450DLC Excavator Operation and Tests

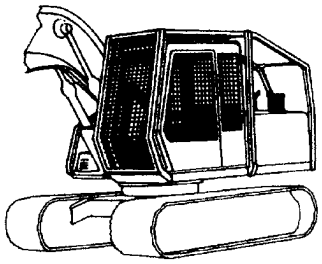
TECHNICAL MANUAL
450DLC Excavator Operation and Test

TM2361 24JUN08 (ENGLISH)

For complete service information also see:

Worldwide Construction And Forestry Division
LITHO IN U.S.A.

Add Cab Guarding for Special Uses



T133733 –UN–15SEP00

Special work situations or machine attachments may create an environment with falling or flying objects. Working near an overhead bank, doing demolition work, using a hydraulic hammer, or working in a wooded area, for example, may require added guarding to protect the operator.

Additional Level II FOPS (falling object protective structures) and special screens or guarding should be installed when falling or flying objects may enter or damage the machine. Contact your authorized dealer for information on devices intended to provide protection in special work situations.

DW90712,0000056 –19–03FEB06–1/1

Inspect Machine

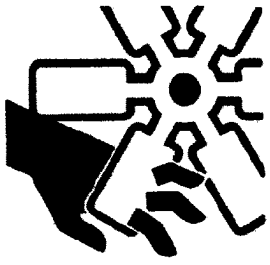
T6607AQ –UN–18OCT88

Inspect machine carefully each day by walking around it before starting.

Keep all guards and shields in good condition and properly installed. Fix damage and replace worn or broken parts immediately. Pay special attention to hydraulic hoses and electrical wiring.

TX03679,0001734 –19–03JAN07–1/1

Stay Clear of Moving Parts



T133592 –UN–12SEP01

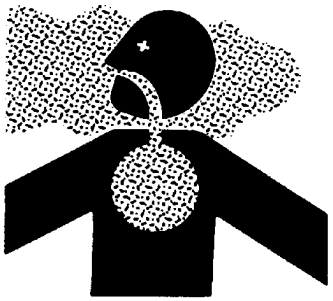
Entanglements in moving parts can cause serious injury.

Stop engine before examining, adjusting or maintaining any part of machine with moving parts.

Keep guards and shields in place. Replace any guard or shield that has been removed for access as soon as service or repair is complete.

TX03679,00016D2 –19–03JAN07–1/1

Remove Paint Before Welding or Heating



T133546 –UN–24AUG00

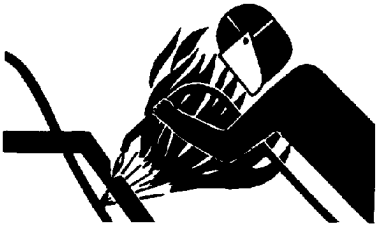
Hazardous fumes can be generated when paint is heated by welding or using a torch. Dust from sanding or grinding paint can also be hazardous.

Remove paint to at least 76 mm (3 in.) from area to be heated. Wear an approved respirator when sanding or grinding paint. If a solvent or paint stripper is used, wash area with soap and water. Remove solvent or paint stripper containers from work area and allow fumes to disperse at least 15 minutes before welding or heating.

Work outside or in a well-ventilated area. Dispose of waste, paint and solvents properly.

TX03679,0001732 –19–28FEB06–1/1

Make Welding Repairs Safely



T133547 –UN–31AUG00

IMPORTANT: Disable electrical power before welding. Turn off main battery switch or disconnect positive battery cable. Separate harness connectors to engine and vehicle microprocessors.

Avoid welding or heating near pressurized fluid lines. Flammable spray may result and cause severe burns if pressurized lines fail as a result of heating. Do not let heat go beyond work area to nearby pressurized lines.

Remove paint properly. Do not inhale paint dust or fumes. Use a qualified welding technician for structural repairs. Make sure there is good ventilation. Wear eye protection and protective equipment when welding.

TX03679,00016D5 –19–25APR08–1/1

❷ **Machine Function Check**	Is operation of machine normal? See Operational Checkout Procedure. (Group 9005-05).	**YES:** Machine may be operated but it is recommended that the main controller (MCF) be replaced. **NO:** Main controller (MCF) malfunction. Replace. See Main Controller (MCF) Remove and Install. (Group 9015-20). – – –1/1

11002.02 — Abnormal A/D Conversion

MS12501,0000048 –19–14JAN06–1/1

Controller Hardware Diagnostics

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❶ **Code Check**	Clear and re-check diagnostic trouble codes. Is DTC 11002.02-Abnormal EEPROM still present?	**YES:** Code is still present and machine does not operate. Replace main controller (MCF). See Main Controller (MCF) Remove and Install. (Group 9015-20). **YES:** Code is still present but machine is still operable. Go to Machine Function Check. **NO:** Main controller (MCF) is OK. – – –1/1

❹ **Open Circuit Check**	Disconnect connector to switch panel. Check continuity between main controller (MCF) connector D pin D15 and switch panel connector pin 2. Is there continuity between the pins?	**YES:** Go to Short Circuit Check. **NO:** Open circuit in harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) – – –1/1

❺ **Short Circuit Check**	Disconnect connector to switch panel. Check continuity between switch panel connector pin 2 and power and ground. Is there continuity to power or ground?	**YES:** Short circuit in harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Main controller (MCF) malfunction. Replace main controller. See Main Controller (MCF) Remove and Install. (Group 9015-20). – – –1/1

❻ **Harness Voltage Check**	*NOTE: Key Switch: ON* Disconnect connector to switch panel. Check voltage between switch panel connector pin 1 and machine ground. Is voltage between 4.5—5.5 volts?	**YES:** Open circuit in harness between main controller (MCF) and engine speed dial pin 3. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Open circuit in harness between main controller (MCF) and engine speed dial pin 1. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) – – –1/1

❹ **Short Circuit Check**	Disconnect harness from main controller (MCF) and pump 2 delivery pressure sensor. Check continuity between pump 2 delivery pressure sensor connector pin 2 and power and ground. Is there continuity between pin 2 and power or ground?	**YES:** Short circuit in harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram, see Machine Harness (W2) Wiring Diagram, and see Pump Harness (W8) Wiring Diagram. (Group 9015-10.) **NO:** Main controller (MCF) malfunction. See Main Controller (MCF) Remove and Install. (Group 9015-20.) – – –1/1

❺ **Harness Voltage Check**	Disconnect pump 2 delivery pressure sensor from harness. Check voltage between pump 2 delivery pressure sensor connector pin 1 and machine ground. Is voltage between 4.5—5.5 Volts? *NOTE: Key Switch: On*	**YES:** Open circuit in harness between main controller (MCF) and pump 2 delivery pressure sensor pin 3. Repair or replace harness. See Cab Harness (W1) Wiring Diagram, see Machine Harness (W2) Wiring Diagram, and see Pump Harness (W8) Wiring Diagram. (Group 9015-10.) **NO:** Open circuit in harness between main controller (MCF) and pump 2 delivery pressure sensor pin 1. Repair or replace harness. See Cab Harness (W1) Wiring Diagram, see Machine Harness (W2) Wiring Diagram, and see Pump Harness (W8) Wiring Diagram. (Group 9015-10.) – – –1/1

11301.03 — Swing Pilot Pressure Sensor Circuit Voltage High

MS12501,0000051 –19–21FEB06–1/1

❹ **Short Circuit Check**	Disconnect harness from arm in pilot pressure sensor and main controller (MCF). Check continuity between arm in pilot pressure sensor connector pin 2 and power and ground. Is there continuity to power or ground?	**YES:** Short circuit in harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) **NO:** Main controller (MCF) malfunction. Replace controller. See Main Controller (MCF) Remove and Install, (Group 9015-20.) – – –1/1

❺ **Harness Voltage Check**	Disconnect arm in pilot pressure sensor from harness. Check voltage between arm in pilot pressure sensor connector pin 1 and machine ground. Is voltage between 4.5—5.5 volts? *NOTE: Key Switch: On*	**YES:** Open circuit in harness between main controller (MCF) and arm in pilot pressure sensor pin 3. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) **NO:** Open circuit in harness between main controller (MCF) and arm in pilot pressure sensor pin 1. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) – – –1/1

11303.04 — Arm Roll-in Pilot Pressure Sensor Circuit Voltage Low

MS12501,0000055 –19–24JAN06–1/1

❸ **Solenoid Function Check**	Switch travel speed solenoid (SI) harness connector with another solenoid valve in solenoid valve manifold. Clear diagnostic trouble codes (DTC) and re-check for DTC. Does diagnostic trouble code stay with travel speed solenoid (SI)?	**YES:** Travel speed solenoid (SI) malfunction. Replace solenoid. **NO:** Main controller (MCF) malfunction. Replace controller. See Main Controller (MCF) Remove and Install. (Group 9015-20.) – – –1/1

11405.04 — Travel Speed Solenoid (SI) Valve Current Feedback Low

MS12501,000005D –19–14JAN06–1/1

Travel Speed Solenoid (SI) Diagnostics

Travel speed solenoid (SI) current 56 mA or less.

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❶ **Solenoid Resistance Check**	Disconnect harness connector from travel speed solenoid (SI). Check resistance of solenoid. Is resistance between 14.8—22.2 ohms?	**YES:** Go to Continuity Check. **NO:** Travel speed solenoid (SI) malfunction. Replace solenoid. – – –1/1

❷ **Continuity Check**	Disconnect harness connectors from main controller (MCF) and travel speed solenoid (SI). Check for continuity between main controller (MCF) connector A pin A11 and travel speed solenoid (SI) harness connector pin 1. Check for continuity between main controller (MCF) connector A pin A17 and travel speed solenoid (SI) harness connector pin 2. Is there continuity between the pins?	**YES:** Go to Solenoid Function Check. **NO:** Open circuit in harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram, see Machine Harness (W2) Wiring Diagram, and see Control Valve Harness (W7) Wiring Diagram. (Group 9015-10.) – – –1/1

Hydraulic Oil Temperature Sensor Diagnostics

Hydraulic oil temperature sensor 4.10 volts or higher.

Diagnostic trouble code sets when intake air temperature is 21°C (70°F) or higher and sensor voltage is 4.10 volts or higher for more than 30 seconds.

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❶ **Connector Check**	Check harness connections to hydraulic oil temperature sensor, MCF and between harness. Are connectors clean and free from debris? Are pins straight and make a good connection?	**YES:** Go to Hydraulic Oil Temperature Sensor Check. **NO:** Repair or replace connector. See Machine Harness (W2) Wiring Diagram. (Group 9015-10.)

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❷ **Hydraulic Oil Temperature Sensor Check**

Disconnect hydraulic oil temperature sensor from harness.

Check resistance of sensor.

Hydraulic Oil Temperature	Resistance
-20°C -4°	14.6—17.8 kΩ
0°C 32°F	5.88 kΩ
20°C 68°F	2.21—2.69 kΩ
40°C 104°F	1.14 kΩ
60°C 140°F	0.54 kΩ
80°C 176°F	0.32 kΩ

Is sensor within specifications?

YES: Go to Continuity Check.

NO: Hydraulic oil temperature sensor malfunction. Replace sensor.

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24 DTC Check	Connect connector to information controller (ICF). Clear diagnostic trouble codes (DTC) and re-check for DTCs. Is DTC 11910.02-Actual Engine Speed Message Error still present?	**YES:** information controller (ICF) malfunction. Replace. See Information Controller (ICF) Remove and Install. (Group 9015-20.) **NO:** Check harness connection to information controller (ICF). – – –1/1
25 ECM CAN Resistance Check	Connect all connectors except engine control module (ECM) connector. Check resistance between pin 18 (CAN High) and pin 37 (CAN Low) wires in connector. Is resistance between 110—130 Ω?	**YES:** Go to DTC Check. **NO:** Go to Monitor Controller CAN Resistance Check. – – –1/1
26 DTC Check	Connect connector to engine control module (ECM). Clear diagnostic trouble codes (DTC) and re-check for DTCs. Is DTC 11910.02-Actual Engine Speed Message Error still present?	**YES:** Engine control module (ECM) malfunction. Replace. See Engine Control Module (ECM) Remove and Install. (Group 9015-20.) **NO:** Check harness connection to engine control module (ECM). – – –1/1
27 Monitor Controller CAN Resistance Check	Connect all connectors except monitor controller connector B (X20). Check resistance between pins B6 and B7. Is resistance between 110—130 Ω?	**YES:** Go to DTC Check. **NO:** Malfunction in any controller on CAN. – – –1/1
28 DTC Check	Connect connector to monitor controller. Clear diagnostic trouble codes (DTC) and re-check for DTCs. Is DTC 11910.02-Actual Engine Speed Message Error still present?	**YES:** Monitor controller malfunction. Replace. See Monitor Controller Remove and Install. (Group 9015-20.) **NO:** Check the connection to monitor controller. – – –1/1

❻ **ECM Short to Ground Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between engine control module (ECM) pin 18 (CAN High wire) and engine control module (ECM) pins 1, 3, 4, 43, and 62 (ground). Check for continuity between engine control module (ECM) pin 37 (CAN Low wire) and engine control module (ECM) pins 1, 3, 4, 43, and 62 (ground). Is there continuity between CAN circuit and ground circuit?	**YES:** CAN circuit short to ground. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) **NO:** Go to ICF Short to Ground Check. – – –1/1

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❼ **ICF Short to Ground Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between information controller (ICF) pin C5 and pins C14 and C15. Check for continuity between information controller (ICF) pin C11 and pins C14 and C15. Is there continuity between CAN circuit and ground circuit?	**YES:** CAN circuit short to ground. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Go to Monitor Controller Short to Ground Check. – – –1/1

❽ **Monitor Controller Short to Ground Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between monitor controller pin B7 and pin B11. Check for continuity between monitor controller pin B6 and pin B11. Is there continuity between CAN circuit and ground circuit?	**YES:** CAN circuit short to ground. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Go to MCF Short to Power Check. – – –1/1

❾ **MCF Short to Power Check**	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between main controller (MCF) pin C4 and pins A1, A12, B7, and B17. Check for continuity between main controller (MCF) pin C15 and pins A1, A12, B7, and B17. Is there continuity between CAN circuit and power circuit?	**YES:** CAN circuit short to power. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Go to ECM Short to Power Check. – – –1/1

18 ECM CAN High and Low Side Continuity Check	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between engine control module (ECM) pin 18 (CAN High and Low wires). Is there continuity between CAN high and low side wires?	**YES:** CAN wires short circuit. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) **NO:** Go to ICF CAN High and Low Side Continuity Check. – – –1/1
19 ICF CAN High and Low Side Continuity Check	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between information controller (ICF) pins C5 and C11. Is there continuity between CAN high and low side wires?	**YES:** CAN wires short circuit. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Go to Monitor Controller CAN High and Low Side Continuity Check. – – –1/1
20 Monitor Controller CAN High and Low Side Continuity Check	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between monitor controller pins B6 and B7. Is there continuity between CAN high and low side wires?	**YES:** CAN wires short circuit. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Monitor Harness (W3) Wiring Diagram. (Group 9015-10.) **NO:** Go to MCF CAN Resistance Check. – – –1/1
21 MCF CAN Resistance Check	Connect all connectors except main controller (MCF) connector C (X30). Check resistance between pin C4 and C15. Is resistance between 50—70 Ω?	**YES:** Go to DTC Check. **NO:** Go to ICF CAN Resistance Check. – – –1/1

11977.03 — Auxiliary Valve 1 Feedback Current High

Diagnostic Trouble Code Not Applicable to This Machine.

MS12501,000006D –19–17JAN06–1/1

11977.04 — Auxiliary Valve 1 Feedback Current Low

Diagnostic Trouble Code Not Applicable to This Machine.

MS12501,000006E –19–17JAN06–1/1

11980.03 — ATT Relief Change Valve Feedback Current High

Diagnostic Trouble Code Not Applicable to This Machine.

MS12501,000006F –19–17JAN06–1/1

11980.04 — ATT Relief Change Valve Feedback Current Low

Diagnostic Trouble Code Not Applicable to This Machine.

MS12501,0000070 –19–17JAN06–1/1

24 DTC Check	Connect connector to information controller (ICF). Clear diagnostic trouble codes (DTC) and re-check for DTCs. Is DTC 11983.02-Intake Air Temperature Message Error still present?	**YES:** information controller (ICF) malfunction. Replace. See Information Controller (ICF) Remove and Install. (Group 9015-20.) **NO:** Check harness connection to information controller (ICF). – – –1/1

25 ECM CAN Resistance Check	Connect all connectors except engine control module (ECM) connector. Check resistance between pin 18 (CAN High) and pin 37 (CAN Low) wires in connector. Is resistance between 110—130 Ω?	**YES:** Go to DTC Check. **NO:** Go to Monitor Controller CAN Resistance Check. – – –1/1

26 DTC Check	Connect connector to engine control module (ECM). Clear diagnostic trouble codes (DTC) and re-check for DTCs. Is DTC 11983.02-Intake Air Temperature Message Error still present?	**YES:** Engine control module (ECM) malfunction. Replace. See Engine Control Module (ECM) Remove and Install. (Group 9015-20.) **NO:** Check harness connection to engine control module (ECM). – – –1/1

27 Monitor Controller CAN Resistance Check	Connect all connectors except monitor controller connector B (X20). Check resistance between pins B6 and B7. Is resistance between 110—130 Ω?	**YES:** Go to DTC Check. **NO:** Malfunction in any controller on CAN. – – –1/1

28 DTC Check	Connect connector to monitor controller. Clear diagnostic trouble codes (DTC) and re-check for DTCs. Is DTC 11983.02-Intake Air Temperature Message Error still present?	**YES:** Monitor controller malfunction. Replace. See Monitor Controller Remove and Install. (Group 9015-20.) **NO:** Check the connection to monitor controller. – – –1/1

11991.03 — Travel Right Pilot Pressure Sensor Circuit Voltage High

MS12501,0000079 –19–17JAN06–1/1

Travel Right Pilot Pressure Sensor Diagnostics

Travel right pilot pressure sensor voltage 4.75 volts or higher.

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❶ **Sensor Check**	Switch travel right pilot pressure sensor with another pilot pressure sensor. Clear diagnostic trouble codes (DTC) and re-check DTCs. Does DTC follow travel right pilot pressure sensor?	**YES:** Travel right pilot pressure sensor malfunction. Replace sensor. **NO:** Go to Sensor Circuit Check. – – –1/1
❷ **Sensor Circuit Check**	Disconnect connector of travel right pilot pressure sensor. Check voltage between terminals 1 and 3 of harness. Is voltage between 4.5—5.5 volts? *NOTE: Key Switch: ON*	**YES:** Go to Open Circuit Check. **NO:** Go to Harness Voltage Check. – – –1/1
❸ **Open Circuit Check**	Disconnect harness from travel right pilot pressure sensor and main controller (MCF). Check continuity between travel right pilot pressure sensor connector pin 2 and main controller (MCF) connector D pin D9. Is there continuity between the pins?	**YES:** Go to Short Circuit Check. **NO:** Open circuit in harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) – – –1/1

Travel Left Pilot Pressure Sensor Diagnostics

Travel left pilot pressure sensor voltage 0.25 volts or less.

– – –1/1

❶ **Sensor Check**	Switch travel left pilot pressure sensor with another pilot pressure sensor. Clear diagnostic trouble codes (DTC) and re-check DTCs. Does DTC follow travel left pilot pressure sensor?	**YES:** Travel left pilot pressure sensor malfunction. Replace sensor. **NO:** Go to Sensor Circuit Check. – – –1/1
❷ **Sensor Circuit Check**	Disconnect connector of travel left pilot pressure sensor. Check voltage between terminals 1 and 3 of harness. Is voltage between 4.5—5.5 volts? *NOTE: Key Switch: ON*	**YES:** Go to Open Circuit Check. **NO:** Go to Harness Voltage Check. – – –1/1
❸ **Open Circuit Check**	Disconnect harness from travel left pilot pressure sensor and main controller (MCF). Check continuity between travel left pilot pressure sensor connector pin 2 and main controller (MCF) connector D pin D14. Is there continuity between the pins?	**YES:** Go to Short Circuit Check. **NO:** Open circuit in harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) – – –1/1

Bucket Dump Pilot Pressure Sensor Diagnostics

Bucket dump pilot pressure sensor voltage 4.75 volts or higher.

– – –1/1

❶ **Sensor Check**	Switch bucket dump pilot pressure sensor with another pilot pressure sensor. Clear diagnostic trouble codes (DTC) and re-check DTCs. Does DTC follow bucket dump pilot pressure sensor?	**YES:** Bucket dump pilot pressure sensor malfunction. Replace sensor. **NO:** Go to Sensor Circuit Check. – – –1/1
❷ **Sensor Circuit Check**	Disconnect connector of bucket dump pilot pressure sensor. Check voltage between terminals 1 and 3 of harness. Is voltage between 4.5—5.5 volts? *NOTE: Key Switch: ON*	**YES:** Go to Open Circuit Check. **NO:** Go to Harness Voltage Check. – – –1/1
❸ **Open Circuit Check**	Disconnect harness from bucket dump pilot pressure sensor and main controller (MCF). Check continuity between bucket dump pilot pressure sensor connector pin 2 and main controller (MCF) connector C pin C11. Is there continuity between the pins?	**YES:** Go to Short Circuit Check. **NO:** Open circuit in harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) – – –1/1

Bucket Curl Pilot Pressure Sensor Diagnostics

Bucket curl pilot pressure sensor voltage 0.25 volts or less.

– – –1/1

❶ **Sensor Check**	Switch bucket curl pilot pressure sensor with another pilot pressure sensor. Clear diagnostic trouble codes (DTC) and re-check DTCs. Does DTC follow bucket curl pilot pressure sensor?	**YES:** Bucket curl pilot pressure sensor malfunction. Replace sensor. **NO:** Go to Sensor Circuit Check. – – –1/1
❷ **Sensor Circuit Check**	Disconnect connector of bucket curl pilot pressure sensor. Check voltage between terminals 1 and 3 of harness. Is voltage between 4.5—5.5 volts? *NOTE: Key Switch: ON*	**YES:** Go to Open Circuit Check. **NO:** Go to Harness Voltage Check. – – –1/1
❸ **Open Circuit Check**	Disconnect harness from bucket curl pilot pressure sensor and main controller (MCF). Check continuity between bucket curl pilot pressure sensor connector pin 2 and main controller (MCF) connector C pin C2. Is there continuity between the pins?	**YES:** Go to Short Circuit Check. **NO:** Open circuit in harness. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) – – –1/1

651.03 — Open Circuit in Injection Nozzle #1 (P0201)

Injector #1 feedback signal does not exist.

See Tech 2 Diagnostic Trouble Code P0201 in Isuzu Engine Trouble Shooting Manual. (1E-273.)

JC89288,00000AC –19–14JAN06–1/1

652.03 — Open Circuit in Injection Nozzle #2 (P0202)

Injector #2 feedback signal does not exist.

See Tech 2 Diagnostic Trouble Code P0202 in Isuzu Engine Trouble Shooting Manual. (1E-278.)

JC89288,00000AD –19–18JAN06–1/1

653.03 — Open Circuit in Injection Nozzle #3 (P0203)

Injector #3 feedback signal does not exist.

See Tech 2 Diagnostic Trouble Code P0203 in Isuzu Engine Trouble Shooting Manual. (1E-283.)

JC89288,00000AE –19–18JAN06–1/1

654.03 — Open Circuit in Injection Nozzle #4 (P0204)

Injector #4 feedback signal does not exist.

See Tech 2 Diagnostic Trouble Code P0204 in Isuzu Engine Trouble Shooting Manual. (1E-288.)

JC89288,00000AF –19–24JAN06–1/1

14100.02 — Satellite Communication Terminal: Abnormal EEPROM

NOT APPLICABLE TO THIS MACHINE

MS12501,0000036 –19–18JAN06–1/1

14101.02 — Satellite Communication Terminal: Abnormal IB/OB Queue

NOT APPLICABLE TO THIS MACHINE

MS12501,0000037 –19–18JAN06–1/1

14102.02 — Satellite Communication Terminal: Abnormal Local Loop Back

NOT APPLICABLE TO THIS MACHINE

MS12501,0000038 –19–18JAN06–1/1

14103.02 — Satellite Communication Terminal: The satellite is not found.

NOT APPLICABLE TO THIS MACHINE

MS12501,0000039 –19–18JAN06–1/1

E43 — Abnormal Damper

Abnormal air conditioner and heater blower port change servomotor or air conditioner and heater rear blower port change servomotor.

AH91621,0000170 –19–15MAR06–1/1

Harness Diagnostics

– – –1/1

❶ **Connector Check**	Check harness connection to servomotors and air conditioner and heater controller. Are connectors clean and free from debris? Are pins straight and do they make a good connection?	**YES:** Go to Open Circuit Check. **NO:** Repair or replace connector or pins. – – –1/1

❷ **Open Circuit Check**	Disconnect harness from servomotors and air conditioner and heater controller. Check continuity between pins on controller and servomotor connector. Is there continuity on the appropriate pins? **IMPORTANT: Some wires between air conditioner controller and air conditioner servomotor are spliced with other control, power, and ground circuits. Use caution when checking and testing wires.**	**YES:** Air conditioner and heater blower port change servomotor or air conditioner and heater rear blower port change servomotor malfunction. **NO:** Repair or replace harness. See Air Conditioner Harness (W6) Wiring Diagram. (Group 9015-10.) – – –1/1

E44 — Abnormal Damper

Abnormal air conditioner and heater mixer servomotor.

AH91621,0000171 –19–15MAR06–1/1

11 ICF Short to Power Check	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between information controller (ICF) pin C5 and pins C1 and C2. Check for continuity between information controller (ICF) pin C11 and pins C1 and C2. Is there continuity between CAN circuit and power circuit?	**YES:** CAN circuit short to power. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Go to Monitor Controller Short to Power Check. – – –1/1
12 Monitor Controller Short to Power Check	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between monitor controller pin B7 and A16. Check for continuity between monitor controller pin B6 and A16. Is there continuity between CAN circuit and power circuit?	**YES:** CAN circuit short to power. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Monitor Harness (W3) Wiring Diagram. (Group 9015-10.) **NO:** Go to MCF Short to Key Switch Signal Check. – – –1/1
13 MCF Short to Key Switch Signal Check	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between main controller (MCF) pin C4 and B16. Check for continuity between main controller (MCF) pin C15 and B16. Is there continuity between CAN circuit and key switch signal circuit?	**YES:** CAN circuit short to key switch signal. Repair or replace harness. See Cab Harness (W1) Wiring Diagram. (Group 9015-10.) **NO:** Go to ECM Short to Key Switch Signal Check. – – –1/1
14 ECM Short to Key Switch Signal Check	Disconnect all connectors to main controller (MCF), information controller (ICF), engine control module (ECM) and monitor controller. Check for continuity between engine control module (ECM) pin 18 (CAN High wire) and engine control module (ECM) pin 24 (key switch signal wire). Check for continuity between engine control module (ECM) pin 37 (CAN Low wire) and engine control module (ECM) pin 24 (key switch signal wire). Is there continuity between CAN circuit and key switch signal circuit?	**YES:** CAN circuit short to key switch signal. Repair or replace harness. See Cab Harness (W1) Wiring Diagram and see Machine Harness (W2) Wiring Diagram. (Group 9015-10.) **NO:** Go to ICF Short to Key Switch Signal Check. – – –1/1

Operational Checkout

This procedure is used to check operation of the machine. It is designed so you can do a walk around inspection, check machine operation, and perform specific checks from the operator's seat.

If there is a problem with the machine, diagnostic information in this checkout will help determine the probable cause. This information may allow you to perform a simple adjustment to correct the problem. Use the table of contents to help find adjustment procedures.

A location will be required which is level and has adequate space to complete the checks. No tools are needed to perform the checkout.

Complete the usual necessary visual checks (oil levels, oil condition, external leaks, loose hardware, linkage, wiring) prior to doing the checkout. The machine must be at operating temperature for many of the checks.

Read each check completely before performing. If no problem is found, you will be instructed to go to the next check. If a problem is indicated, you will be referred to a procedure for adjustment, repair, or replacement.

The monitor can be used to perform diagnostic and operational checks. The monitor can display engine speed, pressures, and Diagnostic Trouble Codes (DTCs).

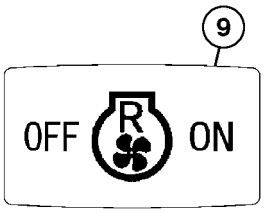
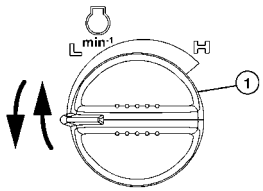
MD46667,0000057 –19–25APR06–1/1

Diagnostic Trouble Codes Check

– – –1/1

Display and Clear Trouble Diagnostic Codes	Always check for diagnostic trouble codes and correct them before performing the operational checkout. Diagnostic trouble codes can be displayed by using several methods: • Monitor Controller • With Service Advisor • With Dr. ZX *LOOK: Are diagnostic trouble codes present?*	**YES:** Correct all diagnostic trouble codes before proceeding. See Reading Diagnostic Trouble Codes With Service ADVISOR™ Diagnostic Application (Group 9015-20.) or see Reading Diagnostic Trouble Codes With Monitor Display (Group 9015-20.) or see Reading Diagnostic Trouble Codes With Dr. ZX. (Group 9015-20.) **NO:** Proceed with operational checkout.

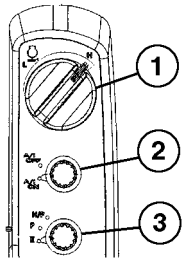
– – –1/1

Reversing Cooling Fan Switch—If Equipped	*NOTE: The pilot control shut-off lever must be in the LOCKED (rearward) position, for the reversing cooling fan to operate.* **IMPORTANT: Air conditioner may be damaged if the reversing cooling fan switch is pressed when using the air conditioner. Turn air conditioned off while performing this check.**  TX1005664 –UN–31MAR06  TX1000874 –UN–01DEC05 **1—Engine Speed Dial** **9—Reversing Cooling Fan Switch** Pilot control shut-off lever in the LOCK position. Turn engine speed dial (1) to H fast idle with auto idle A/I OFF. Push air conditioner switch OFF. Press reversing cooling fan switch ON. *LISTEN: Does engine speed go to slow idle? Does fan speed slow down?* *LOOK/LISTEN: After approximately 20 seconds, does engine return to fast idle, does the fan speed increase and rotate in reverse direction for approximately one minute?* *LISTEN/LOOK: Does engine speed go to slow idle? Does the fan speed slow for approximately 20 seconds? Does fan direction return to normal?* *LISTEN: Does engine return to fast idle? Does fan speed increase?*	**YES:** Go to next check. **NO:** See Reversing Fan Switch Harness (W16) Wiring Diagram (Group 9015-10.) and see Reversing Fan Switch Harness (W16) Component Location (Group 9015-10.) and see Cab Harness (W1) Wiring Diagram. (Group 9015-10.) 9005 10 11 – – –1/1

Swing Priority Circuit Check

CAUTION: Perform check in an open area away from other machinery or personnel.

T6290AF –UN–19OCT88



TX1000170 –UN–10NOV05

1—Engine Speed Dial
2—Auto-Idle Switch
3—Power Mode Switch

Position machine as shown.

Turn engine speed dial (1) to H (fast idle) position.

Turn power mode switch (3) to P (power) mode.

Operate swing function and record time required for three complete revolutions.

Divide that time by three to get an average time for one revolution.

Specification

Swing Function—Time—One Revolution..... 6.17—7.17 seconds

IMPORTANT: Position machine as shown. Operate swing and arm in slowly a few times before attempting to perform check to ensure bucket does not contact machine or ground.

Position machine as shown, arm extended, bucket curled, and upper structure 90 degrees to tracks.

Turn engine speed dial (1) to H (fast idle) position.

Turn power mode switch (3) to P (power) mode.

Raise boom high enough so bucket does not contact the machine or ground during arm in and swing combined operation.

Operate swing function and slowly actuate arm in function when upperstructure is in line with tracks. Record time required for one complete revolution.

NOTE: Swing speed should not slow when actuating arm in.

LOOK: Does swing speed remain unchanged when actuating arm in?

YES: Go to next check.

NO: Check arm 1 flow rate pilot valve. See Diagnose Swing Circuit Malfunctions (Group 9025-15.) and see Pilot Signal Manifold Operation (Group 9025-05.) and see Arm 1 (Swing Priority) Flow Rate Circuit Operation. (Group 9025-05.)

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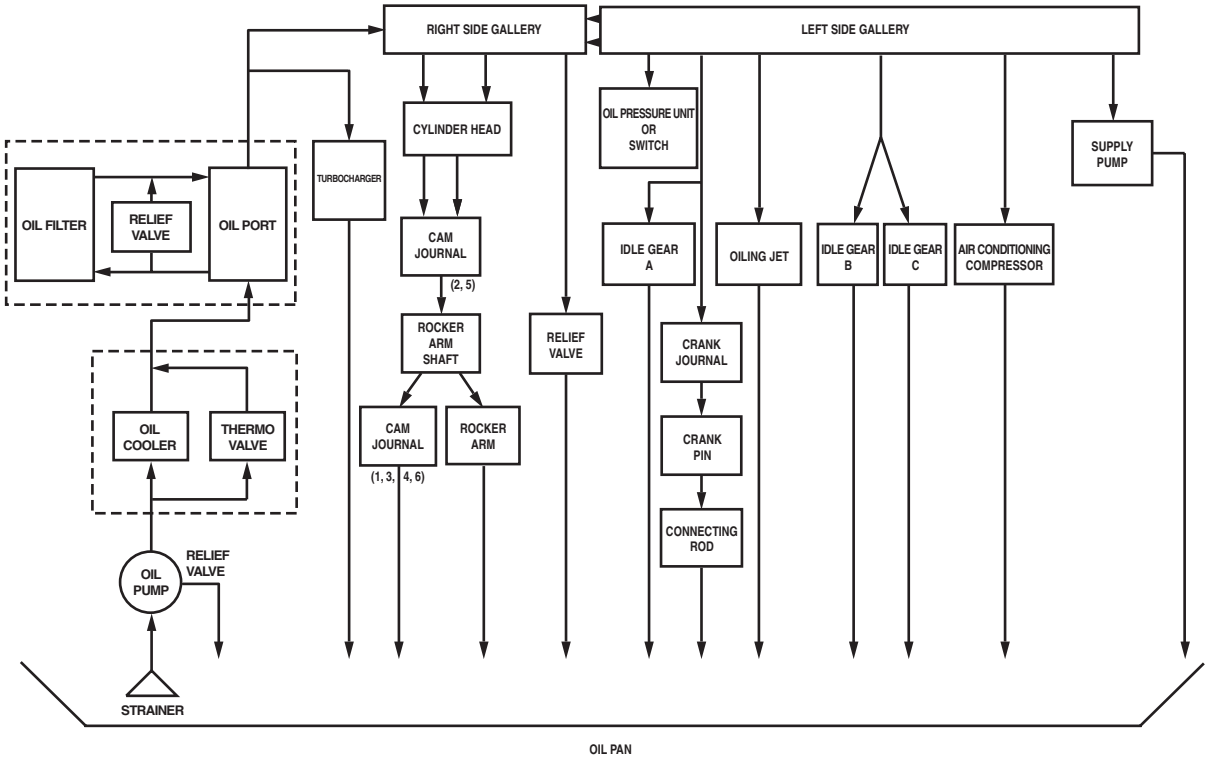
Section 9010
Engine

Contents

Continued on next page

Engine Lubrication System Operation



TX1001650 –19–22DEC05

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9

The engine lubrication system consists of a positive displacement gear-driven oil pump, full-flow oil filters, water-cooled oil cooler, oil jets and relief valves. The oil pump pulls oil from the oil pan sump through a strainer and a suction line. The pump forces oil through the outlet tube into a vertical drilling in the cylinder block, and up to the oil cooler and to the remote-mounted filters. After flowing through the cooler and filters, oil flows into the right and left oil galleries and some is routed to the turbocharger.

The right-side oil gallery runs the length of the cylinder block and delivers oil to oil passages that feed the cylinder head, cam journal rocker arm shaft, and main bearing bushings. The left-side oil gallery runs the length of the cylinder block as well as providing oil to oil jets, supply pump, air compressor, idle gears, crank journal, crank pin, and connecting rod. From the main bearings, oil flows to the connecting rod bearings through drilled cross-passages in the crankshaft between the main journals and connecting rod journals.

Oil from the main bearing also supplies oil to the piston cooling orifices. Oil from the piston cooling orifices sprays on the underside of the piston to keep the piston crown cool. The oil spray also provides splash lubrication for the piston pin and bushing by splashing oil into a hole drilled in the top end of the connecting rod. At the rear of the cylinder block, oil flows from the rear camshaft bushing, up through the cylinder head, and into the rocker arm shaft. Oil flows through the rocker arm shaft and lubricates each of the rocker arms. Oil drips from the rocker arms to lubricate the adjusting screws, push rods, and camshaft followers. At the front of the cylinder block, oil flows from the oil passage into a machined groove in the front face of the block. This groove connects with the upper idler gear shaft to provide oil to the idler gear bushing. The lower idler gear bushing is splash lubricated.

Continued on next page

Engine Speed Control System Operation

Engine Speed Specifications

Item	Measurement	Specification
Engine Speeds 450DLC		
Slow Idle	Speed	885 rpm
Fast Idle—HP Mode	Speed	1650 rpm
Fast Idle—P Mode	Speed	1650 rpm
Fast Idle—E Mode	Speed	1630 rpm
Travel HP	Speed	1750 rpm
Auto Idle	Speed	1030 rpm

Continued on next page

❻ **Injector Check**	1. Clear the DTC. For information on how to clear DTC, See Reading Diagnostic Trouble Codes With Tech 2 Diagnostic Scan Tool (9015-20) or See Reading Diagnostic Trouble Codes With Dr. ZX. (9015-20.) 2. Start the engine. 3. Select the Actuator test from the Tech 2 menu. *NOTE: If Tech2 scan tool is not available, See Injector Balance Test (Injector Misfire Test). (Group 9010-25.) or Injector Force Drive Test. (Group 9010-25.)* 4. Select the **Injection Stop** at each injector in the common rail system. 5. Press the **OFF** soft key to stop the fuel injection in the cylinder one by one, and check the change in engine sound. Is there any cylinder of which engine vibration and engine sound did not change when it is stopped?	**YES:** Replace the injector in the cylinder of which engine sound did not change when it is stopped. **NO:** Go to Crankshaft Position Sensor Check. 9010 15 7 – – –1/1
❼ **Crankshaft Position Sensor Check**	Check for condition of the crankshaft position sensor. 1. Check to see if the sensor is loose. See Engine Component Location. (Group 9010-05.) 2. Check the signal detection condition of the crankshaft position senor. a. Connect the Tech 2. b. Crank the engine. c. Correct the data list on the Tech 2. Is the speed displayed?	**YES:** Go to Camshaft Position Sensor Check. **NO:** Repair or replace parts as necessary and retest. – – –1/1
❽ **Camshaft Position Sensor Check**	Check for condition of the crankshaft position sensor. 1. Check to see if the sensor is loose. See Engine Component Location. (Group 9010-05.) 2. Check the signal detection condition of the camshaft position senor. a. Connect the Tech 2. b. Start the engine. c. Remove the harness from the crankshaft position sensor. (The DTC is detected when this procedure is performed. Be sure to clear the DTC after repairing the machine.) Is the speed displayed?	**YES:** Go to EGR Control System Check. **NO:** Repair or replace parts as necessary and retest. – – –1/1

❹ **Oil Pressure Regulating Valve Check**	Remove and inspect engine oil pressure regulating valve. Is oil pressure regulating valve in good operating condition?	**YES:** Go to Oil Supply System Check. **NO:** Repair or replace parts as necessary and retest. – – –1/1

❺ **Oil Supply System Check**	Remove oil pan and check the following components. • Pump screen (plugging) • Pickup tube (for cracks) • Engine oil supply pump • Piston oiling jets (faulty or missing) • Main or connecting rod bearing clearances Was problem found?	**YES:** Repair or replace parts as necessary and retest. – – –1/1

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High Engine Oil Pressure

JC89288,0000056 –19–21APR06–1/1

High Engine Oil Pressure Diagnostics Procedure

– – –1/1

❶ **Preliminary Checks**	• Oil viscosity wrong (too thick). • Pressure regulating valve stuck or misadjusted. • Piston cooling oil jets plugged. • Engine oil has antifreeze in it. Was Problem found?	**YES:** Repair or replace parts as necessary and retest. – – –1/1

Engine Uses Too Much Oil

JC89288,0000057 –19–04APR06–1/1

Engine Uses Too Much Oil Diagnostics

– – –1/1

Serpentine Belt Tension Check

SPECIFICATIONS	
Serpentine Belt Deflection	6-8 mm at 98 N .24-.32 in. at 22 lb-force

SERVICE EQUIPMENT AND TOOLS
JDG529 Belt Tension Gauge

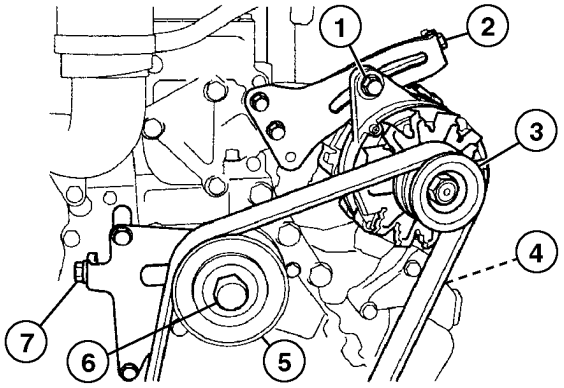
MS12501,000002F –19–24APR06–1/2

1. Check belt regularly for wear. Replace if necessary.
2. Check belt tension with belt deflection gauge at midway between tensioner pulley (6) and alternator pulley (3).

Specification

Serpentine Belt—Deflection ..... 6-8 mm at 98 N
.24-.32 in. at 22 lb-force

3. If deflection is not within specification, loosen alternator lock nut (1) and tensioner pulley lock nut (5).
4. Adjust tensioner pulley adjustment bolt (7) and alternator adjustment bolt (2) until belt tension is within specification.
5. Tighten alternator lock nut (1) and tensioner pulley lock nut (5).



TX1002487 –UN–10JAN06

1—Lock Nut (alternator)
2—Adjustment Bolt (alternator)
3—Alternator Pulley
4—Bolt (alternator)
5—Lock Nut (tensioner pulley)
6—Tensioner Pulley
7—Adjustment Bolt (tensioner pulley)

MS12501,000002F –19–24APR06–2/2

Engine Power Test Using Turbocharger Boost Pressure

SPECIFICATIONS	
Work Mode Switch Position	HP
Engine Rated Speed	1800 RPM
450DLC	
Turbocharger Boost Pressure	128 kPa (1.28 bar) (18 psi) using No. 2 fuel
Turbocharger Boost[a] Pressure	119 kPa (1.19 bar) (17 psi) using No. 1 fuel
650DLC	
Turbocharger Boost Pressure	128 kPa (1.28 bar) (18 psi) using No. 2 fuel
Turbocharger Boost[a] Pressure	119 kPa (1.19 bar) (17 psi) using No. 1 fuel
850DLC	
Turbocharger Boost Pressure	128 kPa (1.28 bar) (18 psi) using No. 2 fuel
Turbocharger Boost[a] Pressure	119 kPa (1.19 bar) (17 psi) using No. 1 fuel
[a]Turbocharger boost pressure is reduced by 7% if using No. 1 fuel.	

SERVICE EQUIPMENT AND TOOLS
JT07248 Turbo Boost Test Kit

OTHER MATERIAL
T43512 Thread Lock and Sealer (Medium Strength)
TY9473 Canadian Thread Lock and Sealer (Medium Strength)
242 LOCTITE® Thread Lock and Sealer (Medium Strength)

This procedure must only be used as a guide to determine engine condition. One technician can perform this test if the Turbo Boost Test Kit is used.

LOCTITE is a trademark of Loctite Corp.

Continued on next page

5. Select **F1: Injector Balancing** from Common Rail System Menu.

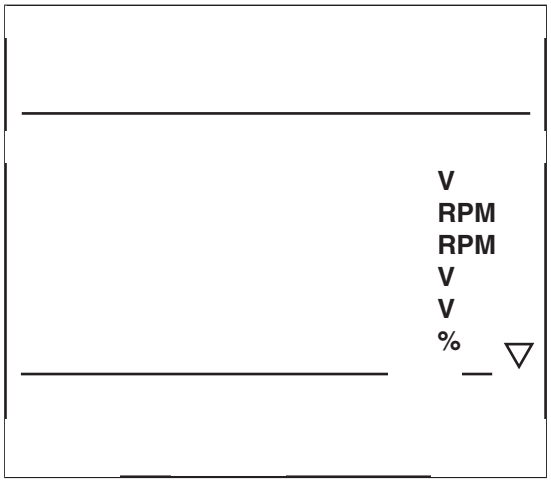
TX1006104 –19–07APR06

Common Rail System Menu

JC89288,00001AA –19–24APR06–4/5

6. Send instruction to each injector (set to OFF by soft key on Tech 2) to stop the injector, and check the variation of engine speed.

   If engine speed varies when injector stops, electrical circuit of that injector is judged as normal. If engine speed does not vary when injector stops, electrical circuit of that injector or injector body is judged as faulty.



TX1006134 –19–10APR06

Injector Balancing

JC89288,00001AA –19–24APR06–5/5

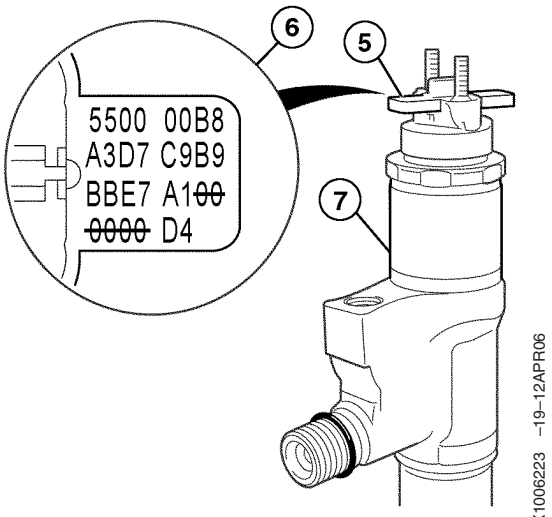
(Injector ID Code) Cylinder 1 - Cylinder 6 cylinder registration using Tech 2

"Fuel rate adjust, Injector Code Label" is attached to the cylinder head cover. It is used for rewriting and registering the Injector ID Code.

NOTE: Do not enter the six figures "0" indicated with strike through in the illustration, of the ID Code on the Injector ID plate.

The Injector Code information is also on top of the injector. When replacing the injector, register its code.

5—Injector ID Plate
6—Injector ID Code
7—Injector



TX1006223 –19–12APR06

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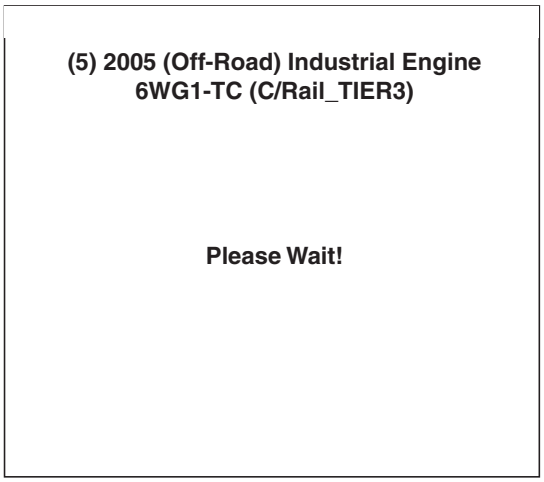
JC89288,00001AD –19–24APR06–8/18

7. You need to enter the ID on the following display. ID Code is number of the year. The following conditions must be met. Press the function keys (F0—F9) to enter.

   The time setting of the Tech 2 matches the calendar.

   Press the function keys (F0—F9) to enter.



TX1006204 –19–17APR06

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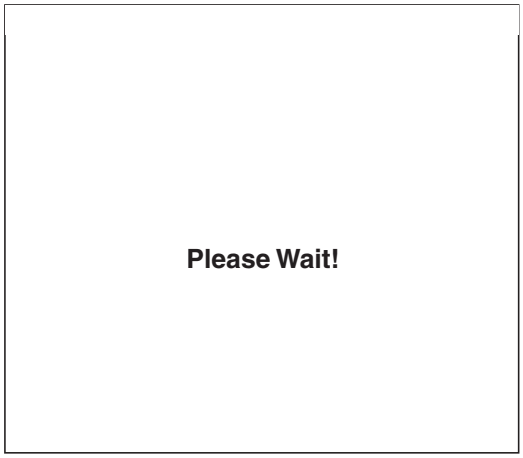
JC89288,00001AD –19–24APR06–9/18

2. Press the softkey Confirm.



TX1006469 –19–19APR06

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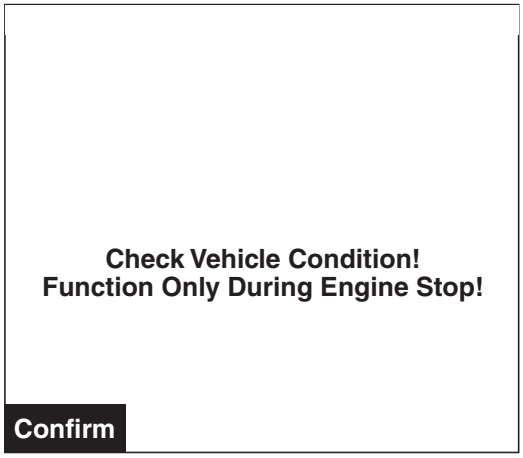
JC89288,00001AF –19–20APR06–3/10

As an example, the vehicle will be checked whether it is in the condition engine stopped that the ECM requests during ID Code Registration.

The following display appears while checking if the engine speed is 0 rpm.



TX1006470 –19–19APR06

Continued on next page

JC89288,00001AF –19–20APR06–4/10

1—Continuity Chart
2—Power Wires
3—Routing Location Information
4—Wire Identification
5—Ground Wires
7—Section Number
8—Component Name
9—Component Identification Number
10—Component Schematic Symbol
11—Connector Identification Number
12—Connector
13—Connector Pin Information

System Functional Schematic Diagram

The System Functional Schematic is made up of equal sections to simplify searching the schematic. Each section of the System Functional Schematic is assigned a number (7). The System Functional Schematic is formatted with power supply wires (2) shown near the top of the drawing and ground wires (5) near the bottom. The schematic may contain some harness or connector information.

When connector information is shown, it will be displayed as a double chevron (12) with a component identification number (11) corresponding to the connector identification number. Connector pin information (13) will be displayed in a text size smaller than that of the connector identification number.

Each electrical component is shown by a schematic symbol (10), the component name (8), and a component identification number (9). A component identification number and name will remain the same throughout the Operation and Test Technical Manual. This will allow for easy cross-referencing of all electrical drawings (Schematics, Wiring Diagrams, and Component Location).

Routing location information (3) is presented to let the reader know when a wire is connected to a component in another section. TO and FROM statements identify when power is going “To” or coming “From” a component in a different location. The section and component identification number are given in the first line of information and any pin information for the component is given in parenthesis in the second line. In this example, power is going TO section 23, component B14 on pin C4.

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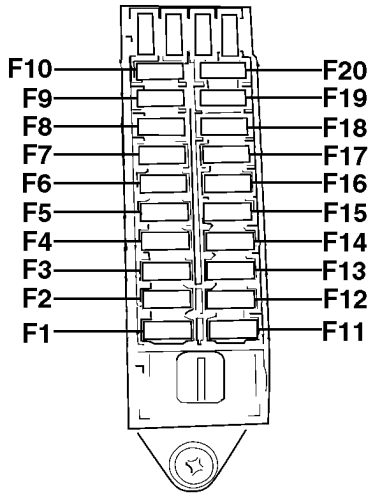
Continued on next page
LD30992,00002D8 –19–14JAN06–3/9

Fuse Block 1

F1—Boom Lights 20 A Fuse (Marked LAMP)
F2—Windshield Wiper and Washer 10 A Fuse (Marked WIPER)
F3—Air Conditioner and Heater 20 A Fuse (Marked HEATER)
F4—Solenoid 10 A Fuse (Marked SOLENOID)
F5—Travel Alarm 5 A Fuse (Marked OPT. ALT 1)
F6—Optional Equipment 10 A Fuse (Marked OPT. 2)
F7—Lubricator 10 A Fuse (Marked LUBRICATOR)
F8—Engine Control Module (ECM) 30 A Fuse (Marked ECM)
F9—Radio Backup 5 A Fuse (Marked BACK UP)
F10—Machine Information Center and Main Controller Batter Power 5 A Fuse (Marked CU)
F11—Horn 10 A Fuse (Marked HORN)
F12—Radio and Dome Light 5 A Fuse (Marked ROOM LAMP RADIO)
F13—Lighter 10 A Fuse (Marked LIGHTER)
F14—High Pressure Fuel Pump Control Valve 15 A Fuse (Marked PCV)
F15—Cab Auxiliary Power Connector One 10 A Fuse (Marked AUXILIARY)
F16—Glow Plug Relay 5 A Fuse (Marked GLOW/RELAY)
F17—Air Conditioner and Heater 5 A Fuse (Marked AIR CON)
F18—Controller Key Switch Signal 5 A Fuse (Marked POW ON)
F19—Controller 5 A Fuse (Marked SW. BOX)
F20—Optional Equipment 10 A Fuse (Marked (OPT. BATT 3))



TX1000782 –UN–29NOV05

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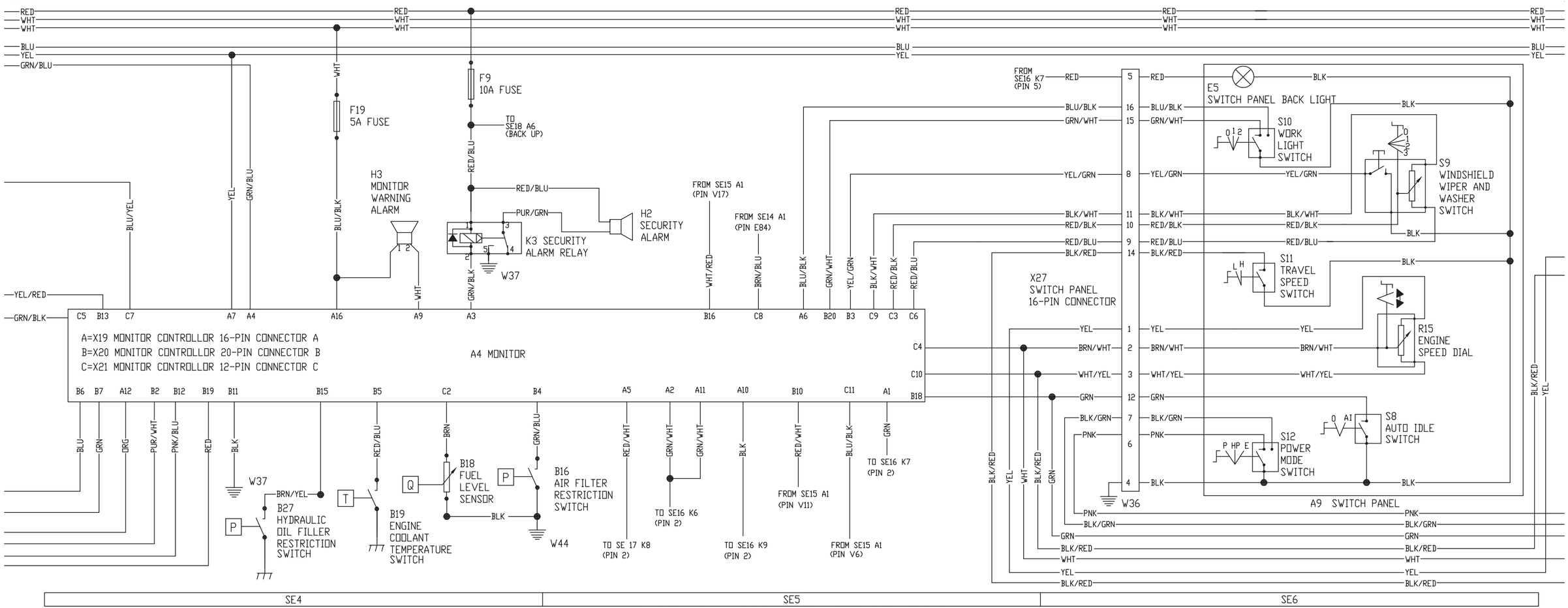
LD30992,00001EE –19–31AUG07–2/4

TX1006631 –19–26APR06



TX1006631

450DLC, 650DLC, 850DLC SYSTEM FUNCTIONAL SCHEMATIC (2 OF 7)

System Functional Schematic (2 of 7) (SE4, SE5, and SE6)

A3—Main Controller (MCF)
A5—Information Controller (ICF)
A9—Switch Panel
B25—Left Speaker
B26—Right Speaker
E3—Cab Dome Light
H2—Security Alarm
H3—Monitor Warning Alarm
M5—Windshield Wiper Motor
R9—Lighter
R15—Engine Speed Dial
S2—Cab Dome Light Switch
S5—Horn Switch
S8—Auto Idle Switch
S9—Windshield Wiper and Washer Switch
S10—Work Light Switch
S11—Travel Speed Switch
S12—Power Mode Switch
S13—Travel Alarm Cancel Switch
S14—Engine Stop Switch
S15—Reversing Fan Switch
S18—Learning Switch
V3—Load Dump Relay Diode
V4—Security Diode
V5—Start Relay Diode
V6—Auxiliary Power Connector Diode
V12—Main Controller Pilot Switch Signal Diode
V13—ECM Power On Signal Diode
W15—Travel Alarm Cancel Switch Harness
W16—Reversing Fan Switch Harness
W17—Pilot Shutoff Valve Harness
W35—Cab Harness Ground 1
W36—Cab Harness Ground 2
W37—Cab Harness Ground 3
W38—Cab Harness Ground 4
X2—Dr. ZX 6-Pin Connector
X3—Cab Harness-to-Machine Harness 52-Pin Connector
X4—Cab Harness-to-Machine Harness 32-Pin Connector
X11—Cab Harness-to-Pilot Shutoff Solenoid Valve Harness Connector
X12—Cab Harness-to-Reversing Fan Switch Harness Connector
X17—Cab Harness-to-Auxiliary Fuse Box Harness Connector
X18—Cab Harness-to-Monitor Harness 4-Pin Connector
X22—Cab Harness-to-Monitor Harness 16-Pin Connector (White)
X23—Cab Harness-to-Monitor Harness 16-Pin Connector (Black)
X24—Cab Harness-to-Monitor Harness 16-Pin Connector (Brown)
X25—Auxiliary Power Connectors
X26—Optional Connector
X27—Cab Harness-to-Switch Panel Connector
X28—Cab Harness-to-Main Controller 32-Pin Connector
X29—Cab Harness-to-Main Controller 25-Pin Connector
X30—Cab Harness-to-Main Controller 31-Pin Connector
X31—Cab Harness-to-Main Controller 16-Pin Connector
X32—Cab Harness-to-Information Controller 31-Pin Connector
X34—Cab Harness-to-Information Controller 17-Pin Connector
X36—Machine Information Center 20-Pin Connector (Not Used)
X37—Machine Information Center 16-Pin Connector (Not Used)
X38—Cab Harness-to-Air Conditioner Harness 16-Pin Connector
X39—Cab Harness-to-Air Conditioner Harness4-Pin Connector
X41—Cab Harness-to-Machine Harness 2-Pin Connector 1
X42—Cab Harness-to-Machine Harness 2-Pin Connector 2
X43—Auxiliary Fuse Box Connector
X44—Optional Light Connector
X45—Option 2 12-Pin Connector (Not Used)
X47—Cab Harness-to-Air Conditioner Harness 6-Pin Connector
X71—Cab Harness-to-Auto Lubricator Switch Harness (Not Used)
X72—Cab Harness-to-Pilot Shutoff Switch Harness Connector
X73—Cab Harness-to-Cab Switch Harness Connector
X74—Cab Harness-to-Travel Alarm Cancel Switch Harness Connector
X100—Cab Ground Splice Connector
Y10—Pilot Shutoff Solenoid

LD30992,00001F2 –19–15MAY08–2/2

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B1—Crankshaft Position Sensor
B2—Camshaft Position Sensor (G Sensor)
B4—Engine Coolant Temperature Sensor
B5—Fuel Temperature Sensor
B10—Boost Temperature Sensor
B11—Engine Oil Pressure Sensor
B12—Fuel Rail Pressure Sensor
B14—Boost Pressure Sensor
B60—Exhaust Gas Recirculation (EGR) Position Sensor
M3—Exhaust Gas Recirculation (EGR) Valve Actuator
X57—Engine Harness-to-Glow Plug Bus Bar Connector
X58—Engine Harness-to-Injector Harness Connector 1 (Y1, Y2, Y3)
X59—Engine Harness-to-Injector Harness Connector 2 (Y4, Y5, Y6)
X89—Machine Harness-to-Engine Harness 20-Pin Connector (D)
X90—Machine Harness-to-Engine Harness 12-Pin Connector (E)
X91—Machine Harness-to-Engine Harness 8-Pin Connector (F)
X92—Machine Harness-to-Engine Harness 6-Pin Connector (G)
X93—Machine Harness-to-Engine Harness 1-Pin Connector (H)
Y15—Fuel Pump Control Valve Solenoid 1
Y16—Fuel Pump Control Valve Solenoid 2

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A6—Radio
B20—Air Conditioner High/Low Pressure Switch
B41—Air Conditioner Freeze Control Switch
B42—Cab Air Temperature Sensor
B43—Coolant Temperature Sensor
K12—Blower Motor Relay
K15—Air Conditioner Compressor Clutch Relay
M7—Air Conditioner and Heater Blower Motor
M9—Air Conditioner and Heater Internal and External Servomotor
M10—Air Conditioner and Heater Blower Port Change Servomotor
M11—Air Conditioner and Heater Mixer Servomotor
M12—Air Conditioner and Heater Rear Blower Port Change Servomotor
R17—Blower Motor Resistor
S1—Key Switch
S7—Power Dig Switch
V7—Blower Motor Diode
V11—Blower Motor Signal Diode
X38—Cab Harness-to-Air Conditioner Harness 16-Pin Connector
X39—Cab Harness-to-Air Conditioner Harness 4-Pin Connector
X47—Cab Harness-to-Air Conditioner Harness 6-Pin Connector
X48—Air Conditioner Harness-to-Air Conditioner and Heater Controller 20-Pin Connector
X49—Air Conditioner Harness-to-Air Conditioner and Heater Controller 16-Pin Connector

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A8—12 Volt Power Converter
G5—12 Volt Power Outlet
X17—Cab Harness-to-Auxiliary Fuse Box Harness 4-Pin Connector
X43—Auxiliary Fuse Box Connector
X44—Optional Light Connector
X60—Heated Air Seat Connector
X61—Rear Cab Light Connector
X62—12 Volt Power Converter Connector
X63—IMOBI Connector
X64—Quick Hitch Connector
X65—Cab Auxiliary Power Connector 3
X66—Front Cab Light 2 Connector
X67—Warning Lamp Connector
X68—Cab Auxiliary Power Connector 2
X69—Front Cab Light 1 Connector

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A10—Machine Information Gateway (MIG) Controller
A11—GlobalTRACS® Terminal (GTT) Controller
F40—JDLink™ Unswitched Power 7.5-Amp Fuse
F41—JDLink™ Switched Power 3-Amp Fuse
F42—JDLink™ Alternator Run Signal 3-Amp Fuse
F43—JDLink™ Ground 7.5-Amp Fuse
G3—Alternator
K19—Battery Relay
W50—Machine Information Gateway (MIG) Harness
W51—GlobalTRACS® Terminal (GTT) Harness
W52—JDLink™ CAN Harness
W53—JDLink™ Power Harness
W54—JDLink™ Jumper Harness
W57—GlobalTRACS® Terminal (GTT) Antenna
X140—Machine Information Gateway (MIG) Harness-to-JDLink™ Power Harness 4-Pin Connector
X141—Machine Information Gateway (MIG) Harness-to-GlobalTRACS® Terminal (GTT) Harness 10-Pin Connector
X142—Machine Information Gateway (MIG) Harness-to-GlobalTRACS® Terminal (GTT) Harness 4-Pin Connector
X143—Machine Information Gateway (MIG) Harness-to-JDLink™ CAN Harness 8-Pin Connector
X144—Machine Information Gateway (MIG) 30-Pin (L1-Y3) Connector
X145—Machine Information Gateway (MIG) 30-Pin (A1-K3) Connector
X146—JDLink™ MMS Direct 4-Pin Connector (Ethernet)
X147—2-Pin Connector (Not Used)
X148—GlobalTRACS® Terminal (GTT) 70-Pin Connector
X149—JDLink™ Power Harness-to-JDLink™ Jumper Harness Connector
X150—GT Config Tool Adapter 6-Pin Connector (RS-232)
X152—JDLink™ Jumper Harness-to-Machine Harness Connector
X168—Machine Harness-to-JDLink™ CAN Harness Connector 1 (plug into female side of connector X9 on machine harness)
X169—Machine Harness-to-JDLink™ CAN Harness Connector 2 (plug into male side of connector X9 on machine harness)

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JDLink is a trademark of Deere & Company

AA95137,0000C3F –19–31AUG07–2/2

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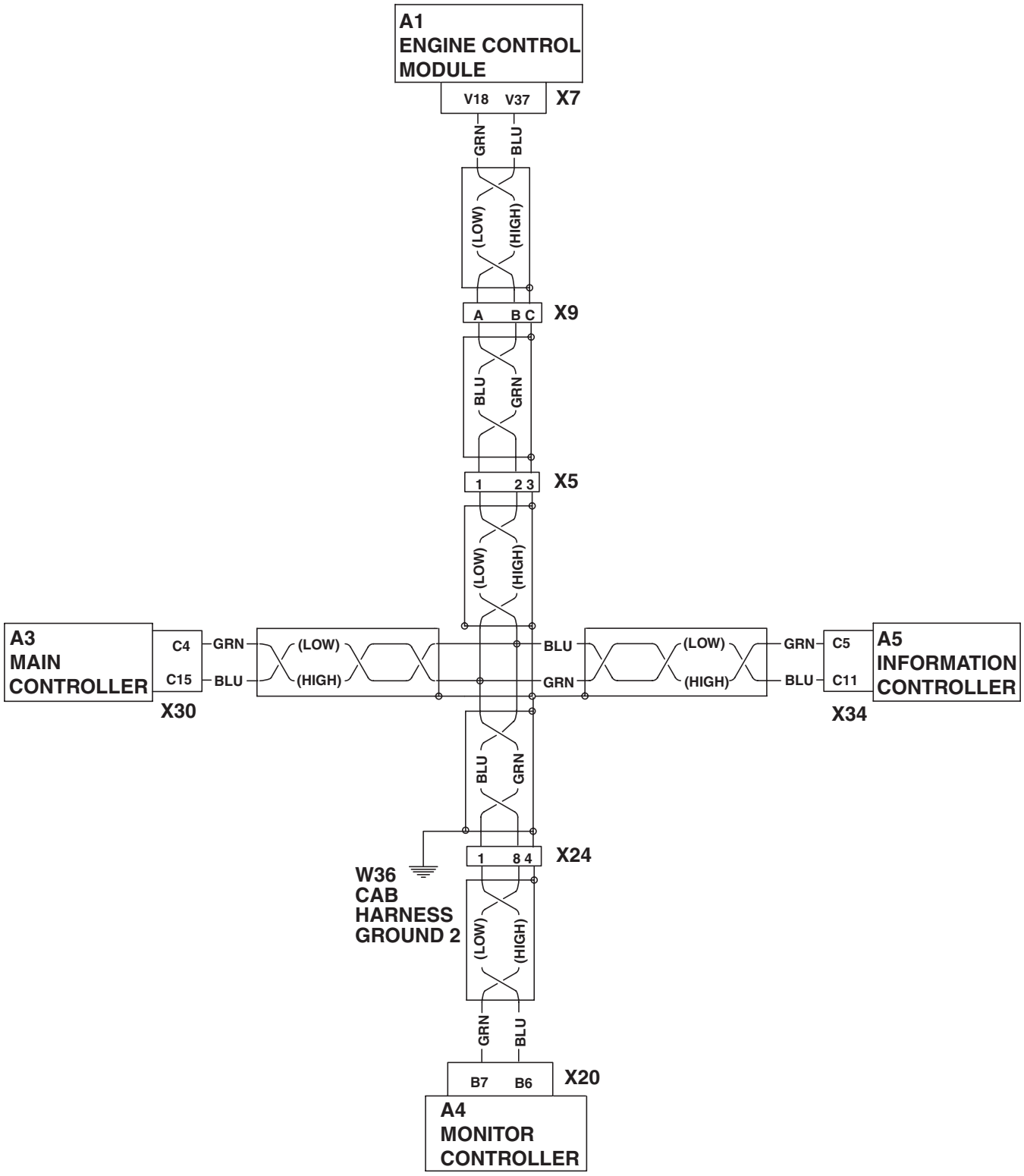
Controller Area Network (CAN) Theory of Operation



TX1003879

Controller Area Network (CAN) Circuit

TX1003879 –19–21APR06

Continued on next page

LD30992,000020C –19–15FEB06–1/2

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1

Specification	
Fuel level sensor (B18)—	
Resistance	90—100 ohms (tank empty)
	82—88 ohms (warning level)
	53 ohms (tank 1/4 full)
	33—43 ohms (tank 1/2 full)
	26 ohms (tank 3/4 full)
	6—10 ohms (tank full)

Auto-Idle Indicator—When auto-idle switch (S8) is in the ON position, terminal B18 on the monitor controller is connected to ground. This causes the auto-idle indicator to appear on the monitor display. For additional information on auto-idle, see Main Controller (MCF) Circuit Theory of Operation (Group 9015-15.) or see Engine Speed Control System Operation. (Group 9010-05.)

Preheat Indicator—When preheating is required, the ECM connects terminal B10 on the monitor controller to ground. This causes the preheat indicator to appear on the monitor display. For additional information on the preheat circuit, see Quick On System (QOS) Preheat Circuit Theory of Operation. (Group 9015-15.)

NOTE: For identification of monitor controller alarm indicators, see Alarm Occurrence Screen. (Operator's Manual.)

Overheat Indicator—When the engine coolant reaches too high a temperature, engine coolant temperature switch (B19) closes. This connects terminal B5 on the monitor controller to ground, causing the overheat indicator to appear on the monitor display.

Engine Warning Indicator—When the ECM detects an abnormality, it connects terminal C11 on the monitor controller to ground. This causes the engine warning alarm indicator to appear on the monitor display. For information on diagnosing ECM circuit malfunctions, see Engine Control Module (ECM) Diagnostic Trouble Codes. (Group 9001-20.)

Engine Oil Pressure Indicator—Engine oil pressure sensor (B11) sends a varying signal to the ECM (terminal V67). The varying signal represents the varying resistance of the engine oil pressure sensor corresponding to the changing engine oil pressure. High resistance of the sensor indicates a low pressure. When engine oil pressure is not to specification, the ECM connects terminal B16 on the monitor controller to ground. This causes the engine oil pressure indicator to appear on the monitor display. For information on diagnosing ECM circuit malfunctions, see Engine Control Module (ECM) Diagnostic Trouble Codes. (Group 9001-20.)

Alternator Indicator—Voltage from terminal L of alternator (G3) is applied to the monitor controller (at terminal C7). If the voltage is too low, or if the alternator does not generate any voltage at all, the alternator voltage indicator appears on the monitor display. For additional information on the charging system, see Starting and Charging Circuit Theory of Operation. (Group 9015-15.)

Remaining Fuel Indicator—Fuel level sensor (B18) sends a varying signal to the monitor controller (terminal C2). The varying signal represents the varying resistance of the fuel level sensor corresponding to the changing fuel level. When fuel level becomes too low, the remaining fuel indicator appears on the monitor display.

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Specification	
Fuel level sensor (B18)—	
Resistance	82—88 ohms (warning level)

Hydraulic Oil Filter Indicator—When the hydraulic oil filter is clogged, hydraulic oil filter restriction switch (B27) connects terminal B15 on the monitor controller to ground. This causes the hydraulic oil filter restriction indicator to appear on the monitor display.

Air Filter Clogged Indicator—When air filter elements are clogged, air filter restriction switch (B16) connects terminal B4 on the monitor controller to ground. This causes the air filter clogged indicator to appear on the monitor display.

Continued on next page

NOTE: For information on diagnosing main controller (MCF) circuit malfunctions, see Main Controller (MCF) Diagnostic Trouble Codes (Group 9001-10.)

The main controller (MCF) (A3) is the heart of the machine electrical controls. The MCF interfaces directly with inputs (sensors and switches) and outputs (solenoids and an audible alarm). In addition, the MCF communicates information, as needed, with the engine control module (ECM) (A1), information controller (ICF) (A5), and monitor controller (A4). It does this through the CAN data link.

For information on the CAN data link, see Controller Area Network (CAN) Theory of Operation. (Group 9015-15.)

For information on the ECM, see Engine Control Module (ECM) Theory of Operation. (Group 9015-15.)

For information on the ICF, see Information Controller (ICF) Theory of Operation. (Group 9015-15.)

For information on the monitor controller, see Monitor Controller Theory of Operation. (Group 9015-15.)

The main controller (MCF) receives inputs from the MCF sensors, switches, etc., then sends the appropriate signals to the MCF outputs (solenoids, travel alarm, and ECM) to control the following major systems:

- Engine Control
- Pump Control
- Valve Control
- Miscellaneous Controls

The main controller inputs:

- A/C Controller (A7)
- Radiator Level Switch (B13)
- Engine Oil Level Switch (B15)
- Swing Pressure Sensor (B33)
- Pump 1 Delivery Pressure Sensor (B35)
- Pump 1 Control Pressure Sensor (B36)
- Pump 2 Delivery Pressure Sensor (B37)
- Pump 2 Control Pressure Sensor (B38)
- Hydraulic Oil Temperature Sensor (B40)
- Attachment Pressure Sensor (B45)
- Counterweight Removal Pressure Sensor (B46)
- Arm Out Pressure Sensor (B50)
- Arm In Pressure Sensor (B51)
- Boom Up Pressure Sensor (B52)
- Boom Down Pressure Sensor (B53)
- Bucket Curl Pressure Sensor (B54)
- Bucket Dump Pressure Sensor (B55)
- Travel Right Pressure Sensor (B56)
- Travel Left Pressure Sensor (B57)
- Boom Pressure Sensor (B58)
- Engine Speed Dial (R15)
- Pilot Shutoff Switch (S3)
- Power Dig Switch (S7)
- Auto-Idle Switch (S8)
- Travel Speed Switch (S11)
- Power Mode Switch (S12)
- Reversing Fan Switch (S15) (Optional)
- Pump Learning Switch (S18)
- Boom Mode Switch (S20)
- Engine Fluid Level Check Switch (S21)

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The main controller outputs:

- Travel Alarm (H4)
- Reversing Fan Solenoid (Y8) (optional)
- Reversing Fan Solenoid (Y9) (optional; 850DLC)
- Pump 1 Control Solenoid (Y12)
- Pump 2 Control Solenoid (Y13)
- Boom flow rate solenoid (Y22) (SF)
- Boom mode solenoid (Y23) (SC)
- Power dig solenoid (Y24) (SG)
- Travel speed solenoid (Y25) (SI)

Engine Control—The engine control involves the following functions:

- Engine Speed Dial and ECO Control
- Power Mode Control
- Travel Speed Increase Control
- Auto-Idle Control
- Attachment Operation Speed Control

Continued on next page

MCF inputs involved:

- Pump 1 delivery pressure sensor (B35)
- Arm in pressure sensor (B51)
- Boom up pressure sensor (B52)

MCF output involved: Power dig solenoid (Y24)

The auto-power lift control has the following requirements:

- Boom up function operated [pressure detected by boom up pressure sensor (B52) (terminal C13) more than 1700 kPa (17 bar) (247 psi)]
- Arm in function not operated [pressure detected by arm in pressure sensor (B51) (terminal C23) less than 500 kPa (5 bar) (73 psi)
- High pressure detected by pump 1 delivery pressure sensor (B35) (terminal C3) 29 100 kPa (291 bar) (4220 psi)

Counterweight Removal and Installation Control— Temporarily energizes the power dig solenoid and controls pump delivery flow rate during the counterweight remove and install process.

MCF inputs involved:

- Counterweight removal pressure sensor (B46)
- Pump 1 control pressure sensor (B36)
- Pump 2 control pressure sensor (B38)

MCF outputs involved:

- Power dig solenoid (Y24)
- Pump 1 control solenoid (Y12)
- Pump 2 control solenoid (Y13)

The MCF determines the actual swash plate angle from signals received from pump control pressure sensors (B36 and B38) (terminals D11 and D4). The MCF determines the target swash plate angle from signals received from pump delivery pressure sensors (B35 and B37) (terminals C3 and C12).

The MCF continually compares signals from the pump control pressure sensors to signals from the pump delivery pressure sensors.

When the counterweight control lever is moved to the raise or lower position, counterweight pressure sensor (B46) detects pilot pressure and sends a corresponding signal to terminal D3 on the MCF. When the MCF receives this signal, it activates power dig solenoid (Y24) to increase main relief pressure.

At the same time, the MCF decreases current to pump control solenoids (Y12 and Y13), causing pump displacement (and pump delivery flow rate) to go to minimum.

Travel Speed Solenoid (Y25) (SI): Selects travel mode by changing the swash plate angle on the travel motors.

MCF input involved: Travel speed switch (S11)

MCF output involved: Travel speed solenoid (Y25)

Slow speed— When travel speed switch (S11) is at the LOW (turtle) position, no ground is sent to terminal B21 on the MCF. When the MCF does not detect ground at terminal B21, the MCF de-energizes travel speed solenoid (Y25).

Fast speed— When travel speed switch (S11) is at the HI (rabbit) position, the switch provides a ground to terminal B21 on the MCF. When the MCF detects this ground, it sends current out terminals A11 and A17 to travel speed solenoid (Y25), energizing the solenoid.

For hydraulic information on this circuit, see Travel Motor Speed Circuit Operation. (Group 9025-05.)

Reversing Fan Solenoids (Y8 and Y9): The reversing fan operation requires that the pilot shut off lever be in the rearward (LOCK) position and the air conditioning OFF. The process takes approximately 100 seconds from beginning to end.

Continued on next page

The pilot shutoff circuit enables or disables (unlocks or locks) the pilot oil, thus enabling or disabling the machine hydraulics. The pilot shutoff circuit consists of the following components:

- Pilot shutoff switches 1 and 2 (S3 and S4)
- Pilot shutoff diode (V8)
- Pilot shutoff solenoid (Y10
- Pilot shutoff solenoid relay (K2)
- Security relay (K5)
- Monitor controller (A4)
- Security diode (V4)
- Engine stop switch (S14)
- Starter relay (K4)
- Starter protection relay (K18)
- Starter relay diode (V5)

When the key switch is turned to the ON or START position, power is available to the following components:

- Coil of pilot shutoff solenoid relay (K2) [from battery relay (K19)]
- Pilot shutoff solenoid (Y10) [from battery relay (K19)]
- Coil of security relay (K5) (from key switch terminal M)

Pilot Shutoff Disabled (Locked)—For the pilot shutoff to be disabled, the pilot shutoff lever must be in the rearward (LOCK) position. When the pilot shutoff lever is at this position, the cam levers of both pilot shutoff switches (S3 and S4) are in the down (released) position and continuity exists across the normally closed contacts connecting the red and black wires of the pilot shutoff switches.

When continuity exists across the normally closed contacts of the pilot shutoff switches, the following occur:

—Terminal B19 of monitor controller (A4) is connected to cab harness ground 4 (W38), through pilot shutoff diode (V8) (terminals 2 and 3) and the normally closed contacts of both pilot shutoff switches. When ground is present at terminal B19, the monitor controller knows that the pilot shutoff circuit is functioning properly. If ground is not present at terminal B19, the pilot control shutoff lever alarm indicator will appear on the monitor display, alerting the operator that the pilot shutoff circuit is malfunctioning. For information on monitor alarms, see Alarm Occurrence Screen. (Operator's Manual.)

NOTE: The monitor controller must detect a ground at terminal B19 at all times, regardless of position of pilot shutoff lever.

—No ground is present at terminal B12 of the monitor controller. Terminals B2 and B12 are connected inside the monitor controller, so with no ground available at terminal B12, no ground is available to the coil of pilot shutoff solenoid relay (K2). Relay is de-energized. With the pilot shutoff solenoid relay de-energized, no ground is available to pilot shutoff solenoid (Y10). Solenoid is de-energized; pilot hydraulics are disabled.

—No ground is present at terminal C31 of main controller (MCF) (A3). With no ground available at terminal C31, the MCF knows the pilot shutoff is disabled. This input is used by the optional fan reversing circuit. For more information, see Main Controller (MCF) Theory of Operation. (Group 9015-15.)

Pilot Shutoff Enabled (Unlocked)—For the pilot shutoff to be enabled, the pilot shutoff lever must be in the forward (UNLOCK) position. When the pilot shutoff lever is at this position, the cam levers of both pilot shutoff switches (S3 and S4) are pushed up and continuity exists across the normally open contacts (now closed), connecting the white and black wires of the pilot shutoff switches.

When continuity exists across the normally open contacts of the pilot shutoff switches, the following occur:

Continued on next page

NOTE: The monitor can display up to 20 diagnostic trouble codes for each controller. The Main Fault Code screen can display 10 diagnostic trouble codes at one time. If the Main Fault Code screen displays 10 codes, use the buttons (1) and (2) to view any additional codes on the next screen.

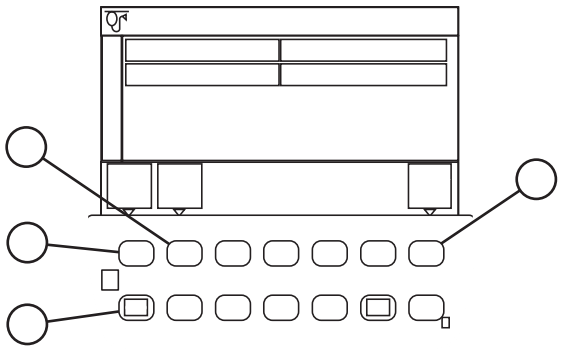
7. View the diagnostic trouble codes for the selected controller.

   See Main Controller (MCF) Diagnostic Trouble Codes. (Group 9001-10.)

   See Engine Control Unit (ECU) Diagnostic Trouble Codes. (Group 9001-20.)

   See Information Controller (ICF) Diagnostic Trouble Codes. (Group 9001-30.) This section includes diagnostic trouble codes displayed for both the Monitor Controller and the Information Controller (ICF).

8. Press the back button (12) to return to the Troubleshooting screen and select another controller, or push the Return to Default Screen button (6) to display the default screen.



TX1002679 –19–20JAN06

Main Fault Code Screen

1—Button 1
2—Button 2
6—Return to Default Screen Button
12—Back Button

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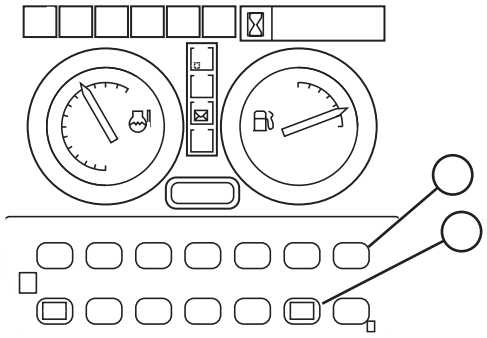
Reading Diagnostic Trouble Codes With Monitor Display

1. Press and hold the back button (12) and turn key switch to the ON position. This step adds the service menu option to the main menu.

2. After the default screen displays, push the menu button (13) to display the main menu.

12—Back Button
13—Menu Button



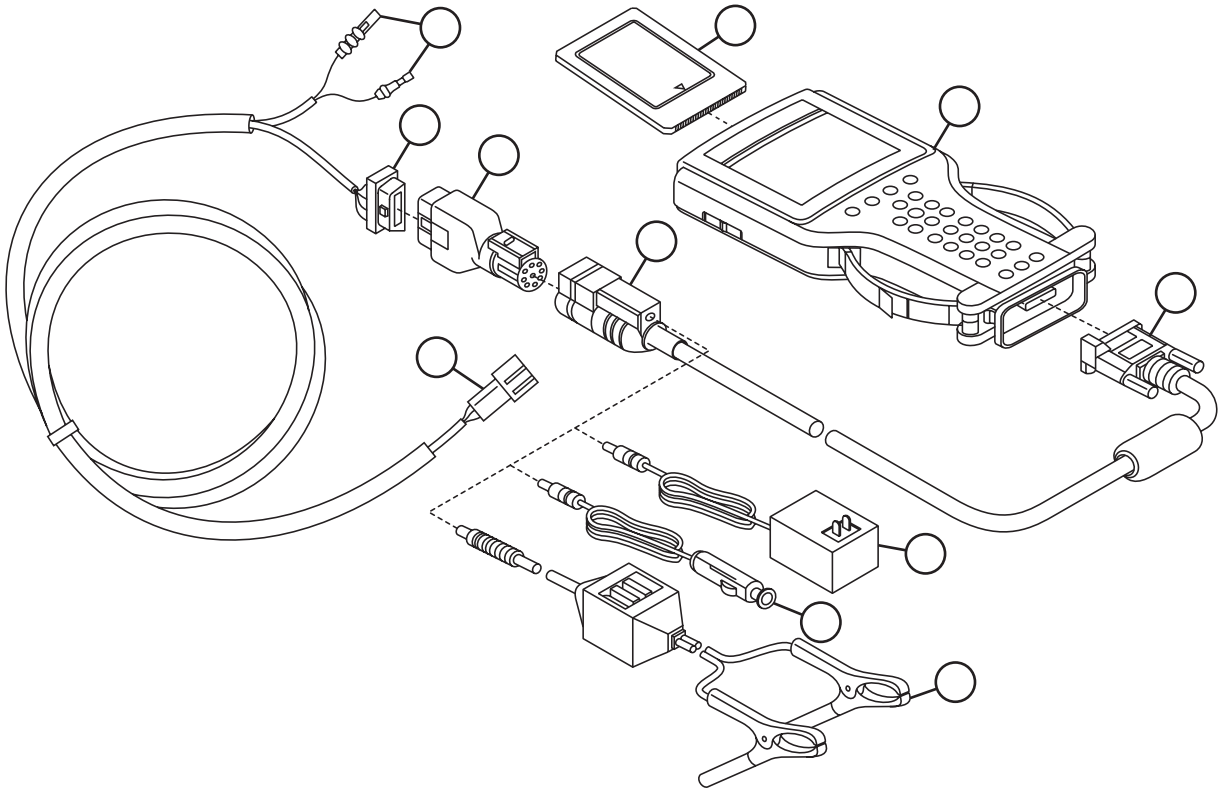
TX1002673 –UN–06SEP06

Default Screen

Continued on next page

LD30992,0000219 –19–16MAR06–1/5

Tech 2 Diagnostic Scan Tool Connection Procedure



TX1004288 —UN–16MAR06

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Tech 2 Connection

1—Tech 2 Diagnostic Scan Tool
2—Power Jack Connection
3—Data Link Connector (DLC) Cable
4—AC Power Supply Cable
5—DC Power Supply Cable
6—Battery Power Supply Cable
7—SAE 16/19 Adapter (Female)
8—Diagnostic Trouble Code (DTC) Memory Clear Terminal
9—SAE 16/19 Connector (Male)
10—Tech 2 Engine Diagnostic Connector to Engine Diagnostic Connection (X6).
11—Personal Computer Memory Card Industry Association (PCMCIA)

1. Turn ignition key switch to the OFF position.

IMPORTANT: Power must be off on the Tech 2 when inserting or removing PCMCIA card. It will damage the PCMCIA card.

2. With the Tech 2 Diagnostic Scan Tool (1) powered down. Insert the PCMCIA (11) card with the latest version of Isuzu software into the Tech 2 (1).

3. Connect the SAE 16/19 adapter (female) (7) into DLC cable.

4. Connect the Data Link Connector (DLC) (3) to the Tech 2 (1).

5. Connect the SAE 16/19 (female) (7) adapter to SAE 16/19 connector (male) (9).

6. Connect engine diagnostic connector (10) to engine diagnostic connection (X6).

Continued on next page

2. Select **F1: Data Display** from on the Engine Applications Menu. See chart below for data available for display in this option.

3. Display fixed parameters

   0 to 5 (Max.) Data parameters can be fixed on the "Data Display" Screen. Once fixed these parameters will remain at the upper part of the screen until manually removed, even when scrolling. To fix parameters, press the softkey "Select Items" then move the highlight bar over the desired parameter and press "Enter". The selected parameter will be shown with an asterisk (*). Move the highlight bar with the arrow up or down keys to select the parameters you want fixed then press the softkey "Accept". To change fixed parameters press the softkey "Select Items", move the highlight bar with the arrow up or down keys to select the parameter you want to change and press "Enter". That parameter will be cleared. Pressing the softkey "Clear All" will clear all fixed parameters.

4. Change units

   To change units from SI/metric to Standard/English use softkey "more" then select "values", this will toggle between SI/metric and Standard/English press again and it toggles back.

TX1006490 –19–20APR06

Engine Application Menu

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Tech 2 Data			
	Read out		
Item	Measured in	Engine off, key on	Engine on, key on
System Voltage	V	24.8 V	27.0 V
Main Relay Voltage	V	24.5 V	27.0 V
Desired Engine Speed	rpm	499 rpm	499 rpm
Engine Speed	rpm	0 rpm	900 rpm
Accelerator Pedal Position 1 Sensor	V	0.0 V	0.0 V
Accelerator Pedal Position 2 Sensor	V	0.0 V	0.0 V
Accelerator Pedal Position Signal	%	0.0%	0.0%
Fuel Rail Pressure Difference (Actual—Desired)	MPa	-50 MPa	0-1 MPa
Fuel Rail Pressure Sensor	V	0.9 V	2.0 V
Rail Pressure Feedback Mode		Wait Mode	Feedback Mode
Coolant Temperature Sensor	V	1.4 V	1.5 V
Coolant Temperature	°C	*°C	*°C

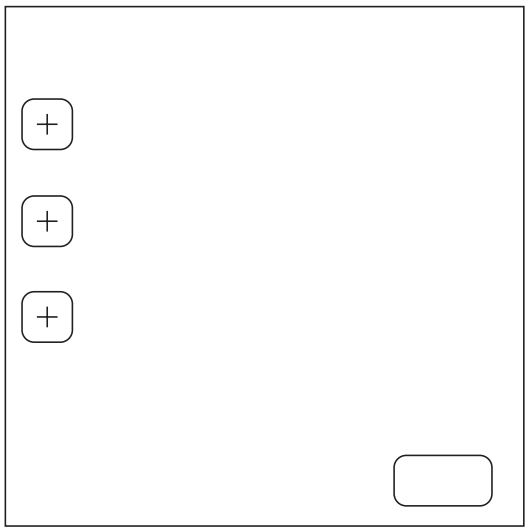
Continued on next page

5. Monitor Display will show the status of switches, sensors, and controller signals on the machine. See **Monitor Display** later in this procedure.

   Special Function will allow control over some functions of the machine. See **Special Function** later in this procedure.

   Setup adjusts parameters of machine operation. See **Setup** later in this procedure.

   ESC will return to Dr. ZX start screen.



Main Controller Select Function Screen

LD30992,0000220 –19–25APR06–5/30

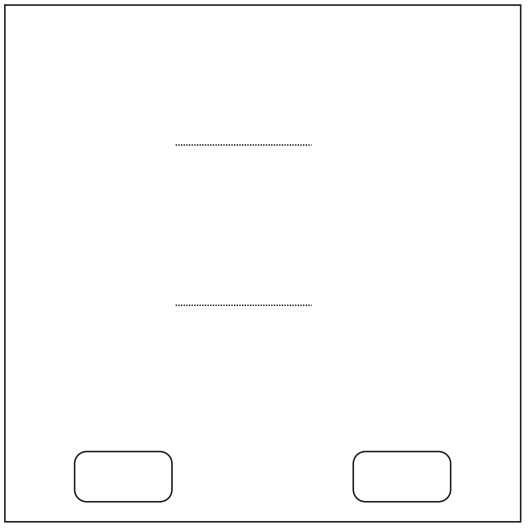
1. **Monitor Display**

   After selecting Monitor Display, enter the model and serial number of the machine.

   Select OK to continue after entering model and serial number.

   ESC will return to Main Controller Select Function Screen.

NOTE: Model and serial numbers are not necessary to proceed. Model and serial numbers will be necessary if a recording is to be taken.



Enter Model and Serial Number Screen

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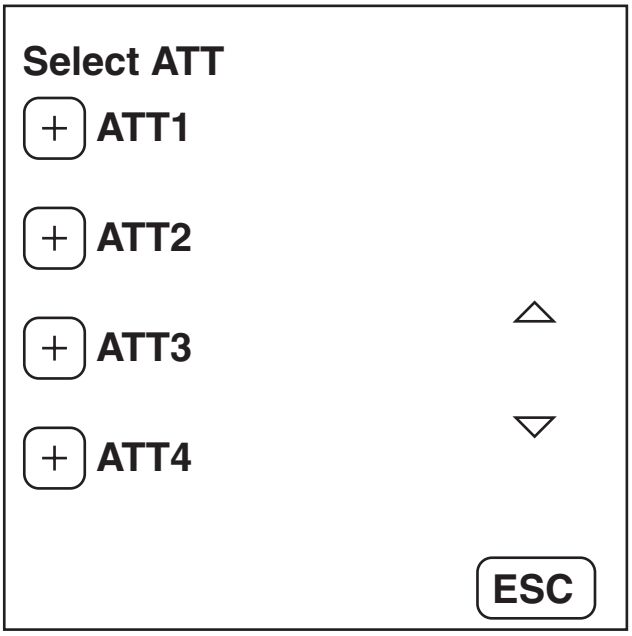
LD30992,0000220 –19–25APR06–6/30

a. **ATT Parameter Change—**After selecting ATT Parameter Change, Dr. ZX will display a list of attachments which parameters can be changed. Select an attachment to change the parameters.

   ESC will return to Main Controller Parameter Change screen.



Attachment Selection

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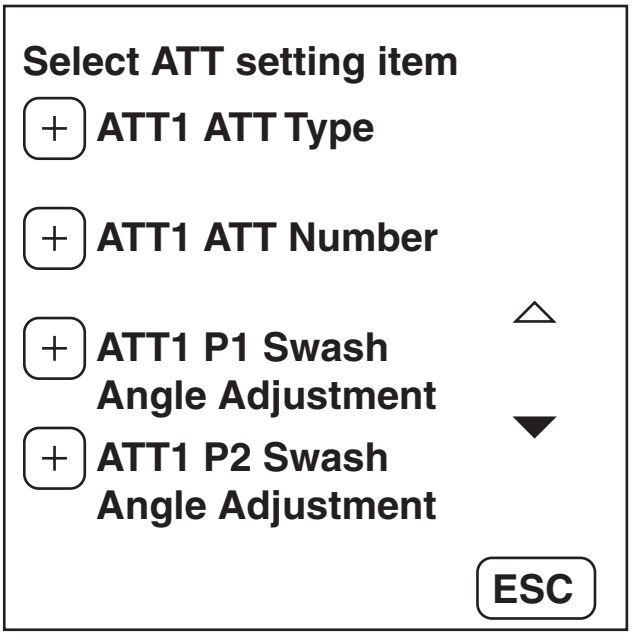
LD30992,0000220 –19–25APR06–23/30

b. Each attachment has a list of parameters that may be changed. Select a parameter to change.

   ESC will return to Attachment Selection Screen.



Attachment Parameter Change List

Continued on next page

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6. Once the data has been stored, comments or additional information may be added to the recording.

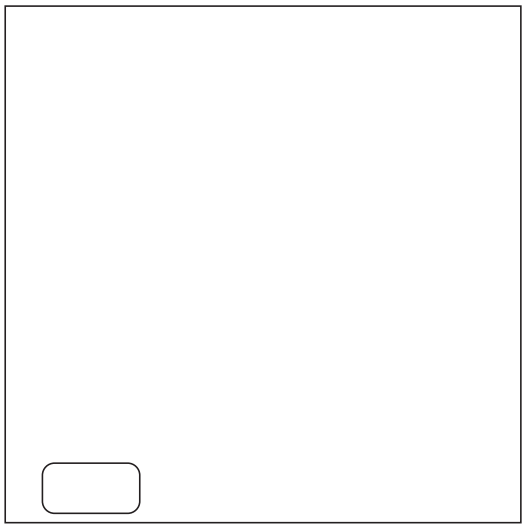
   Select Comment to add a comment to the reading.

   ESC will return to the Monitoring Screen.

7. Following the comment screen, Dr. ZX will allow corrections to the comment by selecting Re-Input.

Special Function

Engine Special Function is not available at this time.



Data Bank Comment Screen

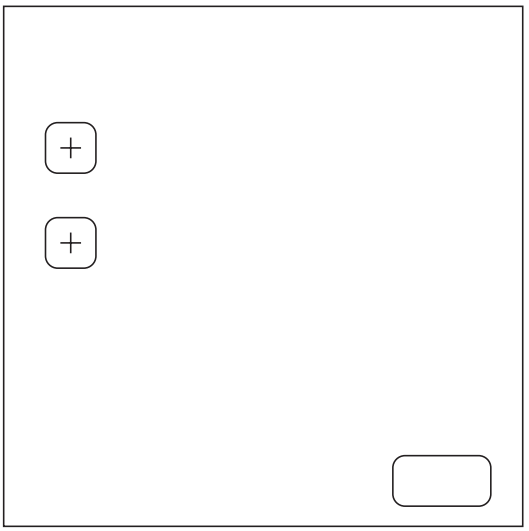
LD30992,0000221 –19–25APR06–10/10

Monitor Controller Diagnostics Using Dr. ZX

1. Start Dr. ZX and select Select Controller.

   For connection procedure to machine, See Personal Digital Assistant (PDA) Connection to Excavator Using DR. ZX Application. (Group 9015-20.)

NOTE: Screen will display "Communicating" while sending and receiving data.

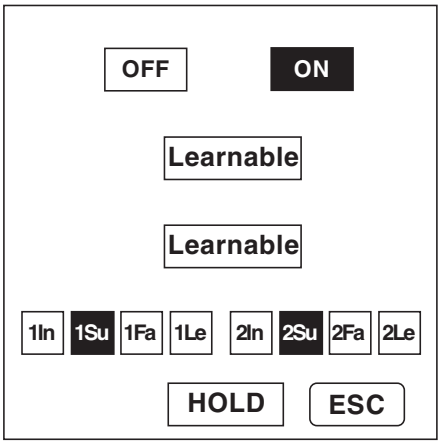


Function Selection Screen

Continued on next page

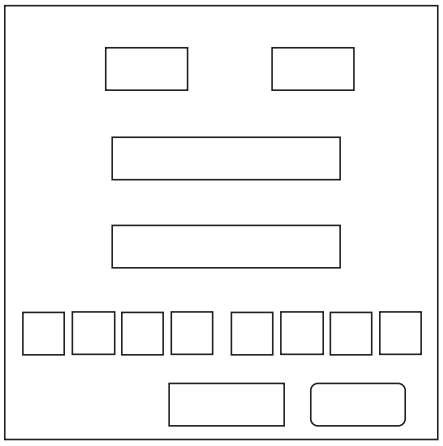
LD30992,0000222 –19–26APR06–1/9

5. When “1Su” and “2Su” are displayed, pump learning procedure is complete. If “1Fa” or “2Fa” is displayed, pump learning procedure has failed. See diagnostic table below.



TX1007071 –19–27APR06

Pump Learning Success



TX1007072 –19–27APR06

Pump Learning Failure

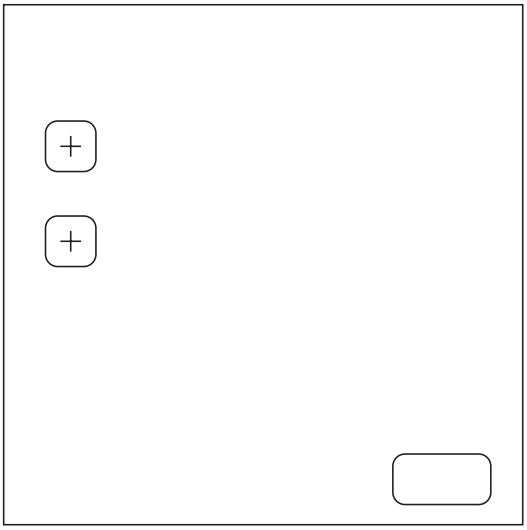
Continued on next page

LD30992,00004C8 –19–08JUN06–3/4

Information Controller (ICF) Date and Time

1. Start Dr. ZX and select Select Controller.

   ESC will return ZX—3 Large Screen.

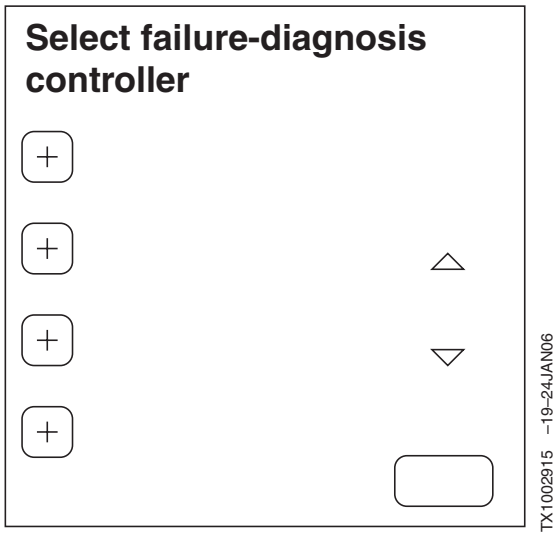


Function Selection Screen

LD30992,00004C5 –19–08JUN06–1/7

2. Select Information C/U.

   ESC will return to Function Selection Screen.



Controller Selection Screen

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LD30992,00004C5 –19–08JUN06–2/7

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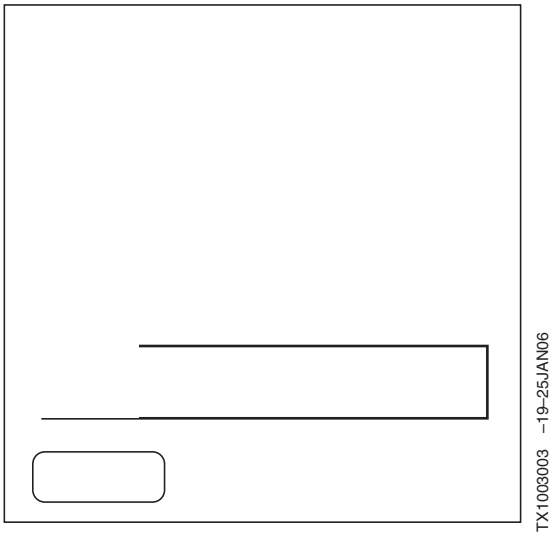
6. The download screen is displayed while data is transferred.

   Cancel will terminate download and return to Information Controller Setup Screen.



Data Download Screen

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LD30992,0000226 –19–08JUN06–6/7

Pressure Sensor Test

Pressure Sensor Resistance Test

1. A suspect pressure sensor can be checked by switching positions with a known good sensor. If the problem follows the suspect pressure sensor, it has failed.

   If the problem remains, the harness has failed.

2. To check a pressure sensor using a multimeter, remove it from the machine.

NOTE: Resistance values for pump 1 delivery pressure sensor (B35) and pump 2 delivery pressure sensor (B37) may vary widely. To verify the sensor's functionality, use the on-board monitor or check for diagnostic trouble codes and to monitor the sensor's output. See Monitor Data Items. (Group 9015-20.) See SERVICE ADVISOR™ Diagnostic Application . (Group 9015-20.) See Dr. ZX Diagnostic Application. (Group 9015-20.)

3. Measure resistance as indicated. Resistance may vary from one sensor to another.

Pressure Sensor Resistance Ranges—Specification

Pump 1 (4-Spool) Control Pressure Sensor (B36)—Resistance	5k—15k ohms (Pins 1—2) 30k—50k ohms (Pins 2—3)
Pump 2 (5-Spool) Control Pressure Sensor (B38)—Resistance	5k—15k ohms (Pins 1—2) 30k—50k ohms (Pins 2—3)
Swing Pressure Sensor (B33)—Resistance	5k—15k ohms (Pins 1—2) 30k—50k ohms (Pins 2—3)
Counterweight Removal Pressure Sensor (B46)—Resistance	5k—15k ohms (Pins 1—2) 30k—50k ohms (Pins 2—3)
Arm Out Pressure Sensor (B50)—Resistance	5k—15k ohms (Pins 1—2) 30k—50k ohms (Pins 2—3)
Arm In Pressure Sensor (B51)—Resistance	5k—15k ohms (Pins 1—2) 30k—50k ohms (Pins 2—3)
Boom Up Pressure Sensor (B52)—Resistance	5k—15k ohms (Pins 1—2) 30k—50k ohms (Pins 2—3)

Continued on next page

CAN Bus Terminator Check	Turn key switch (S1) OFF. Disconnect harness from CAN bus terminator. See Engine Interface Harness (W6) Component Location. (Group 9015-10.)  T140697B –UN–29MAR01 Measure resistance across terminator pins. *LOOK: Does the multimeter read 105—135 ohms?*	**YES:** CAN bus terminator is OK. **NO:** CAN bus terminator has failed. Replace the CAN bus terminator. – – –1/1

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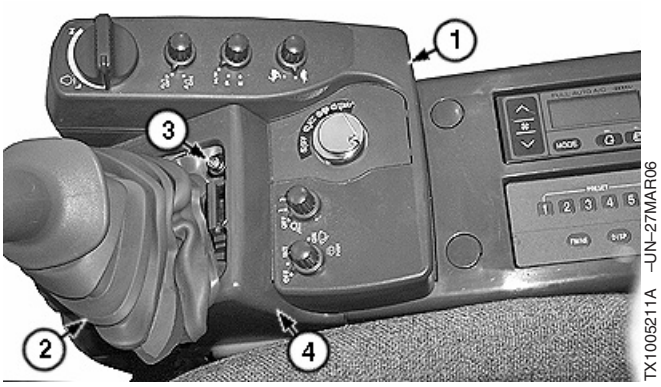
Pilot Shutoff Switch Harness Check	Disconnect harness from cab. Remove diode from harness. With the positive lead on the center terminal of the diode, there should be continuity when you probe the two outer terminals with the negative lead. Switch the leads and put the negative lead on the center terminal, there should not be continuity when you probe the two outer terminals with the positive lead. Is there continuity one way and not the other?	**YES:** Diode is good, reinstall the diode into the harness. Continue checkout. **NO:** Replace the diode.
	 TX1005243A –UN–28MAR06 *Pilot Shutoff Switch Connector* **1—Blue Wire** **2—Red Wire** With the positive lead on the red wire (2), and the negative lead on the blue wire (1), check for continuity with the pilot shutoff switch handle in the forward position. Bring the handle back to the rearward position, and check for continuity. Is there continuity with the handle in the forward position and not in the rearward position?	**YES:** Harness is good. **NO:** Replace the pilot shutoff switch harness. – – –1/1

Switch Panel Remove and Install

1. Lift pilot control lever boot (2) and remove screws and spacers (3).
2. Pull up pilot control lever boot and console cover.

1—Switch Panel
2—Pilot Control Lever Boot
3—Screw and Spacer (4 used)
4—Console Cover

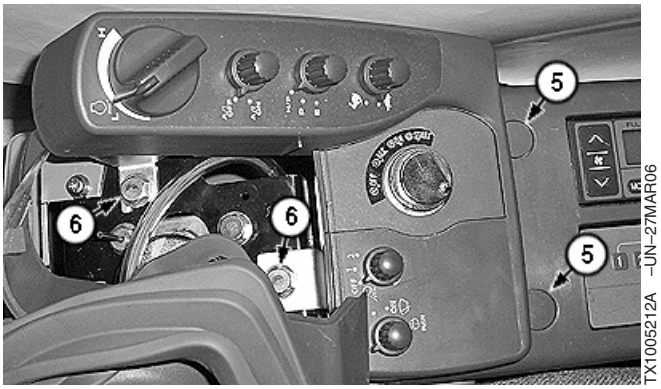


Pilot Control Lever Boot

LD30992,0000432 –19–23MAR06–1/3

3. Remove plugs and screws (5) and remove cap screws (6).
4. Pull switch panel assembly forward and gently tilt back. Disconnect harness connector to key switch.

5—Plug and Screw (2 used)
6—Cap Screw (2 used)



Switch Panel Cap Screws

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LD30992,0000432 –19–23MAR06–2/3

Replace (Push Type) Metri-Pack™ Connectors

Disconnect the Metri-Pack[1] connector. Remove the tie bands and tape.

Remove the connector lock (A), and mark wire colors for identification.

Identify wire color locations with connector terminal letters.

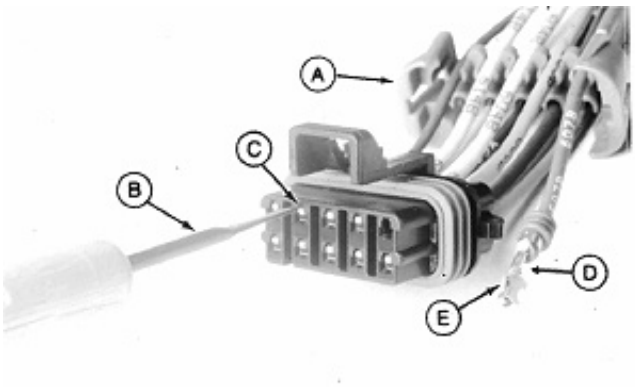
Insert JDG776 or JDG777[2] Terminal Extraction Tool (B) into connector body socket (C) pushing the terminal locking tab inward.

NOTE: Use JDG776 Extraction Tool with 56, 280 and 630 series METRI-PACK terminals. Use JDG777 Extraction Tool with 150 series METRI-PACK terminals.

Remove extraction tool and pull terminal (D) out of the socket.

Replace terminal. Make sure locking tab (E) on the new terminal is in the outward position.

Push terminal into connector body socket until terminal locks.



RW21325 –UN–29JUN92

A—Connector Lock
B—Extraction Tool JDG777
C—Connector Body Socket
D—Terminal
E—Locking Tab

[1]*Metri-Pack is a trademark of Packard Electric*

[2]*Included in JT07195A Electrical Repair Kit*

LD30992,0000243 –19–31MAR06–1/1

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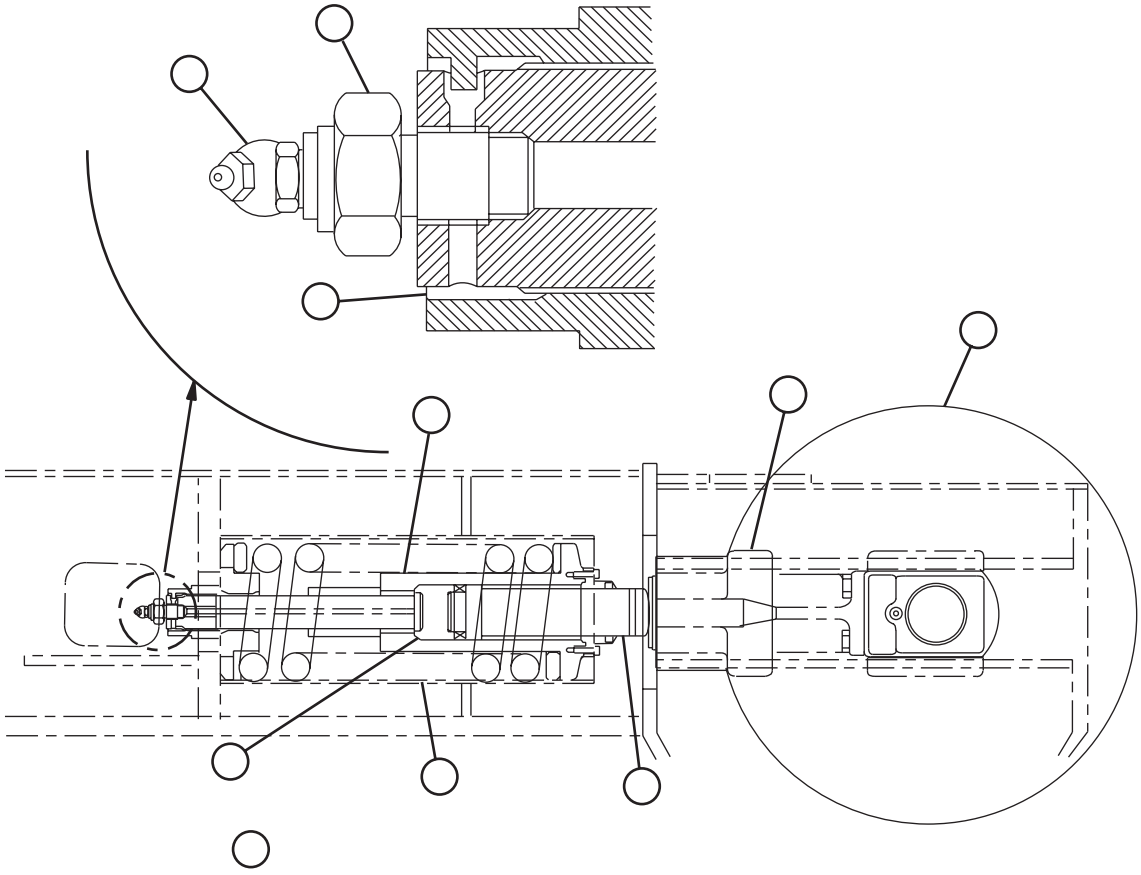
Track Adjuster and Recoil Spring Operation



T140036 –19–17MAY01

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1—Grease Fitting
2—Valve
3—Grease Relief Passage
4—Cylinder
5—Yoke
6—Front Idler
7—Piston
8—Recoil Spring
9—Grease
10—Track Adjuster and Recoil Spring

The track adjuster and recoil spring (10) is supported by the track frame. Shock loads on the track and front idler (6) are absorbed by the recoil spring (8).

To decrease track sag, grease (9) is pumped into the cylinder (4) through the grease fitting (1). The grease pushes the piston (7) against the yoke moving the front idle out, reducing track sag. The grease fitting (1) is protected from excess pressure by a check ball.

Increasing track sag is accomplished by loosening the valve (2) to release grease from the cylinder through the grease relief passage (3). When releasing grease from the cylinder, only loosen the valve (2).

MR50960,00000FF –19–27APR06–1/1

CAUTION: Stay clear of moving parts. Position dial indicator so it can be seen while the operator can see you.

NOTE: Two people are needed to take the measurement. One to operate the machine and one to take the readings.

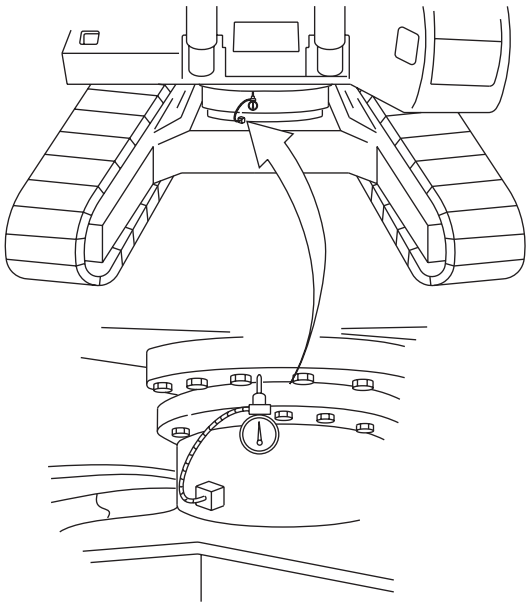
1. Check that swing bearing-to-main frame cap screws are tightened to specification. See Upperstructure Remove and Install. (Group 4350.)
2. Check that swing bearing is lubricated with the specified grease. See Track Adjuster, Working Tool Pivot, Swing Bearing, And Swing Bearing Gear Grease. (Operator's Manual.)
3. Check that bearing rotation is smooth and without noise.

NOTE: Readings vary depending on the location of dial indicator base with respect to the swing bearing support tower. To obtain an accurate reading, the base for dial indicator must be attached to the support tower or as close to it as possible.

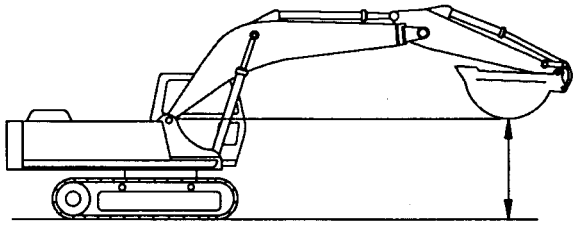
4. Install dial indicator with needle point contacting bottom face of bearing outer race and base attached to the swing bearing support tower or as close to it as possible.
5. Move boom and arm to the position shown with bucket off the ground. Bucket must be empty.
6. Turn dial indicator to zero.
7. Lower the boom to raise front idlers off the ground approximately 500 mm (20 in.).
8. Record dial indicator reading.

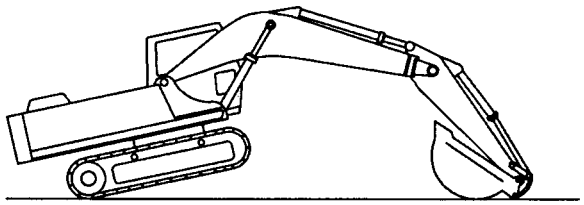
Swing Bearing—Specification

Swing Bearing—Play	0.6—1.85 mm new
	0.024—0.073 in. new
	3.1—4.35 mm maximum allowable
	0.122—0.171 in maximum allowable



T140090 –UN–17MAY01





T7886AJ –UN–23NOV92

T7886AJ CV

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17—Pump 1 Regulator
18—Pump 2 Regulator
26—Charge Pump
27—Pilot Pump
29—Fan Drive Pump Regulator
47—Hydraulic Oil Tank
50—Suction Screen
52—Pilot Filter Element
54—Pilot Pressure Regulating Valve
55—Solenoid Valve Manifold
56—Travel Pilot Control Valve
57—Left Pilot Control Valve
58—Right Pilot Control Valve
59—Boom Up Shockless Valve
66—Pilot Signal Manifold
81—Accumulator
82—Pilot Check Valve Manifold
83—Right Control Valve
84—Left Control Valve
85—Main Relief and Power Digging Valve
89—Travel Flow Combiner Valve
97—Boom Flow Rate Control Valve—Switch Valve
102—Boom Reduced Leakage Valve—Switch Valve
105—Arm 2 Flow Rate Control Valve—Switch Valve
110—Bypass Shutoff Valve (4-spool)
121—Arm Reduced Leakage Valve—Switch Valve
129—Boom Mode Relief Control Valve
149—Swing Motor
154—Swing Park Brake Release
157—Left Travel Motor
159—Right Travel Motor
190—To Control Valve Pilot Caps
Y10—Pilot Shutoff Solenoid Valve
Y12—Pump 1 Control Solenoid Valve
Y13—Pump 2 Control Solenoid Valve
Y14—Fan Drive Pump Solenoid Valve
Y22—Boom Flow Rate Solenoid Valve (SF)
Y23—Boom Mode Relief Solenoid Valve (SC)
Y24—Power Dig Solenoid Valve (SG)
Y25—Travel Speed Solenoid Valve (SI)

The pilot system is used to operate the control circuits of the machine. The pilot pump (27) is mounted on the end of main hydraulic pump 1. Oil is drawn from the hydraulic tank (47) by the charge pump (26). This charge oil is then drawn into the pilot pump and out to the pilot filter (52) and pilot pressure regulating valve (54).

The filtered oil then flows to the fan drive pump solenoid (Y14), fan drive pump regulator (29), pump 1 regulator (17), pump 2 regulator (18), pump 1 control solenoid valve (Y12), and pump 2 control solenoid valve (Y13).

From the filter, oil is also routed to the solenoid valve manifold (55), which controls power dig (SG), travel speed (SI), boom flow rate (SF), and boom mode relief (SC). Pilot oil is routed directly to the control valve to facilitate the functioning of the arm reduced leakage valve (121) and the boom reduced leakage valve (102).

The pilot oil continues on to the pilot check valve manifold (82), where it is divided off to the accumulator (81), the pilot signal manifold (66), and the pilot shutoff solenoid valve (Y10). From the pilot shutoff solenoid valve, pilot oil flows to the travel pilot control valve (56), left pilot control valve (57), right pilot control valve (58), and to the pilot signal manifold's warm-up circuit.

Pilot oil from the right pilot control valve flows through the boom up shockless valve (59) to the pilot signal manifold. Pilot oil from the pilot signal manifold flows to the swing park brake release (154) of the swing motor (149) and to the control valve pilot caps (190).

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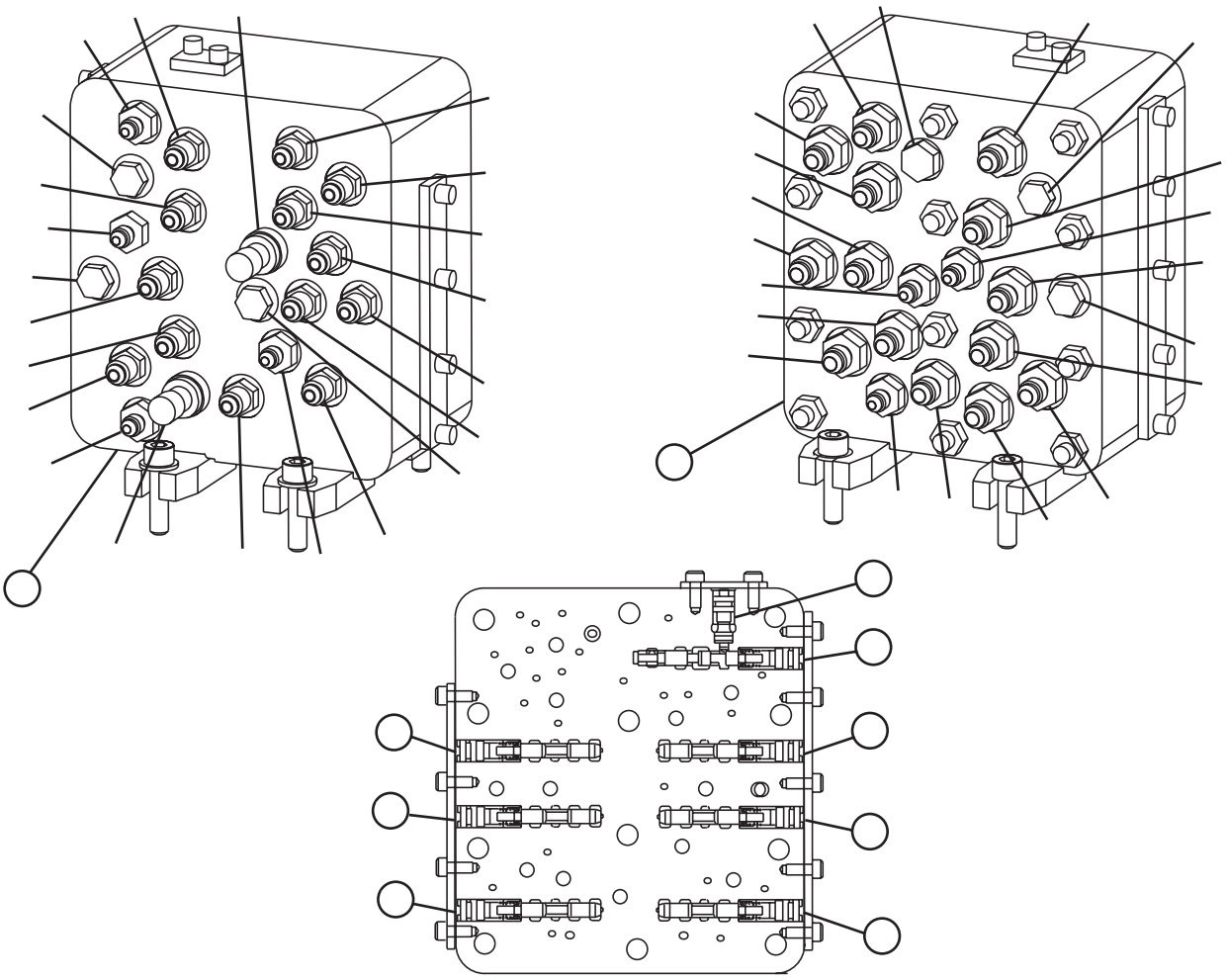
LD30992,000024F –19–26APR06–2/2

Pilot Signal Manifold Operation



TX1005673 –UN–25APR06

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1, A—Boom Up
2, B—Boom Down
3, C—Arm Out
4, D—Arm In
5, E—Swing Left
6, F—Swing Right
7, G—Bucket Curl
8, H—Bucket Dump
9, I—Left Travel Forward
10, J—Left Travel Reverse
11, K—Right Travel Forward
12, L—Right Travel Reverse
13, M—Plug (auxiliary)
14, N—Plug (auxiliary)
15—Control Valve Side of Pilot Signal Manifold
16—Pilot Control Valve Side of Pilot Signal Manifold
67—Boom Down Shockless Valve
69—Orifice
70—Pilot Valve (port SE) (not used, plug installed)
71—Arm 2 Flow Rate Pilot Valve (port SK)
72—Pump 1 Flow Rate Pilot Valve (port SA) (not used, plug installed)
73—Pump 2 Flow Rate Pilot Valve (port SB) (not used, plug installed)
74—Swing Park Brake Release Pilot Valve (port SH)
75—Travel Flow Combiner Pilot Valve (port SL)
DF—To Hydraulic Oil Tank
TR—B56 and B57 Travel Pressure Sensor
S3—B33 Swing Pressure Sensor
SA—From Pump 1 Flow Rate Pilot Valve Remote Control Spool (not used, plug installed)
SB—From Pump 2 Flow Rate Pilot Valve Remote Control Spool (not used, plug installed)
SE—To Pilot Valve (port SE) (not used, plug installed)
SH—To Swing Park Brake (port SH)
SK—To Arm Flow Rate Control Valve—Switch Valve
SL—To Travel Flow Combiner Valve
SM—To Hydraulic Oil Tank
SN—Plug (not used)
SP—To Solenoid Valve Manifold (port SP)
PH—From Pilot Shutoff Solenoid Valve
PI—From Pilot Check Valve Manifold

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9025
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15—Pump 1
19—Servo Piston
20—Load Sleeve
21—Load Spool
22—Feedback Link
23—Check Valve
24—Check Valve
25—Pilot Piston
27—Pilot Pump
83—To Right Control Valve
180—Supply Oil
182—Pilot Oil
184—Return Oil
200—Spring
201—Pivot Pin
202—Large Chamber
203—Small Chamber
Y12—Pump 1 Control Solenoid Valve

Operation of pump 1 regulator and pump 2 regulator is the same. Pump 1 regulator is discussed throughout.

The pump regulators are located at the top of each pump and are responsible for the control of the pump delivery flow rate. The pump control solenoid valve (Y12) regulates the pilot control pressure according to signals received from the main controller (MCF). As pilot control pressure increases, the pump delivery flow rate increases. For more information on the MCF and the pump control circuit, see Main Controller (MCF) Circuit Theory of Operation. (Group 9015-15.)

Supply oil (180) is routed through check valve (23) to load spool (21) and to the small chamber (203) of the servo piston (19).

Pilot oil (182) from the pump control solenoid valve acts on the pilot piston (25), moving the load spool back and forth against the spring (200). Pilot oil can also be combined with the supply oil through check valve (24) if the supply oil pressure becomes lower than the pilot oil pressure.

Regulator Operation at Minimum Flow Rate—With pump 1 control solenoid valve open to the tank, the load spool is shifted to the left by the spring. With the spool in this position, supply oil is routed to the large chamber (202) of the servo piston. With supply oil at both ends of the servo piston, the servo piston will move to the right, due to the difference in surface areas on either end.

When the servo piston moves to the right, the feedback link (22) will rotate counterclockwise, moving the load sleeve (20) to the left. The servo piston will continue to move to the right until the oil passages on the load sleeve and load spool are completely closed. With the servo piston in this position, the pump swash plate is moved to minimum displacement; thus the pump will deliver minimum flow rate.

Continued on next page

27—Pilot Pump
28—Fan Drive Pump
30—Servo Piston
31—Feedback Link
32—Load Sleeve
33—Load Spool
34—Pilot Piston
35—Compensating Piston
36—To Fan Drive Motor
200—Lever
201—Pin
202—Pin
203—Pin
204—Hole
205—Inner Spring
206—Small Chamber
207—Outer Spring
208—Compensating Rod
209—Pin
210—Pin
211—Large Chamber
212—Lever
213—Pin
214—Hole
215—Spring
216—Pin
217—Solenoid Valve Spool
218—Supply Oil
219—Pilot Oil
Y14—Pump Control Solenoid Valve

Regulator Control by Fan Drive Pump Delivery Pressure (Decreasing Flow Rate)—The regulator controls the fan drive pump in this manner if engine speed (fan drive pump speed) increases beyond the rated speed during startup. When fan drive pump delivery pressure increases beyond the force of the inner spring (205) and the outer spring (207), the compensating piston (35) will move the compensating rod (208) to the right, in turn moving the lever (200) to the right (counterclockwise), around the pin (201), which is fixed to the housing.

The pin (203), which is attached to the feedback link (31), pulls the feedback link and the load spool (33) to the right, as the feedback link pivots clockwise around the pin (210).

With the load spool in this position, supply oil (218) is routed to the large chamber (211) of the servo piston (30). With supply oil being routed to both ends of the servo piston, the servo piston will move to the right, due to the larger surface area of the large chamber side. When the servo piston moves to the right, the feedback link (31) will rotate counterclockwise around the pin (203), moving the load spool (33) to the left.

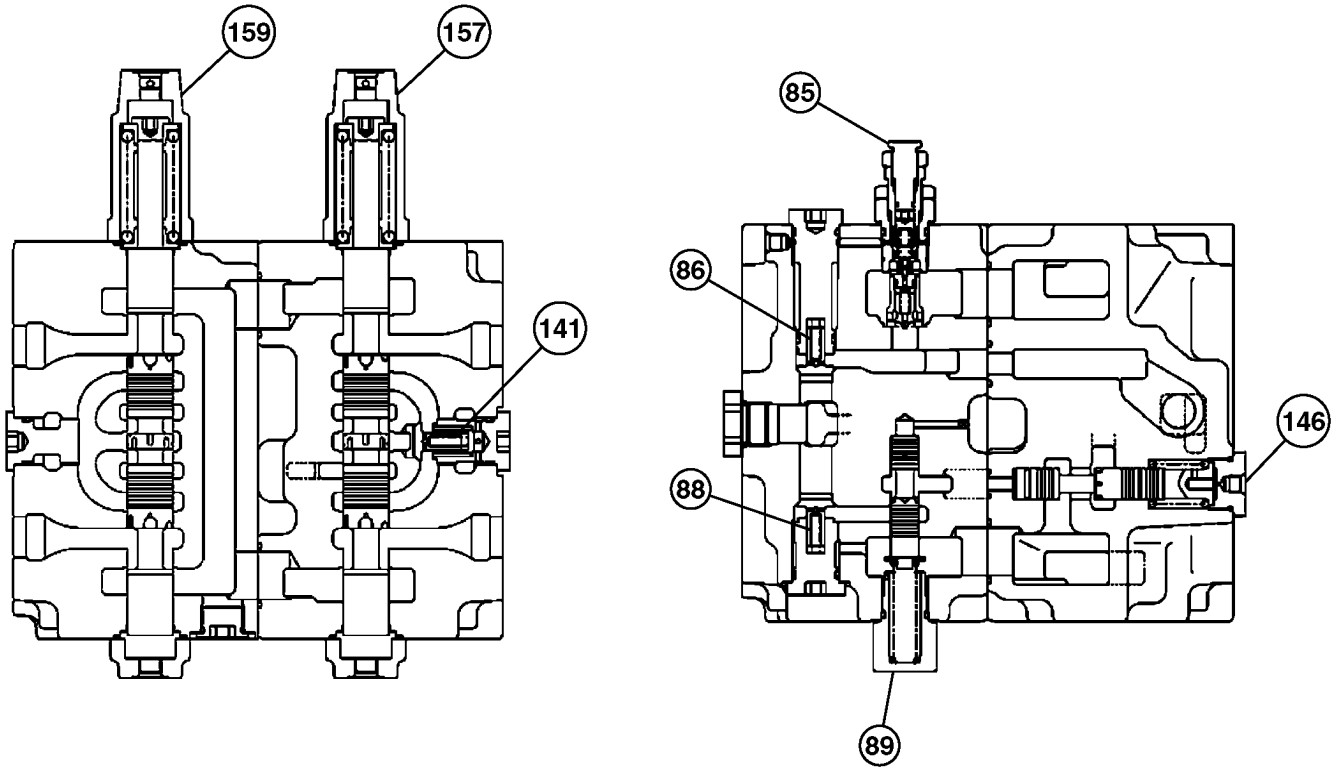
The servo piston will continue to move to the right until the oil passages on the load spool and the load sleeve (32) are completely closed. With the servo piston in this position, the pump swash plate will move to minimum displacement, decreasing the flow rate of the pump.

Continued on next page

15—Pump 1
16—Pump 2
44—Restriction Valve
45—Oil Cooler Bypass Valve
83—Right Control Valve (4-spool)
84—Left Control Valve (5-spool)
90—Right Travel Spool
94—Bucket Spool
99—Boom 1 Spool
107—Arm 2 Spool
110—Bypass Shutoff (auxiliary flow combiner) Valve
111—Arm Regenerative Valve—Switch Valve
113—Swing Spool
118—Arm 1 Spool
126—Boom 2 Spool
137—Auxiliary Spool
140—Left Travel Spool
149—Swing Motor
157—Left Travel Motor
158—Right Travel Motor
168—Boom Cylinder (2 used)
170—Bucket Cylinder
169—Arm Cylinder
180—Neutral and Power Passages
183—Combiner Passage
184—Return Passage

Supply oil from pump 1 (15) flows to the right control valve (83). Supply oil from pump 2 (16) flows to the left control valve (84). When all functions are in neutral, supply oil flows through the neutral and power passages (180) for each valve spool section and then into the return passage (184). Neutral and power passages in the left and right control valves are used to route supply oil for the combined operation of functions. Arm 1 and 2 spools (107 and 118), and the boom 1 and 2 spools (99 and 126), are connected by combiner passages (183) so supply oil from both pump 1 and pump 2 flows to the cylinders during a single operation. Supply oil from pump 2 can be combined with supply oil from pump 1 by the auxiliary combiner power passage to supply the auxiliary spool (137).

MM61211,0001522 –19–15MAY08–9/15



TX1006460

TX1006460 –UN–17APR06

Right and Left Travel Valve Cross Sections

85—Main Relief and Power Digging Valve
86—Main Relief Valve Isolation Check Valve (4-spool)
88—Check Valve
89—Travel Flow Combiner Valve
141—Neutral Passage Check Valve (left travel lift check)
146—Bypass Shutoff (bucket flow combiner) Valve (5-spool)
157—Left Travel Spool
159—Right Travel Spool

Continued on next page

MM61211,0001522 –19–15MAY08–10/15

15—Pump 1
16—Pump 2
83—Right Control Valve (4-spool)
84—Left Control Valve (5-spool)
85—Main Relief and Power Digging Valve
88—Check Valve—Travel Flow Combiner Valve Circuit
89—Travel Flow Combiner Valve
90—Right Travel Spool
94—Bucket Spool
107—Arm 2 Spool
118—Arm 1 Spool
140—Left Travel Spool
142—Check Valve (lift check)—Bucket
143—Orifice—Bucket Power Passage
157—Left Travel Motor
159—Right Travel Motor
169—Arm Cylinder
180—Supply Oil
182—Pilot Oil
184—Return Oil

When travel only is actuated, supply oil (180) from pump 2 (16) flows through the neutral passage of arm 1 (118), boom 2, and auxiliary spools, then through the left travel spool (140) and out to the left travel motor (157). Supply oil from pump 1 (15) flows through the right travel spool (90) and out to the right travel motor (159). Right travel spool blocks the flow of supply oil through the neutral passage of bucket (94), boom 1, and arm 2.

When dig functions are actuated at the same time as travel, the travel flow combiner valve (89) is shifted by pilot oil from the travel flow combiner pilot valve (port SL) in the pilot signal manifold. See Pilot Signal Manifold Operation for operation of pilot valves. (Group 9025-05.)

Supply oil (180) from pump 1 (15) flows to right travel spool and now through the travel flow combiner valve to the left travel spool and bucket spool (90). Supply oil flow from pump 1 to both left and right travel motors prevents mistracking.

When travel is not actuated, return oil and spring force keep the travel flow combiner valve closed.

Supply oil from pump 2 (16) is used for the swing, arm, and boom functions and, when connected, the auxiliary function.

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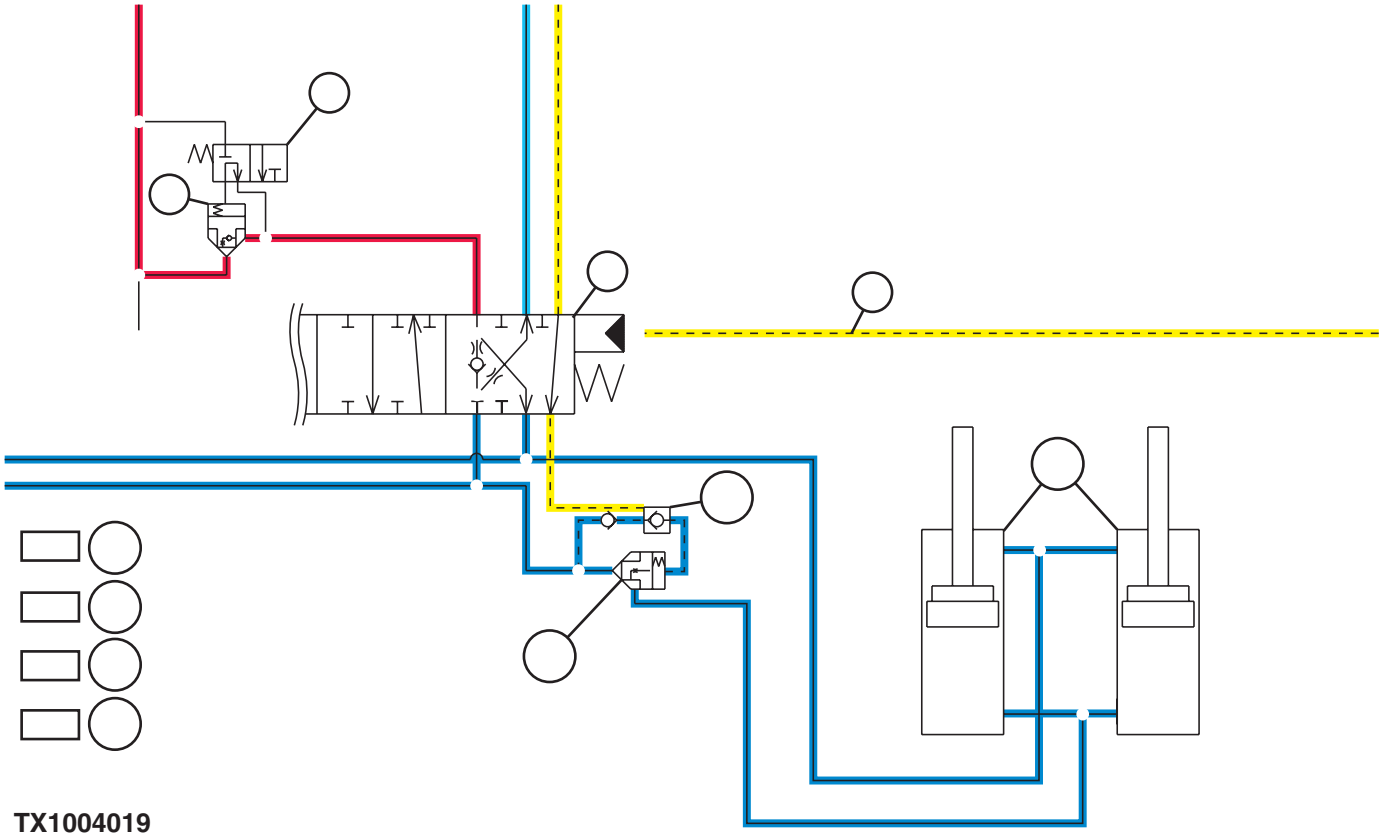

TX1004019

TX1004019 –UN–01MAR06

Boom Down Schematic

97—Boom Flow Rate Control Valve—Switch Valve
98—Boom Flow Rate Control Valve—Poppet Valve
99—Boom 1 Spool
102—Boom 1 Reduced Leakage Valve—Switch Valve
103—Boom 1 Reduced Leakage Valve—Poppet Valve
168—Boom Cylinder (2 used)
180—Supply Oil
182—Pilot Oil
183—Trapped Oil
184—Return Oil

Boom Down Position—When a function is actuated, the boom 1 spool (99) allows pilot oil to shift the boom 1 reduced leakage valve—switch valve (102). The switch valve allows oil on the spring side of the boom 1 reduced leakage valve—poppet valve (103) to flow to return oil. The poppet valve opens allowing oil from the boom cylinder head end (401) to flow past the boom 1 spool to return oil (184).

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LD30992,0000262 –19–26APR06–4/5

1—Boom Up (pilot)
4—Arm In (pilot)
15—Pump 1
16—Pump 2
27—Pilot Pump
66—Pilot Signal Manifold
71—Arm 2 Flow Rate Pilot Valve (port SK)
99—Boom 1 Spool
105—Arm 2 Flow Rate Control Valve—Switch Valve
106—Arm 2 Flow Rate Control Valve—Poppet Valve
107—Arm 2 Spool
111—Arm Regenerative Valve—Switch Valve
118—Arm 1 Spool
126—Boom 2 Spool
168—Boom Cylinders
169—Arm Cylinder
182—Pilot Oil
184—Return Oil
200—Pump 1 Supply Oil
201—Reduced Flow Pump 1 Supply Oil
202—Pump 2 Supply Oil

Normal Operation—During normal operation, pump 1 supply oil (200) is routed to the boom 1 spool (99) and the arm 2 spool (107) through the 4-spool power circuit, and pump 2 supply oil (202) is routed to the arm 1 spool (118) and the boom 2 spool (126) through the 5-spool power circuit.

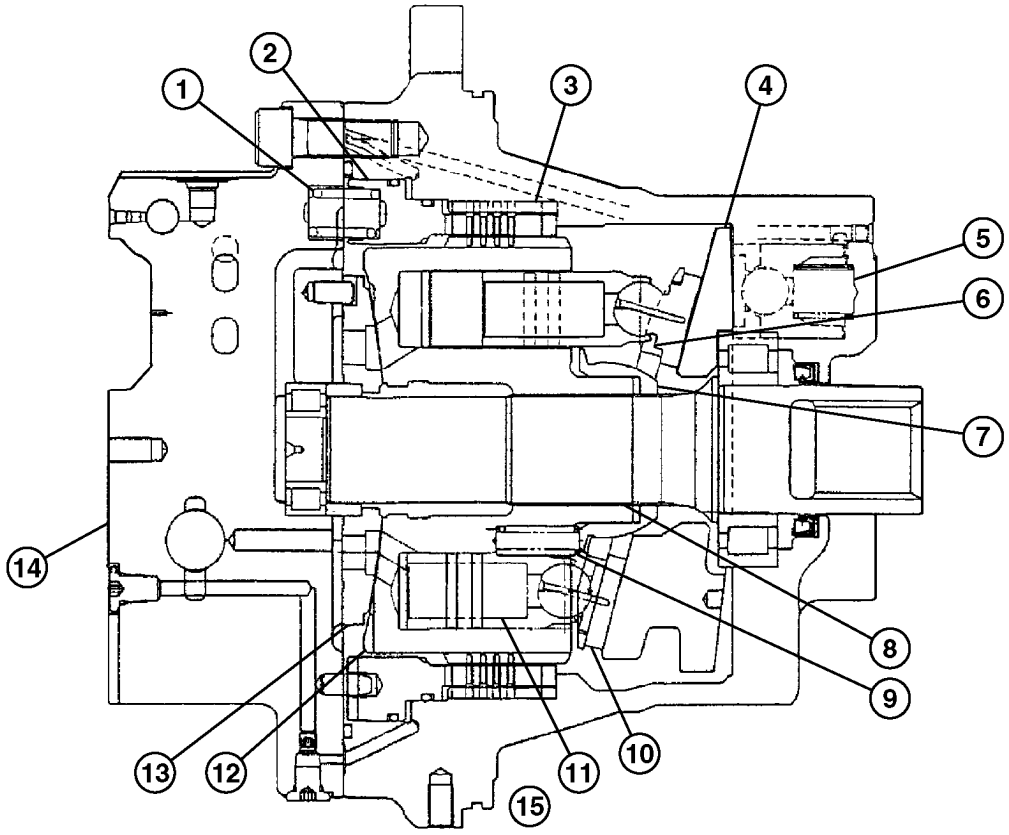
Combined Operation—During combined operation of boom up (1) and arm in (4), arm in pilot pressure shifts the arm 2 flow rate pilot valve (71), allowing boom up pilot oil to flow to, and shift, the arm 2 flow rate control valve—switch valve (105). For arm 2 flow rate pilot valve information, see Pilot Signal Manifold Operation. (Group 9025-05.)

With the switch valve shifted, the pump 1 supply oil (200) is routed to the back side of the arm 2 flow rate control valve—poppet valve (106), where it can push on the poppet valve reducing the flow of pump 1 supply oil (201) to the arm 2 spool (107). Consequently, more pump 1 supply oil is available to the boom 1 spool (99), allowing the boom up speed to be maintained.

During this combined operation the arm function will be maintained by the pump 2 supply oil (202) and the arm 1 spool regenerative circuit. See Regenerative Valve Circuit Operation. (Group 9025-05.)

Continued on next page

Travel Motor and Park Brake Circuit Operation



Travel Motor

TX1006976 –UN–25APR06

1—Brake Spring
2—Brake Piston
3—Travel Park Brake
4—Swashplate
5—Swashplate Piston
6—Retainer
7—Ball Guide
8—Output Shaft
9—Spring
10—Slipper
11—Piston
12—Cylinder Block
13—Valve Plate

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Travel Motor Components—The travel motor is a two speed, axial piston, swash plate type motor which includes the park brake.

The travel motor and park brake valve assembly is composed of counterbalance valve, crossover relief valves, speed selector valve, and check valves.

Pressure oil flows through valve plate (13) forcing the pistons against the angled swashplate (4) in one half of the cylinder block (12). Because the swashplate is fixed, the piston slippers slide down the angled face turning the cylinder block and output shaft (8). The valve plate (13) is held stationary by a pin. Retainer (6) holds the slippers against the swash plate by force from ball guide (7) and springs (9). As the cylinder block and output shaft rotate, the pistons move out of their bores. The pistons in the other half of the cylinder block move back into their bores to discharge oil.

The cylinder block is preloaded against the valve plate by springs (9), ball guide (7) and retainer (6) to prevent leakage during starting or low pressure operation. As pressure in the cylinder block bores increase, the force holding the cylinder block against the valve plate and pistons also increase.

Pressure oil flows through the center of each piston to the balljoint and to the face of each slipper for lubrication.

Swashplate pistons (5) control the angle of the swashplate (4) to change motor displacement.

Continued on next page

❽ **Wiring Connector Check**	See System Functional Schematic, Wiring Diagram, and Component Location Master Legend. (Group 9015-10.) Inspect hydraulic control wiring. *NOTE: Most wiring problems should generate a DTC, check for DTC's before tracing wiring.* Are all the connectors in good condition?	**YES:** Replace monitor unit. See Monitor Controller Remove and Install. (Group 9015-20.) **NO:** Repair or replace connectors.

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Diagnose All Hydraulics Slow Malfunctions

IMPORTANT: Make sure hydraulic oil level, condition, and type of oil is checked before doing this procedure.

- **Hydraulic oil temperature, cold oil can slow hydraulic functions.**
- **Low oil level can cause pump cavitation, see Check Hydraulic Tank Oil Level. (Operator's Manual.)**
- **Suction side air leaks will cause oil to foam or become aerated. Inspect site glass oil condition.**
- **Wrong viscosity oil can cause pump cavitation, see Hydraulic Oil. (Operator's Manual.)**

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TX19495,0000004 –19–26APR06–1/1

All Hydraulic Functions Slow Diagnostic Procedure

NOTE: Reduction in pump 1 and 2 flow rate due to other reasons or faulty pilot system may cause this problem. If unloaded function speed is satisfactory, diagnose low power problem, see All Hydraulic Functions Low Power Diagnostic Procedure. (Group 9025-15.).

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❻ **Actuating Pilot Pressure Check**	Key on, use monitor service menu to display Swing / Attachment Control Pilot Pressure. See Monitor Service Menu Operation. (Group 9015-16.) *NOTE: Spool actuating pressure can be checked for each function by installing a tee and gauge in pilot line and then actuating that function. Perform Control Valve Spool Actuating Pilot Pressure Test. (Group 9025-25.)* Run engine at fast idle and operate problem function. Observe pressure when function held over relief. Is pilot pressure above 3.70 MPa?	**YES:** Diagnostic procedure complete. **NO:** If pressure is low, adjust or replace valve. Perform Pilot Pressure Regulating Valve Test and Adjustment. (Group 9025-25.) – – –1/1

Function Does Not Stop When Control Lever Released Diagnostic Procedure

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❶ **Pilot Shutoff Lever Check**	Run engine at slow idle with pilot shutoff lever to down position. Activate problem function, then move lever to raised position. Does function stops when pilot shutoff lever is raised?	**YES:** Go to Pilot Control Valve Check. **NO:** Go to Control Valve Spool Stuck Check. – – –1/1
❷ **Control Valve Spool Stuck Check**	See Control Valve Disassemble and Assemble. (Group 3360.) Inspect control valve spool. Does control valve spool move freely?	**YES:** Diagnostic procedure complete. **NO:** Repair or replace control valve components as necessary. – – –1/1
❸ **Pilot Control Valve Check**	See Control Valve Operation. (Group 9025-05.) Inspect pilot control valve for sticking spool. Does pilot control valve spool move freely?	**YES:** Diagnostic procedure complete. **NO:** Inspect, repair or replace pilot control valve. See Pilot Control Valve Disassemble and Assemble. (Group 3360.) – – –1/1

Some Functions Cannot Be Operated, All Others Are Normal Diagnostic Procedure

– – –1/1

❹ **Boom Overload Relief Check**	Key on, use monitor service menu to display Pump 1 Delivery Pressure. See Monitor Service Menu Operation. (Group 9015-16.) Put boom mode switch in **on** position. Run engine at fast idle and lower boom to raise one track off ground. Record maximum pressure. Does delivery pressure stop at approximately 14.0 MPa?	**YES:** Diagnostic procedure complete. **NO:** Go to Boom Mode Switch Exchange Check. (Group 9025-15.) – – –1/1

❺ **Boom Mode Switch Exchange Check**	See System Functional Schematic. (Group 9015-10.) Swap boom mode switch S20 with engine fluid level check switch S21. Does machine now raise off ground?	**YES:** Replace boom mode selector switch. **NO:** Go to Continuity Check. – – –1/1

❻ **Continuity Check**	See System Functional Schematic. (Group 9015-10.) Disconnect boom mode switch and connector B in main controller. Check for continuity between terminal #9 harness end connector and terminal #2 of harness and end connector B at main controller. Is continuity measured?	**YES:** Diagnose problem in main controller. See Main Controller (MCF) Diagnostics Using Dr. ZX. (Group 9015-20.). **NO:** Open circuit in harness, replace or repair as required. – – –1/1

❼ **Circuit Relief Valve Check**	Key on, use monitor service menu to display Pump 1 or Pump 2 Delivery Pressure. See Monitor Service Menu Operation. (Group 9015-16.) Put power mode switch on HP and work mode on digging. Run engine at fast idle and operate each digging function over relief. Record pressure. Do all circuit relief valve above 30.4 MPa?	**YES:** Diagnostic procedure complete. **NO:** Adjust or repair circuit relief. Perform Circuit Relief Valve Test and Adjustment. (Group 9025-25.) – – –1/1

Load Falls When Control Valve Is Actuated To Raise Load With Engine Running At Slow Idle Diagnostic Procedure

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❺ **Flow Rate Pilot Valve Check**	See Pilot Signal Manifold Operation. (Group 9025-05.) Inspect pump 1 or pump 2 flow rate pilot valves. Do flow rate pilot valve spools move freely?	**YES:** Go to Pump 2 Flow Check. **NO:** Repair or replace pilot signal manifold flow rate pilot valve spool. See Pilot Signal Manifold Disassemble and Assemble. (Group 3360.) – – –1/1

❻ **Pump 2 Flow Check**	Perform Cycle Times Check. (Group 9005-10.) Check travel cycle times. Slow travel cycle times may indicate worn pump. If travel cycle times do not meet specification, check pump flow. Perform Pump Flow Test. (Group 9025-25.) Do travel cycle times and pump flow meet specification?	**YES:** Diagnostic procedure complete. **NO:** Repair or replace pump. See Pump Remove and Install. (Group 3360.) – – –1/1

Swing Speed Slow or Does Not Operate In One Direction Diagnostic Procedure

IMPORTANT: If dig and travel functions normally, the pilot pump is considered to be ok. If all functions are slow, perform All Hydraulic Functions Slow Diagnostic Procedure first. (Group 9025-15.)

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❶ **Actuating Pilot Pressure Check**	Key on, use monitor service menu to display Swing / Attachment Control Pilot Pressure. See Monitor Service Menu Operation. (Group 9015-16.) *NOTE: Spool actuating pressure can be checked for each function by installing a tee and gauge in pilot line and then actuating that function. Perform Control Valve Spool Actuating Pilot Pressure Test. (Group 9025-25.)* Run engine at fast idle and operate problem function. Observe pressure when function held over relief. Is pilot pressure above 3.70 MPa?	**YES:** Go to Park Brake Release Pressure Check. (Group 9025-15.) **NO:** Go to Pilot Valve Check. – – –1/1

❸ **Circuit Relief Valve Check**	Key on, use monitor service menu to display Pump 1 or Pump 2 Delivery Pressure. See Monitor Service Menu Operation. (Group 9015-16.) Put power mode switch on HP and work mode on digging. Run engine at fast idle and operate each travel function over relief. Record pressure. Do all circuit relief valve above 30.4 MPa?	**YES:** Go to Hose Swap Check. **NO:** Go to Travel Relief Swap. – – –1/1

❹ **Travel Relief Swap**	Swap travel forward and reverse circuit reliefs and check if symptom changes. Does symptom move to other track?	**YES:** Repair seal in rotary manifold. **NO:** Replace circuit relief that can not be adjusted to specifications. Perform Circuit Relief Valve Test and Adjustment. (Group 9025-25.) – – –1/1

❹ **Servo Piston Shuttle Valve Check**	See Park Brake Valve Housing Disassemble and Assemble. (Group 0260. Inspect servo piston shuttle valve. Does shuttle valve operate correctly?	**YES:** Go to Travel Motor Leakage Check. **NO:** Repair or replace motor swash plate angle control. See Travel Motor Cover Disassemble and Assemble. (0260.) – – –1/1
❺ **Travel Motor Leakage Check**	Check tracking while descending a hill. Perform Travel System Tracking Check. (Group 9005-10.) If tracking does not meet specification, check travel motor leakage. Perform Travel Motor Leakage Test. (Group 9025-25.) If tracking is within specification when descending a hill, but not when on the level or going up hill, travel motor leakage is indicated. Does tracking and motor leakage meet specification?	**YES:** Go to Rotary Manifold Leakage Check. **NO:** If travel motor leakage does not meet specification, repair or replace travel motor. See Travel Motor and Park Brake Disassemble and Assemble. (Group 0260.) – – –1/1
❻ **Rotary Manifold Leakage Check**	Perform Rotary Manifold Air Test. (Group 0260.) Inspect rotary manifold for leakage. Is rotary manifold OK?	**YES:** Go to Pump 1 or Pump 2 Regulator Check. **NO:** Repair or replace rotary manifold. See Rotary Manifold Disassemble and Assemble. (Group 0260.) – – –1/1
❼ **Pump 1 or Pump 2 Regulator Check**	Perform Pump Regulator Test and Adjustment—Minimum Flow. (Group 9025-25.) Perform Pump Regulator Test and Adjustment—Maximum Flow. (Group 9025-25.) Test pump 1 or pump 2 regulators. Does pump 1 or pump 2 regulator meet specification?	**YES:** Diagnostic procedure complete. **NO:** Repair or replace pump 1 or pump 2 regulator. See Pump Regulator Disassemble and Assemble. (Group 3360.) – – –1/1

❽ **Grease Pump Check**	Inspect grease pump. Is grease pump operating?	**YES:** Check the following items in this order: No grease, refill grease cartridge. Repair damaged piping between pump and distribution valve. Replace distribution valve. **NO:** Go to Grease Pump Harness Check. – – –1/1

❾ **Grease Pump Harness Check**	See System Functional Schematic, Wiring Diagram, and Component Location Master Legend. (Group 9015-10.) Disconnect harness connector at pump and check voltage on terminal #2. Turn key and auto lubrication switch on. Does harness terminal #2 measure 24 V?	**YES:** Go to Proximity Switch Harness Check **NO:** Repair or replace open wire in harness between relay K11 and pump. – – –1/1

❿ **Proximity Switch Harness Check**	See System Functional Schematic, Wiring Diagram, and Component Location Master Legend. (Group 9015-10.) Remove harness from proximity switch. Turn key and auto lubrication switch on. Measure voltage at switch end connector terminal #3. Does terminal # 3 measure 24 V?	**YES:** Replace proximity switch or repair open circuit in harness between switch and ground. **NO:** Repair open circuit in harness between relay K11 and proximity switch. – – –1/1

Auto Lubrication Does Not Stop Diagnostic Procedure

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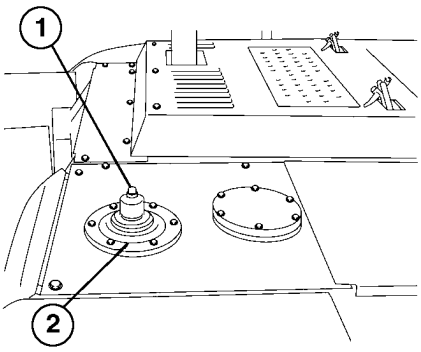
CAUTION: High pressure release of oil from pressurized system can cause serious burns or penetrating injury. Relieve pressure by pushing pressure release button.

5. Push pressure release button (1).

1—Pressure Release Button
2—Hydraulic Oil Tank Cover



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1—Bucket Cylinder
2—Arm Cylinder
3—Boom Cylinder (2 used)
4—Left Control Valve (5-spool)
5—Right Control Valve (4-spool)
6—Center Joint
7—Swing Motor and Gearbox (2 used)
8—Hydraulic Oil Cooler
9—Pump 1
10—Pilot Pump
11—Pump 2
12—Fan Drive Pump
13—Pilot Pressure Regulating Valve
14—Hydraulic Oil Tank

OUT3035,000002E –19–07JUN06–2/2

Counterweight Removal Hydraulic System Component Location

Information not available at the time of release.

OUT3035,000002F –19–28APR06–1/1

Counterweight Removal Hydraulic System Line Connections

Information not available at the time of release.

OUT3035,0000030 –19–28APR06–1/1

15—Pump 1
16—Pump 2
17—Pump 1 Regulator
18—Pump 2 Regulator
19—Servo Piston
20—Load Sleeve
21—Load Spool
22—Feedback Link
23—Check Valve
24—Check Valve
25—Pilot Piston
26—Charge Pump
27—Pilot Pump
28—Fan Drive Pump
29—Fan Drive Pump Regulator
30—Servo Piston
31—Feedback Link
32—Load Sleeve
33—Load Piston
34—Pilot Piston
35—Compensating Piston
36—To Fan Drive Motor
42—Attenuator Hose
46—To Pump Case Drain Filter and Bypass Valve
47—From Hydraulic Oil Tank
51—Pilot Filter and Pressure Regulating Valve
52—Pilot Filter Element
53—Pilot Filter Bypass Valve
54—Pilot Pressure Regulating Valve
55—To Solenoid Valve Manifold
82—To Pilot Check Valve Manifold
83—To Right Control Valve
84—To Left Control Valve
175—Engine
B35—Pump 1 (4-Spool) Delivery Pressure Sensor (4P)
B36—Pump 1 (4-Spool) Control Pressure Sensor (4P)
B37—Pump 2 (5-Spool) Delivery Pressure Sensor (5P)
B38—Pump 2 (5-Spool) Control Pressure Sensor (5P)
Y12—Pump 1 (4-Spool) Control Solenoid Valve (4P)
Y13—Pump 2 (5-Spool) Control Solenoid Valve (5P)
180—Supply Oil
182—Pilot Oil
184—Return or Pressure-Free Oil

Continued on next page

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Hydraulic Oil Cleanup Procedure Using Portable Filter Caddy

SPECIFICATIONS	
Hydraulic Oil Tank Capacity	321 L approximate 85 gal approximate
Hydraulic Oil Tank Filtering Time	30 minutes approximate
Hydraulic System Capacity	560 L approximate 148 gal approximate
Hydraulic System Filtering Time	90 minutes approximate

SERVICE EQUIPMENT AND TOOLS
JDG1724A Super Caddy
JT05679 Hose 3.7 m (12 ft) x 3/4 in. ID 100R1 Hose with 3/4 M NPT Ends (2 used)
JTO5751A Suction Wand
JTO5750A Discharge Wand

1. Install new return filter elements.

NOTE: For a failure that creates a lot of debris, remove access cover from hydraulic tank. Drain hydraulic tank. Connect filter caddy suction line to drain port. Add a minimum of 19 L (5 gal) of oil to reservoir. Operate filter caddy and wash out the hydraulic tank.

IMPORTANT: The minimum ID for a connector is 13 mm (1/2 in.) to prevent cavitation of filter caddy pump.

2. Put filter caddy suction and discharge wands into hydraulic tank filler hole so ends are as far apart as possible to obtain a thorough cleaning of oil.

3. Start the filter caddy. Check to be sure oil is flowing through the filters.

   Operate filter caddy until all the oil in hydraulic tank has been circulated through the filter a minimum of four times.

Specification

Hydraulic Oil Tank—Capacity ..... 321 L approximate
85 gal approximate
Hydraulic Oil Tank—Filtering Time ..... 30 minutes approximate

NOTE: Filtering time for hydraulic tank is 0.089 minute x number of liters (0.33 minutes x number of gallons).

4. Leave filter caddy operating for the next step.

5. Start the engine and run it at fast idle.

IMPORTANT: For the most effective results, cleaning procedure must start with the smallest capacity circuit then proceed to the next larger capacity circuit.

6. Starting with the smallest capacity circuit, operate each function through a complete cycle.

   Repeat procedure until the total system capacity has circulated through filter caddy seven times. Each function must go through a minimum of three complete cycles for a thorough cleaning of oil.

Specification

Hydraulic System—Capacity ..... 560 L approximate
148 gal approximate
Hydraulic System—Filtering Time ..... 90 minutes approximate

NOTE: Filtering time for complete hydraulic system is 0.158 minute x number of liters (0.6 minute x number of gallons). Filtering time for machines with auxiliary hydraulic functions must be increased because system capacity is larger.

7. Stop the engine. Remove the filter caddy.

8. Install new return filter elements.

9. Check hydraulic oil level. See Check Hydraulic Oil Level. (Operator's Manual.)

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TX04577,00000E3 –19–26APR06–1/1

NOTE: Spool actuating pressure can be checked for each function by installing a tee and gauge in pilot line and then actuating that function.

Spool actuating pressure for boom up, arm in, left and right swing, and all travel functions can also be measured with the monitor.

2. Heat hydraulic oil to specification. See Hydraulic Oil Warm-Up Procedure. (Group 9025-25.)

3. Run machine at specifications.

Specification	
Hydraulic Oil—Temperature	45—55°C 110—130°F
Engine—Speed	Slow Idle and Fast Idle
Work Mode Switch—Position	Dig Mode
Power Mode Switch—Position	P (Standard) Mode
Auto Idle Switch—Position	Off
Travel Speed Switch—Position	Fast Speed (Rabbit)

4. Actuate the function control lever to full stroke at slow idle.

5. Record pressure.

6. Compare pressure to specifications.

Specification	
Minimum Valve Spool Actuating— Pressure	3.33 MPa 3334 kPa 33.3 bar 483 psi

If valve spool actuating pressure is not to specification check pilot system pressure. See Pilot Pressure Regulating Valve Test and Adjustment. (Group 9025-25.)

If pilot system pressure is to specification then check pressure at the solenoid valve manifold, pilot control shutoff valve, pilot controllers, and pilot signal manifold.

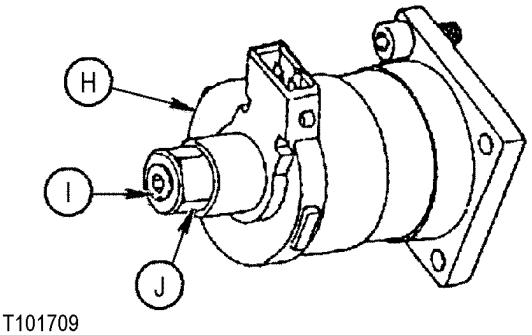
9. Adjust the solenoid valve (H) as needed.

IMPORTANT: Turning adjusting screw out too far may cause oil leakage because the O-ring has come off its seat.

a. Loosen nut (J).

b. Turn adjusting screw (I) in to increase pressure setting; turn adjusting screw out to decrease pressure setting. The length from end of adjusting screw to nut must not exceed the specified length.

Specification	
Solenoid Valve Adjusting Screw—	
Pressure Change	0.069 MPa approximate per 1/4 turn
	69 kPa approximate per 1/4 turn
	0.69 bar approximate per 1/4 turn
	10 psi approximate per 1/4 turn
End of Adjusting Screw-to-Nut—	
Length	2 mm maximum
	0.079 in. maximum



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H—Solenoid Valve
I—Adjusting Screw
J—Nut

c. Hold adjusting screw and tighten nut.

Specification	
Solenoid Valve Adjusting Screw-to-Housing Nut—Torque	3.0 N•m
	27 lb-in.

10. Check the pressure setting again.

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LD30992,00002B2 –19–05JUN06–5/5

1. Connect one of the following test equipment to perform test:

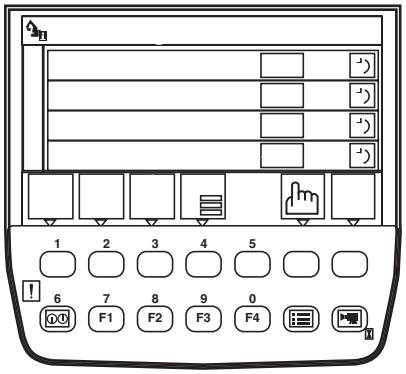
   1. SERVICE ADVISOR™ application. See SERVICE ADVISOR Connection Procedure for instruction. (Group 9015-20.)
      Access Main Relief and Power Digging Valve Test.
      Or select the following items from the menu:
      - Pump 1 Delivery Pressure
      - Pump 2 Delivery Pressure
      - Hydraulic Oil Temperature
      - Actual Engine Speed

   2. See Personal Digital Assistant (PDA) Connection To Excavator Using Dr. ZX Application for instruction. (Group 9015-20.)
      Select the following items from the Monitor Display:
      - Pump 1 Delivery Pressure
      - Pump 2 Delivery Pressure
      - Hydraulic Oil Temperature
      - Actual Engine Speed

   3. See Monitor Service Menu Operation for instruction to actuate the service menu on monitor in cab. (Group 9015-20.)
      Select the following items from Monitoring list:
      - Pump 1 Delivery Pressure
      - Pump 2 Delivery Pressure
      - Hydraulic Oil Temperature
      - Actual Engine Speed

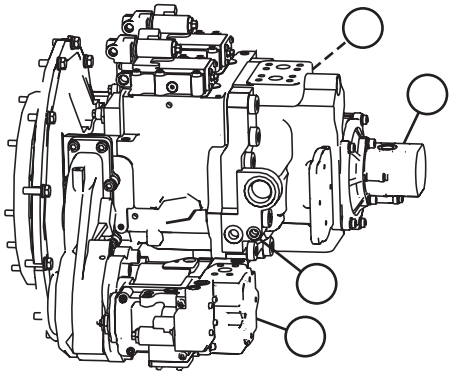
   4. Connected a gauge to test port in pump 1 and/or pump 2.
      Push the pressure release button on top of hydraulic oil tank to relieve pressure before removing plug from test port.
      Install the 4200465 Adapter (A).
      Connect the JT02156A Digital Pressure/Temperature Analyzer and JT02160 Transducer or a 70 000 kPa (700 bar) (10,000 psi) gauge. See JT02156A Digital Pressure/Temperature Analyzer Installation for instruction.

2. Heat hydraulic oil to specification. See Hydraulic Oil Warm-Up Procedure. (Group 9025-25.)



Monitor Display

TX1003295 –19–03MAR06



Pump 1 and 2 Test Ports

TX1003196 –UN–01FEB06

15—Pump 1 Test Port
16—Pump 2 Test Port
27—Pilot Pump
28—Fan Drive Pump

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LD30992,0000280 –19–05JUN06–2/6

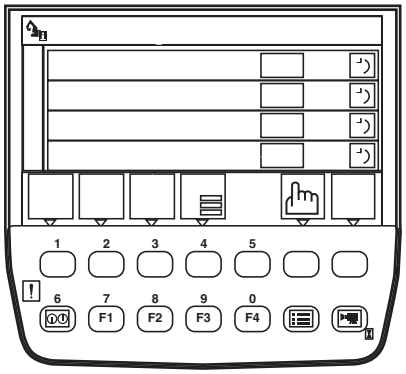
1. Connect one of the following test equipment to perform test:

   1. SERVICE ADVISOR™ application. See SERVICE ADVISOR Connection Procedure for instruction. (Group 9015-20.)
      Access Boom Mode Circuit Relief Valve Test.
      Or select the following items from the menu:
      - Pump 1 Delivery Pressure
      - Pump 2 Delivery Pressure
      - Hydraulic Oil Temperature
      - Actual Engine Speed
      - Boom Mode Switch

   2. See Personal Digital Assistant (PDA) Connection To Excavator Using Dr. ZX Application for instruction. (Group 9015-20.)
      Select the following items from the Monitor Display:
      - Pump 1 Delivery Pressure
      - Pump 2 Delivery Pressure
      - Hydraulic Oil Temperature
      - Actual Engine Speed

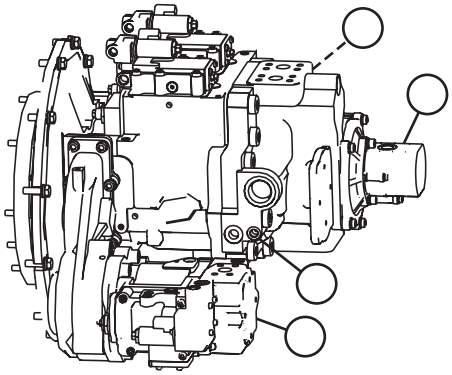
   3. See Monitor Service Menu Operation for instruction to actuate the service menu on monitor in cab. (Group 9015-20.)
      Select the following items from Monitoring list:
      - Pump 1 Delivery Pressure
      - Pump 2 Delivery Pressure
      - Hydraulic Oil Temperature
      - Actual Engine Speed

   4. Connect a gauge to test port in pump 1 and/or pump 2.
      Push the pressure release button on top of hydraulic oil tank to relieve pressure before removing plug from test port.
      Install the 4200465 Adapter (A).
      Connect the JT02156A Digital Pressure/Temperature Analyzer and JT02160 Transducer or a 70 000 kPa (700 bar) (10,000 psi) gauge. See JT02156A Digital Pressure/Temperature Analyzer Installation for instruction. (Group 9025-25.)



Monitor Display

TX1003295 –19–03MAR06



Pump 1 and 2 Test Ports

TX1003196 –UN–01FEB06

15—Pump 1 Test Port
16—Pump 2 Test Port
27—Pilot Pump
28—Fan Drive Pump

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1. SERVICE ADVISOR™ application. See SERVICE ADVISOR Connection Procedure for instruction. (Group 9015-20.)
   Access Swing Motor Crossover Relief Valve Test.
   Or select the following items from the menu:
   - Pump 1 Delivery Pressure
   - Pump 2 Delivery Pressure
   - Hydraulic Oil Temperature
   - Actual Engine Speed

2. See Personal Digital Assistant (PDA) Connection To Excavator Using Dr. ZX Application for instruction. (Group 9015-20.)
   Select the following items from the Monitor Display:
   - Pump 1 Delivery Pressure
   - Pump 2 Delivery Pressure
   - Hydraulic Oil Temperature
   - Actual Engine Speed

3. See Monitor Service Menu Operation for instruction to actuate the service menu on monitor in cab. (Group 9015-16.)
   Select the following items from Monitoring list:
   - Pump 1 Delivery Pressure
   - Pump 2 Delivery Pressure
   - Hydraulic Oil Temperature
   - Actual Engine Speed

   Push the pressure release button on top of the hydraulic oil tank to relieve pressure.

   Install 4200465 adapter into test port (1) on pump two.

   Connect the JT02156A Digital Pressure/Temperature Analyzer and JT02160 Transducer or a 70 000 kPa (700 bar) (10,000 psi) gauge. See JT02156A Digital Pressure/Temperature Analyzer Installation for instruction.

2. Warm hydraulic oil to specification. See Hydraulic Oil Warm-Up Procedure. (Group 9025-25.)

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6. **To check left side swing motor:**

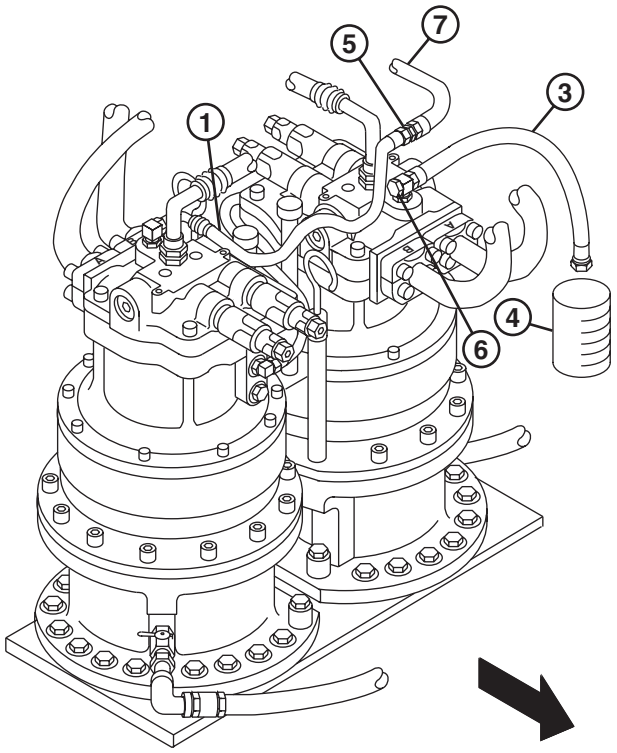
   a. Disconnect drain lines (1 and 7) from tee fitting and connect them using JT03037 (3/4-16 M 37° x 3/4-16 M 37°) (Parker No. 0303-8-8) union (5). Install JT03025 (3/4-16 M 37°) (Parker No. 06CP-8) cap (6) on tee.

   b. Connect test hose (3) to tee fitting. Put other end in calibrated container (4).

CAUTION: Move machine to an area with a level surface and enough room to swing the upperstructure. Clear area of all bystanders before performing test to avoid personnel injury.

7. Actuate swing function for one minute. Compare amount of leakage to specified amount. Repeat for swing in opposite direction.

1—Drain Line
3—Test Hose
4—Calibrated Container
5—Union
6—Cap
7—Drain Line



Left Side Swing Motor Leakage Check Lines

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13. Slowly close the loading valve on flowmeter to obtain the specified pressures. Record flow rate at each pressure.

Specification	
Pump 1 or Pump 2—Flow Rate—New	360.0 L/min at 13.8 MPa and 1850 rpm 360.0 L/min at 13 790 kPa and 1850 rpm 360.0 L/min at 137.9 bar and 1850 rpm 95.1 gpm at 2000 psi and 1850 rpm
Pump 1 or Pump 2—Flow Rate—New	348.6 L/min at 20.7 MPa and 1850 rpm 348.6 L/min at 20 685 kPa and 1850 rpm 348.6 L/min at 206.8 bar and 1850 rpm 92.1 gpm at 3000 psi and 1850 rpm
Pump 1 or Pump 2—Flow Rate—Minimum Allowable	305.9 L/min at 13.8 MPa and 1850 rpm 305.9 L/min at 13 790 kPa and 1850 rpm 305.9 L/min at 137.9 bar and 1850 rpm 80.8 gpm at 2000 psi and 1850 rpm
Pump 1 or Pump 2—Flow Rate—Minimum Allowable	294.5 L/min at 20.7 MPa and 1850 rpm 294.5 L/min at 20 685 kPa and 1850 rpm 294.5 L/min at 206.8 bar and 1850 rpm 77.8 gpm at 3000 psi and 1850 rpm

14. Open loading valve. Stop the engine.

    Pump flow rate can be increased some by adjusting the pump servo piston maximum flow adjusting screw. See Pump Servo Piston Maximum Flow Test and Adjustment. (Group 9025-25.)

SPECIFICATIONS	
Fan Drive Pump Flow Rate—Minimum Allowable	48.4 L/min at 23.3 MPa and 1750 rpm 48.4 L/min at 23 305 kPa and 1750 rpm 48.4 L/min at 233.1 bar and 1750 rpm 12.8 gpm at 3380 psi and 1750 rpm
Fan Drive Pump Flow Rate—Minimum Allowable	42.8 L/min at 26.3 MPa and 1750 rpm 42.8 L/min at 26 270 kPa and 1750 rpm 42.8 L/min at 262.7 bar and 1750 rpm 11.3 gpm at 3810 psi and 1750 rpm

SERVICE EQUIPMENT AND TOOLS
Flowmeter, 380 L/min (100 gpm)
JT03452 Split Flange Connector Plate Kit
-12 Hose with -12 Split Flange Connector, Code 62

The purpose of test is to check the condition of fan drive pump.

1. Release pressure from hydraulic oil tank by pushing pressure release button on top of hydraulic oil tank.

2. Connect a vacuum pump to hydraulic oil tank to minimize oil loss.

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Diagnose Air Conditioning System Malfunctions

NOTE: Diagnostic charts are arranged from most probable and simplest to verify, to least likely more difficult to verify.

NOTE: Prior to diagnosis and component tests Perform Heating and Air Conditioning System Checks. (Group 9031-25.) These conditions may affect diagnostic and test results.

Symptom	Problem	Solution
Air Conditioning System Does Not Operate	Air conditioner and heater 5 amp fuse (F17)	Replace fuse. See Fuse and Relay Specifications. (Group 9015-10.)
	Air conditioner and heater 20 amp fuse (F3)	Replace fuse. See Fuse and Relay Specifications. (Group 9015-10.)
	Fan motor malfunction or operating too slow	Check fan motor resistor. See Air Conditioner Harness (W6) Wiring Diagram. (Group 9015-10.)
		Check fan motor for obstructions. See Heater and Air Conditioner Component Location. (Group 9031-15.)
		Check fan motor. See Air Conditioner Harness (W6) Wiring Diagram. (Group 9015-10.)
	Air conditioner high/low pressure switch malfunction	Check wiring. See Air Conditioner Harness (W6) Wiring Diagram. (Group 9015-10.)

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Refrigerant Cautions and Proper Handling

CAUTION: DO NOT allow liquid refrigerant to contact eyes or skin. Liquid refrigerant will freeze eyes or skin on contact. Wear goggles, gloves and protective clothing.

If liquid refrigerant contacts eyes or skin, DO NOT rub the area. Splash large amounts of COOL water on affected area. Go to a physician or hospital immediately for treatment.

DO NOT allow refrigerant to contact open flames or very hot surfaces such as electric welding arc, electric heating element and lighted smoking materials.

DO NOT heat refrigerant over 52°C (125°F) in a closed container. Heated refrigerant will develop high pressure, which can burst the container.

Keep refrigerant containers away from heat sources. Store refrigerant in a cool place.

DO NOT handle damp refrigerant container with your bare hands. Skin may freeze to container. Wear gloves.

If skin freezes to container, pour COOL water over container to free the skin. Go to a physician or hospital immediately for treatment.

IMPORTANT: To meet government standards relating to the use of refrigerants, R134a is used in the air conditioning system. Because it does not contain chlorine, R134a is not detrimental to the ozone in the atmosphere. However, it is illegal to discharge any refrigerant into the atmosphere. It must be recovered using the appropriate recovery stations.

Use correct refrigerant recovery, recycling and charging stations. Never mix refrigerants, hoses, fittings, components or refrigerant oils.

Use only John Deere approved R134a refrigerant products. Mixing of products not compatible will cause system damage and contaminate recovery, recycling and charging station equipment. Care must be taken to identify and use equipment, refrigerant oil and refrigerant designed only for R134a refrigerant systems. Refrigerant should be tested for type and purity before recovery, recycling or charging of system. JT02167A refrigerant test instrument should be used before any testing or repair to system is performed.

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Terminology Cross Reference Chart

Terminology Cross Reference Chart	
John Deere Service Information Term	**Alternate Term Used**
Air Filter Restriction Switch	Air Cleaner Restriction Switch
Ambient Air Temperature Sensor	Outdoor Ambient Temperature Sensor
Arm In Circuit Relief and Anticavitation Valve	Overload Relief Valve with Make-Up Function (Arm: Bottom Side)
Arm Out Circuit Relief and Anticavitation Valve	Overload Relief Valve with Make-Up Function (Arm: Rod Side)
Attenuator Hose	Tail Hose
Boom Down Circuit Relief and Anticavitation Valve	Overload Relief Valve with Make-Up Function (Boom: Rod Side)
Boom Down Shockless Valve	Shockless Valve
Boom Up Circuit Relief and Anticavitation Valve	Overload Relief Valve with Make-Up Function (Boom: Bottom Side)
Boom Up Pressure Sensor	Boom Raise Pressure Sensor
Bucket Curl Circuit Relief and Anticavitation Valve	Overload Relief Valve with Make-Up Function (Bucket: Bottom Side)
Bucket Dump Circuit Relief and Anticavitation Valve	Overload Relief Valve with Make-Up Function (Bucket: Rod Side)
Cab Air Temperature Sensor	In Cab Ambient Temperature Sensor
Center Joint	Rotary Manifold
Check Valve (lift check)	Load Check Valve
Diagnostic Trouble Codes	Error Codes, Fault Codes, Failure Codes
Engine Control Unit (ECU)	Engine Control Module (ECM)
Engine Speed Dial	Engine Control Dial or Engine RPM Dial
Front Attachment Pressure Sensor	Dig and Swing Pressure Sensor
Hydraulic Pumps (pump 1, pump 2, pilot pump)	Pump Device
Information Controller (ICF)	ICX or ICF
Intercooler	Charge Air Cooler
Light	Lamp
Main Controller (MCF)	MC, MCX
Main Relief and Power Digging Valve	Main Relief Valve, System Relief Valve
Pilot Control Lever, Right/Left	Control Lever, Right/Left
Pilot Shutoff Lever	Pilot Control Shut-Off Lever
Pilot Pressure Regulating Valve	Relief Valve, Pilot Relief Valve
Pilot Shutoff Solenoid Valve	Pilot Shut-off Valve
Pilot Signal Manifold	Power Boost Switch, Signal Control Valve
Power Dig Switch	Power Digging Switch
Pump 2 Flow Rate Limit Solenoid Valve	Maximum Pump 2 Flow Rate Control Solenoid
Solar Sensor	Solar Radiation Sensor
Solenoid Valve Manifold	4-Spool Solenoid Valve Unit
Starter Relay	Starter Cut Relay
Swing Gearbox and Swing Motor	Swing Device, Swing Reduction Gear
Swing Motor Make-Up Check Valve	Make-Up Valve (Swing Device)
Switch Panel	Switch Box

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