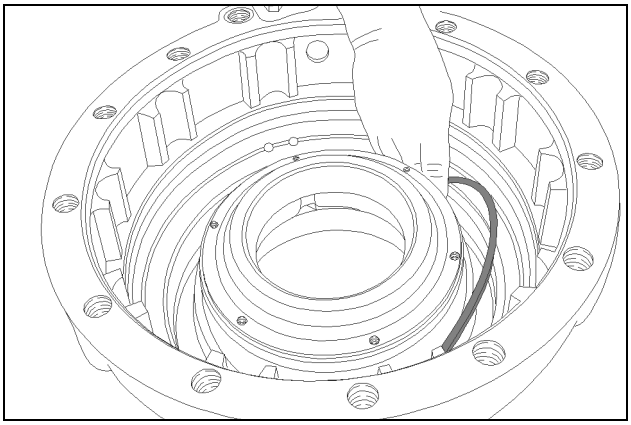
STEP 49



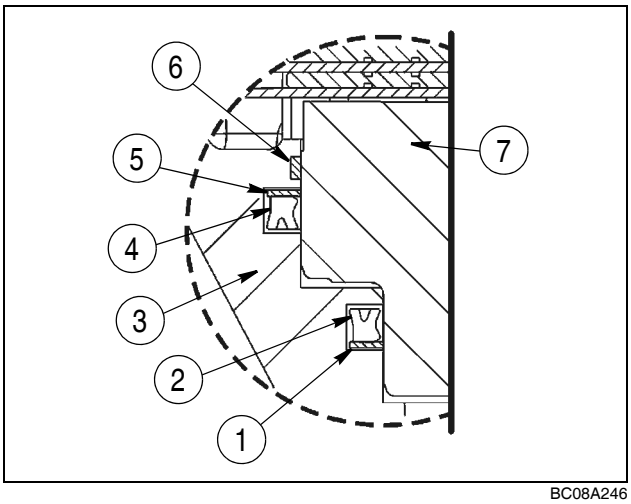
BD07N069-01

Clean the seal grooves of the brake housing with solvent.

STEP 50



BD07N070-01



BC08A246

WEAR RING, BACK-UP RINGS AND PISTON SEAL LOCATION

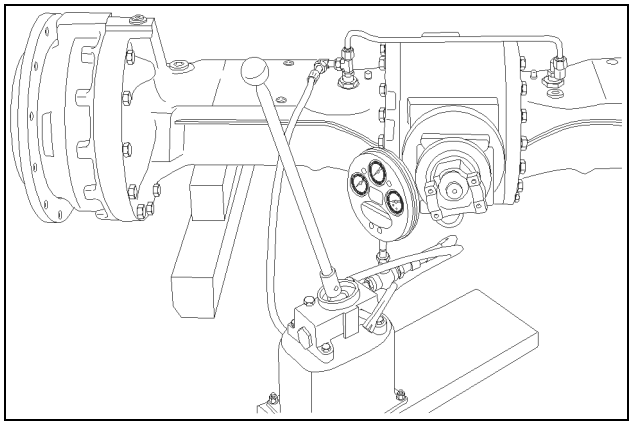
1. LOWER BACK-UP RING
2. LOWER PISTON SEAL
3. BRAKE HOUSING
4. UPPER PISTON SEAL
5. UPPER BACK-UP RING
6. WEAR RING
7. BRAKE PISTON

Install the lower back-up ring (1) in the brake housing.

BRAKE HYDRAULICS LEAKAGE TEST

IMPORTANT: *DO NOT EXCEED 100 BAR (1450 PSI) PRESSURE IN THE FOLLOWING STEPS. If the maximum pressure of 100 bar (1450 psi) is exceeded damage to brake piston seals may occur.*

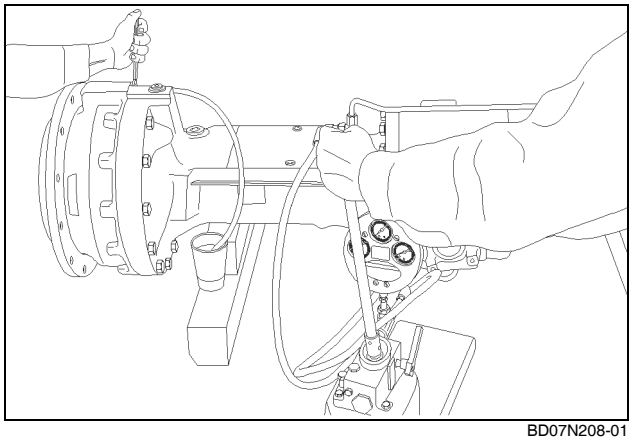
STEP 92



BD07N209-01

Connect a hand pump with pressure gauge to the brake port as shown above.

STEP 93



BD07N208-01

Fill the hand pump with hydraulic oil. Build up pressure in the axle internal brake lines then bleed air from the lines. After air is bled, actuate the brakes a minimum of 5 times to a pressure of 100 bar (1450 psi) by operating the hand pump.

Torque brake bleeder to 6 Nm (4.4 pound feet)

High Pressure Test

STEP 94

Operate the hand pump to increase pressure to 100 bar (1450 psi) maximum. Close connection to hand pump using the shutoff valve. During a 5 minute period, pressure shall not drop more than 3 bar (44 psi).

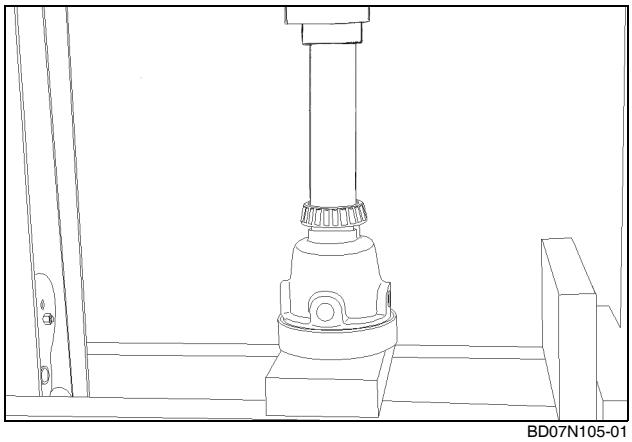
Low Pressure Test

STEP 95

Reduce pressure to 5 bar (72.5 psi) and close the shutoff valve. During a 5 minute period pressure shall not drop.

Reassembly Limited Slip Differential Version DZ-1200

STEP 131



BD07N105-01

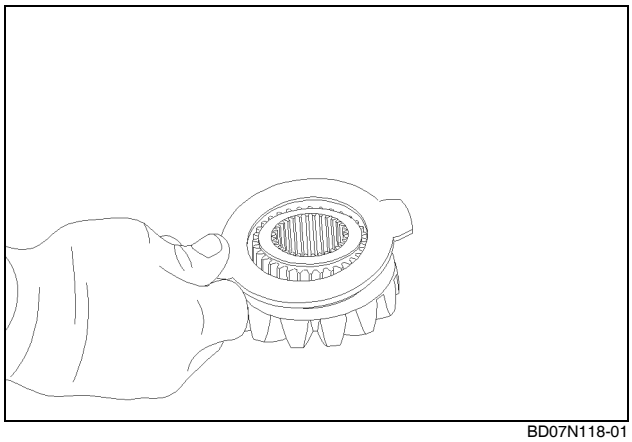
Install bearing on differential housing using a press.

STEP 132

Check reaction plates, friction plates and thrust washers for damage or wear, replace if necessary.

NOTE: *Be sure to apply oil to all parts before assembly.*

STEP 133

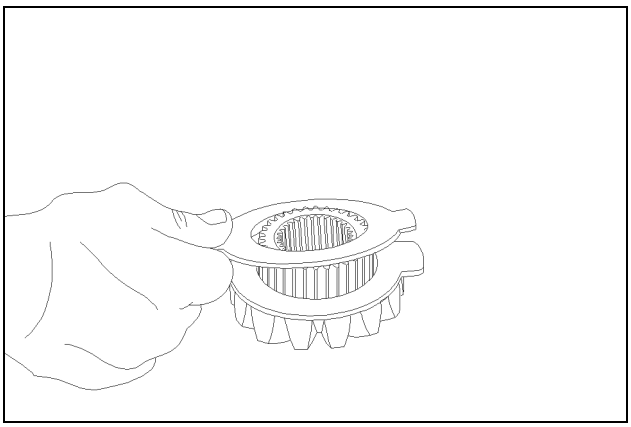


BD07N118-01

Install the (copper color) thrust washer on the inner bevel gear.

NOTE: *Clutch plates must be installed on the inner bevel gear in the correct order, refer to illustration on page 35.*

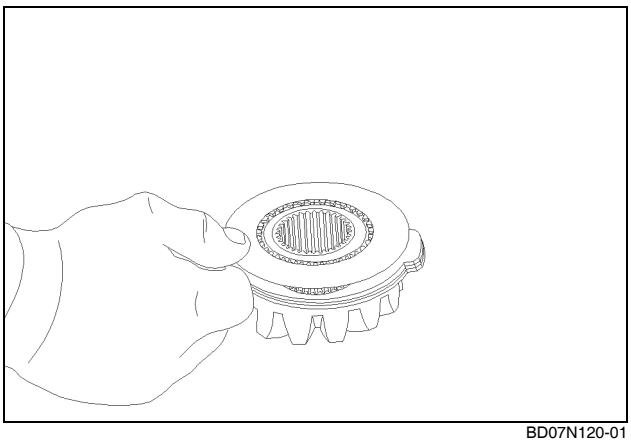
STEP 134



BD07N119-01

Install **one** reaction plate on the inner bevel gear.

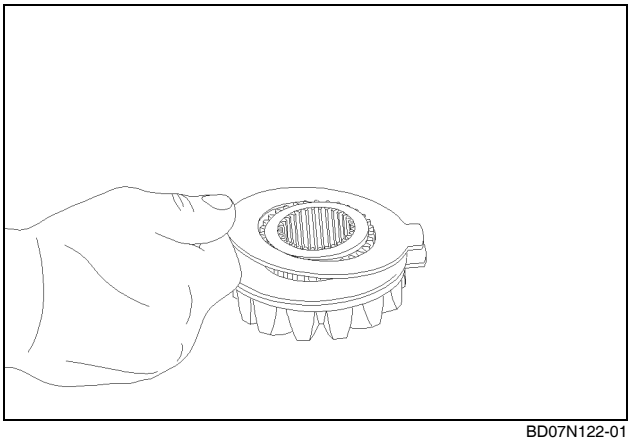
STEP 135



BD07N120-01

Install **one** friction plate on the inner bevel gear.

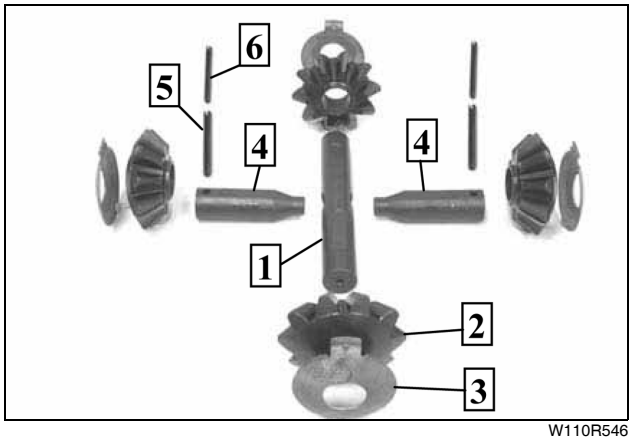
STEP 136



BD07N122-01

Install **two** reaction plates on the inner bevel gear.

STEP 177

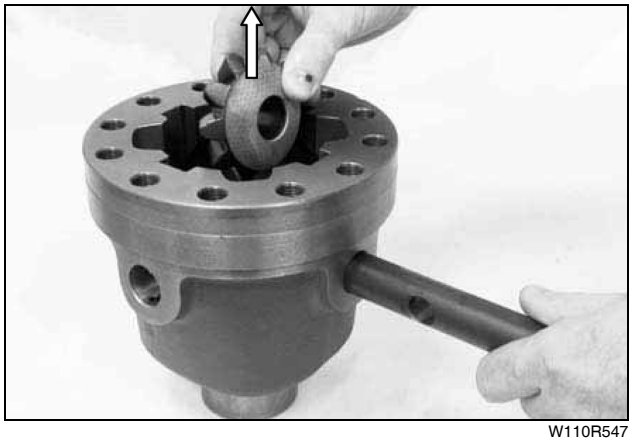


W110R546

Legend to figure-no. W110R536 ... figure-no. W110R549:

Differential spider – single parts:
1 = Spider shaft (one part)
2 = Spider gear (4x)
3 = Thrust washer (4x)
4 = Spider shaft (split version)
5 = Slotted pin (2x)
6 = Slotted pin (2x)

STEP 178

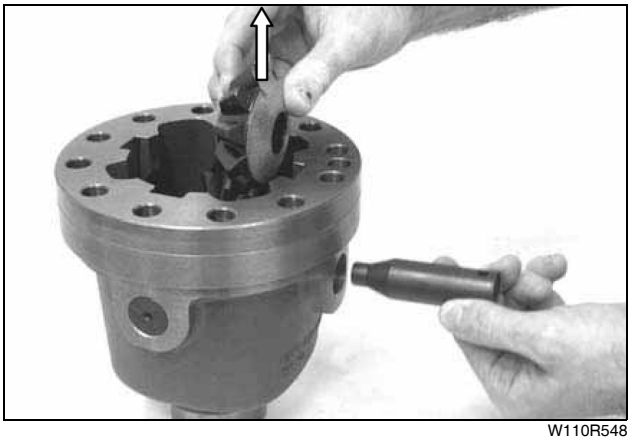


W110R547

Insert one-part spider shaft (1) into hole/differential (without slotted pin location hole) thereby mounting two spider gears (2) with thrust washers (3).

NOTE: *Insert thrust washers with tabs showing upwards - see arrow - and being located in recess.*

STEP 179



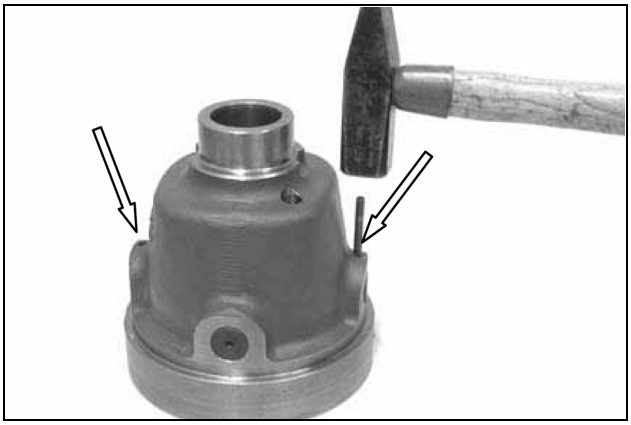
W110R548

Install split spider shaft (4) with spider gears (2) and thrust washers (3).

NOTE: *Insert thrust washers with tabs showing upwards - see arrow - and being located in recess.*

NOTE: *Pay attention to installation position of spider shaft/halves - slotted pin/location holes of spider shaft towards diff. carrier.*

STEP 180



W110R549

Fix spider shaft half (arrows) with double-slotted pins.

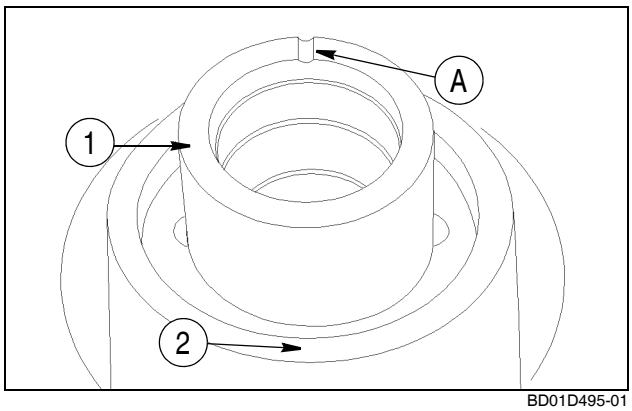
NOTE: *Install double-slotted pins - always with slots in a 180° offset position to each other.*

Pivot Pin Bushing Installation

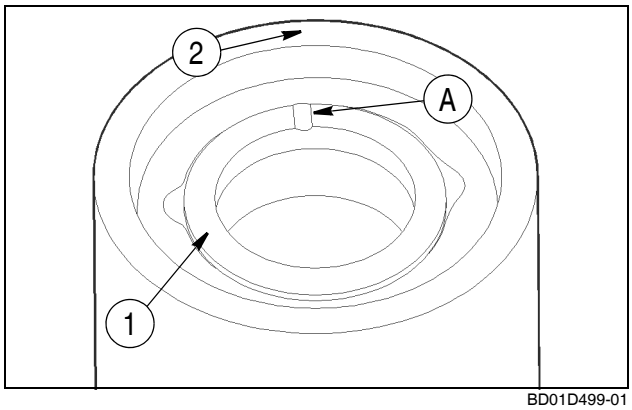
WARNING: *Always wear gloves to prevent frostbite to your hands when handling frozen parts.*

SM118A

STEP 218



BD01D495-01



BD01D499-01

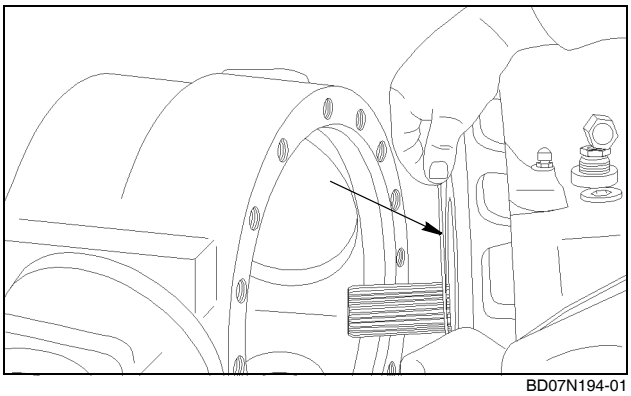
1. DIFFERENTIAL HOUSING PIVOT PIN BUSHING
2. CENTER OF DIFFERENTIAL HOUSING

A. GROOVE

Freeze new bushing in dry ice for several hours. Install bushing in differential housing with groove (A) on circumference of bushing facing center of housing Install bushing against shoulder in housing.

Repeat Step 218 to install the other pivot bushing.

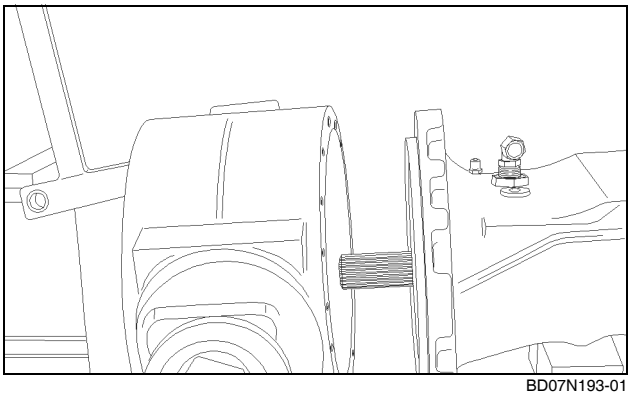
STEP 219



BD07N194-01

Install a new O-ring on the left axle housing.

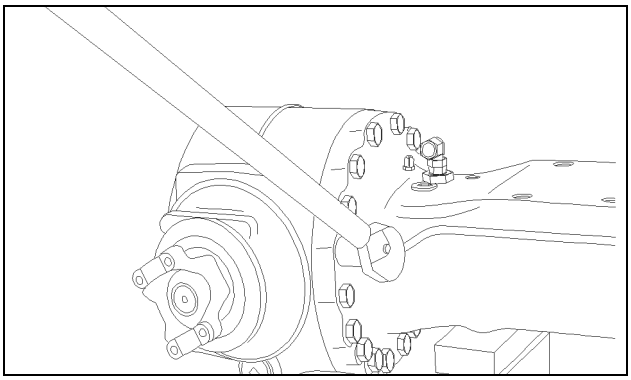
STEP 220



BD07N193-01

Position differential housing with left axle housing and install bolts.

STEP 221



BD07N197-01

Torque bolts evenly to 390 Nm (288 pound feet).

NOTES

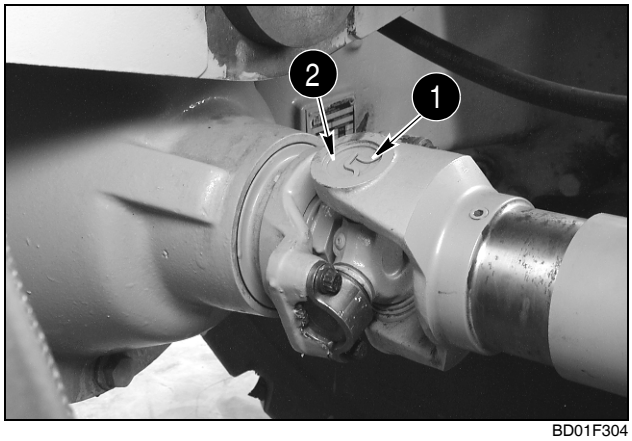
UNIVERSAL JOINTS

Removal

STEP 52

Remove the drive shaft from the machine.

STEP 53



BD01F304

1. RING 2. BEARING

Remove the ring (1) and the bearing (2) from the drive shaft.

NOTE: *The above photo shows the drive shaft on the machine and is for reference of the ring and bearing only.*

STEP 54

Remove the universal joint from the drive shaft.

Installation

NOTE: *The bearing race and journal that make up the universal joint are not serviced separately. If the bearing race or journal is worn or damaged, a new universal joint must be used.*

STEP 55

Clean the slots in the yoke of the drive shaft.

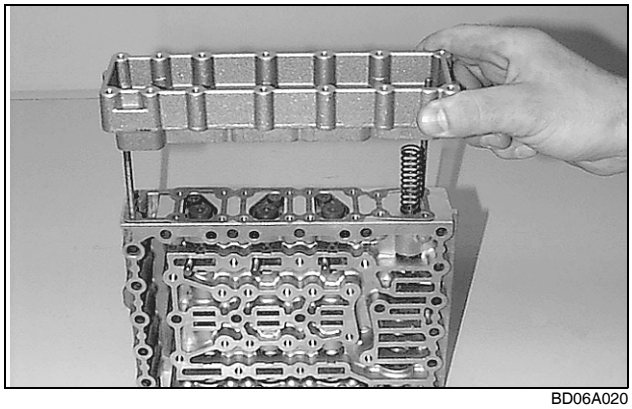
STEP 56

Install the universal joint and install the bearings (2) and the rings (1). Refer to the photo in Step 53.

STEP 57

Install the drive shaft.

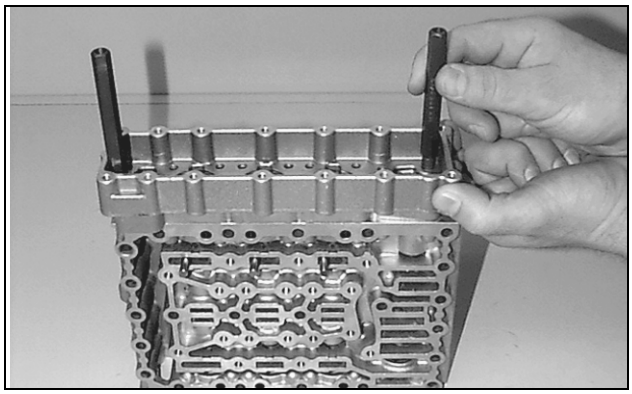
STEP 14



BD06A020

Install the adjusting screws, gasket, and housing cover.

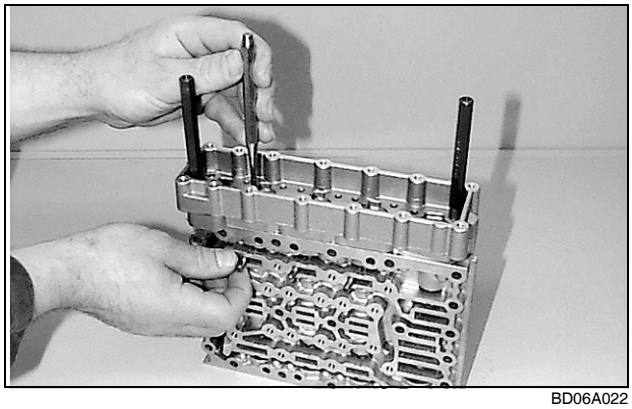
STEP 15



BD06A021

Tighten the adjusting screws equally until the cover is flush on the valve body.

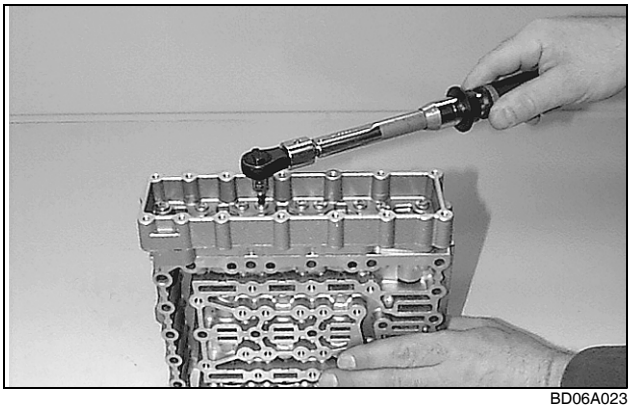
STEP 16



BD06A022

Push the pistons down through the pressure controller wholes and remove the roll pins.

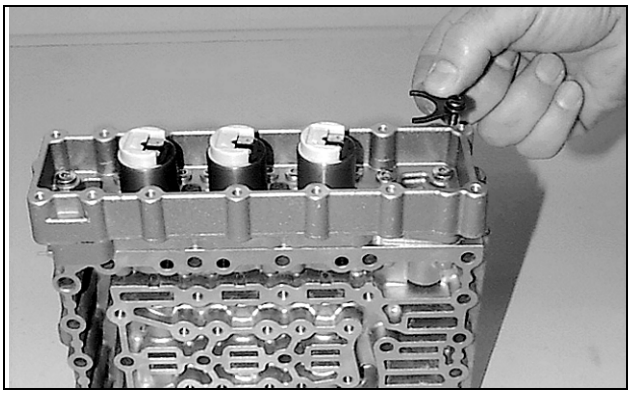
STEP 17



BD06A023

Install the cap screws and torque in a criss cross pattern to 7.5 Nm (66.3 pound-inch).

STEP 18

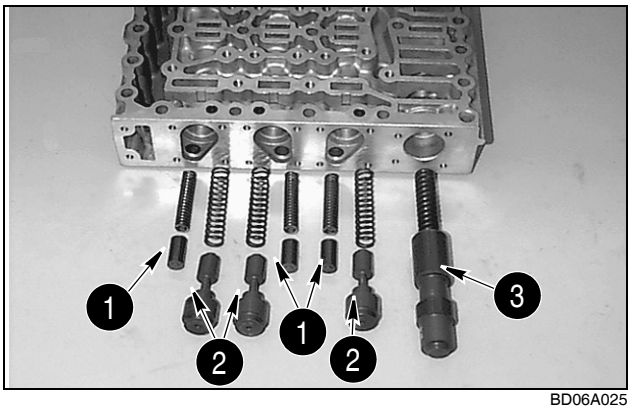


BD06A024

Install the solenoids and secure them with the retaining plates and cap screws. Torque the cap screws to 5.5 Nm (48.5 pound-inch).

NOTE: *Install the retaining plate with the neck towards valve body, install controllers with connectors as shown.*

STEP 19

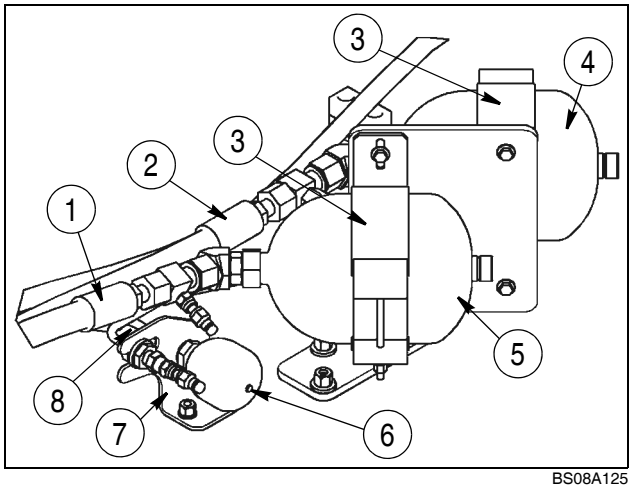


BD06A025

1. VIBRATION DAMPER
2. PISTONS
3. MAIN PRESSURE VALVE

Install components in positions shown.

SERVICE BRAKE AND PARKING BRAKE ACCUMULATORS



BS08A125

1. FRONT ACCUMULATOR HOSE
2. REAR ACCUMULATOR HOSE
3. MOUNTING CLAMP
4. REAR ACCUMULATOR (FRONT AXLE)
5. FRONT ACCUMULATOR (REAR AXLE)
6. PARKING BRAKE ACCUMULATOR
7. BRACKET
8. PARKING BRAKE ACCUMULATOR HOSE

Removal

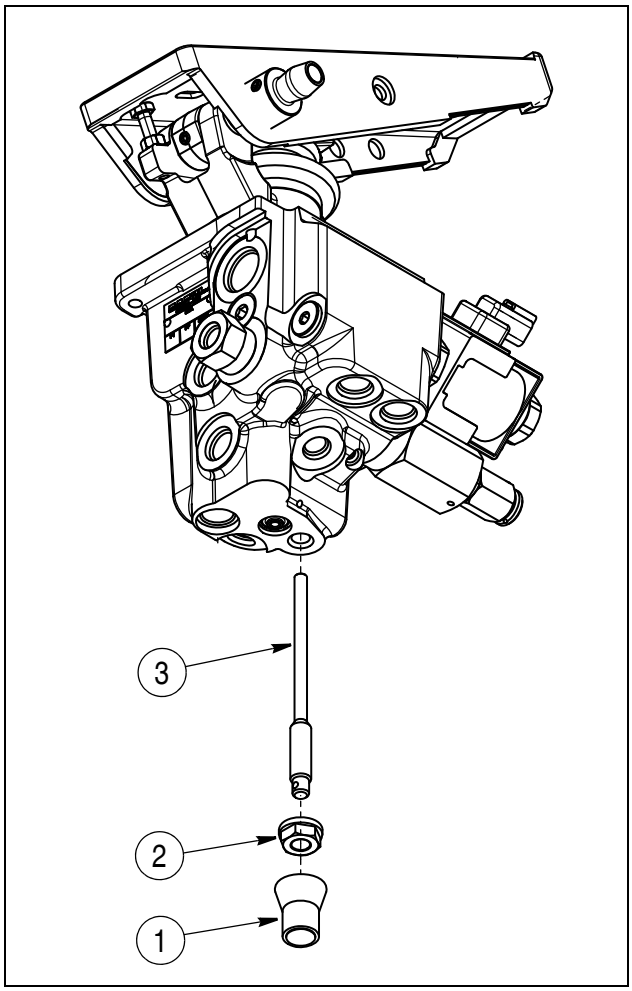
1. Park the machine on a level surface and lower the loader bucket to the floor. Stop the engine.
2. Put blocks on both sides of each tire to prevent machine movement.
3. Make sure the brake accumulators (4) and (5) and the parking brake accumulator (6) are completely discharged. Push down and release the brake pedal at least 30 times.
4. Turn the master disconnect switch to the OFF position.
5. Remove the left cab skirt located under the cab or canopy to gain access to accumulators.
6. To release the pressure on the parking brake accumulator (6), the line at the accumulator must be SLOWLY cracked open. A pan will be needed to catch the hydraulic oil.
7. Connect a drain hose to the quick disconnect couplings in each brake circuit to release any pressure in the brake circuit.
8. Clean the brake accumulators (4) and (5), parking brake accumulator (6) and hoses (1), (2) and (8). Refer to illustration above.
9. Put identification tag on hose (8) that is connected to the parking brake accumulator (6).
10. Connect a vacuum pump to the hydraulic reservoir. Start the vacuum pump.
11. Tag and disconnect the accumulator hoses (1) and (2) from brake accumulators (4) and (5).
12. Install plugs in hoses and caps on fittings.
13. Loosen the clamp stud on the accumulator clamps (3).
14. Remove accumulators (4) and (5) from clamps (3).
15. Disconnect hose (8) from parking brake accumulator (6).
16. Remove the mounting nut on the back side of bracket (7) for parking brake accumulator (6), remove the accumulator.
17. Install a plug in the hose and cap fitting.

Installation

1. Mount the accumulators (4) and (5) in clamps (3), do not tighten clamps at this time. Refer to illustration.
2. Connect hose (1) to brake accumulator (5) and tighten.
3. Connect hose (2) to brake accumulator (4) and tighten.
4. Tighten clamps (3) to 17Nm (13 pound feet).
5. Install the parking brake accumulator (6) into bracket (7).
6. Install the mounting nut and tighten.
7. Connect hose (8) to the parking brake accumulator (6).
8. Remove and discard tags.
9. Stop the vacuum pump and remove.
10. Install the left cab skirt.
11. Refer to Section 7004 and check the nitrogen charge on the accumulators.
12. Turn the master disconnect switch to the ON position.
13. Bleed the brake system. See Section 7002.
14. Refer to Section 7008 and perform the Parking Brake Test Procedure.
15. Check the hydraulic reservoir oil level and add oil as required. See Section 1002 for the correct oil.

Adjusting the Brake Modulation Pressure

NOTE: *The adjusting bolt to adjust the modulation pressure is located in the cab, under the brake pedal.*



W270R015

1. TAMPER RESISTANT COVER
2. LOCKING BOLT
3. ADJUSTING SCREW

1. Remove the tamper evident cover (1).

NOTE: *This is a tamper evident cover and it will be necessary to install a new cover after the modulation pressure is adjusted.*

2. Remove the locking bolt (2).
3. Turn the adjusting screw (3) to adjust the modulation pressure.

NOTE: *The rear brake modulation pressure cannot be adjusted separately from the front brake modulation pressure.*

4. Repeat steps 5 through 10 in the Testing the Brake Modulation Pressure procedure.
5. Repeat these steps until the brake modulation pressure is within the specified range.

BRAKE PUMP

Disassembly

1. Secure the pump by the port end cover (13) in a soft jawed vise.
2. Draw a line the length of the pump to assist during assemble.
3. Loosen and remove bolts (14).
4. Tap the shaft end cover housing (4) with soft hammer to loosen it, remove the shaft end cover housing (4).
5. Remove the backup ring (5), channel seal (6), and thrust plate (7).
6. Remove the drive gear (11) from the gear housing (10).
7. Remove the driven gear (12) from the gear housing (10).
8. Tap the gear housing (10) with a soft hammer to loosen it from the port end housing cover (13) .
9. Remove the backup ring (5), channel seal (6), and thrust plate (7).
10. Remove the outer shaft seal (1) from the shaft end cover housing (4).
11. Remove the retaining ring (2) from the shaft end cover housing (4).
12. Remove the shaft seal (3) from the shaft end cover housing (4).

Inspection

1. Discard all seals and quad rings. Clean all parts in cleaning solvent. Check all machined surfaces for damage or wear.
2. Hold a straightedge across each gear housing and use a feeler gauge to measure the amount of wear caused by the gear teeth in the gear pocket. If the wear in any gear pocket is more than 0.18 MM. (0.007 inch), use a new gear housing.
3. Inspect the thrust plates for scoring, pitting, or other damage.
4. Inspect the gears for wear and damage. There must be no scoring on the gear hubs or on the outside edges of the gear teeth. There must be no more than 0.05 MM. (0.002 inch) wear in the seal area of the drive shaft. If any gear must be discarded, you must use a new hydraulic pump.

Assembly

1. Install shaft seal (3) into the shaft end cover housing (4).
2. Install the retaining ring (2) into the shaft end cover housing (4).
3. Install a new outer shaft seal (1) into the shaft end cover housing (4).
4. Place the shaft end housing (4), facing down, into a soft jawed vise.
5. Install new backup rings (5) and channel seals (6) into the thrust plates (7).
6. Place an assembled thrust plate (7) onto the shaft end cover housing (4).

IMPORTANT: *Be sure to place the thrust plate (7) onto the shaft end cover housing (4) in the position shown in the illustration on page 3.*

7. Lubricate the driven gear (12) with hydraulic oil, slide the driven gear (12) through the thrust plate (7) into the shaft end cover housing (4).
8. Lubricate the drive gear (11) with hydraulic oil, slide the drive gear (11) through the thrust plate (7) into the shaft end cover housing (4).
9. Install a new quad ring (8) into the gear housing (10). Check that dowel pins (9) are in place either in the gear housing (10) or the shaft end cover housing (4).
10. Align the marks made during disassembly, carefully place the gear housing (10) onto the gears.
11. Slide the other assembled thrust plate (7) onto the shafts of the gears.

IMPORTANT: *Be sure to place the thrust plate (7) onto the gears in the position shown in the illustration on page 3.*

12. Install a new quad ring (8) into the gear housing (10). Check that dowel pins (9) are in place either in the gear housing (10) or the port end cover housing (13).
13. Align the marks made during disassembly, place the port housing (13) onto the gear housing (10).
14. Install bolts (14) with clean and dry threads. Torque bolts to 192 ± 5.5 Nm (141.5 ± 4 pound feet).

Inspection

STEP 10

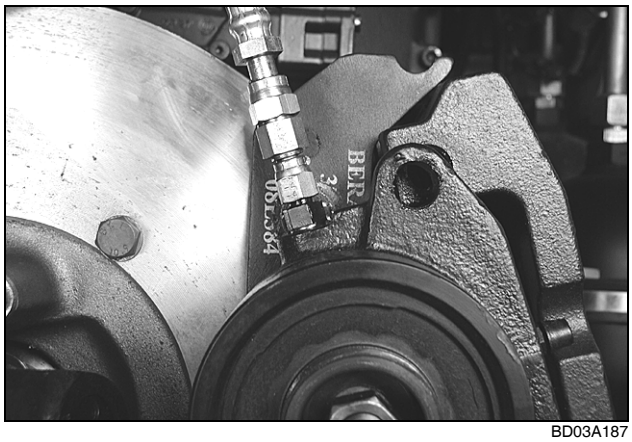
Clean and inspect all parts for wear and damage.

Inspect the brake disc for wear and damage.

Replace all parts that are worn or damaged.

Assembly

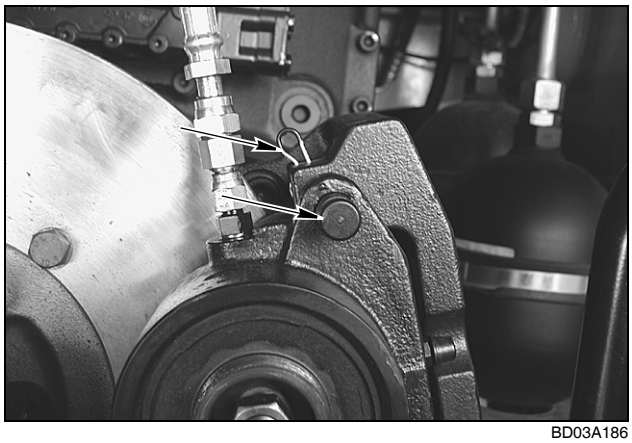
STEP 11



BD03A187

Install the two brake pads in the parking brake assembly.

STEP 12



BD03A186

Install the brake pins and retainer pins.

STEP 13

Start the machine and run the engine at low idle with the bucket resting on the ground.

IMPORTANT: *It will be necessary to have an assistant help for this procedure. An operator must be present in the cab at all times to apply the service brakes and shut down the machine in the event of mechanical failure.*

STEP 14

Disengage the parking brake switch.

NOTE: *Hydraulic pressure will not be applied to the parking brake until the parking brake rocker switch is turned off, the service brakes applied and the transmission is put into gear.*

A. Place the parking brake rocker switch in the OFF position.

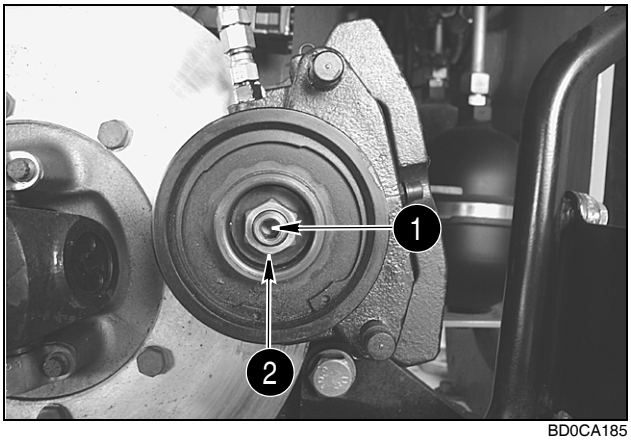
B. Apply the service brake and put the machine into gear.

C. The parking brake light on the cluster will turn off at this time.

Place the transmission back into neutral before proceeding.

Parking Brake Adjustment Procedure

STEP 15



BD0CA185

Turn the adjusting bolt (1) clockwise until both brake pads contact the brake disc, then turn the adjusting bolt (1) counterclockwise 1/2 turn. Tighten the jam nut (2) to secure the adjusting bolt.

STEP 16

Install the cover on the parking brake.

STEP 17

Perform the Parking Brake Test Procedure as described in this section.

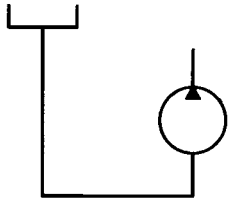
STEP 18

Remove the articulation lock.

STEP 19

Place the master disconnect switch to the ON position.

A hydraulic line connected to the bottom of the reservoir may be drawn from the bottom of the symbol if the bottom connection is essential to the system operation.



BS07B625

If the pump inlet must be charged or flooded with a positive head of oil above the inlet port, the reservoir symbol will be above the pump symbol with a suction line drawn out of the bottom of the reservoir symbol.

Every vehicle or system reservoir has at least two hydraulic lines connected to it, and some may have many more. Often the components that are connected to the reservoir are spread all over the schematic. Rather than having a number of confusing lines all over the schematic, it is customary to draw individual reservoir symbols close to the components. The reservoir is usually the only component symbol pictured more than once.

Lines, Tubes, and Hoses

A hydraulic line, tube, hose, or any conductor that carries the fluid between components is shown as a line.

BS07B626

A working line, such as an inlet pressure or return, is shown as a solid line.

BS07B627

OIL FLOWS ONE WAY ONLY

BS07B628

OIL CAN FLOW EITHER WAY

Working lines with arrows show direction of flow.

BS07B629

Pilot or control lines are broken into long dashes.

BS07B630

Drain lines for leakage oil are broken into short dashes.

BS07B631

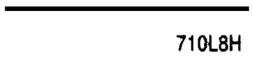
A flexible line is show as an arc between two dots and is always represented by a solid line.

BS07B632

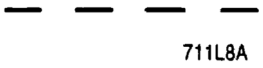
Quite often you will see an enclosure outline that indicates that there are several symbols that make up a component assembly such as a valve or a valve stack. The enclosure outline appears like a box and is broken with dashes on all sides.

COMMON SYMBOLS

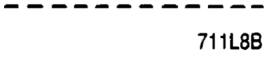
Line and Line Fuctions


710L8H

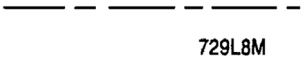
Solid Line
Main Line


711L8A

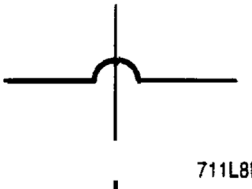
Dashed Line
Pilot Line


711L8B

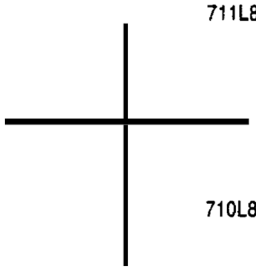
Dotted Line
Exhaust or Drain


729L8M

Enclosure
Outline


711L8E

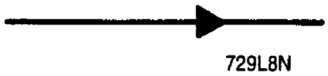
Lines
Crossing


710L8M

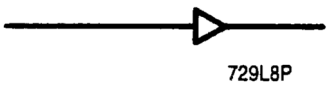
Lines
Crossing


710L8P

Lines
Joining


729L8N

Liquid Direction
of Flow


729L8P

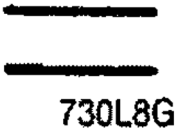
Gaseous Direction
of Flow


711L8C

Flexible Line

BS07B694

Mechanical Devices


730L8G

Mechanical Connections
Two Parallel Lines
(Shafts, Levers, etc.)

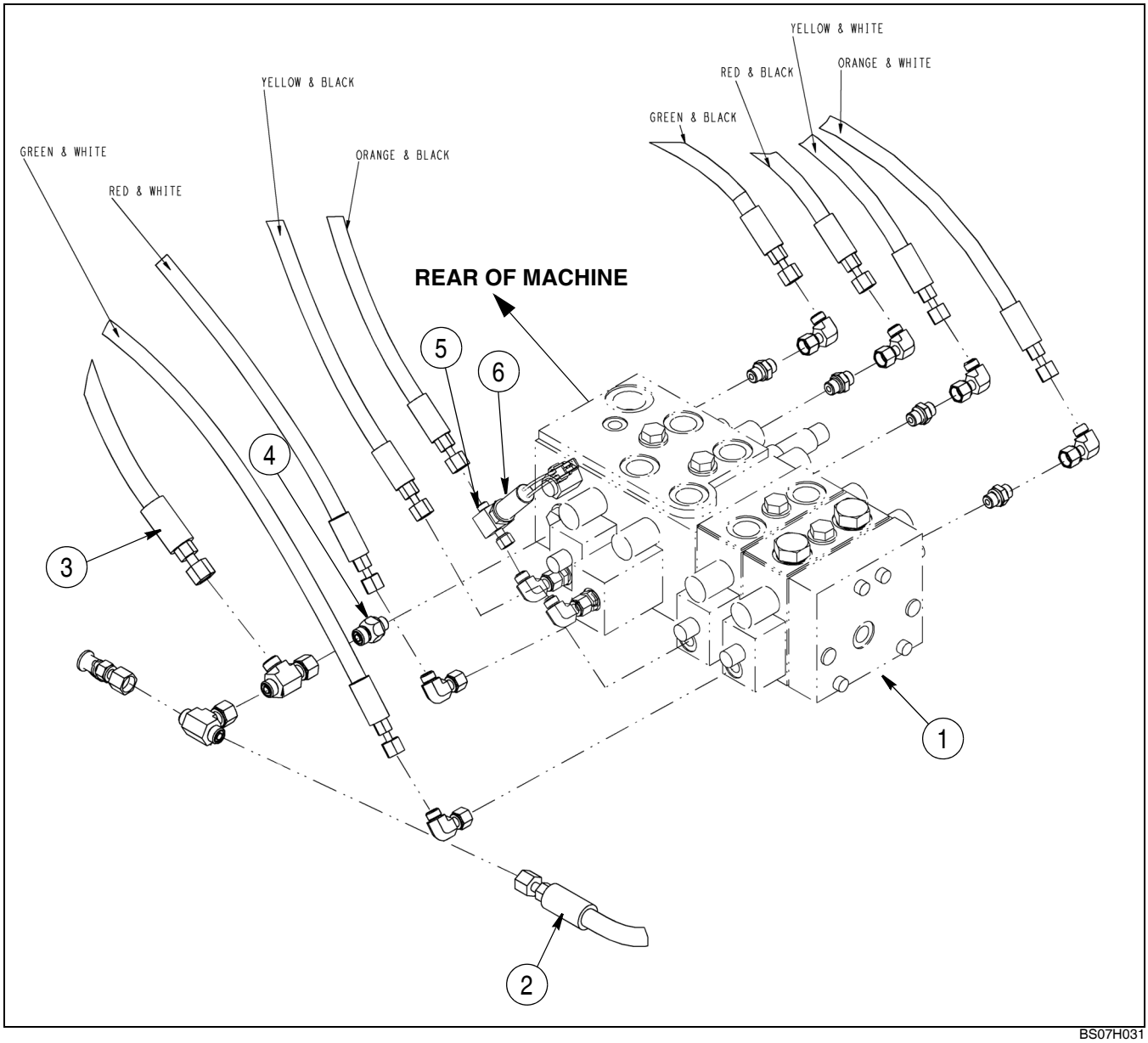

730L8H

Variable Component
(Run arrow through
symbol at 45°)


730L8J

Spring

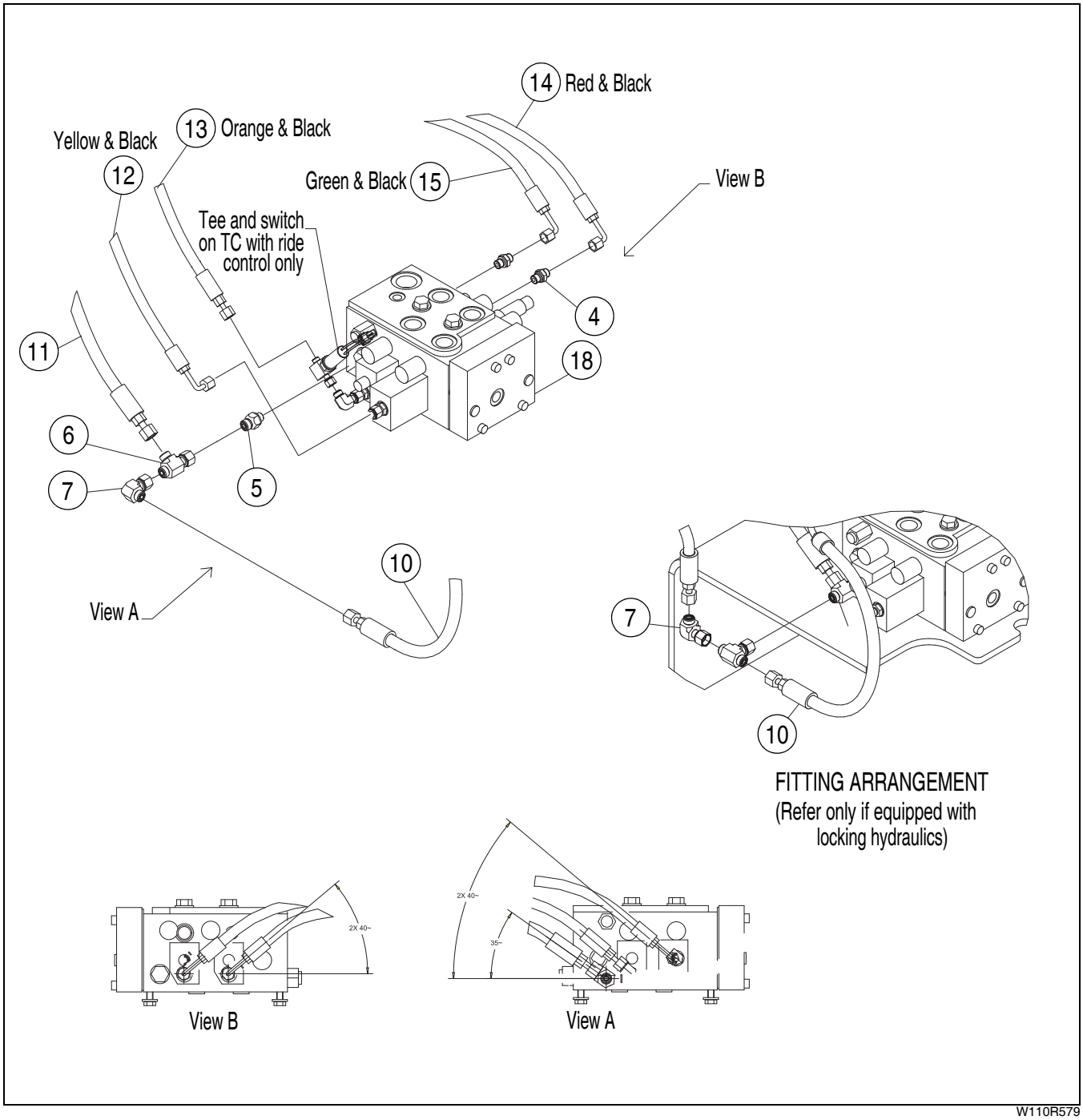
BS07B696



BS07H031

4 SPOOL LINE REMOVAL AND INSTALLATION ILLUSTRATION

1. LOADER CONTROL VALVE
2. PILOT ACCUMULATOR HOSE
3. PILOT PRESSURE HOSE
4. CHECK VALVE
5. SWITCH FITTING (XT WITH LOAD TRAVEL STABILIZATION ONLY)
6. SWITCH (XT WITH LOAD TRAVEL STABILIZATION ONLY)

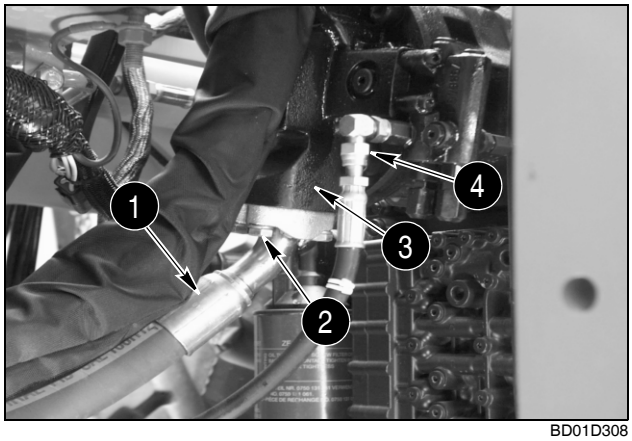


W110R579

2 SPOOL LINE REMOVAL AND INSTALLATION (jotstick version)

1. GROMMET
2. ELBOW
3. HOSE/A PILOT TANK
4. CONNECTOR
5. VALVE CHECK
6. TEE
7. ELBOW
8. ACCUMULATOR PILOT
9. NUT
10. HOSE PILOT ACCUMULATOR
11. HOSE PILOT PRESSURE
12. HOSE PILOT LIFT RIGHT
13. HOSE PILOT TILT RIGHT
14. HOSE PILOT LIFT LEFT
15. HOSE PILOT TILT LEFT
16. SLEEVE HOSE 60X1200
17. O-RING

STEP 67



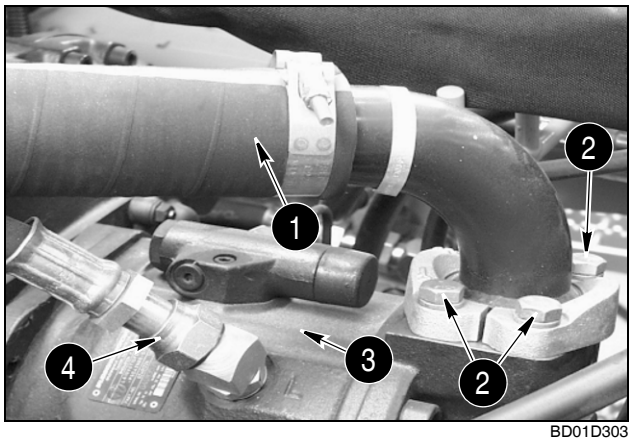
BD01D308

1. PRESSURE HOSE
2. BOLTS (4)
3. HYDRAULIC PUMP
4. LOAD SENSING HOSE

A. Install the pressure hose (1) to the hydraulic pump (3) using four bolts (2).

B. Install the load sensing hose (4) to the hydraulic pump (3).

STEP 68



BD01D303

1. SUCTION HOSE
2. BOLTS (4)
3. HYDRAULIC PUMP
4. CASE DRAIN HOSE

A. Install the suction hose (1) to the hydraulic pump (3) using four bolts (2).

B. Install the case drain hose (4) to the hydraulic pump (3).

STEP 69

See Section 9007 for installing the ROPS cab or ROPS canopy.

STEP 70

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

STEP 71

Place the master disconnect switch in the ON position.

STEP 72

Start the engine and run the engine at low idle for two minutes.

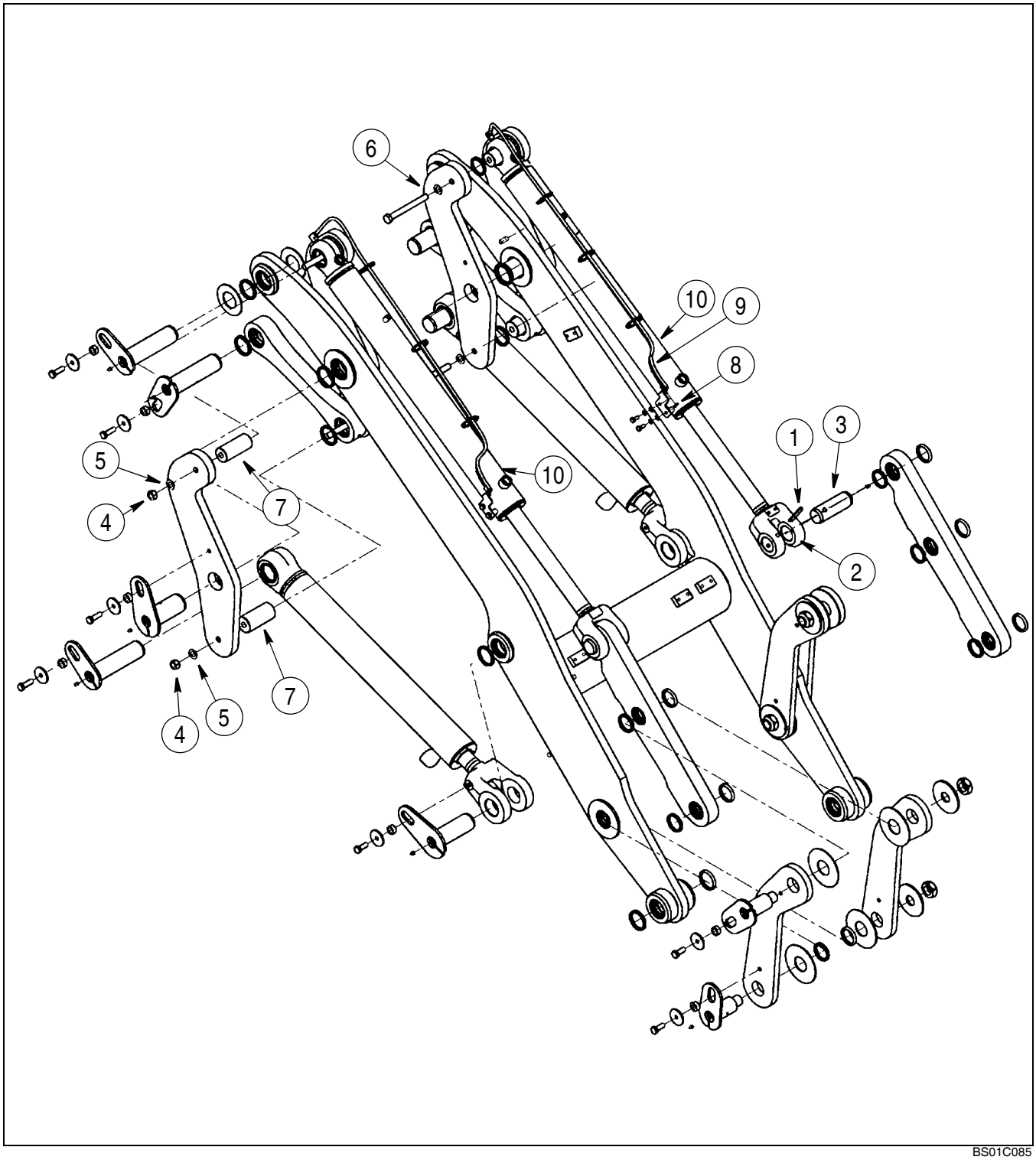
NOTE: *If any unusual vibration is heard coming from the pump, stop the machine immediately and check for obstructions in the pump suction line.*

STEP 73

Stop the engine and check for hydraulic oil leakage at the hydraulic pump.

STEP 74

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



BS01C085

TC LOADER BUCKET CYLINDER REMOVAL AND INSTALLATION ILLUSTRATION

1. ROLL PIN
2. YOKE
3. PIVOT PIN
4. NUT
5. WASHER
6. INNER BELLCRANK
7. PIVOT PIN
8. BOLT
9. GREASE LINE
10. BUCKET CYLINDER

Installation

STEP 208

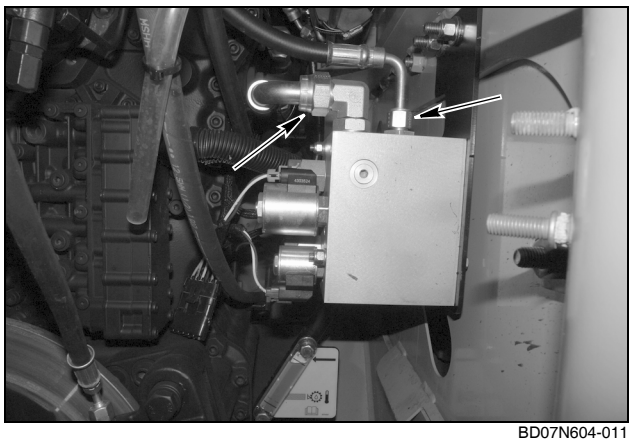
Place the fan reversing valve into position on the machine.

STEP 209

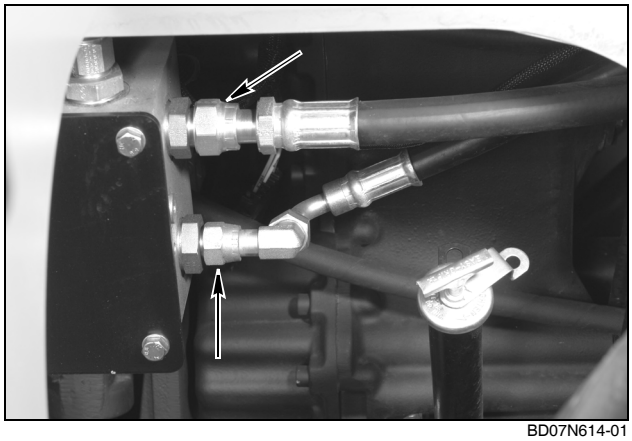
Lubricate and install new O-rings in the fittings.

STEP 210

Install the bolts, washers and nuts. Tighten the nuts.



BD07N604-011



BD07N614-01

Remove caps from fittings and plugs from hoses. Connect hoses to the fan reversing valve, remove and discard tags.

STEP 211

BD07N610-01

Connect the electrical connectors on the fan reversing valve.

STEP 212

Turn off the vacuum pump and disconnect from the hydraulic reservoir.

STEP 213

Check the level of the hydraulic oil in the reservoir.

STEP 214

Start the engine and run the engine at low idle for two minutes.

STEP 215

Stop the engine and check for hydraulic oil leakage at the fan reversing valve.

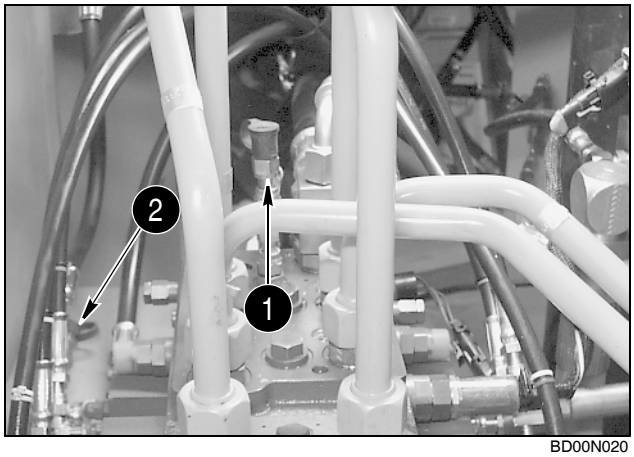
STEP 216

Put the articulation lock in the OPERATING position.

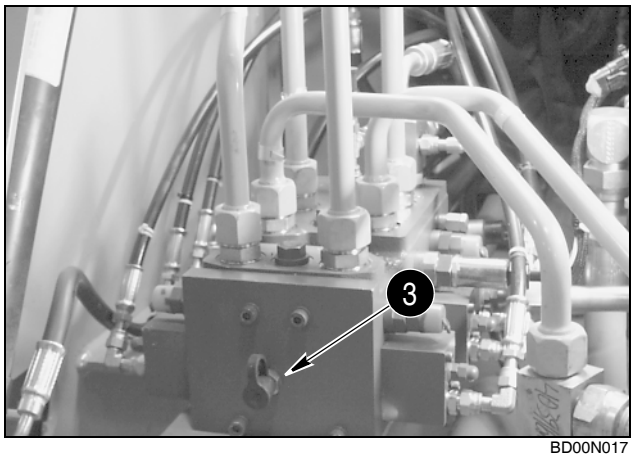
STEP 217

Check the level of the hydraulic oil in the reservoir and add as required. Tighten the filler cap on the reservoir.

STEP 5



BD00N020



BD00N017

1. TEST PORT (LOAD SENSE)
2. TEST PORT (PILOT PRESSURE)
3. TEST PORT (PUMP PRESSURE)

Connect two 69 bar (1000 psi) test gauges to the test ports (1) and (3) located on the loader control valve.

STEP 6

Start the engine and run at low idle.

STEP 7

Make sure all of the controls are in the neutral position and record the readings on the test gauges (1) and (3).

STEP 8

The pressure on test port (1) should read approximately 29 bar (420 psi). The pressure on test port (3) should read approximately 51 bar (740 psi).

NOTE: *These readings may vary from one machine to another. The important value is the difference between the readings of gauges 1 and 3.*

STEP 9

Subtract the reading of the test port (1) from the reading of the test port (3).

STEP 10

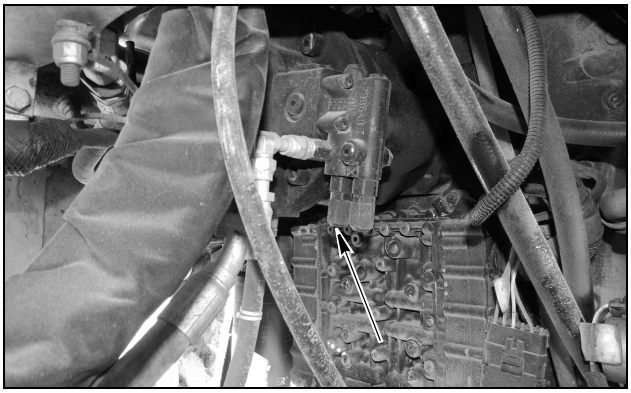
The difference between the two readings should be 22 to 25 bar (320 to 360 psi).

STEP 11

If this reading is more or less than that specified, it will be necessary to adjust the pump.

Adjusting the Main Hydraulic Pump

STEP 12



W110R581

The delta pressure adjusting screw is the farthest from the pump. Turn the screw clockwise to increase the differential pressure. Turning the screw counterclockwise will decrease the differential pressure.

NOTE: *One turn of the adjustment screw will change the pressure approximately 16 bar (230 psi).*

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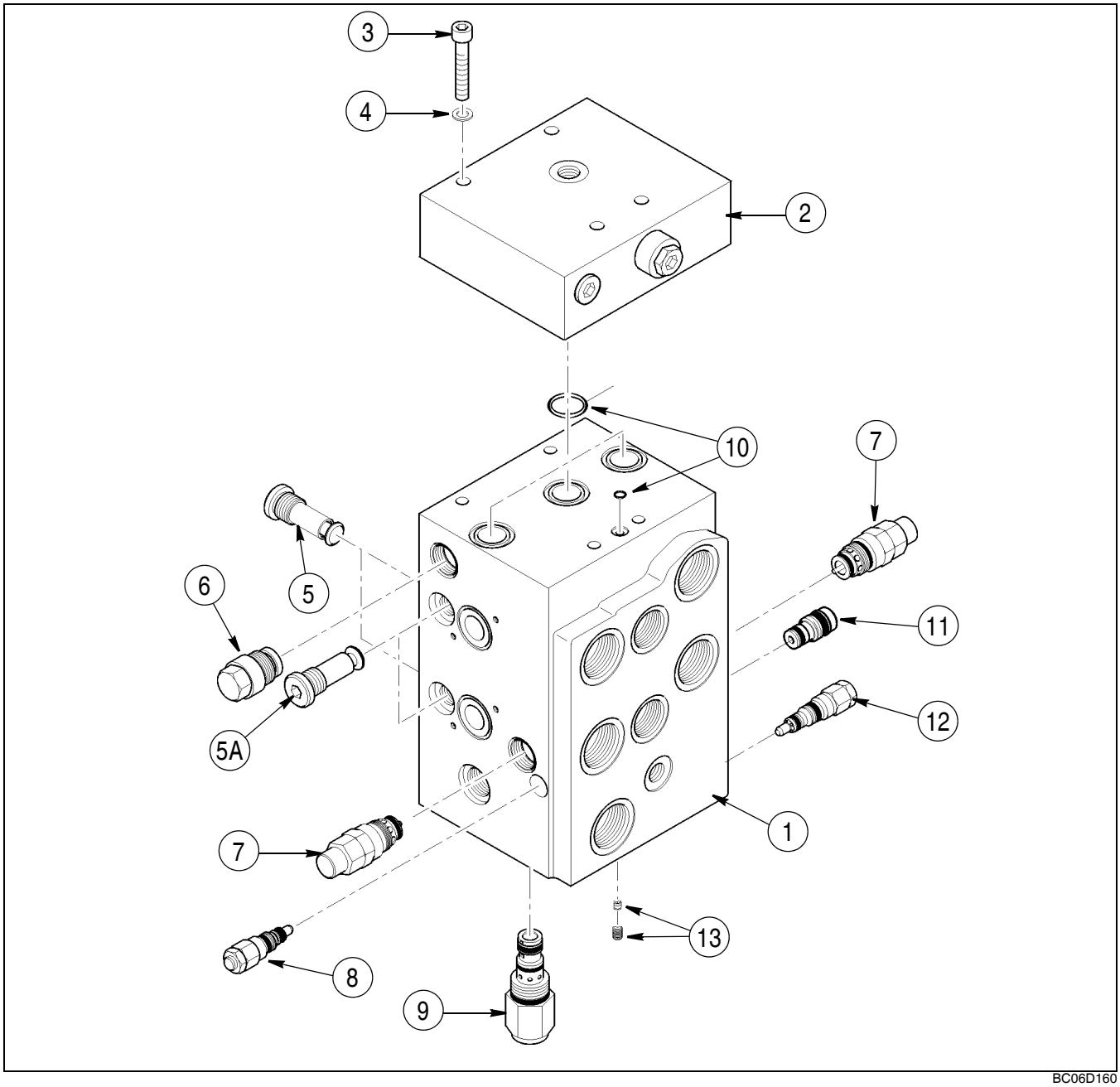


BC06D160

1. HOUSING
2. PLATE
3. BOLT
4. WASHER
5. LOAD CHECK VALVE
5A. REGENERATION CHECK VALVE
6. REGENERATION RELIEF VALVE
7. ANTICAVITATION AND CIRCUIT RELIEF
8. LS (MAIN) RELIEF VALVE
9. PILOT PRESSURE REDUCING VALVE
10. O-RINGS
11. LS BLEED ORIFICE
12. STEERING RELIEF VALVE
13. LS SHUTTLE CHECK VALVE

2 SPOOL VALVE HOUSING CONFIGURATION

STEP 5

Install and torque regeneration check valve (14) to 100 Nm (73.7 pound-feet).

STEP 6

Install new O-rings on housing (1). Install plate (2), bolts (3) and washers (4), onto housing (1). Torque bolts to 20 to 25 Nm (177 to 221 pound-inches).

NOTE: *For 4 spool configuration install new O-rings between housings (30) and housing (1), install nuts (32) on studs (33).* Torque nuts to 70 Nm (51.5 pound-feet).

STEP 7

Install and torque pilot pressure reducing valve (6) to 90 Nm (66 pound-feet).

STEP 8

Install and torque anticavitation valves (7) to 90 Nm (66 pound-feet).

NOTE: *Repeat step for 3 and 4 spool anticavitation valves (31).*

STEP 9

Install anticavitation valves (27), spring (17), and cap (24) and torque cap to 60 Nm (44 pound-feet).

STEP 10

Install and torque flow limit valve (9 and 11) to 20 to 25 Nm (177 to 221 pound-inches).

STEP 11

Install and torque pressure relief valves (8 and 12) to 20 to 25 Nm (177 to 221 pound-inches).

STEP 12

Install and torque check valves (5) to 40 Nm (29.5 pound-feet).

STEP 13

Install and torque cone and plug (13) to 10 Nm (88.5 pound-inches).

STEP 14

Install and torque plug (28) to 60 Nm (44 pound-feet).

STEP 15

Lubricate spools with hydraulic oil and push spools (20 and 26) into housing (1).

IMPORTANT: *Do not force spools into housing.*

STEP 16

Install spring retainers (18), springs (17), covers (16), and bolts (14). Torque bolts to 6 Nm (53 pound-inches).

NOTE: *Repeat steps 15 and 16 for 3 and 4 spool valve configuration.*

STEP 17

Install spring (17) and cap (24) and torque cap to 60 Nm (44 pound-feet).

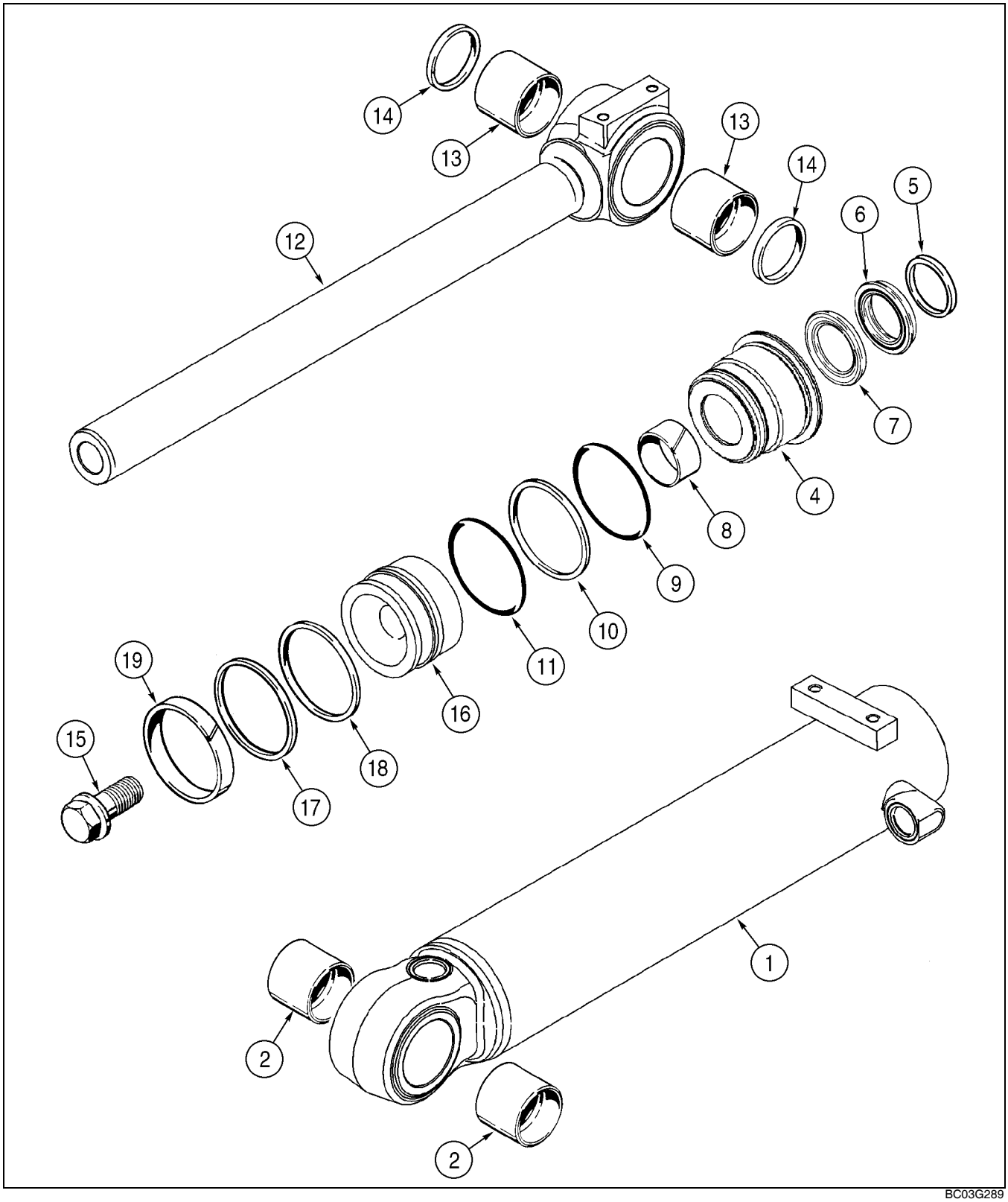
NOTE: *Prior to installation in the machine, circuit reliefs can be tested.*

STEP 18

Install valve in machine, see section 8001.

STEP 19

Check loader limit pressure, see section 8002.



1. TUBE
2. BUSHING
3. SCREW (NOT SHOWN)
4. GLAND
5. WIPER
6. SEAL
7. SEAL
8. BUSHING
9. O-RING
10. BACKUP RING
11. O-RING
12. PISTON ROD
13. BUSHING
14. WIPER
15. BOLT AND WASHER
16. PISTON
17. SEAL
18. BACKUP RING
19. WEAR RING

FIGURE 2. BUCKET CYLINDER FOR Z-BAR MODELS

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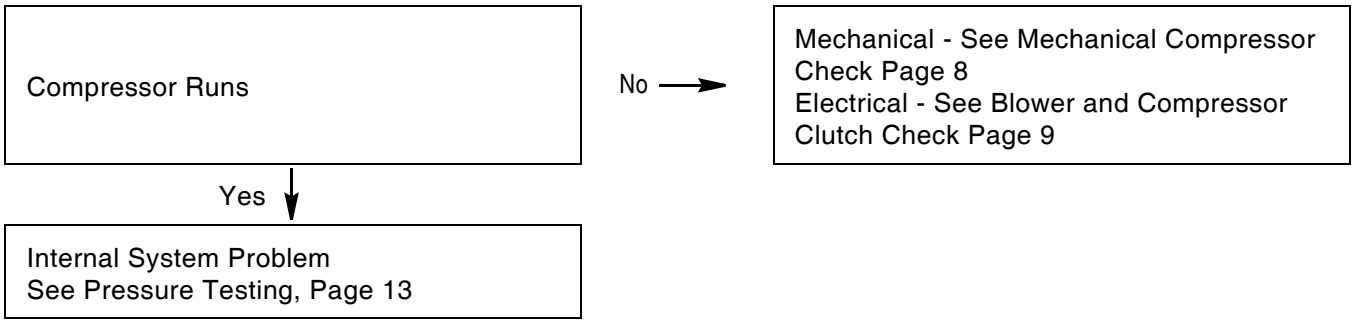
TROUBLESHOOTING

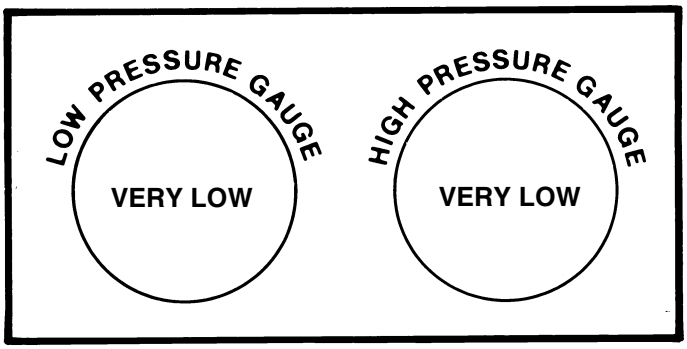
Perform a visual inspection of the machine. Check the following and correct as necessary:

1. - Obtain service history if possible.
2. - Is compressor drive belt in place and tensioned?
3. - Are grille screens, fan blades, condenser, air filter, and evaporator unobstructed?
4. - Are there any sharp bends or kinks in the hoses?
5. - Are there heavy accumulations of oil, or oily dust around the fittings, indicating refrigerant leakage?
6. - Are air ducts undamaged, sealed properly and in position?
7. - Condensate drain hoses and check valves present and unobstructed?

Problem: No Cooling



PROBLEM: NO COOLING



476L7

SEE PRESSURE - TEMPERATURE CHART ON PAGE 14

Indication of No Refrigerant or Low Refrigerant Charge:

A. Discharge air from evaporator warm.

B. Compressor does not run, or cycles off rapidly after start-up. (A/C warning light in cab should illuminate).

Yes →

1. Leak test the system, see Page 11. It may be necessary to add refrigerant. See Section 9003.
2. Evacuate and reclaim remaining refrigerant from system. See Section 9003.
3. Repair system leaks as needed. Follow the given repair procedure.
4. Check level of oil in compressor - possible for compressor to have an oil loss.
5. Remove air and moisture from the system. Replace Receiver-Drier. See Section 9004.
6. Charge system with new refrigerant. See Section 9003.
7. Continue performance test for other possible problems.

TUBE CONNECTIONS TORQUE CHART

TUBING SIZE	3/8 inch		1/2 inch	5/8 inch	
THREAD SIZE	M10 -1.25	5/8-18	3/4-18 OR 3/4-16	7/8-18 OR 7/8-14	1-14
STEEL TO STEEL	31-36 Nm	31-36 Nm	40-46 Nm	45-52 Nm	45-52 Nm
ALUMINUM TO BRASS	10-14 Nm	10-14 Nm	24-30 Nm	30-37 Nm	45-52 Nm

NOTE: *When tightening air conditioning hose or pipe fittings, a second wrench serving as support must be used.*

IMPORTANT: *Special care is required when tightening the fittings on the compressor, condenser and evaporator since these connections are easily distorted.*

PRESSURE - TEMPERATURE CHART

AMBIENT TEMPERATURE °F (°C)	NORMAL LOW PRESSURE INDICATION psi (bar)	NORMAL HIGH PRESSURE INDICATION psi (bar)	AIR LOUVER MAXIMUM TEMP. °F (°C)
80 (27)	9 to 12 (0.62 to 0.83)	145 to 165 (10 to 11.5)	55 (14)
90 (32)	11 to 15 (0.76 to 1.04)	190 to 210 (13.1 to 14.5)	61 (18)
95 (35)	16 to 18 (1.10 to 1.24)	210 to 230 (14.5 to 15.8)	63 (20)
100 (38)	17 to 19 (1.17 to 1.31)	235 to 255 (16.2 to 17.6)	66 (22)
105 (41)	20 to 21 (1.38 to 1.45)	260 to 280 (17.9 to 19.3)	68 (23)
110 (43)	22 to 24 (1.93 to 2.14)	290 to 310 (20 to 21.4)	72 (25)

The pressure-temperature chart is based on the following conditions:

1. Engine operating at 1500 RPM
2. No engine load
3. Fan speed control in maximum position and all louvers open.
4. Cab temperature control set to maximum cooling.
5. Both cab doors open
6. All panels and access doors installed and closed.
7. Cab filters clean and installed.
8. Heater valve at engine closed.
9. Measurements taken 15 minutes after start-up.

Removal

STEP 16
Park the machine on a level surface and lower the bucket to the floor.

STEP 17
If changing any air conditioning components, discharge the air conditioning system according to the instructions in Section 9003.

STEP 18

BD02N160

If changing the heater core, put a container capable of holding 22.7 liter (6 gallon) container below radiator drain. Remove radiator cap. Remove cap and drain coolant into container. Install cap after coolant has drained. Install radiator cap.

STEP 19
Place the master disconnect in the OFF position.

STEP 20
Disconnect the wiring harness from the operator's seat (if equipped with air seat option).

STEP 21

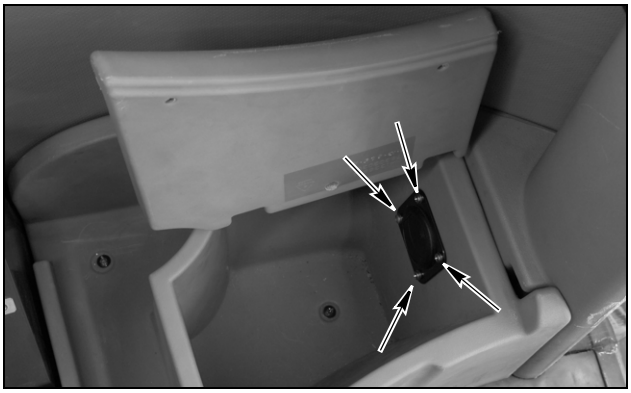
BD06G202

Remove the four bolts that fasten the operator's seat to the upper box, remove the seat from the machine.

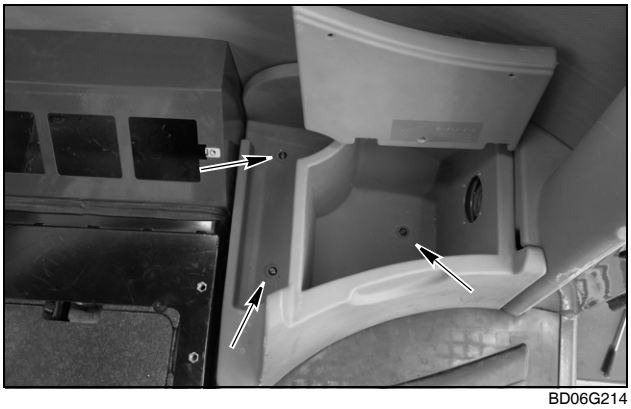
STEP 22

BD06G212

Open the cover on the cooler.

STEP 23

BD06G213

Remove the four screws securing the air vent, remove the vent cover.

STEP 24

BD06G214

Remove the three screws securing the cooler to the cab, remove the cooler.

STEP 25
Fold the rubber mat over to gain access to the upper box mounting bolts.

CONDENSER AND RECIEVER DRIER

Removal

STEP 79

Park the machine on a level surface and lower the bucket to the ground.

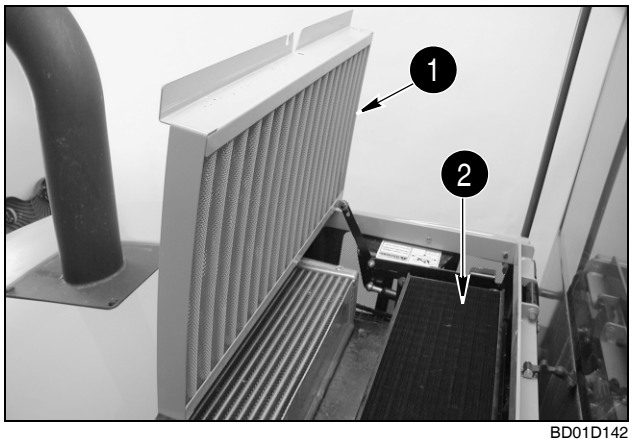
STEP 80

Place the master disconnect switch in the OFF position.

STEP 81

Discharge the air conditioning system according to the instructions in Section 9003.

STEP 82



BD01D142

1. COVER 2. CONDENSER

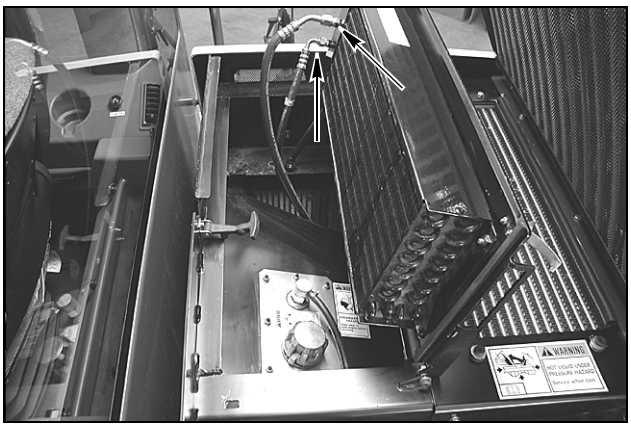
Open the cover (1) to gain access to the condenser (2).

STEP 83

BD03A109

The condenser is connected to a bracket which pivots on the cooling frame. Pivot the condenser to gain access to the hoses.

STEP 84



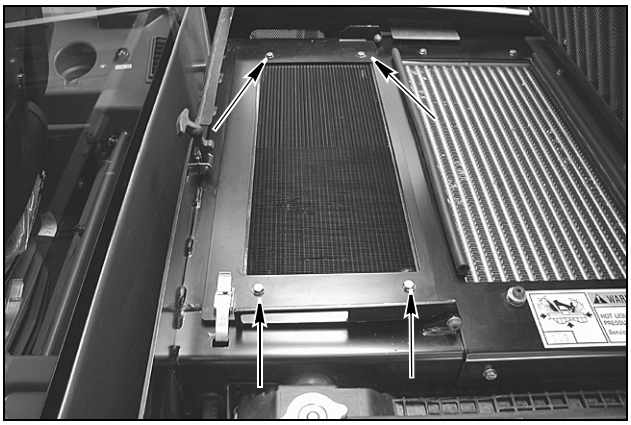
BS03A107

Fasten identification tags on the hoses and disconnect the hoses from the condenser.

STEP 85

Install plugs in the hoses and caps on the fittings.

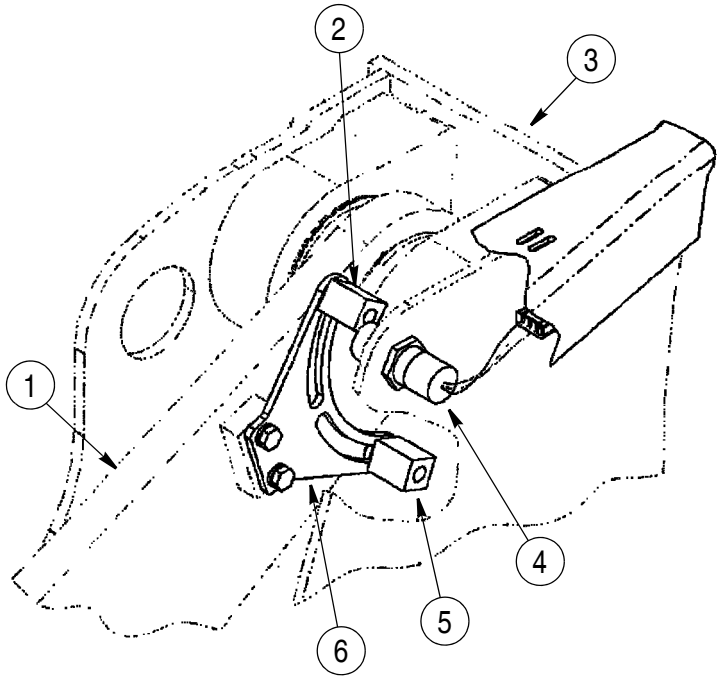
STEP 86



BS03A109

Loosen the bolts that fasten the condenser to the bracket, pivot the condenser and remove the bolts and condenser.

HEIGHT CONTROL AND RETURN TO TRAVEL ADJUSTMENT (Z-BAR, TC, AND LR MODELS)



BS01C081

1. LIFT ARM
2. RETURN TO TRAVEL TARGET
3. FRONT CHASSIS (TOP LEFT HAND SIDE)
4. PROXIMITY SWITCH
5. HEIGHT CONTROL TARGET
6. TARGET MOUNTING PLATE

HEIGHT CONTROL AND RETURN TO TRAVEL ADJUSTMENT ILLUSTRATION Z-BAR, TC AND LR MODELS

1. Park the machine on a level surface.
2. Start the engine and apply the parking brake.
3. Lower the lift arms and place the bucket flat on the ground.
4. Stop the engine.

NOTE: *To avoid damage to the proximity switch (4), it must be adjusted back to clear everything on the lift arm as it passes. Refer to the illustration on this page.*

WARNING: *Raised equipment on the machine without an operator can cause injury or death. Before you leave the operators compartment, always support or lower the equipment (backhoe, blade, boom, bucket, etc.) to the ground and stop the engine.*

CM105

5. Position the return to travel target (2) opposite the proximity switch (4) and tighten it to the target mounting plate (6).
6. Adjust the proximity switch (4) out towards the return to travel target (2) until an air gap of 3.5 to 5.0 mm (1/8 to 3/16 inch) is obtained.
7. Lock the proximity switch (4) in this position with the jam nut. Torque the jam nut to 6 to 7.5 Nm (4.5 to 5.5 pound-feet).

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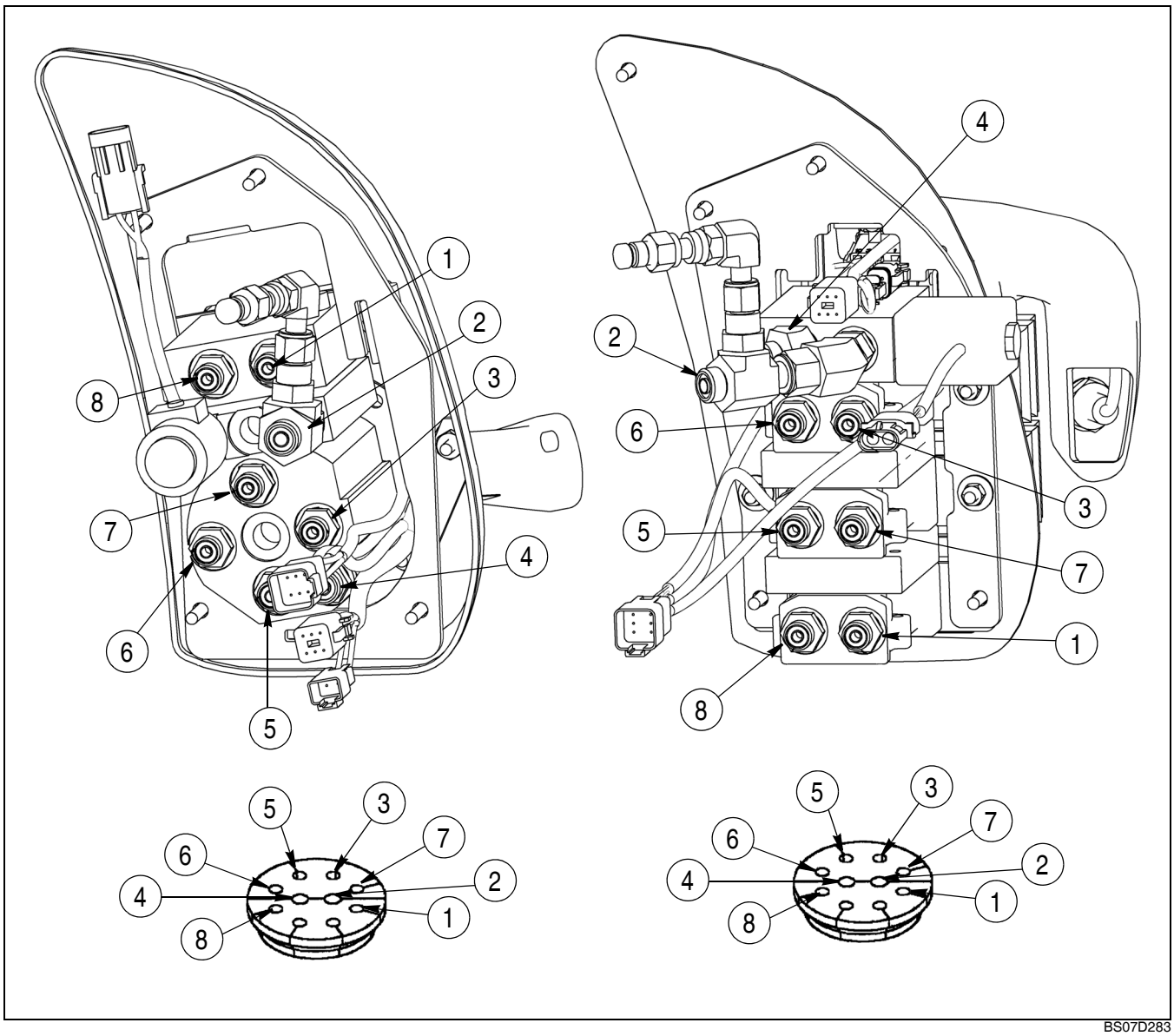

1. YELLOW WHITE
2. PILOT PRESSURE HOSE
3. RED BLACK
4. PILOT TANK HOSE
5. ORANGE BLACK
6. YELLOW BLACK
7. GREEN BLACK
8. RED WHITE

JOYSTICK AND 1 LEVER HOSE COLOR CODING

1. YELLOW WHITE
2. PILOT PRESSURE HOSE
3. RED BLACK
4. PILOT TANK HOSE
5. ORANGE BLACK
6. YELLOW BLACK
7. GREEN BLACK
8. RED WHITE

3 LEVER HOSE COLOR CODING