850DLC Excavator Operation and Tests

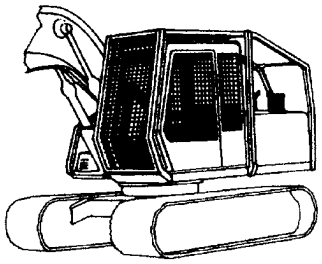
TECHNICAL MANUAL
850DLC Excavator Operation and Test

TM10009 06SEP07 (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

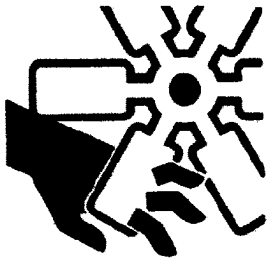
T6607AQ –UN–18OCT88

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

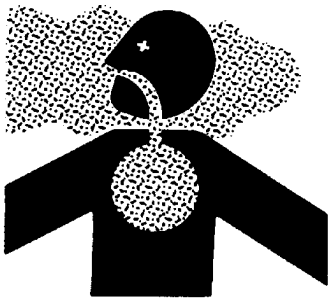
Entanglements in moving parts can cause serious injury.

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

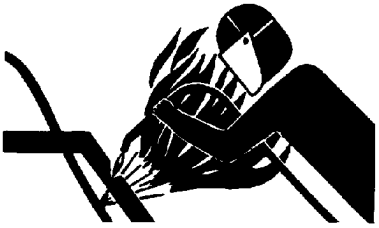
Hazardous fumes can be generated when paint is heated by welding or using a torch. Dust from sanding or grinding paint can also be hazardous.

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 –19–08MAY07–1/1

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

LD30992,0000375 –19–02MAY07–1/1

Controller Hardware Diagnostics

– – –1/1

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

LD30992,000037E –19–02MAY07–1/1

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

LD30992,0000383 –19–02MAY07–1/1

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

LD30992,000038B –19–02MAY07–1/1

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.

– – –1/1

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.

LD30992,000039B –19–02MAY07–1/1

11977.04 — Auxiliary Valve 1 Feedback Current Low

Diagnostic Trouble Code Not Applicable to This Machine.

LD30992,000039C –19–02MAY07–1/1

11980.03 — ATT Relief Change Valve Feedback Current High

Diagnostic Trouble Code Not Applicable to This Machine.

LD30992,000039D –19–02MAY07–1/1

11980.04 — ATT Relief Change Valve Feedback Current Low

Diagnostic Trouble Code Not Applicable to This Machine.

LD30992,000039E –19–02MAY07–1/1

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

LD30992,00003A7 –19–02MAY07–1/1

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.)

LD30992,00003D3 –19–02MAY07–1/1

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.)

LD30992,00003D4 –19–02MAY07–1/1

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.)

LD30992,00003D5 –19–02MAY07–1/1

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.)

LD30992,00003D6 –19–02MAY07–1/1

14100.02 — Satellite Communication Terminal: Abnormal EEPROM

NOT APPLICABLE TO THIS MACHINE

LD30992,0000400 –19–02MAY07–1/1

14101.02 — Satellite Communication Terminal: Abnormal IB/OB Queue

NOT APPLICABLE TO THIS MACHINE

LD30992,0000401 –19–02MAY07–1/1

14102.02 — Satellite Communication Terminal: Abnormal Local Loop Back

NOT APPLICABLE TO THIS MACHINE

LD30992,0000402 –19–02MAY07–1/1

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

NOT APPLICABLE TO THIS MACHINE

LD30992,0000403 –19–02MAY07–1/1

E43 — Abnormal Damper

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

LD30992,000048A –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.

LD30992,000048B –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).

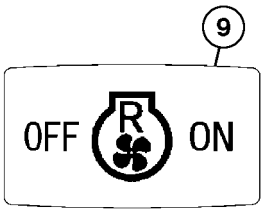
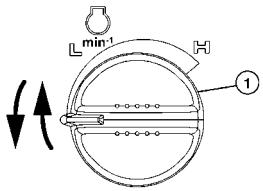
MD46667,00000A5 –19–10NOV06–1/1

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.

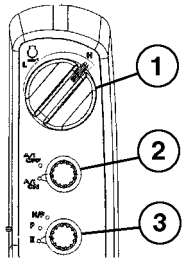
– – –1/1

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.) – – –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..... 7.93—8.60 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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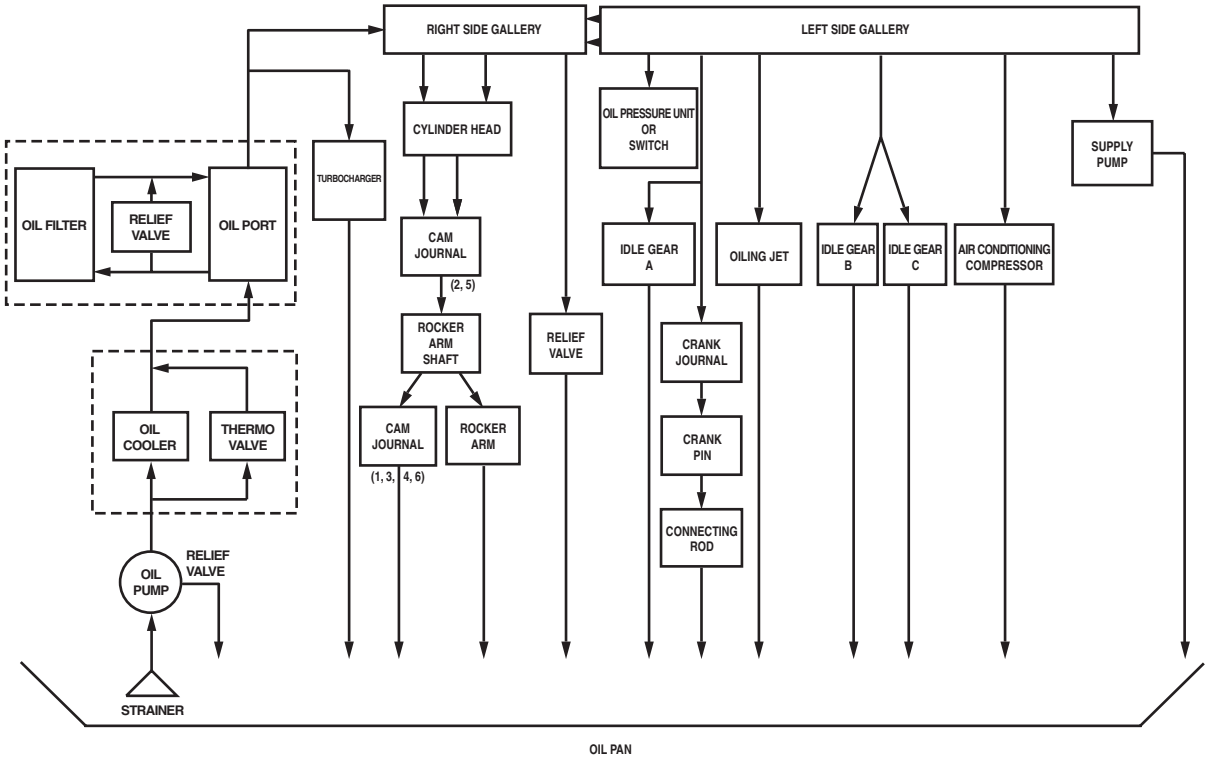
Section 9010
Engine

Contents

Continued on next page

Engine Lubrication System Operation



TX1001650 –19–22DEC05

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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 850DLC		
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

AH91621,0000297 –19–31JAN06–1/4

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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. – – –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

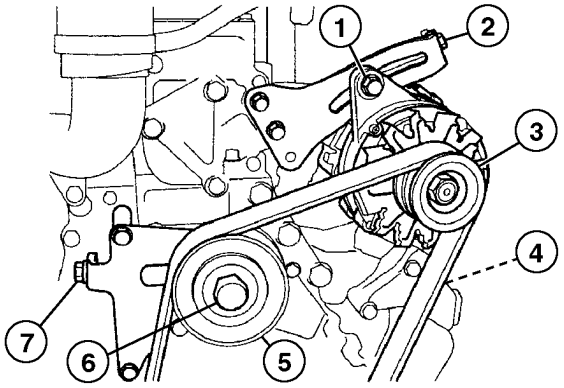
MS12501,000002F –19–24APR06–1/2

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.

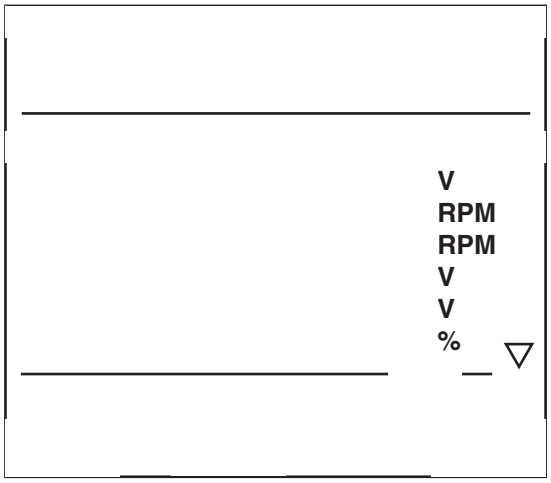
TX1006104 –19–07APR06

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

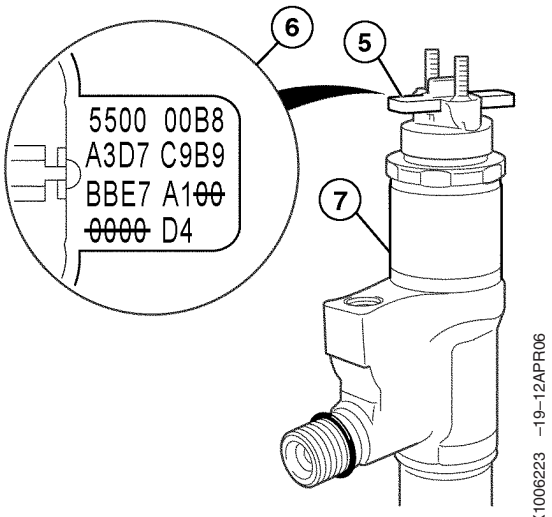
(Injector ID Code) Cylinder 1 - Cylinder 6 cylinder registration using Tech 2

"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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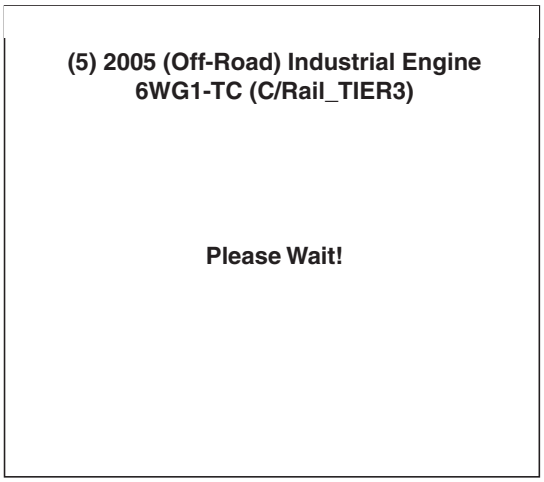
JC89288,00001AD –19–24APR06–8/18

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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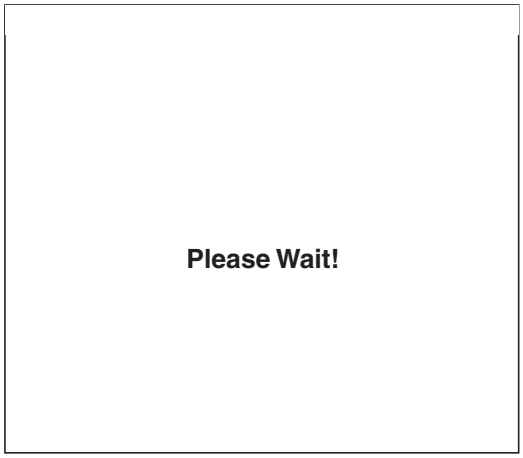
JC89288,00001AD –19–24APR06–9/18

2. Press the softkey Confirm.



TX1006469 –19–19APR06

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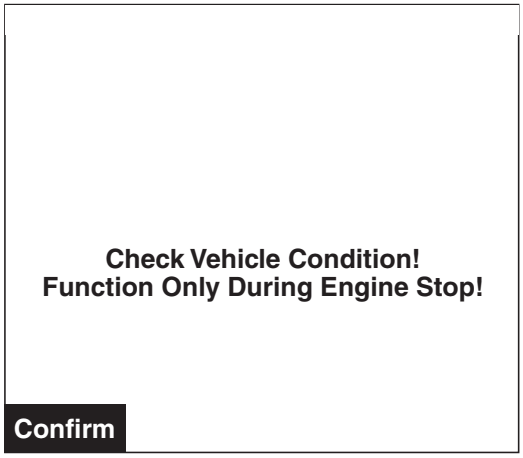
JC89288,00001AF –19–20APR06–3/10

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

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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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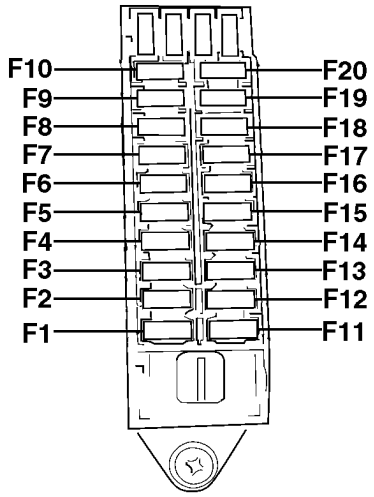
Continued on next page

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))



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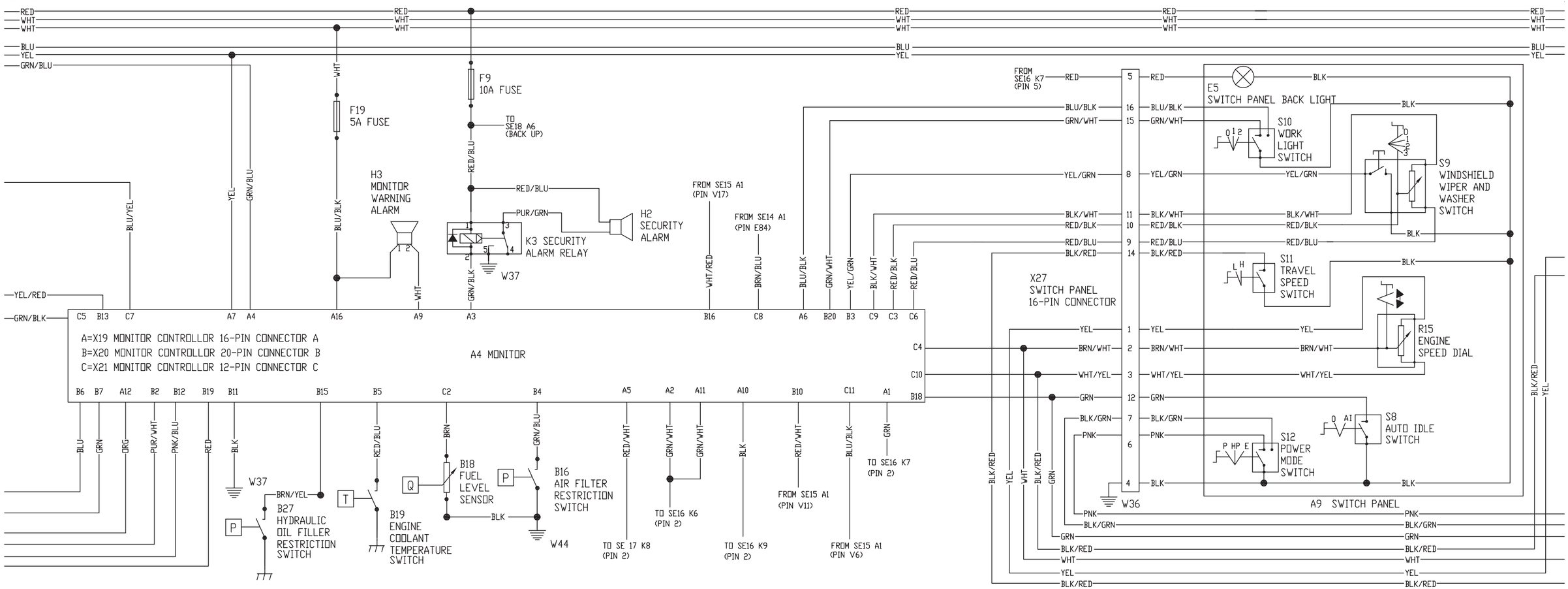
LD30992,000047F –19–31AUG07–2/4

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
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

LD30992,000045A –19–28APR06–2/2

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9015
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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

LD30992,0000460 –19–18APR06–2/2

9015
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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

LD30992,0000465 –19–20MAR06–2/2

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

LD30992,000046A –19–26APR06–2/2

9015
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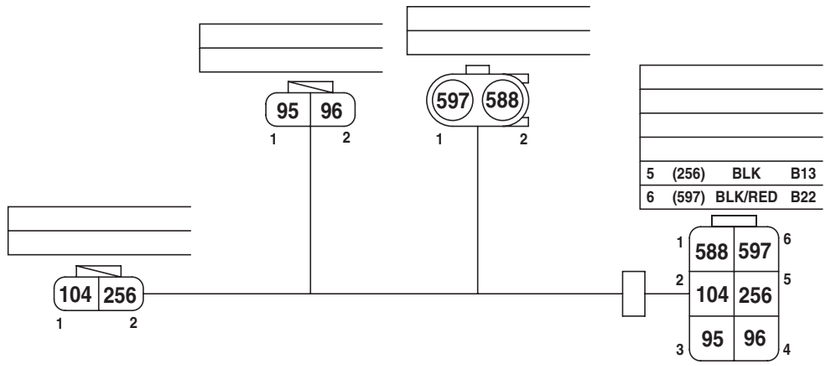
B13—Radiator Level Switch
B22—Ambient Air Temperature Sensor
X55—Machine Harness-to-Oil Cooler Harness Connector
Y9—Fan Reversing Solenoid 2

LD30992,000047C –19–26APR06–2/2

Oil Cooler Harness (W20) Wiring Diagram



NUMBER	COLOR	END #1	END #2
95	YEL	X55	Y9
96	YEL/BLK	X55	Y9
104	PNK/GRN	X55	B13
256	BLK	X55	B13
588	RED/WHT	X55	B22
597	BLK/RED	X55	B22

TX1003988 –UN–09MAR06

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Oil Cooler Harness (W20) Wiring Diagram

B13—Radiator Level Switch
B22—Ambient Air Temperature Sensor
X55—Machine Harness-to-Oil Cooler Harness Connector
Y9—Fan Reversing Solenoid 2

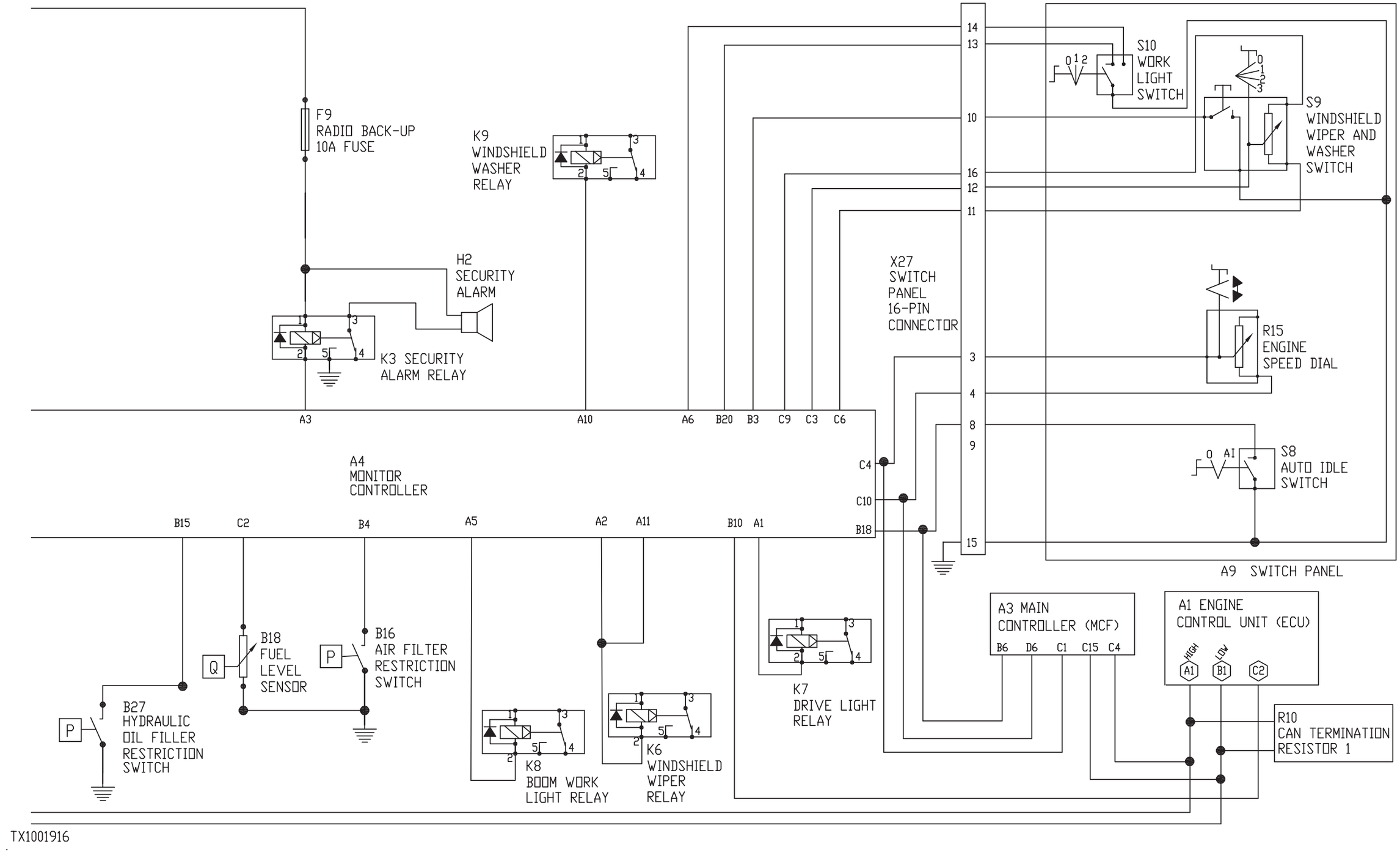
LD30992,000047D –19–20MAR06–1/1

F40—JDLink™ Unswitched Power 7 Amp Fuse
F41—JDLink™ Switched Power 3 Amp Fuse
F42—JDLink™ Alternator Run Signal 3 Amp Fuse
F43—JDLink™ Ground 7.5 Amp Fuse
K19—Battery Relay
X140—Power Harness-to-Machine Information Gateway (MIG) Harness 4-Pin Connector
X149—Power Harness-to-JDLink™ Jumper Harness Connector

JDLink is a trademark of Deere & Company

AA95137,0000C53 –19–31AUG07–2/2

TX1001916 –19–25JAN06



Monitor Controller (A4) Circuit (2 of 2)

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)

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.

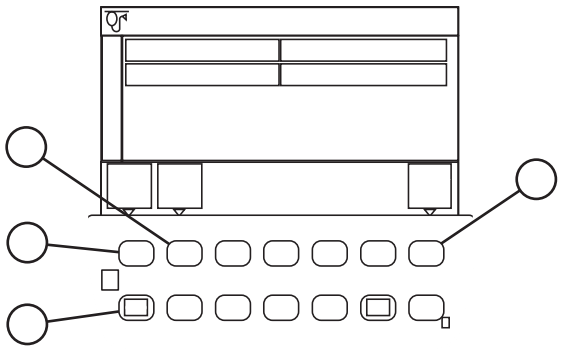
7. View the diagnostic trouble codes for the selected controller.

   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

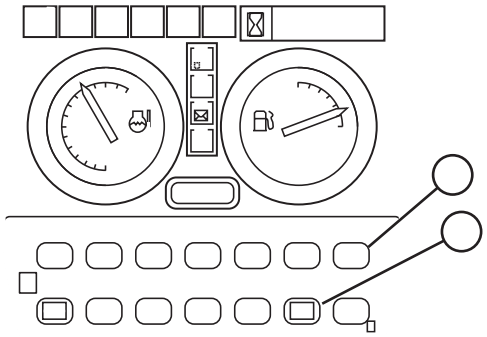
LD30992,0000218 –19–16MAR06–5/5

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

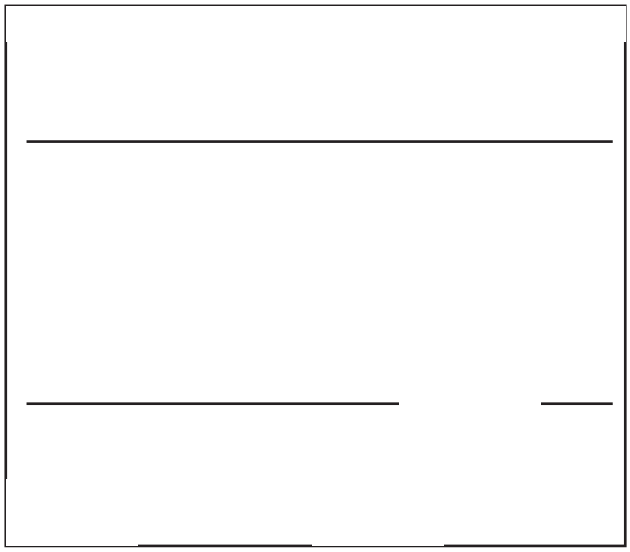
17. The following illustration shows the state in which the Tech 2 is waiting for communication with the machine controller. If **Confirm** is selected with the ignition key in the OFF position this display will stay forever.

TX1004459 –19–09MAR06

JC89288,00001A1 –19–21APR06–10/13

NOTE: If a mistake was made in the selection of the vehicle type, despite the fact that the communication is enabled, a message to that effect will appear, flashing. If this occurs, check the vehicle type again and redo the connection procedure.

18. Once communication is established, the display will show the **Part No.** and **Diagnostic Data Identification (DDI)** (which varies from system to system). Select **Confirm**.



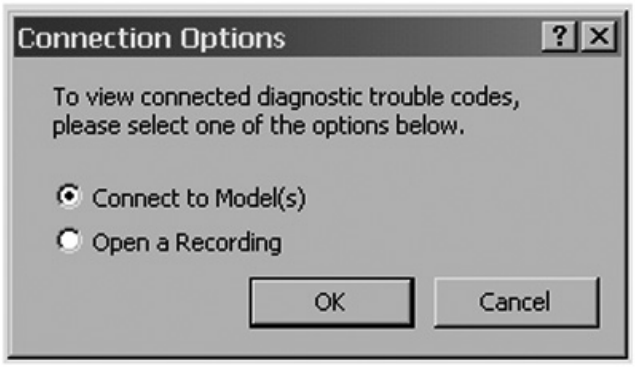
TX1004460 –19–09MAR06

System Information Screen

Continued on next page

JC89288,00001A1 –19–21APR06–11/13

5. Select the Connect to Model(s) radio button on the Connection Options dialog box, and click OK.



Connection Options Dialog Box

Continued on next page

LD30992,000021C –19–16MAR06–2/3

9015
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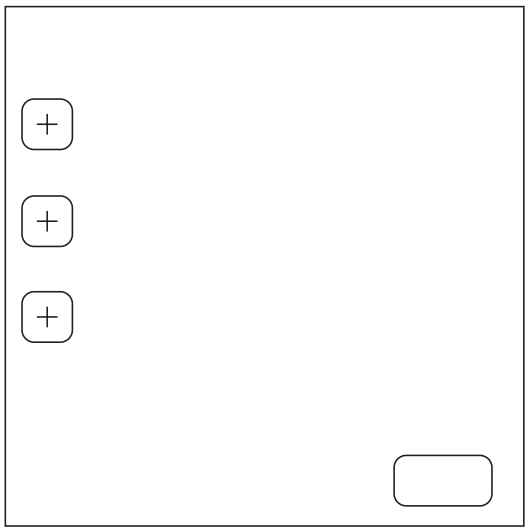
5. Monitor Display will show the status of switches, sensors, and controller signals on the machine. See **Monitor Display** later in this procedure.

   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

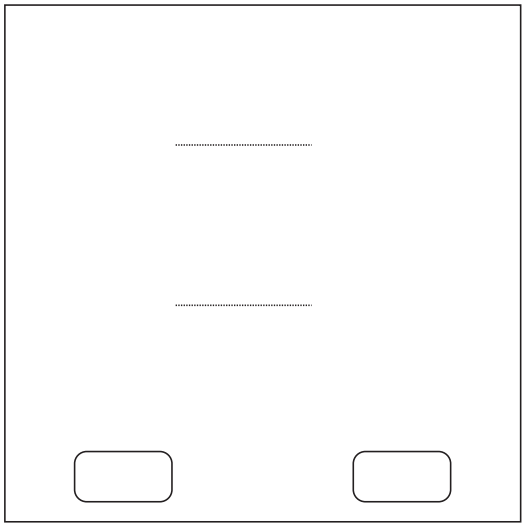
1. **Monitor Display**

   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.



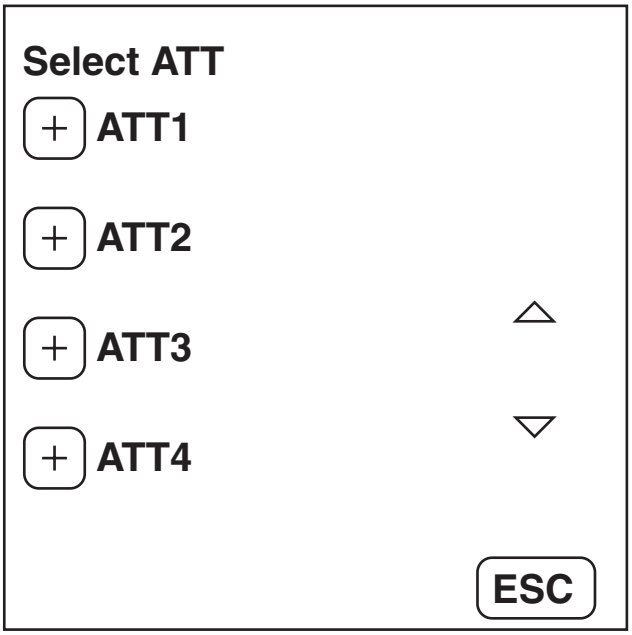
Enter Model and Serial Number Screen

Continued on next page

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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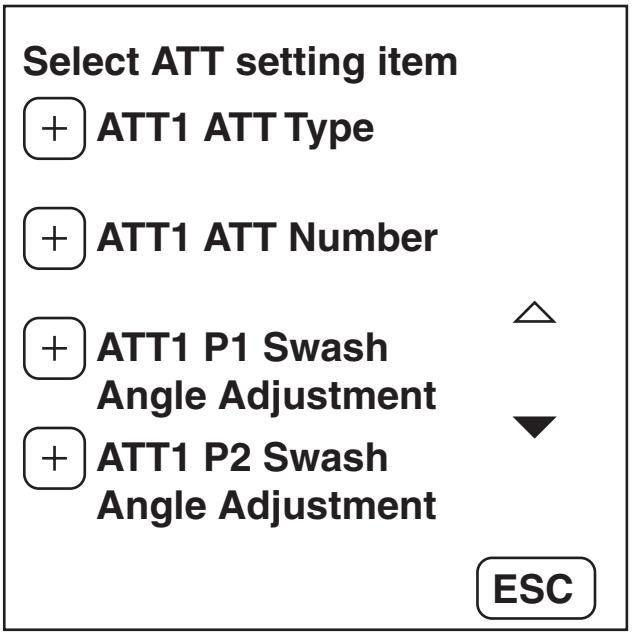
LD30992,0000220 –19–25APR06–23/30

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

LD30992,0000220 –19–25APR06–24/30

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

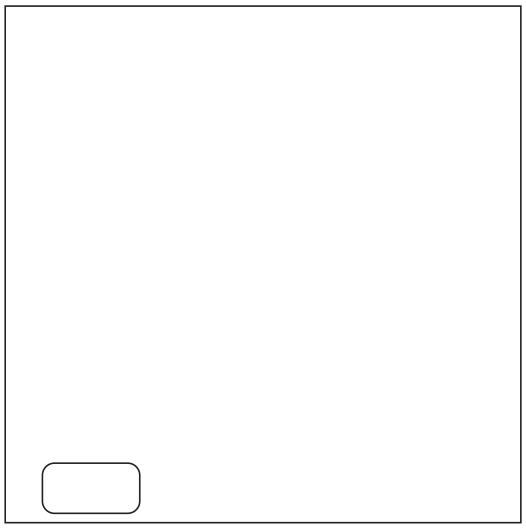
   Select Comment to add a comment to the reading.

   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

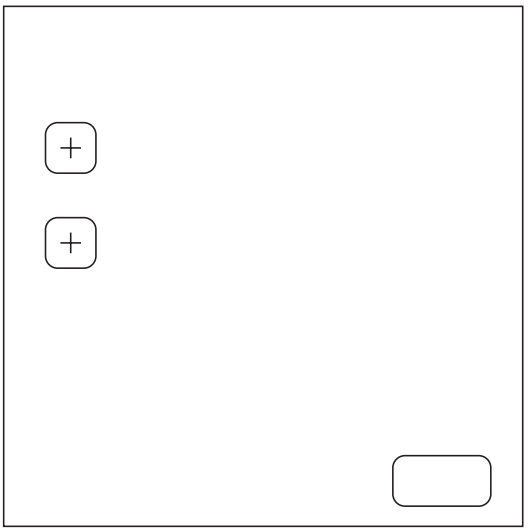
LD30992,0000221 –19–25APR06–10/10

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.

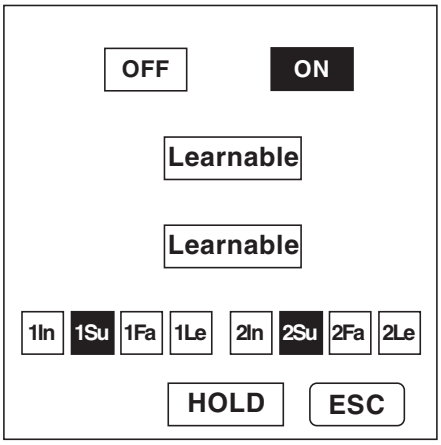


Function Selection Screen

Continued on next page

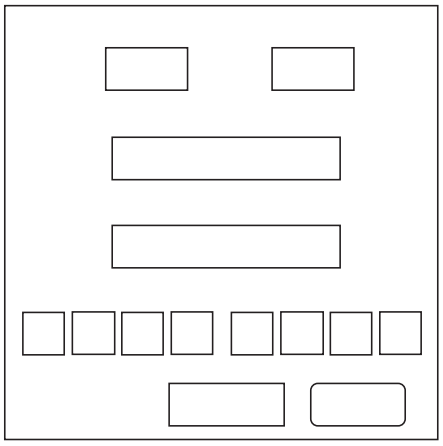
LD30992,0000222 –19–26APR06–1/9

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

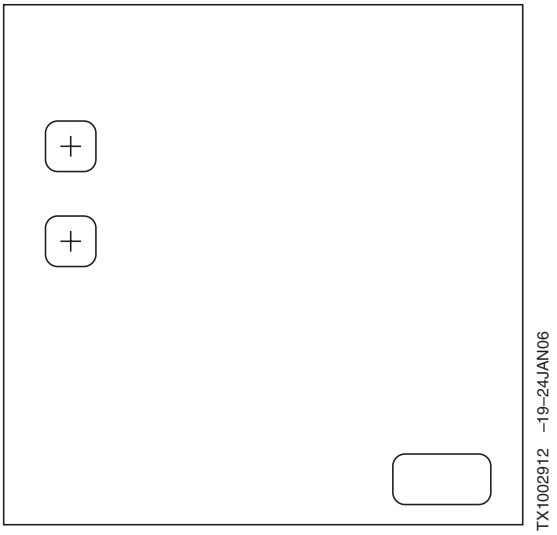
Pump Learning Failure

Continued on next page

Information Controller (ICF) Date and Time

1. Start Dr. ZX and select Select Controller.

   ESC will return ZX—3 Large Screen.

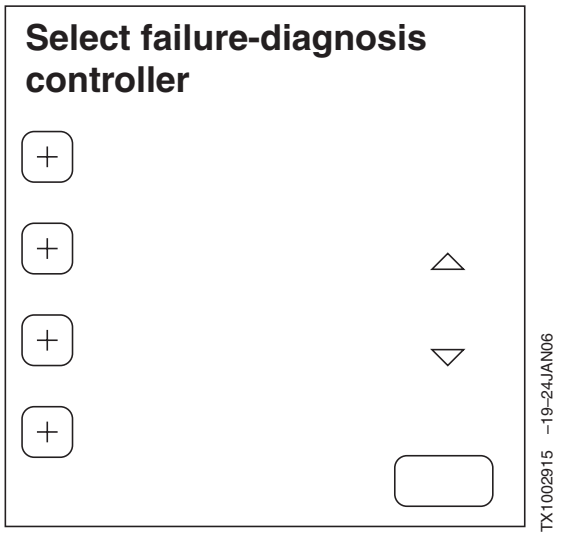


Function Selection Screen

LD30992,00004C5 –19–08JUN06–1/7

2. Select Information C/U.

   ESC will return to Function Selection Screen.



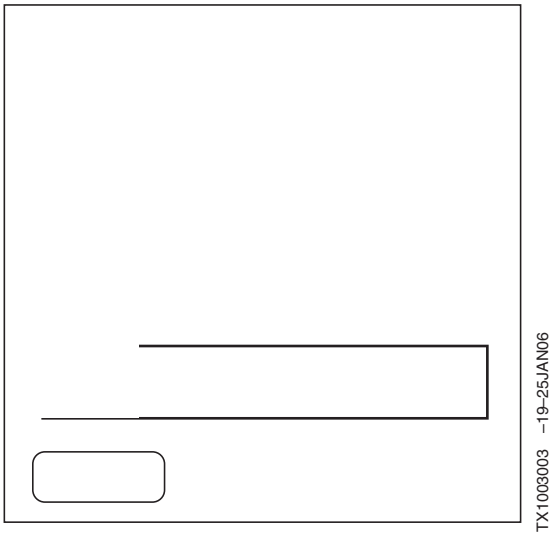
Controller Selection Screen

Continued on next page

LD30992,00004C5 –19–08JUN06–2/7

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

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



Data Download Screen

Continued on next page

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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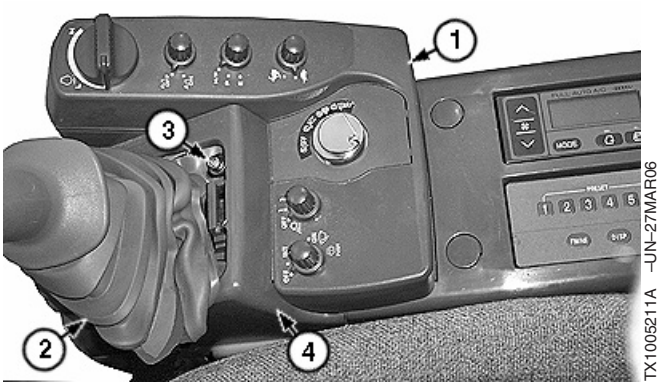
Pilot Shutoff Switch Harness Check	Disconnect harness from cab. Remove diode from harness. With the positive lead on the center terminal of the diode, there should be continuity when you probe the two outer terminals with the negative lead. Switch the leads and put the negative lead on the center terminal, 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

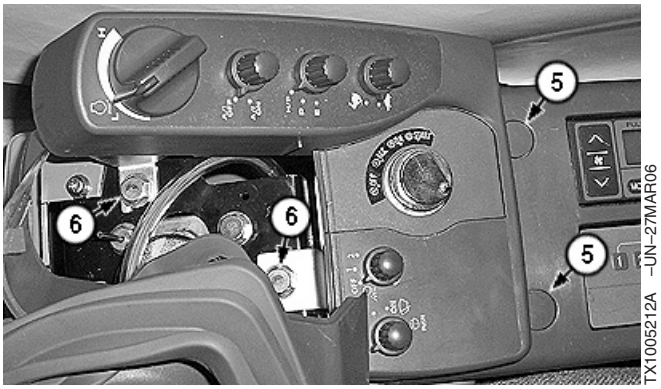


Pilot Control Lever Boot

LD30992,0000493 –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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LD30992,0000493 –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.

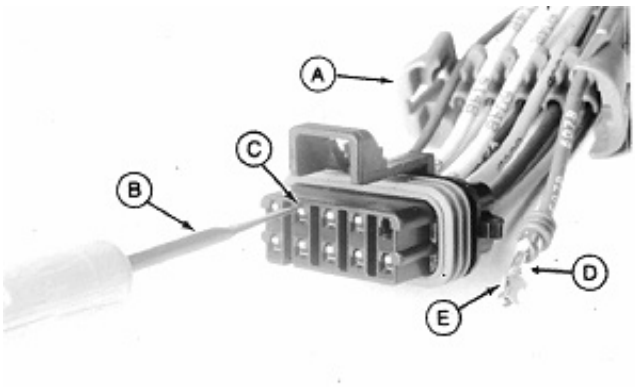
Insert JDG776 or JDG777[2] Terminal Extraction Tool (B) into connector body socket (C) pushing the terminal locking tab inward.

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*

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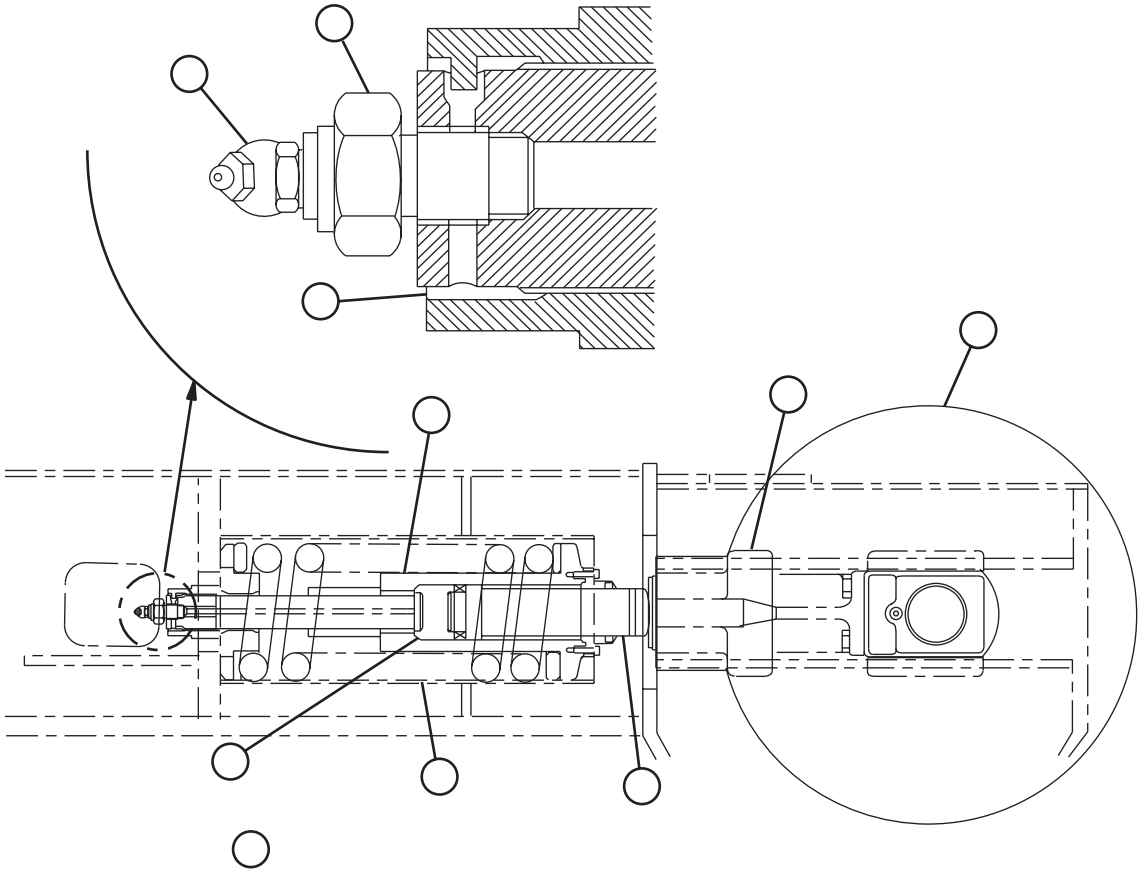
Track Adjuster and Recoil Spring Operation



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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.

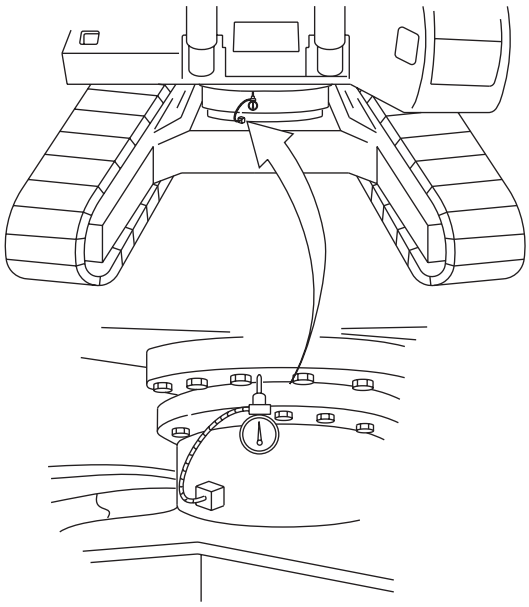
1. Check that swing bearing-to-main frame cap screws are tightened to specification. See Upperstructure Remove and Install. (Group 4350.)
2. Check that swing bearing is lubricated with the specified grease. See Track Adjuster, Working Tool Pivot, Swing Bearing, And Swing Bearing Gear Grease. (Operator's 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	0.4—1.6 mm new
	0.016.—0.063 in. new
	3.6—4.8 mm maximum allowable
	0.142—0.189 in. maximum allowable



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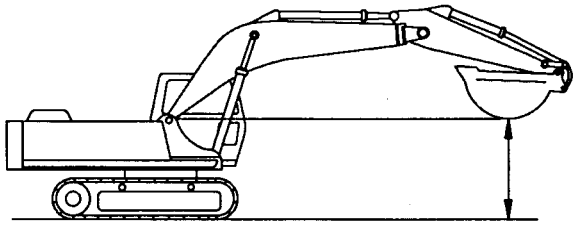

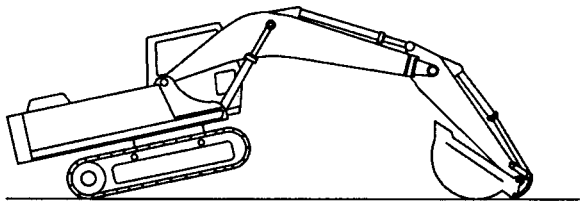

T7886AJ –UN–23NOV92

T7886AJ CV

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17—Pump 1 Regulator
18—Pump 2 Regulator
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 the fan drive pump. Oil is drawn into the pilot pump from the hydraulic tank (47) 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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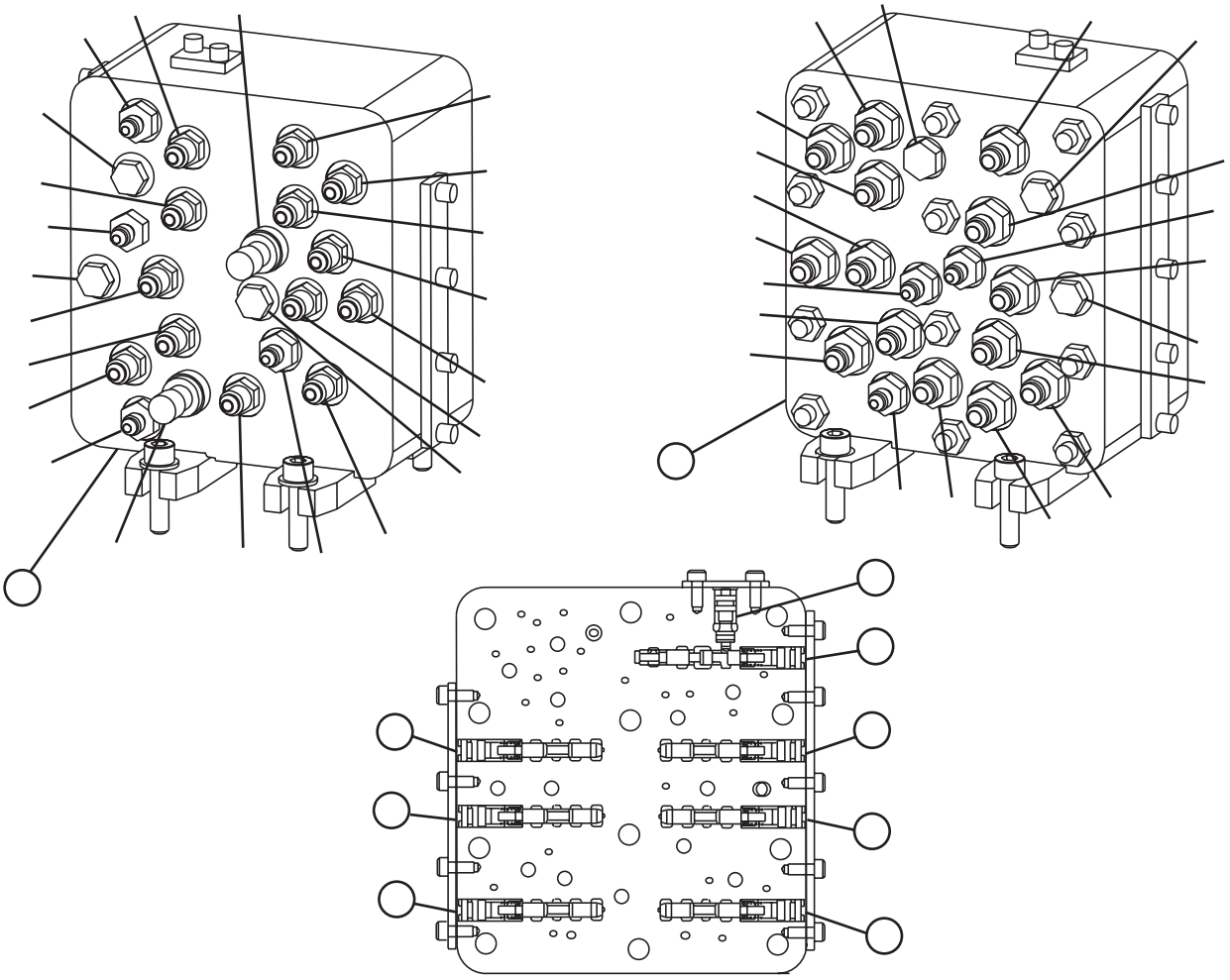
Pilot Signal Manifold Operation



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

Continued on next page

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.

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87—Main Relief Valve Isolation Check Valve (5-spool)
112—Neutral Passage Check Valve (swing lift check)
115—Power Passage Check Valve (arm 1 in function lift check)
116—Power Passage Check Valve (arm 1 out function lift check)
117—Neutral Passage Check Valve (arm 1 in function lift check)
122—Arm In Circuit Relief and Anticavitation Valve
123—Arm Out Circuit Relief and Anticavitation Valve
124—Neutral Passage Check Valve (boom 2 lift check)
128—Boom Mode Relief Valve
129—Boom Mode Relief Control Valve
133—Check Valve (lift check)
138—Auxiliary Circuit Relief and Anticavitation Valve
139—Auxiliary Circuit Relief and Anticavitation Valve
141—Neutral Passage Check Valve (left travel lift check)
145—Left Travel and Bucket Flow Combining Circuit Check Valve
146—Bypass Shutoff (Bucket Flow Combiner) Valve (5-spool)

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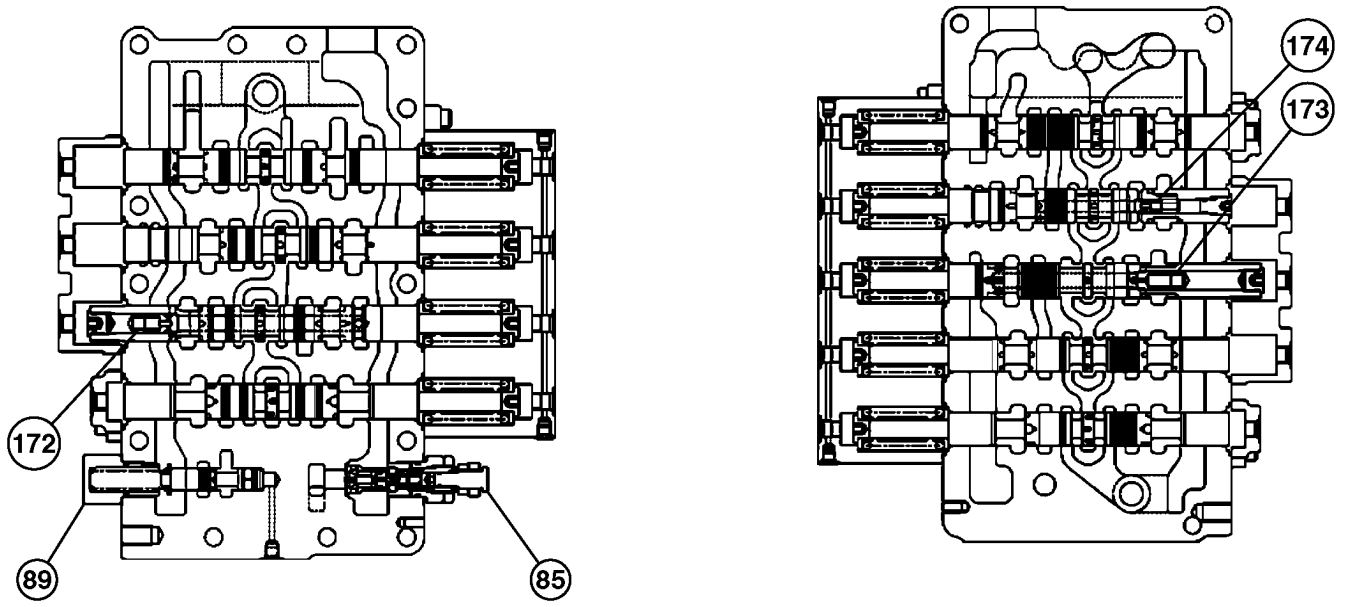

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TX1006458 –UN–17APR06

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4 and 5-Spool Cross Section

85—Main Relief and Power Digging Valve
89—Travel Flow Combiner Valve
172—Bucket Regenerative Valve
173—Boom 2 Regenerative Valve
174—Arm 1 Regenerative Valve

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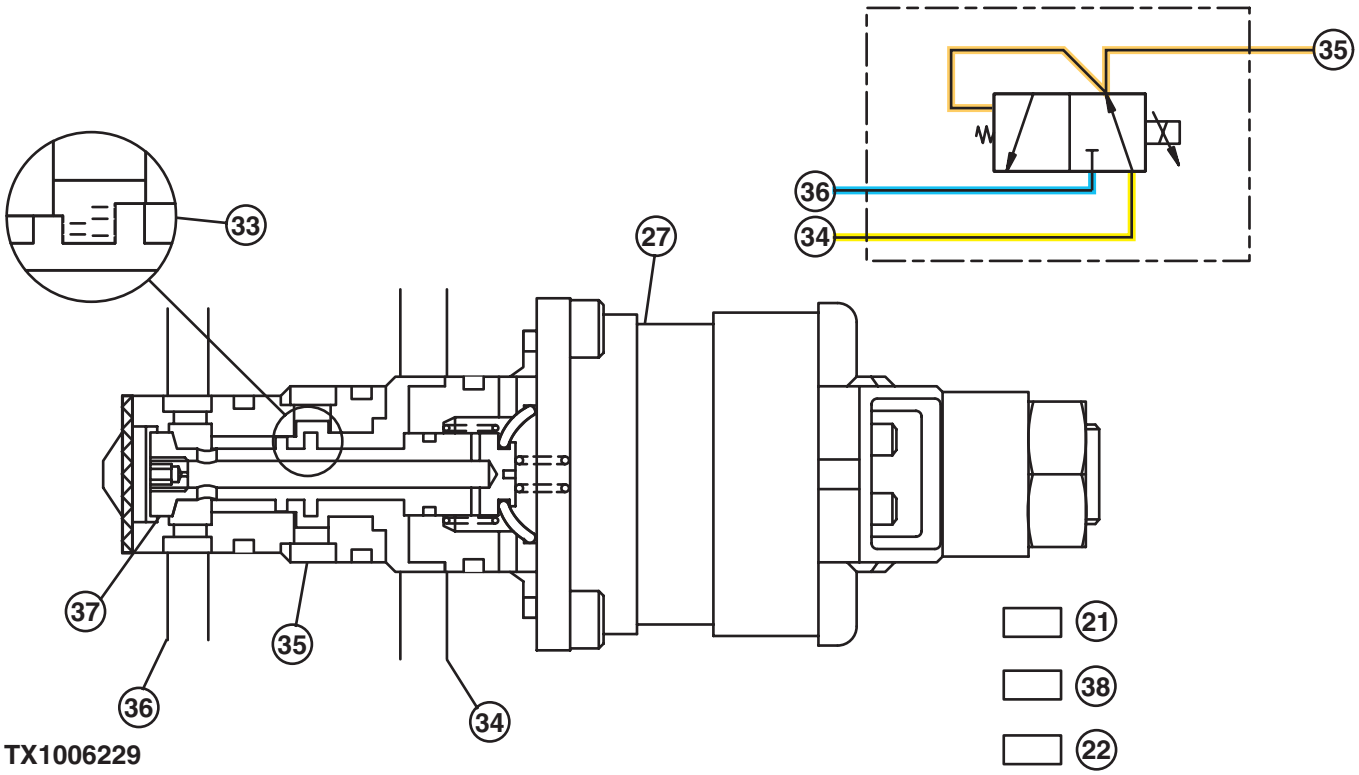
MM61211,0001522 –19–26APR06–5/15



TX1006229 –UN–12APR06

Power Dig Solenoid Valve SG Operation

21—Pilot Oil
22—Return Oil
27—Power Dig Solenoid Valve SG
33—Flange on the Right Is Larger
34—From Pilot Filter and Pressure Regulating Valve
35—Valve Function Port
36—To Hydraulic Oil Tank
37—Valve Spool
38—Reduced Pilot Oil

Power Dig Solenoid Valve SG Operation—The power dig solenoid valve SG (27) is a proportional solenoid valve type. The solenoid valve is activated by an electrical signal from the MCF.

When de-energized, the spool (37) is pushed to the right by a spring. The valve function port (35) is then connected to the hydraulic oil tank (36).

When energized, the magnetic force shifts the spool left against the spring. Pilot oil (21) flows past the spool flange and out the valve function port as reduced pilot oil (38) to the main relief and power dig valve. Because the flange on the right is larger (33) than the flange on the left, the spool is pushed to the right against the magnetic force as the electrical signal to the solenoid increases. When the reduced pilot oil pressure becomes equal to or greater than the magnetic force, the spool is pushed to the right, closing the passage. The spool is moving constantly to maintain the reduced pilot oil pressure to the main relief and power dig valve in response to the electrical signal to the solenoid.

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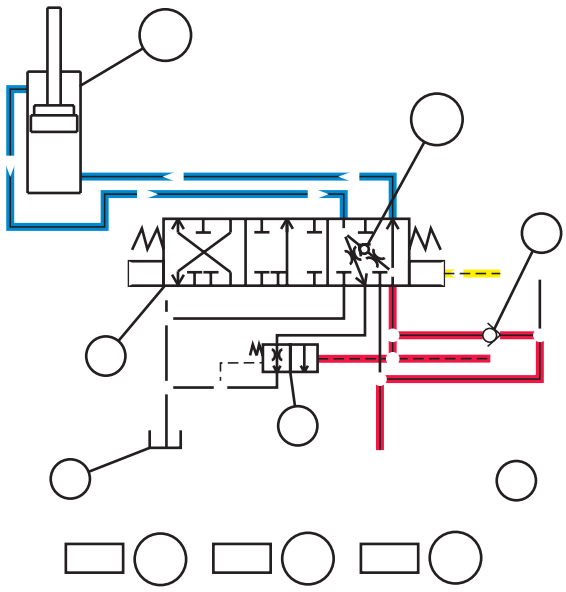
LD30992,000025C –19–13APR06–6/6

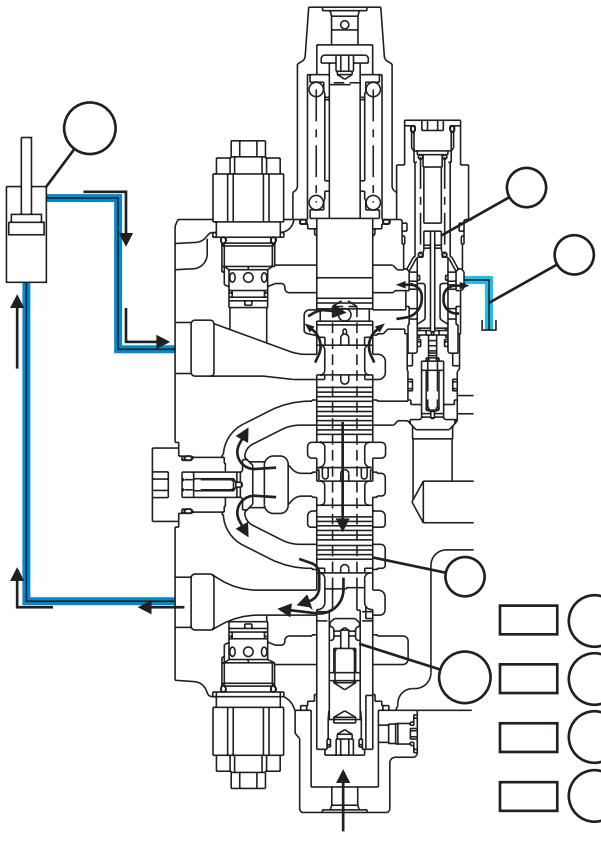
Bucket Regenerative Valve Circuit Operation

During bucket digging operation, return oil (184) from the bucket cylinder (170) flows to the hydraulic oil tank (47). Return oil (184) from the bucket cylinder (170) enters the spool (94) and acts on the bucket regenerative check valve (172) inside the spool (94). When digging operation is done with the bucket rolled-out, the bucket moves faster as compared with supply oil (180) from the pump (15). Therefore, pressure in the circuit between pump (15) and bottom of the bucket cylinder (170) decreases. When pressure in the bottom of bucket cylinder becomes lower than that of the top side, the bucket regenerative check valve (172) opens. Therefore, regenerative return oil (185) from the top of the bucket cylinder (170) flows to the bottom side of the bucket cylinder and is combined with supply oil (180) from the pump (15). Consequently, the regenerative operation is done and speed of the cylinder increases.

15—From Pump 1
47—Hydraulic Oil Tank
91—Bucket Regenerative Switch Valve
93—Power Passage Check Valve (bucket lift check)
94—Bucket Spool
170—Bucket Cylinder
172—Bucket Regenerative Valve
180—Supply Oil
182—Pilot Oil
184—Return or Pressure-Free Oil
185—Regenerative Return Oil



TX1006656 –19–19APR06



TX1006681 –UN–20APR06

During Regenerative Operation

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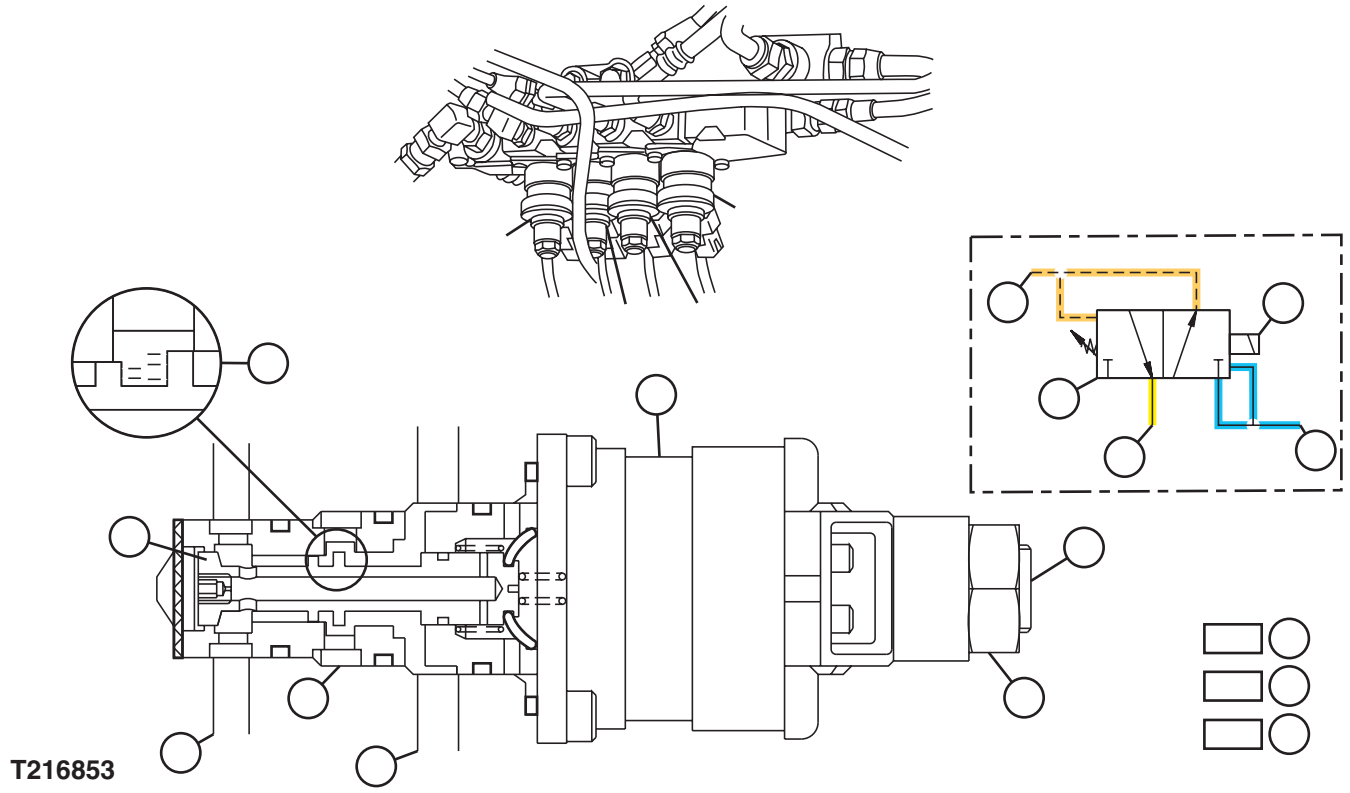

Boom Flow Rate Solenoid Valve, (port SF)

Y22—Boom Flow Rate Solenoid Valve, (port SF)
Y23—Boom Mode Solenoid Valve (port SC)
Y24—Power Digging Solenoid Valve (port SG)
Y25—Travel Speed Solenoid Valve (port SI)
16—Solenoid Coil
17—Adjusting Screw
18—Nut
19—From Pilot Shutoff Solenoid Valve
20—Boom Flow Rate Control Valve—Switch Valve
21—To Hydraulic Oil Tank
22—Spool
23—Pressure Equals Magnetic Force
24—Pilot Oil
25—Reduced Pilot Oil
26—Return Oil

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Boom Flow Rate Solenoid Valve, (port SF)

Operation— Boom flow rate solenoid valve (Y22) is a proportional solenoid valve type. The solenoid valve is activated by an electrical signal from the main controller (MCF). The electrical signal is DC voltage that is turned on and off to form a pulse-width modulated signal. Solenoid coil (16) reacts to the average voltage to create a magnetic force to shift the spool (22) left against a spring. When shifted left, reduced pilot oil (25) is sent to the boom flow rate control valve—switch valve (20). The pressure of reduced pilot oil is in proportion to the electrical signal to the solenoid coil.

De-energized—When de-energized, the spool is pushed to the right by a spring. The boom flow rate control valve—switch valve is then connected to the hydraulic oil tank (21) through the spool.

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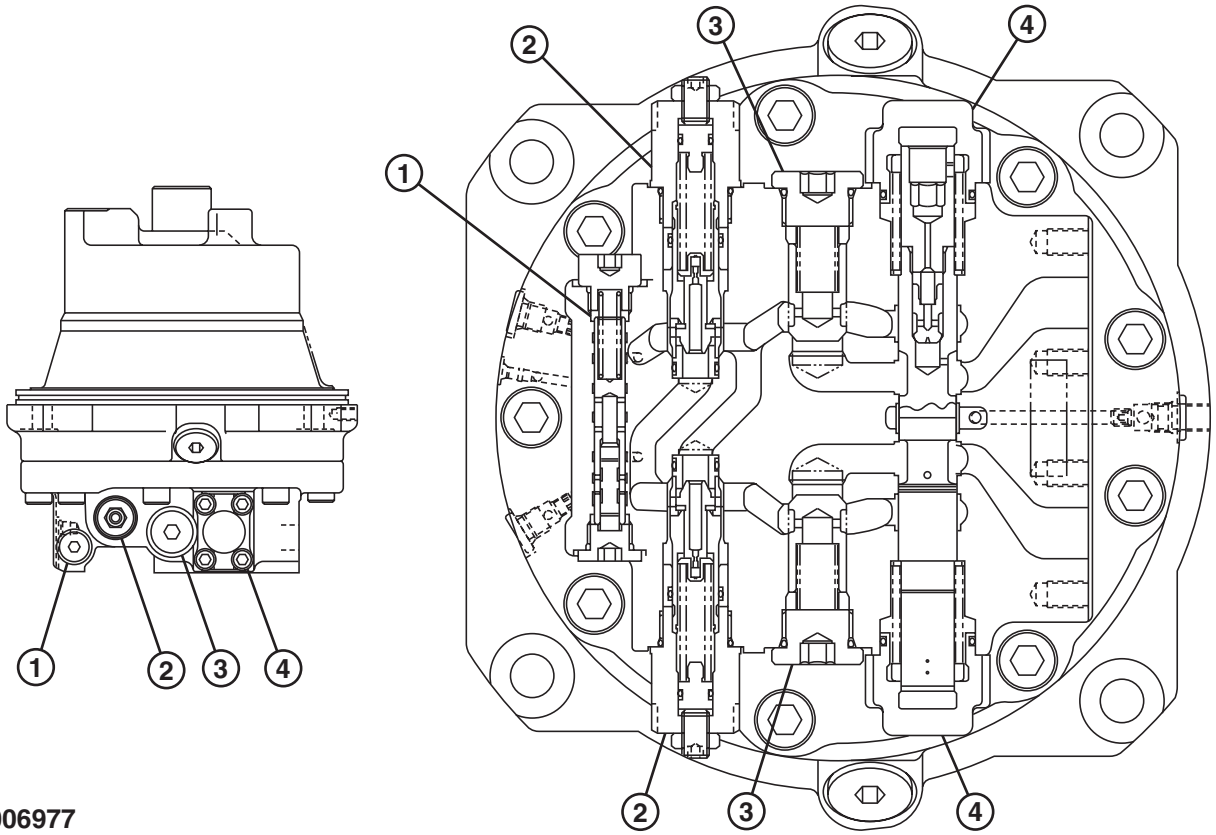

TX1006977

TX1006977 –UN–25APR06

Travel Motor and Park Brake Valve Assembly

1—Travel Speed Change Selector Valve **2—Crossover Relief Valve** **3—Check Valve** **4—Counterbalance Valve**

Travel Motor and Park Brake Valve Assembly Components—The travel brake valve is located on the travel motor head and consists of the following valves. Crossover relief valve (2) which prevents the occurrence of overload and surge pressure in the motor circuit. The counterbalance valve (4) makes starting and stopping travel operations smooth and prevents the machine from running away while descending slopes. Check Valve (3) will assists the counterbalance valve operation and prevents cavitation in the motor circuit. And the travel speed change selector valve (1) which controls the tilt piston when selecting travel mode.

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LD30992,0000269 –19–25APR06–2/2

❺ **Main Relief Valve Check**	Key on, use monitor service menu to display Pump 1 and Pump 2 Delivery Pressure. See Monitor Service Menu Operation. (Group 9015-16.) *NOTE: To test with remote gauge, Perform Main Relief and Power Digging Valve Test and Adjustment. (Group 9025-25.)* Set power mode at HP. Run engine at fast idle and operate boom raise function. Observe pump 1 and 2 delivery pressure when boom raise is held over relief. Are both pumps delivery pressure in 30.4—32.9 MPa range?	**YES:** Go to Cycle Time Check. **NO:** Adjust or replace main relief and power digging valve. Perform Main Relief and Power Digging Valve Test and Adjustment. (Group 9025-25.) – – –1/1
❻ **Cycle Time Check**	Perform Cycle Times Check. (Group 9005-10.) Check travel cycle times. Are travel cycle times at specifications?	**YES:** Diagnostic procedure complete. **NO:** Go to Restricted Hydraulic Oil Tank Suction Screen Check. – – –1/1
❼ **Restricted Hydraulic Oil Tank Suction Screen Check**	Inspect hydraulic oil tank suction screen. See Change Hydraulic Tank Oil, Clean Suction Screen. (Operator's Manual.) Is hydraulic oil tank suction screen free of restriction?	**YES:** Go to Hydraulic Pump Check. **NO:** Clean or replace hydraulic oil tank suction screen. – – –1/1
❽ **Hydraulic Pump Check**	Perform Pump Flow Test. (Group 9025-25.) Check pump flow. Does pump flow meet specification?	**YES:** Go to Wiring Connector Check. **NO:** Repair or replace pump. See Pump Remove and Install. (Group 3360.) – – –1/1
❾ **Wiring Connector Check**	See Pilot Shutoff Switch Harness (W11) Component Location. (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:** Diagnostic procedure complete. **NO:** Repair or replace connectors. – – –1/1

All Functions Slow Diagnostic Procedure

– – –1/1

❶ **Restricted Pilot Filter Check**	Inspect pilot filter. Is pilot filter free of restriction?	**YES:** Go to Actuating Pilot Pressure Check. **NO:** Replace pilot filter. See Replace Pilot System Oil Filter. (Operator's Manual.)

– – –1/1

❷ **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 Pilot Shutoff Solenoid Valve Check. **NO:** Adjust, repair or replace pilot pressure regulating valve. See Pilot Pressure Regulating Valve Test and Adjustment. (Group 9025-25.) **NO:** Pilot pump worn. Inspect, repair or replace pilot pump. See Pilot Pump Remove and Install. (Group 3360.)

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❸ **Pilot Shutoff Solenoid Valve Check**	Inspect pilot shutoff solenoid valve for restriction. Is pilot shutoff solenoid valve free of restriction?	**YES:** Diagnostic procedure complete. **NO:** Repair or replace pilot shutoff solenoid valve. See Pilot Shutoff Solenoid Valve Disassemble and Assemble. (Group 3360.)

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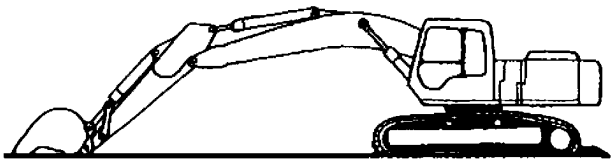
❸ **Boom Circuit Leakage Check**	 TX1006310 –UN–12APR06 *Leakage Test Position* Position bucket and arm as shown with bucket cylinder fully retracted. 1. Relieve hydraulic pressure from boom circuit. 2. Remove rod end hoses from both boom cylinders. 3. Drain oil from hoses and cap hose ends with high pressure plugs. 4. Leave cylinder rod end ports open and place container under them to catch any excess oil. 5. Start engine and slowly retract arm cylinder so bucket is approximately 300 mm (12 in.) off ground Does oil leak out of rod end of boom cylinder?	**YES:** Repair boom cylinder piston seals. **NO:** If boom lowers and no oil leaks out of rod end ports, the control valve is leaking. Inspect and repair control valve spool. Look for broken spring or loose spool end. – – –1/1

Load Drifts Down When Control Valve Is In Neutral Position Diagnostic Procedure

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❺ **Circuit Relief Valve Check**	Perform Circuit Relief Valve Test and Adjustment. (Group 9025-25.) Check swing relief pressure. Do circuit relief valves meet test specifications?	**YES:** Go to Swing Motor Case Drain Check. **NO:** Adjust or repair circuit relief. – – –1/1

❻ **Swing Motor Case Drain Check**	Perform Swing Motor Leakage Test. (Group 9025-25.) Check if swing case drain leakage is normal. Does case drain leakage meet specification?	**YES:** Remove and repair motor. **NO:** Inspect swing reduction gear. See Swing Gearbox Disassemble and Assemble. (Group 4350.) – – –1/1

❼ **Control Valve Check**	See Control Valve Operation. (Group 9025-05.) Inspect control valve for sticking spool. For component location. Does control valve spool move freely?	**YES:** Diagnostic procedure complete. **NO:** Repair or replace control valve components as necessary. See Control Valve Disassemble and Assemble. (Group 3360.) – – –1/1

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Swing Is Too Fast Diagnostic Procedure

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❶ **DTC Check**	See Reading Diagnostic Trouble Codes With Monitor Display. (Group 9015-20.) See Reading Diagnostic Trouble Codes With Service ADVISOR™ Diagnostic Application Are any of the following DTC displayed? • 11301.03 See Swing Pilot Pressure Sensor Circuit Voltage High. (Group 9001-10.) • 11301.04 See Swing Pilot Pressure Sensor Circuit Voltage Low. (Group 9001-10.)	**YES:** Diagnose and repair as required to clear displayed DTC. Diagnostic procedure complete. **NO:** Go to Swing Pressure Sensor Check. – – –1/1

❽ **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:** Inspect travel reduction gear. **NO:** Repair or replace motor swash plate angle control. See Travel Motor Cover Disassemble and Assemble. (0260.) – – –1/1

Machine Mistracks During Combined Operation With Dig Functions Diagnostic Procedure

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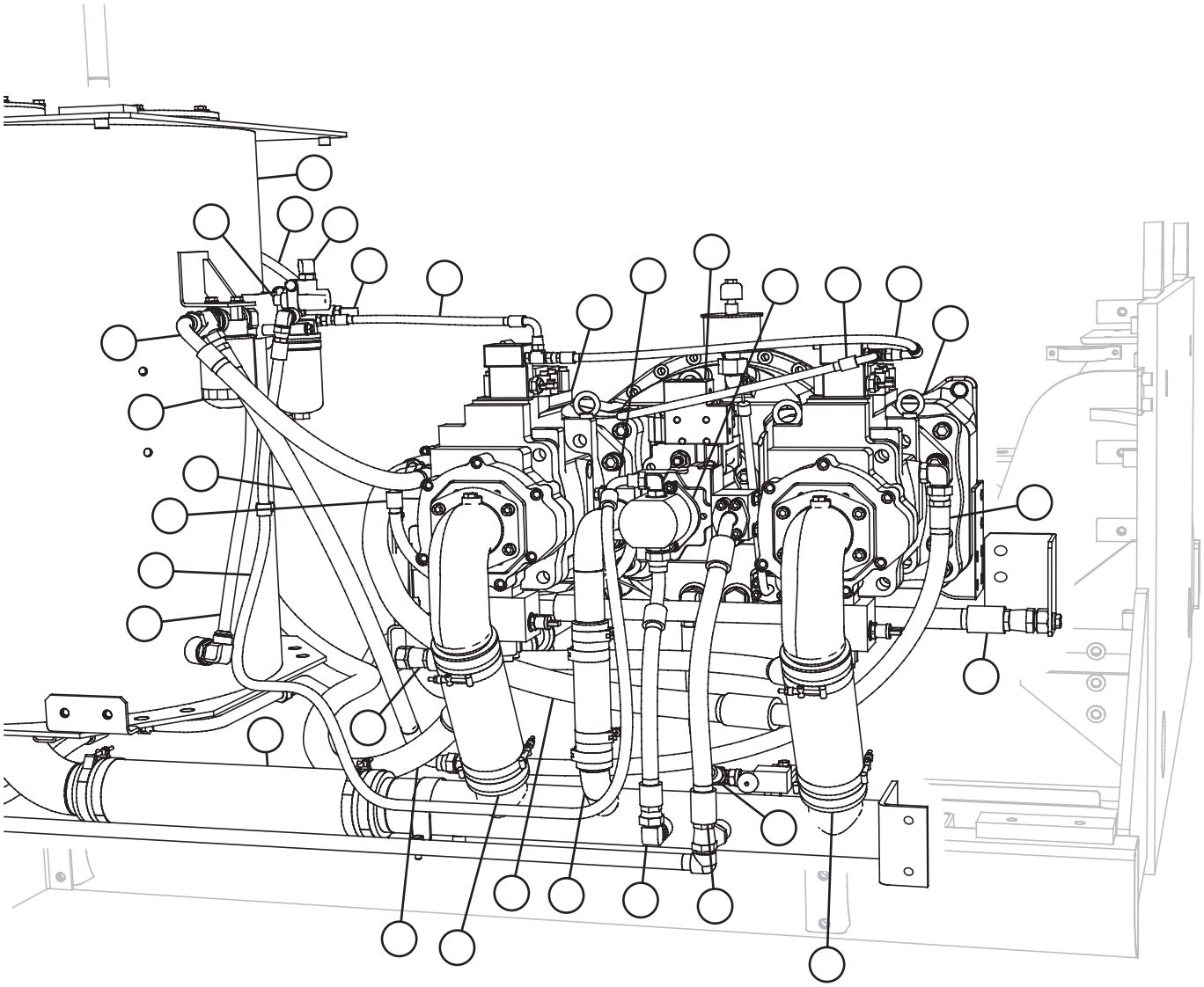
❶ **Flow Combiner Valve Check**	See Control Valve Operation. (Group 9025-05.) Remove and inspect flow combiner valve in control valve. Is valve in good working condition?	**YES:** Go to Flow Combiner Signal Pressure Check. **NO:** Repair or replace flow combiner valve. See Control Valve 5-Spool Disassemble and Assemble. (Group 3360.) – – –1/1

❺ **Rotary Manifold Leakage Check**	Perform Rotary Manifold Air Test. (Group 0260.) Inspect rotary manifold for leakage. Is rotary manifold OK?	**YES:** Go to Hydraulic Pump Check. **NO:** Repair or replace rotary manifold. See Rotary Manifold Disassemble and Assemble. (Group 0260.) – – –1/1
❻ **Hydraulic Pump Check**	Perform Cycle Times Check. (Group 9005-10.) 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:** Go to HP Engine Speed Check. **NO:** Repair or replace pump. See Pump Remove and Install. (Group 3360.) – – –1/1
❼ **HP Engine Speed Check**	Key on, use monitor service menu to display Actual Engine Speed and Power Mode. See Monitor Service Menu Operation. (Group 9015-16.) Put power mode switch on P and work mode on digging. Run engine at fast idle and take arm-in function over relief. Record engine speed. Turn power mode switch to HP position. Does engine speed increase approximately 100 rpm when switch is moved to HP?	**YES:** Go to Power Boost Pressure Check. **NO:** Select correct engine speed and power mode setting. See Engine Speed Control System Operation. (Group 9010-05.) – – –1/1
❽ **Power Boost Pressure 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 take arm-in function over relief. Record pressure. Push power dig switch on control lever and observe monitor. Does pump 1 and 2 delivery pressure increase approximately 2.5 MPa when power dig switch held on?	**YES:** Diagnostic procedure complete. **NO:** Replace or adjust main relief valve. See Main Relief and Power Digging Valve Test and Adjustment. (Group 9025-25.) – – –1/1

Pump 1, Pump 2, Fan Drive Pump, and Pilot Pump Line Connections



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Pump 1, Pump 2, Fan Drive Pump, and Pilot Pump Line Identification

1—Hydraulic Oil Tank
2—Pilot Filter and Pressure Regulating Valve
3—Pilot Pump-to-Pilot Filter and Pressure Regulating Valve (port PA)
4—Port PG-to-Pilot Check Valve Manifold (port P)
5—Port TA-to-Hydraulic Oil Tank
6—Port PD-to-Solenoid Valve Manifold (port PD)
7—Port PF-to-Pump 1 Regulator
8—Pump 1
9—Pilot Pump
10—Fan Drive Pump
11—Pump 2 Regulator-to-Fan Drive Pump Regulator
12—Pump 1 Regulator-to-Pump 2 Regulator
13—Pump 2
14—Pump 2 Case Drain-to-Pump Case Drain Filter and Bypass Valve
15—Pump 1 Attenuator Hose
16—Pump 2 Suction Line
17—Pump Drive Gearbox Drain Line
18—Fan Drive Pump-to-Fan Drive Control Valve
19—Pilot Pump Suction Line
20—Fan Drive Pump Suction Line
21—Pump 1 Suction Line
22—Hydraulic Oil Tank-to-Pumps Suction Line
23—Pump 1-to-Right Control Valve (4-spool)
24—Pump 1 Attenuator Hose
25—Pump 2-to-Left Control Valve (5-spool)
26—Pump Case Drain Filter and Bypass Valve-to-Hydraulic Oil Tank
27—Pump 1 Case Drain-to-Pump Case Drain Filter and Bypass Valve
28—Pump Case Drain Filter and Bypass Valve
29—Fan Drive Pump Case Drain-to-Pump 1 Case Drain

LD30992,0000274 –19–07JUN06–1/1

NOTE: DO NOT use manufacturer's hose tags or markings on hose ends to identify hoses for this conversion procedure. The conversion must be done on the side of digging sensor manifold that is connected to the pilot control valves.

Port numbers on digging sensor manifold are given from front to rear of machine and are not marked on manifold.

6. Switch pilot lines connected to port 2 and 5 at digging sensor manifold (9).
7. Disconnect pilot line from port B of the boom shockless valve (10).
8. Use the following table to fabricate the hydraulic hose needed.

Part Number	Description	Assembly Quantity
X10643-6-6	Fittings	2
X421-6	Hydraulic Hose, No Skive	1905 mm (75 in.)
Left Fitting: X10643-6-6 (Parker No. 10643-6-6) Right Fitting: X10643-6-6 (Parker No. 10643-6-6) Hydraulic Hose: X421-6 (Parker No. 421-6) Cut Length: 1885.4 mm (74.23 in.) Crimp Dies: 43-6 (YEL) Die Ring: Silver Length: 1949.9 mm (76.77 in.)		

9. Install a -6 M 37° x -6 M 37° union to fabricated hose. Connect union to pilot line disconnected from the shockless valve
10. Route fabricated hose to digging sensor manifold.
11. Disconnect pilot line from port 6.
12. Connect fabricated hose to port 6.
13. Route pilot line disconnected from port 6 to the shockless valve. Connect line to port B.
14. Install covers.

GD61784,0000062 –19–26OCT06–6/6

9—Left Travel Forward (pilot)
10—Left Travel Reverse (pilot)
11—Right Travel Forward (pilot)
12—Right Travel Reverse (pilot)
55—Solenoid Valve Manifold
56—Travel Pilot Control Valve
66—Pilot Signal Manifold
83—Right Control Valve (4-spool)
84—Left Control Valve (5-spool)
90—Right Travel Spool
140—Left Travel Spool
155—Center Joint
158—Right Travel Motor
157—Left Travel Motor
160—Left Travel Forward
161—Right Travel Forward
162—Left Travel Reverse
163—Right Travel Reverse
164—Return Line to Hydraulic Oil Tank
165—Case Drain Lines
Y10—Pilot Shutoff Solenoid Valve
Y25—Travel Speed Solenoid Valve (SI)
I—Left Travel Forward (pilot)
J—Left Travel Reverse (pilot)
K—Right Travel Forward (pilot)
L—Right Travel Reverse (pilot)
PI—From Pilot Shutoff Solenoid Valve

TX04577,0000105 –19–05SEP07–2/2

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1—Boom Up (pilot)
2—Boom Down (pilot)
3—Arm Out (pilot)
4—Arm In (pilot)
5—Swing Left (pilot)
6—Swing Right (pilot)
7—Bucket Curl (pilot)
8—Bucket Dump (pilot)
9—Left Travel Forward (pilot)
10—Left Travel Reverse (pilot)
11—Right Travel Forward (pilot)
12—Right Travel Reverse (pilot)
13—Plug—Auxiliary (pilot)
14—Plug—Auxiliary(pilot)
17—To Pump 1 Regulator
18—To Pump 2 Regulator
27—Pilot Pump
29—To Fan Drive Pump Regulator
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—Solenoid Valve Manifold
56—Travel Pilot Control Valve
57—Left Pilot Control Valve (swing and arm)
58—Right Pilot Control Valve (bucket and boom)
59—Boom Up Shockless Valve
62—Bulkhead
63—Travel Sensor Manifold
64—Shuttle Valve (2 used)
65—Digging Sensor Manifold
66—Pilot Signal Manifold
67—Boom Down Shockless Valve
68—Check Valve—Warmup Circuit
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)
76—Filter (18 used)
77—Orifice—Warmup Circuit
78—Shuttle Valve (17 used)
79—Check Valve—Warmup Circuit (3 used)
81—Accumulator
82—Pilot Check Valve Manifold
85—To Main Relief and Power Digging Valve
89—To Travel Flow Combiner Valve
97—To Boom Flow Rate Control Valve—Switch Valve
— From Boom Flow Rate Control Valve—Spring Cavity of Switch Valve
99—To Boom 1 Spool
105—To Arm 2 Flow Rate Control Valve—Switch Valve
—From Arm 2 Flow Rate Control Valve—Spring Cavity of Switch Valve
110—From Bypass Shutoff Valve (4-spool)
118—To Arm 1 Spool
129—To Boom Mode Relief Control Valve
146—From Bypass Shutoff Valve (5-spool)
154—To Swing Park Brake (port SH)
164—To Travel Speed Selector Valve
182—Pilot Oil
184—Return or Pressure-Free Oil
B33—Swing Pressure Sensor
B50—Arm Out Pressure Sensor
B51—Arm In Pressure Sensor
B52—Boom Up Pressure Sensor
B53—Boom Down Pressure Sensor
B54—Bucket Curl Pressure Sensor
B55—Bucket Dump Pressure Sensor
B56—Travel Right Pressure Sensor
B57—Travel Left Pressure Sensor
Y10—Pilot Shutoff Solenoid Valve
Y22—Boom Flow Rate Solenoid Valve (port SF)
Y23—Boom Mode Solenoid Valve (port SC)
Y24—Power Dig Solenoid Valve (port SG)
Y25—Travel Speed Solenoid Valve (port SI)

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OUT3035,0000007 –19–01JUN06–2/16

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26—Check Valve
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—Fan Drive Motor (2 used)
37—Fan Drive Control Valve (standard) (2 used)
38—Fan Drive Relief Valve
39—Make-Up Check Valve
40—Fan Drive Reversing Control Valve (2 used)
41—Fan Drive Reversing Spool
43—Hydraulic Oil Cooler
44—Restriction Valve
46—To Pump Case Drain Filter and Bypass Valve
47—From Hydraulic Oil Tank
51—From Pilot Filter and Pressure Regulating Valve
82—From Pilot Check Valve Manifold
83—From Right Control Valve
176—Radiator
Y8—Reversing Fan Solenoid Valve 1
Y9—Reversing Fan Solenoid Valve 2
Y14—Fan Pump Control Solenoid Valve
180—Supply Oil
182—Pilot Oil
184—Return or Pressure-Free Oil

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OUT3035,0000007 –19–01JUN06–12/16

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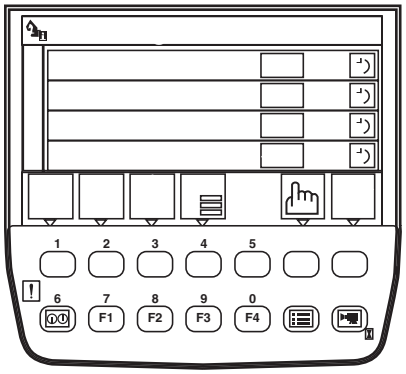
1. Connect one of the following test equipment to perform test:

   1. SERVICE ADVISOR™ application. See SERVICE ADVISOR Connection Procedure for instruction. (Group 9015-20.)
      Access Hydraulic Warm-Up.
      Or select the following items from the menu:
      - Coolant Temperature
      - 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:
      - Coolant Temperature
      - 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:
      - Coolant Temperature
      - Hydraulic Oil Temperature
      - Actual Engine Speed



Monitor

TX1003295 –19–03MAR06

CAUTION: Avoid possible serious injury from machine movement during warm-up procedure. Clear the area of all bystanders before doing the warm-up procedure.

2. Clear the area of all bystanders to allow for machine movement.

3. Start engine. Run engine at approximately 1/2 speed for approximately 5 minutes before operating any functions.

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TX04577,00000E7 –19–05JUN06–2/4

NOTE: Pressure reading displayed on the monitor is calculated pressure from an electrical signal in the main controller (MCF). The reading does not change when valve adjustment is made. The actual pressure to the power digging valve must be measured using a gauge.

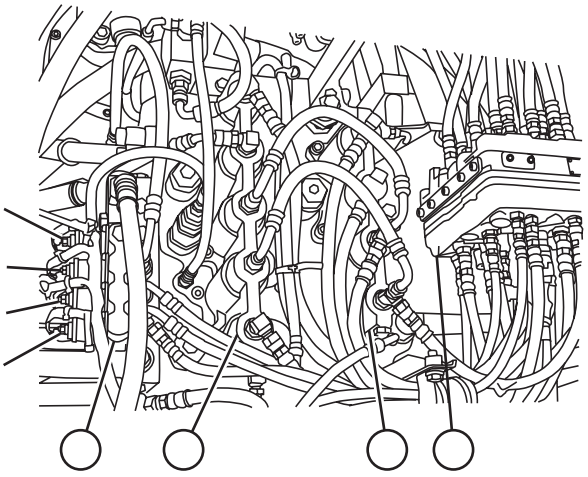
1. Release pressure from hydraulic oil tank by pushing pressure release button at top of hydraulic oil tank.

2. Disconnect line for power dig solenoid valve (Y24) to main relief and power digging valve (85) from elbow at the bottom of solenoid valve manifold (55).

   Install a JT03191 Tee in the line.

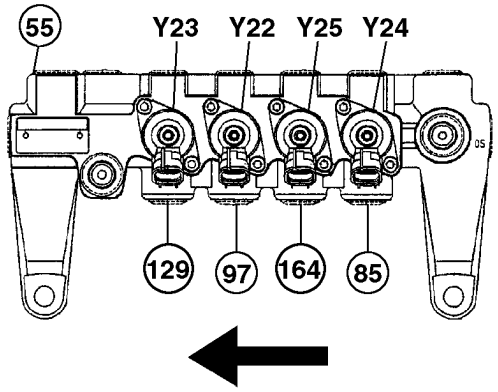
3. Connect the JT02156A Digital Pressure/Temperature Analyzer and JT02162 Transducer or a 7 MPa (7000 kPa) (70 bar) (1000 psi) gauge. See JT02156A Digital Pressure/Temperature Analyzer Installation.

Y22—Boom Flow Rate Solenoid Valve (port SF)
Y23—Boom Mode Solenoid Valve (port SC)
Y24—Power Dig Solenoid Valve (port SG)
Y25—Travel Speed Solenoid Valve (port SI)
55—Solenoid Valve Manifold
66—Pilot Signal Manifold
83—Right Control Valve (4-spool)
84—Left Control Valve (5-spool)
85—To Main Relief and Power Digging Valve
97—To Boom Flow Rate Control Valve—Switch Valve
129—To Boom Mode Relief Control Valve
164—To Travel Speed Selector Valve (left and right travel motors)



TX1003387 –UN–10FEB06

Solenoid Valve Manifold Location



TX1003386 –UN–13FEB06

Power Dig Solenoid Valve (port SG)

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LD30992,00002B1 –19–05JUN06–2/5

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NOTE: Pressure reading displayed on the monitor is calculated from an electrical signal in the main controller (MCF). The reading does not change when valve adjustment is made. The actual pressure to the boom mode relief control valve must be measured using a gauge.

The calculated pressure reading for boom mode solenoid valve does not displayed on the monitor in cab.

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

2. Disconnect line for boom mode solenoid valve (Y23) to boom mode relief control valve (129) from elbow at the bottom of solenoid valve manifold (55).

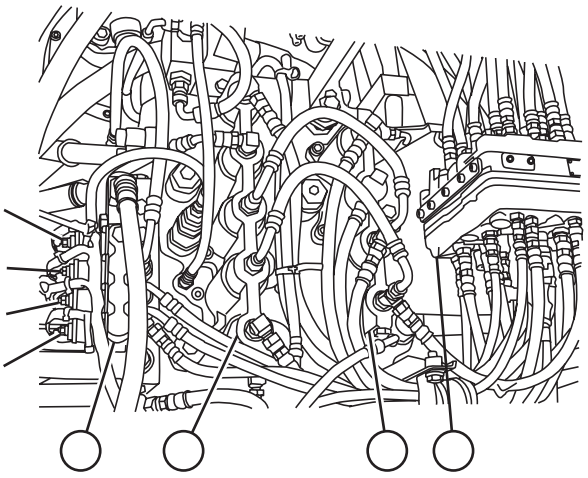
   Install a JT03191 Tee in the line.

3. Connect the JT02156A Digital Pressure/Temperature Analyzer and JT02162 Transducer or a 7 MPa (7000 kPa) (70 bar) (1000 psi) gauge. See JT02156A Digital Pressure/Temperature Analyzer Installation.

4. Use one of the following test equipment to display the calculated pressure:

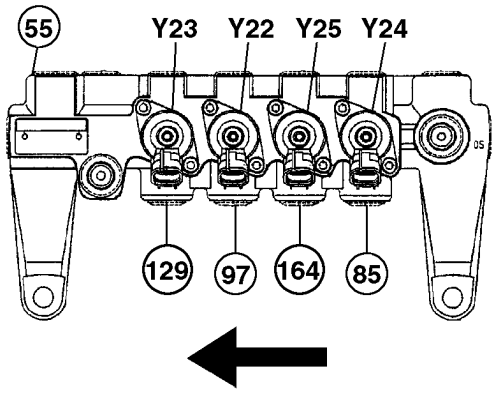
   1. SERVICE ADVISOR™ application. See SERVICE ADVISOR Connection Procedure for instruction. (Group 9015-20.)
      Access Boom Mode Solenoid Valve Test.
      Or select the following items from the menu:
      - Hydraulic Oil Temperature
      - Actual Engine Speed
      - Boom Mode Switch

   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:
      - Boom Mode Control Pressure
      - Hydraulic Oil Temperature
      - Actual Engine Speed
      - Boom Mode Switch



TX1003387 –UN–10FEB06

Solenoid Valve Manifold Location



TX1003386 –UN–13FEB06

Boom Mode Solenoid Valve (port SC)

Y22—Boom Flow Rate Solenoid Valve (port SF)
Y23—Boom Mode Solenoid Valve (port SC)
Y24—Power Dig Solenoid Valve (port SG)
Y25—Travel Speed Solenoid Valve (port SI)
55—Solenoid Valve Manifold
66—Pilot Signal Manifold
83—Right Control Valve (4-spool)
84—Left Control Valve (5-spool)
85—To Main Relief and Power Digging Valve
97—To Boom Flow Rate Control Valve—Switch Valve
129—To Boom Mode Relief Control Valve
164—To Travel Speed Selector Valve (left and right travel motors)

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NOTE: A pressure setting that cannot be raised can be caused by a low pressure setting of the circuit relief valve. Use boom up and the other propel function for adjusting the main relief and power digging valve. See Circuit Relief Valve Test and Adjustment to check the circuit relief valve that is low. (Group 9025-25.)

7. Adjust the main relief and power digging valve pressure setting as needed.

Specification

Main Relief Valve—Pressure ..... 30.4—32.9 MPa
30 400—32 900 kPa
304—329 bar
4410—4770 psi

Specification

Power Digging Valve—Pressure ..... 32.8—35.3 MPa
32 800—35 300 kPa
328—353 bar
4770—5120 psi

8. Loosen the 30 mm nut (2).

9. Turn first adjusting plug (1) in until piston (5) is against shoulder (6) in second adjusting plug (3). Tighten nut finger tight.

10. Loosen the 41 mm nut (4).

11. Actuate the propel function over relief.

12. Turn second adjusting plug (3) in to increase power digging relief pressure; turn adjusting plug out to decrease pressure.

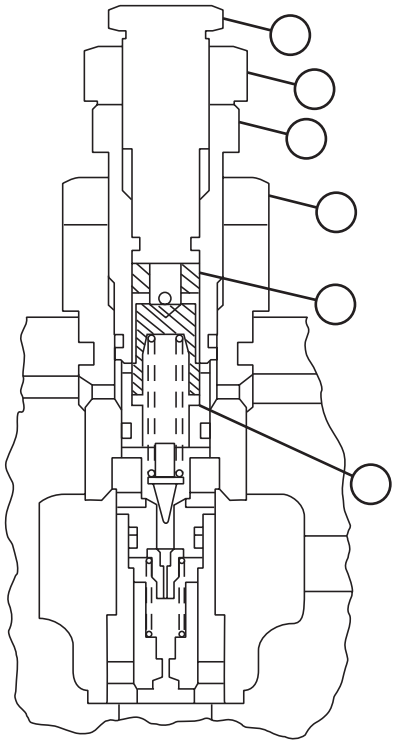
Specification

Second Adjusting Plug—Pressure Change ..... 4.5 MPa approximate per 1/4 turn
4500 kPa approximate per 1/4 turn
45 bar approximate per 1/4 turn
655 psi approximate per 1/4 turn

13. Hold second adjusting plug. Tighten 41 mm nut to specification.

Specification

41 mm Nut—Torque ..... 98 N•m
70 lb-ft



TX1003242 –UN–01FEB06

Main Relief and Power Digging Valve

1—First Adjusting Plug
2—30 mm Nut
3—Second Adjusting Plug
4—41 mm Nut
5—Piston
6—Shoulder

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Continued on next page

5. Adjust the boom mode relief valve (128) as needed.

   Disconnect pilot line from relief valve.

   Loosen nut (2).

   Turn adjusting plug (1) in to increase pressure setting; turn adjusting plug out to decrease pressure setting.

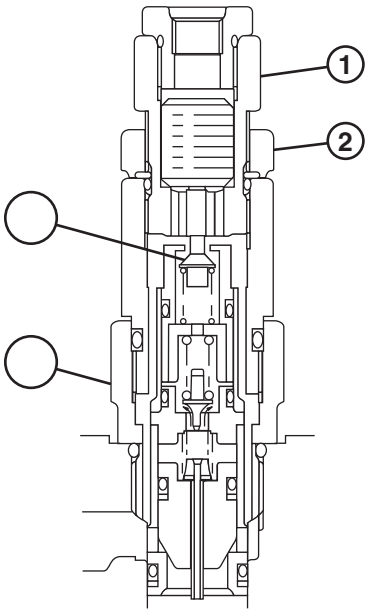
   Hold adjusting plug and then tighten nut.

Specification

Boom Mode Relief Valve	
Adjusting Plug—Pressure Change.....	2.1 MPa approximate per 1/4 turn 2100 kPa approximate per 1/4 turn 21 bar approximate per 1/4 turn 300 psi approximate per 1/4 turn

6. Connect pilot line.

7. Check the pressure setting.



TX1004306 –UN–09MAR06

Boom Mode Relief Valve

1—Adjusting Plug
2—Nut
128—Boom Mode Relief Valve
129—Boom Mode Relief Control Valve

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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

4. Push the pressure release button on top of the hydraulic oil tank to relieve pressure.
   Install 4200465 adapter into test port (1 and 2) on pump one and 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.

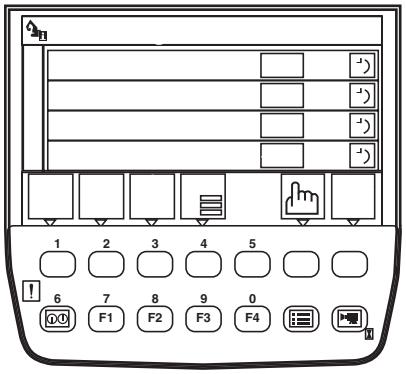
2. Turn second adjusting plug of main relief and power digging valve in 1/2 turn to increase pressure setting. See Main Relief and Power Digging Valve Test and Adjustmentfor adjustment procedure. (Group 9025-25.)

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

Continued on next page

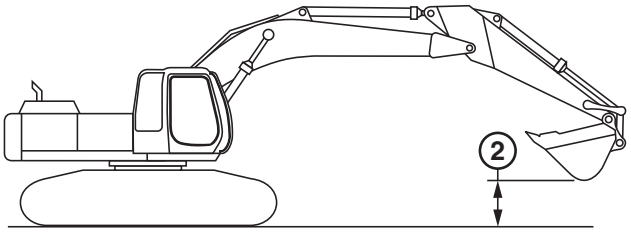
Cylinder Drift Test—Arm, Boom, and Bucket

SPECIFICATIONS	
Hydraulic Oil Temperature	45—55°C 110—130°F
Bucket Load Weight	4650 kg approximate 10,250 lb approximate
Test Time	5 minutes
Boom Cylinder Drift	5 mm or less 0.2 in. or less
Arm Cylinder Drift	18 mm or less 0.7 in. or less
Bucket Cylinder Drift	27 mm or less 1.1 in. or less
Bucket Bottom to Ground Drift	150 cm 60 in.



TX1003295 –19–03MAR06

Display Monitor



T141254 –UN–26APR01

2—150 cm (60 in.)

The following test is used to check the leakage past the cylinder piston seals and past the spools in the control valve.

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 Cylinder Drift Test.
      Or select the following items from the menu:
      - 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:
      - 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 monitor list:
      - Hydraulic Oil Temperature
      - Actual Engine Speed

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TX04577,00000FA –19–05JUN06–1/2

NOTE: The fan drive control valves and motors are connected in parallel. Therefore, the fan drive system relief valve with the lower pressure setting controls the system pressure.

12. Turn the adjusting screw for one of the fan drive system relief valve (38) in to increase pressure setting; turn adjusting screw out to decrease pressure setting.

Specification	
Fan Drive System Relief Valve—Pressure Change	1.7 MPa approximate per 1/4 turn 1723 kPa approximate per 1/4 turn 17.2 bar approximate per 1/4 turn 250 psi approximate per 1/4 turn

A pressure reading that does not increase or decrease means that the other relief valve has a pressure setting that is lower.

Turn the adjusting screw back to its original position and then turn the adjusting screw for the other relief valve in to increase the pressure setting.

OUT3035,0000015 –19–06JUN06–4/4

Specification	
Fan Drive Pump—Flow Rate—Minimum Allowable	88.6 L/min at 17.6 MPa and 1750 rpm 88.6 L/min at 17 580 kPa and 1750 rpm 88.6 L/min at 175.8 bar and 1750 rpm 23.4 gpm at 2550 psi and 1750 rpm
Fan Drive Pump—Flow Rate—Minimum Allowable	70.0 L/min at 21.7 MPa and 1750 rpm 70.0 L/min at 21 720 kPa and 1750 rpm 70.0 L/min at 217.2 bar and 1750 rpm 18.5 gpm at 3150 psi and 1750 rpm

13. Open loading valve. Stop the engine.

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

14. Turn adjusting screw for fan drive system relief valve back to its original setting.

OUT3035,0000019 –19–05JUN06–6/6

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Diagnose Heating 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 Air Conditioner and Heater Operational Checks. (Group 9031-25.) These conditions may affect diagnostic and test results.

Symptom	Problem	Solution
Heater 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 slowly	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.)
	Heater and air conditioner controller malfunction	Check air conditioner diagnostic trouble codes. See Air Conditioner Diagnostic Trouble Code Check. (Group 9031-15.)
Heater Does Not Warm Interior of Cab	Fresh air filter restricted	Clean or replace filter. See Clean Cab Fresh Air and Recirculating Air Filter. (Operator's Manual.)
	Recirculating air filter restricted	Clean or replace filter. See Clean Cab Fresh Air and Recirculating Air Filter. (Operator's Manual.)

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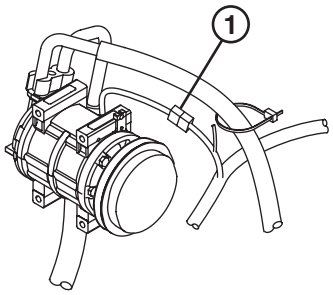
Air Conditioner Compressor Clutch Test

1. Disconnect connector (1) from clutch.
2. Connect battery voltage to clutch connector.
3. Clutch solenoid should engage and will “click”.
4. If clutch solenoid does not engage repair or replace compressor. See Compressor Remove and Install (Group 1830.) and see Compressor Clutch Disassemble and Assemble. (Group 1830.)
5. If clutch solenoid engages check harness. See Air Conditioning Harness (W6) Wiring Diagram. (Group 9015-10.)



T144993 –UN–28AUG01

1—Connector

LD30992,00004B5 –19–23MAR06–1/1

Refrigerant Leak Test

1. Inspect all lines, fittings, and components for oily or dusty spots. When refrigerant leaks from the system, a small amount of oil is carried out with it.
2. A soap and water solution can be sprayed on the components in the system to form bubbles at the source of the leak.
3. If a leak detector is used, move the leak detector probe under the hoses and around the connections at a rate of 25 mm (1 in.) per second.
4. Some refrigerant manufacturers add dye to refrigerant to aid in leak detection.

LD30992,00004B8 –19–23MAR06–1/1