

550K and 650K Crawler Dozer Operation and Test

(PIN: 1T0550KX__F275977—303907)

(PIN: 1T0650KX__F275978—303837)

OPERATION & TEST TECHNICAL MANUAL

**550K and 650K
Crawler Dozer
(PIN: 1T0550KX__F275977—303907)
(PIN: 1T0650KX__F275978—303837)**

TM13356X19 24AUG17 (ENGLISH)

For complete service information also see:

550K and 650K Crawler Dozer Repair.....	TM13357X19
550K and 650K Crawler Dozer Operator's Manual	OMT356886X19
PowerTech™ 4.5 L OEM Diesel Engines — Final Tier 4/Stage IV Platform.....	CTM120119
4000S Winches	CTM166
Hydraulic Cylinders.....	CTM120519
JDLINK™ (MTG) Technical Manual.....	TM114519
Undercarriage Appraisal Manual	SP326VOL1
Test and Service Specifications Manual	SP458VOL2

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

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Handle Chemical Products Safely

Direct exposure to hazardous chemicals can cause serious injury. Potentially hazardous chemicals used with John Deere equipment include such items as lubricants, coolants, paints, and adhesives.

A Material Safety Data Sheet (MSDS) provides specific details on chemical products: physical and health hazards, safety procedures, and emergency response techniques.

Check the MSDS before you start any job using a hazardous chemical. That way you will know exactly what the risks are and how to do the job safely. Then follow procedures and recommended equipment.

(See your John Deere dealer for MSDS's on chemical products used with John Deere equipment.)



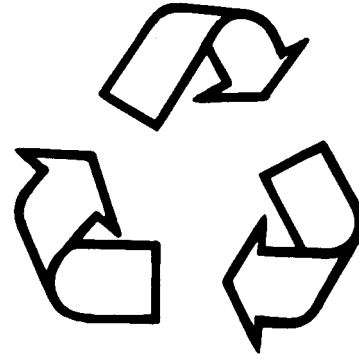
TS1132 —UN—15APR13

DX,MSDS,NA -19-03MAR93-1/1

Decommissioning — Proper Recycling and Disposal of Fluids and Components

Safety and environmental stewardship measures must be taken into account when decommissioning a machine and/or component. These measures include the following:

- Use appropriate tools and personal protective equipment such as clothing, gloves, face shields or glasses, during the removal or handling of objects and materials.
- Follow instructions for specialized components.
- Release stored energy by lowering suspended machine elements, relaxing springs, disconnecting the battery or other electrical power, and releasing pressure in hydraulic components, accumulators, and other similar systems.
- Minimize exposure to components which may have residue from agricultural chemicals, such as fertilizers and pesticides. Handle and dispose of these components appropriately.
- Carefully drain engines, fuel tanks, radiators, hydraulic cylinders, reservoirs, and lines before recycling components. Use leak-proof containers when draining fluids. Do not use food or beverage containers.
- Do not pour waste fluids onto the ground, down a drain, or into any water source.
- Observe all national, state, and local laws, regulations, or ordinances governing the handling or disposal of waste fluids (example: oil, fuel, coolant, brake fluid);



TS1133 —UN—15APR13

- filters; batteries; and, other substances or parts. Burning of flammable fluids or components in other than specially designed incinerators may be prohibited by law and could result in exposure to harmful fumes or ashes.
- Service and dispose of air conditioning systems appropriately. Government regulations may require a certified service center to recover and recycle air conditioning refrigerants which could damage the atmosphere if allowed to escape.
 - Evaluate recycling options for tires, metal, plastic, glass, rubber, and electronic components which may be recyclable, in part or completely.
 - Contact your local environmental or recycling center, or your John Deere dealer for information on the proper way to recycle or dispose of waste.

DX,DRAIN -19-01JUN15-1/1

Exhaust Filter Ash Handling and Disposal

CAUTION: Under federal, state, and local laws or regulations, exhaust filter ash can be classified as a hazardous waste. Hazardous waste must be disposed of in accordance with all applicable federal, state, and local laws or regulations

governing hazardous waste disposal. Only a qualified service provider should remove ash from the exhaust filter. Personal protective equipment and clothing, maintained in a sanitary and reliable condition, should be used when handling and cleaning exhaust filter. See your authorized dealer for exhaust filter ash handling and disposal.

TX,ASH,DISP -19-20JAN11-1/1

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Continued on next page

000237.02 — Vehicle ID

Vehicle identification numbers (VINs) do not match between engine control unit (ECU) and at least one other controller (vehicle control unit [VCU], vehicle control unit 2 [VC2], or standard display monitor [SDM]).

Alarm Level:

- Check Diagnostic Code Indicator

Machine Response:

- None

Circuit Information:

- See Engine Control Unit (ECU) Circuit Theory of Operation. (Group 9015-05.)

Component Location:

- See Load Center Harness (W18) Component Location. (Group 9015-10.)
- See Operator's Station Harness (W20) Component Location or see Operator's Station (IGC Controls) Harness (W21) Component Location. (Group 9015-10.)
- See Front Dash Harness (W22) Component Location. (Group 9015-10.)

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Wiring Diagram:

- See Load Center Harness (W18) Wiring Diagram and see Load Center (IGC Controls) Harness (W19) Wiring Diagram. (Group 9015-10.)
- See Operator's Station Harness (W20) Wiring Diagram or see Operator's Station (IGC Controls) Harness (W21) Wiring Diagram. (Group 9015-10.)
- See Front Dash Harness (W22) Wiring Diagram. (Group 9015-10.)
- See Engine Harness (W32) Wiring Diagram. (Group 9015-10.)

Diagnostic Test Box Information:

- Not Applicable

Additional References:

- Intermittent DTCs: See Intermittent Diagnostic Trouble Code (DTC) Diagnostics. (Group 9015-15.)
- Service ADVISOR™ Remote: See Using Service ADVISOR™ Remote. (Group 9015-15.)

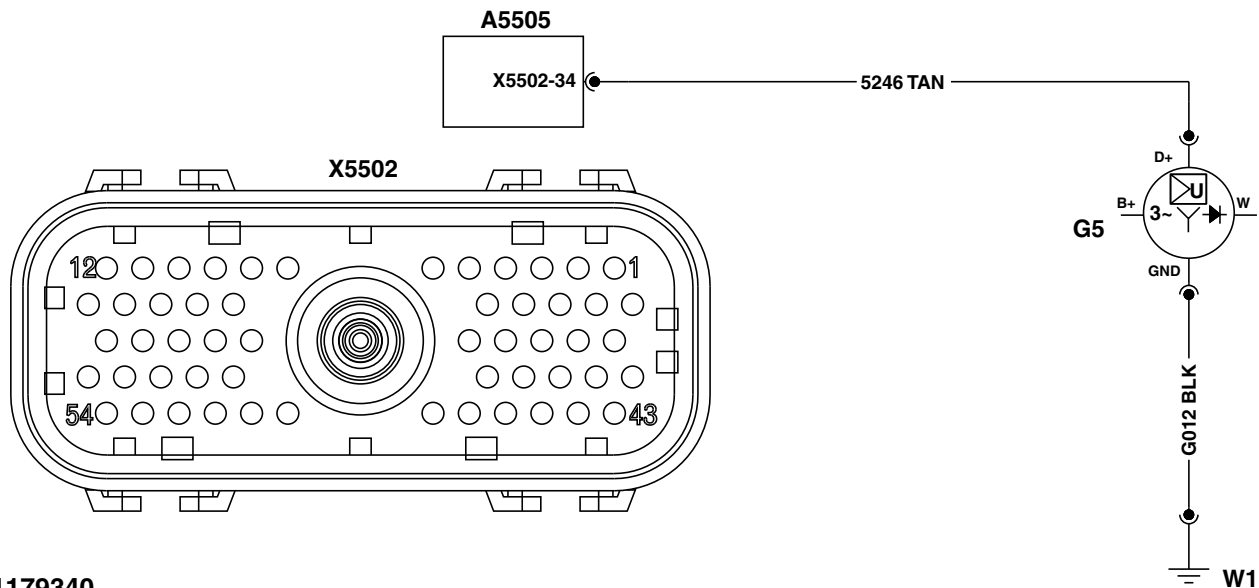
Possible Causes:

1. Software malfunction. Program controllers.

AB51738,0000832 -19-12NOV14-1/1

003353.31 — Alternator Output

Alternator output is low for more than 5 seconds while engine is running.



TX1179340

Alternator (G5) Circuit Schematic

A5505—Engine Control Unit (ECU)

G5—Alternator
W1—System Ground

X5502—Engine Control Unit (ECU) Connector 2

X5502—34—Signal

Alarm Level:

- Low Battery Voltage Indicator

Machine Response:

- Engine is derated to 25% of full power.
- Engine is derated at 20% per minute.
- Engine power is recovered at 20% per minute.

Circuit Information:

- See Engine Control Unit (ECU) Circuit Theory of Operation. (Group 9015-05.)

Component Location:

- See Engine Harness (W32) Component Location. (Group 9015-10.)

Diagnostic Test Box Information:

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- Not Applicable

Additional References:

- Intermittent DTCs: See Intermittent Diagnostic Trouble Code (DTC) Diagnostics. (Group 9015-15.)
- Service ADVISOR™ Remote: See Using Service ADVISOR™ Remote. (Group 9015-15.)

Possible Causes:

1. Loose or broken serpentine belt. See Inspect or Replace Belt and Check Automatic Belt Tensioner. (Operator's Manual.)
2. Component malfunction. See Alternator Test Procedure. (Group 9015-25.)
3. Circuit is shorted to ground.
4. Circuit is open.
5. Software malfunction. Program controller.

TX1179340—UN—08DEC14

AB51738,000083D -19-12NOV14-1/1

002141.09 — Communication System Message Missing

Controller area network (CAN) communication error; standard display monitor (SDM) has lost communication with sealed switch module (SSM).

Alarm Level:

- Check Diagnostic Code Indicator

Machine Response:

- None

Circuit Information:

- See Standard Display Monitor (SDM) Circuit Theory of Operation. (Group 9015-05.)
- See Controller Area Network (CAN) Circuit Theory of Operation. (Group 9015-05.)

Component Location:

- See Operator's Station Harness (W20) Component Location or see Operator's Station (IGC Controls) Harness (W21) Component Location. (Group 9015-10.)

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- See Front Dash Harness (W22) Component Location. (Group 9015-10.)
- See Cab Roof Harness (W24) Component Location or see Canopy Roof Harness (W25) Component Location. (Group 9015-10.)

Diagnostic Test Box Information:

- Not Applicable

Additional References:

- Intermittent DTCs: See Intermittent Diagnostic Trouble Code (DTC) Diagnostics. (Group 9015-15.)
- Service ADVISOR™ Remote: See Using Service ADVISOR™ Remote. (Group 9015-15.)

Possible Causes:

1. Open or shorted circuit. See Controller Area Network (CAN) Circuit Test. (Group 9015-25.)
2. Software malfunction. Program controller.

AB51738,0000A5A -19-07JAN15-1/1

002251.09 — Communication System Message Missing

Controller area network (CAN) communication error; standard display monitor (SDM) has lost communication with modular telematics gateway (MTG) control unit.

Alarm Level:

- Check Diagnostic Code Indicator

Machine Response:

- None

Circuit Information:

- See Vehicle Control Unit (VCU) Circuit Theory of Operation. (Group 9015-05.)
- See Standard Display Monitor (SDM) Circuit Theory of Operation. (Group 9015-05.)
- See Controller Area Network (CAN) Circuit Theory of Operation. (Group 9015-05.)
- For JDLINK™ circuit information, see JDLINK™ Circuit Theory of Operation—If Equipped. Group 9015-05.)

Component Location:

- See Operator's Station Harness (W20) Component Location or if equipped with SmartGrade™ and

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integrated grade control (IGC), see Operator's Station (SmartGrade™ and IGC Controls) Harness (W21) Component Location. (Group 9015-10.)

- See Front Dash Harness (W22) Component Location. (Group 9015-10.)
- See JDLINK™ Harnesses (W6002 and W6003) Component Location. (Group 9015-10.)

Diagnostic Test Box Information:

- Not Applicable

Additional References:

- Intermittent DTCs: See Intermittent Diagnostic Trouble Code (DTC) Diagnostics. (Group 9015-15.)
- Service ADVISOR™ Remote: See Using Service ADVISOR™ Remote. (Group 9015-15.)

Possible Causes:

1. Open or shorted circuit. See Controller Area Network (CAN) Circuit Test. (Group 9015-25.)
2. MTG control unit is disconnected or not equipped on machine. Disable software delivery. See Operation—Software Delivery, SDM. (Group 9015-16.)
3. Software malfunction. Program controller.

AB51738,00008D6 -19-12NOV16-1/1

523335.09 — Communication System Message Missing

No LED response from engine control unit (ECU) for engine speed decrease switch on sealed switch module (SSM).

NOTE: The sealed switch module (SSM) does not store diagnostic trouble codes; when switched power is restored, the SSM resets and all codes are lost.

Alarm Level:

- Check Diagnostic Code Indicator

Machine Response:

- None

Circuit Information:

- See Standard Display Monitor (SDM) Circuit Theory of Operation. (Group 9015-05.)

Component Location:

- See Load Center Harness (W18) Component Location or if equipped with SmartGrade™ and integrated grade control (IGC), see Load Center (SmartGrade™ and IGC Controls) Harness (W19) Component Location. (Group 9015-10.)

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- See Operator's Station Harness (W20) Component Location or if equipped with SmartGrade™ and integrated grade control (IGC), see Operator's Station (SmartGrade™ and IGC Controls) Harness (W21) Component Location. (Group 9015-10.)
- See Cab Roof Harness (W24) Component Location or see Canopy Roof Harness (W25) Component Location. (Group 9015-10.)

Diagnostic Test Box Information:

- Not Applicable

Additional References:

- Intermittent DTCs: See Intermittent Diagnostic Trouble Code (DTC) Diagnostics. (Group 9015-15.)
- Service ADVISOR™ Remote: See Using Service ADVISOR™ Remote. (Group 9015-15.)

Possible Causes:

1. Circuit is open or shorted. See Controller Area Network (CAN) Circuit Test. (Group 9015-25.)
2. Software malfunction. Program ECU.
3. Hardware malfunction. Replace SSM. See Controller Remove and Install. (Group 1600.)

AB51738,000085B -19-07JAN15-1/1

523336.04 — SSM Button Stuck

Economy (ECO) mode enable switch on sealed switch module (SSM) is stuck.

NOTE: The sealed switch module (SSM) does not store diagnostic trouble codes; when switched power is restored, the SSM resets and all codes are lost.

Alarm Level:

- Check Diagnostic Code Indicator

Machine Response:

- None

Circuit Information:

- See Standard Display Monitor (SDM) Circuit Theory of Operation. (Group 9015-05.)

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Component Location:

- See Cab Roof Harness (W24) Component Location or see Canopy Roof Harness (W25) Component Location. (Group 9015-10.)

Diagnostic Test Box Information:

- Not Applicable

Additional References:

- Intermittent DTCs: See Intermittent Diagnostic Trouble Code (DTC) Diagnostics. (Group 9015-15.)
- Service ADVISOR™ Remote: See Using Service ADVISOR™ Remote. (Group 9015-15.)

Possible Causes:

1. Hardware malfunction. Replace SSM. See Controller Remove and Install. (Group 1600.)

AB51738,000085C -19-07JAN15-1/1

523856.09 — Communication System Message Missing

No LED response from vehicle control unit (VCU) for cab work light switch on sealed switch module (SSM).

NOTE: The sealed switch module (SSM) does not store diagnostic trouble codes; when switched power is restored, the SSM resets and all codes are lost.

Alarm Level:

- Check Diagnostic Code Indicator

Machine Response:

- None

Circuit Information:

- See Standard Display Monitor (SDM) Circuit Theory of Operation. (Group 9015-05.)

Component Location:

- See Load Center Harness (W18) Component Location or if equipped with SmartGrade™ and integrated grade control (IGC), see Load Center (SmartGrade™ and IGC Controls) Harness (W19) Component Location. (Group 9015-10.)

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- See Operator's Station Harness (W20) Component Location or if equipped with SmartGrade™ and integrated grade control (IGC), see Operator's Station (SmartGrade™ and IGC Controls) Harness (W21) Component Location. (Group 9015-10.)
- See Cab Roof Harness (W24) Component Location or see Canopy Roof Harness (W25) Component Location. (Group 9015-10.)

Diagnostic Test Box Information:

- Not Applicable

Additional References:

- Intermittent DTCs: See Intermittent Diagnostic Trouble Code (DTC) Diagnostics. (Group 9015-15.)
- Service ADVISOR™ Remote: See Using Service ADVISOR™ Remote. (Group 9015-15.)

Possible Causes:

1. Circuit is open or shorted. See Controller Area Network (CAN) Circuit Test. (Group 9015-25.)
2. Software malfunction. Program VCU.
3. Hardware malfunction. Replace SSM. See Controller Remove and Install. (Group 1600.)

AB51738,000086F -19-07JAN15-1/1

523857.04 — SSM Button Stuck

Switch 10 on sealed switch module (SSM) is stuck.

NOTE: The sealed switch module (SSM) does not store diagnostic trouble codes; when switched power is restored, the SSM resets and all codes are lost.

Alarm Level:

- Check Diagnostic Code Indicator

Machine Response:

- None

Circuit Information:

- See Standard Display Monitor (SDM) Circuit Theory of Operation. (Group 9015-05.)

Component Location:

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- See Cab Roof Harness (W24) Component Location or see Canopy Roof Harness (W25) Component Location. (Group 9015-10.)

Diagnostic Test Box Information:

- Not Applicable

Additional References:

- Intermittent DTCs: See Intermittent Diagnostic Trouble Code (DTC) Diagnostics. (Group 9015-15.)
- Service ADVISOR™ Remote: See Using Service ADVISOR™ Remote. (Group 9015-15.)

Possible Causes:

1. Hardware malfunction. Replace SSM. See Controller Remove and Install. (Group 1600.)

AB51738,0000870 -19-12NOV14-1/1

523868.09 — Communication System Message Missing

No LED response from vehicle control unit (VCU) for engine start switch on sealed switch module (SSM).

NOTE: The sealed switch module (SSM) does not store diagnostic trouble codes; when switched power is restored, the SSM resets and all codes are lost.

Alarm Level:

- Check Diagnostic Code Indicator

Machine Response:

- None

Circuit Information:

- See Standard Display Monitor (SDM) Circuit Theory of Operation. (Group 9015-05.)

Component Location:

- See Load Center Harness (W18) Component Location or if equipped with SmartGrade™ and integrated grade control (IGC), see Load Center (SmartGrade™ and IGC Controls) Harness (W19) Component Location. (Group 9015-10.)

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- See Operator's Station Harness (W20) Component Location or if equipped with SmartGrade™ and integrated grade control (IGC), see Operator's Station (SmartGrade™ and IGC Controls) Harness (W21) Component Location. (Group 9015-10.)
- See Cab Roof Harness (W24) Component Location or see Canopy Roof Harness (W25) Component Location. (Group 9015-10.)

Diagnostic Test Box Information:

- Not Applicable

Additional References:

- Intermittent DTCs: See Intermittent Diagnostic Trouble Code (DTC) Diagnostics. (Group 9015-15.)
- Service ADVISOR™ Remote: See Using Service ADVISOR™ Remote. (Group 9015-15.)

Possible Causes:

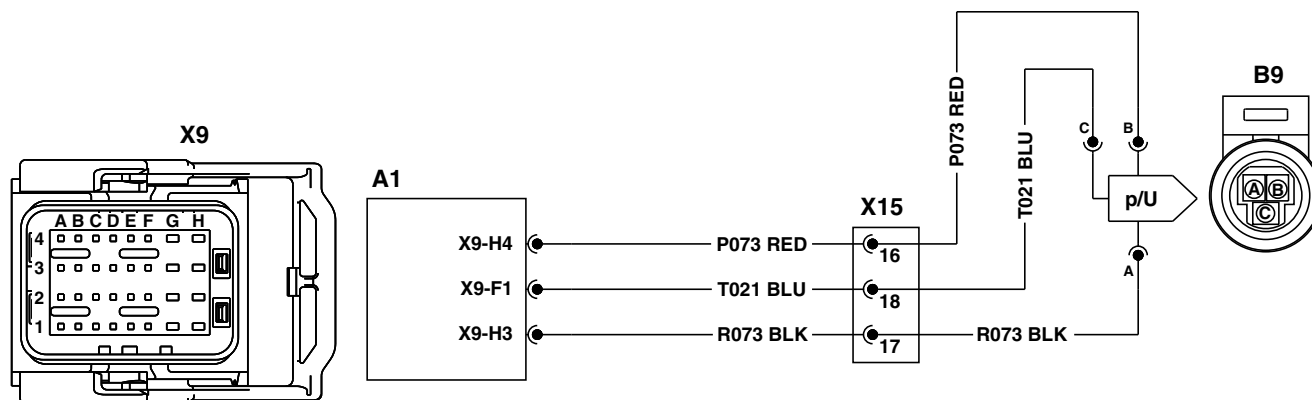
1. Circuit is open or shorted. See Controller Area Network (CAN) Circuit Test. (Group 9015-25.)
2. Software malfunction. Program VCU.
3. Hardware malfunction. Replace SSM. See Controller Remove and Install. (Group 1600.)

AB51738,0000883 -19-07JAN15-1/1

000116.04 — Brake Pressure Circuit Fault

Brake pressure sensor (B9) circuit is open or is shorted to ground (below 0.24 V).

NOTE: Transmission control unit (TCU) software is contained within vehicle control unit (VCU) (A1), but TCU software functions independently of VCU.



TX1178804

Brake Pressure Sensor (B9) Circuit Schematic

A1—Vehicle Control Unit (VCU)
B9—Brake Pressure Sensor

X9—Vehicle Control Unit (VCU)
Connector 1
X9—F1—Signal

X9—H3—Return
X9—H4—Supply (5 V)
X15—Load Center Harness-
to-Vehicle Harness
Connector 1

Alarm Level:

- Check Diagnostic Code Indicator

Machine Response:

- Transmission Control Set to Neutral

Circuit Information:

- See Transmission Control Unit (TCU) Circuit Theory of Operation. (Group 9015-05.)

Component Location:

- See Vehicle Harness (W16) Component Location or see Vehicle (IGC Controls) Harness (W17) Component Location. (Group 9015-10.)
- See Load Center Harness (W18) Component Location. (Group 9015-10.)

Diagnostic Test Box Information:

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- Test Box S1 Setting: **6**
- Service ADVISOR™ Reading: **Brake Pressure**
- See Three Wire Sensor Circuit Check—Out of Range Low. (Group 9015-17.)

Additional References:

- Intermittent DTCs: See Intermittent Diagnostic Trouble Code (DTC) Diagnostics. (Group 9015-15.)
- Service ADVISOR™ Remote: See Using Service ADVISOR™ Remote. (Group 9015-15.)

Possible Causes:

- Circuit is shorted to ground.
- Circuit is open.
- Component malfunction. See Electrical Component Specifications. (Group 9015-15.)
- Software malfunction. Program controller.

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AB51738,0000712 -19-11FEB15-1/1

000521.01 — Decel Sensor Calibration Fault

Decelerator sensor (B1) voltage out of range low for minimum calibration (below 0.63 V).

NOTE: Transmission control unit (TCU) software is contained within vehicle control unit (VCU) (A1), but TCU software functions independently of VCU.

Alarm Level:

- Check Diagnostic Code Indicator

Machine Response:

- Machine Speed Limited to 3.2 km/h (2.0 mph)
- Commanded Engine Speed Set to 0%
- Decelerator Pedal Set to No Deceleration
- Park Brake Set to Released State

Circuit Information:

- See Transmission Control Unit (TCU) Circuit Theory of Operation. (Group 9015-05.)

Component Location:

- See Load Center Harness (W18) Component Location. (Group 9015-10.)

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- See Operator's Station Harness (W20) Component Location or see Operator's Station (IGC Controls) Harness (W21) Component Location. (Group 9015-10.)
- See Front Dash Harness (W22) Component Location. (Group 9015-10.)

Diagnostic Test Box Information:

- Not Applicable

Additional References:

- Intermittent DTCs: See Intermittent Diagnostic Trouble Code (DTC) Diagnostics. (Group 9015-15.)
- Service ADVISOR™ Remote: See Using Service ADVISOR™ Remote. (Group 9015-15.)

Possible Causes:

1. Decelerator/brake pedal out of adjustment. See Decelerator/Brake Pedal Adjustment. (Group 9015-20.)
2. Component not calibrated. See Transmission Control Unit (TCU) Calibration. (Group 9015-20.)
3. Decelerator sensor malfunction. See Electrical Component Specifications. (Group 9015-15.)
4. Software malfunction. Program controller.

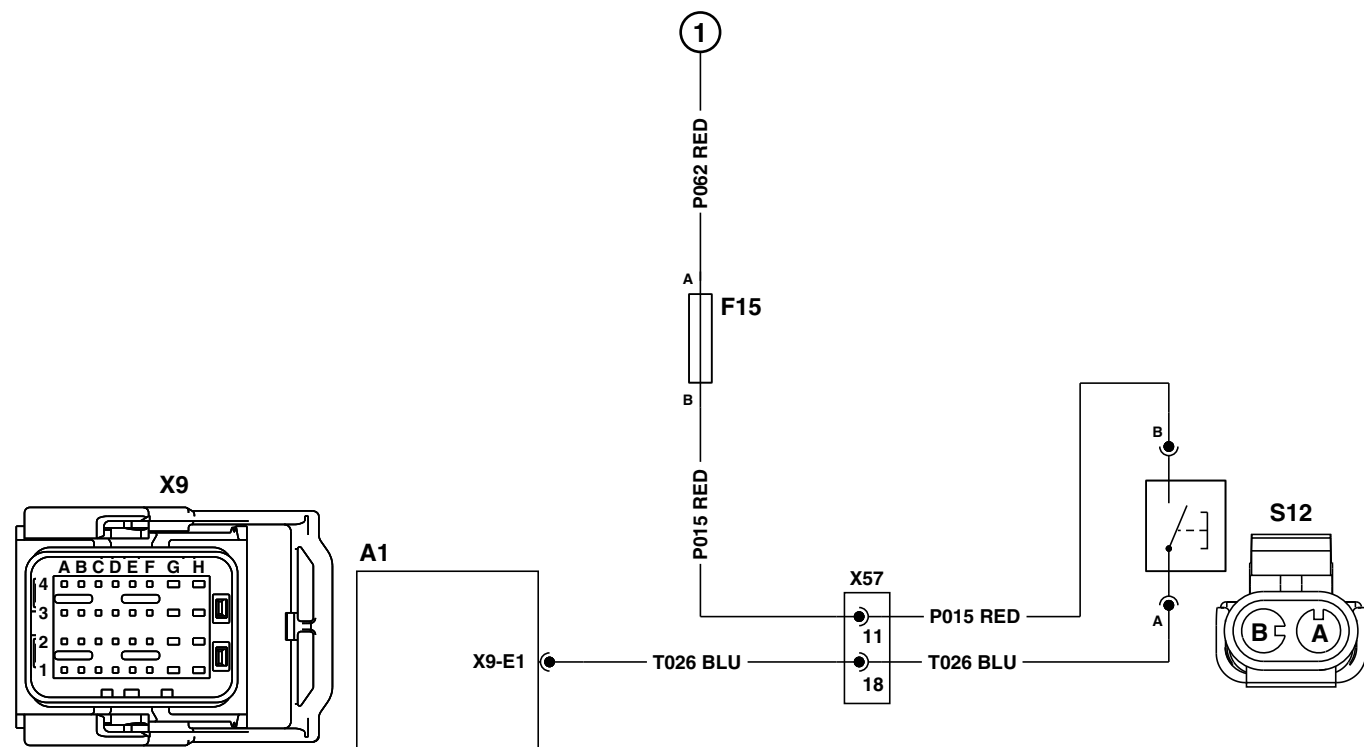
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000604.03 — Neutral Position Switch Circuit Fault

Neutral start switch (S12) input circuit is open or mismatch exists between neutral start switch and forward, neutral, and reverse (FNR) sensor (B2).

Neutral start switch indicates out of neutral and FNR sensor output voltage indicates neutral.

NOTE: Transmission control unit (TCU) software is contained within vehicle control unit (VCU) (A1), but TCU software functions independently of VCU.



TX1179182

Neutral Start Switch (S12) Circuit Schematic

1—Switched Power
A1—Vehicle Control Unit (VCU)
F15—Transmission Switches 5
A Fuse

S12—Neutral Start Switch
X9—Vehicle Control Unit (VCU)
Connector 1

X9—E1—Signal
X57—Load Center Harness-
to-Operator's Station
Harness 35-Pin Connector

Alarm Level:

- Check Diagnostic Code Indicator

Machine Response:

- No Forward or Reverse Operation

Circuit Information:

- See Transmission Control Unit (TCU) Circuit Theory of Operation. (Group 9015-05.)

Component Location:

- See Load Center Harness (W18) Component Location. (Group 9015-10.)
- See Operator's Station Harness (W20) Component Location or if equipped with SmartGrade™ and integrated grade control (IGC), see Operator's Station

(SmartGrade™ and IGC Controls) Harness (W21)
Component Location. (Group 9015-10.)

Diagnostic Test Box Information:

- Not Applicable

Additional References:

- Intermittent DTCs: See Intermittent Diagnostic Trouble Code (DTC) Diagnostics. (Group 9015-15.)
- Service ADVISOR™ Remote: See Using Service ADVISOR™ Remote. (Group 9015-15.)

Possible Causes:

1. Circuit is open.
2. FNR sensor (B2) malfunction. Check for FNR codes.
3. Neutral start switch (S12) malfunction. See Electrical Component Specifications. (Group 9015-15.)
4. Software malfunction. Program controller.

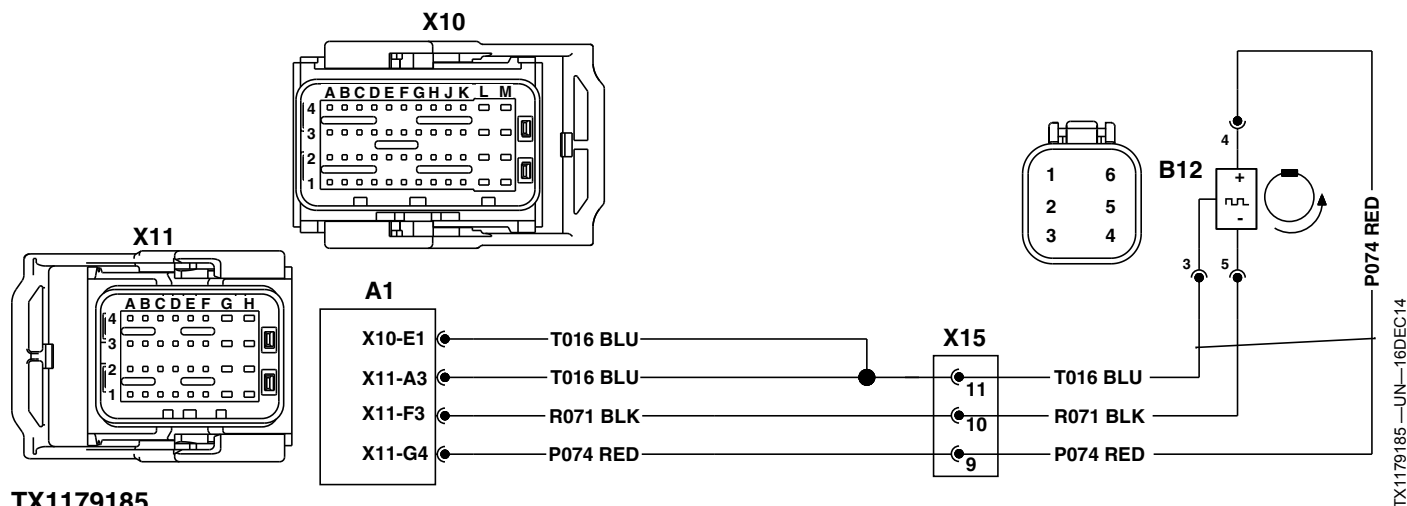
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AB51738,000072B -19-11FEB15-1/1

000907.04 — Left Motor Speed Sensor Circuit Fault

Left motor speed sensor (B12) out of range low or shorted to ground (below 0.25 V).

NOTE: Transmission control unit (TCU) software is contained within vehicle control unit (VCU) (A1), but TCU software functions independently of VCU.



Left Motor Speed Sensor (B12) Circuit Schematic

A1—Vehicle Control Unit (VCU)
B12—Left Motor Speed Sensor
X10—Vehicle Control Unit (VCU)
Connector 2

X10—E1—Signal
X11—Vehicle Control Unit (VCU)
Connector 3
X11—A3—Signal

X11—F3—Return
X11—G4—Supply (5 V)
X15—Load Center Harness-
to-Vehicle Harness
Connector 1

Alarm Level:

- Check Diagnostic Code Indicator

Machine Response:

- Tracker Control Disabled

Circuit Information:

- See [Transmission Control Unit \(TCU\) Circuit Theory of Operation](#). (Group 9015-05.)

Component Location:

- See [Vehicle Harness \(W16\) Component Location](#) or see [Vehicle \(IGC Controls\) Harness \(W17\) Component Location](#). (Group 9015-10.)
- See [Load Center Harness \(W18\) Component Location](#). (Group 9015-10.)

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Diagnostic Test Box Information:

- Not Applicable

Additional References:

- Intermittent DTCs: See [Intermittent Diagnostic Trouble Code \(DTC\) Diagnostics](#). (Group 9015-15.)
- Service ADVISOR™ Remote: See [Using Service ADVISOR™ Remote](#). (Group 9015-15.)

Possible Causes:

1. Circuit is shorted to ground.
2. Component malfunction. See [Electrical Component Specifications](#). (Group 9015-15.)
3. Software malfunction. Program controller.

AB51738,0000739 -19-11FEB15-1/1

002141.09 — Communication System Message Missing

Controller area network (CAN) communication error; transmission control unit (TCU) has lost communication with sealed switch module (SSM).

NOTE: Transmission control unit (TCU) software is contained within vehicle control unit (VCU) (A1), but TCU software functions independently of VCU.

Alarm Level:

- Check Diagnostic Code Indicator

Machine Response:

- None

Circuit Information:

- See Standard Display Monitor (SDM) Circuit Theory of Operation. (Group 9015-05.)
- See Transmission Control Unit (TCU) Circuit Theory of Operation. (Group 9015-05.)

Component Location:

- See Load Center Harness (W18) Component Location. (Group 9015-10.)

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- See Operator's Station Harness (W20) Component Location or if equipped with SmartGrade™ and integrated grade control (IGC), see Operator's Station (SmartGrade™ and IGC Controls) Harness (W21) Component Location. (Group 9015-10.)
- See Cab Roof Harness (W24) Component Location or see Canopy Roof Harness (W25) Component Location. (Group 9015-10.)

Diagnostic Test Box Information:

- Not Applicable

Additional References:

- Intermittent DTCs: See Intermittent Diagnostic Trouble Code (DTC) Diagnostics. (Group 9015-15.)
- Service ADVISOR™ Remote: See Using Service ADVISOR™ Remote. (Group 9015-15.)

Possible Causes:

1. Open or shorted circuit. See Controller Area Network (CAN) Circuit Test. (Group 9015-25.)
2. Software malfunction. Program controller.

AB51738,0000744 -19-11FEB15-1/1

002660.00 — Steer Sensor Calibration Fault

Steer sensor (B3) voltage is out of range high for maximum calibration value (above 3.39 V).

NOTE: Transmission control unit (TCU) software is contained within vehicle control unit (VCU) (A1), but TCU software functions independently of VCU.

Alarm Level:

- Check Diagnostic Code Indicator

Machine Response:

- Machine Speed Limited to 3.2 km/h (2.0 mph)
- Steering Disabled

Circuit Information:

- See Transmission Control Unit (TCU) Circuit Theory of Operation. (Group 9015-05.)

Component Location:

- See Load Center Harness (W18) Component Location. (Group 9015-10.)

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- See Operator's Station Harness (W20) Component Location or see Operator's Station (IGC Controls) Harness (W21) Component Location. (Group 9015-10.)

Diagnostic Test Box Information:

- Not Applicable

Additional References:

- Intermittent DTCs: See Intermittent Diagnostic Trouble Code (DTC) Diagnostics. (Group 9015-15.)
- Service ADVISOR™ Remote: See Using Service ADVISOR™ Remote. (Group 9015-15.)

Possible Causes:

1. Transmission control lever (TCL) out of adjustment. See Transmission Control Lever (TCL) Adjustment. (Group 9015-20.)
2. Component not calibrated. See Transmission Control Unit (TCU) Calibration. (Group 9015-20.)
3. Component malfunction. See Electrical Component Specifications. (Group 9015-15.)
4. Software malfunction. Program controller.

AB51738,0000745 -19-11FEB15-1/1

002661.07 — FNR Sensor Calibration Fault

Forward, neutral, and reverse (FNR) sensor (B2) neutral calibration voltage out of normal range (below 2.25 V or above 2.75 V).

NOTE: Transmission control unit (TCU) software is contained within vehicle control unit (VCU) (A1), but TCU software functions independently of VCU.

Alarm Level:

- Check Diagnostic Code Indicator

Machine Response:

- Machine Speed Limited to 3.2 km/h (2.0 mph)

Circuit Information:

- See Transmission Control Unit (TCU) Circuit Theory of Operation. (Group 9015-05.)

Component Location:

- See Load Center Harness (W18) Component Location. (Group 9015-10.)

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- See Operator's Station Harness (W20) Component Location or if equipped with SmartGrade™ and integrated grade control (IGC), see Operator's Station (SmartGrade™ and IGC Controls) Harness (W21) Component Location. (Group 9015-10.)

Diagnostic Test Box Information:

- Not Applicable

Additional References:

- Intermittent DTCs: See Intermittent Diagnostic Trouble Code (DTC) Diagnostics. (Group 9015-15.)
- Service ADVISOR™ Remote: See Using Service ADVISOR™ Remote. (Group 9015-15.)

Possible Causes:

1. Transmission control lever (TCL) out of adjustment. See Transmission Control Lever (TCL) Adjustment. (Group 9015-20.)
2. Component not calibrated. See Transmission Control Unit (TCU) Calibration. (Group 9015-20.)
3. Component malfunction. See Electrical Component Specifications. (Group 9015-15.)
4. Software malfunction. Program controller.

AB51738,0000753 -19-11FEB15-1/1

002661.13 — FNR Sensor Not Calibrated

Forward, neutral, and reverse (FNR) sensor (B2) not calibrated.

NOTE: Transmission control unit (TCU) software is contained within vehicle control unit (VCU) (A1), but TCU software functions independently of VCU.

Alarm Level:

- Check Diagnostic Code Indicator

Machine Response:

- Machine Speed Limited to 3.2 km/h (2.0 mph)

Circuit Information:

- See Transmission Control Unit (TCU) Circuit Theory of Operation. (Group 9015-05.)

Component Location:

- See Load Center Harness (W18) Component Location. (Group 9015-10.)

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- See Operator's Station Harness (W20) Component Location or if equipped with SmartGrade™ and integrated grade control (IGC), see Operator's Station (SmartGrade™ and IGC Controls) Harness (W21) Component Location. (Group 9015-10.)

Diagnostic Test Box Information:

- Not Applicable

Additional References:

- Intermittent DTCs: See Intermittent Diagnostic Trouble Code (DTC) Diagnostics. (Group 9015-15.)
- Service ADVISOR™ Remote: See Using Service ADVISOR™ Remote. (Group 9015-15.)

Possible Causes:

1. Component not calibrated. See Transmission Control Unit (TCU) Calibration. (Group 9015-20.)
2. Software malfunction. Program controller.

AB51738,0000754 -19-11FEB15-1/1

- See Vehicle Harness (W16) Component Location or see Vehicle (IGC Controls) Harness (W17) Component Location. (Group 9015-10.)
- See Load Center Harness (W18) Component Location. (Group 9015-10.)

Diagnostic Test Box Information:

- Not Applicable

Additional References:

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- Intermittent DTCs: See Intermittent Diagnostic Trouble Code (DTC) Diagnostics. (Group 9015-15.)
- Service ADVISOR™ Remote: See Using Service ADVISOR™ Remote. (Group 9015-15.)

Possible Causes:

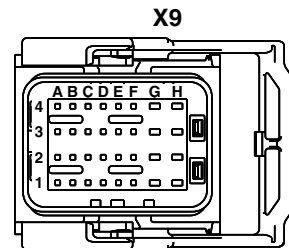
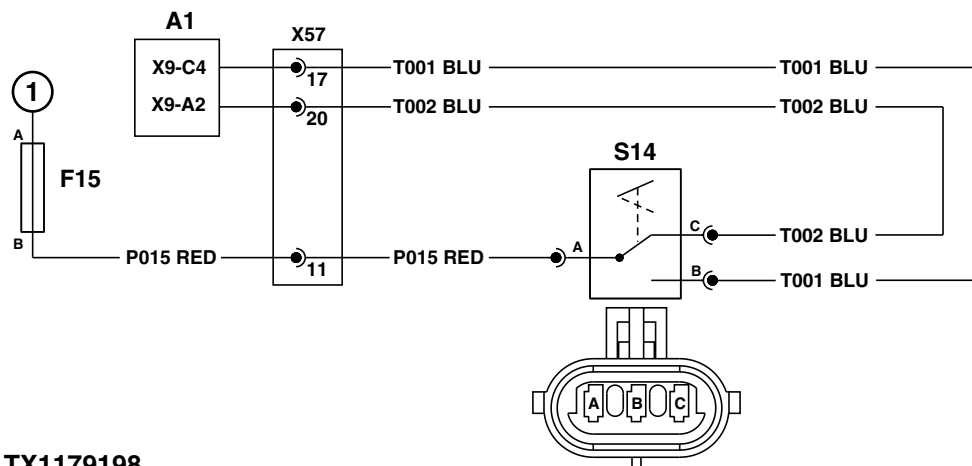
1. P081 RED sensor supply circuit is shorted to ground.
2. Software malfunction. Program controller.

AB51738,000075D -19-11FEB15-2/2

521999.04 — Park Lock Lever Circuit Fault

Right park lock lever switch (S14) park signal circuit is shorted to ground.

NOTE: Transmission control unit (TCU) software is contained within vehicle control unit (VCU) (A1), but TCU software functions independently of VCU.



TX1179198

Right Park Lock Lever Switch (S14) Circuit Schematic

- | | | |
|-------------------------------------|--|---|
| 1— Switched Power | S14— Right Park Lock Lever Switch | X9—A2—Run Signal |
| A1—Vehicle Control Unit (VCU) | X9— Vehicle Control Unit (VCU) Connector 1 | X9—C4—Park Signal |
| F15— Transmission Switches 5 A Fuse | | X57— Load Center Harness-to-Operator's Station Harness 35-Pin Connector |

Alarm Level:

- Check Diagnostic Code Indicator

Machine Response:

- Transmission Control Set to Neutral

Circuit Information:

- See Transmission Control Unit (TCU) Circuit Theory of Operation. (Group 9015-05.)

Component Location:

- See Load Center Harness (W18) Component Location. (Group 9015-10.)
- See Operator's Station Harness (W20) Component Location or see Operator's Station (IGC Controls) Harness (W21) Component Location. (Group 9015-10.)

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Diagnostic Test Box Information:

- Not Applicable

Additional References:

- Intermittent DTCs: See Intermittent Diagnostic Trouble Code (DTC) Diagnostics. (Group 9015-15.)
- Service ADVISOR™ Remote: See Using Service ADVISOR™ Remote. (Group 9015-15.)

Possible Causes:

- Circuit is shorted to ground.
- Component malfunction. Replace right park lock lever switch (S14).
- Software malfunction. Program controller.

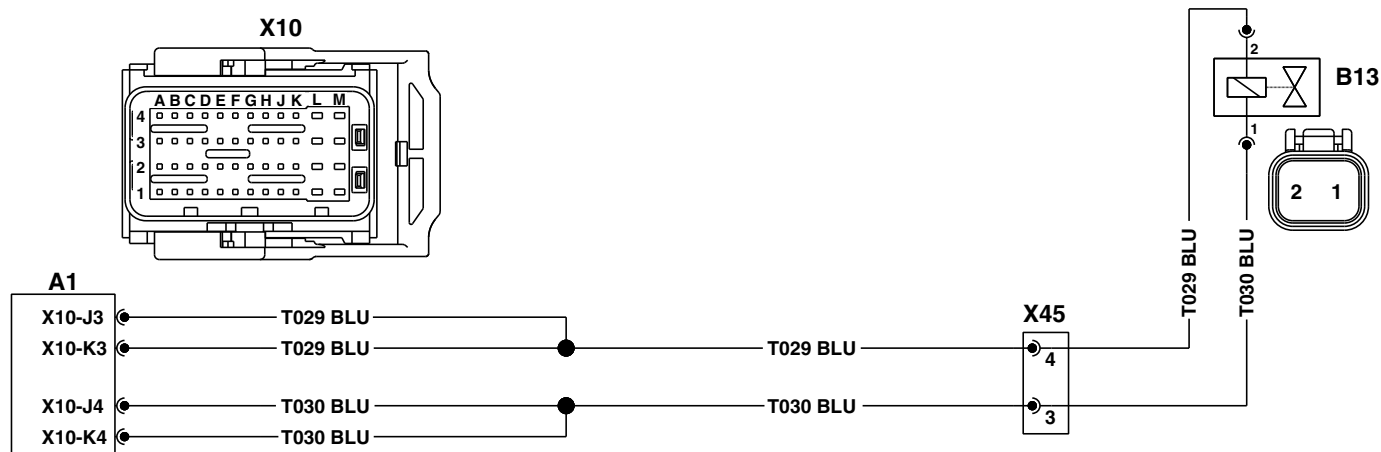
TX1179198—UN—16DEC14

AB51738,0000768 -19-11FEB15-1/1

522448.06 — Right Reverse Pump Coil Circuit Fault

Front pump pressure control pilot (PCP) (B13) circuit for right reverse command is shorted to ground.

NOTE: Transmission control unit (TCU) software is contained within vehicle control unit (VCU) (A1), but TCU software functions independently of VCU.



TX1179205

Front Pump Pressure Control Pilot (PCP) (B13) Circuit Schematic

A1—Vehicle Control Unit (VCU)
B13—Front Pump Pressure Control Pilot (PCP)

X10—Vehicle Control Unit (VCU) Connector 2
X10—J3—Forward Signal
X10—J4—Reverse Signal

X10—K3—Reverse Return
X10—K4—Forward Return
X45—Engine Auxiliary Harness-to-Load Center Harness 12-Pin Connector

Alarm Level:

- Check Diagnostic Code Indicator

Machine Response:

- No Reverse Operation

Circuit Information:

- See [Transmission Control Unit \(TCU\) Circuit Theory of Operation](#). (Group 9015-05.)

Component Location:

- See [Engine Auxiliary Harness \(W9\) Component Location](#). (Group 9015-10.)
- See [Load Center Harness \(W18\) Component Location](#). (Group 9015-10.)

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Diagnostic Test Box Information:

- Not Applicable

Additional References:

- Intermittent DTCs: See [Intermittent Diagnostic Trouble Code \(DTC\) Diagnostics](#). (Group 9015-15.)
- Service ADVISOR™ Remote: See [Using Service ADVISOR™ Remote](#). (Group 9015-15.)

Possible Causes:

1. Circuit is shorted to ground.
2. Component malfunction. See [Electrical Component Specifications](#). (Group 9015-15.)
3. Software malfunction. Program controller.

TX1179205 —UN—16DEC14

AB51738,0000777 -19-11FEB15-1/1

522450.17 — Left Forward Pump Coil Calibration Fault

Rear pump pressure control pilot (PCP) (B14) calibration threshold current too low in forward direction.

NOTE: Transmission control unit (TCU) software is contained within vehicle control unit (VCU) (A1), but TCU software functions independently of VCU.

Alarm Level:

- Check Diagnostic Code Indicator

Machine Response:

- No Forward Operation

Circuit Information:

- [See Transmission Control Unit \(TCU\) Circuit Theory of Operation.](#) (Group 9015-05.)

Component Location:

- [See Engine Auxiliary Harness \(W9\) Component Location.](#) (Group 9015-10.)

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- [See Load Center Harness \(W18\) Component Location.](#) (Group 9015-10.)

Diagnostic Test Box Information:

- Not Applicable

Additional References:

- Intermittent DTCs: [See Intermittent Diagnostic Trouble Code \(DTC\) Diagnostics.](#) (Group 9015-15.)
- Service ADVISOR™ Remote: [See Using Service ADVISOR™ Remote.](#) (Group 9015-15.)

Possible Causes:

1. Component not calibrated. [See Transmission Control Unit \(TCU\) Calibration.](#) (Group 9015-20.)
2. TCU calibration malfunction. [See TCU Calibration Malfunctions.](#) (Group 9026-15.)
3. Component malfunction. [See Electrical Component Specifications.](#) (Group 9015-15.)
4. Software malfunction. Program controller.

AB51738,0000786 -19-11FEB15-1/1

522450.18 — Left Forward Pump Coil Calibration Fault

Rear pump pressure control pilot (PCP) (B14) calibration current too low at maximum speed in forward direction.

NOTE: Transmission control unit (TCU) software is contained within vehicle control unit (VCU) (A1), but TCU software functions independently of VCU.

Alarm Level:

- Check Diagnostic Code Indicator

Machine Response:

- Machine Speed Limited to 3.2 km/h (2.0 mph)

Circuit Information:

- [See Transmission Control Unit \(TCU\) Circuit Theory of Operation.](#) (Group 9015-05.)

Component Location:

- [See Engine Auxiliary Harness \(W9\) Component Location.](#) (Group 9015-10.)

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- [See Load Center Harness \(W18\) Component Location.](#) (Group 9015-10.)

Diagnostic Test Box Information:

- Not Applicable

Additional References:

- Intermittent DTCs: [See Intermittent Diagnostic Trouble Code \(DTC\) Diagnostics.](#) (Group 9015-15.)
- Service ADVISOR™ Remote: [See Using Service ADVISOR™ Remote.](#) (Group 9015-15.)

Possible Causes:

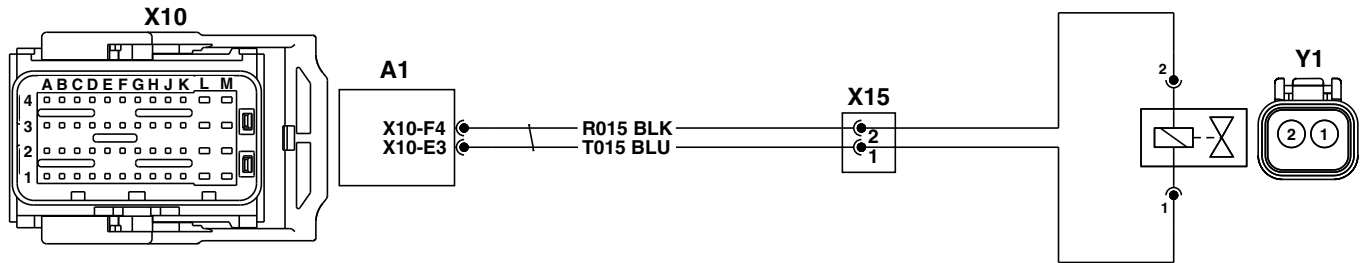
1. Component not calibrated. [See Transmission Control Unit \(TCU\) Calibration.](#) (Group 9015-20.)
2. TCU calibration malfunction. [See TCU Calibration Malfunctions.](#) (Group 9026-15.)
3. Component malfunction. [See Electrical Component Specifications.](#) (Group 9015-15.)
4. Software malfunction. Program controller.

AB51738,0000787 -19-26APR16-1/1

523579.06 — Left Motor Solenoid Circuit Fault

Left motor shift solenoid (Y1) circuit is shorted to power.

NOTE: Transmission control unit (TCU) software is contained within vehicle control unit (VCU) (A1), but TCU software functions independently of VCU.



TX1179207

Left Motor Shift Solenoid (Y1) Circuit Schematic

A1—Vehicle Control Unit (VCU) X10—E3—Supply
 X10—Vehicle Control Unit (VCU) X10—F4—Return
 Connector 2 X15—Load Center Harness-to-Vehicle Harness Connector 1
 Y1—Left Motor Shift Solenoid

Alarm Level:

- Check Diagnostic Code Indicator

Machine Response:

- Machine Speed Limited to 3.2 km/h (2.0 mph)

Circuit Information:

- See Transmission Control Unit (TCU) Circuit Theory of Operation. (Group 9015-05.)

Component Location:

- See Vehicle Harness (W16) Component Location or see Vehicle (IGC Controls) Harness (W17) Component Location. (Group 9015-10.)
- See Load Center Harness (W18) Component Location. (Group 9015-10.)

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Diagnostic Test Box Information:

- Not Applicable

Additional References:

- Intermittent DTCs: See Intermittent Diagnostic Trouble Code (DTC) Diagnostics. (Group 9015-15.)
- Service ADVISOR™ Remote: See Using Service ADVISOR™ Remote. (Group 9015-15.)

Possible Causes:

1. Circuit is shorted to power.
2. Component malfunction. See Electrical Component Specifications. (Group 9015-15.)
3. Controller malfunction. Program controller.

TX1179207 —UN—09DEC14

AB51738,00007A0 -19-11FEB15-1/1

Vehicle Control Unit (VCU) Diagnostic Trouble Codes

Vehicle Control Unit (VCU) Diagnostic Trouble Codes

The diagnostic trouble code number is indicated by a suspect parameter number (SPN) and a failure mode indicator (FMI) number. In the example **000070.03**, 70 is the SPN and 03 is the FMI number.

Diagnostic trouble codes can be displayed using the standard display monitor (SDM) or by using Service ADVISOR™.

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- See Diagnostics—Codes, SDM. (Operator's Manual.)
- See Reading Diagnostic Trouble Codes with Service ADVISOR™ Diagnostic Application. (Group 9015-15.)

Note: For in-depth diagnostics on all VCU diagnostic trouble codes, see specific code diagnostic procedure in this group.

AB51738,0000884 -19-02DEC14-1/1

000237.02 — Vehicle Identification Fault

Vehicle identification numbers (VINs) do not match between vehicle control unit (VCU) and at least one other controller (engine control unit [ECU] or vehicle controller 2 [VC2]).

Alarm Level:

- Check Diagnostic Code Indicator

Machine Response:

- None

Circuit Information:

- See Vehicle Control Unit (VCU) Circuit Theory of Operation. (Group 9015-05.)

Component Location:

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- See Load Center Harness (W18) Component Location. (Group 9015-10.)
- See Engine Harness (W32) Component Location. (Group 9015-10.)

Diagnostic Test Box Information:

- Not Applicable

Additional References:

- Intermittent DTCs: See Intermittent Diagnostic Trouble Code (DTC) Diagnostics. (Group 9015-15.)
- Service ADVISOR™ Remote: See Using Service ADVISOR™ Remote. (Group 9015-15.)

Possible Causes:

1. Software malfunction. Program controllers.

AB51738,0000885 -19-27JAN15-1/1

Possible Causes:

1. Component is shorted to power.

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2. Software malfunction. Program controller.

AB51738,000088D -19-27JAN15-2/2

002000.09 — Communication System Message Missing

Controller area network (CAN) communication error; vehicle control unit (VCU) has lost communication with engine control unit (ECU).

Alarm Level:

- Check Diagnostic Code Indicator

Machine Response:

- None

Circuit Information:

- See Controller Area Network (CAN) Circuit Theory of Operation. (Group 9015-05.)
- See Vehicle Control Unit (VCU) Circuit Theory of Operation. (Group 9015-05.)

Component Location:

- If equipped with SmartGrade™ and integrated grade control (IGC), see Load Center (SmartGrade™ and

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IGC Controls) Harness (W19) Component Location or see Load Center Harness (W18) Component Location. (Group 9015-10.)

- See Engine Harness (W32) Component Location. (Group 9015-10.)

Diagnostic Test Box Information:

- Not Applicable

Additional References:

- Intermittent DTCs: See Intermittent Diagnostic Trouble Code (DTC) Diagnostics. (Group 9015-15.)
- Service ADVISOR™ Remote: See Using Service ADVISOR™ Remote. (Group 9015-15.)

Possible Causes:

1. Open or shorted circuit. See Controller Area Network (CAN) Circuit Test. (Group 9015-25.)
2. Software malfunction. Program controller.

AB51738,000088E -19-27OCT16-1/1

002141.09 — Communication System Message Missing

Controller area network (CAN) communication error; vehicle control unit (VCU) has lost communication with sealed switch module (SSM).

Alarm Level:

- Check Diagnostic Code Indicator

Machine Response:

- None

Circuit Information:

- See Vehicle Control Unit (VCU) Circuit Theory of Operation. (Group 9015-05.)

Component Location:

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- See Load Center Harness (W18) Component Location and see Load Center (IGC Controls) Harness (W19) Component Location. (Group 9015-10.)
- See Engine Harness (W32) Component Location. (Group 9015-10.)

Diagnostic Test Box Information:

- Not Applicable

Additional References:

- Intermittent DTCs: See Intermittent Diagnostic Trouble Code (DTC) Diagnostics. (Group 9015-15.)
- Service ADVISOR™ Remote: See Using Service ADVISOR™ Remote. (Group 9015-15.)

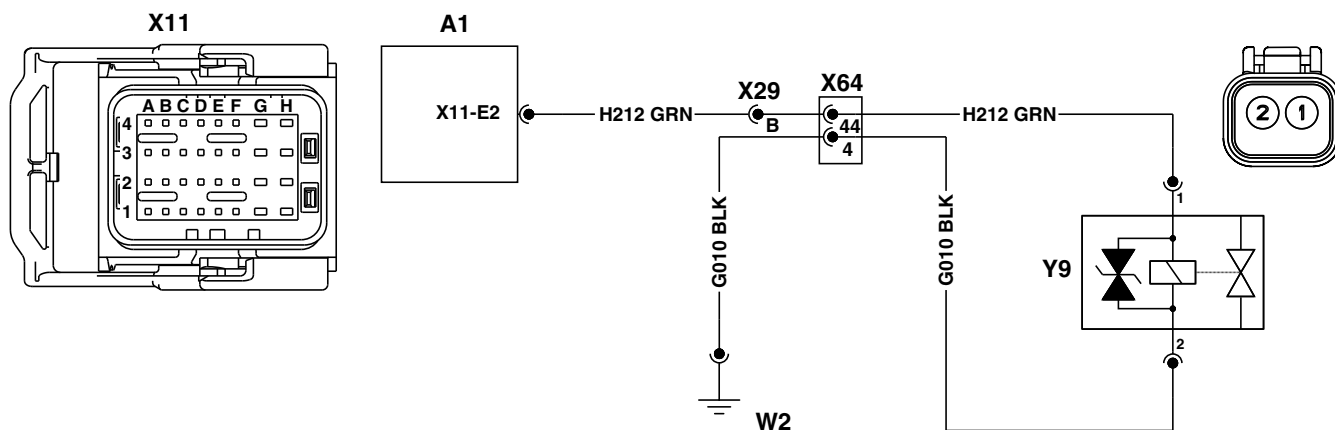
Possible Causes:

1. Open or shorted circuit. See Controller Area Network (CAN) Circuit Test. (Group 9015-25.)
2. Software malfunction. Program controller.

AB51738,000088F -19-27JAN15-1/1

520688.05 — Hydraulic Enable Solenoid Circuit Fault

Hydraulic enable solenoid (Y9) circuit is open.



TX1185890

Hydraulic Enable Solenoid (Y9) Circuit Schematic

A1—Vehicle Control Unit (VCU)
W2—Frame Ground
X11— Vehicle Control Unit (VCU)
Connector 3

X11—E2—Supply
X29— Load Center Harness-
to-Vehicle Harness
Connector 3

X64— Rear Service
Harness-to-Vehicle
Harness Connector
Y9— Hydraulic Enable Solenoid

Alarm Level:

- Check Diagnostic Code Indicator

Machine Response:

- Hydraulics Disabled

Circuit Information:

- See Vehicle Control Unit (VCU) Circuit Theory of Operation. (Group 9015-05.)

Component Location:

- See Rear Service Harness (W14) Component Location or see Rear Service (IGC Controls) Harness (W15) Component Location. (Group 9015-10.)
- See Vehicle Harness (W16) Component Location or see Vehicle (IGC Controls) Harness (W17) Component Location. (Group 9015-10.)

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- See Load Center Harness (W18) Component Location. (Group 9015-10.)

Diagnostic Test Box Information:

- Not Applicable

Additional References:

- Intermittent DTCs: See Intermittent Diagnostic Trouble Code (DTC) Diagnostics. (Group 9015-15.)
- Service ADVISOR™ Remote: See Using Service ADVISOR™ Remote. (Group 9015-15.)

Possible Causes:

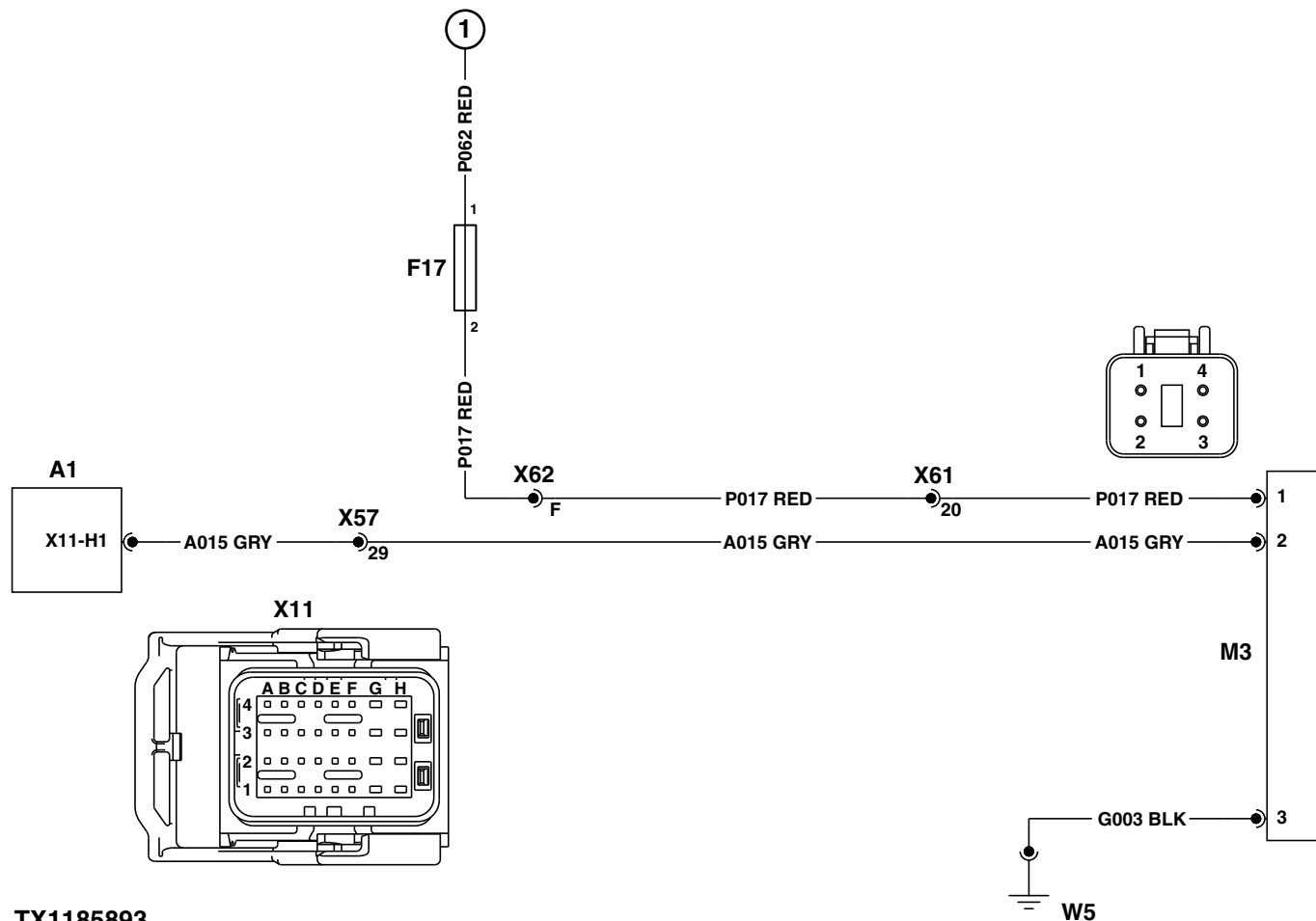
1. Circuit is open.
2. Component malfunction. See Electrical Component Specifications. (Group 9015-15.)
3. Software malfunction. Program controller.

TX1185890 —UN—27FEB15

AB51738,000089B -19-06FEB15-1/1

522433.03 — Rear Wiper Circuit Fault

Rear wiper motor (M3) signal circuit has short to power.



TX1185893

Rear Wiper Motor (M3) Circuit Schematic

1—Switched Power
A1—Vehicle Control Unit (VCU)
F17—Window Wipers 15 A Fuse
M3—Rear Wiper Motor

W5—Cab Ground
X11—Vehicle Control Unit (VCU) Connector 3
X11—H1—Signal
X57—Load Center Harness-to-Operator's Station Harness 35-Pin Connector

X61—Operator's Station Harness-to-Roof Harness 31-Pin Connector
X62—Load Center Harness-to-Operator's Station Harness 23-Pin Connector

Alarm Level:

- Check Diagnostic Code Indicator

Machine Response:

- None

Circuit Information:

- See Vehicle Control Unit (VCU) Circuit Theory of Operation. (Group 9015-05.)

Component Location:

- See Load Center Harness (W18) Component Location. (Group 9015-10.)
- See Operator's Station Harness (W20) Component Location or if equipped with SmartGrade™ and integrated grade control (IGC), see Operator's Station

(SmartGrade™ and IGC Controls) Harness (W21) Component Location. (Group 9015-10.)

- See Cab Roof Harness (W24) Component Location. (Group 9015-10.)

Diagnostic Test Box Information:

- Not Applicable

Additional References:

- Intermittent DTCs: See Intermittent Diagnostic Trouble Code (DTC) Diagnostics. (Group 9015-15.)
- Service ADVISOR™ Remote: See Using Service ADVISOR™ Remote. (Group 9015-15.)

Possible Causes:

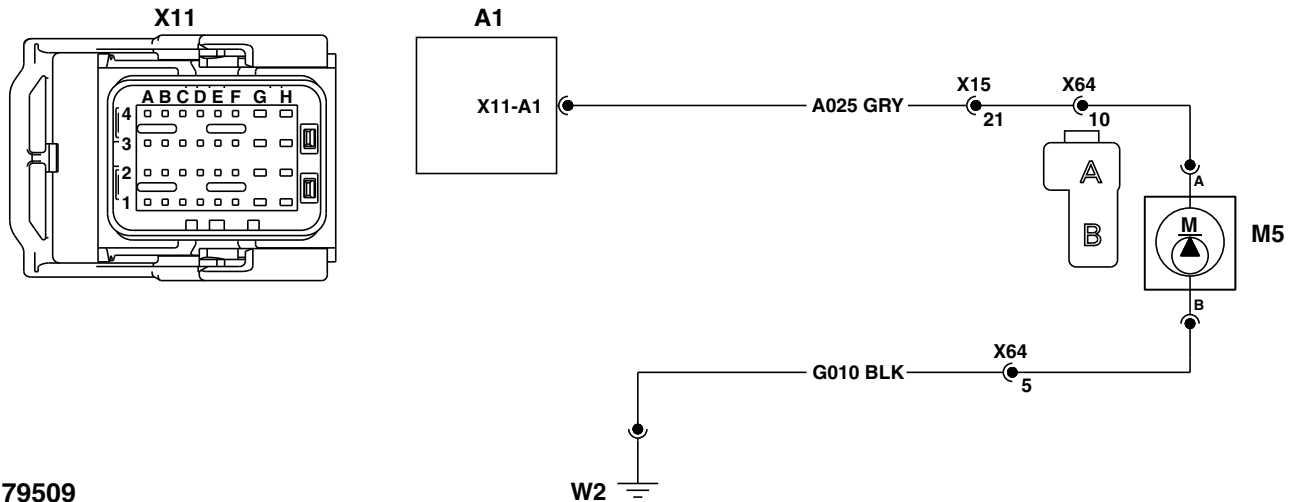
1. Signal circuit is shorted to power.
2. Component malfunction.

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AB51738,00008B0 -19-12NOV14-1/2

522796.05 — Rear Washer Pump Circuit Fault

Rear washer motor (M5) circuit is open.

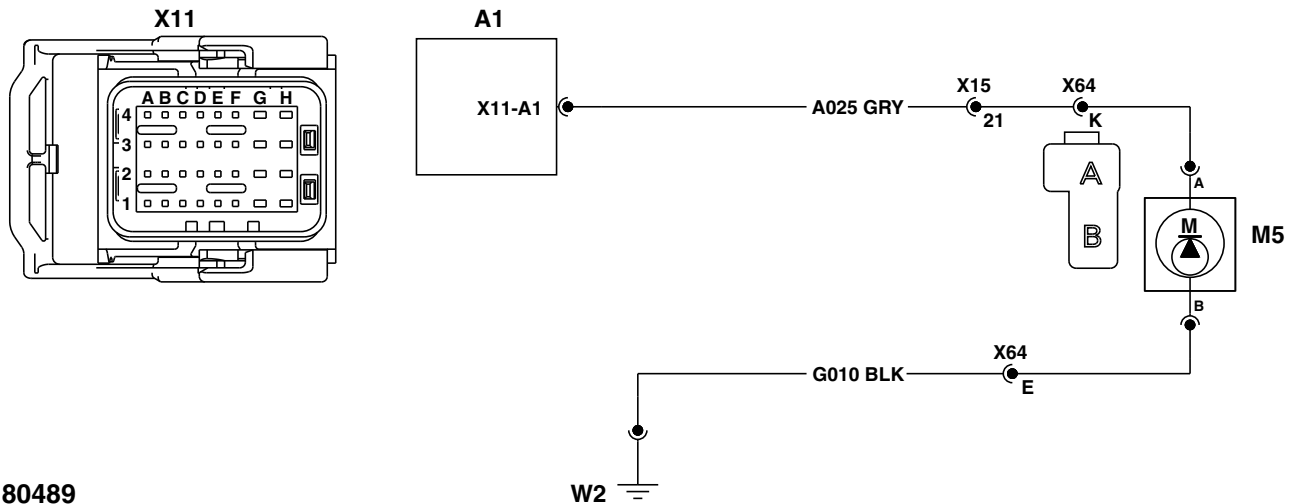


TX1179509

Rear Washer Motor (M5) Circuit Schematic (IGC controls)

A1—Vehicle Control Unit (VCU)	X11—A1—Signal
M5—Rear Washer Motor	W2—Frame Ground
X11— Vehicle Control Unit (VCU) Connector 3	X15— Load Center Harness- to-Vehicle Harness Connector 1

X64— Rear Service Harness-to-Vehicle Harness Connector



TX1180489

Rear Washer Motor (M5) Circuit Schematic (manual controls)

A1—Vehicle Control Unit (VCU)	X11—A1—Signal
M5—Rear Washer Motor	W2—Frame Ground
X11— Vehicle Control Unit (VCU) Connector 3	X15— Load Center Harness- to-Vehicle Harness Connector 1

X64— Rear Service Harness-to-Vehicle Harness Connector

Alarm Level:

- Check Diagnostic Code Indicator

Machine Response:

- None

Circuit Information:

- See Vehicle Control Unit (VCU) Circuit Theory of Operation. (Group 9015-05.)

Component Location:

- See Vehicle Harness (W16) Component Location or see Vehicle (IGC Controls) Harness (W17) Component Location. (Group 9015-10.)
- See Load Center Harness (W18) Component Location. (Group 9015-10.)
- See Rear Service (IGC Controls) Harness (W15) Component Location. (Group 9015-10.)

Diagnostic Test Box Information:

- Not Applicable

Continued on next page

AB51738,00008A5 -19-27JAN15-1/2

TM13356X19 (24AUG17)

9001-50-41

082417
PN=241

Hydraulic Valve Controller (HVC) Diagnostic Trouble Codes

The diagnostic trouble code number is indicated by a Suspect Parameter Number (SPN) and a Failure Mode Indicator (FMI) number. In the example **000628.12**, 628 is the SPN and 12 is the FMI number.

Diagnostic trouble codes can be displayed using the standard display monitor (SDM) (A8) or by using Service ADVISOR™.

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- See Diagnostics—Codes, SDM. (Operator's Manual.)
- See Reading Diagnostic Trouble Codes with Service ADVISOR™ Diagnostic Application. (Group 9015-15.)

Note: For in-depth diagnostics on all HVC diagnostic trouble codes, see specific code diagnostic procedure in this group.

AB51738,00009D6 -19-05DEC14-1/1

000237.02 — Vehicle Identification Fault

Vehicle identification numbers (VINs) do not match between hydraulic valve controller (HVC) and at least one other controller (engine control unit [ECU] or vehicle control unit [VCU]).

Alarm Level:

- Check Diagnostic Code Indicator

Machine Response:

- None

Circuit Information:

- See Integrated Grade Control (IGC) Circuit Theory of Operation—If Equipped. (Group 9015-05.)

Component Location:

- See Load Center Harness (W18) Component Location or if equipped with SmartGrade™ and integrated grade

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control (IGC), see Load Center (SmartGrade™ and IGC Controls) Harness (W19) Component Location. (Group 9015-10.)

- See Engine Harness (W32) Component Location. (Group 9015-10.)

Diagnostic Test Box Information:

- Not Applicable

Additional References:

- Intermittent DTCs: See Intermittent Diagnostic Trouble Code (DTC) Diagnostics. (Group 9015-15.)
- Service ADVISOR™ Remote: See Using Service ADVISOR™ Remote. (Group 9015-15.)

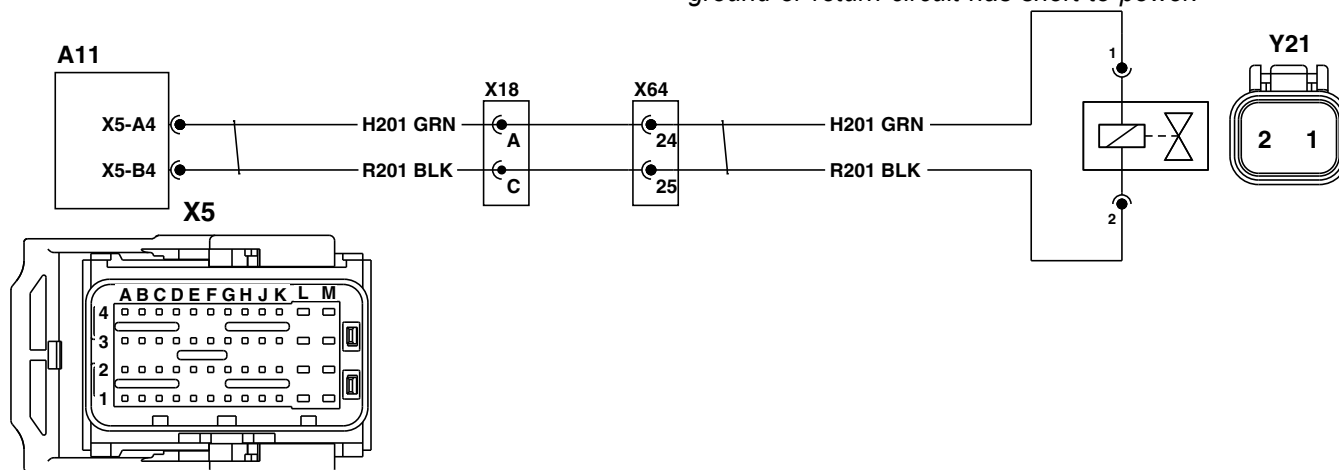
Possible Causes:

1. Software malfunction. Program controllers.

AB51738,00009D7 -19-05DEC14-1/1

001900.06 — Blade Raise Valve Circuit Fault

Lift port B solenoid (Y21) supply circuit has short to ground or return circuit has short to power.

**TX1179931**

Lift Port B Solenoid (Y21) Circuit Schematic

A11— Hydraulic Valve Controller (HVC)

X5— Hydraulic Valve Controller (HVC) Connector 2

X5—A4—Supply

X5—B4—Return

X18— Load Center Harness-to-Vehicle Harness Connector 2

X64— Rear Service Harness-to-Vehicle Harness Connector

Y21— Lift Port B Solenoid

Alarm Level:

- Check Diagnostic Code Indicator

Machine Response:

- None

Circuit Information:

- See Integrated Grade Control (IGC) Circuit Theory of Operation—If Equipped. (Group 9015-05.)

Component Location:

- See Rear Service (IGC Controls) Harness (W15) Component Location. (Group 9015-10.)
- See Vehicle (IGC Controls) Harness (W17) Component Location. (Group 9015-10.)
- See Load Center Harness (W18) Component Location and see Load Center (IGC Controls) Harness (W19) Component Location. (Group 9015-10.)

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Diagnostic Test Box Information:

- Not Applicable

Additional References:

- Intermittent DTCs: See Intermittent Diagnostic Trouble Code (DTC) Diagnostics. (Group 9015-15.)
- Service ADVISOR™ Remote: See Using Service ADVISOR™ Remote. (Group 9015-15.)

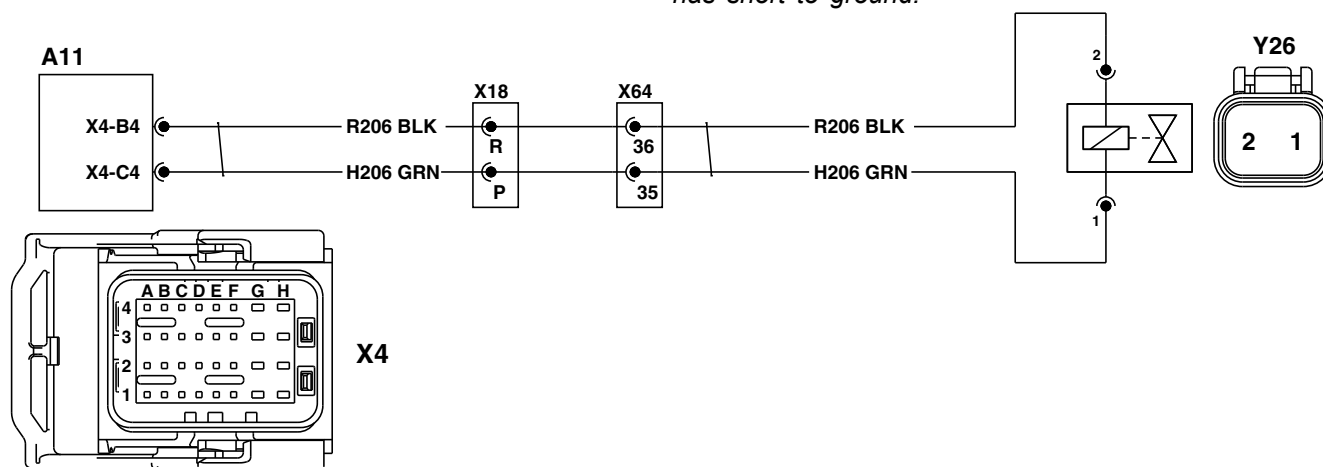
Possible Causes:

1. Supply circuit is shorted to power.
2. Return circuit is shorted to ground.
3. Component malfunction. See Electrical Component Specifications. (Group 9015-20.)
4. Software malfunction. Program controller.

TX1179931 —UN—13DEC14

001923.04 — Blade Angle Right Valve Circuit Fault

Angle port A solenoid (Y26) return circuit has short to ground.



TX1179938

Angle Port A Solenoid (Y26) Circuit Schematic

A11— Hydraulic Valve Controller (HVC)

X4— Hydraulic Valve Controller (HVC) Connector 1

X4—B4—Return

X4—C4—Supply

X18— Load Center Harness-to-Vehicle Harness Connector 2

X64— Rear Service

Harness-to-Vehicle

Harness Connector

Y26— Angle Port A Solenoid

Alarm Level:

- Check Diagnostic Code Indicator

Machine Response:

- None

Circuit Information:

- See Integrated Grade Control (IGC) Circuit Theory of Operation—If Equipped. (Group 9015-05.)

Component Location:

- See Rear Service (IGC Controls) Harness (W15) Component Location. (Group 9015-10.)
- See Vehicle (IGC Controls) Harness (W17) Component Location. (Group 9015-10.)
- See Load Center Harness (W18) Component Location and see Load Center (IGC Controls) Harness (W19) Component Location. (Group 9015-10.)

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Diagnostic Test Box Information:

- Not Applicable

Additional References:

- Intermittent DTCs: See Intermittent Diagnostic Trouble Code (DTC) Diagnostics. (Group 9015-15.)
- Service ADVISOR™ Remote: See Using Service ADVISOR™ Remote. (Group 9015-15.)

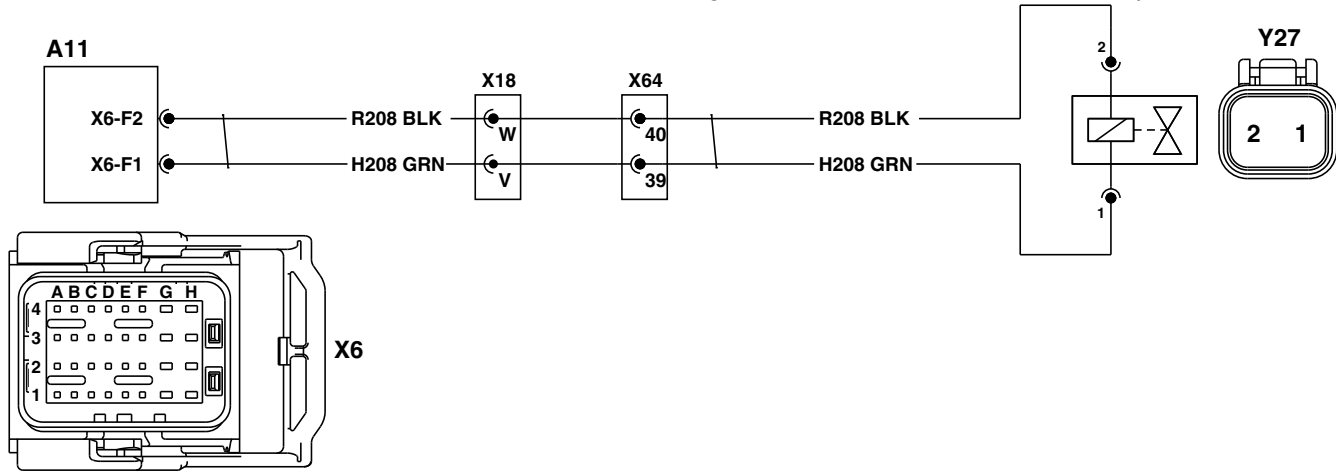
Possible Causes:

1. Return circuit is shorted to ground.
2. Component malfunction. See Electrical Component Specifications. (Group 9015-20.)
3. Software malfunction. Program controller.

TX1179938 —UN—13DEC14

001935.06 — Rear Auxiliary 1 Valve Circuit Fault

Auxiliary port A solenoid (Y27) supply circuit has short to ground or return circuit has short to power.



TX1179943

Auxiliary Port A Solenoid (Y27) Circuit Schematic

A11— Hydraulic Valve Controller (HVC)

X6— Hydraulic Valve Controller (HVC) Connector 3

X6—F1—Supply

X6—F2—Return

X18— Load Center Harness-to-Vehicle Harness Connector 2

X64— Rear Service Harness-to-Vehicle Harness Connector

Y27— Auxiliary Port A Solenoid

Alarm Level:

- Check Diagnostic Code Indicator

Machine Response:

- None

Circuit Information:

- See Integrated Grade Control (IGC) Circuit Theory of Operation—If Equipped. (Group 9015-05.)

Component Location:

- See Rear Service (IGC Controls) Harness (W15) Component Location. (Group 9015-10.)
- See Vehicle (IGC Controls) Harness (W17) Component Location. (Group 9015-10.)
- See Load Center Harness (W18) Component Location and see Load Center (IGC Controls) Harness (W19) Component Location. (Group 9015-10.)

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Diagnostic Test Box Information:

- Not Applicable

Additional References:

- Intermittent DTCs: See Intermittent Diagnostic Trouble Code (DTC) Diagnostics. (Group 9015-15.)
- Service ADVISOR™ Remote: See Using Service ADVISOR™ Remote. (Group 9015-15.)

Possible Causes:

1. Supply circuit is shorted to power.
2. Return circuit is shorted to ground.
3. Component malfunction. See Electrical Component Specifications. (Group 9015-15.)
4. Software malfunction. Program controller.

TX1179943 —UN—06FEB15

- See Load Center Harness (W18) Component Location or if equipped with SmartGrade™ and integrated grade control (IGC), see Load Center (SmartGrade™ and IGC Controls) Harness (W19) Component Location. (Group 9015-10.)
- If equipped with SmartGrade™ and integrated grade control (IGC), see Operator's Station (SmartGrade™ and IGC Controls) Harness (W21) Component Location. (Group 9015-10.)

Diagnostic Test Box Information:

- Not Applicable

Additional References:

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- Intermittent DTCs: See Intermittent Diagnostic Trouble Code (DTC) Diagnostics. (Group 9015-15.)
- Service ADVISOR™ Remote: See Using Service ADVISOR™ Remote. (Group 9015-15.)

Possible Causes:

1. Switch is stuck.
2. Blade shake switch signal circuit is shorted to ground.
3. Component malfunction. See Electrical Component Specifications. (Group 9015-15.)
4. Software malfunction. Program HVC.

AB51738,0000A1D -19-16FEB15-2/2

- See Load Center Harness (W18) Component Location or if equipped with SmartGrade™ and integrated grade control (IGC), see Load Center (SmartGrade™ and IGC Controls) Harness (W19) Component Location. (Group 9015-10.)
- If equipped with SmartGrade™ and integrated grade control (IGC), see Operator's Station (SmartGrade™ and IGC Controls) Harness (W21) Component Location. (Group 9015-10.)

Diagnostic Test Box Information:

- Not Applicable

Additional References:

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- Intermittent DTCs: See Intermittent Diagnostic Trouble Code (DTC) Diagnostics. (Group 9015-15.)
- Service ADVISOR™ Remote: See Using Service ADVISOR™ Remote. (Group 9015-15.)

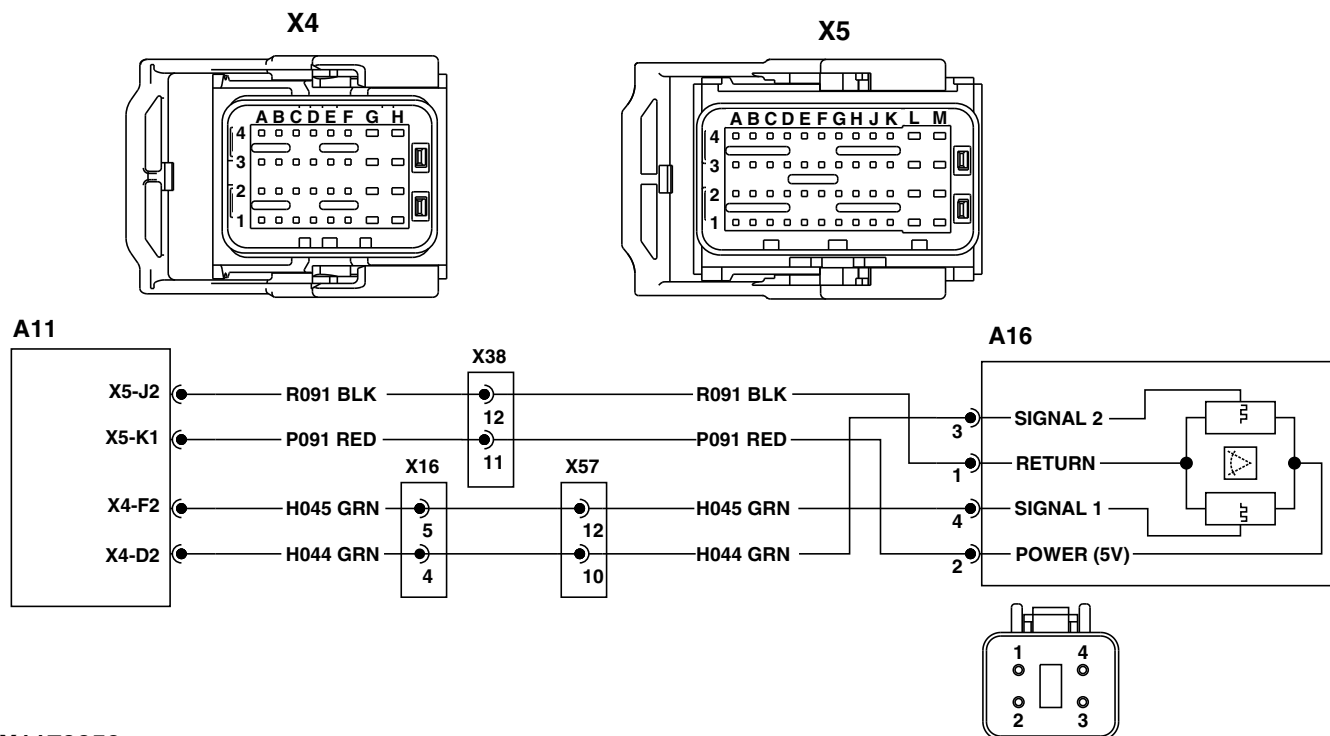
Possible Causes:

1. Switch is stuck.
2. IGC On/Off signal circuit is shorted to ground.
3. Component malfunction. See Electrical Component Specifications. (Group 9015-15.)
4. Software malfunction. Program HVC.

AB51738,0000A22 -19-23JAN15-2/2

002735.03 — Rear Auxiliary 2 Joystick Circuit Fault

Auxiliary joystick 2 (A16) signal 1 or signal 2 is shorted to power (above 4.75 V).



TX1179950

Auxiliary Joystick 2 (A16) Circuit Schematic

A11— Hydraulic Valve Controller (HVC)	X4—F2—Signal 1	X38— Load Center (IGC controls) Harness-to-Operator's Station Harness 31-Pin Connector
A16— Auxiliary Joystick 2	X5— Hydraulic Valve Controller (HVC) Connector 2	
X4— Hydraulic Valve Controller (HVC) Connector 1	X5—J2—Return	X57— Load Center Harness-to-Operator's Station Harness 35-Pin Connector
X4—D2—Signal 2	X5—K1—Supply (5 V)	
	X16— Load Center Harness-to-Load Center (IGC controls) Harness 16-Pin Connector	

Alarm Level:

- Check Diagnostic Code Indicator

Machine Response:

- None

Circuit Information:

- See Integrated Grade Control (IGC) Circuit Theory of Operation—If Equipped. (Group 9015-05.)

Component Location:

- See Load Center Harness (W18) Component Location and see Load Center (IGC Controls) Harness (W19) Component Location. (Group 9015-10.)
- See Operator's Station (IGC Controls) Harness (W21) Component Location. (Group 9015-10.)

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Diagnostic Test Box Information:

- Not Applicable

Additional References:

- Intermittent DTCs: See Intermittent Diagnostic Trouble Code (DTC) Diagnostics. (Group 9015-15.)
- Service ADVISOR™ Remote: See Using Service ADVISOR™ Remote. (Group 9015-15.)

Possible Causes:

1. Signal 1 or signal 2 circuit is shorted to power.
2. Component malfunction. See Electrical Component Specifications. (Group 9015-15.)
3. Software malfunction. Program controller.

TX1179950 —UN—13DEC14

002698.13 — Right Hand Joystick Y-Axis Calibration Error

The Y-axis sensor is not giving the expected output. Blade control joystick (BCJ) internal malfunction.

Alarm Level:

- Check Diagnostic Code Indicator

Machine Response:

- None

Circuit Information:

- See Integrated Grade Control (IGC) Circuit Theory of Operation—If Equipped. (Group 9015-05.)

Component Location:

- If equipped with SmartGrade™ and integrated grade control (IGC), see Load Center (SmartGrade™ and

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IGC Controls) Harness (W19) Component Location. (Group 9015-10.)

- If equipped with SmartGrade™ and integrated grade control (IGC), see Operator's Station (SmartGrade™ and IGC Controls) Harness (W21) Component Location. (Group 9015-10.)

Diagnostic Test Box Information:

- Not Applicable

Additional References:

- Intermittent DTCs: See Intermittent Diagnostic Trouble Code (DTC) Diagnostics. (Group 9015-15.)
- Service ADVISOR™ Remote: See Using Service ADVISOR™ Remote. (Group 9015-15.)

Possible Causes:

1. Software malfunction. Program controller.
2. Component malfunction. Replace component.

AB51738,00007CB -19-11FEB15-1/1

002698.14 — Right Hand Joystick Y-Axis Position Circuit Fault

Two Y-axis Hall effect sensor readings do not correspond with respect to one another within an acceptable range. Blade control joystick (BCJ) internal malfunction.

Alarm Level:

- Check Diagnostic Code Indicator

Machine Response:

- None

Circuit Information:

- See Integrated Grade Control (IGC) Circuit Theory of Operation—If Equipped. (Group 9015-05.)

Component Location:

- If equipped with SmartGrade™ and integrated grade control (IGC), see Load Center (SmartGrade™ and

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IGC Controls) Harness (W19) Component Location. (Group 9015-10.)

- If equipped with SmartGrade™ and integrated grade control (IGC), see Operator's Station (SmartGrade™ and IGC Controls) Harness (W21) Component Location. (Group 9015-10.)

Diagnostic Test Box Information:

- Not Applicable

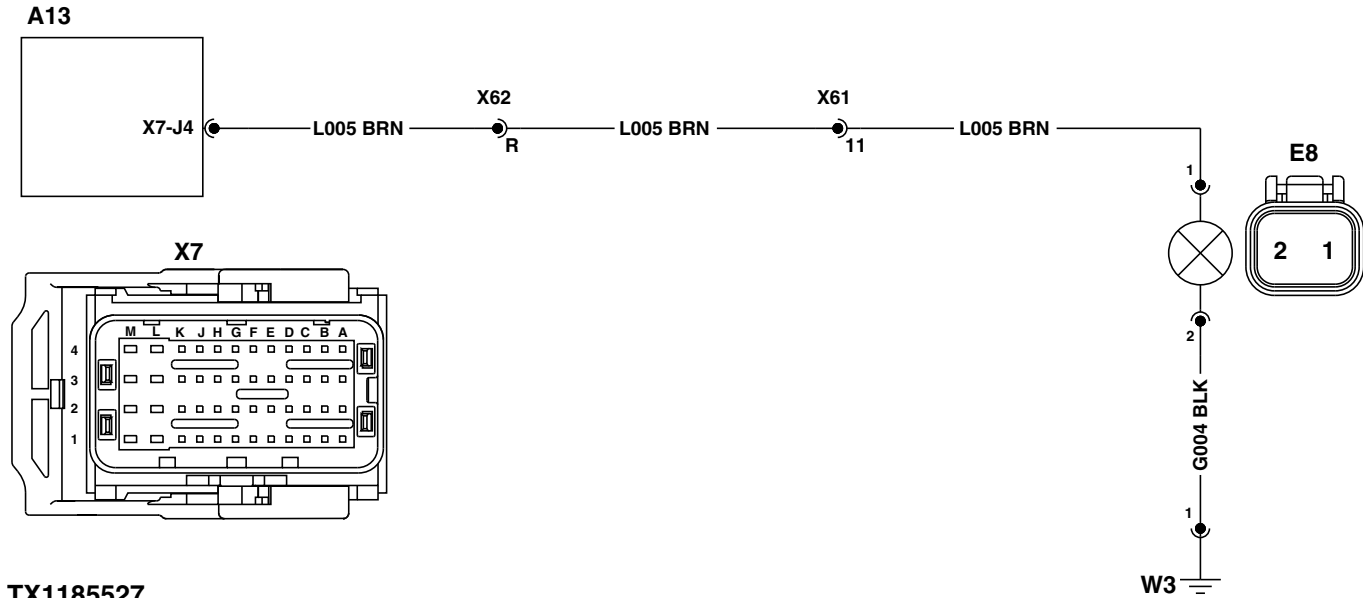
Additional References:

- Intermittent DTCs: See Intermittent Diagnostic Trouble Code (DTC) Diagnostics. (Group 9015-15.)
- Service ADVISOR™ Remote: See Using Service ADVISOR™ Remote. (Group 9015-15.)

Possible Causes:

1. Software malfunction. Program controller.
2. Component malfunction. Replace component.

AB51738,00007C0 -19-11FEB15-1/1

521555.05 — Front Work Light Circuit Fault*Right front cab work light (E8) circuit is open.***TX1185527***Right Front Cab Work Light (E8) Circuit Schematic***A13—** Vehicle Control Unit 2 (VC2)**E8—** Right Front Cab Work Light**W3—** Roof Ground**X7—** Vehicle Control Unit 2 (VC2) Connector**X7—J4—** Supply**X61—** Operator's Station Harness-to-Roof Harness 31-Pin Connector**X62—** Load Center Harness-to-Operator's Station Harness 23-Pin Connector**Alarm Level:**

- Check Diagnostic Code Indicator

Machine Response:

- None

Circuit Information:

- See Vehicle Control Unit (VCU) Circuit Theory of Operation. (Group 9015-05.)

Component Location:

- See Load Center Harness (W18) Component Location. (Group 9015-10.)
- See Operator's Station Harness (W20) Component Location or if equipped with SmartGrade™ and integrated grade control (IGC), see Operator's Station (SmartGrade™ and IGC Controls) Harness (W21) Component Location. (Group 9015-10.)

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- See Cab Roof Harness (W24) Component Location or see Canopy Roof Harness (W25) Component Location. (Group 9015-10.)

Diagnostic Test Box Information:

- Not Applicable

Additional References:

- Intermittent DTCs: See Intermittent Diagnostic Trouble Code (DTC) Diagnostics. (Group 9015-15.)
- Service ADVISOR™ Remote: See Using Service ADVISOR™ Remote. (Group 9015-15.)

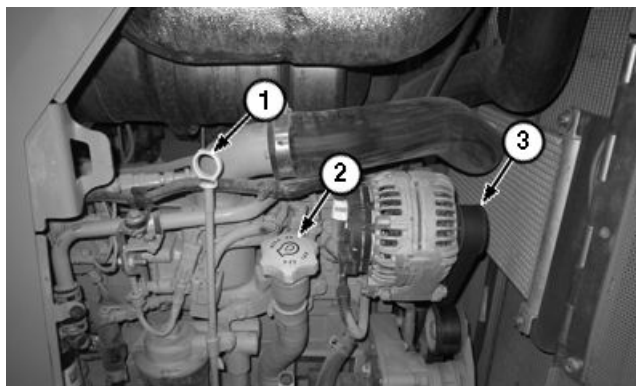
Possible Causes:

1. Component malfunction.
2. Circuit is open.
3. Software malfunction. Program controller.

TX1185527 —UN—18FEB15

AB51738,0000A57 -19-22DEC14-1/1

Belt Check



TX1179620A —UN—09DEC14

Right Engine Compartment

- 1—Dipstick
- 2—Fill Port Cap
- 3—Belt

Inspect condition of belt (3).

FEEL/LOOK: Are belt and pulleys free of oil or grease?

LOOK: Is inside surface of belt free of any cracks?

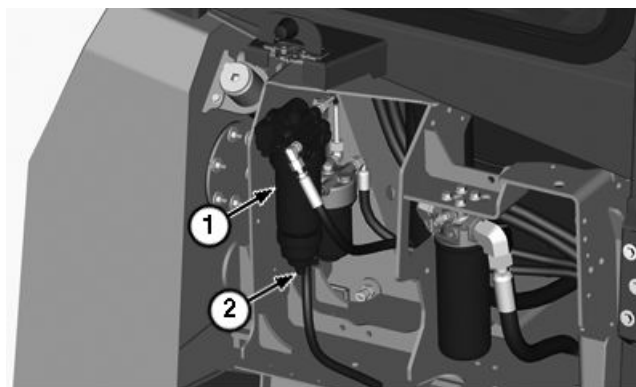
NOTE: If operator has been reporting squealing sound during engine shutdown, replace belt.

YES: Go to next check.

NO: Replace belt.

SK32938,00008E6 -19-22JUL16-10/61

Fuel Water Separator Check



TX1179623A —UN—09DEC14

Primary Fuel Filter

- 1—Primary Fuel Filter
- 2—Drain Valve

Open right rear service compartment door.

Place drain hose from primary fuel filter (1) into container.

Open drain valve (2) on bowl, and drain fuel for several seconds or until water and sediment are removed.

Close drain valve.

LOOK: Does fuel flow from drain valve?

FEEL/LOOK: Does drain valve seal when closed?

YES: Go to next check.

NO: Clean or replace drain valve.

Continued on next page

SK32938,00008E6 -19-22JUL16-11/61

Wiper Speed Check



TX1180469A —UN—11DEC14

Wiper Speed Switch

- 1— Wiper Speed Switch
- 2— Left LED
- 3— Middle LED
- 4— Right LED

Press wiper speed switch (1). One LED illuminated.

LOOK: Does wiper operate in low-speed intermittent mode?

Press wiper speed switch. Two LEDs illuminated.

LOOK: Does wiper operate in medium-speed intermittent mode?

Press wiper speed switch. Three LEDs illuminated.

LOOK: Does wiper operate in high-speed continuous mode?

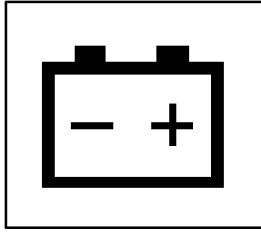
YES: Go to next check.

NO: Check wiper speed switch circuit. [See Vehicle Control Unit \(VCU\) Circuit Theory of Operation.](#) (Group 9015-05.)

Continued on next page

SK32938,00008E6 -19-22JUL16-27/61

Alternator Output Check



TX1000662 —UN—23NOV05

Voltage Indicator

Run engine at slow idle.

LOOK: Is voltage indicator off?

YES: Go to next check.

NO: Increase engine speed to fast idle; if light is still on, check and charge batteries.

Check alternator wiring and output; repair as required. See Start and Charge Circuits Theory of Operation. (Group 9015-05.)

Continued on next page

SK32938,00008E6 -19-22JUL16-39/61

Operational Checkout Procedure

LOOK: Does engine speed remain the same as machine speed increases?

LOOK: Does LED illuminate?

YES: Go to next check.

NO: Check decelerator/brake pedal and decelerator sensor circuit. See Transmission Control Unit (TCU) Circuit Theory of Operation. (Group 9015-05.)

Continued on next page

SK32938,00008E6 -19-22JUL16-51/61

Section 9010 Engine

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System Diagrams

1—Fuel Tank	8—High-Pressure Common Rail (HPCR)	16—Injector Leakoff Line	W32—Engine Harness
2—Primary Fuel Filter	11—High-Pressure Common Rail (HPCR)-to-Injector Fuel Line (4 used)	17—Air Bleed Line	Y5002—Pressure Control Valve
3—Secondary Fuel Filter	12—High-Pressure Fuel Pump Supply Line	18—High-Pressure Fuel Pump Crossover Line	Y5004—Low-Pressure Fuel Pump
4—Auxiliary Fuel Filter and Water Separator	13—High-Pressure Fuel Pump	19—Fuel Sensor Manifold	Y5024—Fuel Rail Pressure Relief Valve (PRV)
5—Fuel Tank-to-High-Pressure Fuel Pump Line	15—High-Pressure Fuel Pump-to-High-Pressure Common Rail (HPCR) Fuel Line	B5113—Fuel Rail Pressure Sensor	
6—Hand Fuel Valve-to-Low-Pressure Fuel Pump Line		B5600—Water-in-Fuel (WIF) Sensor	
7—Secondary Fuel Filter-to-Fuel Sensor Manifold Hose		R6—Fuel Filter Heater (if equipped)	

AB51738,0000700 -19-30JAN15-2/2

John Deere Engine

This machine uses a John Deere 4045 PowerTech™ 4.5 L diesel engine.

For additional information on John Deere 4045 PowerTech™ 4.5 L diesel engines and components, see the following component technical manual (CTM):

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- See PowerTech™ 4.5 L OEM Diesel Engines—Final Tier 4/Stage IV Platform. (CTM120119.)

AB51738,0000702 -19-21JAN15-1/1

Low-Pressure Fuel Pump Pressure Test

For more information, see Low-Pressure Fuel System Check. (CTM120119.)

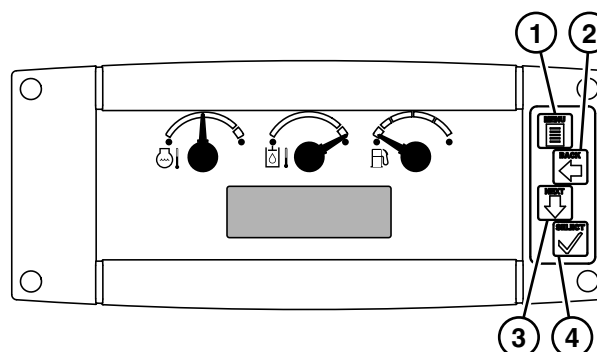
Low-pressure fuel pump pressure can be viewed using the standard display monitor (SDM):

Standard Display Monitor (SDM)

With engine running, navigate the menu: **MAIN MENU >> DIAGNOSTICS >> MACHINE INFORMATION >> ENGINE READINGS >> PRESSURES >> FUEL.**

1— MENU Button
2— BACK Button

3— NEXT Button
4— SELECT Button



Standard Display Monitor (SDM)

TX1072800 —UN—05MAR10

TZ24494,000161F -19-07NOV16-1/1

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A1—Vehicle Control Unit (VCU)	K2—Switched Power Relay	X9—Vehicle Control Unit (VCU) Connector 1	X36—Operator's Station Harness-to-Front Dash Harness Connector
A8—Standard Display Monitor (SDM)	M1—Starter Motor	X10—Vehicle Control Unit (VCU) Connector 2	X57—Load Center Harness-to-Operator's Station Harness 35-Pin Connector
B9—Brake Pressure Sensor	S1—Battery Disconnect Switch	X11—Vehicle Control Unit (VCU) Connector 3	Y3—Park Brake Solenoid
F15—Transmission Switches 5 A Fuse	S2—Left Park Lock Lever Switch	X15—Load Center Harness-to-Vehicle Harness Connector 1	
F61—System 120 A Circuit Breaker	S14—Right Park Lock Lever Switch	X29—Load Center Harness-to-Vehicle Harness Connector 3	
G1—Battery	V2—Starter Solenoid Diode		
G2—Battery	W1—System Ground		
K1—Start Relay	W2—Frame Ground		

NOTE: Transmission control unit (TCU) software is contained within vehicle control unit (VCU) (A1), but TCU software functions independently of VCU.

The park brakes are spring applied, hydraulically released. The electrical circuit for the park brakes consists of the following:

- Vehicle Control Unit (VCU) (A1)
- Standard Display Monitor (SDM) (A8)
- Brake Pressure Sensor (B9)
- Transmission Switches 5 A Fuse (F15)
- Left Park Lock Lever Switch (S2)
- Right Park Lock Lever Switch (S14)
- Park Brake Solenoid (Y3)

Switched power from transmission switches 5 A fuse (F15) is provided to pin A of both left and right park lock lever switches (S2 and S14).

Park Brakes Applied Operation (Brakes On)

When the left park lock lever switch (S2) is in the park position (left park lock lever full up [locked] position), voltage is sent from pin C of left park lock lever switch to pin D1 of vehicle control unit (VCU) connector 1 (X9). When the right park lock lever switch (S14) is in the park position (right park lock lever full up [locked] position), voltage is sent from pin C of right park lock lever switch to pin A2 of VCU connector 1 (X9).

If voltage is received from either park lock lever switch, the TCU de-energizes park brake solenoid (Y3). With park brake solenoid de-energized, hydraulic oil is prevented from releasing the park brakes. A momentary delay of de-energizing park brake solenoid is programmed in the TCU, allowing track motor speed to stop before the park brakes are applied and reducing wear of the park brakes. For more information on the TCU, [see Transmission Control Unit \(TCU\) Circuit Theory of Operation](#). (Group 9015-05.)

The brake pressure sensor (B9) sends a signal from pin C to pin F1 of VCU connector 1 (X9). When the sensor

signal indicates that brake pressure is low and that brakes are applied, the TCU then sends a signal across the controller area network (CAN) to the standard display monitor (SDM) (A8) to illuminate the park brake indicator. For information on the CAN or SDM, see the theory of operation of the specific component:

- [See Controller Area Network \(CAN\) Circuit Theory of Operation](#). (Group 9015-05.)
- [See Standard Display Monitor \(SDM\) Circuit Theory of Operation](#). (Group 9015-05.)

When the engine stops, the park brakes are applied because of the loss of hydraulic pressure to release the spring pressure. The park brake will also apply anytime loss of switched power occurs.

Park Brakes Released Operation (Brakes Off)

When the left park lock lever switch is in the run position (left park lock lever full down [unlocked] position), voltage is sent from pin B of left park lock lever switch to pin C1 of VCU connector 1 (X9). When the right park lock lever switch is in the run position (right park brake lever full down [unlocked] position), voltage is sent from pin B to pin C4 of VCU connector 1 (X9). Once the TCU detects voltage at pins C1 and C4, voltage is sent from pin D1 of VCU connector 3 (X11) to energize park brake solenoid, allowing hydraulic oil to release the park brakes. A momentary delay of machine movement while the park brake is released is programmed in the TCU, allowing the park brakes to be fully released before motion is commanded and prevent dragging of the park brake.

The brake pressure sensor (B9) sends a signal from pin C to pin F1 of VCU connector 1 (X9). When the sensor signal indicates that park brake pressure is enough to release the park brakes, the TCU then sends a signal across the CAN to the SDM. The SDM then shuts off the park brake indicator (park brake is off).

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A5505—Engine Control Unit (ECU)
B5500—Intake Air Sensor
B5502—Aftertreatment Inlet NOx Sensor

B5503—Aftertreatment Outlet NOx Sensor
R5603—Engine CAN Terminator
R5605—Aftertreatment CAN Terminator

X5039—Aftertreatment Harness-to-Engine Harness 12-Pin Connector
X5501—Engine Control Unit (ECU) Connector 1

X5502—Engine Control Unit (ECU) Connector 2

The controller area network (CAN) provides a standardized means for electronic controllers and other devices to communicate with each other.

The CAN consists of two wires: CAN high and CAN low. These two wires carry signals opposite to each other to overcome noise interference and minimize communication errors. The high and low wires, along with a ground wire, are woven together forming what is called a twisted triple. The twisted triple provides an additional method of reducing interference and thus helps the devices communicate with minimal errors.

To help prevent signal errors, the CAN data line uses 120-ohm termination resistors, usually located at opposite ends of the CAN data line.

The CAN is an arbitration-based system, meaning that a low-priority message always allows a high-priority message to go first. Each CAN device checks to see if the bus is idle before transmitting a signal. Whichever device gets on the bus first is able to transmit its signal.

When a signal collision occurs, that is, when two or more devices are transmitting at the same time, the device with the lowest ID has higher priority to access the bus. The device that loses arbitration immediately retransmits its signal when the device with the higher priority has completed its transmission.

A two wire bus called the local interconnect network (LIN) provides communication between the sealed switch module (SSM) (A4) and vehicle control unit 2 (VC2). Operator input from the SSM is sent across LIN to the VC2. The VC2 either relays the message to other controllers over CAN or outputs a signal to components that are directly connected to the VC2.

This machine contains one LIN circuit and up to four CAN circuits: machine CAN (CAN 1), engine CAN, aftertreatment CAN, and integrated grade control (IGC) CAN (CAN 2).

Machine CAN

Provides the communication link for the following devices:

- Vehicle Control Unit (VCU) (A1)
- Sealed Switch Module (SSM) (A4)
- Standard Display Monitor (SDM) (A8)
- Blade Control Joystick (BCJ) (A9) (IGC only)
- Hydraulic Valve Controller (HVC) (A11) (IGC only)
- Vehicle Control Unit 2 (VC2) (A13)
- Engine Control Unit (ECU) (A5505)
- Modular Telematics Gateway (MTG) Control Unit (A6000) (if equipped with JDLINK™)

Operations and functions of the individual devices on LIN and machine CAN are covered separately.

- [See Vehicle Control Unit \(VCU\) Circuit Theory of Operation.](#) (Group 9015-05.)
- [See Engine Control Unit \(ECU\) Circuit Theory of Operation.](#) (Group 9015-05.)
- [See Standard Display Monitor \(SDM\) Circuit Theory of Operation.](#) (Group 9015-05.)
- [See Transmission Control Unit \(TCU\) Circuit Theory of Operation.](#) (Group 9015-05.)
- [See Integrated Grade Control \(IGC\) Circuit Theory of Operation—If Equipped.](#) (Group 9015-05.)

Machine CAN also includes the following components:

- CAN 1 Termination Resistor 1 (R1)
- CAN 1 Termination Resistor 2 (R2)
- Service ADVISOR™ Connector (X8)

The Service ADVISOR connector provides an interface for connecting diagnostic equipment such as a laptop. [See Service ADVISOR™ Connection Procedure.](#) (Group 9015-15.)

Engine CAN

Provides the communication link for the following items:

- Engine Control Unit (ECU) (A5505)
- Intake Air Sensor (B5500)

Operations and functions of the individual devices on engine CAN are covered separately.

- [See Engine Control Unit \(ECU\) Circuit Theory of Operation.](#) (Group 9015-05.)
- [See Electronic Fuel System.](#) (CTM120119.)
- [See Air Intake and Exhaust System.](#) (CTM120119.)
- [See Electrical Control System.](#) (CTM120119.)

The engine CAN also has two termination resistors: one located inside the ECU and not accessible, and engine CAN terminator (R5603) within the engine harness.

Aftertreatment CAN

Provides the communication link for the following items:

- Engine Control Unit (ECU) (A5505)
- Aftertreatment Inlet NOx Sensor (B5502)
- Aftertreatment Outlet NOx Sensor (B5503)

Operations and functions of the individual devices on aftertreatment CAN are covered separately.

- [See Engine Control Unit \(ECU\) Circuit Theory of Operation.](#) (Group 9015-05.)
- [See Exhaust Aftertreatment Circuit Theory of Operation.](#) (Group 9015-05.)
- [See Aftertreatment System Operation.](#) (CTM120119.)
- [See Electrical Control System.](#) (CTM120119.)

The ECU sends 5 volts to the EGR temperature sensor, monitors voltage drop across the sensor at pins 24 and 27 on ECU connector 2 (X5502), then compares the voltage drop to preprogrammed values.

NOTE: For component location, see Engine Harness (W32) Component Location. (Group 9015-10.)

For information on how temperature sensors operate, see Measuring Temperature. (CTM120119.)

For information on engine protection and derate programs, see Engine Derate and Shutdown Protection. (CTM120119.)

For sensor specifications, see Electrical Component Specifications. (Group 9015-15.)

Crankshaft Position Sensor (B5301)

The crankshaft position sensor is an inductive-type pickup sensor that detects teeth on the crankshaft timing gear. The crankshaft timing gear is composed of 45 teeth. The timing gear has one tooth that is wider than the others. Either piston 1 or 4 is at top-dead-center (TDC) of its compression stroke when this different pulse is detected.

The ECU uses the input of both the crankshaft position sensor and the camshaft position sensor to precisely control the timing and duration of fuel injection. The ECU uses crankshaft position input to determine engine speed and the angular position of the crankshaft in its 360-degree field of rotation. The ECU also uses this signal to calculate engine (crankshaft) speed and sends this information across the CAN data line to the standard display monitor (SDM), where the information appears on the monitor display as engine rpm.

Based on information from the crankshaft position and camshaft position sensors, the ECU calculates the timing and duration of fuel injection. If there is a problem with the crankshaft position sensor, the ECU uses the camshaft position sensor to determine engine timing. Prolonged engine cranking may be required to start the engine.

The crankshaft position sensor uses pin 38 of ECU connector 1 (X5501) for signal and pin 30 for ground.

NOTE: For component location, see Engine Harness (W32) Component Location. (Group 9015-10.)

For information on how speed sensors operate, see Measuring Speed. (CTM120119.)

For information on engine protection and derate programs, see Engine Derate and Shutdown Protection. (CTM120119.)

For sensor specifications, see Electrical Component Specifications. (Group 9015-15.)

Camshaft Position Sensor (B5302)

The camshaft position sensor is used to determine engine speed and when each cylinder is at top-dead-center

(TDC) at the end of the compression stroke. The ECU uses this information to determine injection timing.

The camshaft position sensor consists of a permanent magnet, coil, and yoke. The sensor is mounted near the inner camshaft gear which contains 12 evenly spaced notches (webs). During engine rotation, an AC voltage pulse is induced in the coil as each web passes by the sensor. The circular distance (arc) between two of the 12 webs is smaller than the rest. The ECU determines that cylinder 1 is at TDC by detecting this different arc.

The camshaft position signal circuit is shielded from electromagnetic interference (EMI). If there is a problem with the camshaft position sensor, the ECU uses the crankshaft position sensor to determine engine timing. Prolonged engine cranking may be required to start the engine.

The camshaft position sensor uses pin 28 of ECU connector 1 (X5501) for signal and pin 29 for ground.

NOTE: For component location, see Engine Harness (W32) Component Location. (Group 9015-10.)

For information on engine protection and derate programs, see Engine Derate and Shutdown Protection. (CTM120119.)

For sensor specifications, see Electrical Component Specifications. (Group 9015-15.)

Intake Air Sensor (B5500)

Intake air sensor is used to measure temperature, pressure, and humidity of the turbocharger compressor inlet air. The location of the measurements is in the intake prior to the turbocharger. These measurements provide input for fueling calculations made by the ECU. The ECU compares turbocharger compressor inlet pressure to barometric air pressure to calculate the intake air pressure drop. The sensor communicates with the ECU over the engine controller area network (CAN).

NOTE: For component location, see Engine Harness (W32) Component Location. (Group 9015-10.)

For information on CAN communication, see Controller Area Network (CAN) Circuit Theory of Operation. (Group 9015-05.)

For sensor specifications, see Electrical Component Specifications. (Group 9015-15.)

Low-Pressure Fuel Pump (Y5004)

The low-pressure fuel pump draws fuel from the fuel tank through the fuel filter head and primary fuel filter. The fuel is pumped through the secondary fuel filter to the high-pressure fuel pump.

The low-pressure fuel pump is provided power at pin 22 of ECU connector 1 (X5501) and ground at pin 14.

A1—Vehicle Control Unit (VCU)	F7—Sealed Switch Module (SSM)	V2—Starter Solenoid Diode	X61—Operator's Station
A4—Sealed Switch Module (SSM)	Unswitched Power 5 A Fuse	W1—System Ground	Harness-to-Roof Harness
A8—Standard Display Monitor (SDM)	F11—Display Unit Switched Power 5 A Fuse	W2—Frame Ground	31-Pin Connector
A13—Vehicle Control Unit 2 (VC2)	F61—System 120 A Circuit Breaker	X7—Vehicle Control Unit 2 (VC2) Connector	X62—Load Center Harness-to-Operator's Station Harness 23-Pin Connector
A5505—Engine Control Unit (ECU)	G1—Battery	X10—Vehicle Control Unit (VCU) Connector 2	X5503—Engine Control Unit (ECU) Connector 3
F1—Display Unit Unswitched Power 10 A Fuse	G2—Battery	X36—Operator's Station Harness-to-Front Dash Harness Connector	
F6—Vehicle Control Unit 2 (VC2) Unswitched Power 10 A Fuse	G5—Alternator	X57—Load Center Harness-to-Operator's Station Harness 35-Pin Connector	
	H1—Display Unit Alarm		
	K2—Switched Power Relay		
	M1—Starter Motor		
	S1—Battery Disconnect Switch		

SDM and SSM Power-Up (Power and Ground)

The standard display monitor (SDM) (A8) receives unswitched battery power from display unit unswitched power 10 A fuse (F1) at pin A. Ground is provided by system ground (W1) at pin P.

The sealed switch module (SSM) (A4) receives unswitched power from SSM unswitched power 5 A fuse (F7) at pin 1. Ground is provided by system ground at pin 2.

When the engine start switch is pressed once, current flows from pin 3 of the SSM to the coil of switched power relay (K2), energizing the relay. With the switched power relay energized, current flows through display unit switched power 5 A fuse (F11) to pin L of the SDM, powering up the SDM.

When powered up, the SDM performs a self-test by activating all indicators: lights, gauges, and monitor display window. For more information on SDM functions, [see Standard Display Monitor \(SDM\)](#). (Operator's Manual.)

Standard Display Monitor (SDM) (A8)

The SDM contains a menu structure designed for monitoring certain machine functions for operational and/or diagnostic purposes. The SDM provides a means for viewing and clearing diagnostic trouble codes (DTCs) and also provides a means for adjusting certain machine and monitor settings. For more information on the SDM menu structure, [see Main Menu, SDM](#). (Operator's Manual.)

The SDM uses the controller area network (CAN) data line to communicate with the engine control unit (ECU) (A5505), vehicle control unit (VCU) (A1), and vehicle control unit 2 (VC2) (A13). For more information on the CAN, [see Controller Area Network \(CAN\) Circuit Theory of Operation](#). (Group 9015-05.)

The VCU transmits vehicle information across the CAN data line. Vehicle information and DTCs can be displayed in the monitor menu. For more information on the SDM menu structure, [see Main Menu, SDM](#). (Operator's Manual.)

The ECU transmits engine speed, engine coolant temperature, engine oil pressure, and any ECU related DTC information across the CAN data line. Engine speed and DTCs can be displayed on the monitor display window. The SDM receives the signal representing engine coolant

temperature from the ECU and uses this information to determine the needle position of the engine coolant temperature gauge. For operation of SDM gauges, [see Standard Display Monitor \(SDM\)](#). (Operator's Manual.)

The VC2 transmits fuel level and DTC information to the SDM across the CAN data line. DTCs are displayed on the monitor display window. The SDM receives signal representing fuel level to determine needle position of the fuel level gauge. For operation of SDM gauges, [see Standard Display Monitor \(SDM\)](#). (Operator's Manual.)

The VCU, VC2, and SDM also exchange machine model information to prevent a controller mismatch. Once a VCU or SDM is installed in a machine, the unit cannot be removed and put in a different model machine.

Display Unit Alarm (H1): Switched power is provided through display unit switched power 5 A fuse (F11) to display unit alarm (H1). When a warning condition occurs that requires an audible alarm, the SDM provides a ground at pin D of the SDM (A8), activating the display unit alarm (H1). The display unit alarm is activated at an intermittent rate, depending on the type of warning condition. For more information about the monitor alarm, [see Standard Display Monitor \(SDM\)](#). (Operator's Manual.)

Sealed Switch Module (SSM) (A4)

The SSM contains an array of 25 switches. For description and operation of the switches, [see Sealed Switch Module \(SSM\) Functions](#). (Operator's Manual.)

The VC2 receives local interconnect network (LIN) messages from the SSM, relays the messages to the VCU through CAN data lines, and determines the state of associated button. An SSM button may have two or more states. The operator toggles between states by pressing the button. LEDs on each button indicate the current state of associated function.

The VC2 receives messages from the SSM identifying a pressed button. The VC2 communicates with the VCU through CAN messages to determine if information is valid, then sends a message to the SSM to control the relevant button LEDs.

When the VCU and VC2 are initially powered up, the VCU and VC2 must determine the correct state for each button function.

1—Unswitched Power	F17— Window Wipers 15 A Fuse	X7— Vehicle Control Unit 2 (VC2) Connector	X53— Auxiliary Lighting (beacon) Connector
2— Switched Power	F37— Platform Lights Switch 5 A Fuse	X9— Vehicle Control Unit (VCU) Connector 1	X57— Load Center Harness-to-Operator's Station Harness 35-Pin Connector
A1— Vehicle Control Unit (VCU)	H3—Horn	X10— Vehicle Control Unit (VCU) Connector 2	X58— Fan Harness-to-Vehicle Harness Connector
A4—Sealed Switch Module (SSM)	M2—Front Wiper Motor	X11— Vehicle Control Unit (VCU) Connector 3	X61— Operator's Station Harness-to-Roof Harness 31-Pin Connector
A10— Transmission Control Lever (TCL)	M3—Rear Wiper Motor	X15— Load Center Harness-to-Vehicle Harness Connector 1	X62— Load Center Harness-to-Operator's Station Harness 23-Pin Connector
A13— Vehicle Control Unit 2 (VC2)	M4—Front Washer Motor	X25— Fuse Box 1 Connector	X64— Rear Service Harness-to-Vehicle Harness Connector
B19— Fuel Level Sensor	M5—Rear Washer Motor	X26— Fuse Box 2 Connector	
E2— Left Front Drive Light	M6—Left Door Wiper Motor	X29— Load Center Harness-to-Vehicle Harness Connector 3	
E3— Right Front Drive Light	M7—Right Door Wiper Motor	X37— Platform Lights Switch Connector	
E5— Right Rear Drive Light	S8— Horn Switch (in TCL)	X40— Fuel Sender Harness-to-Rear Service Harness Connector	
E6— Left Rear Drive Light	S19— Platform Lights Switch		
E7— Left Front Cab Work Light	V1— Right Door Wiper Diode		
E8— Right Front Cab Work Light	V3— Left Door Wiper Diode		
E12— Rotary Beacon Light (if equipped)	V5— Front Wiper Diode		
	W2—Frame Ground		
	W3—Roof Ground		
	W5—Cab Ground		

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1—Switched Power	B1—Decelerator Sensor	W5—Cab Ground	X36— Operator's Station
A1—Vehicle Control Unit (VCU)	B2— Forward, Neutral, and	X7— Vehicle Control Unit 2 (VC2)	Harness-to-Front Dash
A4—Sealed Switch Module (SSM)	Reverse (FNR) Sensor	Connector	Connector
A8—Standard Display Monitor	B3—Steer Sensor	X9— Vehicle Control Unit (VCU)	X57— Load Center Harness-to-
(SDM)	F15— Transmission Switches 5	Connector 1	Operator's Station Harness
A10— Transmission Control	A Fuse	X10— Vehicle Control Unit (VCU)	35-Pin Connector
Lever (TCL)	S2— Left Park Lock Lever Switch	Connector 2	X5503—Engine Control Unit
A13— Vehicle Control Unit 2	S12— Neutral Start Switch	X11— Vehicle Control Unit (VCU)	(ECU) Connector 3
(VC2)	S14— Right Park Lock Lever	Connector 3	
A5505—Engine Control Unit	Switch	X25— Fuse Box 1 Connector	
(ECU)			

Transmission Control Lever (TCL) (A10)

Located in the TCL, the transmission speed control switch increases and decreases ground speed. The transmission speed control switch receives 5-volt power from pin G4 and reference ground from pin F3, both of vehicle control unit (VCU) connector 3 (X11). When neither the up or down buttons are pressed, the transmission speed control switch applies a voltage to pin D2 of vehicle control unit (VCU) connector 1 (X9). When either the up or down buttons are pressed, a different voltage is applied to the VCU.

When either the up or down buttons are pressed, the TCU broadcasts the transmission speed over CAN to the SDM. The SDM displays the transmission speed in the display window.

For more information on the SDM, [see Standard Display Monitor \(SDM\) Circuit Theory of Operation](#). (Group 9015-05.)

For more information on the CAN, [see Controller Area Network \(CAN\) Circuit Theory of Operation](#). (Group 9015-05.)

The 5-volt sensor supply from pin G4 and the reference ground from pin F3 of vehicle control unit (VCU) connector 3 are distributed to various sensors.

If this sensor causes a DTC, the transmission speed is limited and SDM displays 1.0 for speed setting.

When ECO mode switch is enabled on the SSM, the TCU enables economy mode. Economy mode is a power management routine that controls engine speed according to operator speed and load demands. Economy mode increases transmission speed and reduces engine speed to maintain a desired machine speed and reduce fuel consumption at low load demands. The control increases engine speed when the load demand increases.

Decelerator Sensor (B1)

The decelerator sensor is located on a rotating shaft on the decelerator/brake pedal. The decelerator sensor is a rotary Hall effect sensor without contacts. The sensor receives 5-volt power from pin F4 and reference ground from pin F3, both of vehicle control unit (VCU) connector 3. When the decelerator/brake pedal is pressed down, the rotating shaft turns a keyed slot on the sensor and the sensor applies a varied voltage to pin E3 of vehicle control unit (VCU) connector 3. The voltage of this sensor at certain decelerator pedal positions is stored in the TCU during calibration.

The 5-volt sensor supply from pin F4 and the reference ground from pin F3, both of vehicle control unit (VCU) connector 3, are distributed to various sensors.

If this sensor causes a DTC, the TCU limits machine performance. The maximum machine speed is limited to 3.2 km/h (2.0 mph) when the sensor calibration is either too high or too low. If the sensor output is out of range, commanded engine speed is set to 0%, decelerator percentage is set to no deceleration, and the park brake is set to a released state.

Forward, Neutral, and Reverse (FNR) Sensor (B2)

FNR sensor is located on a rotating shaft on the TCL. The FNR sensor is a rotary Hall effect sensor without contacts. The sensor receives 5-volt power from pin F4 and reference ground from pin F3, both of vehicle control unit (VCU) connector 3. When the TCL is moved into forward or reverse, the rotating shaft turns a keyed slot on the sensor and the sensor applies a varied voltage to pin B3 of vehicle control unit (VCU) connector 3. The voltage of this sensor at certain TCL positions is stored in the TCU during calibration.

The 5-volt sensor supply from pin F4 and the reference ground from pin F3, both of vehicle control unit (VCU) connector 3, are distributed to various sensors.

If this sensor causes a DTC, the forward and reverse functions are disabled.

Steer Sensor (B3)

Steer sensor is located on a rotating shaft on the transmission control lever (TCL). The steer sensor is a rotary Hall effect sensor without contacts that receives 5-volt power from pin F4 and reference ground from pin F3, both of vehicle control unit (VCU) connector 3. When the TCL is moved left or right, the rotating shaft turns a keyed slot on the sensor and the sensor applies a varied voltage to pin B4 of vehicle control unit (VCU) connector 3. The voltage of this sensor at certain TCL positions is stored in the TCU during calibration.

The 5-volt sensor supply from pin F4 and the reference ground from pin F3, both of vehicle control unit (VCU) connector 3, are distributed to various sensors.

If this sensor causes a DTC, the steer functions are disabled and the maximum machine speed is limited to 3.2 km/h (2.0 mph).

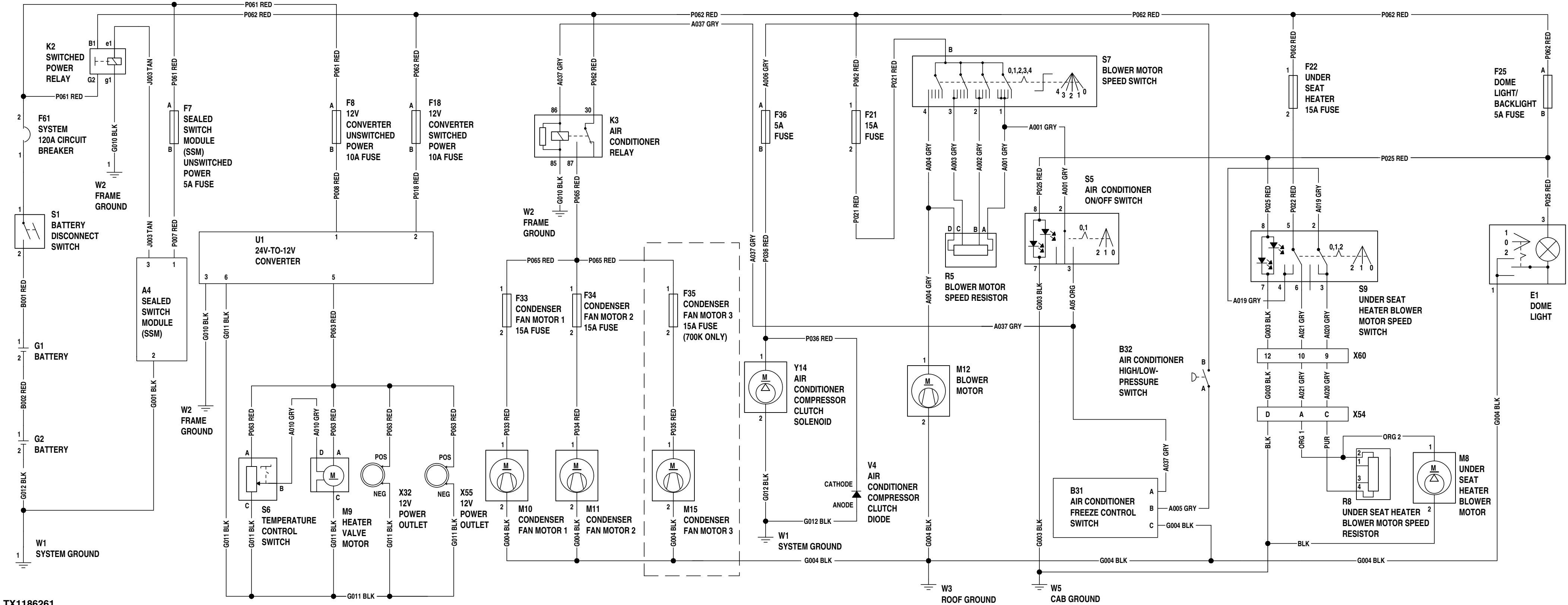
Park Lock Lever Switch (S2 and S14)

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Air Conditioner and Heater Circuits Theory of Operation

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Air Conditioner and Heater Circuit Schematic

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A2—Radio	F8— 12 V Converter Unswitched Power 10 A Fuse	X15— Load Center Harness-to-Vehicle Harness Connector 1	X74— Auxiliary Radio USB Input (if equipped)
A4—Sealed Switch Module (SSM)	F18— 12 V Converter Switched Power 10 A Fuse	X22— Radio Antenna Power Connector	X152— Radio Connector
A29— SiriusXM® Radio Module (if equipped)	F61— System 120 A Circuit Breaker	X29— Load Center Harness-to-Vehicle Harness Connector 3	X153— Radio Auxiliary Connector 1
B20— Right Speaker	G1—Battery	X52— Radio Auxiliary Port	X154— Radio Auxiliary Connector 2
B21— Left Speaker	G2—Battery	X61— Operator's Station Harness-to-Roof Harness 31-Pin Connector	X155— Auxiliary Radio Input Harness Connector
B51— Radio Microphone (if equipped)	K2—Switched Power Relay	X62— Load Center Harness-to-Operator's Station Harness 23-Pin Connector	
F7— Sealed Switch Module (SSM) Unswitched Power 5 A Fuse	S1— Battery Disconnect Switch		
	U1— 24 V-to-12 V Converter		
	W1—System Ground		
	W2—Frame Ground		

System Power Overview

Unswitched Power

Battery voltage from system 120 A circuit breaker (F61) flows through 12 V converter unswitched power 10 A fuse (F8) to pin 1 of 24 V-to-12 V converter (U1). The 24 V-to-12 V converter provides unswitched 12 V to pin A_7 of the radio (A2). This unswitched 12 V maintains the radio memory and user settings when switched power is off.

Battery voltage from system 120 A circuit breaker also flows through sealed switch module (SSM) unswitched power 5 A fuse (F7) to pin 1 of the sealed switch module (SSM) (A4). The SSM allows the operator to provide switched power to the radio and other machine circuits.

For more information on unswitched power circuits, [see Start and Charge Circuits Theory of Operation](#). (Group 9015-05.)

Switched Power ON

The engine start switch is located on the sealed switch module (SSM). When the engine start switch is pressed once, current flows from pin 3 of the SSM to the coil of the switched power relay (K2), energizing the relay. With relay energized, current from system 120 A circuit breaker flows through 12 V converter switched power 10 A fuse (F18) to pin 2 of 24 V-to-12 V converter. The 24 V-to-12 V converter provides switched 12 V to pins A_4 and A_6 of the radio connector.

For more information on switched power circuits, [see Start and Charge Circuits Theory of Operation](#). (Group 9015-05.)

Ground

The 24 V-to-12 V converter receives ground from the frame ground (W2). The 24 V-to-12 V converter provides ground from pin 6 to pin A_8 of the radio connector.

Radio System Components

Radio (A2)

The radio receives power and ground from the 24 V-to-12 V converter. Switched 12 V power is provided at pins A_4 and A_6 of the radio connector. Unswitched 12 V power is provided at pin A_7 of the radio connector. Ground is provided at pin A_8 of the radio connector.

SiriusXM® Radio Module (A29)—If Equipped

The SiriusXM® radio module (A29) connects directly to the radio using satellite radio harness (W38). The satellite radio harness transfers switched and unswitched 12 V, ground, left and right audio signals, and two-way data between the radio and SiriusXM® radio module.

Unswitched 12 V power is provided at pin 7 from pin 15 of auxiliary radio input harness connector (X155). Switched 12 V power is provided at pin 8 from pin 16 of X155. Ground is provided at pin 1 from pin 13 of X155.

For more information, [see Satellite Radio Harness \(W38\) Component Location—If Equipped](#). (Group 9015-10.)

Right Speaker (B20)

The right speaker (B20) is powered by the radio's internal amplifier. The positive signal is provided at pin B of the right speaker by pin B_3 of radio connector (X152). Negative signal is provided at pin A of the right speaker by pin B_4 of radio connector.

Left Speaker (B21)

The left speaker (B21) is powered by the radio's internal amplifier. The positive signal is provided at pin B of the left speaker by pin B_5 of radio connector. Negative signal is provided at pin A of the left speaker by pin B_6 of radio connector.

Radio Microphone (B51)—If Equipped

The radio microphone (B51) provides an audio input to Bluetooth®-capable radios.

The radio microphone connects to the radio using a 3.5 mm stereo auxiliary plug. The positive microphone signal is sent from the plug's tip to pin 9 of radio auxiliary connector 2 (X154). Negative signal is sent from the plug's sleeve to pin 10 of radio auxiliary connector 2.

Radio Antenna Power Connector (X22)

The radio antenna power connector (X22) provides the antenna with switched 12 V power.

Switched 12 V power is provided at pin 1 from pin A_5 of radio connector. Ground is provided at pin 2 from pin 6 of 24 V-to-12 V converter (U1).

Radio Auxiliary Port (X52)

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A1—Vehicle Control Unit (VCU)	F26— JDLINK™ Switched Power 5 A Fuse	X41— JDLINK Connector	X6020—Analog Input 1 (not used)
A4—Sealed Switch Module (SSM)	F32— JDLINK™ Unswitched Power 5 A Fuse	X62— Load Center Harness-to-Operator's Station Harness 23-Pin Connector	X6021—Analog Input 2 (not used)
A6000—Modular Telematics Gateway (MTG) Control Unit	F61— System 120 A Circuit Breaker	X6014—Modular Telematics Gateway (MTG) Control Unit 48-Pin Connector	X6022—Analog Input 3 (not used)
A6001—GPS/Cellular Antenna	G1—Battery	X6015—Satellite (SAT) Module Control Unit 48-Pin Connector	X6023—Analog Input 4 (not used)
A6002—Satellite (SAT) Module Control Unit	G2—Battery		
A6003—Satellite (SAT) Antenna	K2—Switched Power Relay		
F7— Sealed Switch Module (SSM) Unswitched Power 5 A Fuse	S1— Battery Disconnect Switch	X6016—Modular Telematics Gateway (MTG) Harness-to-Satellite (SAT) Harness 6-Pin Connector	
	W1—System Ground		
	W2—Frame Ground		
	X9— Vehicle Control Unit (VCU) Connector 1		

System Overview

The JDLINK™ system provides two-way communication between the machine and JDLINK™ host server. The system may enable the following advanced features:

- MTG firmware updates
- Service ADVISOR™ Remote dealer service tool
- John Deere Remote Display Access™
- Data recording
- Location services
- Maintenance management

The JDLINK™ system consists of two controllers responsible for machine communication:

• Modular Telematics Gateway (MTG) Control Unit (A6000)

The MTG is a module containing firmware, a cellular modem, and subscriber identification module (SIM) device. The MTG allows data transfer to and from the JDLINK™ host server over a cellular network.

• Satellite (SAT) Module Control Unit (A6002)

The SAT module control unit is used in conjunction with the MTG. It contains a satellite modem component enabling the MTG to transfer data to and from the JDLINK™ host server. Data is transferred over a satellite connection when a valid cellular network is unavailable or unreliable.

For more information, reference JDLINK™ (MTG) Technical Manual (TM114519.) [See Theory of Operation.](#) (TM114519.)

System Power Overview

Unswitched Power

Battery voltage flows through JDLINK™ unswitched power 5 A fuse (F32) to pin M2 of modular telematics gateway (MTG) control unit 48-pin connector (X6014) and to pin M2 of satellite (SAT) module control unit 48-pin connector (X6015).

Battery voltage from system 120 A circuit breaker (F61) also flows through sealed switch module (SSM) unswitched power 5 A fuse (F7) to pin 1 of the sealed switch module (SSM) (A4). The SSM allows the operator to provide switched power to the MTG and other machine circuits.

For more information on unswitched power circuits, [see Start and Charge Circuits Theory of Operation.](#) (Group 9015-05.)

Switched Power

The engine start switch is located on the sealed switch module (SSM). When the engine start switch is pressed once, current flows from pin 3 of the SSM to the coil of the switched power relay (K2), energizing the relay. With relay energized, current from system 120 A circuit breaker flows through JDLINK™ switched power 5 A fuse (F26) to pin L1 of MTG control unit 48-pin connector.

For more information on switched power circuits, [see Start and Charge Circuits Theory of Operation.](#) (Group 9015-05.)

Ground

The MTG and SAT module control units receive ground from system ground (W1). The MTG's ground is provided at pins F3 and M1 of MTG control unit 48-pin connector. The SAT module control unit's ground is provided at pin M1 of SAT module control unit 48-pin connector.

For more information, reference JDLINK™ (MTG) Technical Manual (TM114519.) [See Theory of Operation.](#) (TM114519.)

JDLINK™ System Components

Modular Telematics Gateway (MTG) Control Unit (A6000)

The MTG accesses machine system information via the controller area network (CAN). CAN 1 high signal is provided at pin H1 of modular telematics gateway (MTG) control unit 48-pin connector (X6014). CAN 1 low signal is provided at pin H2 of MTG control unit 48-pin connector.

CAN 2 high signal is provided at pin G1 of MTG control unit 48-pin connector. CAN 2 low signal is provided at pin G2 of MTG control unit 48-pin connector.

The MTG activates the SAT module control unit by energizing pin M3 of MTG control unit 48-pin connector. Communication with SAT module control unit is accomplished using pins A1 and A2 of MTG control unit 48-pin connector.

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

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

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

Each electrical component is shown by a component schematic symbol (10), the component name (8), and

a component identification number (9). A component identification number and name will remain the same throughout the Operation and Test Manual. This will allow for easy cross-referencing of all electrical drawings (schematics, wiring diagrams, and component location).

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

Continued on next page

AS79221,000054E -19-24FEB16-3/4

- F4—Spare 15 A Fuse
- F5—Vehicle Control Unit (VCU) Unswitched Power 10 A Fuse ([SE16](#))
- F6—Vehicle Control Unit 2 (VC2) Unswitched Power 10 A Fuse ([SE2](#))
- F7—Sealed Switch Module (SSM) Unswitched Power 5 A Fuse ([SE1](#))
- F8—12 V Converter Unswitched Power 10 A Fuse ([SE28](#))
- F9—Service ADVISOR™ Connector 5 A Fuse ([SE32](#))
- F11—Display Unit Switched Power 5 A Fuse ([SE31](#))
- F12—Engine Control Unit (ECU) Switched Power 5 A Fuse ([SE3](#))
- F13—Vehicle Control Unit 2 (VC2) Switched Power 5 A Fuse ([SE2](#))
- F14—Fuel Filter Heater 10 A Fuse ([SE3](#))
- F15—Transmission Switches 5 A Fuse ([SE22](#))
- F16—Spare 5 A Fuse
- F17—Window Wipers 15 A Fuse ([SE24](#))
- F18—12 V Converter Switched Power 10 A Fuse ([SE28](#))
- F19—Winch Pressure 5 A Fuse ([SE15](#))
- F21—Blower Motor 15 A Fuse ([SE33](#))
- F22—Under Seat Heater 15 A Fuse ([SE34](#))
- F23—Spare Switched Power 10 A Fuse ([SE35](#))
- F24—Air Seat Motor 10 A Fuse ([SE35](#))
- F25—Dome Light/Backlight 5 A Fuse ([SE35](#))
- F26—JDLINK™ Switched Power 5 A Fuse ([SE36](#))
- F27—Spare Power Switched Connector 10 A Fuse ([SE38](#))
- F31—Engine Control Unit (ECU) Unswitched Power 25 A Fuse 1 ([SE3](#))
- F32—JDLINK™ Unswitched Power 5 A Fuse ([SE36](#))
- F33—Condenser Fan Motor 1 15 A Fuse ([SE33](#))
- F34—Condenser Fan Motor 2 15 A Fuse ([SE33](#))
- F35—15 A Fuse (not used) ([SE33](#))
- F36—Air Conditioner Compressor Clutch 5 A Fuse ([SE33](#))
- F37—Platform Lights Switch 5 A Fuse ([SE2](#))
- F41—Blade Control Joystick 5 A Fuse ([SE25](#))
- F43—Hydraulic Valve Controller (HVC) Switched Power 10 A Fuse ([SE25](#))
- F44—Hydraulic Valve Controller (HVC) Switched Power 10 A Fuse ([SE26](#))
- F45—Hydraulic Valve Controller (HVC) Switched Power 10 A Fuse ([SE26](#))
- F46—Hydraulic Valve Controller (HVC) Switched Power 10 A Fuse ([SE26](#))
- F47—Hydraulic Valve Controller (HVC) Switched Power 10 A Fuse ([SE26](#))
- F48—Integrated Grade Control (IGC) Switched Power 15 A Fuse ([SE37](#))
- F51—Hydraulic Valve Controller (HVC) Unswitched Power 10 A Fuse ([SE25](#))
- F52—Integrated Grade Control (IGC) Unswitched Power 10 A Fuse 1 ([SE37](#))
- F53—Integrated Grade Control (IGC) Unswitched Power 10 A Fuse 2 ([SE37](#))
- F54—Integrated Grade Control (IGC) Unswitched Power 10 A Fuse 3 ([SE37](#))
- F61—System 120 A Circuit Breaker ([SE1](#)) ([W18](#))
- F62—Glow Plug 50 A Fuse ([SE6](#)) ([W34](#)), ([W35](#)), ([W36](#))
- F63—Fuse Box 1 ([W18](#))
- F64—Fuse Box 2 ([W18](#))
- F65—Fuse Box 3 ([W19](#))
- G1—Battery ([SE1](#))
- G2—Battery ([SE1](#))
- G5—Alternator ([SE1](#)) ([W32](#))
- H1—Display Unit Alarm ([SE2](#), [SE31](#)) ([W22](#))
- H2—Backup Alarm ([SE18](#)) ([W17](#))
- H3—Horn ([SE17](#)) ([W11](#))
- H4—Winch Pressure Light ([SE15](#)) ([W21](#))
- K1—Start Relay ([SE2](#)) ([W9](#))
- K2—Switched Power Relay ([SE1](#))
- K3—Air Conditioner Relay ([SE33](#)) ([W18](#))
- K7—Glow Plug Relay ([SE6](#)) ([W34](#)), ([W35](#)), ([W36](#))
- M1—Starter Motor ([SE1](#)) ([W9](#))
- M2—Front Wiper Motor ([SE23](#)) ([W24](#))
- M3—Rear Wiper Motor ([SE24](#)) ([W21](#))
- M4—Front Washer Motor ([SE24](#)) ([W15](#))
- M5—Rear Washer Motor ([SE24](#)) ([W15](#))
- M6—Left Door Wiper Motor ([SE24](#)) ([W24](#))
- M7—Right Door Wiper Motor ([SE23](#)) ([W24](#))
- M8—Under Seat Heater Blower Motor ([SE35](#)) ([W29](#))
- M9—Heater Valve Motor ([SE28](#)) ([W21](#))
- M10—Condenser Fan Motor 1 ([SE33](#)) ([W27](#))
- M11—Condenser Fan Motor 2 ([SE33](#)) ([W27](#))
- M12—Blower Motor ([SE34](#)) ([W27](#))
- M13—Air Seat Motor ([SE35](#)) ([W21](#))
- R1—Controller Area Network (CAN) 1 Termination Resistor 1 ([SE3](#)) ([W18](#))
- R2—Controller Area Network (CAN) 1 Termination Resistor 2 ([SE32](#)) ([W22](#))
- R3—Controller Area Network (CAN) 2 Termination Resistor 1 ([SE25](#)) ([W21](#))
- R5—Blower Motor Speed Resistor ([SE34](#)) ([W27](#))
- R6—Fuel Filter Heater (if equipped) ([SE4](#)) ([W15](#))
- R8—Under Seat Heater Blower Motor Speed Resistor ([SE34](#)) ([W29](#))
- R10—Glow Plug Resistor ([SE6](#)) ([W34](#)), ([W35](#)), ([W36](#))
- R11—Glow Plug Cylinder 1 ([SE6](#)) ([W36](#))
- R12—Glow Plug Cylinder 2 ([SE6](#)) ([W36](#))
- R13—Glow Plug Cylinder 3 ([SE6](#)) ([W36](#))
- R14—Glow Plug Cylinder 4 ([SE6](#)) ([W36](#))
- R5603—Engine CAN Terminator ([SE4](#))
- R5605—Aftertreatment CAN Terminator ([SE10](#)) ([W8](#))
- S1—Battery Disconnect Switch ([SE1](#))
- S2—Left Park Lock Lever Switch ([SE22](#)) ([W21](#))
- S3—Not Used ([W23](#))
- S5—Air Conditioner On/Off Switch ([SE34](#)) ([W23](#))
- S6—Temperature Control Switch ([SE28](#)) ([W23](#))
- S7—Blower Motor Speed Switch ([SE34](#)) ([W23](#))
- S8—Horn Switch (in TCL) ([W21](#))
- S9—Under Seat Heater Blower Motor Speed Switch ([SE34](#)) ([W23](#))
- S10—Heated Seat Switch ([SE35](#)) ([W23](#))
- S12—Neutral Start Switch ([SE23](#)) ([W21](#))
- S14—Right Park Lock Lever Switch ([SE22](#)) ([W21](#))
- S15—Dome Light Switch ([W24](#)), ([W30](#))
- S19—Platform Lights Switch ([SE2](#)) ([W18](#))
- S29—Blade Shake Switch ([SE25](#)) ([W21](#))
- S30—Blade Angle Switch ([SE25](#)) ([W21](#))
- S31—Integrated Grade Control (IGC) On/Off Switch ([SE25](#)) ([W21](#))

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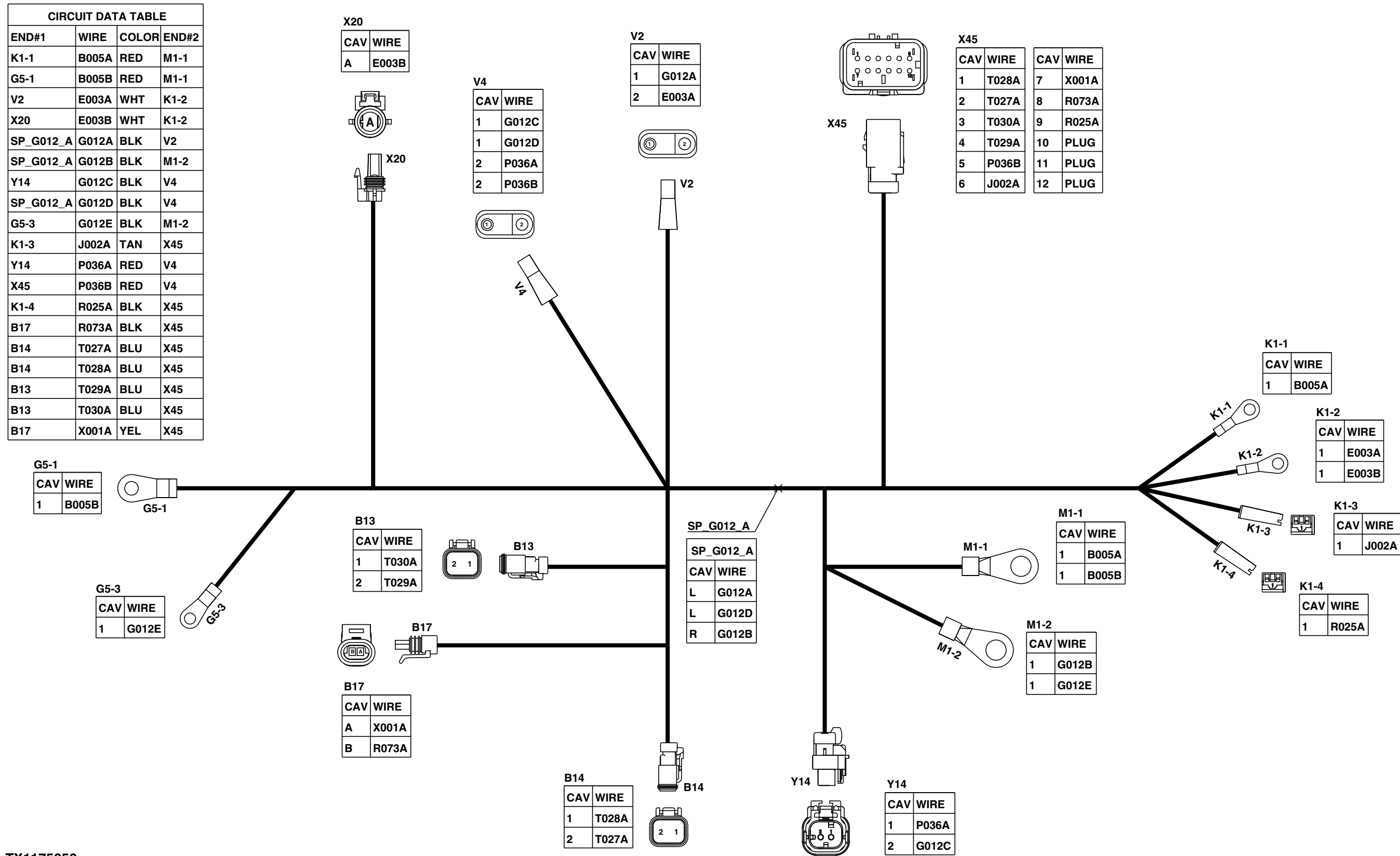
System Diagrams

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Engine Auxiliary Harness (W9) Wiring Diagram

TX1175050 —UN—09DEC14



TX1175050

Continued on next page

Engine Auxiliary Harness (W9) Wiring Diagram

JL05046,000009A -19-09DEC14-1/2

System Diagrams

B15— Hydrostatic Oil Filter Restriction Switch	B5600—Water-in-Fuel Sensor M4—Front Washer Motor	SP_G010_E—G010 BLK Splice 5	Y5004—Low-Pressure Fuel Pump
B16— Hydraulic Oil Filter Restriction Switch	M5—Rear Washer Motor	X40— Fuel Tank Harness Connector	
B18— Hydraulic Oil Temperature Sensor	R6—Fuel Filter Heater (if equipped)	X64— Rear Service Harness-to-Vehicle Harness Connector	

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TX1203874 —UN—16OCT15

CIRCUIT DATA TABLE			
END#1	WIRE	COLOR	END#2
Y5004	5003A	ORG	X64
B5600	5453A	ORG	X64
X64	5817A	VLT	Y5004
B5600	5826A	BLU	X64
M4	A024A	GRY	X64
M5	A025A	GRY	X64
SP_G010_E	G010A	BLK	X64
R6	G010B	BLK	X64
M4	G010C	BLK	SP_G010_E
M5	G010D	BLK	SP_G010_E
Y9	G010E	BLK	SP_G010_E
W51	G010F	BLK	SP_G010_F
W52	G010G	BLK	SP_G010_F
SP_G010_F	G010H	BLK	X64
B42	H013A	GRN	X64
Y21	H201A	GRN	X64
Y22	H202A	GRN	X64
Y23	H203A	GRN	X64
Y24	H204A	GRN	X64
Y25	H205A	GRN	X64
Y26	H206A	GRN	X64
Y27	H207A	GRN	X64
Y28	H208A	GRN	X64
Y9	H212A	GRN	X64
B15	N001A	YEL	X64
B16	N002A	YEL	X64
R6	P014A	RED	X64
X64	P081A	RED	B42
X64	R035A	BLK	X40
B18	R073A	BLK	X64
B42	R081A	BLK	X64
Y21	R201A	BLK	X64
Y22	R202A	BLK	X64
Y23	R203A	BLK	X64
Y24	R204A	BLK	X64
Y25	R205A	BLK	X64
Y26	R206A	BLK	X64
Y27	R207A	BLK	X64

CIRCUIT DATA TABLE			
END#1	WIRE	COLOR	END#2
Y28	R208A	BLK	X64
X64	X002A	YEL	B18
X40	Y001A	YEL	X64

M4	
CAV	WIRE
A	A024A
B	G010C

B18	
CAV	WIRE
A	X002A
B	R073A

X40	
CAV	WIRE
1	Y001A
2	R035A
3	PLUG
4	PLUG

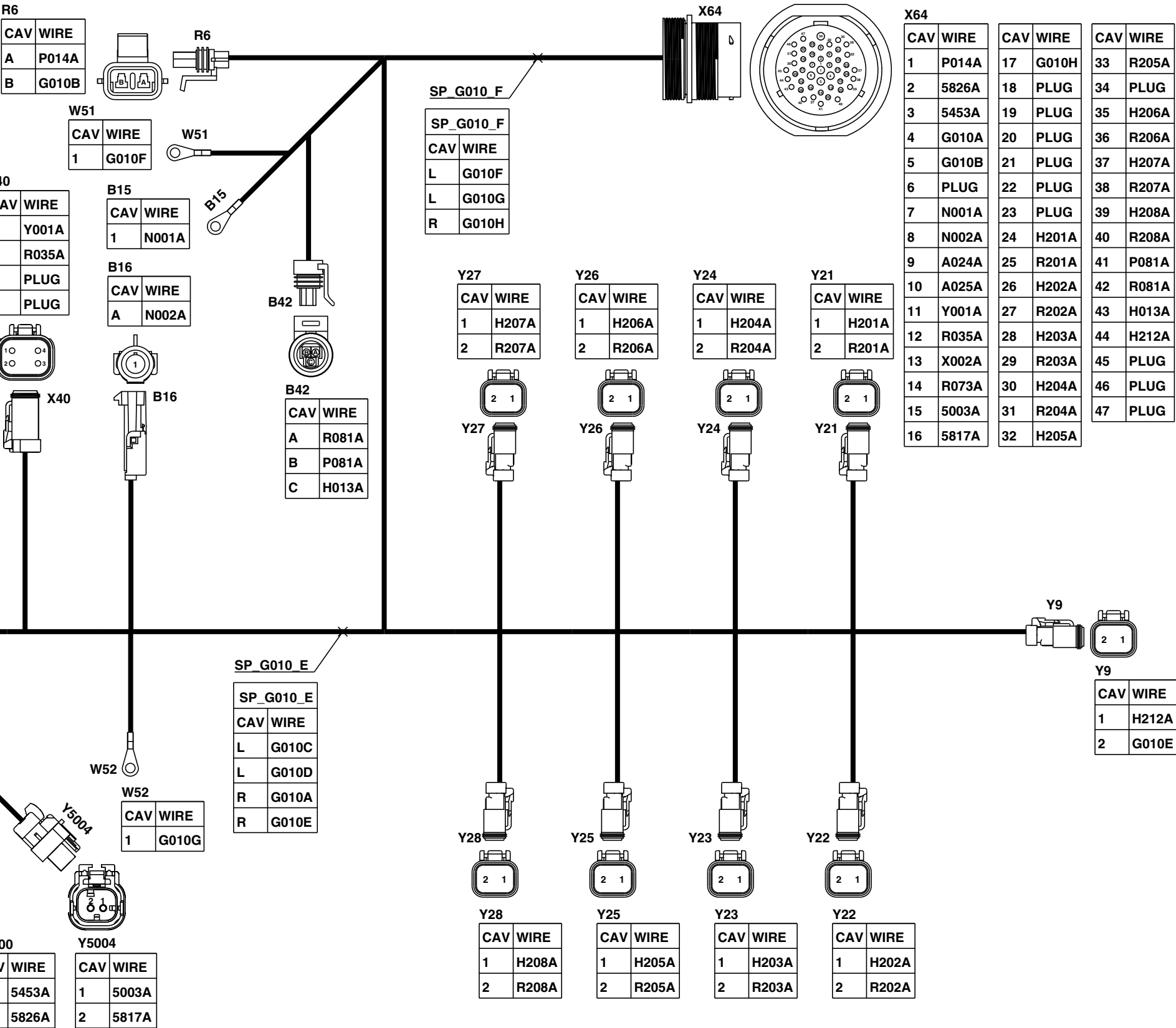
B15	
CAV	WIRE
1	N001A

B16	
CAV	WIRE
A	N002A

M5	
CAV	WIRE
A	A025A
B	G010D

B5600	
CAV	WIRE
1	5453A
2	5826A

Y5004	
CAV	WIRE
1	5003A
2	5817A



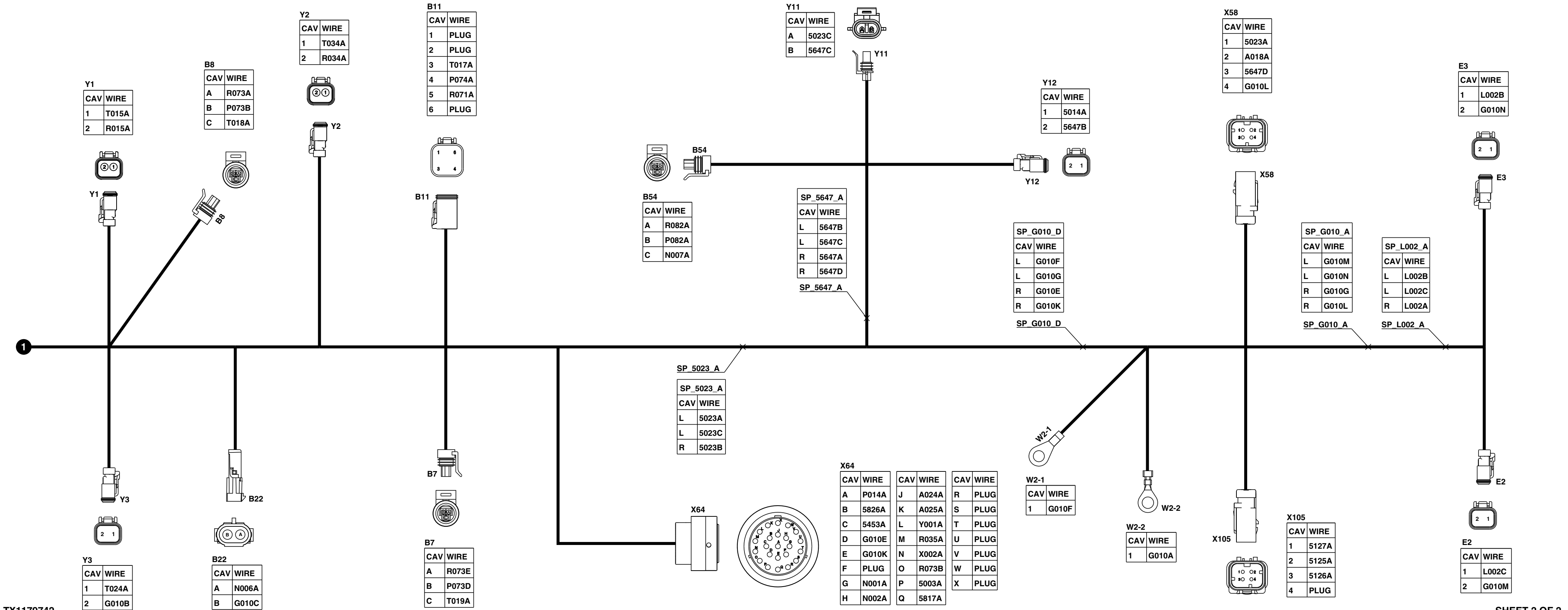
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Rear Service (IGC controls) Harness (W15) Wiring Diagram (S.N. 285905—)

JL05046,00000A0 -19-15OCT15-3/4

TX1179742 —UN—04DEC14



TX1179742

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Vehicle Harness (W16) Wiring Diagram (S.N. —285904) (2 of 2)

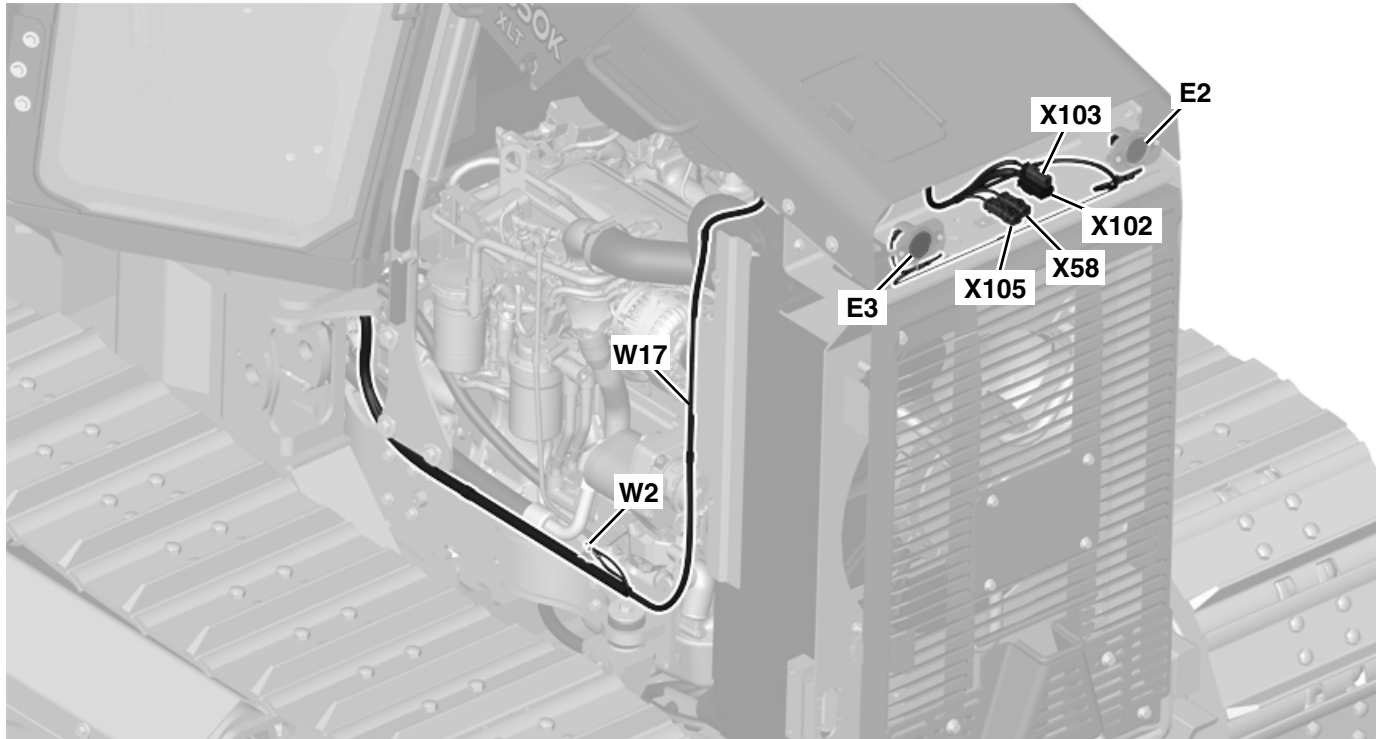
SHEET 2 OF 2

JL05046,00000A2 -19-15OCT15-3/8

1—Continued on Sheet 1	E2—Left Front Drive Light	W2—Frame Ground	Y2—Right Motor Shift Solenoid
B7—Right Hydrostatic Pressure Sensor	E3—Right Front Drive Light	X58—Fan Harness-to-Vehicle Harness Connector	Y3—Park Brake Solenoid 1
B8—Hydrostatic Charge Pressure Sensor	SP_5023_A—5023 ORG Splice	X64—Rear Service Harness-to-Vehicle Harness Connector	Y11—Hydraulic Fan Proportional Relief Solenoid
B11—Right Motor Speed Sensor	SP_5647_A—5647 VLT Splice	X105—Cooling Package Harness-to-Vehicle Harness Connector	Y12—Hydraulic Fan Reversing Solenoid
B22—Winch Pressure Sensor	SP_G010_A—G010 BLK Splice 1		
B54—Fan Drive Pressure Sensor	SP_G010_D—G010 BLK Splice 4		
	SP_L002_A—L002 BRN Splice	Y1—Left Motor Shift Solenoid	

JL05046,00000A2 -19-15OCT15-8/8

Vehicle (IGC Controls) Harness (W17) Component Location



TX1181827 —UN—14JAN15

TX1181827

Vehicle (IGC controls) Harness (W17) Component Location (front view)

E2—Left Front Drive Light	X58—Fan Harness-to-Vehicle Harness Connector	X103—Integrated Grade Control (IGC) System 6-Pin Connector 2
E3—Right Front Drive Light	X102—Integrated Grade Control (IGC) System 12-Pin Connector 2	X105—Cooling Package Harness-to-Vehicle Harness Connector
W2—Frame Ground		
W17—Vehicle (IGC controls) Harness		

Continued on next page

JL05046,00000A3 -19-21JAN15-1/4

System Diagrams

1—Continued on Sheet 1	B54— Fan Drive Pressure Sensor	W2—Frame Ground	Y1— Left Motor Shift Solenoid
B6—Left Hydrostatic Pressure Sensor	E2— Left Front Drive Light	X58— Fan Harness-to-Vehicle Harness Connector	Y2— Right Motor Shift Solenoid
B7—Right Hydrostatic Pressure Sensor	E3— Right Front Drive Light	X64— Rear Service Harness-to-Vehicle Harness Connector	Y3— Park Brake Solenoid 1
B8—Hydrostatic Charge Pressure Sensor	SP_5023_A—5023 ORG Splice	X102— Integrated Grade Control (IGC) System 12-Pin Connector 2	Y11— Hydraulic Fan Proportional Relief Solenoid
B9—Brake Pressure Sensor	SP_5647_A—5647 VLT Splice	X103— Integrated Grade Control (IGC) System 6-Pin Connector 2	Y12— Hydraulic Fan Reversing Solenoid
B11— Right Motor Speed Sensor	SP_G010_A—G010 BLK Splice 1	X105— Cooling Package Harness-to-Vehicle Harness Connector	
B12— Left Motor Speed Sensor	SP_G010_C—G010 BLK Splice 3		
B22— Winch Pressure Sensor	SP_G010_D—G010 BLK Splice 4		
	SP_L002_A—L002 BRN Splice		

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JL05046,00000A4 -19-15OCT15-4/8

Load Center Harness (W18) Wiring Diagram

TX1191262 —UN—27APR15

CIRCUIT DATA TABLE			
END#1	WIRE	COLOR	END#2
X62	A006A	GRY	X26
X11	A008A	GRY	X57
X11	A015A	GRY	X57
X9	A017A	GRY	X57
X10	A018A	GRY	X15
X11	A024A	GRY	X15
X11	A025A	GRY	X15
X11	A026A	GRY	X57
X11	A029A	GRY	X57
X57	A037A	GRY	K3
X26	B001A	RED	SP_B001_A
X26	B001B	RED	SP_B001_A
X21	B001C	RED	SP_B001_A
X16	C013A	GRY	X62
X7	E010A	WHT	X57
X5503	G001A	BLK	SP_G001_G
X5503	G001B	BLK	SP_G001_G
X5503	G001C	BLK	SP_G001_G
X5503	G001D	BLK	SP_G001_G
X5503	G001E	BLK	SP_G001_G
X7	G001F	BLK	SP_G001_F
X7	G001G	BLK	SP_G001_F
X10	G001H	BLK	SP_G001_E
X10	G001J	BLK	SP_G001_E
SP_G001_F	G001K	BLK	W1-1
SP_G001_E	G001M	BLK	X62
SP_G001_E	G001N	BLK	W1-2
SP_G001_F	G001Q	RED	SP_G001_G
X10	G001R	BLK	SP_G001_E
K3	G010A	BLK	SP_G010_B
X29	G010B	BLK	SP_G010_B
SP_G010_B	G010C	BLK	K2-3
SP_G010_B	G010D	BLK	U1
U1	G011A	BLK	X62
X11	H013A	GRN	X29
X16	H044A	GRN	X57
X16	H045A	GRN	X57

CIRCUIT DATA TABLE			
END#1	WIRE	COLOR	END#2
X11	H212A	GRN	X29
X5503	J002A	TAN	X45
K2-4	J003A	TAN	X62
X11	L002A	BRN	X15
X11	L003A	BRN	X57
X7	L004A	BRN	X57
X7	L005A	BRN	X62
X11	L007A	BRN	X57
X7	L025A	BRN	X37
X7	L026A	BRN	X37
X7	M001A	VLT	X57
X11	M002A	VLT	X15
X10	N001A	YEL	X15
X10	N002A	YEL	X15
X29	N006A	YEL	X57
X5503	N007A	YEL	X29
X25	P001A	RED	X62
X5503	P002A	RED	SP_P002_A
X5503	P002B	RED	SP_P002_A
X25	P002C	RED	SP_P002_A
X5503	P003A	RED	SP_P003_A
X5503	P003B	RED	SP_P003_A
X25	P003C	RED	SP_P003_A
SP_P005_A	P005A	RED	X10
X25	P005B	RED	SP_P005_A
X10	P005C	RED	SP_P005_A
SP_P006_A	P006A	RED	X7
X25	P006B	RED	SP_P006_A
X7	P006C	RED	SP_P006_A
X25	P007A	RED	X62
X25	P008A	RED	U1
X25	P009A	RED	X57
X25	P011A	RED	X57
X25	P012A	RED	X5503
X7	P013A	RED	X25
X29	P014A	RED	X25
X25	P015A	RED	X57

CIRCUIT DATA TABLE			
END#1	WIRE	COLOR	END#2
X25	P017A	RED	X62
X25	P018A	RED	U1
X25	P019A	RED	X57
X26	P021A	RED	X62
X26	P022A	RED	X62
X26	P023A	RED	X62
X26	P024A	RED	X62
X26	P025A	RED	X62
X26	P026A	RED	X62
SP_P031_A	P031A	RED	X5503
X26	P031B	RED	SP_P031_A
X5503	P031C	RED	SP_P031_A
X26	P033A	RED	X62
X26	P034A	RED	X62
X26	P035A	RED	X62
X26	P036A	RED	X45
X26	P037A	RED	X37
K2-1	P061A	RED	F61-2
X25-L1	P061B	RED	X26
X25-L1	P061C	RED	K2-1
X26-L1	P062A	RED	K2-2
X25-L2	P062B	RED	X26-L1
X25-L2	P062C	RED	K3
X12	P062D	RED	K2-2
U1	P063A	RED	X62
U1	P064A	RED	X62
SP_P065_A	P065A	RED	X26
X26	P065C	RED	SP_P065_A
K3	P065D	RED	SP_P065_A
X26	P065E	RED	SP_P065_A
X11	P071A	RED	X57
X15	P073A	RED	SP_P073_A
X15	P073B	RED	SP_P073_A
X9	P073C	RED	SP_P073_A
X29	P073D	BLK	SP_P073_A
X29	P073E	RED	SP_P073_A
SP_P074_A	P074A	RED	X15

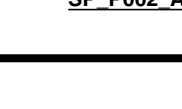
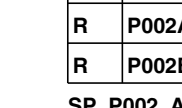
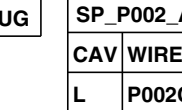
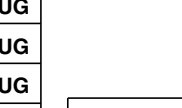
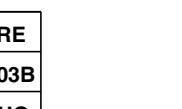
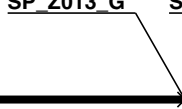
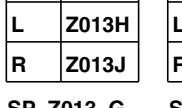
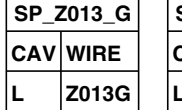
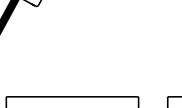
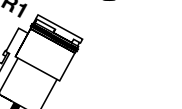
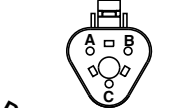
CIRCUIT DATA TABLE			
END#1	WIRE	COLOR	END#2
SP_P074_A	P074B	RED	X15
X57	P074C	RED	SP_P074_A
X11	P074D	RED	SP_P074_A
X9	P081A	RED	X29
X5503	P082A	RED	X29
X26	P1002A	RED	X62
X57	R013A	BLK	SP_R013_D
SP_R013_D	R013B	BLK	HS_R013_H
SP_R013_E	R013C	BLK	SP_R013_D
HS_R013_D	R013D	BLK	SP_R013_E
SP_R013_F	R013E	BLK	SP_R013_E
SP_R013_F	R013F	BLK	X16
SP_R013_G	R013G	BLK	SP_R013_F
HS_R013_K	R013H	BLK	SP_R013_G
R1	R013J	BLK	SP_R013_G
W1-2	R013K	BLK	SP_R013_G
X10	R015A	BLK	X15
X5503	R025A	BLK	X45
X10	R034A	BLK	X15
X7	R035A	BLK	X29
X15	R071A	BLK	SP_R071_B
X15	R071B	BLK	SP_R071_B
X57	R071C	BLK	SP_R071_B
X11	R071D	BLK	SP_R071_B
X15	R073A	BLK	SP_R073_A
SP_R073_A	R073B	BLK	X45
X15	R073C	BLK	SP_R073_A
X9	R073E	BLK	SP_R073_A
X29	R073F	BLK	SP_R073_A
X29	R073G	BLK	SP_R073_A
X9	R081A	BLK	X29
X5503	R082A	BLK	X29
X9	T001A	BLU	X57
X9	T002A	BLU	X57
X11	T005A	BLU	X57
X11	T006A	BLU	X57

CIRCUIT DATA TABLE			
END#1	WIRE	COLOR	END#2
X9	T009A	BLU	X57
X9	T010A	BLU	X57
X9	T011A	BLU	X57
X11	T012A	BLU	X57
X10	T015A	BLU	X15
X11	T016A	BLU	SP_T016_A
X10	T016B	BLU	SP_T016_A
X11	T017A	BLU	SP_T017_A
X10	T017B	BLU	SP_T017_A
SP_T017_A	T017C	BLU	X15
X9	T018A	BLU	X15
X9	T019A	BLU	X29
X9	T020A	BLU	X29
X9	T021A	BLU	X15
X9	T026A	BLU	X57
X10	T027A	BLU	SP_T027_A
X10	T027B	BLU	SP_T027_A
X45	T027C	BLU	SP_T027_A
X10	T028A	BLU	SP_T028_A
X10	T028B	BLU	SP_T028_A
X45	T028C	BLU	SP_T028_A
X10	T029A	BLU	SP_T029_A
X10	T029B	BLU	SP_T029_A
X45	T029C	BLU	SP_T029_A
X10	T030A	BLU	SP_T030_A
X10	T030B	BLU	SP_T030_A
X45	T030C	BLU	SP_T030_A
X10	T034A	BLU	X15
X9	X001A	YEL	X45
X9	X002A	YEL	X29
X7	Y001A	YEL	X15
X7	Z010A	GRY	X57
SP_Z012_D	Z012A	YEL	X57
X7	Z012B	YEL	SP_Z012_D
SP_Z012_E	Z012C	YEL	SP_Z012_D

CIRCUIT DATA TABLE			
END#1	WIRE	COLOR	END#2
SP_Z012_E	Z012D	YEL	X10
SP_Z012_F	Z012E	YEL	SP_Z012_E
X16	Z012F	YEL	SP_Z012_F
SP_Z012_F	Z012G	YEL	SP_Z012_G
X5503	Z012H	YEL	SP_Z012_G
SP_Z012_G	Z012J	YEL	R1
SP_Z013_D	Z013A	GRN	X57
X7	Z013B	GRN	SP_Z013_D
SP_Z013_E	Z013C	GRN	SP_Z013_D
SP_Z013_E	Z013D	GRN	X10
SP_Z013_E	Z013E	GRN	SP_Z013_F
X16	Z013F	GRN	SP_Z013_F
SP_Z013_G	Z013G	GRN	SP_Z013_F
X5503	Z013H	GRN	SP_Z013_G
R1	Z013J	GRN	SP_Z013_G

X45		CAV	WIRE
1	T028C	7	X001A
2	T027C	8	R073B
3	T030C	9	R025A
4	T029C	10	PLUG
5	P036A	11	PLUG
6	J002A	12	PLUG

R1		CAV	WIRE
A	Z012J	B	Z013J
B	Z013J	C	R013J
C	R013J		



SP_Z013_G		CAV	WIRE
L	Z013G	L	Z013G
L	Z013H	L	Z013H
R	Z013J	R	Z013J

SP_Z012_G		CAV	WIRE
L	Z012G	L	Z012G
L	Z012H	L	Z012H
R	Z012J	R	Z012J

SP_R013_G		CAV	WIRE
L	R013G	L	R013G
L	R013H	L	R013H
L	R013K	L	R013K
R	R013J	R	R013J

SP_Z013_F		CAV	WIRE
L	Z013E	L	Z013E
L	Z013F	L	Z013F
R	Z013G	R	Z013G

SP_G001_G		CAV	WIRE
L	G001Q	L	G001Q
R	G001A	R	G001A
R	G001B	R	G001B
R	G001C	R	G001C
R	G001D	R	G001D
R	G001E	R	G001E

SP_P002_A		CAV	WIRE
L	P002C	L	P002C
R	P002A	R	P002A
R	P002B	R	P002B

SP_P003_A		CAV	WIRE
L	P003C	L	P003C
R	P003A	R	P003A
R	P003B	R	P003B

SP_P031_A		CAV	WIRE
L	P031B	L	P031B
R	P031A	R	P031A
R	P031C	R	P031C

SP_G001_G		CAV	WIRE
L	G001Q	L	G001Q
R	G001A	R	G001A
R	G001B	R	G001B
R	G001C	R	G001C
R	G001D	R	G001D
R	G001E	R	G001E

SP_G001_G		CAV	WIRE
L	G001Q	L	G001Q
R	G001A	R	G001A
R	G001B	R	G001B
R	G001C	R	G001C
R	G001D	R	G001D
R	G001E	R	G001E

2—Continued on Sheet 2
 K3—Air Conditioner Relay
 HS_R013_D—Shield
 HS_R013_H—Shield
 SP_G001_E—G001 BLK Splice 5
 SP_G001_F—G001 BLK Splice 6
 SP_P005_A—P005 RED Splice
 SP_P006_A—P006 RED Splice

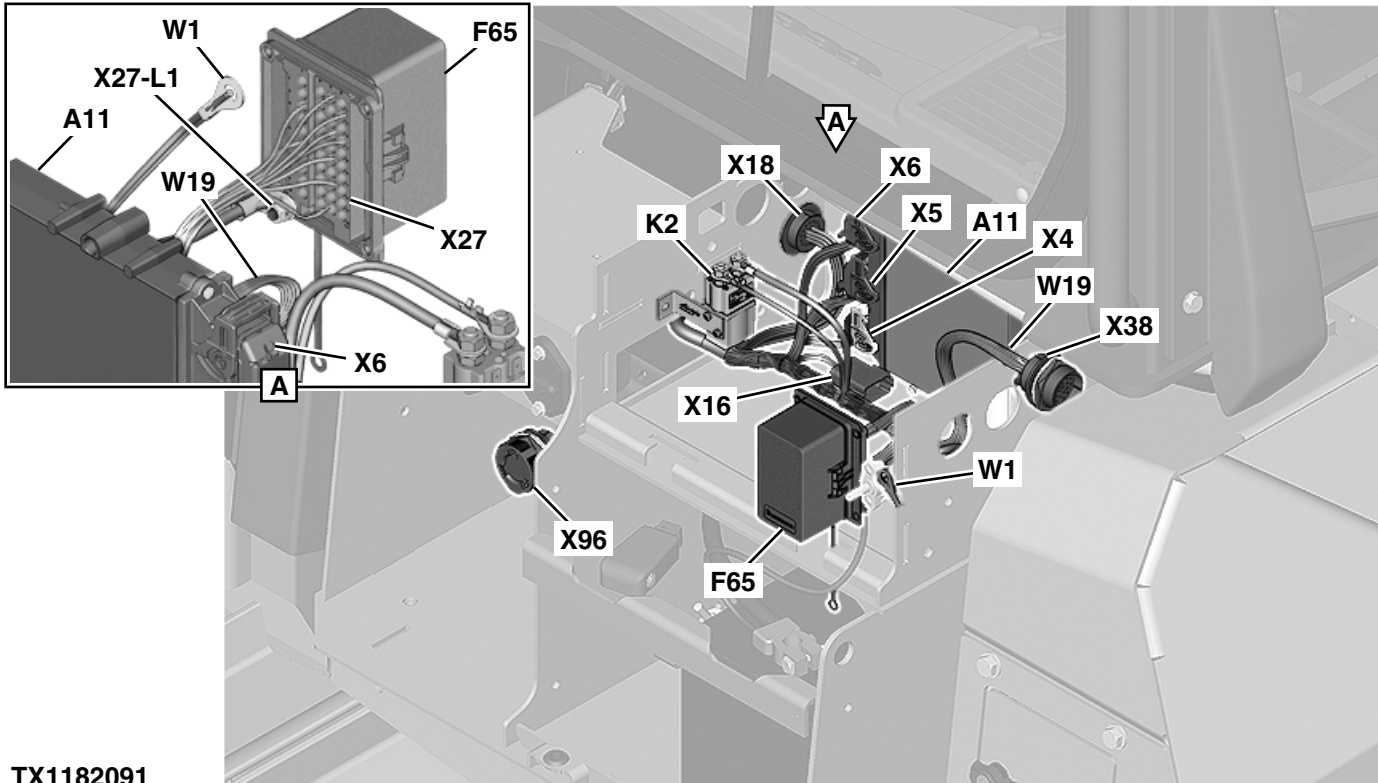
SP_P073_A—P073 RED Splice
 SP_P074_A—P074 RED Splice
 SP_R071_B—R071 BLK Splice 2
 SP_T016_A—T016 BLU Splice
 SP_T017_A—T017 BLU Splice
 SP_T027_A—T027 BLU Splice
 SP_T028_A—T028 BLU Splice
 SP_T029_A—T029 BLU Splice

SP_T030_A—T030 BLU Splice
 W1—System Ground
 X7—Vehicle Control Unit 2 (VC2)
 Connector
 X9—Vehicle Control Unit (VCU)
 Connector 1
 X10—Vehicle Control Unit (VCU)
 Connector 2
 X11—Vehicle Control Unit (VCU)
 Connector 3

X57—Load Center Harness-to-
 Operator's Station Harness
 35-Pin Connector
 X62—Load Center Harness-to-
 Operator's Station Harness
 23-Pin Connector

JL05046,00000A6 -19-30APR15-6/6

Load Center (IGC Controls) Harness (W19) Component Location



TX1182091

Load Center (IGC controls) Harness (W19) Component Location

A11—Hydraulic Valve Controller
 (HVC)
 F65—Fuse Box 3 (if equipped)
 K2—Switched Power Relay
 W1—System Ground
 W19—Load Center (IGC controls)
 Harness
 X4—Hydraulic Valve Controller
 (HVC) Connector 1

X5—Hydraulic Valve Controller
 (HVC) Connector 2
 X6—Hydraulic Valve Controller
 (HVC) Connector 3
 X16—Load Center Harness-to-
 Load Center (IGC controls)
 Harness 16-Pin Connector

X18—Load Center Harness-
 to-Vehicle Harness
 Connector 2
 X27—Fuse Box 3 Connector
 X27-L1—Fuse Box 3 Switched
 Power Connector
 X38—Load Center (IGC controls)
 Harness-to-Operator's
 Station Harness 31-Pin
 Connector

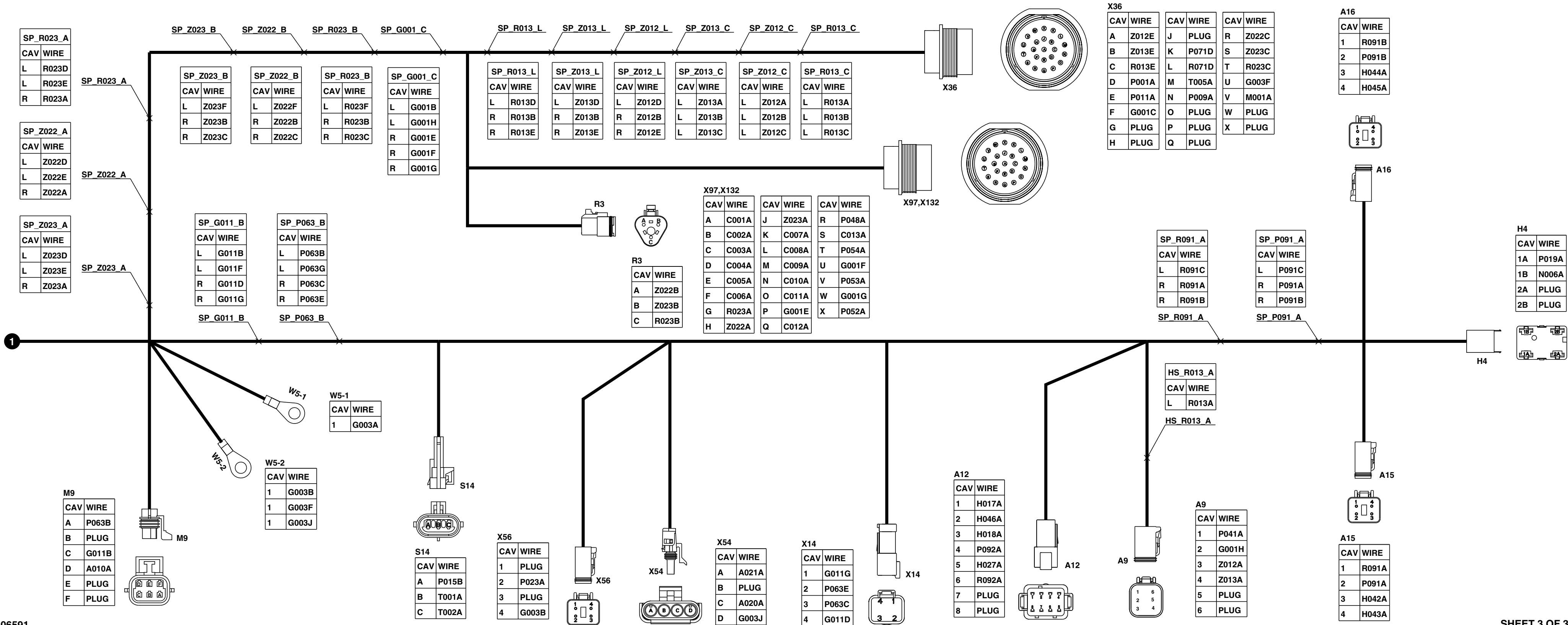
X96—Integrated Grade Control
 (IGC) Interface Connector

JL05046,00000A7 -19-05FEB15-1/1

A10— Transmission Control Lever (TCL)	SP_G003_A—G003 BLK Splice 1	SP_Z013_K—Z013 GRN Splice 11	X59— Operator's Station Harness-to-Left Console Harness 6-Pin Connector
B2—Forward, Neutral, and Reverse (FNR) Sensor	SP_G011_A—G011 BLK Splice 1	W5—Cab Ground	
B3—Steer Sensor	SP_G011_B—G011 BLK Splice 2	X14— Power Outlet Harness Connector	X60— Operator's Station Harness-to-Left Console Harness 12-Pin Connector
E9—Seat Heater	SP_P015_A—P015 RED Splice	X36— Operator's Station Harness-to-Front Dash Harness Connector	X61— Operator's Station Harness-to-Roof Harness 31-Pin Connector
H4—Winch Pressure Light	SP_P017_A—P017 RED Splice	X41— JDLink™ Connector	X62— Load Center Harness-to- Operator's Station Harness 23-Pin Connector
M3—Rear Wiper Motor	SP_P025_A—P025 RED Splice	X54— Under Seat Heater Harness Connector	
M9—Heater Valve Motor	SP_P063_A—P063 RED Splice 1	X56— Spare Power Connector	
M13— Air Seat Motor	SP_P063_B—P063 RED Splice 2	X57— Load Center Harness-to- Operator's Station Harness 35-Pin Connector	
S2—Left Park Lock Lever Switch	SP_P071_A—P071 RED Splice		
S12— Neutral Start Switch	SP_R013_K—R013 BLK Splice 11		
S14— Right Park Lock Lever Switch	SP_R071_A—R071 BLK Splice 1		
SP_A037_A—A037 GRY Splice	SP_Z012_K—Z012 YEL Splice 11		
SP_G001_B—G001 BLK Splice 2			

JDLink is a trademark of Deere & Company

JL05046,00000E0 -19-11FEB15-3/3



System Diagrams

A2—Radio	E7— Left Front Cab Work Light	W38—Satellite Radio Harness (if	X61— Operator's Station
A4—Sealed Switch Module (SSM)	E8— Right Front Cab Work Light	equipped)	Harness-to-Roof Harness
A29— SiriusXM® Satellite Radio	M2—Front Wiper Motor	W39—Radio USB Input Harness	31-Pin Connector
Module (if equipped)	M6—Left Door Wiper Motor	(if equipped)	X74— Auxiliary Radio USB Input
B20— Right Speaker	M7—Right Door Wiper Motor	X22— Radio Antenna Power	(if equipped)
B21— Left Speaker	S15— Dome Light Switch	Connector	X152— Radio Connector
B51— Radio Microphone (if	V1— Right Door Wiper Diode	X35— Heater and Air Conditioner	X153— Radio Auxiliary
equipped)	V3— Left Door Wiper Diode	Harness Connector	Connector 1
E1— Dome Light	V5— Front Wiper Diode	X39— Dome Light Connector	X154— Radio Auxiliary
E5— Right Rear Drive Light	W3—Roof Ground	X52— Radio Auxiliary Port	Connector 2
E6— Left Rear Drive Light	W24—Cab Roof Harness	X53— Auxiliary Lighting (beacon)	X155— Auxiliary Radio Input
	W30—Dome Light Harness	Connector	Harness Connector
		X55— 12 V Power Outlet	

SiriusXM is a trademark of Sirius XM Radio Inc.

JL05046,00000E7 -19-02FEB15-2/2

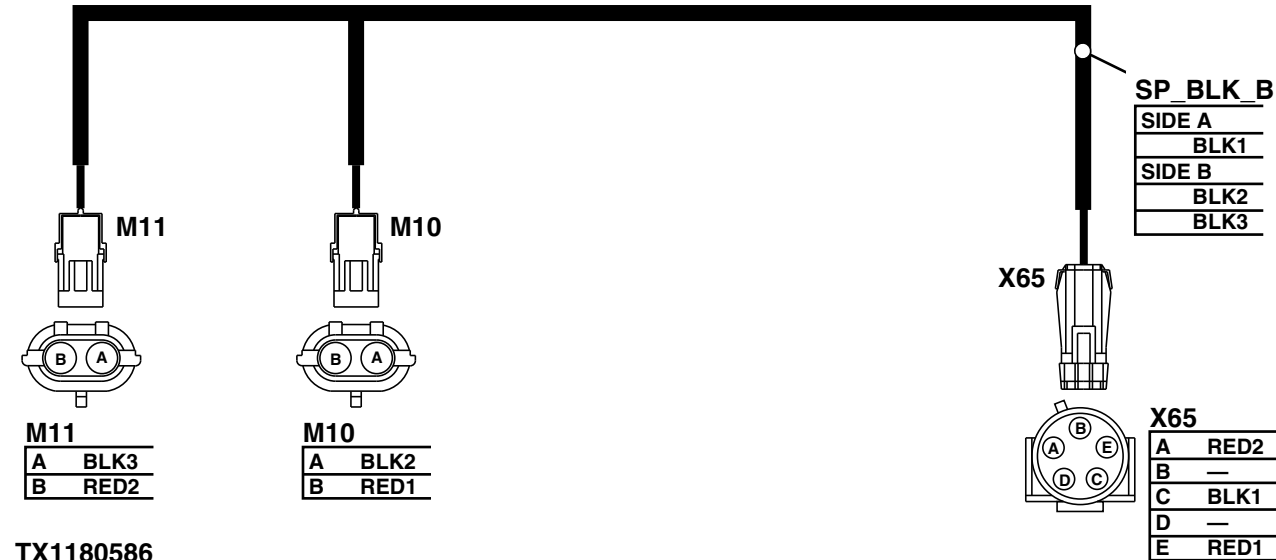
Condenser Harness (W28) Component Location

See Heater and Air Conditioner Harness (W27) Component Location. (Group 9015-10.)

JL05046,00000B9 -19-12JAN15-1/1

Condenser Harness (W28) Wiring Diagram

END #1	NUMBER	COLOR	END #2
X65	BLK1	BLK	SP BLK B
M10	BLK2	BLK	SP BLK B
M11	BLK3	BLK	SP BLK B
M10	RED1	RED	X65
M11	RED2	RED	X65



TX1180586

Condenser Harness (W28) Wiring Diagram

M10— Condenser Fan Motor 1
M11— Condenser Fan Motor 2
SP_BLK_B—BLK Splice 2
X65— Condenser Harness Connector

TX1180586 —UN—12DEC14

JL05046,00000BA -19-12DEC14-1/1

Engine Harness (W32) Wiring Diagram

TX1230099 —UN—05DEC16

CIRCUIT DATA TABLE			
END#1	WIRE	COLOR	END#2
X5501	5003	ORG	X5048
X5502	5010	BLK	X5001
X5502	5014	YEL	X5048
Y5402	5016	LT BLU	X5501
Y5402	5018	GRY	X5001
X5502	5023	ORG	X5048
X5501	5030A	BLK	SP_5030_A
SP_5030_B	5030B	BLK	SP_5030_A
SP_5030_B	5030C	DRAIN	SP_5030_C SHLD
SP_5030_C	5030D	BLK	SP_5030_A
SP_5030_C	5030E	DRAIN	SP_5030_E SHLD
SP_5030_D	5030F	BLK	SP_5030_A
SP_5030_D	5030G	DRAIN	SP_5030_G SHLD
SP_5030_E	5030H	BLK	SP_5030_A
SP_5030_E	5030J	DRAIN	SP_5030_F
SP_5030_F	5030K	BLK	X5039
B5103	5051	BRN	X5502
B5105	5053	ORG	X5502
X5502	5125	DK GRN	X5048
X5502	5126	LT BLU	X5048
X5502	5127	PUR	X5048
X5502	5136	LT BLU	X5048
X5502	5141	BRN	X5048
X5502	5146	LT BLU	X5048
X5502	5218	GRY	X5048
X5502	5246	LT BLU	G5
X5502	5301	BRN	X5048
X5502	5303	ORG	X5048
X5502	5304	YEL	X5048
X5502	5305	DK GRN	X5048
X5502	5306	LT BLU	X5048
X5502	5307	PUR	X5048
X5502	5308	GRY	X5048
X5502	5309	WHT	X5048
X5502	5311	BRN	X5048
X5502	5313	ORG	X5048
X5502	5314	YEL	X5048

CIRCUIT DATA TABLE			
END#1	WIRE	COLOR	END#2
X5502	5315	DK GRN	X5048
X5502	5317	PUR	X5048
X5502	5318	GRY	X5048
X5502	5321	BRN	X5048
X5502	5324	YEL	X5048
X5502	5329	WHT	X5048
X5039	5331	BRN	X5502
X5039	5333	ORG	X5502
X5501	5410A	BLK	SP_5410_A
SP_5410_B	5410B	BLK	SP_5410_A
SP_5410_B	5410C	DRAIN	SP_5410_C SHLD
SP_5410_C	5410D	BLK	SP_5410_A
SP_5410_C	5410E	DRAIN	SP_5410_E SHLD
X5501	5415	DK GRN	B5113
X5501	5419	WHT	Y5002
Y5400	5421	BRN	X5501
Y5400	5423	ORG	X5501
X5501	5424	YEL	Y5002
Y5400	5425	DK GRN	X5501
B5209	5427	PUR	X5501
X5004	5429	WHT	X5501
X5501	5443	ORG	B5302
X5501	5445	DK GRN	B5302
X5501	5447	PUR	B5301
X5501	5448	GRY	B5301
X5501	5453	ORG	X5048
B5205	5455	DK GRN	X5502
B5206	5456	LT BLU	X5502
X5501	5461	BRN	B5208
B5207	5463	ORG	X5502
B5102	5465	DK GRN	X5501
B5101	5467	PUR	X5501
B5104	5468	GRY	X5502
B5107	5469	WHT	X5501
X5021	5491	BRN	X5501
X5021	5493	ORG	X5501
X5021	5495	DK GRN	X5501

CIRCUIT DATA TABLE			
END#1	WIRE	COLOR	END#2
X5021	5496	LT BLU	X5501
X5021	5498	GRY	X5501
X5021	5499	WHT	X5501
Y5402	5509	WHT	X5501
X5039	5602	RED	X5502
X5039	5604	YEL	X5502
X5039	5605	DK GRN	X5502
X5501	5611	BRN	B5113
X5501	5613	ORG	B5113
X5501	5614A	YEL	SP_5614
SP_5614	5614B	YEL	Y5400
SP_5614	5614C	YEL	B5102
B5105	5621	BRN	X5502
X5502	5623A	ORG	SP_5623
SP_5623	5623B	ORG	B5105
SP_5623	5623C	ORG	B5205
SP_5623	5623D	ORG	B5206
X5502	5624A	YEL	SP_5624
SP_5624	5624B	YEL	B5103
SP_5624	5624C	YEL	B5104
X5502	5625A	DK GRN	SP_5625
SP_5625	5625B	DK GRN	B5103
SP_5625	5625C	DK GRN	B5104
SP_5625	5625D	DK GRN	B5207
SP_5625	5625E	DK GRN	X5039
X5501	5626A	LT BLU	SP_5626
SP_5626	5626B	LT BLU	Y5400
SP_5626	5626C	LT BLU	B5102
X5502	5628	GRY	B5500
X5501	5631A	BRN	SP_5631
SP_5631	5631B	BRN	Y5402
SP_5631	5631C	BRN	B5101
X5501	5633A	ORG	SP_5633
SP_5633	5633B	ORG	Y5402
SP_5633	5633C	ORG	B5101
X5039	5634	YEL	X5502
X5039	5636	LT BLU	X5502

CIRCUIT DATA TABLE			
END#1	WIRE	COLOR	END#2
X5004	5646	LT BLU	X5501
X5502	5647	PUR	X5048
B5107	5658	GRY	X5501
X5004	5671	BRN	X5501
X5501	5756	LT BLU	Y5024
X5501	5767	PUR	Y5024
X5502	5783A	ORG	SP_5783
SP_5783	5783B	ORG	B5500
SP_5783	5783C	ORG	X5039
X5039	5785	DK GRN	X5502
X5039	5786	LT BLU	X5502
X5501	5804A	YEL	SP_5804
SP_5804	5804B	YEL	B5500
SP_RESAA02	5804C	YEL	SP_5804
X5501	5805A	DK GRN	SP_5805
SP_5805	5805B	DK GRN	B5500
SP_RESAA01	5805C	DK GRN	SP_5805
X5501	5817	PUR	X5048
B5107	5821	BRN	X5501
X5501	5826A	LT BLU	SP_5826
SP_5826	5826B	LT BLU	B5208
SP_5826	5826C	LT BLU	X5048
SP_5826	5826D	LT BLU	B5209

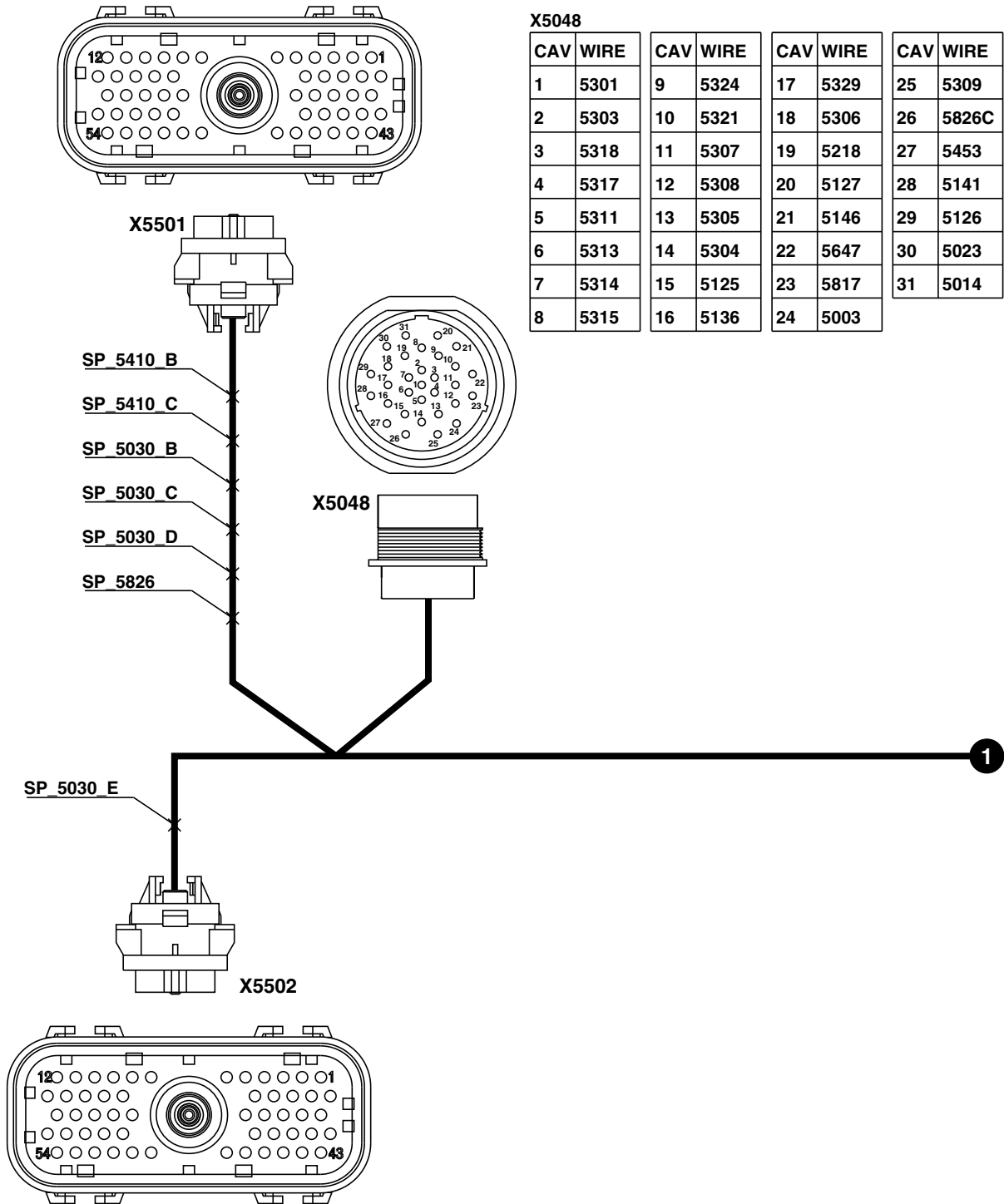
X5501		CAV		CAV		CAV	
CAV	WIRE	CAV	WIRE	CAV	WIRE	CAV	WIRE
1	PLUG	19	PLUG	37	5611		
2	5499	20	PLUG	38	5447		
3	5496	21	5646	39	5469		
4	5491	22	5003	40	5419		
5	PLUG	23	5410A	41	5633A		
6	5756	24	5821	42	5424		
7	5423	25	5614A	43	5495		
8	5421	26	5467	44	5493		
9	5613	27	5626A	45	5804A		
10	5018	28	5445	46	5805A		
11	5465	29	5443	47	PLUG		
12	5016	30	5448	48	5427		
13	PLUG	31	PLUG	49	5826A		
14	5817	32	5671	50	5658		
15	5453	33	5498	51	5415		
16	5461	34	5767	52	5425		
17	5631A	35	5030A	53	PLUG		
18	PLUG	36	5509	54	5429		

X5502		CAV		CAV		CAV	
CAV	WIRE	CAV	WIRE	CAV	WIRE	CAV	WIRE
1	5333	19	5218	37	5468		
2	PLUG	20	5321	38	5786		
3	PLUG	21	5304	39	5313		
4	PLUG	22	5010	40	5308		
5	5051	23	5126	41	5318		
6	5634	24	5625A	42	5315		
7	5141	25	5306	43	5146		
8	PLUG	26	5014	44	5605		
9	5456	27	5463	45	5621		
10	5311	28	5783A	46	5309		
11	5314	29	5455	47	5785		
12	5317	30	5127	48	5136		
13	5331	31	5305	49	5329		
14	5628	32	5023	50	5602		
15	5623A	33	5647	51	5324		
16	5636	34	5246	52	5303		
17	5125	35	5604	53	5307		
18	5053	36	5624A	54	5301		

SP_5410_B		SP_5410_C		SP_5030_B	
CAV	WIRE	CAV	WIRE	CAV	WIRE
R	5410B	R	5410D	R	5030C
R	5410C	R	5410E	R	5030B

SP_5030_C		SP_5030_D		SP_5826	
CAV	WIRE	CAV	WIRE	CAV	WIRE
R	5030D	R	5030F	L	5826A
R	5030E	R	5030G	R	5826B
				R	5826C
				R	5826D

SP_5030_E	
CAV	WIRE
R	5030H
R	5030J



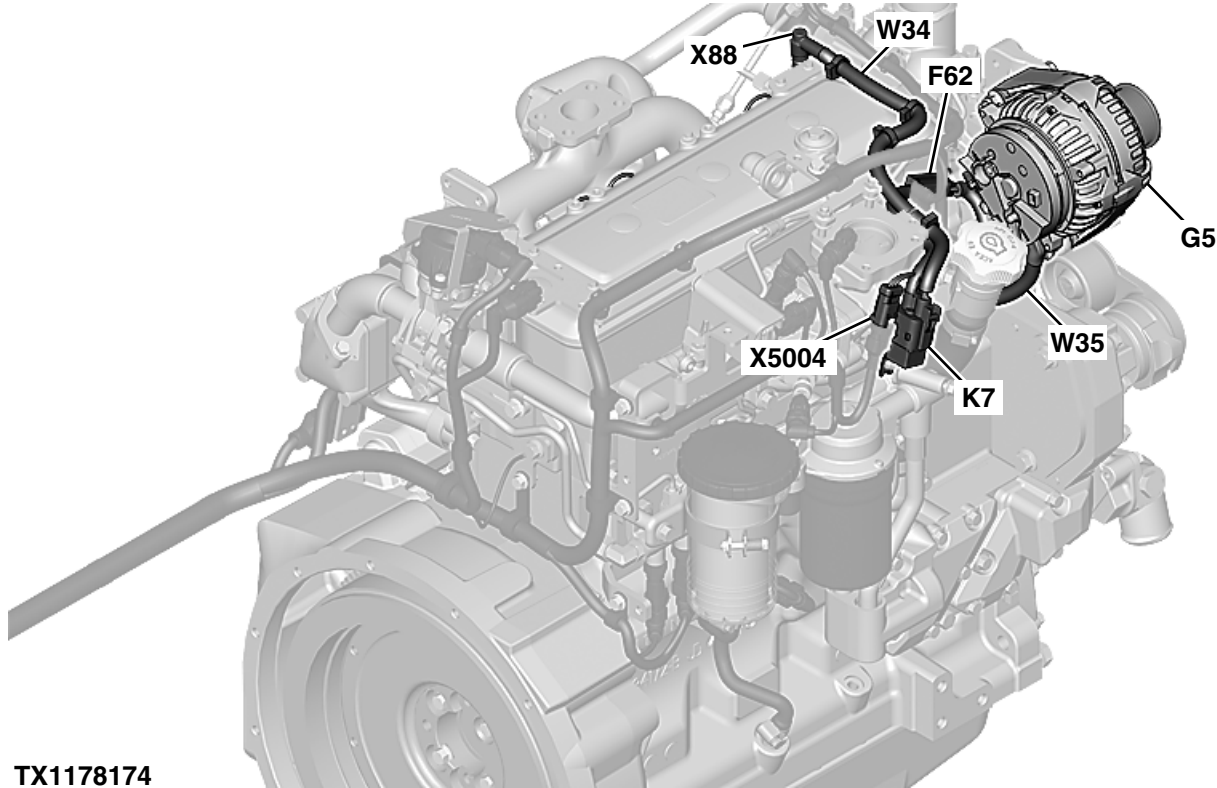
SP_BRN_A—BRN Splice
 SP_VLT_A—VLT Splice
 X5021—Fuel Injector Harness
 Connector

Y5021-1—Fuel Injector 1
 Y5021-2—Fuel Injector 2

Y5021-3—Fuel Injector 3
 Y5021-4—Fuel Injector 4

JL05046,00000C4 -19-22DEC14-2/2

Glow Plug Harnesses (W34, W35, and W36) Component Location



TX1178174

Glow Plug Harnesses (W34 and W35) Component Location

F62— Glow Plug 50 A Fuse
 G5—Alternator
 K7—Glow Plug Relay

W34—Glow Plug Relay Harness
 W35—Glow Plug Fuse Harness
 X88— Glow Plug Relay
 Harness-to-Glow Plug
 Harness Connector

X5004—Engine Harness-to-Glow
 Plug Relay Harness 3-Pin
 Connector

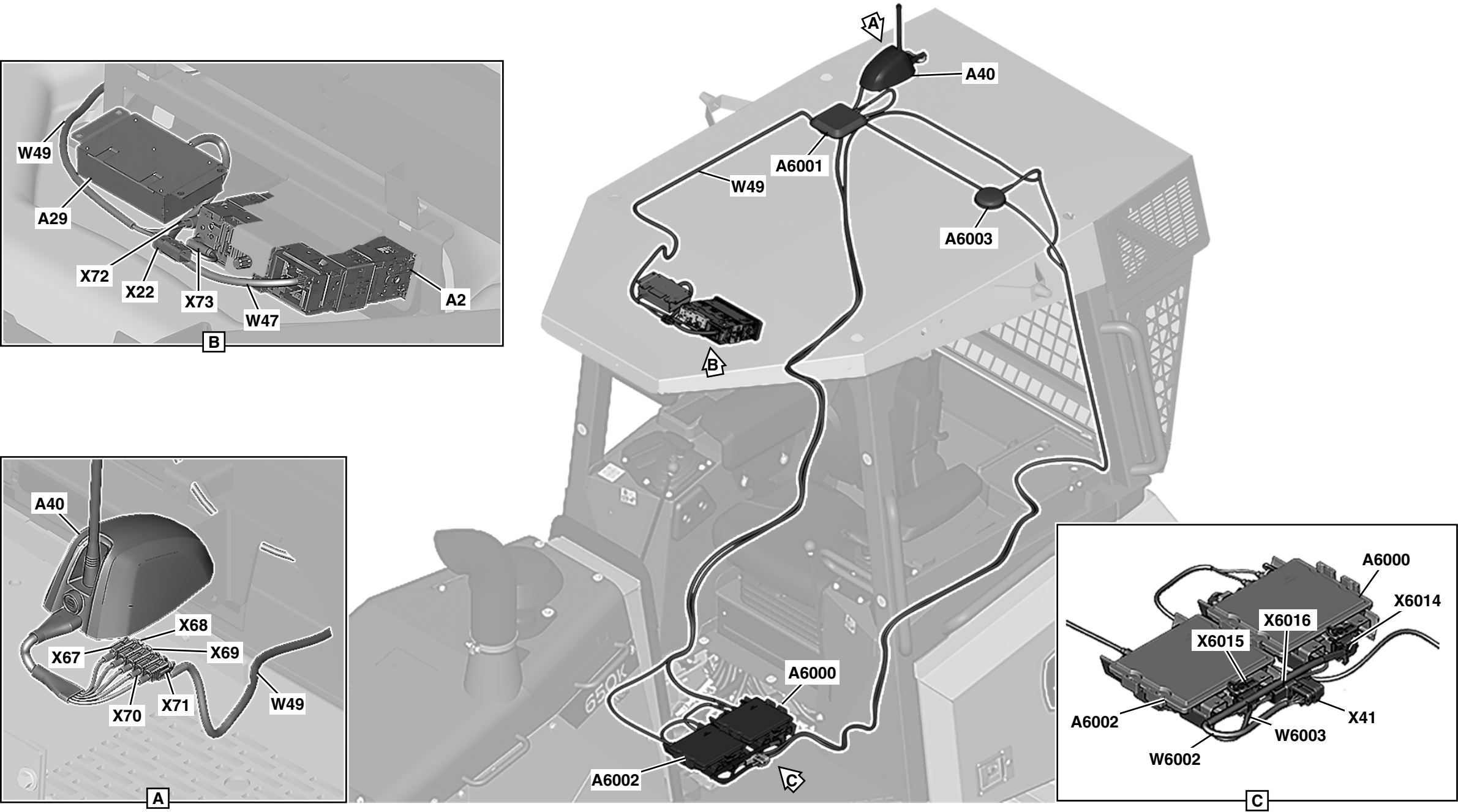
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JL05046,00000C5 -19-23JAN15-1/2

TX1178174 —UN—04DEC14

JDLink™ Harnesses (W6002 and W6003) Component Location

XJ1217336 —UN—23JUN16

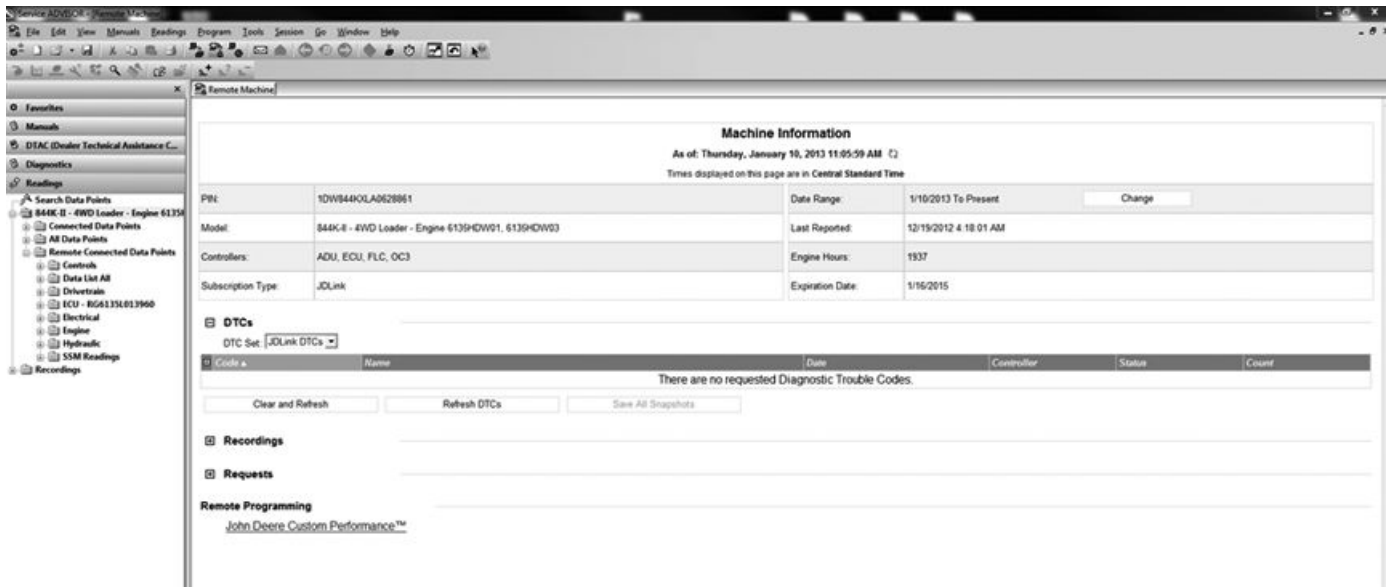


XJ1217336

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JDLink™ Harnesses (W6002 and W6003) Component Location

JL05046,00000FE -19-29JUN16-1/2



TX1145196A—UN—09OCT13

SAR Machine Information Screen

10. SAR will attempt to connect to machine. If all parameters are met, SAR will connect to machine and allow wireless machine diagnostics in Machine Information screen.

11. If connection fails, verify again that machine is able to connect and has cellular signal.

- Switched power ON.
- Engine OFF.

- Valid JLink™ registration.
- Cellular signal (machine may need to be moved to an area with better signal).

If machine is unable to receive cellular signal in an area where other cellular devices are receiving signal, a wired Service ADVISOR™ connection and diagnostics of JLink™ hardware and antenna may be needed.

JL05046,000008B -19-23SEP14-3/3

Item	Measurement	Specification
B5600—Water-in-Fuel (WIF) Sensor	Resistance	209—231 kilo-ohms
R1—Controller Area Network (CAN) 1 Termination Resistor 1	Resistance	120 ohms
R2—Controller Area Network (CAN) 1 Termination Resistor 2	Resistance	120 ohms
R3—Controller Area Network (CAN) 2 Termination Resistor 1	Resistance	120 ohms
R5—Blower Motor Speed Resistor	Low Speed Resistance (between pins 1 and 4)	5.1—5.5 ohms
	Medium Speed Resistance (between pins 1 and 3)	3.1—3.7 ohms
	High Speed Resistance (between pins 1 and 2)	1.1—1.5 ohms
R6—Fuel Filter Heater (if equipped)	Resistance	2.9 ohms
R8—Under Seat Heater Blower Motor Speed Resistor	Low Speed Resistance (between pins 2 and 4)	1.0—1.2 ohms
R10—Glow Plug Resistor	Resistance	1.5 kilo-ohms
R5603—Engine CAN Terminator	Resistance	120 ohms
R5605—Aftertreatment CAN Terminator	Resistance	120 ohms
S6—Temperature Control Switch	Resistance (between pins A and B)	0 kilo-ohms at maximum hot 5 kilo-ohms at maximum cold
	Resistance (between pins A and C)	5 kilo-ohms
S29—Blade Shake Switch	Continuity (button pressed)	Pins 3 and 6 have continuity
	Continuity (button released)	Pins 3 and 6 open
S30—Blade Angle Switch	Voltage (no buttons pressed)	2.39—2.85 V
	Voltage (upper button pressed)	3.19—3.68 V
	Voltage (lower button pressed)	0.86—1.10 V
	Voltage (both buttons pressed)	1.46—1.81 V
S31—Integrated Grade Control (IGC) On/Off Switch	Continuity (button pressed)	Pins 2 and 6 have continuity
	Continuity (button released)	Pins 2 and 6 open
S32—Blade Height Increment/Decrement Switch	Voltage (no buttons pressed) at pin 1 of switch module connector (X99) (joystick side)	2.39—2.85 V
	Voltage (upper button pressed—blade up) at pin 1 of switch module connector (X99) (joystick side)	3.19—3.68 V
	Voltage (lower button pressed—blade down) at pin 1 of switch module connector (X99) (joystick side)	0.86—1.10 V
	Voltage (both buttons pressed) at pin 1 of switch module connector (X99) (joystick side)	1.46—1.81 V
S34—Transmission Speed Control Switch	Voltage	0.88—1.08 V with top button pressed
		3.19—3.53 V with bottom button pressed

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AB51738,00006E0 -19-28JUN17-6/7

Setup and Functional Test

Diagnostic Test Box—Overview and Functionality

The JDG10273 Diagnostic Test Box is designed to aid the technician in troubleshooting electronically controlled systems. The tool must be used in accordance with diagnostic procedures:

- Service ADVISOR™
- JT07306 Digital Multimeter
- JDG10466 Flex Probe Kit
- J-35616-20 Test Leads

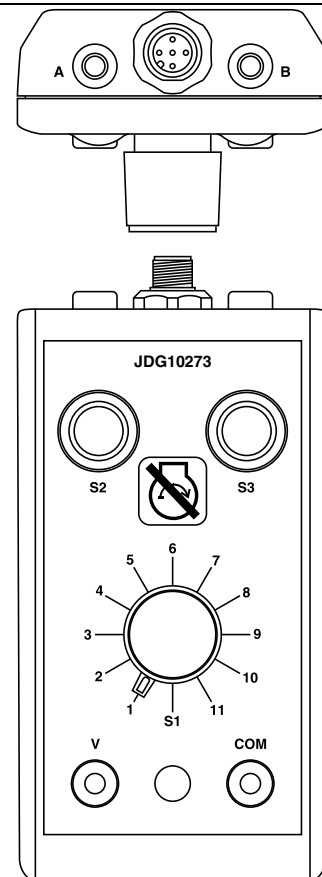
The JDG10273 Diagnostic Test Box is used to find some of the following wiring harness problems:

- Open wires
- Shorted wires
- Series resistance
- Parallel resistance

Functional components of the JDG10273 Diagnostic Test Box are:

- Power connector and power harness provide connection to the machine battery terminals.
- LED indicates that power is applied correctly to JDG10273 Diagnostic Test Box.
- Test lead inputs A and B provide connection to the harness.
- Test lead inputs V and COM provide connection to the digital multimeter.
- S1 switch is used to create a voltage divider circuit as specified within diagnostic procedure.
- S2 switch is used to provide an alternate ground path as specified within diagnostic procedure.
- S3 switch is used to provide a load on a circuit as specified within diagnostic procedure.

Service ADVISOR is a trademark of Deere & Company



JDG10273 Diagnostic Test Box

RG17892 —UN—15FEB10

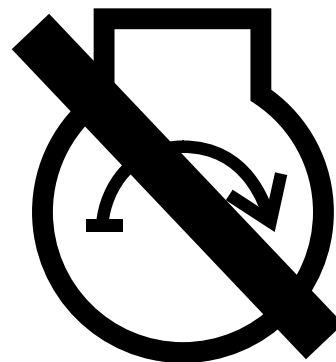
RG80575,0000BE8 -19-01JUN16-1/6

Before Connecting JDG10273 Diagnostic Test Box

IMPORTANT: Prevent possible machine damage.
Do not run engine with JDG10273 Diagnostic Test Box connected.

- **Key OFF, engine OFF** when connecting or disconnecting JDG10273 Diagnostic Test Box.
- **Follow all machine manufacturer safety warnings.**

Do not run engine with JDG10273 Diagnostic Test Box connected.



Do Not Run Engine

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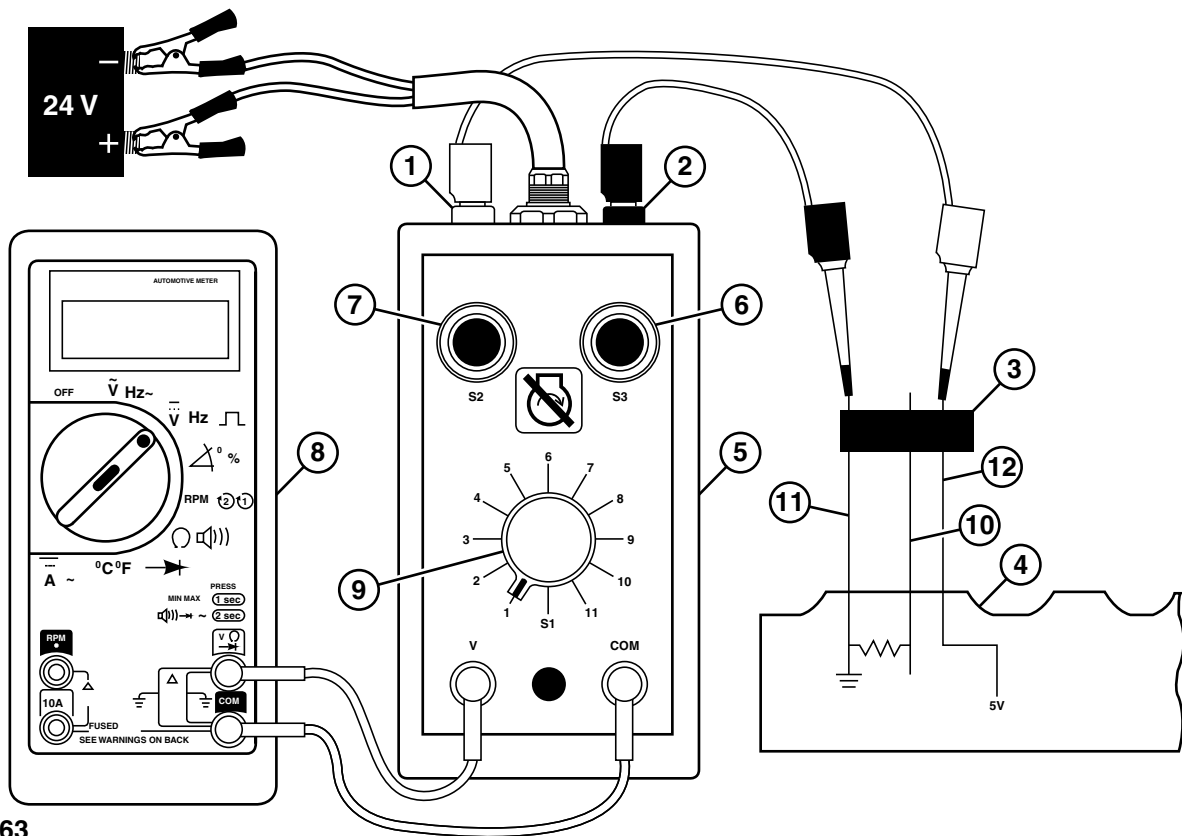
RG80575,0000BE8 -19-01JUN16-2/6

TX1144277 —UN—20SEP13

Three Wire Sensor Circuit Check—Out of Range Low

This condition can be caused by:

- Signal wire short to ground
- Supply, signal, or ground wire open
- Sensor malfunction



TX1137863

Three Wire Test Box Setup

- 1— Terminal A (yellow)
- 2— Terminal B (blue)
- 3— Sensor Harness Connector
- 4— Control Unit
- 5— JDG10273 Diagnostic Test Box
- 6— S3 Switch
- 7— S2 Switch
- 8— Digital Multimeter
- 9— S1 Switch
- 10— Signal Wire
- 11— Ground Wire
- 12— Supply Wire

1. Disconnect sensor.
2. Using wire leads and flex probe kit, connect JDG10273 Diagnostic Test Box (5) to terminals of sensor harness connector (3) as follows:
 - Test box V terminal to digital multimeter (8) V+ terminal
 - Test box COM terminal to digital multimeter COM terminal
3. View voltage on digital multimeter.
 - Test box terminal A (1) to sensor harness connector supply wire terminal
 - Test box terminal B (2) to sensor harness connector ground wire terminal

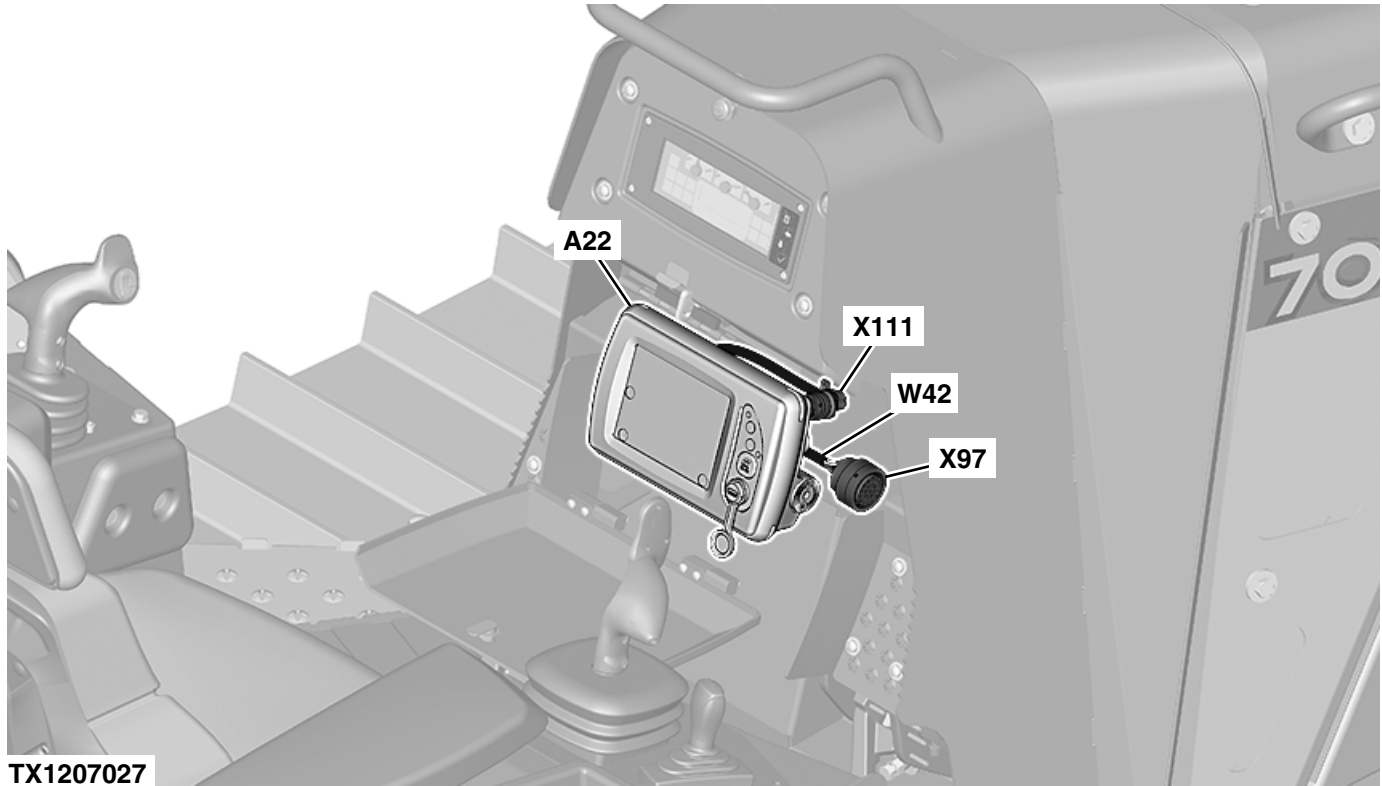
Result	Condition	Action
Voltage is approximately 5 volts.	Open or short signal wire or sensor.	Continue diagnostics. See step 4.
Voltage is 0 volts.	Supply or ground wire is open.	Press S2 switch (7). Voltage Unchanged: Replace supply wire. Voltage Increases: Replace ground wire.

4. Connect Service ADVISOR™. See Service ADVISOR™ Connection Procedure. (Group 9015-15.)
5. Move connection of test box terminal A to sensor harness connector signal wire terminal.
6. View appropriate Service ADVISOR™ reading as indicated by diagnostic procedure.
7. Set digital multimeter to measure voltage.
8. Set S1 switch (9) on test box to number as indicated by diagnostic procedure.
9. Compare voltage on digital multimeter to Service ADVISOR™ reading.

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RG80575.0000BEC -19-22AUG13-1/2

IGC Display Unit Harness (W42) Component Location



IGC Display Unit Harness (W42) Component Location

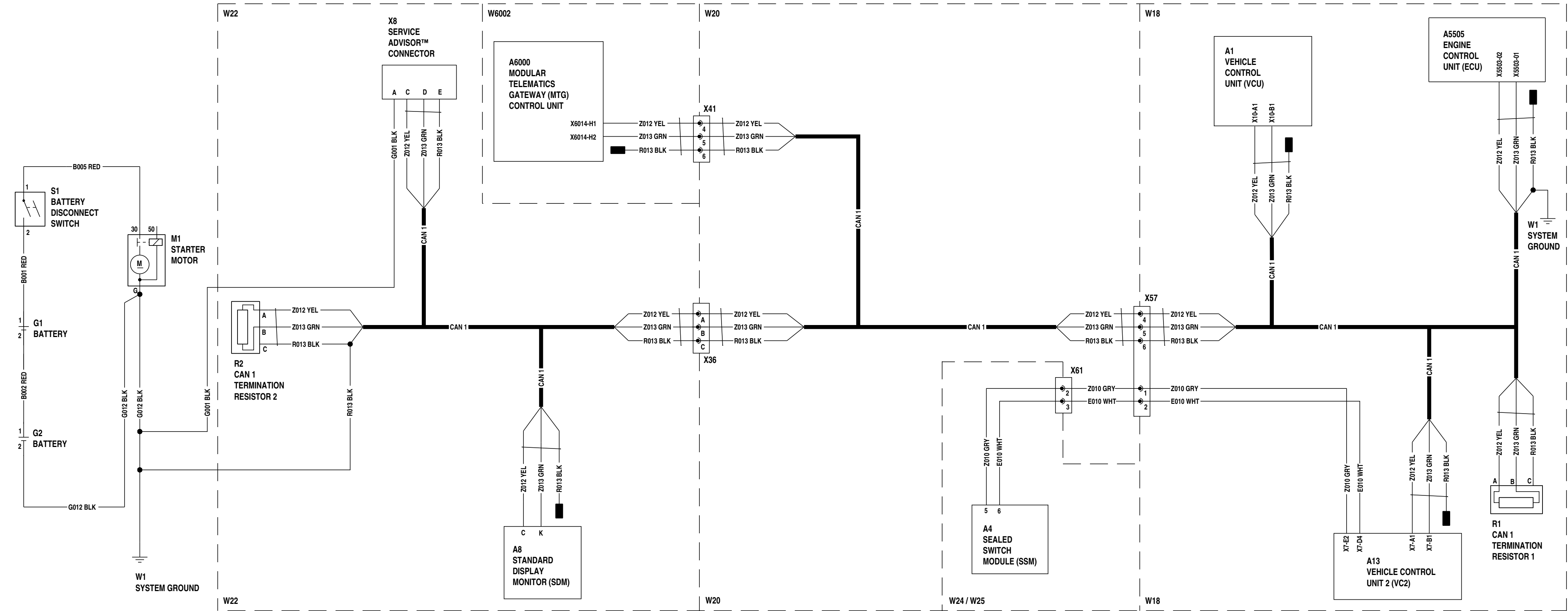
A22— Topcon® IGC Display Unit W42—IGC Display Unit Harness X111— IGC Display Unit
X97— Integrated Grade Control X97— IGC Interface Connector

Topcon is a trademark of Topcon Positioning Systems, Inc.

JL05046,000011B -19-22AUG16-1/1

Controller Area Network (CAN) Circuit Test

TX1180207 —UN—04FEB15



TX1180207

Controller Area Network (CAN) Theory of Operation Schematic—Manual Control

Continued on next page

JL05046,0000128 -19-03FEB15-1/19

4 CAN High Wire Voltage Check	IMPORTANT: Avoid connector and connector terminal damage. Inserting test leads into harness connectors without using spare mating terminal or JDG10466 Flex Probe Kit can damage harness.	
Switched power ON. Using a multimeter, measure the voltage from pin C (CAN high) to pin A (ground) or pin H (IGC CAN high) to pin A (ground) of Service ADVISOR connector. Is voltage between 2.50—3.50 volts?		YES: Go to CAN Low Wire Voltage Check. NO: Go to next step in this check.
	Is system voltage present between pin C (CAN high) and pin A (ground) or pin H (IGC CAN high) and pin A (ground) of Service ADVISOR connector?	YES: A short circuit exists on CAN high wire. Check CAN high voltage one controller at a time to locate short circuit. NO: Go to next step in this check.
	Is zero voltage present between pin C (CAN high) and pin A (ground) or pin H (IGC CAN high) and pin A (ground) of Service ADVISOR connector?	YES: <u>Go to CAN High Wire Circuit Check.</u> NO: Remove one controller at a time and check voltage. When voltage is in range, check harness of disconnected controller for short circuits. Repair or replace harness as necessary.

JL05046,0000128 -19-03FEB15-12/19

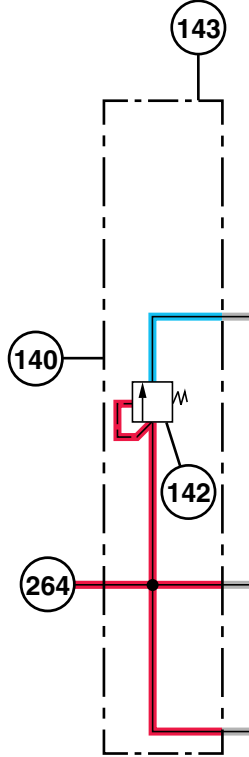
5 CAN Low Wire Voltage Check	Using a multimeter, measure voltage from pin D (CAN low) to pin A (ground) or pin J (IGC CAN low) to pin A (ground) of Service ADVISOR connector.	YES: Go to CAN High Wire Circuit Check.
Is voltage between 2—3 volts?		NO: Go to next step in this check.
	Is system voltage present between pin D (CAN low) and pin A (ground) or pin J (IGC CAN low) and pin A (ground) of Service ADVISOR connector?	YES: A short circuit exists on CAN low wire. Check CAN low voltage one controller at a time to locate short circuit. Repair or replace harness as necessary. NO: Go to next step in this check.
	Is zero voltage present between pin D (CAN low) and pin A (ground) or pin J (IGC CAN low) and pin A (ground) of Service ADVISOR connector?	YES: <u>Go to CAN Low Wire Circuit Check.</u> NO: Remove one controller at a time and check voltage. When voltage is in range, check harness of disconnected controller for short circuits. Repair or replace harness as necessary.

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JL05046,0000128 -19-03FEB15-13/19

Hydraulic Control Valve Operation

Main control valve (140) is located inside right-side access door of machine. Hydraulic control valve is controlled by mechanical linkage attached to blade control lever and is open-centered. In an open-centered control valve, hydraulic oil flows through valve spools and is open to return circuit when all valve spools are in neutral position.



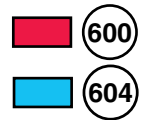
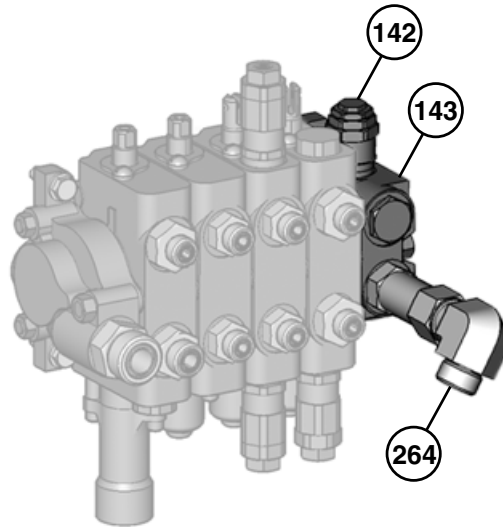
TX1178585

140— Main Control Valve
142— Hydraulic System Relief Valve

143— Inlet Section
264— Main Hydraulic Pump-to-Main Control Valve Inlet Section Line

Inlet Section

High-pressure oil (600) enters control valve through inlet section (143). Inlet section contains hydraulic system relief valve (142). Hydraulic system relief valve limits overall hydraulic system pressure and protects hydraulic system from pressure spikes.



Inlet Section

600— High-Pressure Oil
604— Return Oil

Functional Sections

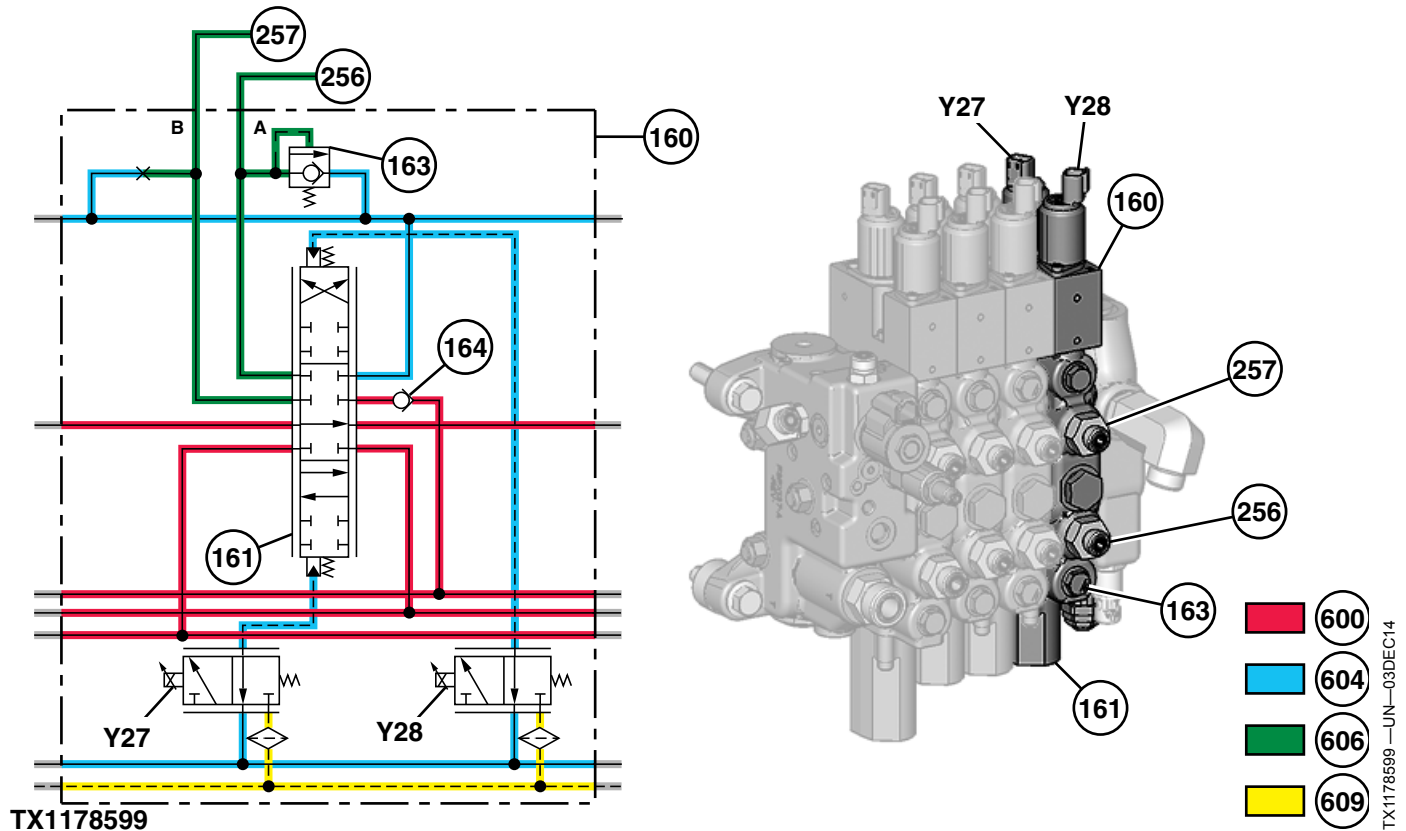
When a function is activated, mechanical linkage attached to blade control lever shifts valve spools, allowing high-pressure oil from main hydraulic pump into activated circuit. Flow to activated circuit is controlled by opening of passages valve spool. As valve spool is shifted, flow through pass-through passage of valve spool decreases while flow to activated circuit increases.

Functional sections of control valve contain high-pressure passages that provide constant supply of high-pressure oil to all valve spools, allowing multiple functions to be activated at the same time. All control valve section valve spools are three-position spools except for blade lift valve spool (146), which includes a float position.

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AB06447,0000BEA -19-03FEB15-1/6

TX1178585 —UN—03DEC14



Auxiliary Section

160— Auxiliary Section
161— Auxiliary Valve Spool
163— Circuit Relief Valve (with anticavitation)

164— Load Check Valve
256— Main Control Valve (port B)-to-Ripper Lift Cylinder Line
257— Main Control Valve (port A)-to-Ripper Lift Cylinder Line

600— High-Pressure Oil
604— Return Oil
606— Trapped Oil
609— Pilot Pressure Oil
Y27— Auxiliary Port A Solenoid

Y28— Auxiliary Port B Solenoid

Blade Angle Section, Blade Tilt Section, and Auxiliary Section

Blade angle section (155), blade tilt section (150), and auxiliary section (160) are three-position, eight-way valve spools containing load check valves. Both blade angle

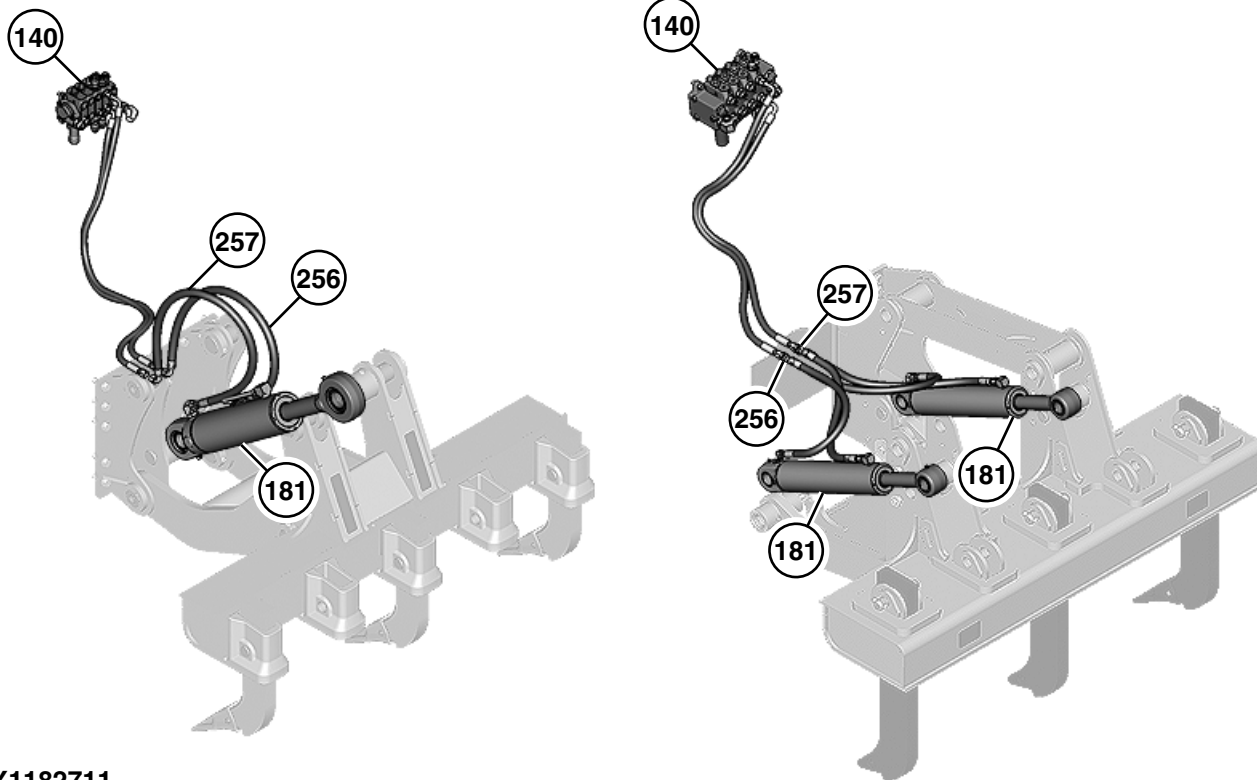
section work ports contain a blade angle circuit relief valve (157 and 158) and port A of auxiliary section contains circuit relief valve (163). Blade tilt section does not contain any circuit relief valves.

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AB06447,0000BC8 -19-19OCT15-5/6

Ripper Operation

Ripper Operation (Manual Controls)



TX1182711

Ripper Operation (550K and 650K shown left, 700K shown right)

140— Main Control Valve
256— Main Control Valve (port B)-to-Ripper Lift Cylinder Line

257— Main Control Valve (port A)-to-Ripper Lift Cylinder Line

181— Ripper Cylinder (2 used, 700K only)

Ripper consists of one control valve section. 550K and 650K ripper uses a single ripper cylinder (181). 700K ripper uses two ripper cylinders. Ripper circuit is mechanically controlled by linkage connected from auxiliary control lever to main control valve (140) to shift auxiliary valve spool. Ripper valve spools are three-position, six-way spools that are returned to neutral by centering springs in spool end caps.

For more information:

- [See Hydraulic Control Valve Operation.](#) (Group 9025-05.)
- [See Hydraulic System Schematic.](#) (Group 9025-10.)

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AB06447,0000BCD -19-05FEB15-1/2

TX1182711 —UN—20JAN15

Hydraulic System Schematic—IGC

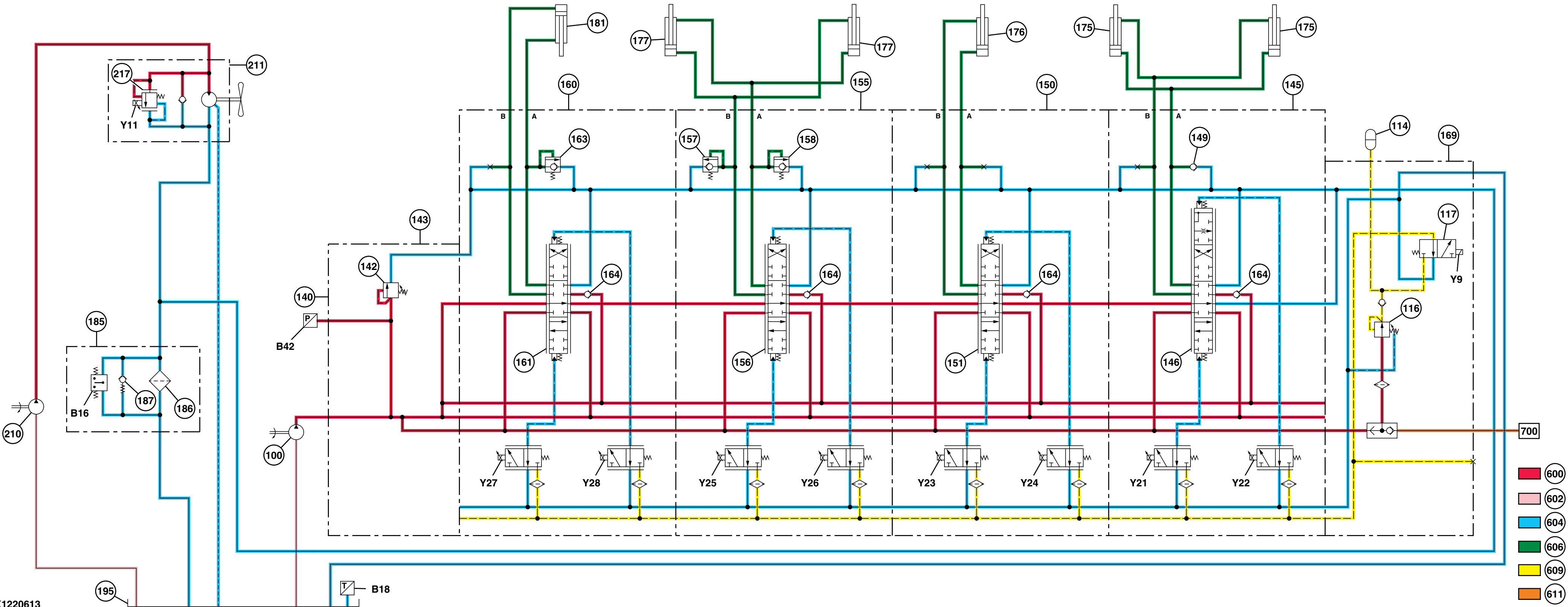
TX1220613 —UN—04AUG16

TX1220613

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Hydraulic System Schematic (IGC, standard fan shown)

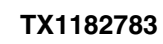
AB06447,0000BD0 -19-04AUG16-1/4



System Diagrams

100— Main Hydraulic Pump	195— Hydraulic Oil Reservoir	264— Main Hydraulic Pump-to-Main Control Valve Inlet Section Line	293— Main Control Valve-to-Right Angle Cylinder (head end) and Left Angle Cylinder (rod end)
140— Main Control Valve	256— Main Control Valve (port B)-to-Ripper Lift Cylinder Line	280— Main Control Valve-to-Hydraulic Oil Filter Manifold Line	294— Main Control Valve-to-Left Angle Cylinder (head end) and Right Angle Cylinder (rod end)
175— Blade Lift Cylinder (2 used)	257— Main Control Valve (port A)-to-Ripper Lift Cylinder Line	284— Hydraulic Oil Reservoir-to-Main Hydraulic Pump Line	
176— Blade Tilt Cylinder	262— Main Control Valve-to-Blade Tilt Cylinder Line	286— Main Control Valve (port A)-to-Blade Lift Cylinder Line	
177— Blade Angle Cylinder (2 used)	263— Main Control Valve-to-Blade Tilt Cylinder Line	287— Main Control Valve (port B)-to-Blade Lift Cylinder Line	
181— Ripper Cylinder			
185— Hydraulic Oil Filter Assembly			
188— Hydraulic Oil Filter Assembly-to-Hydraulic Oil Reservoir Line			

AB06447,0000BD1 -19-14JAN15-2/2



Hydraulic Fan System—Reversing

AB06447,0000C00 -19-22JAN15-3/4

System Diagrams

100— Main Hydraulic Pump	196— Hydraulic Oil Fill Port	284— Hydraulic Oil Reservoir-to-Main Hydraulic Pump Line	299— Hydraulic Control Valve-to-Hydraulic Accumulator Line
114— Hydraulic Accumulator	224— Main Control Valve Pilot Oil Return Line		
140— Main Control Valve			
175— Blade Lift Cylinder (2 used)	262— Main Control Valve-to-Blade Tilt Cylinder Line	286— Main Control Valve (port A)-to-Blade Lift Cylinder Line	600— High-Pressure Oil
176— Blade Tilt Cylinder			602— Low-Pressure Oil
177— Blade Angle Cylinder (2 used)	263— Main Control Valve-to-Blade Tilt Cylinder Line	287— Main Control Valve (port B)-to-Blade Lift Cylinder Line	604— Return Oil
185— Hydraulic Oil Filter Assembly			606— Trapped Oil
188— Hydraulic Oil Filter Assembly-to-Hydraulic Oil Reservoir Line	264— Main Hydraulic Pump-to-Main Control Valve Inlet Section Line	293— Main Control Valve-to-Right Angle Cylinder (head end) and Left Angle Cylinder (rod end)	609— Pilot Pressure Oil
195— Hydraulic Oil Reservoir	280— Main Control Valve-to-Hydraulic Oil Filter Manifold Line	294— Main Control Valve-to-Left Angle Cylinder (head end) and Right Angle Cylinder (rod end)	611— Charge Oil
			700— Supplemental Charge Pressure Line to Main Control Valve

AB06447,0000BD5 -19-08,JAN15-2/2

Diagnostic Information

1 Diagnostic Trouble Codes (DTCs)	Check standard display monitor (SDM) for any DTCs. See Diagnostics—Codes, SDM. (Operator's Manual.) Check diagnostic trouble codes using Service ADVISOR™. See Reading Diagnostic Trouble Codes with Service ADVISOR™ Diagnostic Application. (Group 9015-15.) Are DTCs present?	YES: Diagnose and repair displayed DTCs. NO: Go to Hydraulic Oil Cooling System Check.
<i>Service ADVISOR is a trademark of Deere & Company</i>		AB06447,0000BEB -19-18NOV16-42/51
2 Hydraulic Oil Cooling System Check	Check hydraulic oil cooling system. Is hydraulic oil the only fluid that is overheating?	YES: Go to Oil Viscosity Incorrect. NO: Inspect cooling package and hydraulic fan system.
		AB06447,0000BEB -19-18NOV16-43/51
3 Oil Viscosity Incorrect	Check hydraulic reservoir oil. See Hydraulic and Hydrostatic Oil. (Operator's Manual.) Is correct oil used?	YES: Go to Hydraulic System Relief Valve Stuck Open. NO: Replace reservoir oil with recommended oil.
		AB06447,0000BEB -19-18NOV16-44/51
4 Hydraulic System Relief Valve Stuck Open	Check hydraulic system relief valve pressure. See Hydraulic System Relief Valve Test. (Group 9025-25.) Is system relief valve pressure within specification?	YES: Go to Circuit Relief Valve Stuck Open. NO: Adjust system relief valve to specification. Replace if system relief valve will not adjust correctly.
		AB06447,0000BEB -19-18NOV16-45/51
5 Circuit Relief Valve Stuck Open	Check circuit relief pressures. See Circuit Relief Valve Test—With Remote Pump. (Group 9025-25.) Are circuit relief valves within specification?	YES: Go to Anticavitation Valve Stuck Open. NO: Adjust or replace circuit relief valve as necessary.
		AB06447,0000BEB -19-18NOV16-46/51
6 Anticavitation Valve Stuck Open	Remove and inspect anticavitation valves. See Hydraulic Control Valve Disassemble and Assemble. (Group 3260.) Is anticavitation valve worn or damaged?	YES: Repair or replace anticavitation valve. NO: Go to Hydraulic Lines Blocked or Damaged.
		AB06447,0000BEB -19-18NOV16-47/51

Continued on next page

Diagnostic Information

2 Hydraulic System Relief Valve Stuck Open

Check hydraulic system relief valve pressure. [See Hydraulic System Relief Valve Test.](#) (Group 9025-25.)

Is system relief valve pressure within specification?

YES: Go to Hydraulic Control Valve Spool Binding.

NO: Adjust system relief valve to specification. Replace if system relief valve will not adjust correctly.

AB06447,0000BEC -19-18NOV16-54/55

3 Hydraulic Control Valve Spool Binding

Remove and inspect suspected control valve spool. [See Hydraulic Control Valve Disassemble and Assemble—IGC.](#) (Group 3260.)

Is control valve spool binding?

YES: Repair or replace control valve as necessary.

NO: Checks complete.

AB06447,0000BEC -19-18NOV16-55/55

Hydraulic Fan Does Not Reach Full Speed

AB06447,0000BED -19-26FEB15-1/8

Hydraulic Fan Does Not Reach Full Speed Diagnostic Procedure

AB06447,0000BED -19-26FEB15-2/8

1 DTC Check

Check diagnostic trouble codes (DTCs). [See Diagnostics—Codes, SDM.](#) (Operator's Manual.) [See Reading Diagnostic Trouble Codes with Service ADVISOR™ Diagnostic Application.](#) (Group 9015-20.)

Are diagnostic trouble codes displayed?

YES: Correct problem causing diagnostic trouble code.

NO: Go to Hydraulic Fan Speed Check.

AB06447,0000BED -19-26FEB15-3/8

2 Hydraulic Fan Speed Check

Check hydraulic fan speed. [See Fan Motor Speed Test.](#) (Group 9025-25.)

Is hydraulic fan speed within specification?

YES: Checks complete.

NO: Go to Hydraulic Fan Proportional Relief Solenoid Check.

AB06447,0000BED -19-26FEB15-4/8

3 Hydraulic Fan Proportional Relief Solenoid Check

Check hydraulic fan proportional relief solenoid (Y11) for sticking, blockage, or damage. [See Fan Harness \(W11\) Component Location](#), [see Vehicle Harness \(W16\) Component Location](#), or [see Vehicle \(IGC Controls\) Harness \(W17\) Component Location.](#) (Group 9015-10.)

Is hydraulic fan proportional relief solenoid (Y11) sticking, blocked, or damaged?

YES: Clean or replace as necessary.

NO: Go to Hydraulic Fan Reversing Solenoid Check.

Continued on next page

AB06447,0000BED -19-26FEB15-5/8

Hydraulic Accumulator Precharge Test—IGC

SPECIFICATIONS

Hydraulic Oil Temperature	60—71°C 140—160°F
Hydraulic Accumulator Precharge Pressure	1517—1655 kPa 15.2—16.6 bar 220—240 psi

SERVICE EQUIPMENT AND TOOLS

JT02156A Digital Pressure and Temperature Analyzer
JT02162 34 000 kPa (350 bar) (5000 psi) Transducer

The purpose of this test is to determine hydraulic accumulator precharge 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. Stop engine and relieve hydraulic system pressure. See Hydraulic System Pressure Release. (Operator's Manual.)
2. Install JT02156A Digital Pressure and Temperature Analyzer with JT02162 34 000 kPa (350 bar) (5000 psi) Transducer between hydraulic accumulator (114) and hydraulic control valve-to-hydraulic accumulator line (299).
3. Ensure pilot pressure regulating valve is within specification. See Pressure Reducing Valve Pressure Test and Adjustment. (Group 9025-25.)
4. Warm hydraulic oil to specification. See Hydraulic Oil Warm-Up Procedure. (Group 9025-25.)

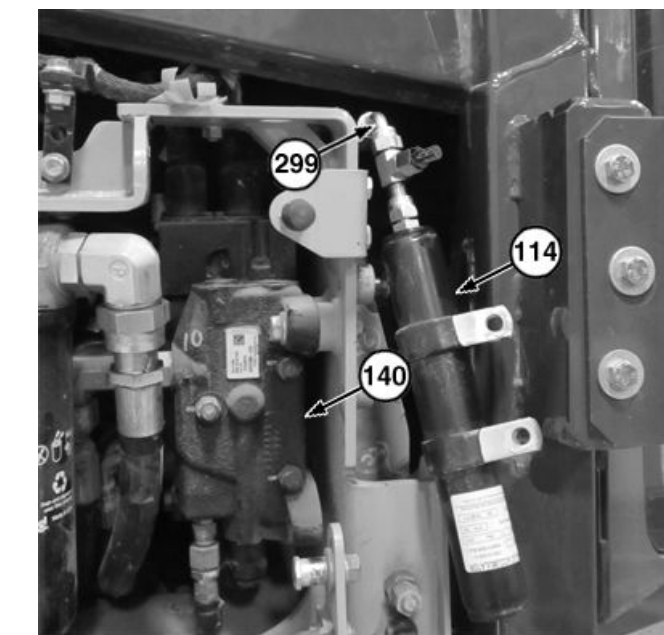
Specification

Hydraulic	
Oil—Temperature.....	60—71°C 140—160°F

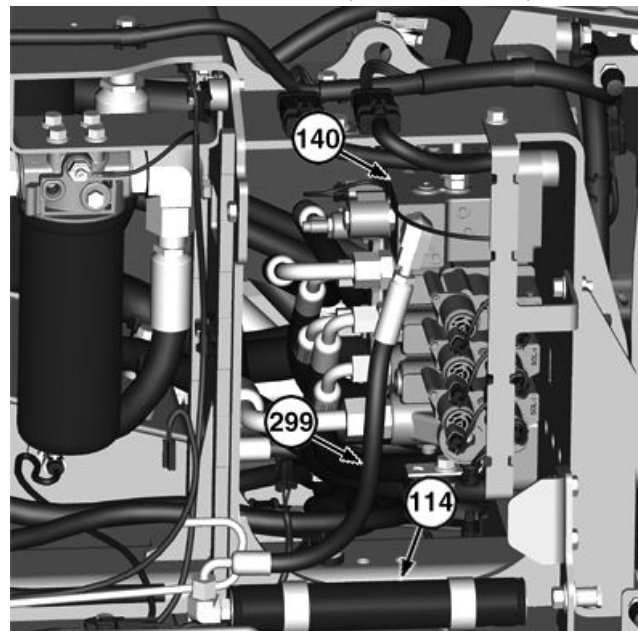
5. Stop engine with blade on ground.
6. Turn switched power on. Enable hydraulics.

NOTE: Hydraulic accumulator pressure will drop slowly when cycling blade control lever. The last pressure recorded before pressure drop of approximately 345 kPa (3.4 bar) (50 psi) is the hydraulic accumulator precharge pressure. Accumulator precharge pressure must be within specification.

7. Record pressure while slowly cycling blade control lever to blade up and down positions. Compare to specification.



Pilot Pressure Test Port (550K/650K shown)



Pilot Pressure Test Port (700K shown)

- 114— Hydraulic Accumulator 299— Hydraulic Control Valve-to-Hydraulic Accumulator Line
140— Main Control Valve

Specification

Hydraulic Accumulator	
Precharge—Pressure.....	1517—1655 kPa 15.2—16.6 bar 220—240 psi

8. If pressure is not within specification, replace hydraulic accumulator.

SK32938,000090B -19-02FEB15-1/1

TX118224A —UN—13JAN15

TX1182241A —UN—20JAN15

Tests

10. Warm hydraulic oil to specification.

Specification	
Hydraulic Oil—Temperature.....	60—71°C 140—160°F

11. Run engine at specification.

Specification	
Engine—Speed.....	2000 rpm

12. Slowly close flowmeter loading valve to obtain specified pressure.

Specification	
Hydraulic Oil—Pressure.....	13 700 kPa 137 bar 2000 psi

13. Record pump flow. Compare to specification.

Specification

550K and 650K Hydraulic Pump—Flow (typical, new).....	78 L/min 19 gpm
Flow (minimum).....	58 L/min 15 gpm

700K Hydraulic Pump—Flow (typical, new).....	89 L/min 24 gpm
Flow (minimum).....	71 L/min 19 gpm

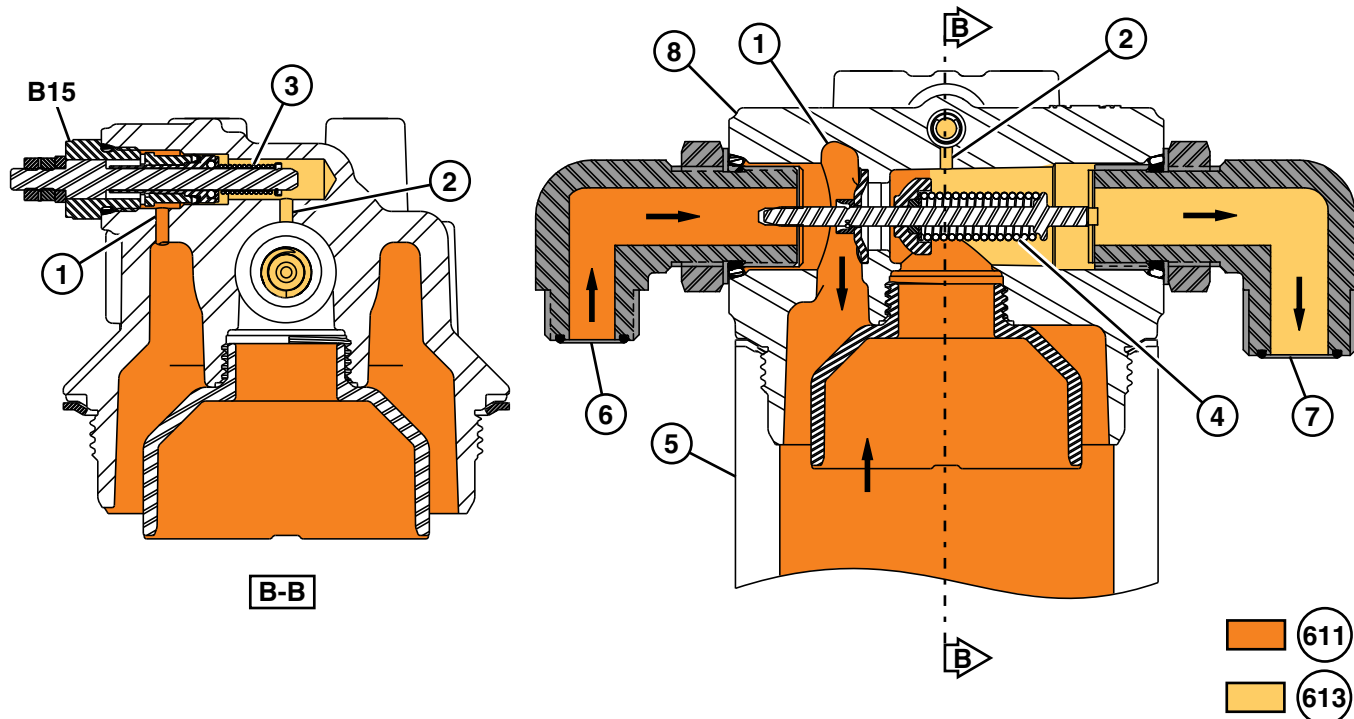
14. If flow is not within specification, repair or replace hydraulic pump as necessary.

15. When testing is complete, remove test equipment.

SK32938,0000911 -19-18NOV16-2/2

1— Operator Input Commands	13— Front Pump Displacement	A4— Sealed Switch Module (SSM)	B13— Front Pump Pressure
2— Power in 24 V DC	Control Valve (PDCV)	A8— Standard Display Monitor	Control Pilot (PCP)
3— Tracking Feedback	14— Engine	(SDM)	B14— Rear Pump Pressure
4— Current	15— Front Pump	A5505—Engine Control Unit	Control Pilot (PCP)
5— To Left Track	16— Rear Pump	(ECU)	S34— Transmission Speed
6— To Right Track	17— Left Hydrostatic Motor	B1—Decelerator Sensor	Control Switch
7— Throttle Command	18— Right Hydrostatic Motor	B2—Forward, Neutral, and	Y1— Left Motor Shift Solenoid
8— Antistall	19— Control Pressure	Reverse (FNR) Sensor	Y2— Right Motor Shift Solenoid
9— Voltage	20— Charge Pressure	B3—Steer Sensor	
10— Differential Control Pressure	21— Closed-Loop Pressure	B11— Right Motor Speed Sensor	
11— Fuel Delivery Command	A1—Vehicle Control Unit (VCU)	B12— Left Motor Speed Sensor	
12— Rear Pump Displacement			
Control Valve (PDCV)			

SK32938,00008B4 -19-07OCT16-2/2

**TX1177900**

- 1—High-Pressure Passage
- 2—Low-Pressure Passage
- 3—Switch Spring

- 4—Bypass Valve
- 5—Filter Element
- 6—Inlet
- 7—Outlet
- 8—Filter Head

- 611— Charge Oil
- 613— Reduced Charge Oil
- B15— Hydrostatic Oil Filter Restriction Switch

*Filter Operation—Restricted***Filter Operation—Restricted:**

If charge oil flow through the filter element becomes restricted, the differential between inlet and outlet pressures increases.

Charge oil pressure is sensed through the high-pressure passage (1) and the low-pressure passage (2) by the hydrostatic charge oil filter restriction switch. As charge oil flow is restricted through the filter element, the high-pressure oil on the inlet side moves the switch piston against spring force and outlet pressure. The piston contacts the terminal, closing the circuit, causing the oil filter restriction indicator to illuminate.

The transmission control unit (TCU) receives the signal from the hydrostatic charge oil filter restriction switch. The TCU communicates with the standard display monitor (SDM) via the controller area network (CAN) to display oil filter restriction warning indicator.

As the filter element becomes plugged, the pressure differential between the inlet and outlet increases. Inlet pressure is sensed on the bypass valve, which then opens against spring force and outlet pressure. The oil then bypasses the filter while the oil restriction indicator illuminates.

It is normal for the oil restriction indicator to be illuminated when operating the machine with cold oil. If the oil restriction indicator is still illuminated after the oil reaches operating temperature, the filter is being bypassed and the filter element should be replaced. Extended operation in the bypass mode could cause damage to the hydrostatic system.

At engine start, if the transmission oil is less than 20°C (68°F), an alternate transmission filter restriction logic is used. The alternate logic begins a 15-minute timer during which the oil restriction indicator will not illuminate. When the 15-minute timer ends, or the transmission oil temperature reaches 40°C (104°F), the normal filter restriction logic resumes.

If the transmission oil temperature is greater than or equal to 20°C (68°F) but less than 37°C (99°F) at engine start, the alternative logic timer will only run for 5 minutes. Once the 5-minute timer expires, or the transmission oil temperature reaches 40°C (104°F), normal filter restriction logic resumes.

SK32938,00008C8 -19-10OCT16-2/2

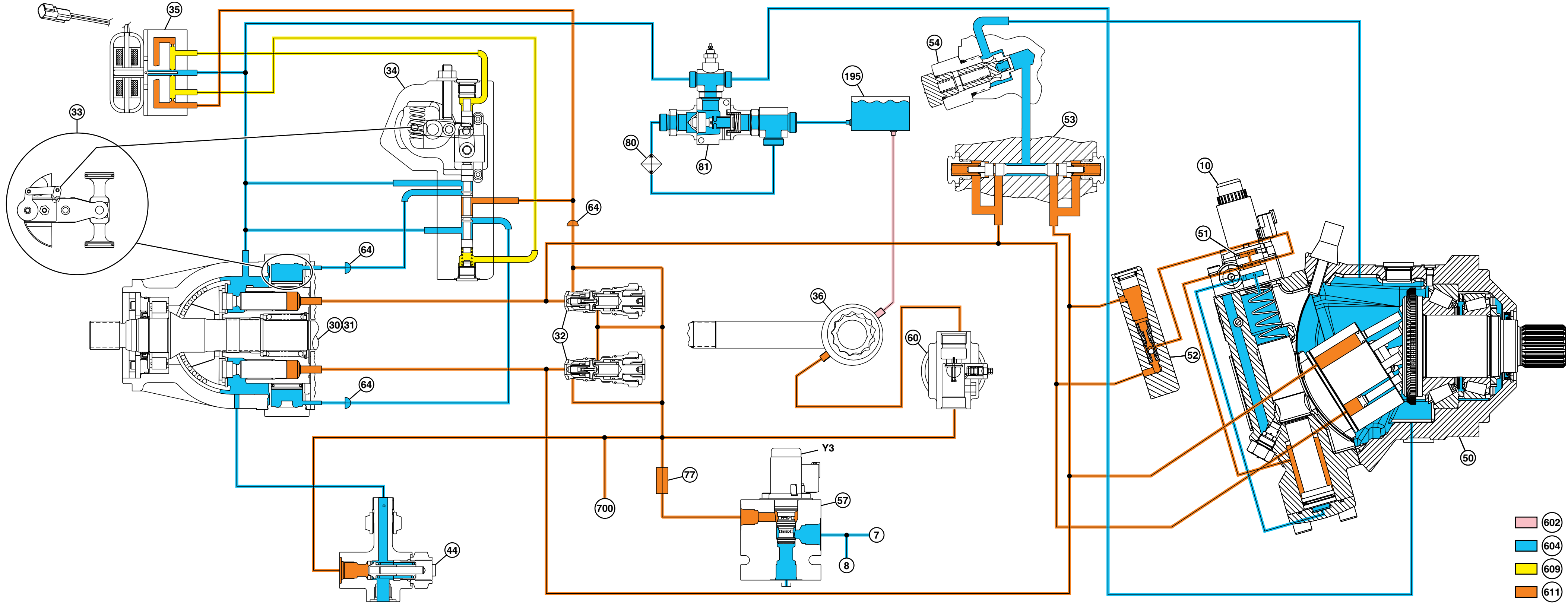
System Diagrams

30— Front Hydrostatic Pump (right track)	53— Flushing Valve (2 used)	80— Hydrostatic Oil Cooler	B9—Brake Pressure Sensor
31— Rear Hydrostatic Pump (left track)	54— Operating Charge Pressure Relief Valve (2 used)	81— Hydrostatic Thermal Bypass Valve	B13— Front Pump Pressure Control Pilot (PCP)
32— Multi-Function Valve (4 used)	55— Motor Servo Piston (2 used)	82— Hydrostatic Oil Cooler Bypass Valve	B14— Rear Pump Pressure Control Pilot (PCP)
33— Motor Servo Piston (2 used)	57— Park Brake Valve Manifold	83— Thermal Bypass Thermostat	B15— Hydrostatic Charge Oil Filter Restriction Switch
34— Pump Displacement Control Valve (PDCV) (2 used)	58— Park Brake Solenoid Valve	195— Hydrostatic Oil Reservoir	B17— Hydrostatic Oil Temperature Sensor
35— Pressure Control Pilot (PCP) Valve (2 used)	60— Hydrostatic Charge Oil Filter Assembly	602— Low-Pressure Oil	Y1— Left Motor Shift Solenoid
36— Charge Pump (2 used)	61— Hydrostatic Charge Oil Filter	604— Return Oil	Y2— Right Motor Shift Solenoid
44— Neutral Charge Relief Valve	62— Hydrostatic Charge Oil Filter Bypass Valve	611— Charge Oil	Y3— Park Brake Solenoid
50— Hydrostatic Motor (2 used)	64— Screen (6 used)	700— Supplemental Charge Pressure Line to Main Control Valve (IGC only)	
51— Motor Shift Solenoid Valve (2 used)	65— Brake Piston (2 used)	B6—Left Hydrostatic Pressure Sensor	
52— Ball Shuttle Valve (2 used)	67— Final Drive (2 used)	B7—Right Hydrostatic Pressure Sensor	
	77— Park Brake Quick Coupler	B8—Hydrostatic Charge Pressure Sensor	

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Hydrostatic System Diagram—Neutral (Park Brake On)

TX1177604 —UN—08JAN15



TX1177604

Continued on next page

Hydrostatic System Diagram—Neutral (park brake on)

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System Diagrams

7— Park Brake Solenoid Valve-to-Left Park Brake Line	33— Pump Servo Piston	54— Operating Charge Pressure Relief Valve	600— High-Pressure Oil
8— Park Brake Solenoid Valve-to-Right Park Brake Line	34— Pump Displacement Control Valve (PDCV)	57— Park Brake Valve Manifold	601— Medium-Pressure Oil
10— Motor Shift Solenoid	35— Pressure Control Pilot (PCP) Valve	60— Hydrostatic Charge Oil Filter Assembly	602— Low-Pressure Oil
30— Front Hydrostatic Pump (right track)	36— Charge Pump	64— Screen	604— Return Oil
31— Rear Hydrostatic Pump (left track)	44— Neutral Charge Relief Valve	77— Park Brake Quick Coupler	611— Charge Oil
32— Multi-Function Valve	50— Hydrostatic Motor	80— Hydrostatic Oil Cooler	700— Supplemental Charge Pressure Line to Main Control Valve
	51— Motor Shift Solenoid Valve	81— Hydrostatic Thermal Bypass Valve	Y3— Park Brake Solenoid
	52— Ball Shuttle Valve	195— Hydrostatic Oil Reservoir	
	53— Flushing Valve		

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Diagnostic Information

8 Transmission Control Unit (TCU) Calibration Check

Turn diagnostic mode ON in SDM. See Diagnostics—TCU Diagnostics, SDM. (Group 9015-16.)

Does machine reach full speed with diagnostic mode ON?

YES: Calibrate TCU. See Transmission Control Unit (TCU) Calibration. (Group 9015-20.)

NO: Go to Neutral and Operating Charge Pressure Check.

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9 Neutral and Operating Charge Pressure Check

Perform neutral charge relief and operating charge relief pressure test. See Neutral Charge Relief and Operating Charge Relief Pressure Test. (Group 9026-25.)

Are charge relief pressures within specification?

YES: Go to Pressure Control Pilot (PCP) Check.

NO: Diagnose and repair charge pressure malfunction. See High/Low Charge Pressure Malfunctions. (Group 9026-15.)

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10 Pressure Control Pilot (PCP) Check

Perform Pressure Control Pilot (PCP) Test. (Group 9026-25.)

Is neutral PCP differential pressure within specifications?

YES: Go to Motor Shift Solenoid Valve Adjustment Check.

NO: Adjust pressure control pilot (PCP). See Pressure Control Pilot (PCP) Test. (Group 9026-25.)

If pressures are still out of specification range, repair or replace PCP. See Hydrostatic Pump Disassemble. (Group 0360.)

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11 Motor Shift Solenoid Valve Adjustment Check

Perform Motor Shift Solenoid Valve Adjustment. (Group 9026-25.)

Is motor shift solenoid valve adjusted properly?

YES: Go to Transmission Efficiency Check.

NO: If motor shift solenoid valve cannot be adjusted, repair or replace motor shift solenoid valve as necessary. See Hydrostatic Motor Disassemble. (Group 0360.)

Continued on next page

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10 Pump Threshold DTC Check

Check for diagnostic trouble codes by accessing the appropriate SDM menu. See Accessing Service Mode, SDM. (Group 9015-16.)

A pump threshold DTC containing failure mode identifier (FMI) 15 indicates that pump threshold high current is greater than 25 mA.

A pump threshold DTC containing FMI 17 indicates that pump threshold low current is less than 6 mA.

Pump threshold used for the DTCs depends on pump coil being calibrated. For example, left forward refers to left forward pump threshold. Right forward refers to right forward pump threshold.

Are any of the following codes active?

Pump Threshold Codes	
Codes With FMI 15	Codes With FMI 17
522450.15—Left Forward Pump Coil Calibration Fault	522450.17—Left Forward Pump Coil Calibration Fault
522447.15—Right Forward Pump Coil Calibration Fault	522447.17—Right Forward Pump Coil Calibration Fault
522449.15—Left Reverse Pump Coil Calibration Fault	522449.17—Left Reverse Pump Coil Calibration Fault
522448.15—Right Reverse Pump Coil Calibration Fault	522448.17—Right Reverse Pump Coil Calibration Fault

YES: If a pump threshold code occurs containing FMI 15, go to Motor Speed Display Check.

If a pump threshold code occurs containing FMI 17, cycle PCP manual overrides to flush contaminant, then go to Pressure Control Pilot Test Check.

NO: Check complete.

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11 Motor Speed Display Check

Is motor speed displayed on the appropriate SDM menu when tracks are moving? See Diagnostics—Machine Information, SDM. (Group 9015-16.)

YES: Go to Pressure Control Pilot Test Check.

NO: Check motor speed sensors wiring for opens and shorts. See Vehicle Harness (W16) Wiring Diagram and see Vehicle (IGC Controls) Harness (W17) Wiring Diagram. (Group 9015-10.)

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12 Pressure Control Pilot Test Check

Perform Pressure Control Pilot (PCP) Test. (Group 9026-25.)

Is PCP adjusted properly?

YES: Go to Pump Displacement Control Valve Turn Check.

NO: Adjust or replace PCP as necessary.

Continued on next page

SK32938,00008DA -19-16FEB16-14/27

Hydrostatic Pump Flushing Procedure

SPECIFICATIONS

Engine Speed	Slow Idle
Transmission Speed Setting	1.6
Engine Speed	1500 rpm

SERVICE EQUIPMENT AND TOOLS

D01182AA 20-Ton Floor Stand (4 used)
-4 M -6 M ORFS 90° Fitting (2 used)
-4 M -6 M ORFS Straight Fitting (4 used)
Fitting 9/16 ORB (4 used)
Hose 2134 mm (7 ft) (4 used)

This procedure is used whenever major repair has been done to the hydrostatic circuit.

CAUTION: Prevent possible injury from unexpected track movement. Raise machine off the ground and support with appropriate stands. Tracks must be free to rotate in either direction; check for objects on tracks before rotating tracks.

1. Raise machine off the ground and support with D01182AA 20-Ton Floor Stands. Lower blade to ground. Tracks must be free to rotate in either direction.
2. Remove floor plate in operator's station to access hydrostatic pumps. See Remove Operator's Station Floor Plate. (Operator's Manual.)
3. Install test hoses and fittings into pump displacement control valve (PDCV) test ports (1) on both pump displacement control valves. Route opposite end of hoses back to reservoir.
4. Start engine and run engine at specification.

Specification

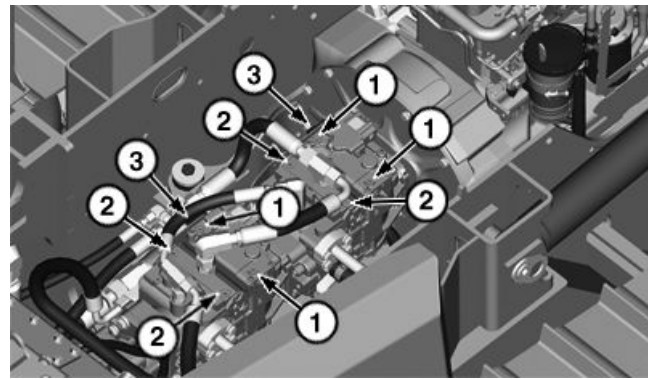
Engine—Speed.....Slow Idle

5. Set transmission speed to specification.

Specification

Transmission
Speed—Setting.....1.6

CAUTION: Prevent possible injury from unexpected track movement. Tracks will



Hydrostatic Pump Test Ports

- 1— Pump Displacement Control Valve (PDCV) Test Port (4 used)
- 2— Pump Servo Test Port (4 used)
- 3— Pump Pressure Control Pilot (PCP) Connector (2 used)

rotate when transmission control lever (TCL) is moved to forward or reverse.

IMPORTANT: To prevent damage to hydrostatic system, operate in 20 second intervals to allow for sufficient cooling.

6. Cycle transmission control lever (TCL) from forward left counter rotate through right counter rotate positions to flush the displacement control valve areas. Continue cycling TCL with engine at slow idle for several minutes.
7. Increase engine speed to specification and continue cycling TCL to actuate transmission pumps for approximately 10 minutes.

Specification

Engine—Speed.....1500 rpm

NOTE: PDCV test ports (1) *MUST* be closed to shift displacement control valve and allow flow from pump servo test ports (2).

8. Repeat procedure using pump servo test ports (2).
9. Install floor plate in operator's station. See Remove Operator's Station Floor Plate. (Operator's Manual.)

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Hydraulic Oil Cleanup Procedure

A hydraulic oil cleanup procedure must be done prior to starting machine after a component has been repaired or replaced. The use of attachments increases the need to

monitor and filter oil to a safe contamination level. See General Oil Cleanup Procedure. (CTM310—Super Caddy Oil Cleanup Procedure.)

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IMPORTANT: To prevent damage to multi-function valves, the tracks must be operated between test function to prevent localized overheating of multi-function valves. Rotating the tracks will circulate some hot oil out of closed-loop circuit to the hydrostatic oil reservoir for cooling.

9. Move transmission control lever (TCL) to forward and hold lever to stop track on opposite side. System pressure will increase rapidly to maximum value. Record maximum pressure.

10. Compare reading to specification.

Specification

550K Relief
Valve—Pressure..... 39 300—41 609 kPa
393—416 bar
5700—6035 psi

650K Relief
Valve—Pressure..... 43 299—45 643 kPa
433—456 bar
6280—6620 psi

700K Relief
Valve—Pressure..... 46 194—48 953 kPa
462—490 bar
6700—7100 psi

- If pressure is within multi-function valve specification, go to next step of test.
- If pressure is low or high, stop test and perform Multi-Function Relief Valve Test. (Group 9026-25.)

11. Return TCL to neutral.

NOTE: LF PCP and LR PCP are read with left system pressure (L. PRESS). RF PCP and RR PCP are read with right system pressure (R. PRESS).

12. Move TCL into forward and slowly release decelerator/brake pedal until left system pressure meets test specification.

Specification

System Test—Pressure
(low)..... 6895 kPa
68.9 bar
1000 psi

Record mA value for left forward PCP.

13. Continue releasing decelerator/brake pedal until left system pressure meets test specification.

Specification

System Test—Pressure
(high)..... 34 500 kPa
345 bar
5000 psi

Record mA value for left forward PCP.

14. Repeat procedure for left reverse PCP.

15. Repeat test procedure for opposite side right forward PCP and right reverse PCP.

16. Move transmission control lever (TCL) to neutral. Return engine speed to slow idle.

17. Subtract mA reading at 6895 kPa (68.9 bar) (1000 psi) from mA reading at 34 500 kPa (345 bar) (5000 psi). Refer to specifications to determine closed-loop circuit condition.

Specification

Pump—Amperage
(good)..... 0—11 mA
Pump—Amperage
(marginal)..... 11—16 mA
Pump—Amperage
(bad)..... Over 16 mA

- If mA difference is 16 mA or less, machine is OK.
- If difference is over 16 mA, indicating high internal leakage in closed-loop circuit, go to next step.

NOTE: The hydrostatic pump does not have test ports to record closed-loop pressure. By setting mA the same as first part of test, engine speed can be monitored to isolate if leakage is in pump or motor.

18. If any of the four readings are not within specification, remove the high-pressure hoses from pump. Close all openings using caps and plugs.

19. Run test as before and set to the same mA reading at 34 500 kPa (345 bar) (5000 psi) on monitor. Record engine speed.

- If engine speed decreases, internal leakage is indicated in the motor. Repair or replace hydrostatic motor. See Hydrostatic Motor Remove and Install. (Group 0300.)
- If engine speed stays the same, leakage is indicated in the pump. Repair or replace hydrostatic pump. See Hydrostatic Pump Remove and Install. (Group 0300.)

20. Change test connections and repeat test procedure for opposite track.

21. Stop engine to return brake mode to NORMAL.

Reading Pressure With Test Equipment

If necessary to confirm sensor operation, pressure readings can be obtained by removing hydrostatic pressure sensors.

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.

Remove left hydrostatic pressure sensor (3) and right hydrostatic pressure sensor (not shown) from left and right hydrostatic motors. Install quick couplers in test port M5.

Continued on next page

SK32938,00008EF -19-08JUN16-2/5

Charge Pressure Sensor Test

SPECIFICATIONS

Transmission Oil Temperature	57—66°C 135—150°F
Engine Speed	Fast Idle

SERVICE EQUIPMENT AND TOOLS

Quick Coupler (7/16-20UN M ORB)
JT02156A Digital Pressure and Temperature Analyzer
JT02161 3500 kPa (35 bar) (500 psi) Transducer

This procedure is used to confirm that the charge pressure sensor is reading properly.

1. Park machine on level surface.
2. Start engine and warm transmission oil to specification. See Transmission Oil Warm-Up Procedure. (Group 9026-25.)

Specification

Transmission	
Oil—Temperature.....	57—66°C 135—150°F

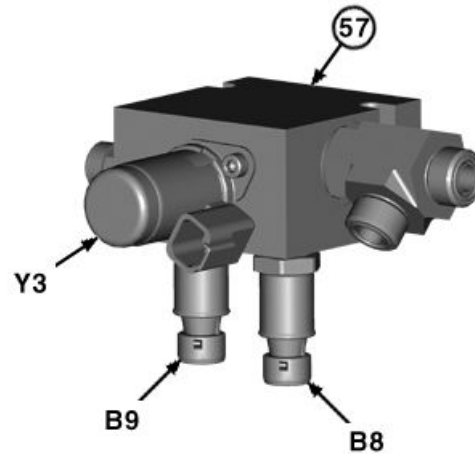
3. Set engine speed to specification.

Specification

Engine—Speed.....	Fast Idle
-------------------	-----------

4. Display and record CHARGE OIL pressure using standard display monitor (SDM). See Diagnostics—Transmission Readings, SDM. (Operator's Manual.)
5. Display brake pressure using the SDM. See Diagnostics—Transmission Readings, SDM. (Operator's Manual.)
6. Release park brake and record reading.
7. Compare transmission charge pressure to brake pressure. If there is less than 69 kPa (0.69 bar) (10 psi) difference, the sensor is reading properly. If the difference is greater than 69 kPa (0.69 bar) (10 psi), one of the sensors is not reading properly.

Reading Pressure With Test Equipment



Park Brake Valve Manifold

57— Park Brake Valve Manifold B9—Brake Pressure Sensor
B8—Hydrostatic Charge Y3—Park Brake Solenoid
Pressure Sensor

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.

If necessary to confirm sensor operation, pressure readings can be obtained by installing JT02156A Digital Pressure and Temperature Analyzer with JT02161 3500 kPa (35 bar) (500 psi) transducer in the charge pressure port. Repeat test.

For more information:

- See JT02156A Digital Pressure and Temperature Analyzer Kit Installation. (Group 9025-25.)

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Section 9031 Heating and Air Conditioning

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Diagnostic Information

9 Air Conditioner High/Low-Pressure Switch Check

Test air conditioner high/low-pressure switch (B32).

See Air Conditioner High/Low-Pressure Switch Test. (Group 9031-25.)

Does air conditioner high/low-pressure switch test good?

YES: Go to Air Conditioner Compressor Clutch Solenoid Check.

NO: Replace switch.

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10 Air Conditioner Compressor Clutch Solenoid Check

Test air conditioner compressor clutch solenoid (Y14).

See Air Conditioner Compressor Clutch Test. (Group 9031-25.)

Does air conditioner compressor clutch solenoid test good?

YES: Go to Air Conditioner Relay Check.

NO: Replace solenoid.

MM12851,00003E9 -19-11FEB15-12/14

11 Air Conditioner Relay Check

Remove air conditioner relay (K3). See Load Center Harness (W18) Component Location or see Load Center (IGC Controls) Harness (W19) Component Location. (Group 9015-10.)

Test air conditioner relay. See Relay Test. (Group 9015-20.)

Does air conditioner relay test good?

YES: Go to Wiring Harness Check.

NO: Replace air conditioner relay.

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12 Wiring Harness Check

Check heating and air conditioning system wiring for open and short circuits.

For additional information:

- See System Functional Schematic and Section Legend or see System Functional Schematic and Section Legend—Integrated Grade Control (IGC). (Group 9015-10.)
- See Engine Auxiliary Harness (W9) Component Location. (Group 9015-10.)
- See Load Center Harness (W18) Component Location or see Load Center (IGC Controls) Harness (W19) Component Location. (Group 9015-10.)
- See Operator's Station Harness (W20) Component Location or see Operator's Station (IGC Controls) Harness (W21) Component Location. (Group 9015-10.)
- See Left Console Harness (W23) Component Location. (Group 9015-10.)
- See Cab Roof Harness (W24) Component Location. (Group 9015-10.)
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- See Condenser Harness (W28) Component Location. (Group 9015-10.)
- See Under Seat Heater Harness (W29) Component Location. (Group 9015-10.)

Does heating and air conditioning system contain open or short circuits?

YES: Repair or replace heating and air conditioning system wiring.

NO: Checks complete.

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Air Conditioning System Does Not Cool Interior of Cab

Continued on next page

MM12851,00003EA -19-11DEC14-1/11

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