710K
Backhoe Loader
Operation and Test

(PIN: 1T0710KX_ _D219607—)

OPERATION & TEST TECHNICAL MANUAL

710K Backhoe Loader
(PIN: 1T0710KX_ _D219607—)

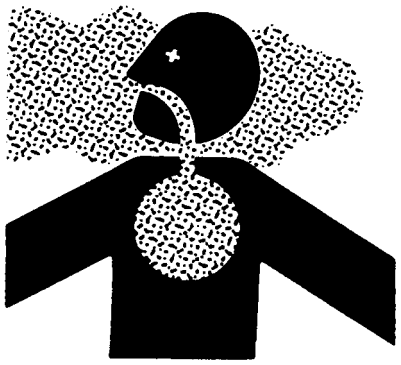
TM12511 15MAY19 (ENGLISH)

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

Work In Ventilated Area

Engine exhaust fumes can cause sickness or death. If it is necessary to run an engine in an enclosed area, remove the exhaust fumes from the area with an exhaust pipe extension.

If you do not have an exhaust pipe extension, open the doors and get outside air into the area.



TS220 —UN—15APR13

DX,AIR -19-17FEB99-1/1

Prevent Fires

Handle Fluids Safely: All fuels, most lubricants, and some coolant mixtures are flammable. Store flammable fluids away from fire hazards. Never refuel machine while smoking or when near sparks or flame.

Clean Machine Regularly: Keep flammable debris (trash, leaves, twigs, straw, and so forth), grease and oil from accumulating in engine compartment, around fuel lines, hydraulic lines, exhaust components, and electrical wiring. Never store oily rags or flammable materials inside a machine compartment.

Maintain Hoses, Tubes, and Wiring: Replace hoses and tubes immediately if they begin to leak, and clean up any oil spills. Examine electrical wiring and connectors frequently for damage.

Keep A Fire Extinguisher Available: Always keep a multipurpose fire extinguisher on or near the machine. Know how to use an extinguisher properly.

Be Aware of the Operating Environment: Airborne debris may contain sparks or embers. Do not operate near any flame.

T133553 —UN—07SEP00

T133554 —UN—07SEP00

T133552 —UN—15APR13

TX,PREVENT,FIRE -19-09JUN16-1/1

Section 9001
Diagnostics

Contents

Continued on next page

3 Component Check	Switched power OFF. Disconnect engine speed control dial (B21). Measure resistance between pins A and B on speed control dial (B21). Does resistance meet specification? **Specification** Engine Speed Control Dial—Resistance (approximate)..... 0—1 kilo-ohms	**YES:** Go to Voltage Check. **NO:** Engine speed control dial (B21) malfunction. Replace engine speed control dial.

RH60123,000077E -19-02OCT12-5/8

4 Voltage Check	Switched power OFF. Engine speed control dial (B21) disconnected. **Switched power ON.** Check for voltage at: • Pin A wire R051 BLK of engine speed dial connector for 0.0 V. • Pin B wire E021 WHT of engine speed dial connector for 0.0 V. • Pin C wire P051 RED of engine speed dial connector for less than 4.76 V. Is correct voltage indicated?	**YES:** Go to Short to Power Check. **NO:** Repair or replace harness. See appropriate wiring diagram or schematic.

RH60123,000077E -19-02OCT12-6/8

5 Short to Power Check	Switched power OFF. Engine speed control dial (B21) disconnected. Disconnect engine speed control pedal (B20). Disconnect ECU 48-pin connector (X42). **Switched power ON.** Check for voltage at: • Pin A wire R051 BLK of engine speed dial connector for 0.0 V. • Pin B wire E021 WHT of engine speed dial connector for 0.0 V. • Pin C wire P051 RED of engine speed dial connector for 0.0 V. Is voltage indicated?	**YES:** Repair or replace harness. See appropriate wiring diagram or schematic. **NO:** Go to Harness Check.

Continued on next page

RH60123,000077E -19-02OCT12-7/8

1 Intermittent Check	Does DTC periodically “go away”?	**YES:** DTC is intermittent. See Intermittent Diagnostic Trouble Code (DTC) Diagnostics. (Group 9015-20.) **NO:** Go to Diagnostic Trouble Code Check.

RH60123,0000798 -19-21SEP12-3/4

2 Diagnostic Trouble Code Check	See Reading Diagnostic Trouble Codes (DTCs). (Group 9015-20.) Check for active engine control unit (ECU) diagnostic trouble codes. • 000190.00 • 000636.02 • 000636.10 • 000637.02 • 000637.07 Are any of the above engine control unit (ECU) codes present?	**YES:** Diagnose and repair active ECU trouble codes. See 4045 PowerTech™ OEM Diesel Engines Below 130kW (175hp)—Interim Tier 4/Stage III B Platform. (CTM104.) **NO:** Program ECU.

RH60123,0000798 -19-21SEP12-4/4

000190.16 — Engine Speed

Engine has exceeded overspeed specification of 2600 rpm.

Alarm Level:

Red Stop Lamp

Additional References: See Engine Control Unit (ECU) Circuit Theory of Operation. (Group 9015-15.)

ML66751,0003638 -19-18MAY12-1/4

Engine Overspeed Moderately High Diagnostic Procedure

ML66751,0003638 -19-18MAY12-2/4

1 Intermittent Check	Does DTC periodically “go away”?	**YES:** DTC is intermittent. See Intermittent Diagnostic Trouble Code (DTC) Diagnostics. (Group 9015-20.) **NO:** Go to Diagnostic Trouble Code Check.

Continued on next page

ML66751,0003638 -19-18MAY12-3/4

2 CAN Circuit Check	Perform Controller Area Network (CAN) Circuit Test. (Group 9015-20.) Does CAN circuit test good?	**YES:** Go to CAN Resistor Check. **NO:** Repair CAN circuit.

RH60123,00008B4 -19-21SEP12-4/5

3 CAN Resistor Check	Perform Controller Area Network (CAN) Resistor Test. (Group 9015-20.) Does CAN resistor test good?	**YES:** Program controller. **NO:** Replace CAN resistor.

RH60123,00008B4 -19-21SEP12-5/5

002071.09 — No CAN From VCU

The engine control unit (ECU) is not receiving the hand throttle message from the vehicle control unit (VCU).

Alarm Level:

Amber Check Service Code Indicator

Additional References:

- See Controller Area Network (CAN) Circuit Theory of Operation. (Group 9015-15.)
- See Engine Control Unit (ECU) Circuit Theory of Operation. (Group 9015-15.)

RH60123,00007A1 -19-12APR12-1/5

Controller Area Network (CAN) Communication Lost For Vehicle Control Unit (VCU) Diagnostic Procedure

RH60123,00007A1 -19-12APR12-2/5

1 Intermittent Check	Does diagnostic trouble code (DTC) periodically “go away”?	**YES:** DTC is intermittent. See Intermittent Diagnostic Trouble Code (DTC) Diagnostics. (Group 9015-20.) **NO:** Go to CAN Circuit Check.

RH60123,00007A1 -19-12APR12-3/5

2 CAN Circuit Check	Perform Controller Area Network (CAN) Circuit Test. (Group 9015-20.) Does CAN circuit test good?	**YES:** Go to CAN Resistor Test. **NO:** Repair CAN circuit.

RH60123,00007A1 -19-12APR12-4/5

3 CAN Resistor Test	Perform Controller Area Network (CAN) Resistor Test. (Group 9015-20.) Does CAN resistor test good?	**YES:** Program controller. **NO:** Replace CAN resistor.

RH60123,00007A1 -19-12APR12-5/5

523702.09 — Flex Power Message Missing

The engine control unit (ECU) is not receiving the flex power message from the vehicle control unit (VCU).

Alarm Level:

Amber Check Service Code Indicator

Additional References:

- See Controller Area Network (CAN) Circuit Theory of Operation. (Group 9015-15.)
- See Engine Control Unit (ECU) Circuit Theory of Operation. (Group 9015-15.)

Continued on next page

RH60123,00007A2 -19-12APR12-1/5

2 CAN Circuit Check	Switched power OFF. Perform CAN circuit test. See Controller Area Network (CAN) Circuit Test. (Group 9015-20.) Does CAN circuit test good?	 **YES:** Go to Program ECU. **NO:** Repair or replace circuit. See appropriate schematic or wiring diagram.

DS35042,0001969 -19-11DEC12-4/6

3 CAN Resistor Check	Switched power OFF. Perform CAN resistor test. Perform Controller Area Network (CAN) Resistor Test. (Group 9015-20.) Does CAN circuit test good?	 **YES:** Go to Software Version Check. **NO:** Repair or replace failed resistor(s).

DS35042,0001969 -19-11DEC12-5/6

4 Software Version Check	Using Service ADVISOR™, verify proper software versions of all controllers. If new software is available, update all controllers and install new software. See Service ADVISOR™ Connection Procedure. (Group 9015-20.) Is correct software stored?	 **YES:** Checks complete. **NO:** Update controller with correct software.

Service ADVISOR is a trademark of Deere & Company

DS35042,0001969 -19-11DEC12-6/6

000237.31 — VIN Missing

Messages are missing or other controllers in CAN network are not completed in the required time.

Alarm Level:

Amber Check Service Code Indicator

Additional References:

See Controller Area Network (CAN) Circuit Theory of Operation. (Group 9015-15.)

DS35042,000196A -19-30MAR12-1/6

VIN Missing Diagnostic Procedure

DS35042,000196A -19-30MAR12-2/6

1 Intermittent Check	Does diagnostic trouble code (DTC) periodically “go away”?	**YES:** DTC is intermittent. See Intermittent Diagnostic Trouble Code (DTC) Diagnostics. (Group 9015-20.) **NO:** Go to

Continued on next page

DS35042,000196A -19-30MAR12-3/6

2 CAN Resistor Check	Perform Controller Area Network (CAN) Resistor Test. (Group 9015-20.) Did CAN resistance check within specification?	**YES:** Go to CAN Circuit Check. **NO:** Replace CAN resistor.

DS35042,0001971 -19-30MAR12-4/5

3 CAN Circuit Check	Perform Controller Area Network (CAN) Circuit Test. (Group 9015-20.) Did CAN circuit check within specification?	**YES:** Checks complete. **NO:** Repair or replace harness. See appropriate wiring diagram or schematic.

DS35042,0001971 -19-30MAR12-5/5

002228.09 — No CAN from HVC

Loss of controller area network (CAN) communication with hydraulic valve controller (HVC).

For more information:

- See Vehicle Control Unit (VCU) Circuit Theory of Operation. (Group 9015-15.)
- See Controller Area Network (CAN) Circuit Theory of Operation. (Group 9015-15.)
- See Standard Display Monitor (SDM) Circuit Theory of Operation. (Group 9015-15.)

DS35042,0001972 -19-30MAR12-1/5

NO CAN From PDU Diagnostic Procedure

DS35042,0001972 -19-30MAR12-2/5

1 Intermittent Check	Does diagnostic trouble code (DTC) periodically “go away”?	**YES:** DTC is intermittent. See Intermittent Diagnostic Trouble Code (DTC) Diagnostics. (Group 9015-20.) **NO:** Go to CAN Resistor Check.

DS35042,0001972 -19-30MAR12-3/5

2 CAN Resistor Check	Perform Controller Area Network (CAN) Resistor Test. (Group 9015-20.) Did CAN resistance check within specification?	**YES:** Go to CAN Circuit Check. **NO:** Replace CAN resistor.

DS35042,0001972 -19-30MAR12-4/5

3 CAN Circuit Check	Perform Controller Area Network (CAN) Circuit Test. (Group 9015-20.) Did CAN circuit check within specification?	**YES:** Checks complete. **NO:** Repair or replace harness. See appropriate wiring diagram or schematic.

DS35042,0001972 -19-30MAR12-5/5

000191.00 — Transmission Speed

Transmission output speed sensor (B14) is reading above 4000 rpm.

When transmission output speed sensor (B14) is invalid the transmission will default to manual mode.

Alarm Level:

Red Stop Lamp Indicator

Additional References:

- See Transmission Control Circuit Theory of Operation. (Group 9015-15.)
- See Vehicle Control Unit (VCU) Circuit Theory of Operation. (Group 9015-15.)
- See Power Train Overview. (Group 9020-05.)

ML66751,0002359 -19-16OCT15-1/5

Transmission Speed Diagnostic Procedure

ML66751,0002359 -19-16OCT15-2/5

1 Active Code Check	Check for any active TCU or VCU codes. Are any TCU or VCU codes active?	**YES:** Diagnose and clear all active TCU and VCU codes. **NO:** Program controller.

ML66751,0002359 -19-16OCT15-3/5

2 Machine Operation Check	Clear active diagnostic trouble codes. Operate machine on smooth level surface through all gear ranges. Check for active TCU code 000191.00—Transmission Speed. Is code active?	 **YES:** Go to Equipment Check. **NO:** Checks complete. Instruct owner/operator of proper machine operations.

ML66751,0002359 -19-16OCT15-4/5

3 Equipment Check	Check machine tires for proper inflation and size. See Tire Pressures. (Operator's Manual.) Are tires properly inflated and correct size?	**YES:** Checks complete. **NO:** Inflate tire to specification or replace with appropriate size.

ML66751,0002359 -19-16OCT15-5/5

000191.03 — Transmission Speed

Transmission output speed sensor (B14) out of range high.

When transmission output speed sensor (B14) is invalid the transmission will default to manual mode.

Alarm Level:

Amber Check Service Code Indicator

Additional References:

- See Transmission Control Circuit Theory of Operation. (Group 9015-15.)
- See Vehicle Control Unit (VCU) Circuit Theory of Operation. (Group 9015-15.)
- See Power Train Overview. (Group 9020-05.)

ML66751,000235B -19-16OCT15-1/6

Transmission Speed Diagnostic Procedure

Continued on next page

ML66751,000235B -19-16OCT15-2/6

6 Continuity Check	Switched power OFF. Disconnect vehicle control unit (VCU) connector 1 (X11). Disconnect vehicle control unit (VCU) connector 2 (X12). Disconnect vehicle control unit (VCU) connector 3 (X13). Check for continuity between: • Pin 2 (T105 BLU) of TCL connector (X48) and pin 7 of VCU connector (X12). • Pin 3 (T205 BLU) of TCL connector (X48) and pin 19 of VCU connector (X12). • Pin 4 (T605 BLU) of TCL connector (X48) and pin C2 of VCU connector (X11). • Pin 5 (T505 BLU) of TCL connector (X48) and pin A3 of VCU connector (X11). • Pin 6 (T705 BLU) of TCL connector (X48) and pin C1 of VCU connector (X11). • Pin 7 (T305 BLU) of TCL connector (X48) and pin 20 of VCU connector (X12). • Pin 8 (T405 BLU) of TCL connector (X48) and pin 8 of VCU connector (X12). • Pin 12 (G001 BLK) of TCL connector (X48) and machine ground. Is continuity indicated?	**YES:** Program controller. **NO:** Repair or replace harness. See appropriate wiring diagram or schematic.

ML66751,0002379 -19-04APR12-8/8

000604.04 — TCL Neutral SW

Forward, neutral, reverse (FNR) switch (S5) input short to ground.

Amber Check Service Code Indicator

Additional References:

- See Transmission Control Circuit Theory of Operation. (Group 9015-15.)
- See Vehicle Control Unit (VCU) Circuit Theory of Operation. (Group 9015-15.)

ML66751,000237A -19-11DEC12-1/6

TCL Neutral SW Diagnostic Procedure

ML66751,000237A -19-11DEC12-2/6

1 Transmission Control Lever Check	Check transmission control lever (TCL). See Transmission Control Lever (TCL) Test. (Group 9015-20.) Did TCL check OK?	**YES:** Go to Intermittent Check. **NO:** Repair or replace TCL.

ML66751,000237A -19-11DEC12-3/6

2 Intermittent Check	Does diagnostic trouble code (DTC) periodically “go away”?	**YES:** DTC is intermittent. See Intermittent Diagnostic Trouble Code (DTC) Diagnostics. (Group 9015-20.) **NO:** Go to Connector Check.

Continued on next page

ML66751,000237A -19-11DEC12-4/6

1 Intermittent Check	Does diagnostic trouble code (DTC) periodically “go away”?	**YES:** DTC is intermittent. See Intermittent Diagnostic Trouble Code (DTC) Diagnostics. (Group 9015-20.) **NO:** Go to Connector Check.

ML66751,0002362 -19-11DEC12-3/7

2 Connector Check	Switched power OFF. Check the following connectors for damage, corrosion, or debris. Use JDG10466 Flex Probe Kit to check for pin fit and continuity. • Transmission reverse direction solenoid (Y2). See Transmission Harness (W13) Component Location. (Group 9015-10.) • Transmission harness-to-cab/canopy harness connector (X21). See Transmission Harness (W13) Component Location. (Group 9015-10.) • Vehicle control unit (VCU) connector 1 (X11). See Cab Harness (W14) Component Location. (Group 9015-10.) Are connectors in good condition and free of corrosion and debris?	**YES:** Go to Voltage Check. **NO:** Repair or replace connector.

ML66751,0002362 -19-11DEC12-4/7

3 Voltage Check	Switched power OFF. Disconnect transmission reverse direction solenoid (Y2). Disconnect VCU connector (X11). Switched power ON. Check for voltage at pin A (wire T002 BLU) of transmission reverse direction solenoid (Y2). Is voltage (approximately 12 V) indicated?	**YES:** Go to Harness Check. **NO:** Go to Component Check.

ML66751,0002362 -19-11DEC12-5/7

4 Component Check	Switched power OFF. Transmission reverse direction solenoid (Y2) disconnected. Check for resistance between pin A and pin B of transmission reverse direction solenoid (Y2). See Electrical Component Specifications. (Group 9015-20.) Is correct resistance indicated?	**YES:** Go to Harness Check. **NO:** Replace transmission reverse direction solenoid (Y2).

Continued on next page

ML66751,0002362 -19-11DEC12-6/7

000737.05 — Y4 Solenoid

Transmission speed solenoid 2 (Y4) circuit is open.

Alarm Level:

Amber Check Service Code Indicator

Additional References:

- See Transmission Control Circuit Theory of Operation. (Group 9015-15.)
- See Vehicle Control Unit (VCU) Circuit Theory of Operation. (Group 9015-15.)
- See Wire Harness Test. (Group 9015-20.)
- See Transmission Control Circuit Test. (Group 9015-20.)
- See Transmission Solenoid Check. (Group 9015-20.)

ML66751,0002369 -19-11DEC12-1/6

Y4 Solenoid Diagnostic Procedure

ML66751,0002369 -19-11DEC12-2/6

1 Intermittent Check	Does diagnostic trouble code (DTC) periodically "go away"?	**YES:** DTC is intermittent. See Intermittent Diagnostic Trouble Code (DTC) Diagnostics. (Group 9015-20.) **NO:** Go to Connector Check.

ML66751,0002369 -19-11DEC12-3/6

2 Connector Check	Switched power OFF. Check the following connectors for damage, corrosion, or debris. Use JDG10466 Flex Probe Kit to check for pin fit and continuity. • Transmission speed solenoid 2 (Y4). See Transmission Harness (W13) Component Location. (Group 9015-10.) • Frame ground near starter motor (W1). See Transmission Harness (W13) Component Location. (Group 9015-10.) • Transmission harness-to-cab/canopy harness connector (X21). See Transmission Harness (W13) Component Location or see Canopy Harness (W15) Component Location. (Group 9015-10.) • Vehicle control unit (VCU) connector 3 (X13). See Cab Harness (W14) Component Location. (Group 9015-10.) Are connectors in good condition and free of corrosion and debris?	**YES:** Go to Component Check. **NO:** Repair or replace connector.

ML66751,0002369 -19-11DEC12-4/6

3 Component Check	Switched power OFF. Disconnect transmission speed solenoid 2 (Y4). Check for resistance between pin A and pin B of transmission speed solenoid (Y4). See Electrical Component Specifications. (Group 9015-20.) Is correct resistance indicated?	**YES:** Go to Continuity Check. **NO:** Replace transmission speed solenoid (Y4).

Continued on next page

ML66751,0002369 -19-11DEC12-5/6

2 Connector Check	Switched power OFF. Check the following connectors for damage, corrosion, or debris. Use JDG10466 Flex Probe Kit to check for pin fit and continuity. • Transmission speed solenoid 4 (Y6). See Transmission Harness (W13) Component Location. (Group 9015-10.) • Frame ground near starter motor (W1). See Transmission Harness (W13) Component Location. (Group 9015-10.) • Transmission harness-to-cab/canopy harness connector (X21). See Transmission Harness (W13) Component Location or see Canopy Harness (W15) Component Location. (Group 9015-10.) • Vehicle control unit (VCU) connector 3 (X13). See Cab Harness (W14) Component Location. (Group 9015-10.) Are connectors in good condition and free of corrosion and debris?	**YES:** Go to Component Check. **NO:** Repair or replace connector.

ML66751,0002370 -19-11DEC12-4/6

3 Component Check	Switched power OFF. Disconnect transmission speed solenoid 4 (Y6). Check for resistance between pin A and pin B of transmission speed solenoid 4 (Y6). See Electrical Component Specifications. (Group 9015-20.) Is correct resistance indicated?	**YES:** Go to Short to Ground Check. **NO:** Replace transmission speed solenoid 4 (Y6).

ML66751,0002370 -19-11DEC12-5/6

4 Short to Ground Check	Switched power OFF. Transmission speed solenoid 4 (Y6) disconnected. Disconnect VCU connector (X13). Check for continuity between pin A (wire T006 BLU) of transmission speed solenoid 4 (Y6) and machine ground. Is continuity indicated?	**YES:** Repair or replace harness. See appropriate wiring diagram or schematic. **NO:** Checks complete.

ML66751,0002370 -19-11DEC12-6/6

000746.03 — Differential Lock

Differential lock solenoid (Y10) short to power.

Alarm Level:

Amber Amber Check Service Code Indicator

Additional References:

- See Transmission Control Circuit Theory of Operation. (Group 9015-15.)
- See Vehicle Control Unit (VCU) Circuit Theory of Operation. (Group 9015-15.)
- See Wire Harness Test. (Group 9015-20.)
- See Differential Operation. (Group 9020-05.)
- See Differential Lock Operation. (Group 9020-05.)
- See Differential Lock Pressure Test. (Group 9020-25.)

ML66751,0002372 -19-11DEC12-1/7

Differential Lock Diagnostic Procedure

Continued on next page

ML66751,0002372 -19-11DEC12-2/7

2 Connector Check	Switched power OFF. Check the following connectors for damage, corrosion, or debris. Use JDG10466 Flex Probe Kit to check for pin fit and continuity. • Left brake/tail light (E9). See Roof Harness (W17) Component Location. (Group 9015-10.) • Right brake/tail light (E10). See Roof Harness (W17) Component Location. (Group 9015-10.) • Roof ground (W3). See Roof Harness (W17) Component Location. (Group 9015-10.) • Cab/canopy harness-to-roof harness connector (X26).See Cab Harness (W14) Component Location or see Canopy Harness (W15) Component Location. (Group 9015-10.) • Vehicle control unit (VCU) connector 3 (X13). See Cab Harness (W14) Component Location or see Canopy Harness (W15) Component Location. (Group 9015-10.) Are connectors in good condition and free of corrosion or debris?	**YES:** Go to next check. **NO:** Repair or replace connector.

DD00738,0000238 -19-23SEP14-4/6

3 Short to Ground Check	Switched power OFF. Disconnect left brake/tail light (E9). Disconnect right brake/tail light (E10). Check for continuity between pin A of both left brake/tail light (E9) and right brake/tail light (E10) and machine ground. Is continuity indicated?	**YES:** Circuit is short to ground. Repair circuit or replace harness. See appropriate wiring diagram or schematic. **NO:** Go to next check.

DD00738,0000238 -19-23SEP14-5/6

4 Component Check	Switched power OFF. Left brake/tail light (E9) disconnected. Right brake/tail light (E10) disconnected. Check for resistance between pins A (L046 BRN) and G (G020 BLK) of left brake/tail light (E9) and right brake/tail light (E10). Is resistance indicated?	**YES:** Program vehicle control unit (VCU). **NO:** Light is internally short to ground. Replace light.

DD00738,0000238 -19-23SEP14-6/6

000903.05 — TCL Forward SW

Forward, neutral, reverse (FNR) switch (S5) circuit is open.

Alarm Level:

Amber Check Service Code Indicator

Additional References:

- See Transmission Control Circuit Theory of Operation. (Group 9015-15.)
- See Vehicle Control Unit (VCU) Circuit Theory of Operation. (Group 9015-15.)

ML66751,000237C -19-01MAR17-1/8

Requested Gear Diagnostic Procedure

Continued on next page

ML66751,000237C -19-01MAR17-2/8

❸ **CAN Circuit Check**	Perform Controller Area Network (CAN) Circuit Test. (Group 9015-20.) Did CAN circuit check within specification?	**YES:** Program controller. **NO:** Repair or replace harness. See appropriate wiring diagram or schematic.

DS35042,0000D92 -19-11DEC12-5/5

002213.09 — No CAN From JSR

The right joystick controller (JSR) has lost CAN communication with vehicle control unit (VCU).

Additional References:

- See Vehicle Control Unit (VCU) Circuit Theory of Operation. (Group 9015-15.)
- See Controller Area Network (CAN) Circuit Theory of Operation. (Group 9015-15.)

ML66751,0002384 -19-11DEC12-1/5

NO CAN From JSR Diagnostic Procedure

ML66751,0002384 -19-11DEC12-2/5

❶ **Intermittent Check**	Does diagnostic trouble code (DTC) periodically “go away”?	**YES:** DTC is intermittent. See Intermittent Diagnostic Trouble Code (DTC) Diagnostics. (Group 9015-20.) **NO:** Go to CAN Resistor Check.

ML66751,0002384 -19-11DEC12-3/5

❷ **CAN Resistor Check**	Perform Controller Area Network (CAN) Resistor Test. (Group 9015-20.) Did CAN resistance check within specification?	**YES:** Go to CAN Circuit Check. **NO:** Replace CAN resistor.

ML66751,0002384 -19-11DEC12-4/5

❸ **CAN Circuit Check**	Perform Controller Area Network (CAN) Circuit Test. (Group 9015-20.) Did CAN circuit check within specification?	**YES:** Program controller. **NO:** Repair or replace harness. See appropriate wiring diagram or schematic.

ML66751,0002384 -19-11DEC12-5/5

002392.03 — Brake Lights

Backup light circuit is short to power.

IMPORTANT: 315SK, 325SK and 710K ONLY

Alarm Level:

Amber Check Service Code Indicator

Additional References:

- See Transmission Control Circuit Theory of Operation. (Group 9015-15.)
- See Vehicle Control Unit (VCU) Circuit Theory of Operation. (Group 9015-15.)
- See Wire Harness Test. (Group 9015-20.)

Continued on next page

TX04577,000001D -19-05DEC13-1/6

5 Harness Check	Switched power OFF. Transmission control lever (TCL) connector (X48) disconnected. Disconnect vehicle control unit (VCU) connector 1 (X11). Disconnect vehicle control unit (VCU) connector 2 (X12). Disconnect vehicle control unit (VCU) connector 3 (X13). Check for continuity between pins listed bellow and all other pins of VCU connectors (X11, X12, and X13). • Pin A3 (T505 BLU) of VCU connector (X11). • Pin C1 (T705 BLU) of VCU connector (X11). • Pin C2 (T605 BLU) of VCU connector (X11). • Pin 7 (T105 BLU) of VCU connector (X12). • Pin 8 (T405 BLU) of VCU connector (X12). • Pin 19 (T205 BLU) of VCU connector (X12). • Pin 20 (T305 BLU) of VCU connector (X12). • Pin 12 (G001 BLK) of TCL connector (X48). Is continuity indicated between pins?	**YES:** Repair or replace harness. See appropriate wiring diagram or schematic. **NO:** Program controller.

ML66751,000237F -19-11DEC12-7/7

004312.03 — TCL Selector

Forward, neutral, reverse (FNR) switch (S5) inputs shorted to power.

Alarm Level:

Amber Check Service Code Indicator

Additional References:

- See Transmission Control Circuit Theory of Operation. (Group 9015-15.)
- See Vehicle Control Unit (VCU) Circuit Theory of Operation. (Group 9015-15.)

ML66751,0002380 -19-11DEC12-1/7

Requested Gear Diagnostic Procedure

ML66751,0002380 -19-11DEC12-2/7

1 Transmission Control Lever Check	Check transmission control lever (TCL). See Transmission Control Lever (TCL) Test. (Group 9015-20.) Did TCL check OK?	**YES:** Go to Intermittent Check. **NO:** Repair or replace TCL.

ML66751,0002380 -19-11DEC12-3/7

2 Intermittent Check	Does diagnostic trouble code (DTC) periodically “go away”?	**YES:** DTC is intermittent. See Intermittent Diagnostic Trouble Code (DTC) Diagnostics. (Group 9015-20.) **NO:** Go to Connector Check.

Continued on next page

ML66751,0002380 -19-11DEC12-4/7

4 Circuit Check	Switched power OFF. Brake pressure sensor 1 (B52) disconnected. Brake pressure sensor 2 (B53) disconnected. Disconnect vehicle control unit (VCU) connector 1 (X11). Disconnect vehicle control unit (VCU) connector 2 (X12). Check for continuity between: • Pin K1 (wire P059 RED) of VCU connector (X11) and pin 2 of brake pressure sensor 1 (B52). • Pin K1 (wire P059 RED) of VCU connector (X11) and pin 2 of brake pressure sensor 2 (B53). Is continuity indicated?	**YES:** Program controller. **NO:** Repair or replace harness. See appropriate wiring diagram or schematic.

ML66751,00023A4 -19-11DEC12-6/7

5 Harness Check	Switched power OFF. Brake pressure sensor harness connector (X35) disconnected. Disconnect vehicle control unit (VCU) connector 1 (X11). Disconnect vehicle control unit (VCU) connector 2 (X12). Disconnect vehicle control unit (VCU) connector 3 (X13). Check for continuity between pins listed bellow and all other pins of VCU connectors (X11, X12, and X13) and machine ground. • Pin K1 (wire P059 RED) of VCU connector (X11). • Pin L2 (wire R059 BLK) of VCU connector (X11). • Pin 24 (wire N052 YEL) of VCU connector (X12). • Pin 25 (wire N053 YEL) of VCU connector (X12). Is continuity indicated between pins or machine ground?	**YES:** Repair or replace harness. See appropriate wiring diagram or schematic. **NO:** Program controller.

ML66751,00023A4 -19-11DEC12-7/7

522379.03 — Park Brake

Park brake release solenoid (Y7) high side driver circuit is short to power.

Alarm Level:

Amber Check Service Code Indicator

Additional References:

- See Transmission Control Circuit Theory of Operation. (Group 9015-15.)
- See Vehicle Control Unit (VCU) Circuit Theory of Operation. (Group 9015-15.)
- See Wire Harness Test. (Group 9015-20.)
- See Park Brake Operation. (Group 9020-05.)
- See Park Brake Release Pressure Test. (Group 9020-25.)

ML66751,0002394 -19-11DEC12-1/7

Park Brake Diagnostic Procedure

Continued on next page

ML66751,0002394 -19-11DEC12-2/7

523689.04 — Diff Lock Switch

Differential lock switch (S10) circuit is short to ground.

Alarm Level:

Amber Check Service Code Indicator

Additional References:

- See Transmission Control Circuit Theory of Operation. (Group 9015-15.)
- See Vehicle Control Unit (VCU) Circuit Theory of Operation. (Group 9015-15.)
- See Wire Harness Test. (Group 9015-20.)
- See Differential Operation. (Group 9020-05.)
- See Differential Lock Operation. (Group 9020-05.)
- See Differential Lock Pressure Test. (Group 9020-25.)

ML66751,000239B -19-11DEC12-1/6

Diff Lock Switch Diagnostic Procedure

ML66751,000239B -19-11DEC12-2/6

1 Intermittent Check	Does diagnostic trouble code (DTC) periodically “go away”?	**YES:** DTC is intermittent. See Intermittent Diagnostic Trouble Code (DTC) Diagnostics. (Group 9015-20.) **NO:** Go to Connector Check.

ML66751,000239B -19-11DEC12-3/6

2 Connector Check	Switched power OFF. Check the following connectors for damage, corrosion, or debris. Use JDG10466 Flex Probe Kit to check for pin fit and continuity. • Differential lock switch (S10). See Cab Harness (W14) Component Location or see Canopy Harness (W15) Component Location. (Group 9015-10.) • Vehicle control unit (VCU) connector 2 (X12). See Cab Harness (W14) Component Location or see Canopy Harness (W15) Component Location. (Group 9015-10.) Are connectors in good condition and free of corrosion and debris?	**YES:** Go to Component Check. **NO:** Repair or replace connector.

ML66751,000239B -19-11DEC12-4/6

3 Component Check	Switched power OFF. Disconnect differential lock switch (S10). Check for continuity between pin A and pin B of differential lock switch (S10) in OFF position. Is continuity indicated in OFF position?	**YES:** Replace differential lock switch (S10). **NO:** Go to Harness Check.

ML66751,000239B -19-11DEC12-5/6

4 Harness Check	Switched power OFF. Differential lock switch (S10) disconnected. Disconnect VCU connector (X11, X12, and X13). Check for continuity between pin 31 (wire W010 BLU) of VCU connector (X12) and machine ground. Is continuity indicated?	**YES:** Repair or replace harness. See appropriate wiring diagram or schematic. **NO:** Checks complete.

ML66751,000239B -19-11DEC12-6/6

Clutch Disconnect Diagnostic Procedure

ML66751,00023A1 -19-11DEC12-2/5

1 Intermittent Check	Does diagnostic trouble code (DTC) periodically “go away”?	**YES:** DTC is intermittent. See Intermittent Diagnostic Trouble Code (DTC) Diagnostics. (Group 9015-20.) **NO:** Go to CAN Resistor Check.

ML66751,00023A1 -19-11DEC12-3/5

2 CAN Resistor Check	Perform Controller Area Network (CAN) Resistor Test. (Group 9015-20.) Did CAN resistance check within specification?	**YES:** Go to CAN Circuit Check. **NO:** Replace CAN resistor.

ML66751,00023A1 -19-11DEC12-4/5

3 CAN Circuit Check	Perform Controller Area Network (CAN) Circuit Test. (Group 9015-20.) Did CAN circuit check within specification?	**YES:** Program controller. **NO:** Repair or replace harness. See appropriate wiring diagram or schematic.

ML66751,00023A1 -19-11DEC12-5/5

000677.06 — Start Relay

Starter relay (K5) circuit is short to ground. (IT4 Only.)

Alarm Level:
Amber Check Service Code Indicator

Additional References:

- See Vehicle Control Unit (VCU) Circuit Theory of Operation. (Group 9015-15.)
- See Start and Charge Circuit Theory of Operation. (Group 9015-15.)
- See Controller Area Network (CAN) Circuit Theory of Operation. (Group 9015-15.)
- See Engine Control Unit (ECU) Circuit Theory of Operation. (Group 9015-15.)
- See Wire Harness Test. (Group 9015-20.)
- See Vehicle Control Unit (VCU) Output Test. (Group 9015-20.)

ML66751,00033E2 -19-11DEC12-1/7

Starter Relay Open Circuit Diagnostic Procedure

ML66751,00033E2 -19-11DEC12-2/7

1 Intermittent Check	Does diagnostic trouble code (DTC) periodically “go away”?	**YES:** DTC is intermittent. See Intermittent Diagnostic Trouble Code (DTC) Diagnostics. (Group 9015-20.) **NO:** Go to Connector Check

ML66751,00033E2 -19-11DEC12-3/7

2 Connector Check	Switched power OFF. Check the following connectors for damage, corrosion, or debris. Use JDG10466 Flex Probe Kit to check for pin fit and continuity. • Starter relay (K5). See Engine Harness (W10) Component Location. (Group 9015-10.) • ECU connector 3 (X5503). See Engine Harness (W10) Component Location. (Group 9015-10.) Are connectors in good condition and free of corrosion and debris?	**YES:** Go to Component Check. **NO:** Repair or replace connector.

ML66751,00033E2 -19-11DEC12-4/7

3 Component Check	Switched power OFF. Disconnect negative battery terminal. Disconnect starter relay (K5). **IMPORTANT: Starter relay (K5) contains a diode between terminal C1 and C2.** Check for continuity between terminal C1 (positive) and terminal C2 (negative) of starter relay (K5). Is continuity indicated?	**YES:** Replace starter relay (K5). **NO:** Go to Short Circuit Check.

Continued on next page

ML66751,00033E2 -19-11DEC12-5/7

5 Continuity Check	Switched power OFF. Load sense pressure sensor (B16) disconnected. Disconnect: • Vehicle control unit (VCU) connector 1 (X11). • Vehicle control unit (VCU) connector 2 (X12). Check for continuity between: • Pin 1 (wire R055 BLK) of load sense pressure sensor (B16) and pin H2 of VCU connector X11. • Pin 2 (wire P055 RED) of load sense pressure sensor (B16) and pin J2 of VCU connector X11. • Pin 4 (wire N030 YEL) of load sense pressure sensor (B16) and pin 13 of VCU connector X12 . Is continuity indicated?	**YES:** Go to Short Circuit Check. **NO:** Circuit with out continuity is open. Repair circuit or replace harness. See appropriate wiring diagram or schematic.

DS35042,000274B -19-11DEC12-7/9

6 Short Circuit Check	Switched power OFF. Load sense pressure sensor (B16) disconnected. VCU connectors X11 and X12 disconnected. Check for continuity between: • Pin 1 (wire R055 BLK) of load sense pressure sensor (B16) and machine ground. • Pin 2 (wire P055 RED) of load sense pressure sensor (B16) and machine ground. • Pin 4 (wire N030 YEL) of load sense pressure sensor (B16) and machine ground. Is continuity indicated?	**YES:** Circuit with continuity indicated is short to ground. Repair circuit or replace harness. See appropriate wiring diagram or schematic. **NO:** Go to Harness Check.

Continued on next page

DS35042,000274B -19-11DEC12-8/9

2 Connector Check	Switched power OFF. Check the following connectors for damage, corrosion, or debris. Use JDG10466 Flex Probe Kit to check for pin fit and continuity. • Left front turn signal (E12). See Roof Harness (W17) Component Location. (Group 9015-10.) • Left rear turn signal (E11). See Roof Harness (W17) Component Location. (Group 9015-10.) • Right front turn signal (E14). See Roof Harness (W17) Component Location. (Group 9015-10.) • Right rear turn signal (E13). See Roof Harness (W17) Component Location. (Group 9015-10.) • Roof ground (W3). See Roof Harness (W17) Component Location. (Group 9015-10.) • Cab/canopy harness-to-roof harness connector (X26).See Cab Harness (W14) Component Location or see Canopy Harness (W15) Component Location. (Group 9015-10.) • Vehicle control unit (VCU) connector 2 (X12). See Cab Harness (W14) Component Location or see Canopy Harness (W15) Component Location. (Group 9015-10.) Are connectors in good condition and free of corrosion or debris?	**YES:** Go to Component Check — Left. **NO:** Repair or replace connector.

DS35042,0000E39 -19-11DEC12-4/7

3 Component Check — Left	Switched power OFF. Disconnect left front turn signal (E12). Disconnect left rear turn signal (E11). Check for continuity. Is continuity indicated?	**YES:** Go to Component Check — Right. **NO:** Replace left front turn signal (E12) or left rear turn signal (E11).

DS35042,0000E39 -19-11DEC12-5/7

4 Component Check — Right	Switched power OFF. Disconnect right front turn signal (E14). Disconnect right rear turn signal (E13). Check for continuity. Is continuity indicated?	**YES:** Go to Circuit Check. **NO:** Replace right front turn signal (E14) or right rear turn signal (E13).

Continued on next page

DS35042,0000E39 -19-11DEC12-6/7

5 Voltage Check	Left front work light (E5) disconnected. Right front work light (E6) disconnected. Switched power ON. Check voltage at: • Pin 1 (wire L042BRN) of left front work light (E5) for system voltage (approximately 12 V). • Pin 2 (wire G020 BLK) of left front work light (E5) for 0.0 V. • Pin 1 (wire L042 BRN) of right front work light (E6) for system voltage (approximately 12 V). • Pin 2 (wire G020 BLK) of right front work light (E6) for 0.0 V. Is correct voltage indicated?	**YES:** Go to Open Circuit Check. **NO:** Repair or replace harness. See appropriate wiring diagram or schematic.

DS35042,0000D97 -19-11DEC12-7/9

6 Open Circuit Check	Switched power OFF. Left front work light (E5) disconnected. Right front work light (E6) disconnected. Disconnect VCU connector (X13). Check for continuity between: • Pin 1 (wire L042 BRN) of left front work light (E5) and pin 4 of VCU connector (X13). • Pin 1 (wire L042 BRN) of right front work light (E6) and pin 4 of VCU connector (X13). • Pin 2 (wire G020 BLK) of left front work light (E5) and machine ground. • Pin 2 (wire G020 BLK) of right front work light (E6) and machine ground. Is continuity indicated?	**YES:** Go to Harness Check. **NO:** Repair or replace harness. See appropriate wiring diagram or schematic.

DS35042,0000D97 -19-11DEC12-8/9

7 Harness Check	Switched power OFF. Disconnect VCU connector (X13). Left front work light (E5) disconnected. Right front work light (E6) disconnected. Check for continuity between pin 4 of VCU connector (X13) and all other pins in VCU connector (X13). Is continuity indicated?	**YES:** Short to power. Repair or replace harness. See appropriate wiring diagram or schematic. **NO:** Checks complete.

DS35042,0000D97 -19-11DEC12-9/9

4 Right Component Check	Switched power OFF.	
	Disconnect right rear work light (E3).	
	Check light for continuity.	**YES:** Go to Short Circuit Check.
	Is continuity indicated?	**NO:** Replace right rear work light (E3).

DS35042,0000E43 -19-11DEC12-6/8

5 Short Circuit Check	Ignition OFF.	
	Left rear work light (E2) disconnected.	
	Right rear work light (E3) disconnected.	
	Disconnect VCU connector (X13).	
	Check circuit L041 BRN for power at pin A of turn signals (E2 and E3) harness connectors.	**YES:** Circuit L040 BRN is short to power. Repair circuit or replace harness. See appropriate wiring diagram or schematic.
	Is voltage present?	**NO:** Go to Harness Check.

DS35042,0000E43 -19-11DEC12-7/8

6 Harness Check	Turn battery disconnect switch OFF.	
	Left rear work light (E2) disconnected.	
	Right rear work light (E3) disconnected.	
	Disconnect VCU connector (X11, X12, X13, and X14).	
	Check for continuity between pin 2 (wire L041 BRN) on VCU connector (X13) and all other pins on VCU connector (X11, X12, X13, and X14).	**YES:** Circuit L041 BRN is short to circuit that indicated continuity. Repair circuit or replace harness. See appropriate wiring diagram or schematic.
	Is continuity indicated?	**NO:** Program vehicle control unit (VCU).

DS35042,0000E43 -19-11DEC12-8/8

002362.05 — Rear Work Lights

Left rear work light (if equipped) (E2) or right rear work light (if equipped) (E3) circuit is open.

Alarm Level:
Amber Check Service Code Indicator

Additional References:

- See Vehicle Control Unit (VCU) Circuit Theory of Operation. (Group 9015-15.)
- See Start and Charge Circuit Theory of Operation. (Group 9015-15.)
- See Controller Area Network (CAN) Circuit Theory of Operation. (Group 9015-15.)
- See Horn, Lights, and Beacon Circuit Theory of Operation. (Group 9015-15.)
- See Wire Harness Test. (Group 9015-20.)
- See Vehicle Control Unit (VCU) Output Test. (Group 9015-20.)

DS35042,0000D99 -19-11DEC12-1/9

Rear Work Lights Diagnostic Procedure

Continued on next page

DS35042,0000D99 -19-11DEC12-2/9

2 Connector Check	Switched power OFF. Check the following connectors for damage, corrosion, and debris. Use JDG10466 Flex Probe Kit to check for pin fit and continuity. • Left front drive light/turn signal connector (X32). See Roof Harness (W17) Component Location. (Group 9015-10.) • Cab/canopy harness-to-roof harness connector (X26). See Cab Harness (W14) Component Location. (Group 9015-10.) • (S.N. —232969): Left rear turn signal (E39) connector. See Roof Harness (W17) Component Location. (Group 9015-10.) • (S.N. 235590—): Left rear light assembly (E45) connector. See Rear Frame Harness (W38) Component Location. (Group 9015-10.) • Turn signal switch (S30) connector. See Cab Harness (W14) Component Location. (Group 9015-10.) • Rear frame harness connector (X33). See Rear Frame Harness (W38) Component Location. (Group 9015-10.) • Vehicle control unit (VCU) connector 2 (X12). See Cab Harness (W14) Component Location. (Group 9015-10.) Are connectors in good condition and free of corrosion and debris?	**YES:** Go to Short Circuit Check. **NO:** Repair or replace connectors.

AB51738,0000112 -19-12SEP13-4/6

3 Short Circuit Check	Switched power OFF. Disconnect left front drive light/turn signal connector (X32). (S.N. —232969): Disconnect left rear turn signal (E39) connector. (S.N. 235590—): Disconnect left rear light assembly (E45) connector. Disconnect VCU connector (X12). Switched power ON. All driving lights, work lights, and beacon light (if equipped) switched ON. Check circuit L048 BRN for power at pin 30 of VCU connector (X12). Is voltage present?	**YES:** Circuit L048 BRN is short to power with circuit not on VCU connector 2 (X12). Repair circuit or replace harness. See appropriate wiring diagram or schematic. **NO:** Go to Harness Check.

AB51738,0000112 -19-12SEP13-5/6

4 Harness Check	Turn battery disconnect switch OFF. Left front drive light/turn signal connector (X32) disconnected. Left rear turn signal (E39) (S.N. —232969) or left rear light assembly (E45) (S.N. 235590—) disconnected. VCU connector 2 (X12) disconnected. Check for continuity between pin 30 (wire L048 BRN) and all other pins of VCU connector 2 (X12). Is continuity indicated?	**YES:** Circuit L048 BRN is short to circuit that indicated continuity. Repair circuit or replace harness. See appropriate wiring diagram or schematic. **NO:** Program vehicle control unit (VCU).

AB51738,0000112 -19-12SEP13-6/6

3 Front Component Check	Switched power OFF.	
	Disconnect left front marker light (E33).	
	Disconnect right front marker light (E34).	
	Check light for continuity.	**YES:** Go to Rear Component Check.
	Is continuity indicated?	**NO:** Replace left front marker light (E33) or right front maker light (E34).

DS35042,0000E56 -19-11DEC12-5/8

4 Rear Component Check	Switched power OFF.	
	Disconnect left brake/tail light (E9).	
	Disconnect right brake/tail light (E10).	
	Disconnect license plate light (E21).	
	Check light for continuity.	**YES:** Go to Short Circuit Check.
	Is continuity indicated?	**NO:** Replace left brake/tail light (E9), right brake/tail light (E10), or license plate light (E21).

DS35042,0000E56 -19-11DEC12-6/8

5 Short Circuit Check	Ignition OFF.	
	Left brake/tail light (E9) disconnected.	
	Right brake/tail light (E10) disconnected.	
	License plate light (E21) disconnected.	
	Left front marker light (E33) disconnected.	
	Right front marker light (E34) disconnected.	
	Disconnect VCU connector (X12).	
	Check circuit L055 BRN for power at pin A of turn signals (E9, E10, E21, E33, and E34) harness connectors.	**YES:** Circuit L047 BRN is short to power. Repair circuit or replace harness. See appropriate wiring diagram or schematic.
	Is voltage present?	**NO:** Go to Harness Check.

Continued on next page

DS35042,0000E56 -19-11DEC12-7/8

4 Short Circuit Check	Switched power OFF. Horn relay (K40) disconnected. Disconnect vehicle control unit (VCU) connector (X13). Check for continuity between pin 7 (wire A140 GRY) of VCU connector X13 and machine ground. Is continuity indicated?	**YES:** Go to Harness Check. **NO:** Circuit is short to ground. Repair or replace harness. See appropriate wiring diagram or schematic.

ML66751,00033F1 -19-11DEC12-6/7

5 Harness Check	Horn relay (K40) disconnected. VCU connector (X13) disconnected. Disconnect: • Negative terminal of the battery. • Vehicle control unit (VCU) connectors (X11, X12, and X14) Check for continuity between pin 7 (wire A140 GRY) of VCU connector X13 and all other pins on VCU connectors (X11, X12, X13, and X14). Is continuity indicated?	**YES:** Circuit with continuity indicated is short to ground. Repair circuit or replace harness. See appropriate wiring diagram or schematic. **NO:** Program controller.

ML66751,00033F1 -19-11DEC12-7/7

002875.03 — Hazard Wakeup

Sealed switch module (SSM) to vehicle control unit (VCU) circuit is short to power.

Alarm Level:
Amber Check Service Code Indicator

Additional References:

- See Vehicle Control Unit (VCU) Circuit Theory of Operation. (Group 9015-15.)
- See Start and Charge Circuit Theory of Operation. (Group 9015-15.)
- See Controller Area Network (CAN) Circuit Theory of Operation. (Group 9015-15.)
- See Horn, Lights, and Beacon Circuit Theory of Operation. (Group 9015-15.)
- See Wire Harness Test. (Group 9015-20.)
- See Vehicle Control Unit (VCU) Output Test. (Group 9015-20.)

ML66751,00033F2 -19-06MAR13-1/6

Hazard Wakeup Diagnostic Procedure

ML66751,00033F2 -19-06MAR13-2/6

1 Intermittent Check	Does diagnostic trouble code (DTC) periodically “go away”?	**YES:** DTC is intermittent. See Intermittent Diagnostic Trouble Code (DTC) Diagnostics. (Group 9015-20.) **NO:** Go to Connector Check.

Continued on next page

ML66751,00033F2 -19-06MAR13-3/6

3 Voltage Check	Ignition OFF. Disconnect vehicle control unit (VCU) connector (X11). Ignition ON. Check for ground at pin 9 (wire P055 RED) on loader control lever (X58) connector. Is ground present?	 **YES:** Circuit P055 RED is short to ground. Repair circuit or replace harness. See appropriate wiring diagram or schematic **NO:** Go to Harness Check.

DS35042,0000D9E -19-11DEC12-5/6

4 Harness Check	Switched power OFF. Disconnect VCU connectors (X11, X12, X13, and X14). Loader control lever (X58) connector disconnected. Check for continuity between pin J3 (wire P053 RED) of VCU connector (X11) and all other pins on VCU connectors (X11, X12, X13, and X14). Is continuity indicated between any circuits?	 **YES:** Repair or replace harness. See appropriate wiring diagram or schematic. **NO:** Checks complete.

DS35042,0000D9E -19-11DEC12-6/6

003511.03 — Sensor Supply 3

Sensor supply voltage 3 is out of range high. (Above 5.25 V.)

Alarm Level:
Amber Check Service Code Indicator

Additional References:

- See Vehicle Control Unit (VCU) Circuit Theory of Operation. (Group 9015-15.)
- See Start and Charge Circuit Theory of Operation. (Group 9015-15.)
- See Controller Area Network (CAN) Circuit Theory of Operation. (Group 9015-15.)
- See Wire Harness Test. (Group 9015-20.)
- See Vehicle Control Unit (VCU) Output Test. (Group 9015-20.)

DS35042,0000D9F -19-30MAR12-1/7

Sensor Supply 3 Diagnostic Procedure

DS35042,0000D9F -19-30MAR12-2/7

1 Intermittent Check	Does diagnostic trouble code (DTC) periodically “go away”?	**YES:** DTC is intermittent. See Intermittent Diagnostic Trouble Code (DTC) Diagnostics. (Group 9015-20.) **NO:** Go to Code Check.

Continued on next page

DS35042,0000D9F -19-30MAR12-3/7

Pilot Enable Switch Diagnostic Procedure

ML66751,00033FA -19-11DEC12-2/7

1 Intermittent Check	Does diagnostic trouble code (DTC) periodically “go away”?	**YES:** DTC is intermittent. See Intermittent Diagnostic Trouble Code (DTC) Diagnostics. (Group 9015-20.) **NO:** Go to Connector Check.

ML66751,00033FA -19-11DEC12-3/7

2 Connector Check	Switched power OFF. Check the following connectors for damage, corrosion, or debris. Use JDG10466 Flex Probe Kit to check for pin fit and continuity. • Pilot enable switch (S52).See Pilot Enable Pattern Select Valve Harness (W30) Component Location or see Pilot Enable Switch Harness (W31) Component Location. (Group 9015-10.) • Pilot enable switch harness connector (X53). See Pilot Enable Pattern Select Valve Harness (W30) Component Location or see Pilot Enable Switch Harness (W31) Component Location. (Group 9015-10.) • Pilot control console harness connector (X52). See Cab Harness (W14) Component Location or see Canopy Harness (W15) Component Location. (Group 9015-10.) • Vehicle control unit (VCU) connector (X13). See Cab Harness (W14) Component Location or see Canopy Harness (W15) Component Location. (Group 9015-10.) • Transmission control 5 A fuse (F35). See Cab Harness (W14) Component Location or see Canopy Harness (W15) Component Location. (Group 9015-10.) Are connectors in good condition and free of corrosion and debris?	**YES:** Go to Component Check. **NO:** Repair or replace connector.

ML66751,00033FA -19-11DEC12-4/7

3 Component Check	Switched power OFF. Disconnect pilot enable switch (S52). *NOTE: Does pilot enable switch (S52) move freely between Enable and Disable?* Pilot enable switch (S52) in “Disable” position. Check for continuity between: • Pin 2 and 3. • Pin 2 and 6. • Pin 5 and 3. • Pin 5 and 6. Is continuity indicated?	**YES:** Switch malfunction. Replace pilot enable switch (S52). **NO:** Got to Voltage Check.

Continued on next page

ML66751,00033FA -19-11DEC12-5/7

520696.05 — Pattern Select Driver

Pattern select solenoid 1 (Y58) or pattern select solenoid 2 (Y59) circuit is open.

Alarm Level:
Amber Check Service Code Indicator

Additional References:

- See Vehicle Control Unit (VCU) Circuit Theory of Operation. (Group 9015-15.)
- See Start and Charge Circuit Theory of Operation. (Group 9015-15.)
- See Controller Area Network (CAN) Circuit Theory of Operation. (Group 9015-15.)
- See Wire Harness Test. (Group 9015-20.)
- See Vehicle Control Unit (VCU) Output Test. (Group 9015-20.)

ML66751,0003400 -19-11DEC12-1/6

Pattern Select Driver Diagnostic Procedure

ML66751,0003400 -19-11DEC12-2/6

1 Intermittent Check	Does DTC periodically “go away”?	**YES:** DTC is intermittent. See Intermittent Diagnostic Trouble Code (DTC) Diagnostics. (Group 9015-20.) **NO:** Go to Connector Check.

ML66751,0003400 -19-11DEC12-3/6

2 Connector Check	Switched power OFF. Check the following connectors for damage, corrosion, or debris. Use JDG10466 Flex Probe Kit to check for pin fit and continuity. • Pattern select solenoid 1 (Y58). See Pilot Enable Pattern Select Valve Harness (W30) Component Location. (Group 9015-10.) • Pattern select solenoid 2 (Y59). See Pilot Enable Pattern Select Valve Harness (W30) Component Location. (Group 9015-10.) • Pilot control console harness connector (X52). See Cab Harness (W14) Component Location or see Canopy Harness (W15) Component Location. (Group 9015-10.) • Vehicle control unit (VCU) connector (X13). See Cab Harness (W14) Component Location or see Canopy Harness (W15) Component Location. (Group 9015-10.) • Operator station floor ground (W2). See Cab Harness (W14) Component Location or see Canopy Harness (W15) Component Location. (Group 9015-10.) Are connectors in good condition and free of corrosion or debris?	**YES:** Go to Component Check. **NO:** Repair or replace connector.

Continued on next page

ML66751,0003400 -19-11DEC12-4/6

3 Short Circuit Check	Switched power OFF. Disconnect: • Vehicle control unit (VCU) connector (X13). • Hydraulic valve controller (HVC) connector (X15). • Hydraulic valve controller (HVC) connector (X16). • Hydraulic valve controller (HVC) connector (X17). Check for continuity to machine ground on the following:. • Pin 18 (wire K037 GRN) of VCU connector (X13). • Pin 30 (wire K037 GRN) of VCU connector (X13). • Pin H3 (wire K037 GRN) of HVC connector (X15). • Pin D4 (wire K037 GRN) of HVC connector (X16). • Pin M4 (wire K037 GRN) of HVC connector (X16). • Pin H1 (wire K037 GRN) of HVC connector (X17). Is continuity indicated?	**YES:** Circuit with continuity is short to ground. Repair circuit or replace harness. See appropriate wiring diagram or schematic. **NO:** Go to Harness Check.

ML66751,0003406 -19-11DEC12-5/6

4 Harness Check	Vehicle control unit (VCU) connector (X13) disconnected. Hydraulic valve controller (HVC) connector (X15) disconnected. Hydraulic valve controller (HVC) connector (X16) disconnected. Hydraulic valve controller (HVC) connector (X17) disconnected. Disconnect: • Negative terminal of the battery. • Vehicle control unit (VCU) connectors (X11, X12, and X14). Check for continuity between: • Pin 18 (wire K037 GRN) of VCU connector (X13) and all other pins on VCU connectors (X11, X12, X13, and X14) and HVC connectors (X15, X16, and X17). • Pin 30 (wire K037 GRN) of VCU connector (X13) and all other pins on VCU connectors (X11, X12, X13, and X14) and HVC connectors (X15, X16, and X17). • Pin H3 (wire K037 GRN) of HVC connector (X15) and all other pins on VCU connectors (X11, X12, X13, and X14) and HVC connectors (X15, X16, and X17). • Pin D4 (wire K037 GRN) of HVC connector (X16) and all other pins on VCU connectors (X11, X12, X13, and X14) and HVC connectors (X15, X16, and X17). • Pin M4 (wire K037 GRN) of HVC connector (X16) and all other pins on VCU connectors (X11, X12, X13, and X14) and HVC connectors (X15, X16, and X17). • Pin H1 (wire K037 GRN) of HVC connector (X17) and all other pins on VCU connectors (X11, X12, X13, and X14) and HVC connectors (X15, X16, and X17). Is continuity indicated?	**YES:** Circuit with continuity indicated is short to ground. Repair circuit or replace harness. See appropriate wiring diagram or schematic. **NO:** Program controller.

ML66751,0003406 -19-11DEC12-6/6

4 Short Circuit Check—Ground	Switched power OFF. Seat position sensor (B9) disconnected. Vehicle control unit (VCU) connector 1 (X11) disconnected. Vehicle control unit (VCU) connector 2 (X12) disconnected. Check for continuity between: • Pin J2 (wire P055 RED) of VCU connector (X11) and machine ground. • Pin H2 (wire R055 BLK) of VCU connector (X11) and machine ground. • Pin 37 (wire M016 PUR) of VCU connector (X12) and machine ground. • Pin 48 (wire M017 PUR) of VCU connector (X12) and machine ground. Is continuity indicated?	**YES:** Circuit with continuity is short to ground. Repair circuit or replace harness. See appropriate wiring diagram or schematic. **NO:** Go to Harness Check.

ML66751,000340B -19-21FEB13-6/8

5 Harness Check	Seat position sensor (B9) disconnected. Vehicle control unit (VCU) connector 1 (X11) disconnected. Vehicle control unit (VCU) connector 2 (X12) disconnected. Disconnect: • Negative terminal of the battery. • Vehicle control unit (VCU) connectors (X13 and X14). • Load sense pressure sensor (B16) or hydraulic system pressure sensor (B26). Check for continuity between: • Pin H2 (wire R055 BLK) of VCU connector X11 and all other pins on VCU connectors (X11, X12, X13, and X14). • Pin J2 (wire P055 RED) of VCU connector X11 and all other pins on VCU connectors (X11, X12, X13, and X14). • Pin 37 (wire M016 PUR) of VCU connector X12 and all other pins on VCU connectors (X11, X12, X13, and X14). • Pin 48 (wire M017 PUR) of VCU connector X12 and all other pins on VCU connectors (X11, X12, X13, and X14). Is continuity indicated?	**YES:** Circuit with continuity indicated is short to power. Repair circuit or replace harness. See appropriate wiring diagram or schematic. **NO:** Go to Component Check.

Continued on next page

ML66751,000340B -19-21FEB13-7/8

1 Intermittent Check	Does diagnostic trouble code (DTC) periodically “go away”?	**YES:** DTC is intermittent. See Intermittent Diagnostic Trouble Code (DTC) Diagnostics. (Group 9015-20.) **NO:** Go to Connector Check.

DS35042,0000E80 -19-11DEC12-3/8

2 Connector Check	Switched power OFF. Check the following connectors for damage, corrosion, or debris. Use JDG10466 Flex Probe Kit to check for pin fit and continuity. • Rear wiper motor (M14). See Cab Harness (W14) Component Location. (Group 9015-10.) • Operator station floor ground (W2). See Cab Harness (W14) Component Location. (Group 9015-10.) • Vehicle control unit (VCU) connector 2 (X12). See Cab Harness (W14) Component Location. (Group 9015-10.) Are connectors in good condition and free of corrosion or debris?	**YES:** Go to Component Check. **NO:** Repair or replace connector.

DS35042,0000E80 -19-11DEC12-4/8

3 Component Check	Switched power OFF. Disconnect rear wiper motor (M14). Apply 12 V to pins 1 and 2 of rear wiper motor (M14). Ground pin 3 of rear wiper motor (M14). Does rear wiper motor (M14) function?	**YES:** Go to Voltage Check. **NO:** Replace rear wiper motor (M14).

DS35042,0000E80 -19-11DEC12-5/8

4 Voltage Check	Rear wiper motor (M14) disconnected. Switched power ON. Check for voltage at pin 1 (wire A414 GRY) of rear wiper motor (M14) connector. Is system voltage (approximately 12 V) indicated?	**YES:** Go to Continuity Check. **NO:** Go to Continuity Check.

Continued on next page

DS35042,0000E80 -19-11DEC12-6/8

3 Open Circuit Check	Ignition OFF. Front wiper motor (M13) disconnected. Disconnect vehicle control unit (VCU) connector 2 (X12). See Cab Harness (W14) Component Location or see Canopy Harness (W15) Component Location Check circuit A213 GRY for continuity between pin 4 on front wiper motor (M13) harness connector and pin 5 on VCU connector (X12). Is continuity indicated?	**YES:** Program vehicle control unit (VCU). **NO:** Circuit A213 GRY open. Repair or replace harness. See appropriate wiring diagram or schematic.

ML66751,0003411 -19-11DEC12-5/5

522435.06 — Front Wiper Hi

Front wiper motor (M13) high speed circuit is short to ground.

Alarm Level:
Amber Check Service Code Indicator

Additional References:

- See Vehicle Control Unit (VCU) Circuit Theory of Operation. (Group 9015-15.)
- See Start and Charge Circuit Theory of Operation. (Group 9015-15.)
- See Controller Area Network (CAN) Circuit Theory of Operation. (Group 9015-15.)
- See Wiper and Washer Circuit Theory of Operation. (Group 9015-15.
- See Wire Harness Test. (Group 9015-20.)
- See Vehicle Control Unit (VCU) Output Test. (Group 9015-20.)

ML66751,0003412 -19-11DEC12-1/7

Front Wiper High Speed Diagnostic Procedure

ML66751,0003412 -19-11DEC12-2/7

1 Intermittent Check	Does DTC periodically “go away”?	**YES:** DTC is intermittent. See Intermittent Diagnostic Trouble Code (DTC) Diagnostics. (Group 9015-20.) **NO:** Go to Component Check.

Continued on next page

ML66751,0003412 -19-11DEC12-3/7

3 Component Check	Switched power OFF. Disconnect front and rear washer motor (M15). Check for continuity. Is continuity indicated?	 **YES:** Go to Short to Ground Check. **NO:** Replace front and rear washer motor (M15).

DS35042,0000E8E -19-11DEC12-5/6

4 Short to Ground Check	Switched power OFF. Front and rear washer motor (M15) disconnected. Disconnect VCU connector (X13). Check for continuity between pin 19 of VCU connector (X13) and machine ground. Is continuity indicated?	 **YES:** Repair or replace harness. See appropriate wiring diagram or schematic. **NO:** Checks complete.

DS35042,0000E8E -19-11DEC12-6/6

523597.03 — Beacon Light Driver

Beacon light (E17) circuit is short to power

Alarm Level:
Amber Check Service Code Indicator

Additional References:

- See Vehicle Control Unit (VCU) Circuit Theory of Operation. (Group 9015-15.)
- See Start and Charge Circuit Theory of Operation. (Group 9015-15.)
- See Controller Area Network (CAN) Circuit Theory of Operation. (Group 9015-15.)
- See Horn, Lights, and Beacon Circuit Theory of Operation. (Group 9015-15.)
- See Wire Harness Test. (Group 9015-20.)
- See Vehicle Control Unit (VCU) Output Test. (Group 9015-20.)

DS35042,0000E8F -19-11DEC12-1/7

Beacon Light Driver Diagnostic Procedure

DS35042,0000E8F -19-11DEC12-2/7

1 Intermittent Check	Does DTC periodically “go away”?	**YES:** DTC is intermittent. See Intermittent Diagnostic Trouble Code (DTC) Diagnostics. (Group 9015-20.) **NO:** Go to Component Check.

Continued on next page

DS35042,0000E8F -19-11DEC12-3/7

523911.16 — Pump Control

Load sense (LS) pressure sensor (B16) data above maximum values during calibration.

Alarm Level:

Amber Check Service Code Indicator

Additional References:

- See Vehicle Control Unit (VCU) Circuit Theory of Operation. (Group 9015-15.)
- See Start and Charge Circuit Theory of Operation. (Group 9015-15.)
- See Controller Area Network (CAN) Circuit Theory of Operation. (Group 9015-15.)
- See Wire Harness Test. (Group 9015-20.)
- See Vehicle Control Unit (VCU) Output Test. (Group 9015-20.)

BJ21193,0000146 -19-03MAY17-1/6

Pump Control Diagnostic Procedure

BJ21193,0000146 -19-03MAY17-2/6

1 Intermittent Check	Does diagnostic trouble code (DTC) periodically "go away"?	**YES:** DTC is intermittent. See Intermittent Diagnostic Trouble Code (DTC) Diagnostics. (Group 9015-20.) **NO:** Go to Connector Check.

BJ21193,0000146 -19-03MAY17-3/6

2 Connector Check	Switched power OFF. Check the following connectors for damage, corrosion, or debris. Use JDG10466 Flex Probe Kit to check for pin fit and continuity. • Load sense pressure sensor (B16). See Transmission Harness (W13) Component Location. (Group 9015-10.) • Transmission harness-to cab/canopy harness connector (X21). See Transmission Harness (W13) Component Location. (Group 9015-10.) • Vehicle control unit (VCU) connector 1 (X11). See Cab Harness (W14) Component Location or see Canopy Harness (W15) Component Location. (Group 9015-10.) • Vehicle control unit (VCU) connector 2 (X12). See Cab Harness (W14) Component Location or see Canopy Harness (W15) Component Location. (Group 9015-10.) Are connectors in good condition and free of corrosion and debris?	**YES:** Go to Calibration Check. **NO:** Repair or replace connector.

BJ21193,0000146 -19-03MAY17-4/6

3 Calibration Check	Calibrate machine. See Standard Display Monitor (SDM)—Service Menu. (Group 9025-16.) Was machine calibration successful?	**YES:** Checks complete. **NO:** Go to Pump Load Sense Differential Pressure Check.

Continued on next page

BJ21193,0000146 -19-03MAY17-5/6

❷ **Software Version Check**	Check software version numbers for HVC, SDM, and VCU. Do controllers have the same major revision number?	**YES:** Checks complete. **NO:** Install compatible version of software.

ML66751,00023A9 -19-11DEC12-4/4

000237.02 — VIN Mismatch

VIN security mismatch.

Alarm Level:

Amber Check Service Code Indicator

Additional References:

- See Controller Area Network (CAN) Circuit Theory of Operation. (Group 9015-15.)
- See Vehicle Control Unit (VCU) Circuit Theory of Operation. (Group 9015-15.)
- See Hydraulic System Circuit Theory of Operation. (Group 9015-15.)
- See Vehicle Control Unit (VCU) Output Test. (Group 9015-20.)
- See Wire Harness Test. (Group 9015-20.)
- See Sensor Circuit Test. (Group 9015-20.)

ML66751,00023AA -19-11DEC12-1/4

VIN Mismatch Diagnostic Procedure

ML66751,00023AA -19-11DEC12-2/4

❶ **Intermittent Check**	Does diagnostic trouble code (DTC) periodically “go away”?	**YES:** DTC is intermittent. See Intermittent Diagnostic Trouble Code (DTC) Diagnostics. (Group 9015-20.) **NO:** Go to Software PIN Check.

ML66751,00023AA -19-11DEC12-3/4

❷ **Software PIN Check**	Using Service ADVISOR™, verify proper PIN is stored in software. See Service ADVISOR™ Connection Procedure. (Group 9015-20.) Is correct PIN number stored?	 **YES:** Checks complete. **NO:** Update controller with correct PIN number.

Service ADVISOR is a trademark of Deere & Company

ML66751,00023AA -19-11DEC12-4/4

000237.13 — VIN Mismatch

VIN security option bytes are not configured (equal to 0).

Alarm Level:

Amber Check Service Code Indicator

Additional References:

- See Controller Area Network (CAN) Circuit Theory of Operation. (Group 9015-15.)
- See Vehicle Control Unit (VCU) Circuit Theory of Operation. (Group 9015-15.)
- See Hydraulic System Circuit Theory of Operation. (Group 9015-15.)
- See Vehicle Control Unit (VCU) Output Test. (Group 9015-20.)
- See Wire Harness Test. (Group 9015-20.)
- See Sensor Circuit Test. (Group 9015-20.)

Continued on next page

ML66751,00023AB -19-11DEC12-1/4

Left Joystick Diagnostic Procedure

ML66751,00023AE -19-11DEC12-2/3

1 **Intermittent Check**	Does diagnostic trouble code (DTC) periodically “go away”?	**YES:** DTC is intermittent. See Intermittent Diagnostic Trouble Code (DTC) Diagnostics. (Group 9015-20.) **NO:** Repair or replace left joystick rocker switch (S95).

ML66751,00023AE -19-11DEC12-3/3

003509.03 — Sensor Supply 1

Sensor power supply 1 voltage is above 5.25 V.

Alarm Level:

Amber Check Service Code Indicator

Additional References:

- See Controller Area Network (CAN) Circuit Theory of Operation. (Group 9015-15.)
- See Vehicle Control Unit (VCU) Circuit Theory of Operation. (Group 9015-15.)
- See Hydraulic System Circuit Theory of Operation. (Group 9015-15.)
- See Vehicle Control Unit (VCU) Output Test. (Group 9015-20.)
- See Wire Harness Test. (Group 9015-20.)
- See Sensor Circuit Test. (Group 9015-20.)

ML66751,00023AF -19-11DEC12-1/7

Sensor Supply 1 Diagnostic Procedure

ML66751,00023AF -19-11DEC12-2/7

1 **Intermittent Check**	Does diagnostic trouble code (DTC) periodically “go away”?	**YES:** DTC is intermittent. See Intermittent Diagnostic Trouble Code (DTC) Diagnostics. (Group 9015-20.) **NO:** Go to Code Check

ML66751,00023AF -19-11DEC12-3/7

2 **Code Check**	Switched power ON. Check for active VCU code: • 520713.03 - Seat Position. Are VCU codes active?	**YES:** Clear codes. **NO:** Go to Connector Check.

Continued on next page

ML66751,00023AF -19-11DEC12-4/7

523769.04 — MFWD Switch

Mechanical front wheel drive (MFWD) momentary switch (S37) stuck closed at start-up for more than 20 seconds.

Alarm Level:

Amber Check Service Code Indicator

Additional References:

- See Vehicle Control Unit (VCU) Circuit Theory of Operation. (Group 9015-15.)
- See Hydraulic System Circuit Theory of Operation. (Group 9015-15.)
- See Vehicle Control Unit (VCU) Output Test. (Group 9015-20.)
- See Wire Harness Test. (Group 9015-20.)
- See Sensor Circuit Test. (Group 9015-20.)

ML66751,00033D4 -19-11DEC12-1/7

MFWD Switch Diagnostic Procedure

ML66751,00033D4 -19-11DEC12-2/7

1 Intermittent Check	Does diagnostic trouble code (DTC) periodically "go away"?	**YES:** DTC is intermittent. See Intermittent Diagnostic Trouble Code (DTC) Diagnostics. (Group 9015-20.) **NO:** Go to Short Circuit Check.

ML66751,00033D4 -19-11DEC12-3/7

2 Connector Check	Switched power OFF. Check the following connectors for damage, corrosion, or debris. Use JDG10466 Flex Probe Kit to check for pin fit and continuity. • Mechanical front wheel drive (MFWD) momentary switch (S37). See Transmission Harness (W13) Component Location. (Group 9015-10.) • Loader control lever connector (X58). See Transmission Harness (W13) Component Location. (Group 9015-10.) • Vehicle control unit (VCU) connector 2 (X12). See Cab Harness (W14) Component Location or see Canopy Harness (W15) Component Location. (Group 9015-10.) Are connectors in good condition and free of corrosion and debris?	**YES:** Go to Component Check. **NO:** Repair or replace connector.

ML66751,00033D4 -19-11DEC12-4/7

3 Component Check	Switched power OFF. *LOOK/FEEL: Is mechanical front wheel drive (MFWD) momentary switch (S37) stuck ON?* Disconnect loader control lever connector (X58). Check for continuity between pin 4 (GRY wire) and pin 8 (LT GRN wire) of loader control lever connector (X58). Do not press MFWD momentary switch (S37). Is continuity indicated?	**YES:** Switch malfunction. Repair or replace MFWD momentary switch (S37). **NO:** Go to Short Circuit Check.

Continued on next page

ML66751,00033D4 -19-11DEC12-5/7

2 Connector Check	Switched power OFF. Check the following connectors for damage, corrosion, or debris. Use JDG10466 Flex Probe Kit to check for pin fit and continuity. • Loader auxiliary extend solenoid (Y20). See Loader Auxiliary Solenoid Harness (W29) Component Location. (Group 9015-10.) • Loader auxiliary solenoid harness connector (X82). See Loader Auxiliary Solenoid Harness (W29) Component Location. (Group 9015-10.) • Vehicle control unit (VCU) connector 1 (X11). See Cab Harness (W14) Component Location or see Canopy Harness (W15) Component Location. (Group 9015-10.) Are connectors in good condition and free of corrosion and debris?	**YES:** Go to Short Circuit Check—Low Side Driver. **NO:** Repair or replace connector.

ML66751,00033DC -19-11DEC12-4/7

3 Short Circuit Check—Low Side Driver	Switched power OFF. Disconnect loader auxiliary extend solenoid (Y20). Disconnect vehicle control unit (VCU) connector 1 (X11). Switched power ON. Check pin K4 (wire R171 BLK) of VCU connector (X11) for 0.0 V. Is correct voltage indicated?	**YES:** Go to Short Circuit Check—High Side Driver. **NO:** Low side driver circuit is short to power. Repair circuit or replace harness. See appropriate wiring diagram or schematic.

ML66751,00033DC -19-11DEC12-5/7

4 Short Circuit Check—High Side Driver	Switched power OFF. Loader auxiliary extend solenoid (Y20) disconnected. VCU connector (X11) disconnected. Check for continuity between pin M3 (wire H171 GRN) of VCU connector (X11) and machine ground. Is continuity indicated?	**YES:** High side driver circuit is short to ground. Repair circuit or replace harness. See appropriate wiring diagram or schematic. **NO:** Go to Harness Check.

Continued on next page

ML66751,00033DC -19-11DEC12-6/7

Ignition Relay Out Current Low Diagnostic Procedure

DS35042,0000D01 -19-14FEB12-2/6

1 Intermittent Check	Does DTC periodically “go away”?	**YES:** DTC is intermittent. See Intermittent Diagnostic Trouble Code (DTC) Diagnostics. (Group 9015-20). **NO:** Go to Ignition Relay Check.

DS35042,0000D01 -19-14FEB12-3/6

2 Ignition Relay Check	Switched power OFF. Remove ignition relay (K10). See Cab Harness (W14) Component Location or see Canopy Harness (W15) Component Location. (Group 9015-10.) Measure resistance across the coil (pins 1 and 2) of relay (K10). Compare resistance to specification. See Electrical Component Specifications. (Group 9015-20.) Is resistance to specification?	**YES:** Go to Open Circuit Check. **NO:** Replace ignition relay (K10).

DS35042,0000D01 -19-14FEB12-4/6

3 Open Circuit Check	Disconnect battery power. Disconnect the SSM connector (X40). Disconnect the ignition relay (K10) connector. Check circuit U110 RED for continuity between pin 3 of SSM connector (X40) and pin 1 of ignition relay connector (K10). Check circuit G001 BLK for continuity between pin 2 of ignition relay connector (K10) and ground. Is continuity indicated?	**YES:** Go to Reset Controller. **NO:** Circuit without continuity indicated is open. Repair circuit or replace harness. See appropriate wiring diagram or schematic.

DS35042,0000D01 -19-14FEB12-5/6

4 Reset Controller	*NOTE: The sealed switch module (SSM) will not store diagnostic trouble codes; when ignition is cycled, the SSM will reset and all codes will be lost.* Switched power OFF. Wait 20 seconds. Ignition ON. Is DTC 002634.05 present?	**YES:** Program controller. **NO:** Checks complete.

DS35042,0000D01 -19-14FEB12-6/6

523850.04 — SSM Button 15

Ride control switch on sealed switch module (SSM) is stuck.

Alarm Level:

Amber Check Service Code Indicator

Continued on next page

DS35042,0000EC8 -19-22MAR12-1/4

523861.09 — SSM Button 7

No LED response for the keypad 1 switch on sealed switch module (SSM).

Alarm Level:

Amber Check Service Code Indicator

DS35042,0000ED9 -19-23APR12-1/5

No LED Response Diagnostic Procedure

DS35042,0000ED9 -19-23APR12-2/5

1 Intermittent Check	Does diagnostic trouble code (DTC) periodically "go away"?	**YES:** DTC is intermittent. See Intermittent Diagnostic Trouble Code (DTC) Diagnostics. (Group 9015-20.) **NO:** Go to Reset Controller.

DS35042,0000ED9 -19-23APR12-3/5

2 Reset Controller	Press engine stop switch to turn off switched power. Wait 20 seconds. Press engine start switch once to turn on switched power. Check for active SSM codes. Is SSM code 523861.09 present?	 **YES:** Go to CAN Circuit Check. **NO:** Checks complete.

DS35042,0000ED9 -19-23APR12-4/5

3 CAN Circuit Check	Perform CAN circuit test to test CAN connection between SSM and vehicle control unit (VCU). See Controller Area Network (CAN) Circuit Test. (Group 9015-20.) Does CAN circuit test good?	**YES:** Sealed switch module (SSM) malfunction. Program SSM. **NO:** Repair CAN circuit.

DS35042,0000ED9 -19-23APR12-5/5

523862.04 — SSM Button 6

Loader coupler switch on sealed switch module (SSM) is stuck.

Alarm Level:

Amber Check Service Code Indicator

DS35042,0000EDA -19-22MAR12-1/4

Switch Stuck Diagnostic Procedure

DS35042,0000EDA -19-22MAR12-2/4

1 Intermittent Check	Does diagnostic trouble code (DTC) periodically "go away"?	**YES:** DTC is intermittent. See Intermittent Diagnostic Trouble Code (DTC) Diagnostics. (Group 9015-20.) **NO:** Go to Reset Controller.

Continued on next page

DS35042,0000EDA -19-22MAR12-3/4

Operational Checkout Procedure

Use this check to make a quick check of machine operation by doing a walk-around inspection and performing specific checks from operator's seat.

Always check for diagnostic trouble codes and correct them before performing the operational checkout.

Complete visual checks (oil levels, oil condition, external leaks, loose hardware, linkage, wiring, etc.) before performing checkout.

Most checks will require machine systems to be at normal operating temperatures and a level area with adequate space to operate machine. Some checks may require varied surfaces.

If no problem is found, go to the next check. If a problem is indicated, an additional check or repair procedure will be suggested.

No special tools are necessary to perform the checkout.

TX04577,00000BD -19-22SEP17-1/58

Diagnostic Trouble Code Check

TX04577,00000BD -19-22SEP17-2/58

❶ **Display and Clear Trouble Codes**	**Always check for diagnostic trouble codes and correct them before performing the operational checkout.** Diagnostic trouble codes can be displayed by using two methods: • Standard Display Monitor (SDM) • Service ADVISOR™ Check for diagnostic trouble codes.	**YES:** Correct all diagnostics trouble codes before proceeding. See Reading Diagnostic Trouble Codes (DTCs). (Group 9015-20.)
	LOOK: Are diagnostic trouble codes present?	**NO:** Proceed with operational checkout.

Service ADVISOR is a trademark of Deere & Company

TX04577,00000BD -19-22SEP17-3/58

Switched Power OFF, Engine OFF Checks

TX04577,00000BD -19-22SEP17-4/58

❶ **Periodic Maintenance Decal Check**	Periodic maintenance decal check.	**YES:** Go to next check.
	LOOK: Is periodic maintenance decal legible?	**NO:** Replace decal.

TX04577,00000BD -19-22SEP17-5/58

❷ **Cab Doors and Window Seals Check**	Open and close doors and windows. Inspect seals.	**YES:** Go to next check.
	LOOK: Do cab doors and windows seal properly?	**NO:** Adjust doors and windows to close against seals properly. Replace seals as necessary.
	LOOK: Do cab doors latch properly?	**NO:** Adjust or replace latches as necessary.

Continued on next page

TX04577,00000BD -19-22SEP17-6/58

❷ **Park Brake Indicator and Switch Check**	Fasten seat belt. Operator's seat facing loader position and locked. Apply service brakes. Start the engine. Engine speed at slow idle. *LOOK: Is the park brake indicator displayed on the standard display monitor (SDM)?* *LOOK: Is the park brake switch LED illuminated?* Release park brake. *LOOK: Is the park brake indicator off on the SDM?* *LOOK: Is the park brake switch LED off?* Apply park brake. Stop the engine.	**YES:** Go to next check. **NO:** Check SDM park brake pressure switch circuit. See Standard Display Monitor (SDM) Circuit Theory of Operation. (Group 9015-15.) See Cab Harness (W14) Component Location and see Cab Harness (W14) Wiring Diagram. (Group 9015-15.) See Canopy Harness (W15) Component Location and see Canopy Harness (W15) Wiring Diagram. (Group 9015-10.) See Transmission Harness (W13) Wiring Diagram and see Transmission Harness (W13) Component Location. (Group 9015-10.)

Continued on next page

TX04577,00000BD -19-22SEP17-28/58

19 Auto-Idle Circuit Check—If Equipped	Enable auto-idle function in the standard display monitor (SDM) menu. See Standard Display Monitor (SDM)—Main Menu—Setup. (Operator's Manual)	
	Lower all equipment to the ground.	
	Transmission control lever (TCL) in neutral.	
	Hydraulic functions in neutral.	
	Operator's seat facing backhoe position and locked.	
	Engine speed fast idle.	
	Warm machine up to operating temperature. See Hydraulic Oil Warm-Up Procedure. (Group 9025-25.)	**YES:** Go to next check.
	LOOK/LISTEN: Does engine speed decrease after 4—6 seconds?	**NO:** See Hydraulic System Circuit Theory of Operation. (Group 9015-15.) See Vehicle Control Unit (VCU) Circuit Theory of Operation. (Group 9015-15.)
	Slowly actuate any boom backhoe function.	**YES:** Go to next check.
	LOOK/LISTEN: Does engine speed return to its original setting?	**NO:** See engine control unit (ECU) circuit theory of operation (for machine engine type). (Group 9015-15.) See Vehicle Control Unit (VCU) Circuit Theory of Operation. (Group 9015-15.)

TX04577,00000BD -19-22SEP17-46/58

20 Loader Return-to-Dig Check	Lower all equipment to the ground.	
	Transmission control lever (TCL) in neutral.	
	Raise loader boom to full height.	
	Lower loader boom by pulling the loader control lever all the way to left and let go of control lever to enable return-to-dig.	**YES:** Go to next check.
	LOOK: Does bucket roll back from dump position to dig position and control lever return to neutral position?	**NO:** See Loader Operation. (Operator's Manual.)

Continued on next page

TX04577,00000BD -19-22SEP17-47/58

John Deere Engine Operation

This machine uses a John Deere PowerTech™ E 6.8 liter diesel engine. The engine model is 6068HT067.

To identify the engine model, see Engine Identification Plate Information. (CTM104).

For theory of operation on John Deere PowerTech™ engines (model 6068HT067) not contained in this group, see the following:

- See General Engine Operation. (CTM104.)
- See Head Gasket Joint Construction and Operation. (CTM104.)
- See Cooling System Operation. (CTM104.)
- See Lubrication System Operation. (CTM104.)
- See Fuel System Operation. (CTM502.)
- See Electronic Injector (EI) Operation. (CTM502.)
- See High-Pressure Fuel Pump Operation. (CTM502.)
- See High-Pressure Fuel System Operation. (CTM502.)
- See Low-Pressure Fuel Pump Operation. (CTM502.)
- See Low-Pressure Fuel System Operation. (CTM502.)
- See Air Intake and Exhaust System Operation. (CTM104.)
- See Variable Geometry Turbocharger (VGT) Operation (Tier 3/Stage IIIA). (CTM104.)
- EGR Valve Operation. (CTM104.)

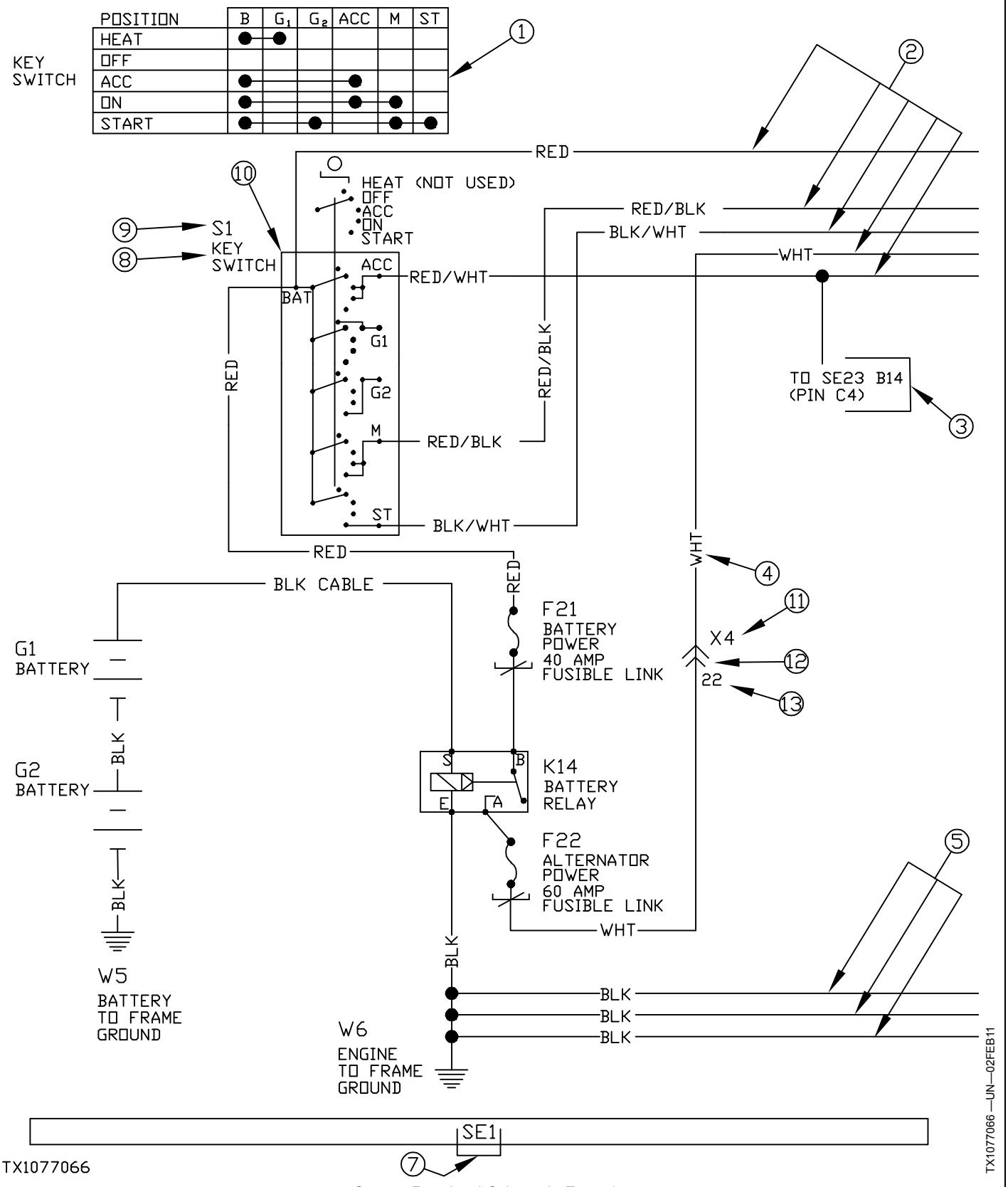
For additional engine information on John Deere engines and components, see the following component technical manuals (CTM).

- See Base Engine Theory of Operation in PowerTech™ 4.5L & 6.8L Diesel Engines—Base Engine. (CTM104.)
- See PowerTech™ E 4.5L & 6.8L Diesel Engines—Level 16 Electronic Fuel System with Denso HPCR. (CTM502.)

PowerTech is a trademark of Deere & Company

TZ24494,00007EC -19-12SEP12-1/1

System Functional Schematic Diagram



System Functional Schematic Example

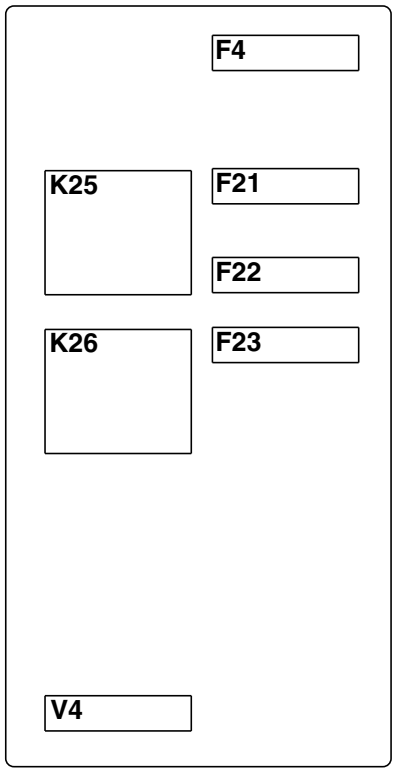
Continued on next page

LD30992,0000005 -19-09FEB16-2/4

Battery Load Center

The battery load center is located on the mainframe on the left-hand side of machine.

F4— Engine Control Unit (ECU) Unswitched Power 20 A Fuse
F21— Fuel Lift Pump 15 A Fuse
F22— Start Aid 15 A Fuse
F23— Fuel Filter Heater 20 A Fuse
K25— Start Aid Relay
K26— Fuel Filter Heater Relay
V4— Alternator Excitation Diode



TX1107580 —UN—27MAR12

Battery Load Center Fuse Panel

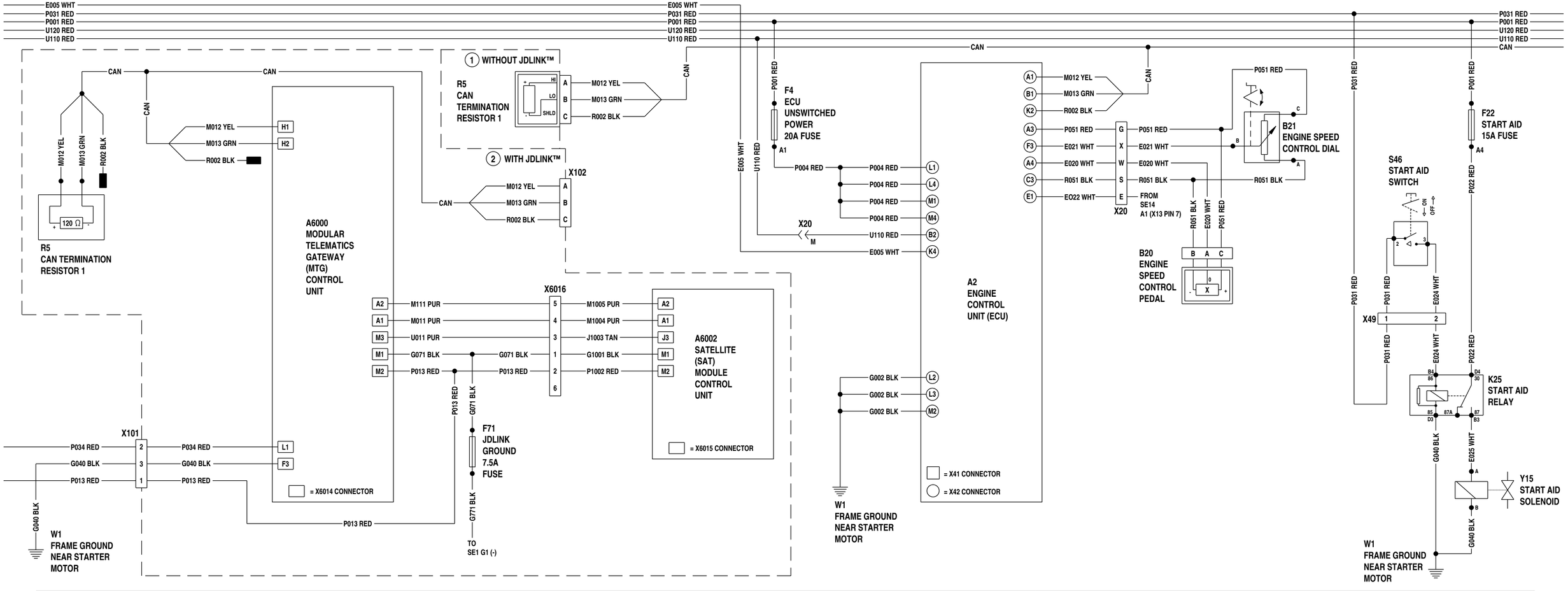
SL78608,0000507 -19-29MAR12-4/4

A1—Vehicle Control Unit (VCU)
B6—Torque Converter Oil Temperature Sensor
B13—Park Brake Pressure Switch
H3—Backup Alarm
S5—Forward, Neutral, Reverse (FNR) Switch
S6—Gear Select Switch
S8—Clutch Disconnect Switch
S10—Differential Lock Switch
S11—Mechanical Front Wheel Drive (MFWD) Switch
S36—Mechanical Front Wheel Drive (MFWD) Switch
S37—Mechanical Front Wheel Drive (MFWD) Momentary Switch
S38—Clutch Disconnect Switch
W1—Frame Ground Near Starter Motor
W2—Operator Station Floor Ground
X7—Transmission Direction Connector
X8—Transmission Range Connector
X11—Vehicle Control Unit (VCU) Connector 1
X12—Vehicle Control Unit (VCU) Connector 2
X13—Vehicle Control Unit (VCU) Connector 3
X21—Transmission Harness-to-Cab/Canopy Harness Connector
X48—Transmission Control Lever (TCL) Connector
X58—Loader Control Lever Connector
Y1—Transmission Forward Direction Solenoid
Y2—Transmission Reverse Direction Solenoid
Y3—Transmission Speed Solenoid 1
Y4—Transmission Speed Solenoid 2
Y5—Transmission Speed Solenoid 3
Y6—Transmission Speed Solenoid 4
Y7—Park Brake Release Solenoid
Y10—Differential Lock Solenoid
Y11—Mechanical Front Wheel Drive (MFWD) Solenoid

Continued on next page

SK44377,000022F -19-23JUL14-11/37

TX1113405 —UN—07MAY12



SE4 | SE5 | SE6

TX1113405

710K SYSTEM FUNCTIONAL SCHEMATIC —EXPORT TO RUSSIA

System Functional Schematic (SE4—SE6)

Continued on next page

SK44377,000022F -19-23JUL14-22/37

A1—Vehicle Control Unit (VCU)
E1—Left Rear Work Light
E2—Left Rear Work Light (if equipped)
E3—Right Rear Work Light (if equipped)
E4—Right Rear Work Light
E5—Left Front Work Light (if equipped)
E6—Right Front Work Light (if equipped)
E7—Left Front Work Light
E8—Right Front Work Light
E9—Left Brake/Tail Light
E10— Right Brake/Tail Light
E11— Left Rear Turn Signal
E13— Right Rear Turn Signal
E15— Left Docking Light
E16— Right Docking Light
E17— Beacon Light
E21— License Plate Light
E22— Backup Light
E31— Left Front Drive Light
E32— Right Front Drive Light
E33— Left Front Marker Light
E34— Right Front Marker Light
E35— Left Front Turn Signal
E36— Right Front Turn Signal
S19— Drive Light High/Low Switch
S26— Brake Light Pressure Switch 1
S27— Brake Light Pressure Switch 2
S30— Turn Signal Switch
S47— Beacon Switch
W2—Operator Station Floor Ground
W3—Roof Ground
X11— Vehicle Control Unit (VCU) Connector 1
X12— Vehicle Control Unit (VCU) Connector 2
X13— Vehicle Control Unit (VCU) Connector 3
X26— Cab/Canopy Harness-to-Roof Harness Connector
X31— Right Front Drive Light/Turn Signal Connector
X32— Left Front Drive Light/Turn Signal Connector

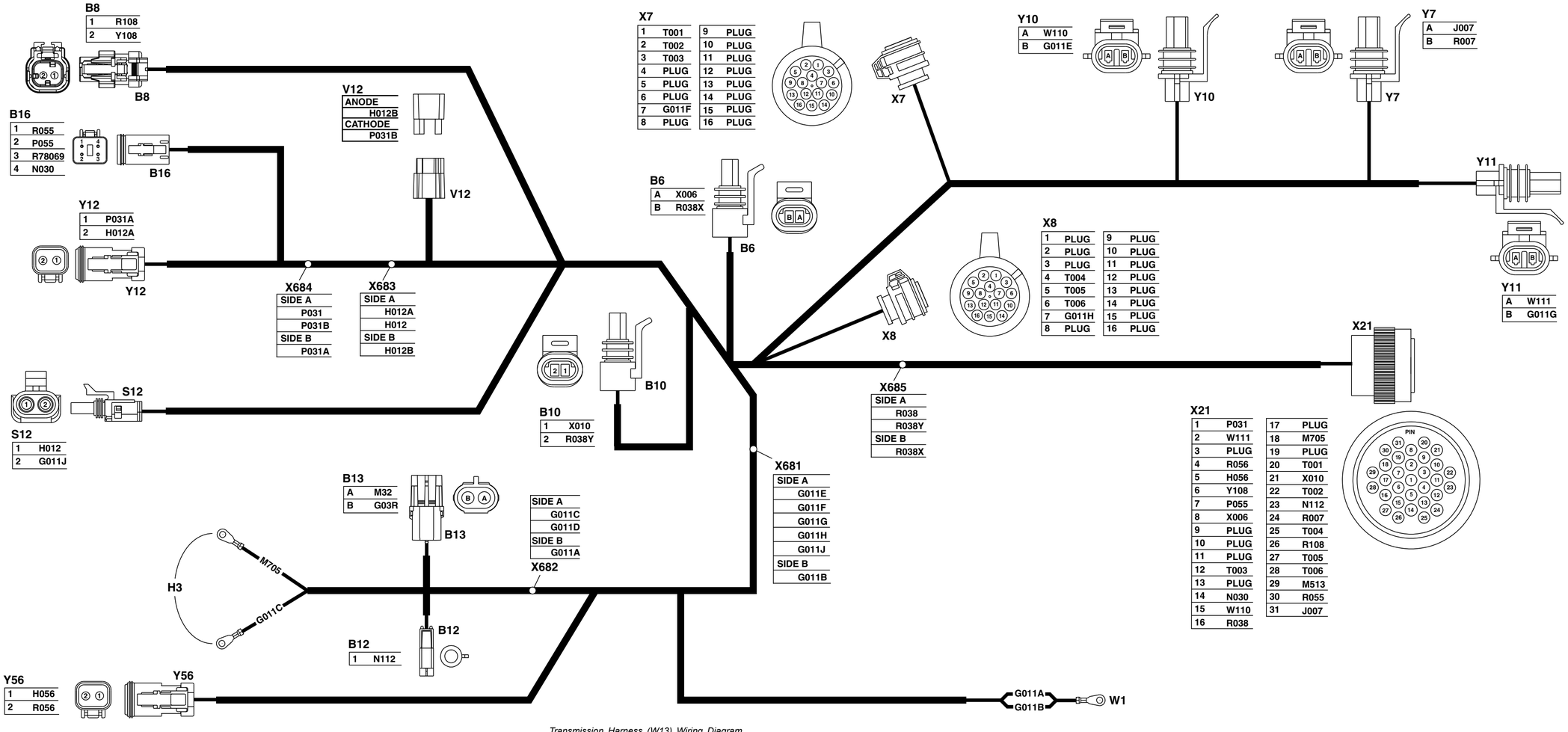
Continued on next page

SK44377,000022F -19-23JUL14-33/37

Transmission Harness (W13) Wiring Diagram

TX1112297 —UN—16APR12

END #1	NUMBER	COLOR	END #2
X682	G011A	BLK	W3
W3	G011B	BLK	X681
H3	G011C	BLK	X682
B13	G011D	BLK	X681
Y10	G011E	BLK	X681
X7	G011F	BLK	X681
Y11	G011G	BLK	X681
X8	G011H	BLK	X681
S12	G011J	BLK	X681
S12	H012	GRN	X683
X683	H012A	GRN	Y12
X683	H012B	GRN	V12
Y56	H056	GRN	X21
Y7	J007	TAN	X21
B13	M513	PUR	X21
H3	M705	PUR	X21
X21	N030	YEL	B16
B12	N112	YEL	X21
X21	P031	RED	X684
Y12	P031A	RED	X684
X684	P031B	RED	V12
X21	P055	RED	B16
Y7	R007	BLK	X21
X21	R038	BLK	X685
B6	R038X	BLK	X685
B10	R038Y	BLK	X685
X21	R055	BLK	B16
Y56	R056	BLK	X21
X21	R108	BLK	B8
X7	T001	BLU	X21
X7	T002	BLU	X21
X7	T003	BLU	X21
X8	T004	BLU	X21
X8	T005	BLU	X21
X21	T006	BLU	X8
Y10	W110	BLU	X21
Y11	W111	BLU	X21
B6	X006	YEL	X21
B10	X010	YEL	X21
X21	Y108	YEL	B8



TX1112297

Continued on next page

Transmission Harness (W13) Wiring Diagram

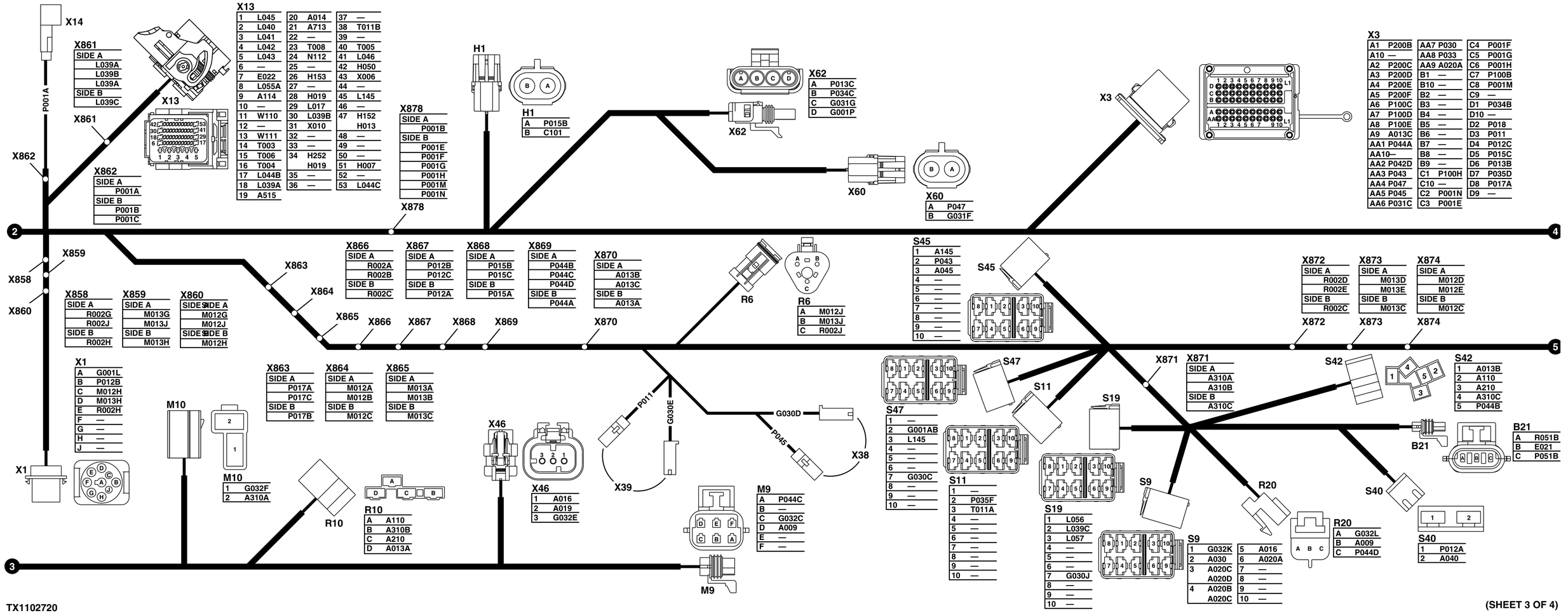
DS35042,00008E3 -19-28DEC16-1/2

1— Continued on Sheet 2
M13— Front Wiper Motor
S30— Turn Signal Switch
V13— Front Wiper Motor Diode
X47— Blower Mode Door Motor Harness Connector
X48— Transmission Control Lever (TCL) Connector
X892— P035 RED Splice

Continued on next page

DS35042,00008DF -19-13APR12-2/16

TX1102720 —UN—16APR12



TX1102720

Continued on next page

Cab Harness (W14) Wiring Diagram

(SHEET 3 OF 4)

DS35042,00008DF -19-13APR12-13/16

1— Continued on Sheet 1
2— Continued on Sheet 3
B9— Seat Position Sensor
M45— Air Seat Motor
S10— Differential Lock Switch
S26— Brake Light Pressure Switch 1
S27— Brake Light Pressure Switch 2
W2— Operator Station Floor Ground
X6— Cab/Canopy Harness Battery Power Connector
X20— Engine Harness-to-Cab/Canopy Harness Connector
X21— Transmission Harness-to-Cab/Canopy Harness Connector
X35— Brake Pressure Sensor Harness Connector
X54— Selective Flow Control Solenoid Harness Connector
X58— Loader Control Lever Connector
X68— Ride Control Solenoid Harness Connector
X81— Loader Coupler Solenoid Harness Connector
X82— Loader Auxiliary Solenoid Harness Connector
X893— U110 RED Splice
X894— G001 BLK Splice 3
X895— P013 RED Splice
X896— Sensor Return BLK Splice
X897— P034 RED Splice
X898— P031 RED Splice
X899— P001 RED Splice 2
X900— T011 BLU Splice
X901— G030 BLK Splice
X902— P055 RED Splice
X903— R055 BLK Splice
X907— G001 BLK Splice 2
X908— G031 BLK Splice
X909— G001 BLK Splice 1

Continued on next page

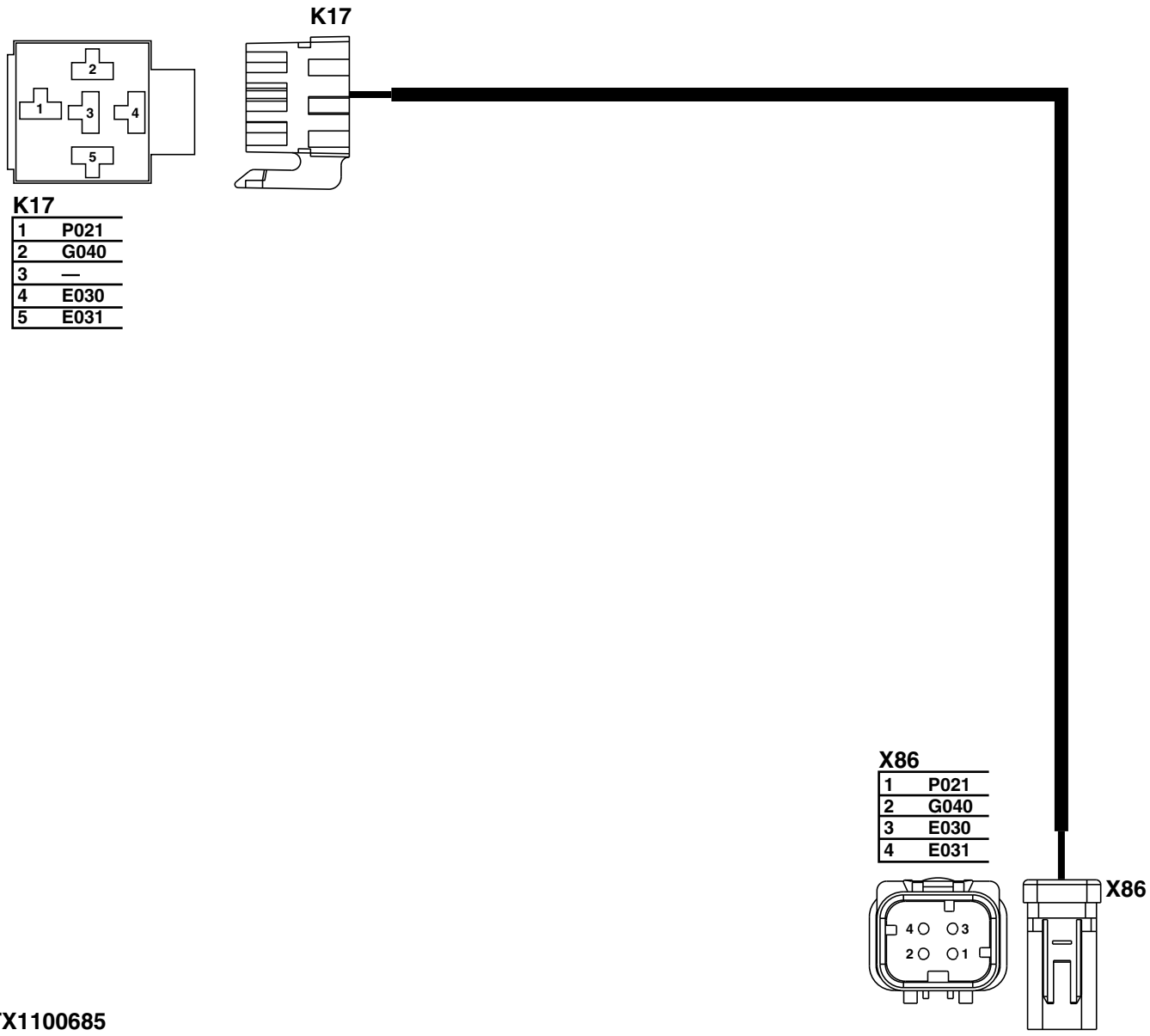
JD29379,0000109 -19-12APR12-4/8

K17— Fuel Lift Pump Relay
W22—Fuel Lift Pump Relay Harness
X86— Fuel Lift Pump Relay Harness Connector

DS35042,000091E -19-04JAN12-2/2

Fuel Lift Pump Relay Harness (W22) Wiring Diagram

END #1	NUMBER	COLOR	END #2
K17	E030	WHT	X86
K17	E031	WHT	X86
K17	G040	BLK	X86
K17	P021	RED	X86



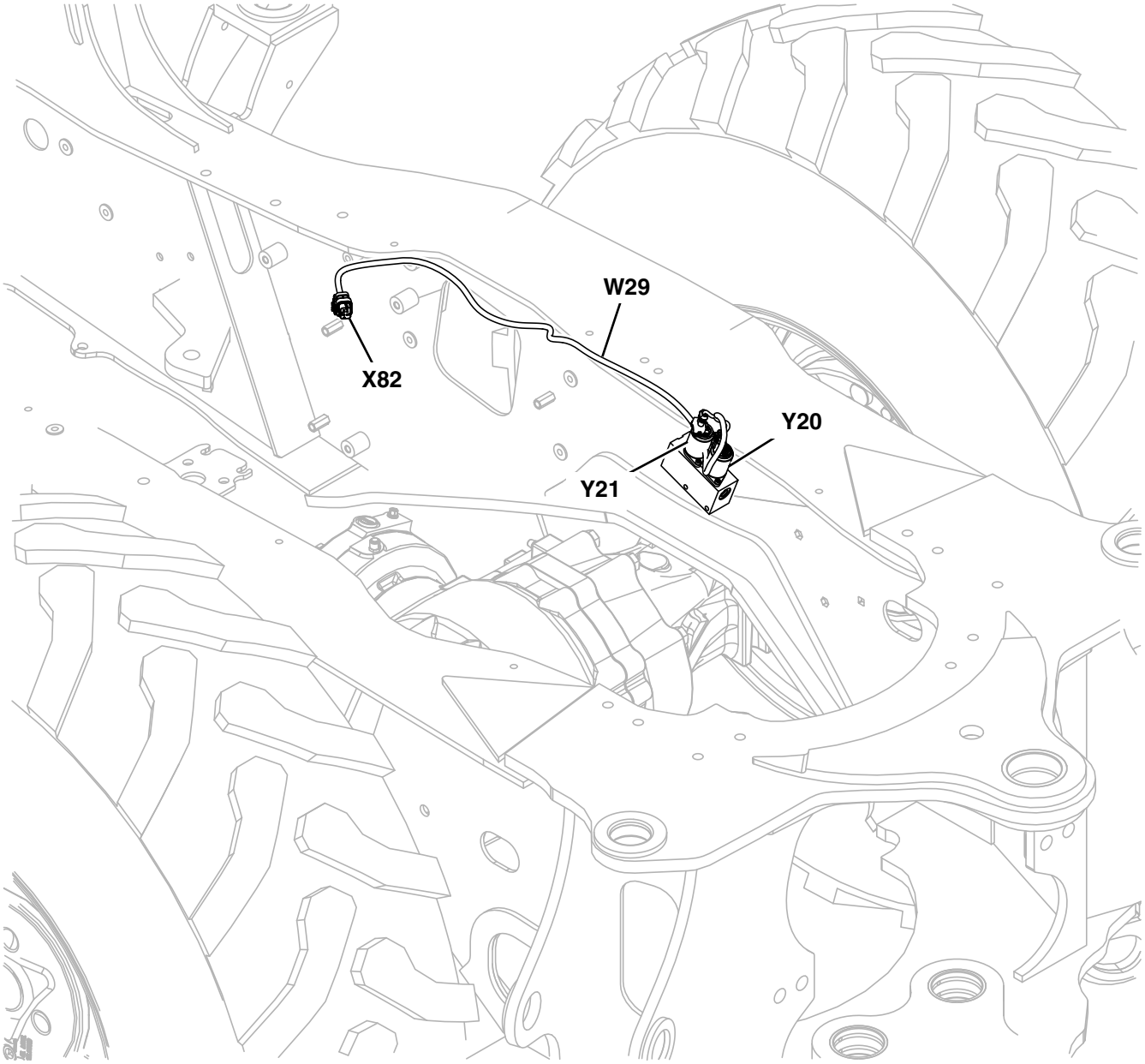
TX1100685

Fuel Lift Pump Relay Harness (W22) Wiring Diagram

K17— Fuel Lift Pump Relay
X86— Fuel Lift Pump Relay Harness Connector

DS35042,000091F -19-16NOV11-1/1

Loader Auxiliary Solenoid Harness (W29) Component Location



TX1104624

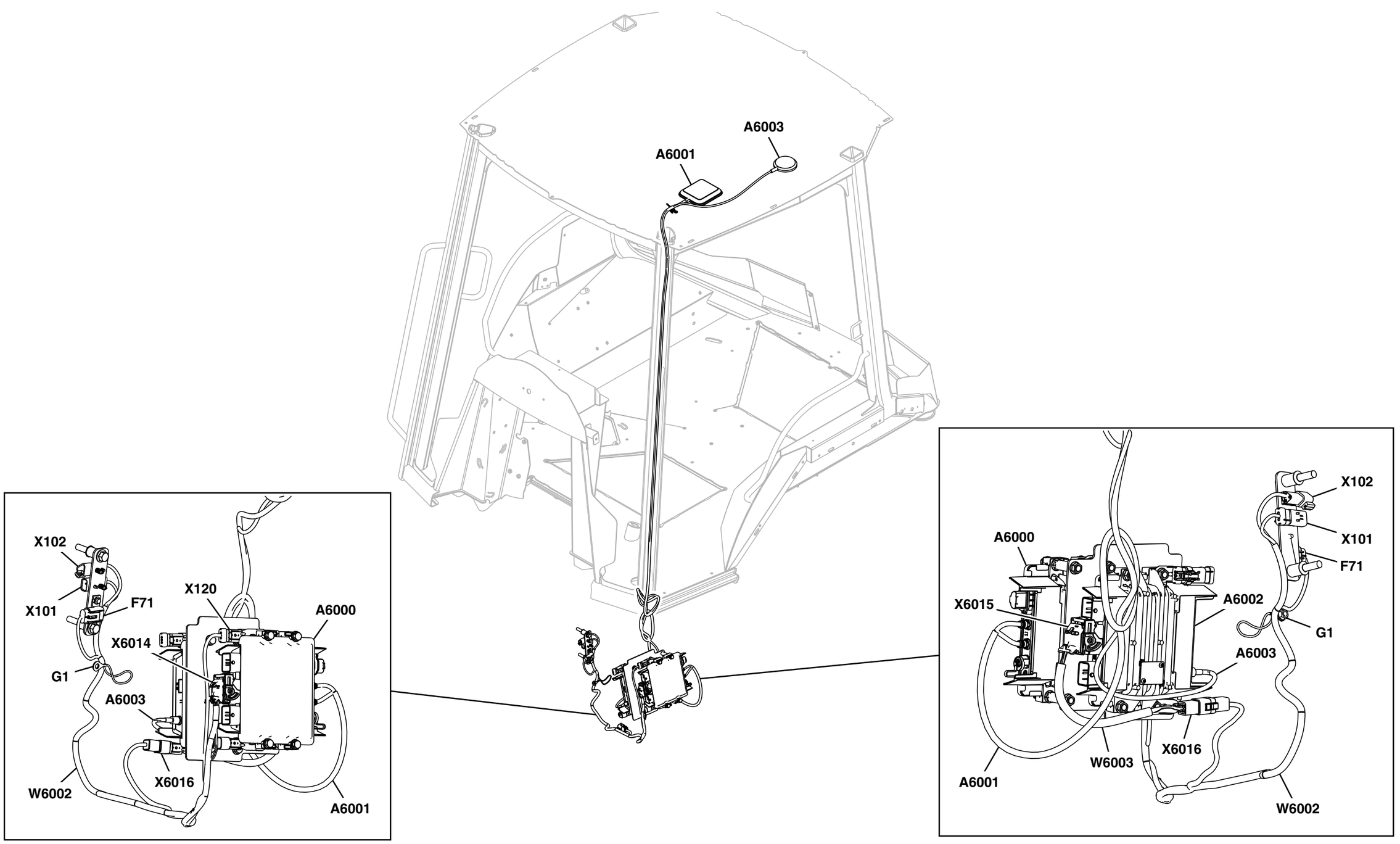
Loader Auxiliary Control Harness (W29) Component Location

W29—Loader Auxiliary Solenoid Harness
X82— Loader Auxiliary Solenoid Harness Connector
Y20— Loader Auxiliary Extend Solenoid
Y21— Loader Auxiliary Retract Solenoid

DS35042,00008D4 -19-11JUL13-1/1

Modular Telematics Gateway (MTG) Harness (W6002) Component Location

TX1112376 —UN—17APR12



TX1112376

Continued on next page

Modular Telematics Gateway (MTG) Harness (W6002) Component Location

JD29379,000014A -19-02MAY12-1/2

NOTE: VCU uses the following engine speed thresholds to determine if engine is running or not running:

- *300 rpm or less—Not running*
- *600 rpm or more—Running*

To determine engine speed, VCU uses crankshaft position sensor (B19) information from ECU.

To prevent overheating starter motor, ECU is equipped with a timer that affects engine cranking. Timer consists of both a 30-second timer that is active during engine cranking and a 60-second timer that becomes active after each crank cycle.

When ECU receives start signal from VCU, ECU checks status of 60-second timer. It also checks for a signal from crankshaft position sensor (B19) representing engine speed. If engine speed is less than 300 rpm and 60-second timer is not active, current is provided at pin K4 of ECU connector (X42) to coil of starter relay (K5) energizing the relay.

With starter relay energized, unswitched battery current flows to starter motor solenoid activating starter motor (M1).

At the same time, ECU activates 30-second timer. If engine start switch is held down for more than 30 seconds, ECU interrupts current flow to coil of start relay which automatically stops cranking of engine.

As starter motor cranks engine, crankshaft position sensor (B19) provides a signal representing engine speed to pins D4 and B4 of ECU connector (X41). The ECU uses this signal to verify that crankshaft is turning. ECU then sends a signal from pin M3 of ECU connector (X42) energizing fuel lift pump relay (K17) and allowing current to flow to fuel lift pump (M17). This provides pressurized fuel to electronic fuel injectors. At the same time, ECU allows current to flow to electronic fuel injectors to start fuel injection process and thus, start the engine. For more information on the ECU, fuel lift pump, and electronic fuel injectors, see Engine Control Unit (ECU) Circuit Theory of Operation. (Group 9015-15.)

When ECU detects engine speed is equal to or greater than 600 rpm, it interrupts current flow to coil of starter relay automatically stopping cranking of engine. It does this even if engine start switch is still held down (VCU still sends start request to ECU).

If engine start switch is pressed and held while 60-second timer is active, ECU prevents current from flowing to the coil of starter relay. Starter cannot be activated until 60 seconds elapses.

Engine Stop

Once engine stop switch has been pressed, SSM sends a message across CAN to VCU requesting to begin engine shutdown process. VCU then returns a message commanding SSM to turn off left LED on start switch.

NOTE: If SSM stop switch is pressed again or held for more than 1 second at any time, SSM removes ignition relay output regardless of VCU command.

VCU also observes vehicle speed via transmission speed sensor (B14). If it is determined that vehicle speed is invalid or greater than 0.5 km/h and current gear is not set to neutral, VCU sets current gear to neutral, sets a park brake apply timer to 15 seconds, and sounds an audible alarm.

A pop-up appears on SDM showing PARK BRAKE APPLY timer and decrements for 15 seconds.

Once timer expires or vehicle speed becomes 0.5 km/h or less, VCU sends a shutdown request to SSM to turn off ignition (switched) power.

VCU also checks turbocharger cool down timer from ECU to see if turbocharger cool down is required.

If value in ECU for turbocharger cool down timer is zero, then VCU commands SSM to turn off ignition (switched) power relay. If value is greater than zero, VCU captures that value and sets it as turbocharger cool down timer, disables engine speed control dial, and sets park brake.

When cool down timer starts, SDM responds with a single beep, displays ENGINE SHUTDOWN timer, and decrements for a value determined by ECU no greater than 120 seconds.

Once turbocharger cool down timer has reached zero, VCU commands SSM to remove power from ignition (switched) power relay.

Cold Start Aid

Ether injection is provided as an optional cold start aid for cold weather start-ups. When ignition is in ON or START position (1 or 2 LEDs illuminated on SSM start button) and momentary start aid switch (S46) is pressedd, start aid relay (K25) is energized allowing current to flow through start aid 15 A fuse (F22) to start aid solenoid (Y15). Therefore energizing solenoid and injecting ether into intake manifold.

Charge Circuit

Alternator (G4) provides power to all machine circuits and charges batteries when engine is running. Terminal B+ of alternator is connected to battery positive (+) terminal at all times. When engine is running, current flows from ignition relay (K10) through alternator excitation/return-to-dig 15 A fuse (F31) and alternator excitation diode (V4) to D+ terminal of alternator. Current then flows through alternator field windings, causing excitation of windings. For more information, Alternator Test. (Group 9015-20.)

Battery voltage at pin A of SDM 16-pin connector (X4) is used to display battery voltage.

Continued on next page

ECU utilizes signal from engine coolant temperature sensor to monitor coolant temperature and apply derate conditions when needed. If engine coolant temperature reaches 111°C (232°F), ECU derates engine 5% per minute to 80% of full power. If coolant temperature reaches 113°C (236°F), ECU derates engine 20% per minute to 40% of full power. Engine returns to full power (at a rate of 5% per minute) when engine coolant temperature drops below derate threshold temperature. If ECU senses a value that is out of valid range, a default temperature of 90°C (194°F) is utilized. For information on engine deration, see Engine Derate and Shutdown Protection and see OEM Engines - Derate Specifications. (CTM502.)

For information on how temperature sensors operate, see Measuring Temperature. (CTM502.)

For sensor specifications, see Electrical Component Specifications. (Group 9015-20.)

Fuel Temperature Sensor (B17)

ECU senses resistance from fuel temperature sensor at pins D2 and F4 of ECU 32-pin connector (X41). ECU transmits fuel temperature information across CAN system to VCU so it can be displayed in SDM service menu.

ECU monitors signal from fuel temperature sensor (B17) to apply derate conditions when needed. If ECU senses fuel temperature above 100°C (220°F), ECU derated engine 5% per minute up to 80% of full power. Engine returns to full power (at a rate of 5% per minute) when fuel temperature drops below derate threshold temperature. If ECU senses a value that is out of valid range, a default temperature of 40°C (104°F) is utilized. High fuel temperature engine protection is disabled. For information on engine deration, see Engine Derate and Shutdown Protection and see OEM Engines - Derate Specifications. (CTM502.)

For information on how temperature sensors operate, see Measuring Temperature. (CTM502.)

For sensor specifications, see Electrical Component Specifications. (Group 9015-20.)

Manifold Air Temperature (MAT) Sensor (B18)

ECU senses resistance from MAT sensor at pins C2 and D2 of ECU 32-pin connector (X41). ECU transmits MAT sensor information across CAN system to VCU so it can be displayed in SDM service menu. See Standard Display Monitor (SDM)—Diagnostics. (Group 9015-16.)

If ECU senses a manifold air temperature above 89°C (192°F), ECU derates engine 5% per minute up to 80% of full power. Engine returns to full power (at a rate of 5% per minute) when manifold air temperature falls below derate temperature. For information on engine deration, see Engine Derate and Shutdown Protection and see OEM Engines - Derate Specifications. (CTM502.)

For information on how temperature sensors operate, see Measuring Temperature. (CTM502.)

For more information on MAT sensor, see Electrical Component Specifications. (Group 9015-20.)

Crankshaft Position Sensor (B19)

ECU detects signal from crankshaft position sensor at pins B4 and D4 of ECU 32-pin connector (X41). ECU determines when number 1 cylinder is at top dead center. ECU also calculates engine (crankshaft) speed and sends this information across CAN system to VCU. VCU then forwards this information to SDM to be displayed as engine rpm.

If ECU detects an invalid signal (“noisy,” invalid pattern, or missing pulse) from crankshaft position sensor, ECU derates engine 20% per minute up to 50% of full power. Engine returns to full power (at the rate of 20% per minute) when ECU detects a valid crankshaft position sensor signal.

For information on how speed sensors operate, see Measuring Speed. (CTM502.)

For sensor specifications, see Electrical Component Specifications. (Group 9015-20.)

Camshaft Position Sensor (B24)

ECU detects signal from camshaft position sensor at pins A4 and E4 of ECU 32-pin connector (X41). ECU determines which cylinder is approaching top dead center.

For information on how speed sensors operate, see Measuring Speed. (CTM502.)

For sensor specifications, see Electrical Component Specifications. (Group 9015-20.)

Engine Oil Pressure Sensor (B23)

ECU supplies a 5-volt reference voltage and ground to engine oil pressure sensor at pins F3 and D2 of ECU 32-pin connector (X41). Engine oil pressure sensor sends an analog signal representing engine oil pressure to pin A3 of ECU 32-pin connector (X41).

ECU transmits engine oil pressure information across CAN system to SDM. The SDM utilizes this information to determine the position of the needle on the engine oil pressure gauge and moves the needle accordingly. It also activates STOP indicator when oil pressure is too low. See Standard Display Monitor (SDM). (Operator's Manual.)

The engine oil pressure can also be displayed in monitor service menu. See Standard Display Monitor (SDM)—Diagnostics. (Group 9015-16.)

ECU monitors engine oil pressure using engine oil pressure sensor (B23) and applies derate conditions when needed. If oil pressure is below threshold pressure, ECU derates engine.

Continued on next page

Power to transmission direction solenoids is controlled by a hardware interlock and a software interlock at pins J4 and M4 from VCU connector 1 (X11). VCU periodically checks status of inputs at pins C2, A3, and C1 of VCU connector 1 (X11) from FNR switch and only allows solenoids to be energized if input is determined to be valid. (X) illustrates which inputs are valid for selected FNR position.

Forward Switch	Reverse Switch	Neutral Switch	Selected FNR	Status
		X	Neutral	Valid
	X		Reverse	Valid
	X	X	Error	Invalid
X			Forward	Valid
X		X	Error	Invalid
X	X		Error	Invalid
X	X	X	Error	Invalid

NOTE: If seat position is not in forward or loader position with engine running and FNR is not in neutral, standard display monitor (SDM) displays a RETURN TCL TO NEUTRAL pop-up.

VCU receives desired gear range command from gear select switch (S6). Inputs are applied through gear select switch to pins 8, 19, 7, and 20 of VCU connector 2 (X12), depending on gear selected. (X) illustrates which pins are activated for the selected gear range.

Pin 8-(X12)	Pin 19-(X12)	Pin 7-(X12)	Pin 20-(X12)	Selected Gear
X		X		1st Gear
	X	X		2nd Gear
X			X	3rd Gear
	X		X	4th Gear

Any other combinations are considered invalid and VCU generates a diagnostic trouble code (DTC) that places transmission in neutral.

VCU activates appropriate solenoids to shift transmission into its requested gear except when park brake is on, in which case no solenoids are active and transmission stays in neutral.

(X) illustrates which solenoid is activated for the selected gear.

Selected Gear	Y1	Y2	Y3	Y4	Y5	Y6
N or Park Brake Applied						
1F	X		X		X	
2F	X		X	X		
3F	X				X	
4F	X			X		
1R		X	X		X	
2R		X	X	X		
3R		X		X		X
4R		X		X		X

When a transmission control solenoid malfunction occurs, VCU generates a diagnostic trouble code (DTC) and deactivates all transmission solenoids (putting transmission in neutral). To get transmission out of neutral and into limp home mode FNR switch must be moved to N (neutral) position and then to a desired direction. Any gear can be selected, but only a limited number of gears are available (based on transmission control solenoid malfunction).

Backup Alarm (H3)

VCU controls backup alarm (H3) by applying power from pin G3 of VCU connector 1 (X11) to backup alarm when FNR switch (S5) is placed in reverse. VCU does not power backup alarm based on actual transmission direction, but does based on placement of FNR switch.

Maximum Gear Limit

VCU can limit maximum gear the transmission allows regardless of TCL input, dependent on operator setting in standard display monitor (SDM). For more information on standard display monitor (SDM), see Standard Display Monitor (SDM)—Machine Options. (Group 9015-16.)

Differential Lock

Vehicle control unit (VCU) controls differential lock and differential lock speed limit functions based on signal from differential lock switch (S10) at pin 31 of VCU connector 2 (X12) and output to differential lock solenoid (Y10) from pin 11 of VCU connector 3 (X13). Switch is activated by a switch on the floor of operator station.

VCU also monitors engine speed to disable differential lock when engine speed is over 1000 rpm. When DIFF LOCK SPEED LIMIT option is enabled in standard display monitor (SDM), VCU sends a signal to SDM to generate an audible alarm in addition to monitor displaying DIFF LOCK DISABLED DUE TO HIGH SPEED to make operator aware that differential lock is being turned OFF because engine speed is over 1000 rpm.

Continued on next page

1—Unswitched Battery Power
A1—Vehicle Control Unit (VCU)
A9—Radio
E1—Left Rear Work Light
E2—Left Rear Work Light (if equipped)
E3—Right Rear Work Light (if equipped)
E4—Right Rear Work Light
E5—Left Front Work Light (if equipped)
E6—Right Front Work Light (if equipped)
E7—Left Front Drive Light
E8—Right Front Drive Light
E9—Left Brake/Tail Light
E10—Right Brake/Tail Light
E11—Left Rear Turn Signal
E12—Left Front Turn Signal
E13—Right Rear Turn Signal
E14—Right Front Turn Signal
E15—Left Docking Light
E16—Right Docking Light
E17—Beacon Light
H40—Horn
K40—Horn Relay
S26—Brake Light Pressure Switch 1
S27—Brake Light Pressure Switch 2
S30—Turn Signal Switch
S40—Horn Switch
S47—Beacon Light Switch
W1—Frame Ground Near Starter Motor
W2—Operator Station Floor Ground
W3—Roof Ground
W7—Horn and Coolant Level Harness
W10—Engine Harness
W14—Cab Harness
W15—Canopy Harness
W17—Roof Harness
W18—Radio Harness
X9—Cab Harness-to-Radio Harness Connector
X11—Vehicle Control Unit (VCU) Connector 1
X12—Vehicle Control Unit (VCU) Connector 2
X13—Vehicle Control Unit (VCU) Connector 3
X20—Engine Harness-to-Cab/Canopy Harness Connector
X26—Cab/Canopy Harness-to-Roof Harness Connector
X63—Engine Interface Harness-to-Horn and Coolant Level Harness Connector

Horn (H40)

On machines having total machine control (TMC) the horn (H40) can be activated two ways, by pressing horn switch (S40) on side console, or by pressing horn switch on left joystick controller (JSL). If operator presses horn switch on left joystick, JSL transfers a horn command on CAN 2 to hydraulic valve controller (HVC). HVC relays this command on CAN 1 to vehicle control unit (VCU), which energizes horn relay (K40). With horn relay energized, unswitched battery power is sent to horn (H40).

Machines without total machine control (TMC), have one horn switch (S40) on the side console. When horn switch (S40) is pressed, unswitched battery power is routed directly to horn (H40).

Front Work Lights and Drive Lights

Front work light switch on sealed switch module (SSM) controls front work lights, drive lights, and marker lights. When switch is pressed for less than 2 seconds, VCU supplies power to both left front drive lights (E7) and right front drive light (E8) through pin 5 of VCU connector 3 (X13), and illuminates left LED of the switch. Left and right tail lights (E9 and E10) are part of drive lights circuit, so anytime drive lights are on, tail lights are on as well. If pressed a second time for less than 2 seconds VCU supplies power to both right front work light (E6) and left front work light (E5) through pin 4 of VCU connector 3 (X13), and illuminates middle LED of the switch. Any subsequent presses of switch toggles between drive lights and work lights.

NOTE: On cab machines, power is also supplied to radio (A9) for illumination via drive lights circuit.

If front work lights switch is held for more than two seconds, VCU removes power from both pin 4 and 5 of VCU connector 3 (X13), shutting off front work and drive lights.

Rear Work Lights and Docking Lights

Rear work lights switch on SSM has five modes:

- Outer Work Lights On: When rear work light switch on SSM is pressed so only left LED is illuminated, VCU sends current out pin 2 of VCU connector 3 (X13) to left and right outer rear work lights (E1 and E4), causing outer work lights to come on.
- Inner and Outer Work Lights On: When rear work light switch on SSM is pressed a second time so left and middle LED's are illuminated, VCU sends current out pin 3 of VCU connector 3 (X13) to left and right inner rear work lights (E2 and E3). Causing inner work lights to come on while outer work lights remain on.
- Inner, Outer, and Docking Lights On: When rear work light switch on SSM is pressed a third time so left, middle, and right LED's are illuminated, VCU sends current out pins 17 and 53 of VCU connector 3 (X13) to left and right docking lights (E15 and E16). This causes docking lights to come on while inner and outer work lights remain on.
- Docking Lights On: When rear work light switch on SSM is pressed a fourth time so only left LED is illuminated, VCU removes current from pins 2 and 3 of VCU connector 3 (X13), causing only docking lights to remain on.
- Lights Off: When rear work light switch on SSM is pressed a fifth time and no LED's are illuminated, VCU removes current from pins 17 and 53 of VCU connector 3 (X13), causing all rear work lights and docking lights to shut off.

Anytime VCU detects a light bulb as faulted a DTC is generated, SDM displays a pop-up and an audible alarm sounds.

Beacon Light

Beacon light (E17) is controlled by VCU via beacon light switch (S47). When VCU is powered-up and beacon light switch is in OFF (open) position, VCU recognizes beacon state as off at pin 45 of VCU connector 3 (X13). With beacon light switch in ON (closed) position, ground is provided to pin 45 of VCU connector 3 (X13) and VCU recognizes beacon state as on. When beacon state is on, current is sent through pin 1 of VCU connector 3 (X13) to beacon light (E17), causing beacon to come on.

Brake Lights

When a brake pedal is pressed and either service brake light pressure switch (S26 or S27) is closed to ground, VCU recognizes circuit being pulled down and sends current out pin 41 of VCU connector 3 (X13) to brake lights (E9 and E10).

Continued on next page

Security System Enable-Disable

NOTE: The security setup menu option is only available if machine is equipped with anti-theft security system.

Enable Security System

IMPORTANT: Default owner PIN for security system is 1111. Operator and Transport security codes are not set and must be set with master PIN or owner PIN. Using master PIN automatically resets owner PIN to default.

1. Switched power ON.
2. Press and hold MENU button for approximately 5 seconds to place standard display monitor (SDM) in SERVICE MENU mode. SDM will display SERVICE MENU for 2 seconds before returning to previous screen. See Standard Display Monitor (SDM)—Service Menu. (Group 9015-16.)
3. From MAIN MENU press NEXT button until SETUP is highlighted, then press SELECT button.
4. Press NEXT button until SECURITY is highlighted, then press SELECT button.
5. ENTER OWNER PIN will be displayed.
6. Enter correct Master or Owner security PIN:

NOTE: A master security PIN can be obtained from John Deere using DealerNet. Current engine hour meter reading and machine's serial number are needed to obtain a master security PIN.

There are two methods to enter hour setting. Both methods can be used independently or together.

- *Numeric entry - use numbers on sealed switch module (SSM)*
- *SDM - use NEXT, BACK, and SELECT buttons*

SSM Numeric Entry Method

NOTE: When ENTER PIN screen is active, SSM shall be in numeric entry mode. This mode prevents functions of each button from controlling their respective function and instead operate as a numeric keypad.

1. Press correct SSM keypad number to display button value on screen. Active field will shift right of value entered.
2. After correct PIN is entered, press ENTER button on SSM to submit value.

NOTE: Security system allows three attempts to enter a valid security PIN before requiring switched power to be turned OFF and ON to restart process.

Next, Back and Select Method

- NEXT - increments current digit
- BACK - decrements current digit
- SELECT - submit entry

a. Press NEXT or BACK button to change number displayed in active field.

b. Press SELECT button to accept number displayed in active field and shift active field next digit to right.

c. After correct hour value is entered, press SELECT button to submit value.

NOTE: Security system allows three attempts to enter a valid security PIN before requiring switched power to be turned OFF and ON to restart process.

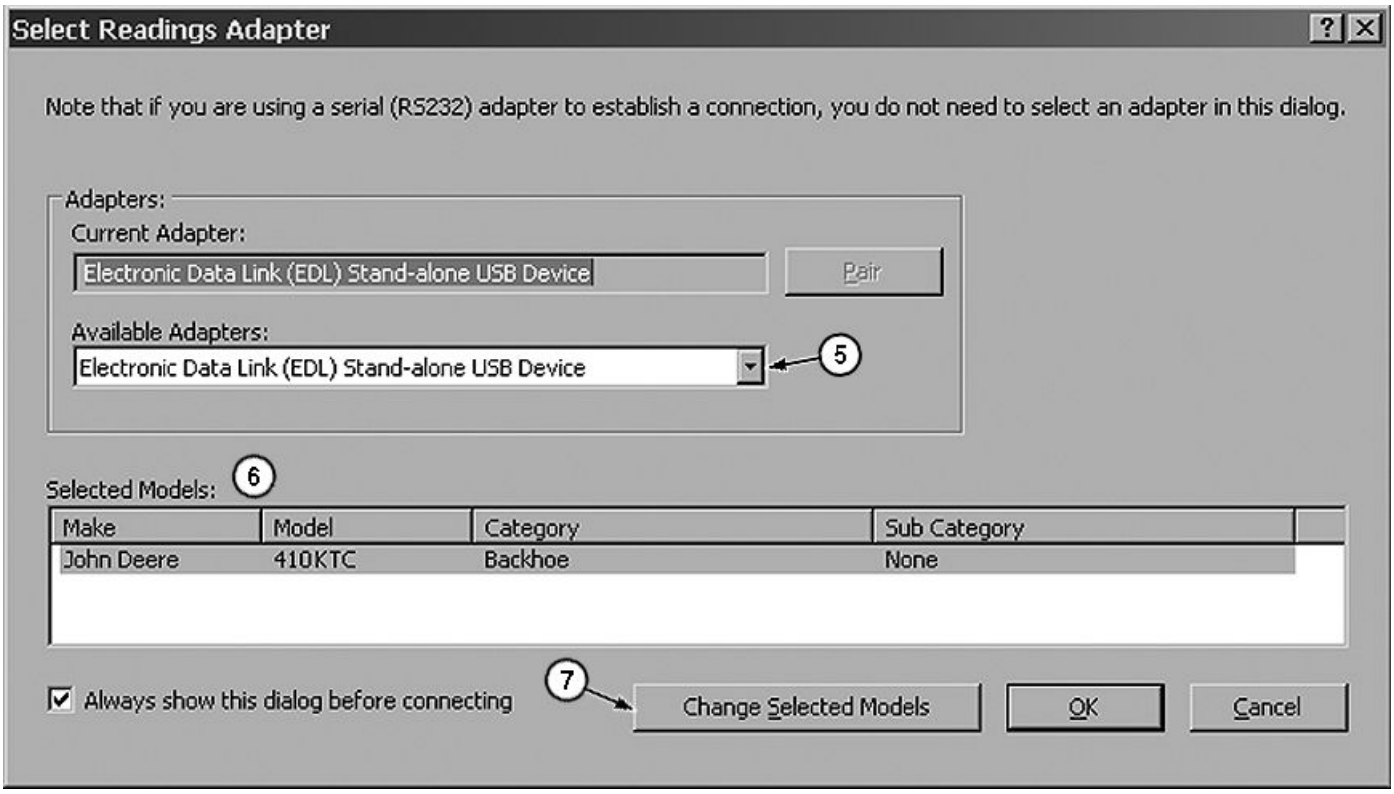
7. If entered security PIN is correct, SECURITY menu will be displayed.
8. Press NEXT button until CONFIGURATION is highlighted, then press SELECT button.
9. There are three options to enable security, press NEXT button to choose, then press SELECT button.
   - LOCK AT SHUTDOWN will be displayed for 2 seconds then display will return to CONFIGURATION menu.
   - LOCK AT 5 MINUTES will be displayed for 2 seconds then display will return to CONFIGURATION menu.
   - LOCK AT 60 MINUTES will be displayed for 2 seconds then display will return to CONFIGURATION menu.

Disable Anti-Theft Security System

NOTE: Security system can be disabled if necessary. When disabled, no theft protection is enabled. Only someone with owner or master security PIN can disable security system.

1. Perform steps 1—8 of Enable Security System in this procedure.
2. Press NEXT button until DISABLE is highlighted, then press SELECT button. DISABLE SELECTED will be displayed for 2 seconds then display will return to CONFIGURATION menu.

JJ03229,00001B8 -19-13NOV12-1/1



Select Readings Adapter Dialog Box

5— Available Adapters Drop-Down List

6— Selected Models List

7— Change Selected Models Button

7. On the Select Readings Adapter dialog box, make sure the appropriate adapter is displayed. If not, select correct adapter from drop-down list (5). Options include:
   - Electronic Data Link (EDL) Stand-alone USB Device
   - Electronic Data Link (EDL) Using Bluetooth

NOTE: The controller area network (CAN) used on the machine requires an EDL connection.

8. Make sure correct machine to connect to displays in the Selected Models list (6). If not, click the Change Selected Models button (7).
9. Click OK to connect to machine.
10. After Service ADVISOR™ connects to machine, both the Readings tab (3) and Connected Diagnostic Trouble Codes tab (4) display.
11. Double-click an underlined code on the Connected Diagnostic Trouble Codes tab to display a detailed description for servicing that diagnostic trouble code.

NOTE: Use the lock topic feature within Service ADVISOR to open multiple windows if machine is transmitting more than one diagnostic trouble code. Refer to Service ADVISOR™ system instructions for using this feature.

12. Click the Connected Diagnostic Trouble Codes tab (4) to select and view details for additional diagnostic trouble codes.

Reading DTCs with Standard Display Monitor (SDM)

1. Turn switched power ON to power up SDM.
2. Press and hold the MENU button for approximately 5 seconds to place SDM in SERVICE MENU mode. SDM will display SERVICE MENU for 2 seconds before returning to previous screen. See Standard Display Monitor (SDM)—Service Menu. (Group 9015-16.)
3. From the MAIN MENU press NEXT button until DIAGNOSTICS is highlighted, then press SELECT button.
4. Press NEXT button until CODES is highlighted, then press SELECT button.
5. From CODES submenu the display will show the amount of stored and active codes.
6. View DTC info:
   - Press the NEXT button to scroll through list of codes.
   - Press the SELECT button to view DTC details.
   - Press the BACK button to move up one menu level.
7. To clear codes, see Standard Display Monitor (SDM)—Clear Codes. (Group 9015-16.)

Service ADVISOR is a trademark of Deere & Company

DS35042,0000DA7 -19-27FEB12-3/3

9 CAN High/CAN Low Short Check	Switched power OFF.	
	Using a multimeter, check for continuity between CAN high and CAN low circuits.	**YES:** Short circuit between CAN high and CAN low wires. Check continuity between CAN high and CAN low circuits one controller at a time to locate harness where short is located. Repair or replace harness as necessary.
	Is continuity indicated?	**NO:** Go to Service ADVISOR Fuse Test.

JJ03229,000027C -19-07MAY13-13/15

10 Controller Fuse Check	Remove fuse for missing controller(s). Check fuse(s) for continuity.	**YES:** Go to Controller Check.
	Is continuity indicated in all fuses?	**NO:** Replace fuse(s) that did not indicate continuity.

JJ03229,000027C -19-07MAY13-14/15

11 Controller Check	Switched power OFF.	
	Disconnect modular telematics gateway (MTG) control unit 48-pin connector (X6014). see Modular Telematics Gateway (MTG) Harness (W6002) Component Location. (Group 9015-10.) Locate suspected controller(s). Using system functional schematic, wiring diagram and component location master legend, locate CAN wires and disconnect appropriate connector. Using a multimeter, measure resistance between CAN high and CAN low wires.	**YES:** Go to next step in this check.
	Is resistance between 55 and 65 ohms?	**NO:** An open or short circuit exists in one of CAN wires. Work from controller back to main harness, checking CAN high and low wires for an open or short circuit.
	Switched power ON.	
	Using system functional schematic, wiring diagram and component location master legend, check for power and ground at suspect controller(s).	**YES:** Program malfunctioning controller.
	Is power and ground present?	**NO:** An open or short circuit exists in circuit with no power or ground. Work from controller back to main harness, checking power and ground circuits for an open or short circuit. Repair or replace harness as necessary.

JJ03229,000027C -19-07MAY13-15/15

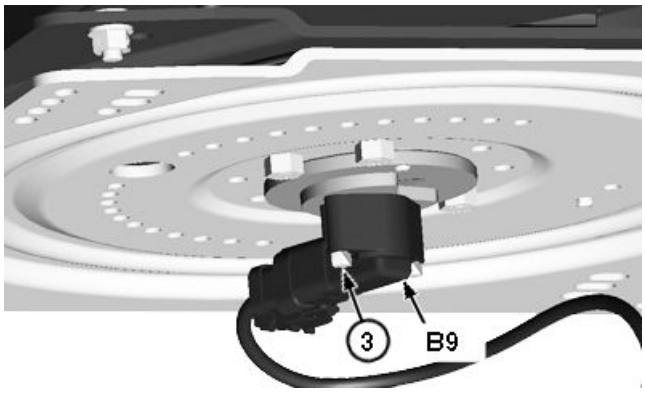
8. Remove seat position sensor cap screws (3).
9. Remove seat position sensor (B9).

NOTE: Position sensor and position sensor lever are keyed.

10. Install new seat position sensor, lining up key on seat position sensor lever and seat position sensor.
11. Place seat position sensor in marked position and install cap screws to sensor plate.

IMPORTANT: Avoid damage to wiring. Route and secure wiring in original positions during assembly.

12. Connect wire connector to seat position sensor.
13. Carefully set seat on operator's station platform without damaging wiring.
14. Install rear seat bracket nuts.
15. Slide seat all the way to the rear and rotate seat counterclockwise 45 degrees.



TX1109534A —UN—08JUN15

Seat Position Sensor

3— Cap Screw (2 used) **B9—Seat Position Sensor**

16. Install front seat bracket nuts.

DS35042,0000DB6 -19-27MAR13-2/2

Controller Remove and Install

When a machine controller is replaced, the new controller must be programmed according to machine's serial number. This will ensure correct software and options are installed to controller for that particular machine. Machine may run and operate without programming new controller, but some features and options may not be available.

DS35042,0000DB7 -19-20MAR12-1/1

1— Spring
2— From Transmission Oil Cooler
3— From Torque Converter
4— To Transmission Oil Cooler
5— Thermostat
6— Bypass
7— Cooling
37— Thermal Bypass Valve
38— Oil Cooler Relief Valve
40— To Lube
603— Lubrication Oil
604— Return Oil

The thermal bypass valve (37) is used to maintain the transmission oil temperature at a level which provides optimum torque converter performance and lubrication to transmission.

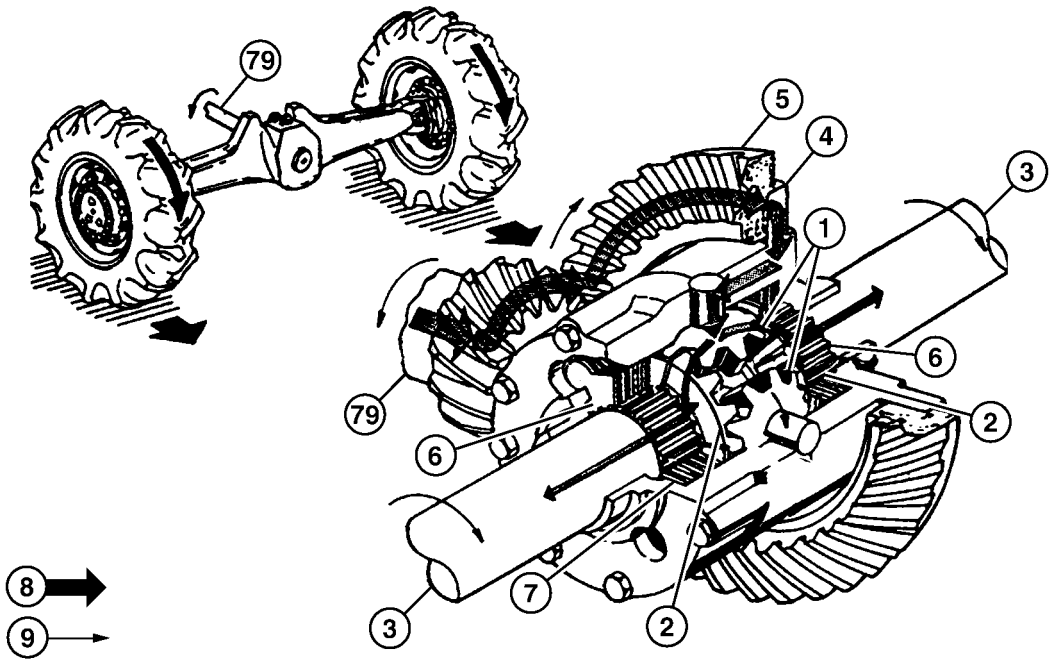
The valve contains a standard automotive-type thermostat element connected to a hollow valve spool.

The valve is designed to bypass transmission oil cooler at low temperatures. Torque converter outlet flow enters from torque converter (3) and flows through the thermal bypass valve (37) to lube (40).

At higher temperatures, thermostat (5) begins to open, allowing flow out to transmission oil cooler (4). When thermostat is in the full open position, the hollow end of thermostat spool closes against oil cooler relief valve (38). The relief valve is a spring loaded seat. When oil cooler flow is blocked, oil pressure through hollow thermostat spool pushes against the seat and springs, allowing oil to bypass oil cooler and flow to lubrication passages.

DF89619,00B50B9 -19-27FEB12-2/2

Mechanical Front Wheel Drive (MFWD) Differential Operation—If Equipped



TX1107275 —UN—09FEB12

TX1107275

Limited Slip Differential

1— Pinion Gears
2— Bevel Drive Gear (2 used)
3— Drive Shaft (2 used)
4— Differential Housing
5— Ring Gear (differential)
6— Clutch Disks
7— Clutch Plates
8— Power Flow
9— Rotation Direction
79— Drive Shaft (MFWD) (if equipped)

Equal Traction

Mechanical front wheel drive (MFWD) axle has a self-applied limited slip differential. The differential utilizes a wet multi-disk clutch to distribute torque. When confronted with slippery field conditions, this system automatically applies correct amount of torque to match traction available to each tire.

With MFWD engaged, when tractor is moving in a straight line and each wheel has equal traction, equal power is supplied to left and right drive shafts (3). No differential action occurs.

Power flows into axle housing through drive shaft (MFWD) (79), turning ring gear (differential) (5) and attached differential housing (4). When both wheels have equal traction, pinion gears (1) remain stationary within rotating housing. Pinions turn bevel drive gears (2) and drive shaft (3) splined to drive gears.

Unequal Traction

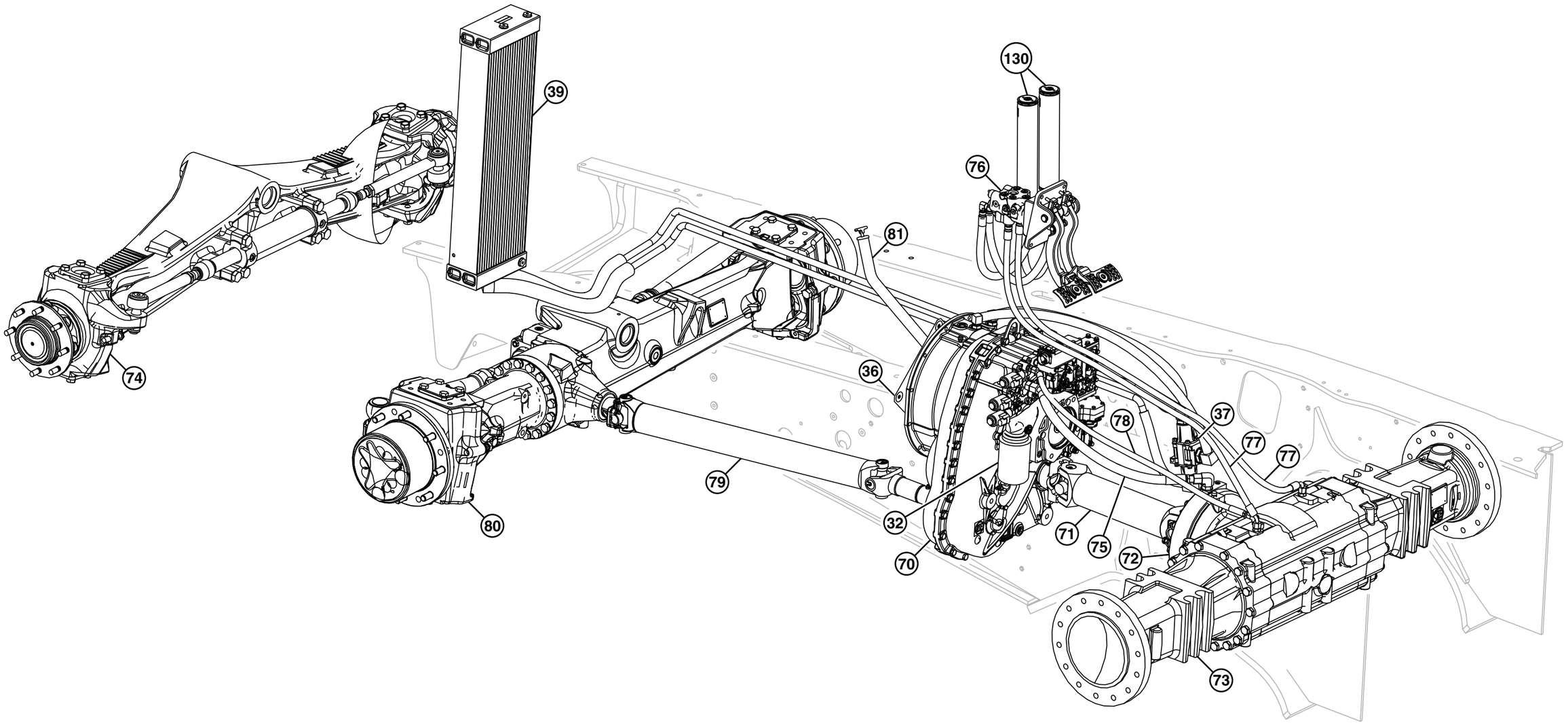
When one wheel starts slipping more than the other, the pinion gears (1) will start "walking" around the bevel drive gear (2) with most traction. At the same time the angle of gear teeth forces the meshed gears (pinion and bevel) apart. The bevel drive gear with most traction is forced out and away from gear mesh assembly, compressing a clutch pack with disks (6) splined to axle and plates (7) splined to housing. The more torque required to turn wheel, the more clutch pack is compressed, therefore the more coupled wheels become.

Because wheel with less traction is exerting less force trying to keep its axle from turning, the pinion gears do not force the bevel drive gear outward, effectively not engaging it's clutch pack. Less drive force is being transmitted to this drive shaft. As long as the difference in traction between tires remains the same, the clutch pack on the side with less traction will continue to slip more than pack for other side.

DF89619,00B516D -19-16OCT12-1/1

Power Train Component Location

TX1111190 —UN—18MAY12



TX1111190

Continued on next page

Power Train Component Location

DF89619,00B511C -19-28MAR12-1/2

Diagnose Transmission Malfunctions

Symptom	Resulting Transmission State								Suspect Component(s)
	N	1F	2F	3F	4F	1R	2R	3R	
No forward or reverse	N	**N**	**N**	**N**	**N**	**N**	**N**	**N**	-Transmission control lever (TCL) switch malfunction -Vehicle control unit (VCU) circuit -Internal VCU logic error
Machine won't start	N	1F	2F	3F	4F	1R	2R	3R	-VCU circuit
No forward gears	N	**N**	**N**	**N**	**N**	1R	2R	3R	-Transmission forward direction solenoid (Y1) open or short to ground -TCL switch malfunction -Transmission reverse direction solenoid (Y2) short to power
No reverse gears	N	1F	2F	3F	4F	**N**	**N**	**N**	-Transmission forward direction solenoid (Y1) short to power -TCL switch malfunction -Transmission reverse direction solenoid (Y2) Open or short to ground -Reverse clutch (KR) problem.
Incorrect 1F, 2F, 3F or no 3F, 1R, 2R, 3R gears	N	**2.5**	**2.5**	**4F**	4F	**N**	**N**	**N**	Transmission speed solenoid 1 (Y3) open or short to ground
Incorrect 4F gear	N	1F	2F	3F	**3F**	1R	2R	3R	Transmission speed solenoid 1 (Y3) short to power
No 2F, 3F, 4F, 2R, 3R gears	N	1F	**N**	**N**	**N**	1R	**N**	**N**	Transmission speed solenoid 2 (Y4) open or short to ground
No 1F, 1R gears	N	**N**	2F	3F	4F	**N**	2R	3R	Transmission speed solenoid 2 (Y4) short to power
No 1F, 2F, 1R, 2R gears	N	**N**	**N**	3F	4F	**N**	**N**	3R	Transmission speed solenoid 3 (Y5) open or short to ground
No 3F, 4F, 3R gears	N	1F	2F	**N**	**N**	1R	2R	**N**	-Transmission speed solenoid 3 (Y5) short to power -Third speed clutch (K3) problem.
No 1F, 3F, 4F, 1R, 3R gears	N	**N**	2F	**N**	**N**	**N**	2R	**N**	Transmission speed solenoid 4 (Y6) open or short to ground
No 2F, 2R gears	N	1F	**N**	3F	4F	1R	**N**	3R	Transmission speed solenoid 4 (Y6) short to power
No 1F, 2F, 3F gears	N	**N**	**N**	**N**	4F	1R	2R	3R	Low range forward clutch (KV) problem.
No 1F, 1R gears	N	**N**	2F	3F	4F	**N**	2R	3R	First speed clutch (K1) problem.
No 2F, 2R gears	N	1F	**N**	3F	4F	1R	**N**	3R	Second speed clutch (K2) problem.
No 4F gear	N	1F	2F	3F	**N**	1R	2R	3R	High range forward clutch (K4) problem.

DF89619,00B516E -19-02MAY12-1/1

Transmission Slippage

RH60123,0000664 -19-14JUN16-1/7

Transmission Slippage Diagnostic Procedure

RH60123,0000664 -19-14JUN16-2/7

❶ **Low Oil Level**	Check transmission oil level. See Check Transmission Oil Level. (Operator's Manual.) Is oil level low?	**YES:** Add oil as necessary. See Transmission, Axles, and Mechanical Front Wheel Drive (MFWD) Oil. (Operator's Manual.) **NO:** Go to Wrong Oil Grade.

Continued on next page

RH60123,0000664 -19-14JUN16-3/7

1 Oil Level Low	Check transmission oil level. See Check Transmission Oil Level. (Operator's Manual.) Is transmission oil level low?	**YES:** See Backhoe Loader Drain and Refill Capacities. (Operator's Manual.) **NO:** Go to Check DTCs.

DF89619,00B5123 -19-17MAY12-3/7

2 Check DTCs	Check machine for DTCs for park brake system. See Reading Diagnostic Trouble Codes (DTCs). (Group 9015-20.)	**YES:** Follow appropriate DTC for diagnostic procedure. **NO:** Go to Park Brake Solenoid Not Working.

DF89619,00B5123 -19-17MAY12-4/7

3 Park Brake Solenoid Not Working	Check park brake solenoid. See Transmission Solenoid Check. (Group 9015-20.) Is park brake solenoid working?	 **YES:** Go to Park Brake Hose Leaking. **NO:** Replace park brake solenoid.

DF89619,00B5123 -19-17MAY12-5/7

4 Park Brake Hose Leaking	Inspect park brake hose. Is park brake hose leaking?	**YES:** Repair hose. **NO:** Go to Park Brake Release Pressure Low.

DF89619,00B5123 -19-17MAY12-6/7

5 Park Brake Release Pressure Low	Inspect for malfunction in park brake release circuit. See Park Brake Release Pressure Test. (Group 9020-25.) Is park brake pressure within specification?	**YES:** Checks complete. **NO:** Diagnose cause of low park brake pressure. Check transmission system pressure. See Transmission System Pressure Test. (Group 9020-25.) Visually inspect condition of solenoid valve seals. Replace as necessary. Check rear axle oil level. See Check Rear Axle Oil Level. (Operator's Manual.) If rear axle oil level is high, this could indicate park brake piston seals are leaking.

DF89619,00B5123 -19-17MAY12-7/7

Transmission Oil Warm-Up Procedure

SPECIFICATIONS	
710K Weight (approximate)	12 143 kg 26 747 lb.
Engine Speed	Slow Idle Fast Idle
Transmission Oil Temperature	60—70°C 140—158°F

IMPORTANT: Never operate machine equipped with mechanical front wheel drive (MFWD) with front wheels (axle) on the ground, rear wheels (axle) off the ground, and transmission in fourth gear forward. Damage to the mechanical front wheel drive (MFWD) will occur.

NOTE: Have test equipment installed before warm-up. Cooling system is highly efficient and may require blocking air flow around the transmission cooling system to control temperature.

1. Prepare machine for service. See Park and Prepare for Service Safely. (Group 9000-01.)

CAUTION: Prevent possible crushing injury from heavy component. Use appropriate lifting device.

2. Raise machine off ground using loader and stabilizers until all tires are off the ground and block with hardwood timbers or appropriate floor stands.

Specification

710K—Weight (approximate)..... 12 143 kg
26 747 lb.

3. View transmission oil temperature on standard display monitor (SDM). See Standard Display Monitor (SDM)—Diagnostics. (Group 9015-16.)

4. Park brake OFF. Put transmission control lever (TCL) in third gear forward.

IMPORTANT: Do not stall converter for longer than 20 seconds or serious converter damage could result.

5. Cycle engine at fast idle for 10 seconds with service brakes engaged and then at slow idle for 5 seconds with service brakes disengaged until desired temperature is reached.

Specification

Engine—Speed.....Slow Idle
Fast Idle

Transmission Oil—Temperature.....60—70°C
140—158°F

DF89619,00B50DB -19-11MAY12-1/1

Transmission Oil Sampling Procedure—If Equipped

For transmission oil sampling procedure, see Fluid Sampling Procedure—If Equipped. (Group 9010-25.)

DF89619,00B511B -19-23MAY12-1/1

- If shift is slow (long modulation time only) and neutral pressure is between 270—300 kPa (2.7—3 bar) (39—44 psi), orifice in modulation circuit is restricted.
- If shift is hard or neutral pressure is high, orifice is oversized, loose, or missing.
- If shift is long (hesitation or long fill time) or neutral pressure is low, modulation spring is weak or not shimmed properly, or orifice is plugged. Shim spring as necessary or clean orifice. A 1 mm (0.039 in.) shim is equal to 42 kPa (0.4 bar) (6 psi).

Specification

1.00 mm (0.039 in.) Shim—Pressure Change	42 kPa 0.4 bar 6 psi

DF89619,00B50D0 -19-11MAY12-2/2

Differential Lock Pressure Test

SPECIFICATIONS	
Transmission Oil Temperature	60—70°C 140—158°F
Engine Speed	1475—1525 rpm
Differential Lock Pressure	1600—2000 kPa 16—20 bar 232—290 psi

SERVICE EQUIPMENT AND TOOLS
JT02158 Digital Pressure and Temperature Analyzer
JT02161 Transducer 3450 kPa (34.5 bar) (500 psi)
Quick Coupler -4

1. Prepare machine for service. See Park and Prepare for Service Safely. (Group 9000-01.)
2. Install quick coupler to differential lock pressure port (90).
3. Install JT02161 Transducer and JT02158 Digital Pressure and Temperature Analyzer to quick coupler. See JT02156A Digital Pressure and Temperature Analyzer Kit Installation. (Group 9025-25.)
4. View transmission oil temperature on standard display monitor (SDM). See Standard Display Monitor (SDM)—Diagnostics. (Group 9015-16.)
5. Warm transmission oil to specification. See Transmission Oil Warm-Up Procedure. (Group 9020-25.)

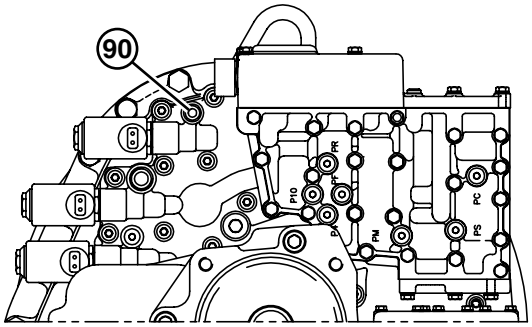
Specification

Transmission Oil—Temperature	60—70°C 140—158°F

6. Engage mechanical front wheel drive (MFWD) and park brake.

IMPORTANT: The DIFF LOCK SPEED LIMIT option must be disabled OFF to allow for differential lock function to operate above 1000 rpm.

7. Increase engine speed to specification and record pressure reading with differential lock pedal switch pressed down.



TX1101816 —UN—22NOV11

Differential Lock Pressure Test Location

90— Differential Lock Pressure Port

Specification

Engine—Speed	1475—1525 rpm
Differential Lock—Pressure	1600—2000 kPa 16—20 bar 232—290 psi

NOTE: When differential lock pedal switch is released, pressure should be zero.

8. If differential pressure is low:
   - Verify differential lock speed option in monitor is turned off.
   - Check axle oil level. See Check Rear Axle Oil Level. (Operator's Manual.) If oil level is too high, seals may be leaking. If axle oil level is OK, but differential lock pressure is low, leakage is indicated in transmission control valve, differential lock solenoid, or gasket.
   - Check transmission system pressure. See Transmission System Pressure Test. (Group 9020-25.) If pressure is OK, but differential lock pressure is low, it indicates a leak in the circuit. See Rear Axle Remove and Install. (Group 0250.)

DF89619,00B50D1 -19-23APR12-1/1

Service Brake Accumulator Charge Pressure Test

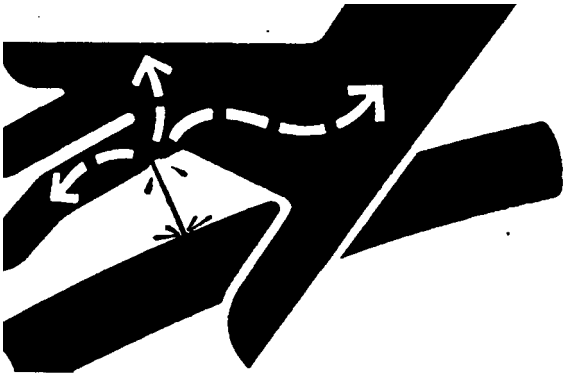
SPECIFICATIONS	
Hydraulic Oil Temperature	60—70°C 140—158°F
Brake Accumulator Charge Pressure	22 750—25 700 kPa 227.5—257.0 bar 3300—3725 psi

SERVICE EQUIPMENT AND TOOLS
JT02158 Digital Pressure and Temperature Analyzer
JT02162 Transducer 34 474 kPa (344.7 bar) (5000 psi)
Swivel Run Tee -6
Quick Coupler -6 OFS

The purpose of this test is to determine whether accumulators will charge to maximum system pressure.

CAUTION: To avoid injury from escaping fluid under pressure, stop engine and relieve the pressure in the system before disconnecting or connecting hydraulic or other lines. Tighten all connections before applying pressure.

1. Prepare machine for service. See Park and Prepare for Service Safely. (Group 9000-01.)



X9811 —UN—23AUG88

High-Pressure Fluid

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

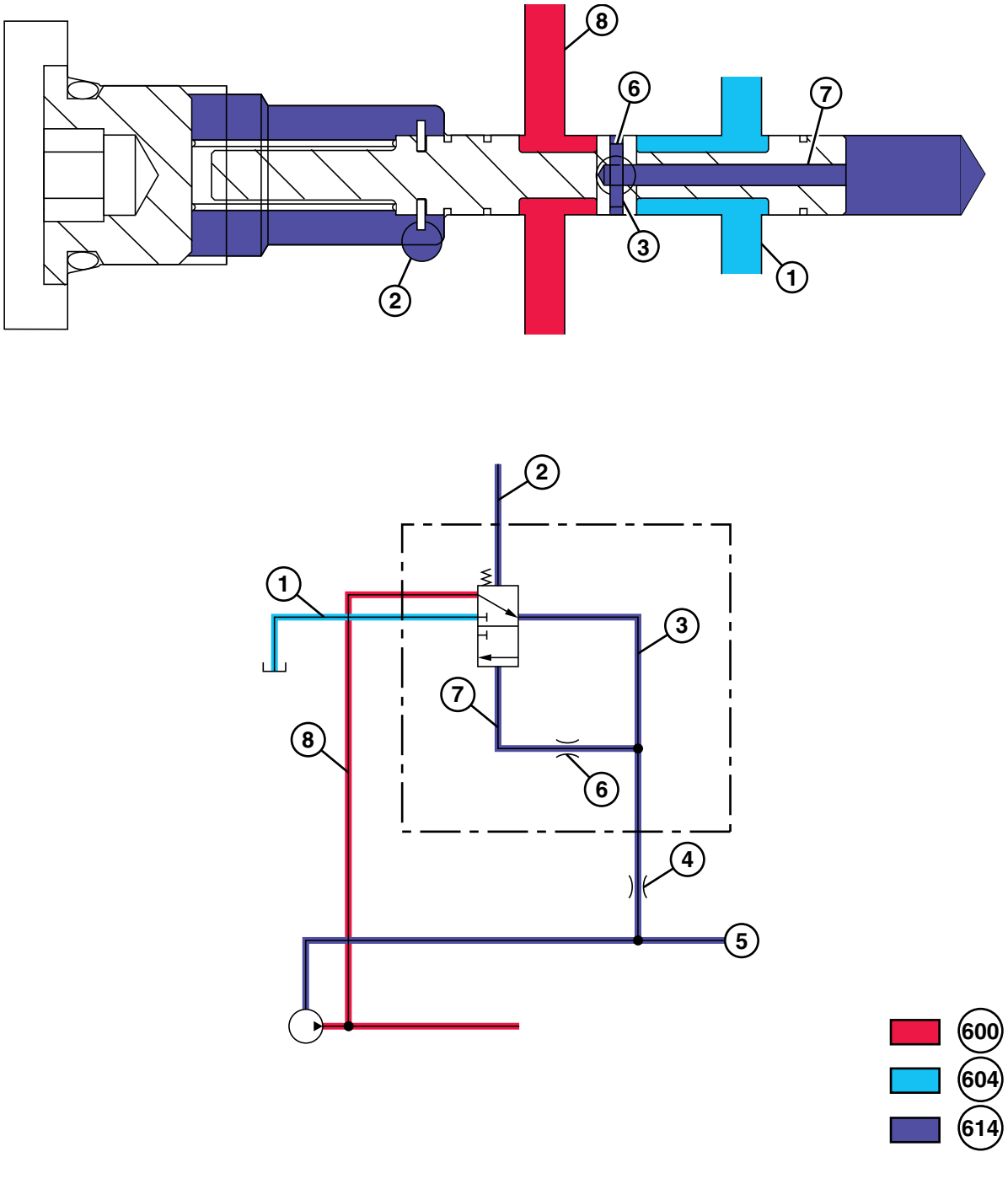
Specification

Hydraulic Oil—Temperature.....60—70°C
140—158°F

3. Pump brakes approximately 50 times to relieve any residual pressure in hydraulic system.
4. Open brake and steering valve access panel. See Brake Valve Remove and Install. (Group 1060.)

Continued on next page

Load Sense Isolator Operation



TX1100978

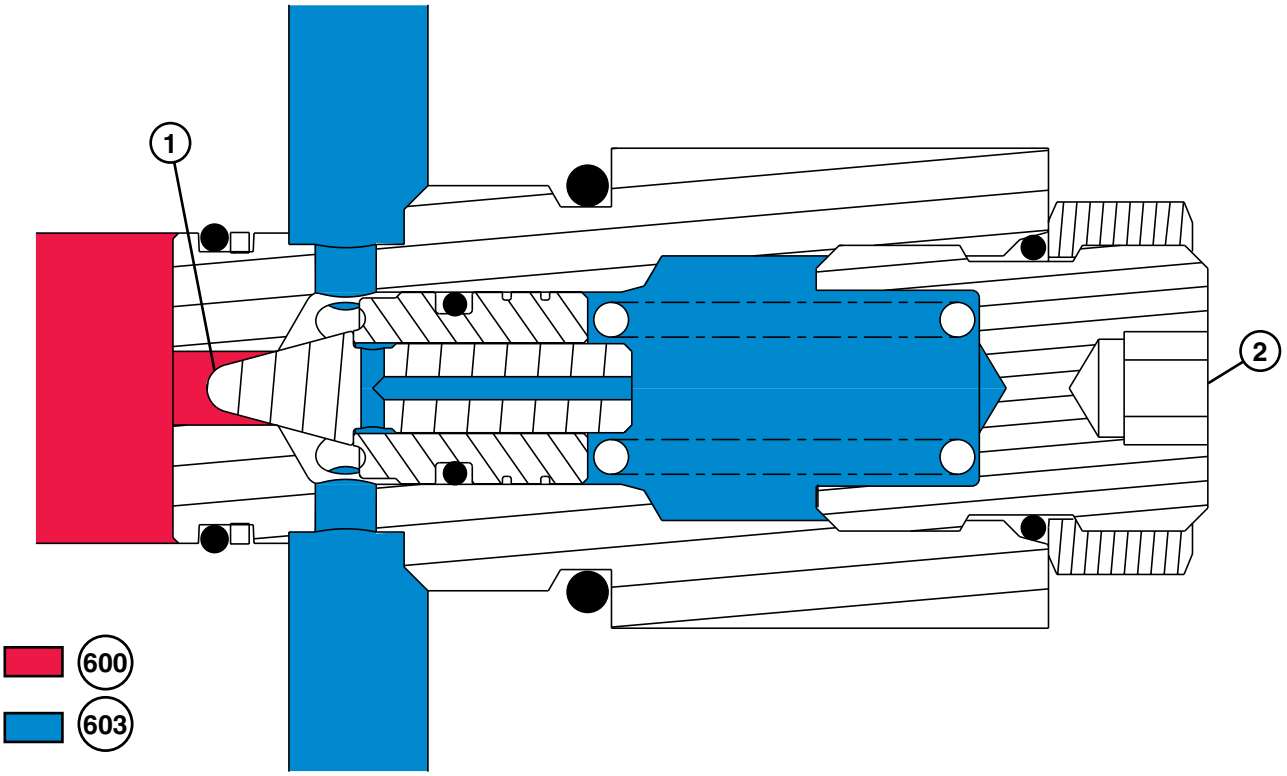
Load Sense Isolator

1— Return Passage
2— Input from Valve Load Sensing Network
3— Load Sense Output (to compensators and pump load sense input)
4— Orifice
5— To Compensators
6— Damping Orifice
7— Pilot Passage
8— Supply from Pump
600— High Pressure Oil
604— Return Oil
614— Load Sense Oil

The load sense isolators are used to sense the loader and stabilizer control or backhoe control valves highest bridge pressure, representing the highest load at a work port. It then sends an equal pressure to the pump's load sense port.

Continued on next page

DB95148,0000BD9 -19-31MAY13-1/2



TX1101084

TX1101084 —UN—26JAN12

26 mm (1.06 in.) Port Size Shown

1— Main Poppet
2— Adjustment Screw
600— High Pressure Oil
603— Return Oil

This 26 mm (1.06 in.) port size O-ring seal relief is used on backhoe control valve boom up, crowd out, and bucket dump. It is also used on loader control valve boom up and bucket curl.

These reliefs are direct acting, screw adjustable, and do not have anticavitation operation.

The pressure set point is adjustable by turning the adjustment screw (2) at the end of the relief. Turning the adjustment screw in increases the pressure setting.

In relief operation, pressure oil overcomes main poppet (1) and oil flows from the pressurized port to tank.

DF89619,00B50AD -19-27JAN12-2/2

The auxiliary section is a three-position, four-way, spool valve. Valve spool (155) is actuated by a manual lever or pilot oil and is returned to neutral by centering spring (1) in end cap.

In neutral position:

- Power passages (2) are blocked from work ports (3, 4).
- Load sense passage is open to bridge passage (5) through orifice (6).
- Bridge passage is open to return through return passage (7).
- Oil in work ports is trapped.

When auxiliary function is commanded:

- Spool opens supply pressure oil from power passage to work port (3).
- Spool opens work port (4) to return passage (8).
- If specific pressure is reached , relief valve (237) opens supply oil to return, protecting circuit from high pressures.

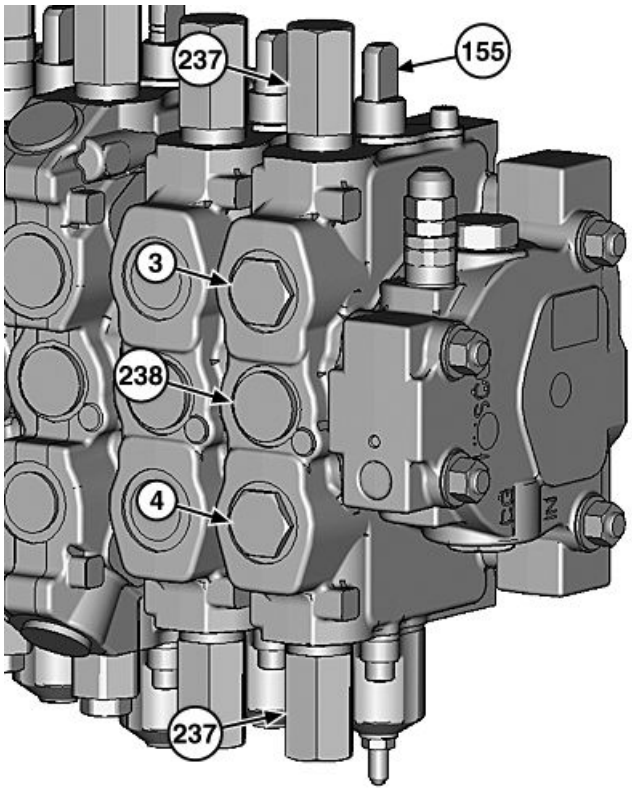
Supply pressure oil must flow through compensator (238) to reach work ports. Compensator acts as a lift check and will not open until oil pressure in power passage exceeds pressure in work port, preventing back flow from work ports. This prevents a cylinder with load from settling before enough pressure has built in power passage to lift load.

Auxiliary Activated (only active function or highest load)

Supply pressure oil shifts compensator (238) to a full flow position (shown), resulting in lowest possible pressure drop across compensator. When spool shifts it opens system pressure oil to the load sense circuit. This creates the auxiliary load sense signal sent to pump control. Supply pressure oil flows through control valve load sense circuit, closing all load sense shuttle valves (9) for all other backhoe functions and shifting load sense isolator (153). This opens load sense circuits for backhoe compensators and hydraulic pump to supply pressure. Compensator will remain open (increasing pressure in load sense circuit thus increasing system pressure) until hydraulic pump supplies enough flow and pressure to move auxiliary load. Auxiliary function operates like this when its the only function activated or has the highest load of multiple functions activated.

Multiple Functions Activated (auxiliary not highest load)

Load sense shuttle valves (9) ensure function with highest load provides load sense signal to pump control. Function with highest load sends supply pressure oil out to load sense circuit, closing all other load sense shuttle valves, allowing only the highest work port oil pressure to reach load sense isolator (153). Load sense isolator shifts, allowing supply oil to enter load sense circuit to backhoe compensators and hydraulic pump (duplicating original load sense signal).



TX1144158A —UN—17SEP13

Auxiliary Section

3— Work Port (boom lower)
4— Work Port (boom raise)
155— Backhoe Auxiliary Spool
237— Relief Valve (with anticavitation, adjustable) (2 used)
238— Compensator

System pressure is now equal to pressure required to move the heaviest load plus the load sense differential pressure. This higher pressure is seen by all other functions that may not require this much force. Compensator prevents functions with a lighter load from experiencing abrupt movement due to excessive supply pressure seen. Compensator responds to auxiliary work port pressure on one side and system load sense pressure on the other. When load sense pressure side is higher, (another function has a higher load) compensator is forced towards the closed position, narrowing flow path to auxiliary work ports and creating a pressure drop. This keeps auxiliary circuit flow proportional to auxiliary demand, preventing abrupt function movements. Compensator will continually meter circuit oil flow according to the difference between highest load sense pressure and auxiliary work port pressure. The compensator in section with highest load remains open to the system pressure passage, thus only sending the highest load sense signal from that particular section.

Anticavitation

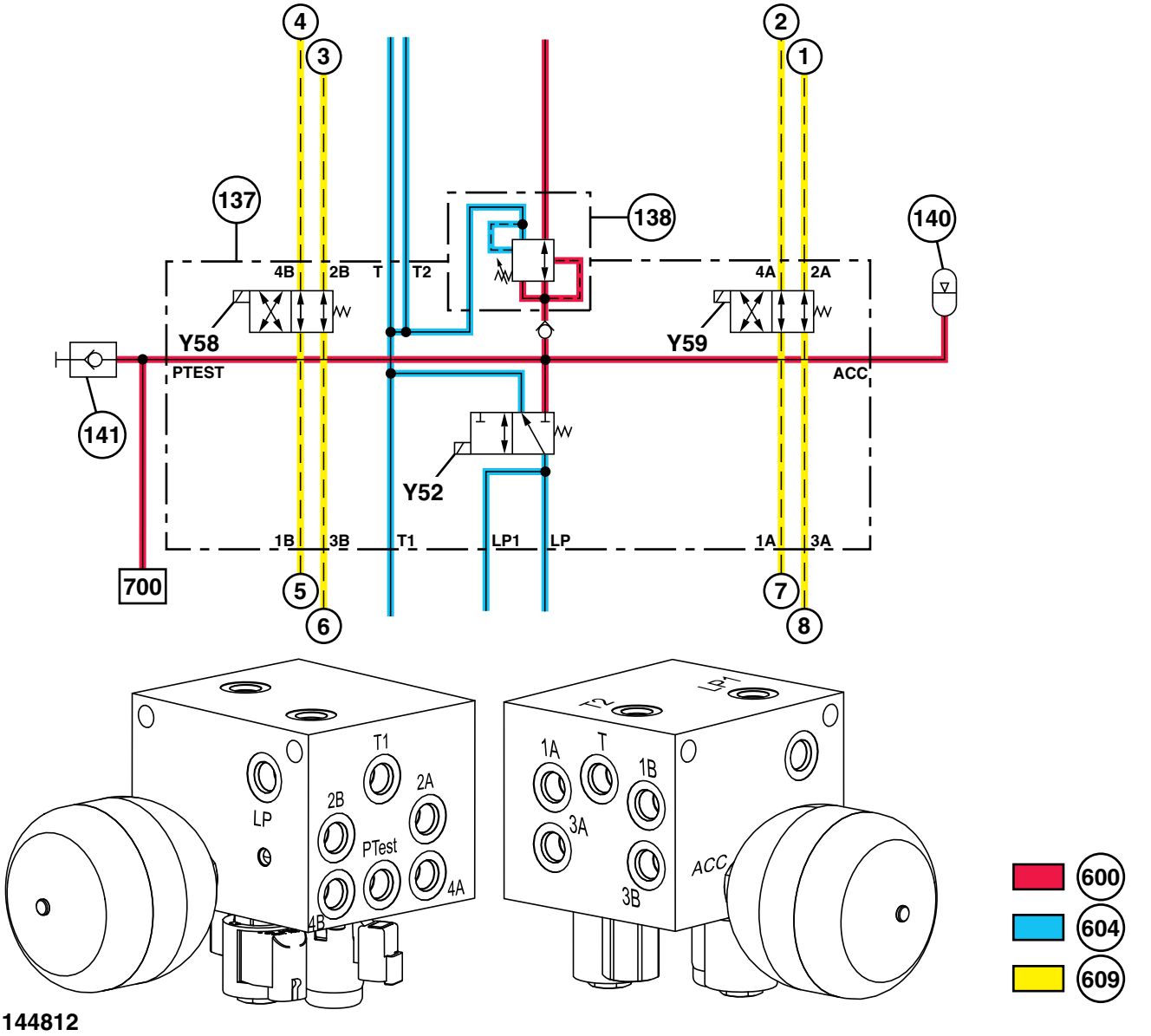
Continued on next page

1— Centering Spring
2— Power Passage (2 used)
3— Work Port (bucket curl)
4— Work Port (bucket dump)
5— Bridge Passage
6— Load Sense Bleed Orifice
7— Return Passage
8— Main Return Passage
9— Load Sense Shuttle Valve
10— Supply Inlet
11— Manual Controls: Supply to Loader Auxiliary Manifold (if equipped)
11— Pilot Controls: Supply to Pilot Enable and Pattern Select (PEPS) Valve and Auxiliary Selective Flow Control Valve (if equipped)
12— Load Sense Signal to Hydraulic Pump
13— Supply Oil to Downstream Backhoe Functions
14— Load Sense Signal from Downstream Backhoe Functions
15— Load Sense Signal to Backhoe Function Compensators
16— Orifice
21— Supply Load Sense Passage
151— Load Sense Relief Valve
153— Load Sense Isolator
158— Backhoe Bucket Spool
163— Bucket Cylinder
221— Inlet Section
231— Relief Valve (no anticavitation)
233— Relief Valve (with anticavitation)
238— Compensator
600— High Pressure Oil
604— Return Oil
614— Load Sense Oil

Continued on next page

DB95148,0000246 -19-19SEP13-20/26

Pilot Enable and Pattern Select Valve Operation—If Equipped



TX1144812

Pilot Enable and Pattern Select Valve Schematic

1— From Right Pilot Control (port 3)
2— From Left Pilot Control (port 1)
3— From Right Pilot Control (port 2)
4— From Left Pilot Control (port 3)
5— To Boom Valve Section (raise boom)
6— To Crowd Valve Section (crowd in)
7— To Boom Valve Section (lower boom)
8— To Crowd Valve Section (crowd out)
137— Pilot Enable and Pattern Select (PEPS) Manifold
138— Pilot Control Pressure Reducing Valve
140— Pilot Control Accumulator
141— Pilot Control Pressure Test Port
600— High Pressure Oil
604— Return Oil
609— Pilot Oil
700— To Loader Auxiliary Manifold (if equipped)
Y52— Pilot Enable Solenoid
Y58— Pattern Select Solenoid 1
Y59— Pattern Select Solenoid 2

The pilot enable and pattern select (PEPS) manifold receives system pressure from the inlet section of the backhoe control valve. System pressure oil flows through the adjustable pressure reducing valve and check valve allowing regulated pressure oil to charge pilot control accumulator. The pressure reducing valve ensures that pressure in the pilot control system and accumulator is within specification. See Hydraulic System Schematic. (Group 9025-15.)

NOTE: Pilot control accumulator is not serviceable. Replace accumulator if necessary.

Continued on next page

System pressure is now equal to pressure required to move the heaviest load plus the load sense differential pressure. This high pressure is seen by all other functions that may not require this much force. Compensator prevents functions with a lighter load from experiencing abrupt movement due to excessive supply pressure seen. When load sense isolator is closed (another function has a higher load), it also forces compensator towards the closed position, narrowing flow path to boom work ports and creating a pressure drop. This keeps boom circuit flow proportional to boom demand, preventing abrupt function movements. The load sense isolator and compensator system will continually meter circuit oil flow according to the difference between highest load sense pressure and boom work port pressure.

Anticavitation

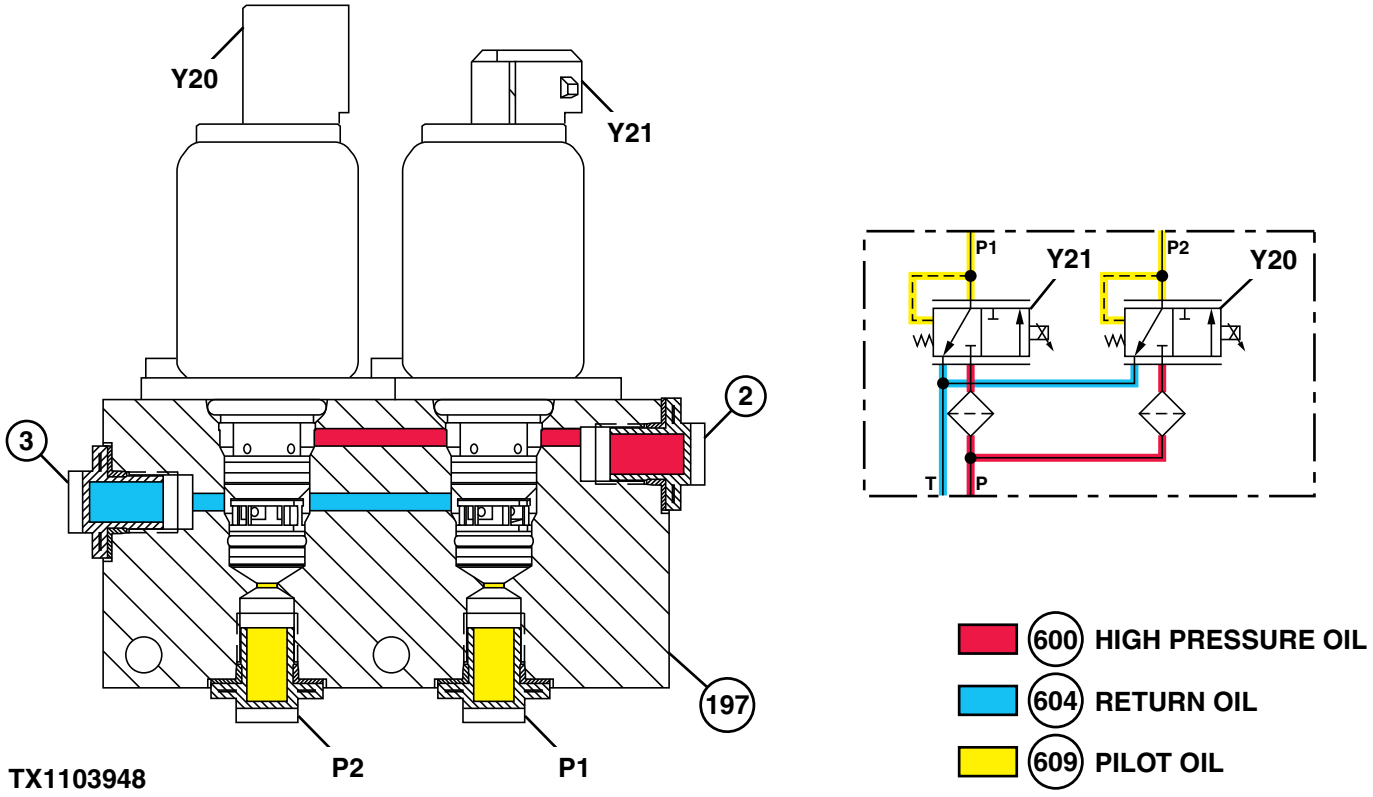
When spool is in boom lower position, supply oil is routed to work ports (5 and 6). Gravity acting on a loaded bucket may force boom to lower faster than hydraulic pump can supply oil flow to work ports, causing cavitation. An anticavitation check valve (252) is provided in boom lower circuit to prevent this. When boom lower circuit supply pressure is less than pressure in return passages (9), check valve opens allowing oil from return passage to flow to supply circuit work ports, making up for any needed supply oil.

Boom Float

When boom spool is in boom float (detent) position, all work ports are open to return, allowing oil to flow freely to and from cylinder head and rod ends. This allows bucket to follow ground contour.

Continued on next page

Loader Auxiliary Control Operation—If Equipped



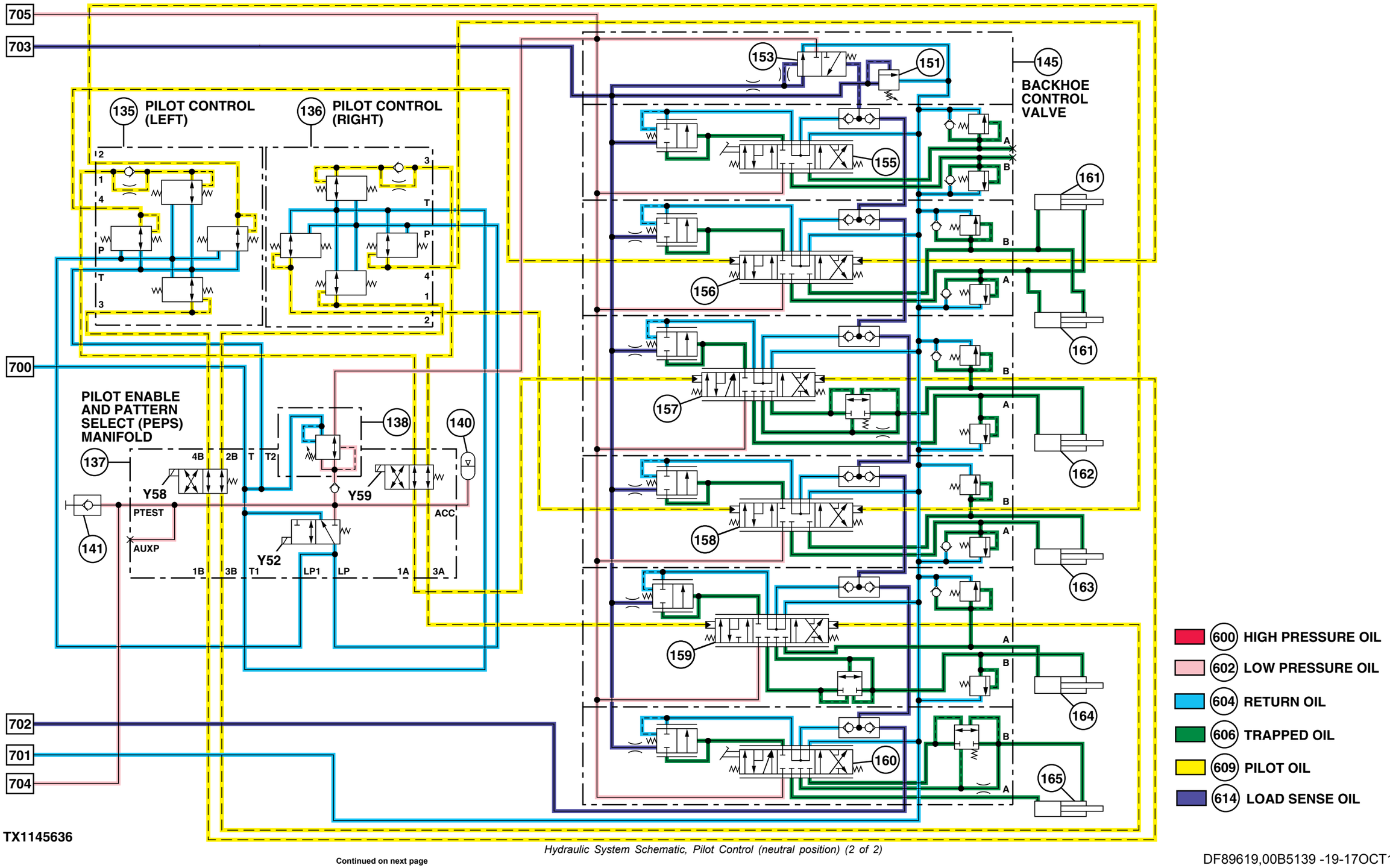
Loader Auxiliary Manifold

2— Inlet Port
3— Outlet Port
197— Loader Auxiliary Manifold
600— High Pressure Oil
604— Return Oil
609— Pilot Oil
P1— To Loader Auxiliary Spool (in)
P2— To Loader Auxiliary Spool (out)
Y20— Loader Auxiliary Extend Solenoid
Y21— Loader Auxiliary Retract Solenoid

The loader auxiliary control replaces the second loader manual control lever making control of the loader auxiliary functions easier by incorporating an electrohydraulic (EH) auxiliary function in to the loader control lever. Once the loader auxiliary manifold (1) receives a signal from the proportional loader auxiliary roller on the loader control lever, solenoid spool moves, sending pilot oil to loader auxiliary section spool. If no auxiliary functions are being used, pressure oil is open to return through outlet port (3) as return oil (604) from the manifold back to the tank (reservoir). When the proportional loader auxiliary roller is rolled backward or forward, it activates the loader auxiliary extend solenoid (Y20) or the loader auxiliary retract solenoid (Y21). The appropriate solenoid sends pilot oil (609) to the loader auxiliary spool in the loader and stabilizer control valve causing it to shift, directing flow from the loader and stabilizer control valve to the auxiliary function. For more information on the loader auxiliary spool or the loader and stabilizer control valve, see Loader and Stabilizer Control Valve Operation. (Group 9025-05.)

DB95148,0000BE7 -19-21MAY12-1/1

TX1145636 —UN—30OCT13

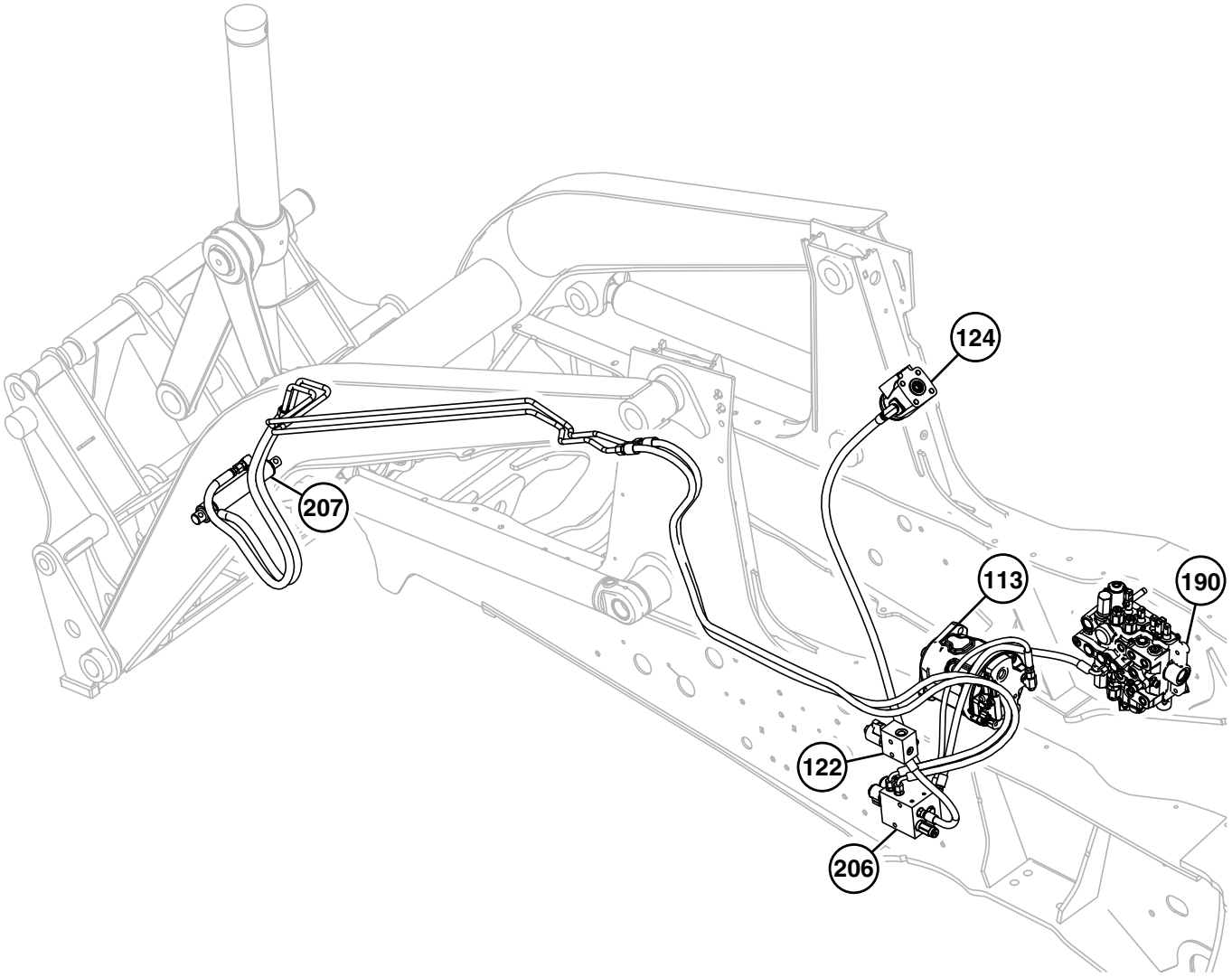


TX1145636

Continued on next page

Hydraulic System Schematic, Pilot Control (neutral position) (2 of 2)

DF89619,00B5139 -19-17OCT13-5/6



TX1113263 —UN—02MAY12

TX1113263

Loader Attachment Coupler Component Location

113— Hydraulic Pump
122— Load Sense Generation Valve
124— Steering Valve
190— Loader and Stabilizer Control Valve
206— Attachment Coupler (if equipped)
207— Attachment Coupler Cylinder (if equipped)

Continued on next page

DF89619,00B513A -19-15JUL13-7/9

❸ **Steering Valve Spline Check**	Inspect steering valve spline for damage. Is the lower steering valve spline disengaged or broken?	**YES:** Repair or replace steering valve as necessary. See Steering Valve Disassemble and Assemble. (Group 0960.) **NO:** Checks complete.

DB95148,00012A2 -19-07SEP12-5/5

Steering Wheel Turns With Slight Resistance and No Action On Steered Wheels

DB95148,00012A3 -19-18MAY12-1/3

Steering Wheel Turns With Slight Resistance and No Action On Steered Wheels Diagnostic Procedure

DB95148,00012A3 -19-18MAY12-2/3

❶ **Steering Cylinder Check**	Inspect steering cylinder. See Non-Powered Axle Steering Cylinder Remove and Install or see Mechanical Front Wheel Drive (MFWD) Axle Steering Cylinder Disassemble and Assemble. (Group 0960.) Is steering cylinder piston seal damaged?	**YES:** Repair steering cylinder as necessary. **NO:** Checks complete.

DB95148,00012A3 -19-18MAY12-3/3

Wander—Machine Will Not Stay in a Straight Line

DB95148,00012A4 -19-18MAY12-1/5

Wander—Machine Will Not Stay in a Straight Line Diagnostic Procedure

DB95148,00012A4 -19-18MAY12-2/5

❶ **Hydraulic Oil Level Check**	Check hydraulic oil level. See Check Hydraulic Reservoir Oil Level. (Operator's Manual.) Is hydraulic oil level too low?	**YES:** Add or remove as necessary. See Hydraulic Oil. (Operator's Manual.) **NO:** Go to Tracking Angle Check.

DB95148,00012A4 -19-18MAY12-3/5

❷ **Tracking Angle Check**	Verify if machine's tracking angle is within specifications. See Tracking Angle Check and Adjust. (Group 9020-20.) Is tracking angle within specification?	**YES:** Go to Steering Cylinder Check. **NO:** Adjust tracking angle.

DB95148,00012A4 -19-18MAY12-4/5

❸ **Steering Cylinder Check**	Inspect steering cylinder. See Non-Powered Axle Steering Cylinder Remove and Install or see Mechanical Front Wheel Drive (MFWD) Axle Steering Cylinder Disassemble and Assemble. (Group 0960.) Are there worn or loose parts in steering cylinder?	**YES:** Repair or replace as necessary. **NO:** Checks complete.

DB95148,00012A4 -19-18MAY12-5/5

No Loader or Steering Hydraulics

Continued on next page

DB95148,00012FB -19-01MAR17-1/6

6 Pilot Controllers (if equipped) Check	Inspect pilot controller for sticking valve spool. See Backhoe Pilot Control Valve Disassemble and Assemble. (Group 3315.) Does pilot controller spool move correctly?	**YES:** Go to Pattern Select Valve (if equipped) Check. **NO:** Repair or replace pilot controller.

DB95148,0001310 -19-10SEP12-8/10

7 Pattern Select Valve (if equipped) Check	Press pattern select valve switch on sealed switch module (SSM) and see if problem moves to another function. Does problem move to another function?	**YES:** Repair or replace pattern select solenoid valve. See Pilot Enable and Pattern Select Valve Disassemble and Assemble. (Group 3360.) **NO:** Go to Backhoe Valve Pilot Cap (if equipped) Check.

DB95148,0001310 -19-10SEP12-9/10

8 Backhoe Valve Pilot Cap (if equipped) Check	Remove and inspect pilot caps of problem function. See Hydraulic System Component Location. (Group 9025-15.) Do pilot caps move valve spool as required?	**YES:** Go to Backhoe Circuit Relief Valves Check. **NO:** Repair or replace pilot cap.

DB95148,0001310 -19-10SEP12-10/10

No Loader Power in One Function

DB95148,0001311 -19-27APR12-1/7

No Loader Power in One Function Diagnostic Procedure

DB95148,0001311 -19-27APR12-2/7

1 Control Lever Linkage Check	Inspect control lever linkage. See Loader and Stabilizer Lever Adjustment. (Group 9025-20.) Is linkage out of adjustment?	**YES:** Adjust as necessary. **NO:** Go to Loader Circuit Relief Valves Check.

DB95148,0001311 -19-27APR12-3/7

2 Loader Circuit Relief Valves Check	Test loader circuit relief valves. See Circuit Relief Valve Test—With Remote Pump. (Group 9025-25.) Are circuit relief valve pressures within specifications?	**YES:** Go to Hydraulic Oil Lines and Valves Check. **NO:** Adjust circuit relief valve settings, as necessary.

Continued on next page

DB95148,0001311 -19-27APR12-4/7

Hydraulic Pump Leaking Diagnostic Procedure

DB95148,00012B5 -19-04APR12-2/5

1 Cap Screws Check	Check hydraulic pump mounting cap screws. See Hydraulic Pump Disassemble and Assemble. (Group 2160.) Are cap screws holding pump together loose?	**YES:** Tighten cap screws to specifications. See Hydraulic Pump Remove and Install. (Group 2160.) **NO:** Go to Shaft Seal Check.

DB95148,00012B5 -19-04APR12-3/5

2 Shaft Seal Check	Inspect shaft seal for damage. See Hydraulic Pump Disassemble and Assemble. (Group 2160.) Is shaft seal worn?	**YES:** Replace seal. **NO:** Go to Pump Seal Check.

DB95148,00012B5 -19-04APR12-4/5

3 Pump Seal Check	Inspect hydraulic pump seals and gaskets for damage. See Hydraulic Pump Disassemble and Assemble. (Group 2160.) Is pump seal or backup gasket broken?	**YES:** Replace seal or gasket. See Hydraulic Pump Remove and Install. (Group 2160.) **NO:** Checks complete.

DB95148,00012B5 -19-04APR12-5/5

Excessive Pump Noise

DB95148,00012B6 -19-24JAN17-1/8

Excessive Pump Noise Diagnostic Procedure

DB95148,00012B6 -19-24JAN17-2/8

1 Hydraulic Oil Level Check	Check hydraulic oil level. See Check Hydraulic Reservoir Oil Level. (Operator's Manual.) Is hydraulic oil level too low?	**YES:** Add hydraulic oil. See Hydraulic Oil. (Operator's Manual.) **NO:** Go to Hydraulic Oil Lines Check.

DB95148,00012B6 -19-24JAN17-3/8

2 Hydraulic Oil Lines Check	Inspect hydraulic lines to determine if they are contacting with machine. Are hydraulic oil lines contacting with operator’s station?	**YES:** Check and secure hydraulic oil lines. See Operator's Station Remove and Install. (Group 1800.) **NO:** Go to Hydraulic Filter Assembly Check.

DB95148,00012B6 -19-24JAN17-4/8

3 Hydraulic Filter Assembly Check	Inspect hydraulic filter assembly for proper operation. See Hydraulic Filter Assembly Remove and Install. (Group 2160.) Is hydraulic filter bypass valve chattering?	**YES:** Inspect, clean, and repair hydraulic filter bypass valve. **NO:** Go to Hydraulic Pump Hardware Check.

Continued on next page

DB95148,00012B6 -19-24JAN17-5/8

Loader Bucket Self-Leveling Linkage and Return-To-Dig Switch Adjustment

SPECIFICATIONS	
Pickup Pin Adjustment Distance	2 mm 0.08 in.
Actuator Plate Adjustment Distance	85—90 mm 3.35—3.54 in.

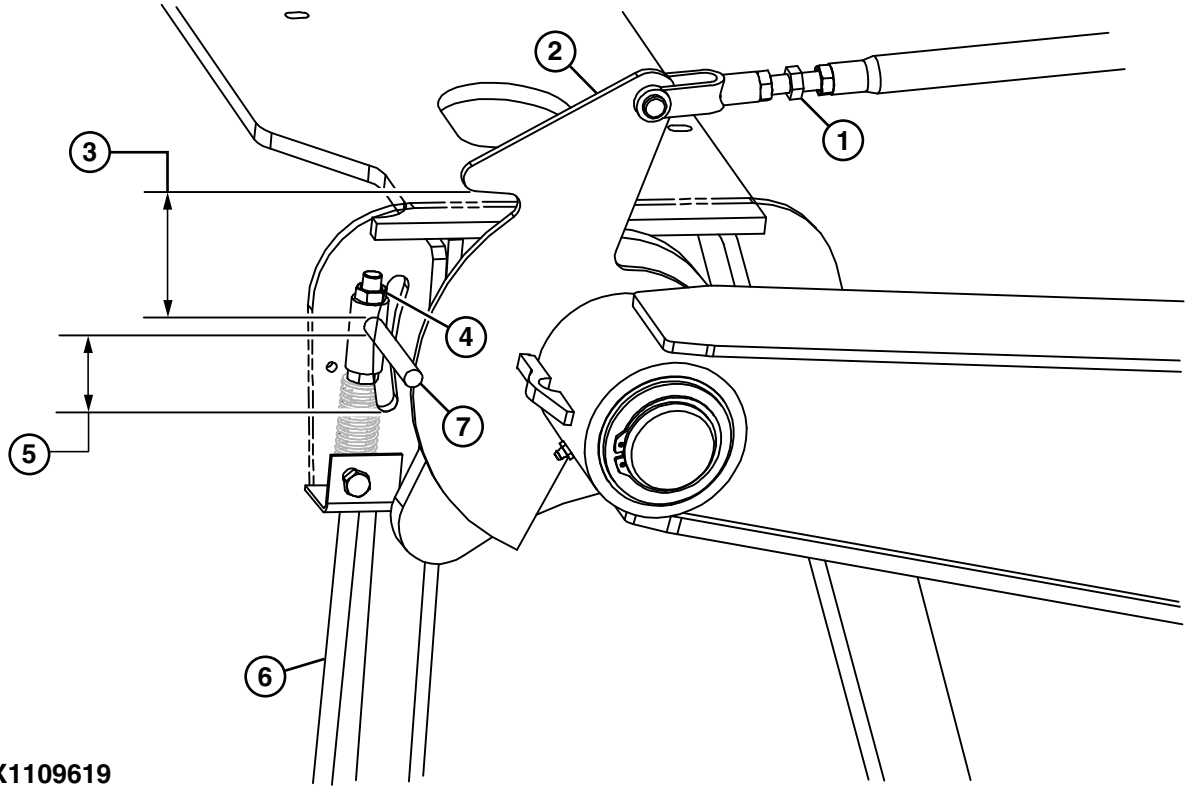
Adjusted correctly, the self-leveling linkage causes the loader control lever to move from bucket roll back to neutral when the boom is fully raised. In neutral, the bucket is automatically leveled preventing spilling of material.

With both the self-leveling linkage and return-to-dig switch adjusted correctly, the bucket will roll back to a slightly dumped or flat on the ground position as the boom lowers.

IMPORTANT: For proper adjustment of loader bucket self-leveling linkage and return-to-dig switch, perform Loader Bucket Self Leveling Linkage Adjustment before Return-To-Dig Switch Adjustment.

Loader Bucket Self-Leveling Linkage Adjustment

1. Position loader bucket flat on ground.
2. Release hydraulic system pressure. See Hydraulic Circuit Pressure Release. (Group 9025-25.)



TX1109619

TX1109619 —UN—06MAR12

Self-Leveling Linkage Adjustment

1— Actuator Tube Turnbuckle
2— Actuator Plate
3— Actuator Plate Adjustment Distance
4— Pickup Pin Adjustment Lock Nut (2 used)
5— Pickup Pin Adjustment Distance
6— Vertical Link
7— Pickup Pin

3. Push pickup pin (7) on vertical link (6) down so that loader valve spool is lifted to maximum height.
4. While holding pickup pin down, adjust lock nuts (4) so that bottom of pickup pin is within specification of bottom of pickup pin adjustment distance (5).

Specification

Pickup Pin—Adjustment Distance..... 2 mm
0.08 in.

5. Release pickup pin (7) .
6. Adjust actuator tube turnbuckle (1) so actuator plate (2) to actuator plate adjustment distance (3) is within specification.

Specification

Actuator Plate—Adjustment Distance.....85—90 mm
3.4—3.5 in.

Continued on next page

DB95148,000100E -19-19MAR12-1/2

Obtaining Fluid Sample

NOTE: This step is best done in a clean environment, rather than at the sample site.

1. Place the sample bottle from the sample kit into plastic bag. Seal plastic bag.

TX1024509A —UN—31MAY07

Place Sample Bottle in Plastic Bag

DB95148,0000820 -19-05JAN12-2/6

2. Remove the lid from the sample container, while keeping bottle inside plastic bag. Move the lid aside within the plastic bag, so that the bottle opening is accessible.

   When collecting hydraulic or power train samples, be careful to hold the sheet of plastic (located under the lid) to the top of the bottle. This will ensure that the protective plastic is not removed when the lid is taken off.

TX1024510A —UN—31MAY07

Remove Lid of Sample Bottle (in plastic bag)

Continued on next page

DB95148,0000820 -19-05JAN12-3/6

Loader, Stabilizer, and Steering Load Sense Pressure Test

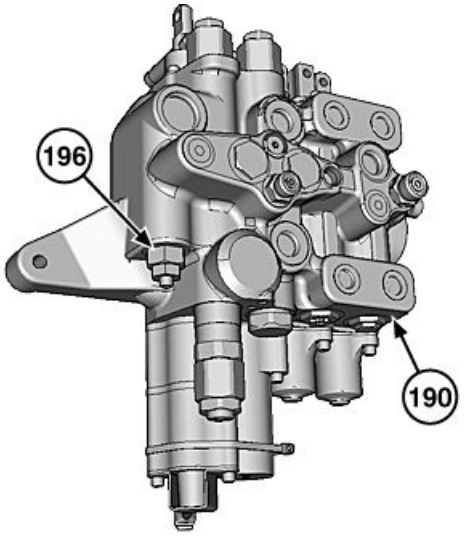
NOTE: Steering valve load sense circuit runs within the same load sense circuit as loader and stabilizer functions. Loader and stabilizer load sense relief valve (196) regulates all said functions. Adjusting relief valve will also change maximum pressure supplied to steering valve.

1. Dump loader bucket to fully dumped position and hold over relief at ground level. Record load sense pressure.

Specification	
Loader, Stabilizer, and Steering Load Sense—Pressure	22 408—23 786 kPa 224—237 bar 3250—3450 psi

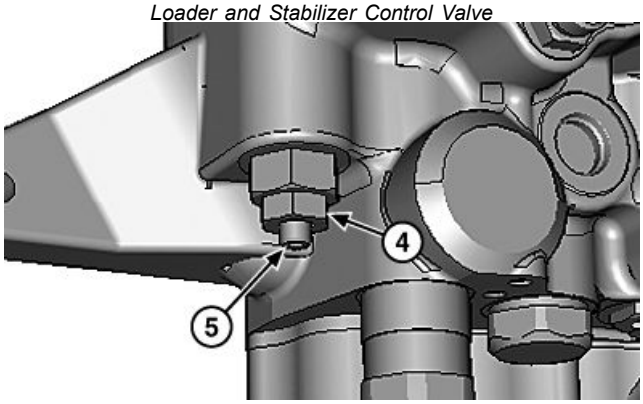
2. Adjust loader and stabilizer load sense relief valve (196) to specification as necessary.
   1. Loosen lock nut (4).
   2. Turn adjustment screw (4) to adjust load sense pressure. Clockwise increases pressure, counterclockwise decreases pressure.

4— Lock Nut
5— Adjustment Screw
190— Loader and Stabilizer Control Valve
196— Loader and Stabilizer Load Sense Relief Valve



TX1137059A —UN—24MAY13

Loader and Stabilizer Control Valve



TX1137076A —UN—24MAY13

Relief Valve Adjustment Screw

DB95148,0000813 -19-05DEC16-3/3

Power Limiting Valve Test

To test power limiting valve, perform torque converter stall speed test. See Torque Converter Stall Speed Test.

(Group 9020-25.) If the solenoid or valve is not working properly, machine will have low combined stall speeds or stall completely.

DB95148,0000814 -19-05JAN12-1/1

Pilot Control Pressure Test

To test pilot control pressure, see Pilot Control Pressure Adjustment. (Group 9025-20.)

DF89619,00B51B6 -19-29MAR12-1/1