

**245GLC
Excavator
Operation and Test
(PIN: 1FF245GX_ _E600001—)**

**OPERATION & TEST TECHNICAL
MANUAL
245GLC Excavator (PIN: 1FF245GX_
_E600001—)
TM12660 18APR18 (ENGLISH)**

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Control Pattern Selector—If Equipped

This machine may be equipped with a control pattern selector valve. Ensure all bystanders are clear of machine

and area is large enough to operate machine functions. Verify the machine response to each control movement.

DB84312,00000A5 -19-07JUL15-1/1

Add Cab Guarding for Special Uses

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

Additional level II FOPS (falling object protective structure), forestry protection packages, and special screens or guarding should be installed when falling or flying objects could enter or damage the machine. A rear screen should always be used with a winch to protect against a snapping cable. Before operating in any special work environments, follow the operator protection recommendations of the manufacturer of any specialized attachment or equipment. Contact your authorized John Deere dealer for information on protective guarding.

TX,CABGUARD -19-12FEB13-1/1

Inspect Machine

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

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



T6607AQ —UN—15APR13

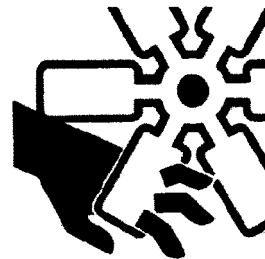
TX,INSPECT -19-08SEP10-1/1

Stay Clear of Moving Parts

Entanglements in moving parts can cause serious injury.

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

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



T133592 —UN—15APR13

TX,MOVING,PARTS -19-20JAN11-1/1

Park and Prepare for Service Safely

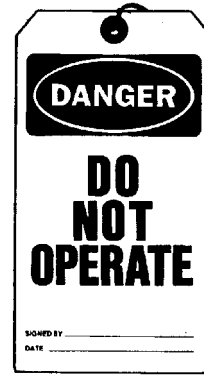
Warn others of service work. Always park and prepare machine for service or repair properly.

- Park machine on a level surface and lower equipment to the ground.
- Place pilot shutoff lever in locked (UP) position. Stop engine and remove key.
- Attach a "Do Not Operate" tag in an obvious place in the operator's station.

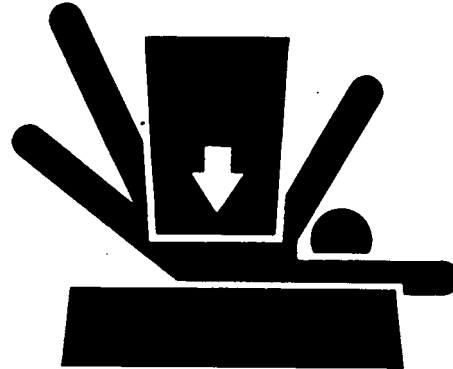
Securely support machine or attachment before working under it.

- Do not support machine with any hydraulically actuated equipment.
- Do not support machine with cinder blocks or wooden pieces that may crumble or crush.
- Do not support machine with a single jack or other devices that may slip out of place.

Understand service procedures before beginning repairs. Keep service area clean and dry. Use two people whenever the engine must be running for service work.



Do Not Operate Tag



Support Machine Properly

OUT4001,000089A -19-02JUL15-1/1

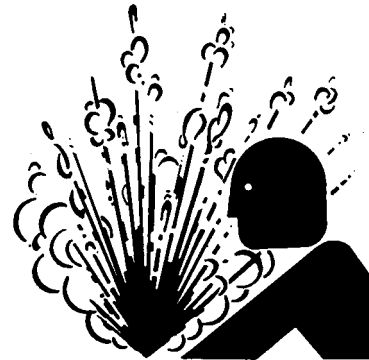
T133332 —19—17APR13

TS229 —UN—23AUG88

Service Cooling System Safely

Explosive release of fluids from pressurized cooling system can cause serious burns.

Shut off engine. Only remove filler cap when cool enough to touch with bare hands. Slowly loosen cap to first stop to relieve pressure before removing completely.



DX,RCAP -19-04JUN90-1/1

TS281 —UN—15APR13

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**011101.04 — Engine Control Dial Sensor
Circuit Low Input****Specification**

100-Pin Connector
(X3)—Torque.....10 N·m
89 lb.-in.

Engine control sensor circuit signal voltage is low. (Below 0.22 V)

IMPORTANT: Avoid connector damage. Do not install connector with impact wrench or power tools. Over torquing will result in permanent damage to connector. Torque only to specification.

NOTE: Machine controller (MCZ) has detected an electrical short in the 5 V signal circuit for multiple sensors and the engine speed dial (R15). Multiple MCZ diagnostic trouble codes (DTCs) may be present. Continue following this procedure if DTCs are only for the engine speed dial (R15).

RH60123,0000C6C -19-16APR18-1/6

Engine Control Dial Sensor Circuit Low Input Diagnostic Procedure

RH60123,0000C6C -19-16APR18-2/6

❶ Connector Check

Key switch in OFF position.

Check the following connectors for damage, corrosion, or debris:

- Cab harness-to-switch panel connector 3 (X29) and cab harness-to-main controller 26-pin connector E (X36). See Cab Harness (W1) Component Location. (Group 9015-10.)
- Cab harness-to-machine harness 100-pin connector (X3). See Machine Harness (W2) Component Location. (Group 9015-10.)
- Cab harness-to-main controller 24-Pin connector E (X34). See Cab Harness (W1) Component Location. (Group 9015-10.)

Are connectors in good condition and free of corrosion and debris?

YES: Go to Component Check.

NO: Repair or replace connector. See appropriate harness.

RH60123,0000C6C -19-16APR18-3/6

❷ Voltage Check

Key switch in OFF position.

Disconnect cab harness-to-switch panel connector 3 (X29).

Turn key switch to ON position.

Check voltage between pins 4 and 6 of cab harness-to-switch panel connector 3 (X29).

Is approximately 5 volts indicated?

YES: Go to Open Circuit Check.

NO: Repair or replace harness. See appropriate harness.

RH60123,0000C6C -19-16APR18-4/6

❸ Open Circuit Check

Key switch in OFF position.

Cab harness-to-switch panel connector 3 (X29) disconnected.

Disconnect cab harness-to-main controller 24-pin connector D (X35).

Disconnect cab harness-to-main controller 26-pin connector E (X36).

Check for continuity between pin 5 of cab harness-to-switch panel connector 3 (X29) and pin 16 of cab harness-to-main controller 24-pin connector E (X35).

Is continuity indicated?

YES: Repair or replace harness. See appropriate harness.

NO: Go to Short Circuit Check.

Continued on next page

RH60123,0000C6C -19-16APR18-5/6

3 Voltage Check

Key switch in OFF position.

Disconnect pump 3 delivery pressure sensor (B56).

Turn key switch to ON position.

Check between pin 2 of pump 3 delivery pressure sensor connector (B56) and machine ground for approximately 0.0 V.

Is correct voltage indicated?

YES: Go to Harness Check.**NO:** Repair or replace harness. See appropriate harness.

RH60123,0000C71 -19-12AUG15-5/6

4 Harness Check

Key switch in OFF position.

Disconnect pump 3 delivery pressure sensor (B56).

Disconnect main controller connectors (X31—X36).

Check for continuity between pin 27 of cab harness-to-main controller 30-pin connector D (X34) to all pins on all main controller connectors.

Is continuity indicated between any circuits?

YES: Repair or replace harness. See appropriate harness.**NO:** Checks complete.

RH60123,0000C71 -19-12AUG15-6/6

011203.04 — Pump 3 Delivery Pressure Sensor Circuit Low Input**Over torquing will result in permanent damage to connector. Torque only to specification.***Pump 3 delivery pressure sensor (B56) signal voltage is low. (Below 0.1 V)***Specification**

100-Pin Connector

(X3)—Torque..... 10 N·m
89 lb.-in.**IMPORTANT: Avoid connector damage. Do not install connector with impact wrench or power tools.**

RH60123,0000C72 -19-12AUG15-1/7

Pump 3 Delivery Pressure Sensor Circuit Low Input Diagnostic Procedure

RH60123,0000C72 -19-12AUG15-2/7

1 Connector Check

Key switch in OFF position.

Check the following connectors for damage, corrosion, or debris:

- Pump 3 delivery pressure sensor (B56) and pump harness splice connector (X97). See Pump Harness (W8) Component Location. (Group 9015-10.)
- Cab harness-to-machine harness 100-pin connector (X3) and cab harness-to-main controller 30-pin connector D (X34). See Cab Harness (W1) Component Location. (Group 9015-10.)
- Pump harness-to-machine harness connector (X40). See Machine Harness (W2) Component Location. (Group 9015-10.)

Are connectors in good condition and free of corrosion and debris?

YES: Go to Component Check.**NO:** Repair or replace connector. See appropriate harness.

Continued on next page

RH60123,0000C72 -19-12AUG15-3/7

Main Controller (MCZ) Diagnostic Trouble Codes

2 Component Check

NOTE: Return connectors to appropriate sensors after check is completed.

Disconnect pump 2 control pressure sensor (B38).

Disconnect pump 1 control pressure sensor (B36).

Connect pump 2 control pressure sensor connector (B38) to pump 1 control pressure sensor (B36).

Clear MCZ diagnostic trouble codes.

Operate machine.

Check for active MCZ diagnostic trouble code 011208.04—Pump 2 Flow Control Pressure Sensor Circuit Low Input.

Is code active?

YES: Go to Voltage Check.

NO: Pump 2 control pressure sensor (B38) malfunction. Replace sensor.

RH60123,0000C78 -19-20AUG12-4/7

3 Voltage Check

Key switch in OFF position.

Disconnect pump 2 control pressure sensor (B38).

Turn key switch to ON position.

Check voltage between pin 1 and pin 3 of pump 2 control pressure sensor connector (B38) for approximately 5 V..

Is correct voltage indicated?

YES: Go to Open Circuit Check.

NO: Repair or replace harness. See appropriate harness.

RH60123,0000C78 -19-20AUG12-5/7

4 Open Circuit Check

Key switch in OFF position.

Pump 2 control pressure sensor (B38) disconnected.

Disconnect cab harness-to-main controller 17-pin connector C (X33).

Check for continuity between pin 2 of pump 2 control pressure sensor connector (B38) and pin 13 of cab harness-to-main controller 17-pin connector C (X33).

Is continuity indicated?

YES: Go to Short Circuit Check.

NO: Repair or replace harness. See appropriate harness.

RH60123,0000C78 -19-20AUG12-6/7

5 Short Circuit Check

Key switch in OFF position.

Pump 2 control pressure sensor (B38) disconnected.

Check for continuity between pin 2 of pump 2 control pressure sensor connector (B38) and machine ground.

Is continuity indicated?

YES: Repair or replace harness. See appropriate harness.

NO: Checks complete.

RH60123,0000C78 -19-20AUG12-7/7

3 Voltage Check

Key switch in OFF position.

Disconnect travel pressure sensor (B34).

Turn key switch to ON position.

Check between pin 2 of travel pressure sensor connector (B34) and machine ground for approximately 0.0 V.

Is correct voltage indicated?

YES: Go to Harness Check.**NO:** Repair or replace harness. See appropriate harness.

RH60123,0000C7F -19-12AUG15-5/6

4 Harness Check

Key switch in OFF position.

Disconnect travel pressure sensor (B34).

Disconnect main controller connectors (X31—X36).

Check for continuity between pin 9 of cab harness-to-main controller 30-pin connector D (X34) to all pins on all main controller connectors.

Is continuity indicated between any circuits?

YES: Circuit is short to power. Repair or replace harness. See appropriate harness.**NO:** Checks complete.

RH60123,0000C7F -19-12AUG15-6/6

011304.04 — Travel Pilot Pressure Sensor Circuit Low Input**Over torquing will result in permanent damage to connector. Torque only to specification.***Travel pressure sensor (B34) signal voltage is low. (Below 0.1 V)***Specification**

100-Pin Connector

(X3)—Torque..... 10 N·m
89 lb.-in.**IMPORTANT: Avoid connector damage. Do not install connector with impact wrench or power tools.**

RH60123,0000C80 -19-12AUG15-1/7

Travel Pilot Pressure Sensor Circuit Low Input Diagnostic Procedure

RH60123,0000C80 -19-12AUG15-2/7

1 Connector Check

Key switch in OFF position.

Check the following connectors for damage, corrosion, or debris:

- Travel pressure sensor (B34) and machine harness splice connector (X98). See Machine Harness (W2) Component Location. (Group 9015-10.)
- Cab harness-to-machine harness 100-pin connector (X3), cab harness-to-main controller 30-pin connector D (X34), and cab harness-to-main controller 26-pin connector E (X36). See Cab Harness (W1) Component Location. (Group 9015-10.)

Are connectors in good condition and free of corrosion and debris?

YES: Go to Component Check.**NO:** Repair or replace connector. See appropriate harness.

Continued on next page

RH60123,0000C80 -19-12AUG15-3/7

3 Continuity Check

Key switch in OFF position.

Disconnect pump 2 flow rate limit solenoid (Y20).

Disconnect main controller connector (X31).

Check for continuity between:

- Pin 1 of pump 2 flow rate limit solenoid connector (Y20) to pin 7 cab harness-to-main controller 31-pin connector A (X31).
- Pin 2 of pump 2 flow rate limit solenoid connector (Y20) to pin 6 cab harness-to-main controller 31-pin connector A (X31).

Is continuity indicated?

YES: Go to Harness Check.**NO:** Repair or replace harness. See appropriate harness.

RH60123,0000C86 -19-12AUG15-5/7

4 Harness Check

Key switch in OFF position.

Cab harness-to-main controller 31-pin connector A (X31) disconnected.

Check for continuity between pin 6 of cab harness-to-main controller 31-pin connector A (X31) to all other pins on connector.

Is continuity indicated between any pins?

YES: Repair or replace harness. See appropriate harness.**NO:** Go to Solenoid Check.

RH60123,0000C86 -19-12AUG15-6/7

5 Solenoid Check

Key switch in OFF position.

Disconnect pump 2 flow rate limit solenoid (Y20).

Test pump 2 flow rate limit solenoid (Y20) and compare to specification. See Proportional Solenoid Test. (Group 9015-20.)

Is pump 2 flow rate limit solenoid (Y20) within specification?

YES: Checks complete.**NO:** Pump 2 flow rate limit solenoid (Y20) malfunction. Replace solenoid.

RH60123,0000C86 -19-12AUG15-7/7

011400.04 — Pump 2 Flow Rate Limit Solenoid Feedback Low Current**Over torquing will result in permanent damage to connector. Torque only to specification.***Pump 2 flow rate limit solenoid (marked SB) (Y20) current below 70 mA.*

100-Pin Connector

(X3)—Torque.....10 N·m
89 lb.-in.**IMPORTANT: Avoid connector damage. Do not install connector with impact wrench or power tools.****Specification**

RH60123,0000C87 -19-12AUG15-1/7

Pump 2 Flow Rate Limit Solenoid Valve Feedback Low Current Diagnostic Procedure

Continued on next page

RH60123,0000C87 -19-12AUG15-2/7

Main Controller (MCZ) Diagnostic Trouble Codes

3 Continuity Check

Key switch in OFF position.

Disconnect dig regenerative solenoid (Y22).

Disconnect main controller connector (X31).

Check for continuity between:

- Pin 1 of dig regenerative solenoid connector (Y22) to pin 15 cab harness-to-main controller 31-pin connector A (X31).
- Pin 2 of dig regenerative solenoid connector (Y22) to pin 14 cab harness-to-main controller 31-pin connector A (X31).

Is continuity indicated?

YES: Go to Harness Check.

NO: Repair or replace harness. See appropriate harness.

RH60123,0000C8C -19-12AUG15-5/7

4 Harness Check

Key switch in OFF position.

Cab harness-to-main controller 31-pin connector A (X31) disconnected.

Check for continuity between pin 14 of cab harness-to-main controller 31-pin connector A (X31) to all other pins on connector.

Is continuity indicated between any pins?

YES: Short to power.

Repair or replace harness. See appropriate harness.

NO: Go to Solenoid Check.

RH60123,0000C8C -19-12AUG15-6/7

5 Solenoid Check

Key switch in OFF position.

Disconnect dig regenerative solenoid (Y22).

Test dig regenerative solenoid (Y22) and compare to specification. [See Proportional Solenoid Test](#). (Group 9015-20.)

Is dig regenerative solenoid (Y22) within specification?

YES: Checks complete.

NO: Dig regenerative solenoid (Y22) malfunction. Replace solenoid.

RH60123,0000C8C -19-12AUG15-7/7

011402.04 — 5-Spool Solenoid Valve Unit (SF) Feedback Low Input

Over torquing will result in permanent damage to connector. Torque only to specification.

Dig regenerative solenoid (marked SF) (Y22) current below 70 mA.

100-Pin Connector

(X3)—Torque.....10 N·m
89 lb.-in.

Specification

IMPORTANT: Avoid connector damage. Do not install connector with impact wrench or power tools.

RH60123,0000C8D -19-12AUG15-1/7

5-Spool Solenoid Valve Unit (SF) Feedback Low Input Diagnostic Procedure

Continued on next page

RH60123,0000C8D -19-12AUG15-2/7

Main Controller (MCZ) Diagnostic Trouble Codes

3 Continuity Check

Key switch in OFF position.

Disconnect pump 3 torque control solenoid (Y28).

Disconnect main controller connector (X31).

Check for continuity between:

- Pin 1 of pump 3 torque control solenoid (Y28) to pin 4 cab harness-to-main controller 31-pin connector A (X31).
- Pin 2 of pump 3 torque control solenoid (Y28) to pin 5 cab harness-to-main controller 31-pin connector A (X31).

Is continuity indicated?

YES: Go to Harness Check.

NO: Repair or replace harness. See appropriate harness.

RH60123,0000C92 -19-12AUG15-5/7

4 Harness Check

Key switch in OFF position.

Cab harness-to-main controller 31-pin connector A (X31) disconnected.

Check for continuity between pin 5 of cab harness-to-main controller 31-pin connector A (X31) to all other pins on connector.

Is continuity indicated between any pins?

YES: Short to power.

Repair or replace harness. See appropriate harness.

NO: Go to Solenoid Check.

RH60123,0000C92 -19-12AUG15-6/7

5 Solenoid Check

Key switch in OFF position.

Disconnect pump 3 torque control solenoid (Y28).

Test pump 3 torque control solenoid (Y28) and compare to specification. See Proportional Solenoid Test. (Group 9015-20.)

Is pump 3 torque control solenoid (Y28) within specification?

YES: Checks complete.

NO: Pump 3 torque control solenoid (Y28) malfunction. Replace solenoid.

RH60123,0000C92 -19-12AUG15-7/7

011406.04 — Pump 3 Torque P/S Valve Feedback Low Current

Over torquing will result in permanent damage to connector. Torque only to specification.

Pump 3 torque control solenoid (marked SU) (Y28) feedback current below 56 mA.

Specification	
100-Pin Connector	
(X3)—Torque.....	10 N·m 89 lb.-in.

IMPORTANT: Avoid connector damage. Do not install connector with impact wrench or power tools.

RH60123,0000C93 -19-12AUG15-1/7

Pump 3 Torque P/S Valve Feedback Low Current Diagnostic Procedure

Continued on next page

RH60123,0000C93 -19-12AUG15-2/7

Main Controller (MCZ) Diagnostic Trouble Codes

3 Continuity Check

Key switch in OFF position.

Disconnect exhaust filter regulator solenoid (marked SJ) (Y13).

Disconnect main controller connectors (X31).

Check for continuity between:

- Pin 1 of exhaust filter regulator solenoid (marked SJ) (Y13) to pin 16 cab harness-to-main controller 31-pin connector A (X31).
- Pin 2 of exhaust filter regulator solenoid (marked SJ) (Y13) to pin 17 cab harness-to-main controller 31-pin connector A (X31).

Is continuity indicated?

YES: Repair or replace harness. See appropriate harness.

NO: Go to Harness Check.

RH60123,0000C98 -19-12AUG15-5/7

4 Harness Check

Key switch in OFF position.

Cab harness-to-main controller 31-pin connector A (X31) disconnected.

Check for continuity between pin 17 of cab harness-to-main controller 31-pin connector A (X31) to all other pins on connector.

Is continuity indicated between any pins?

YES: Short to power. Repair or replace harness. See appropriate harness.

NO: Go to Solenoid Check.

RH60123,0000C98 -19-12AUG15-6/7

5 Solenoid Check

Key switch in OFF position.

Disconnect exhaust filter regulator solenoid (marked SJ) (Y13).

Test exhaust filter regulator solenoid (marked SJ) (Y13) and compare to specification. See [Proportional Solenoid Test](#). (Group 9015-20.)

Is exhaust filter regulator solenoid (marked SJ) (Y13) within specification?

YES: Checks complete.

NO: Exhaust filter regulator solenoid (marked SJ) (Y13) malfunction. Replace solenoid.

RH60123,0000C98 -19-12AUG15-7/7

011408.04 — 2-Spool Solenoid Valve Unit (SJ) Feedback Low Input

Over torquing will result in permanent damage to connector. Torque only to specification.

Exhaust filter regulator solenoid (bypass cut-off valve) (marked SJ) (Y13) current below 70 mA.

100-Pin Connector
(X3)—Torque..... 10 N·m
89 lb.-in.

IMPORTANT: Avoid connector damage. Do not install connector with impact wrench or power tools.

Specification

RH60123,0000C99 -19-21MAY15-1/7

2-Spool Solenoid Valve Unit (SJ) Feedback Low Input Diagnostic Procedure

Continued on next page

RH60123,0000C99 -19-21MAY15-2/7

3 Continuity Check

Key switch in OFF position.

Disconnect arm 1 flow control solenoid (Y29).

Disconnect main controller connector (X31).

Check for continuity between:

- Pin 1 of arm 1 flow control solenoid connector (Y29) to pin 20 cab harness-to-main controller 31-pin connector A (X31).
- Pin 2 of arm 1 flow control solenoid connector (Y29) to pin 21 cab harness-to-main controller 31-pin connector A (X31).

Is continuity indicated?

YES: Go to Harness Check.**NO:** Repair or replace harness. See appropriate harness.

RH60123,0000C9E -19-12AUG15-5/6

4 Harness Check

Key switch in OFF position.

Cab harness-to-main controller 31-pin connector A (X31) disconnected.

Check for continuity between pin 21 of cab harness-to-main controller 31-pin connector A (X31) to all other pins on connector.

Is continuity indicated between any pins?

YES: Short to power. Repair or replace harness. See appropriate harness.**NO:** Checks complete.

RH60123,0000C9E -19-12AUG15-6/6

011427.04 — 5-Spool Solenoid Valve Unit (SE) Feedback Low Current**Over torquing will result in permanent damage to connector. Torque only to specification.***Arm 1 flow control solenoid (marked SE) (Y29) current below 70 mA.*

100-Pin Connector

(X3)—Torque.....10 N·m
89 lb.-in.**Specification****IMPORTANT: Avoid connector damage. Do not install connector with impact wrench or power tools.**

RH60123,0000C9F -19-21MAY15-1/6

5-Spool Solenoid Valve Unit (SE) Feedback Low Current Diagnostic Procedure

RH60123,0000C9F -19-21MAY15-2/6

1 Connector Check

Key switch in OFF position.

Check the following connectors for damage, corrosion, or debris:

- Arm 1 flow control solenoid (Y29). See Machine Harness (W2) Component Location. (Group 9015-10.)
- Pump harness-to-machine harness connector (X40). See Machine Harness (W2) Component Location. (Group 9015-10.)
- Cab harness-to-main controller 31-pin connector A (X31). See Cab Harness (W1) Component Location. (Group 9015-10.)

Are connectors in good condition and free of corrosion and debris?

YES: Go to Component Check.**NO:** Repair or replace connector. See appropriate harness.

Continued on next page

RH60123,0000C9F -19-21MAY15-3/6

Main Controller (MCZ) Diagnostic Trouble Codes

1 Connector Check

Key switch in OFF position.

Check the following connectors for damage, corrosion, or debris:

- Attachment relief solenoid (Y38) and attachment connector (X46). See Attachment Harness (W17) Component Location. (Group 9015-10.)
- Cab harness-to-main controller 24-pin connector B (X32). See Cab Harness (W1) Component Location. (Group 9015-10.)

Are connectors in good condition and free of corrosion and debris?

YES: Go to Component Check.

NO: Repair or replace connector. See appropriate harness.

RH60123,0000CA5 -19-12AUG15-3/7

2 Component Check

NOTE: Return connectors to appropriate solenoids after check is completed.

Key switch in OFF position.

Disconnect attachment relief solenoid (Y38).

Disconnect attachment relief solenoid 2 (Y39).

Connect attachment relief solenoid (Y38) to attachment relief solenoid 2 (Y39).

Clear MCZ diagnostic trouble codes.

Operate machine.

Check for active MCZ diagnostic trouble code 011434.04—Attachment Relief 1 (Upper) Proportional Solenoid Valve Feedback Low Current.

Is code active?

YES: Go to Continuity Check.

NO: Attachment relief solenoid (Y38) malfunction. Replace solenoid.

RH60123,0000CA5 -19-12AUG15-4/7

3 Continuity Check

Key switch in OFF position.

Disconnect attachment relief solenoid (Y38).

Disconnect main controller connector (X32).

Check for continuity between:

- Pin 1 of attachment relief solenoid (Y38) connector to pin 16 cab harness-to-main controller 24-pin connector B (X32).
- Pin 2 of attachment relief solenoid (Y38) connector to pin 15 cab harness-to-main controller 24-pin connector B (X32).

Is continuity indicated?

YES: Go to Short Circuit Check.

NO: Repair or replace harness. See appropriate harness.

Continued on next page

RH60123,0000CA5 -19-12AUG15-5/7

3 Continuity Check

Key switch in OFF position.

Disconnect secondary relief solenoid valve (Y41).

Disconnect main controller connector (X32).

Check for continuity between:

- Pin 1 of secondary relief solenoid valve (Y41) connector to pin 23 cab harness-to-main controller 24-pin connector B (X32).
- Pin 2 of secondary relief solenoid valve (Y41) connector to pin 24 cab harness-to-main controller 24-pin connector B (X32).

Is continuity indicated?

YES: Go to Short Circuit Check.**NO:** Repair or replace harness. See appropriate harness.

RH60123,0000CAB -19-12AUG15-5/6

4 Short Circuit Check

Key switch in OFF position.

Secondary relief solenoid valve (Y41) disconnected.

Cab harness-to-main controller 24-pin connector B (X32) disconnected.

Check for continuity between:

- Pin 1 of secondary relief solenoid valve (Y41) connector to machine ground.
- Pin 24 of cab harness-to-main controller 24-pin connector B (X32) to machine ground.

Is continuity indicated?

YES: Short to ground. Repair or replace harness. See appropriate harness.**NO:** Checks complete.

RH60123,0000CAB -19-12AUG15-6/6

011437.02 — 2-Spool Solenoid Valve Unit (A1) Abnormal Feedback**Over torquing will result in permanent damage to connector. Torque only to specification.***Boom 3 spool control solenoid (marked A1) (Y32) current above 920 mA and below 70 mA.***Specification**

100-Pin Connector

(X3)—Torque..... 10 N·m
89 lb.-in.**IMPORTANT: Avoid connector damage. Do not install connector with impact wrench or power tools.**

RH60123,0000CAC -19-12AUG15-1/7

2-Spool Solenoid Valve Unit (A1) Abnormal Feedback Diagnostic Procedure

RH60123,0000CAC -19-12AUG15-2/7

1 Connector Check

Key switch in OFF position.

Check the following connectors for damage, corrosion, or debris:

- Boom 3 spool control solenoid (marked A1) (Y32) and spool control interface harness-to-spool control harness connector (X53). See Spool Control Harness (W43) Component Location. (Group 9015-10.)
- Cab harness-to-main controller 24-pin connector B (X32) and cab harness-to-spool control harness connector (X49). See Cab Harness (W1) Component Location. (Group 9015-10.)

Are connectors in good condition and free of corrosion and debris?

YES: Go to Component Check.**NO:** Repair or replace connector. See appropriate harness.

Continued on next page

RH60123,0000CAC -19-12AUG15-3/7

Main Controller (MCZ) Diagnostic Trouble Codes

1 Fuse Check	Ignition OFF. Remove fuse F5 from fuse box F50. See Cab Harness (W1) Component Location and see Cab Harness (W1) Wiring Diagram. (Group 9015-10.) Check fuse F5 for continuity. Is continuity indicated?	YES: Go to Solenoid Check. NO: Replace fuse. MB00333,0000163 -19-12AUG15-3/8
2 Solenoid Check	Ignition OFF. Disconnect harness from 2-speed activation solenoid. See 2-Speed Harness (W32) Component Location. (Group 9015-10.) Test solenoid. See Proportional Solenoid Test. (Group 9015-20.) Is 2-speed activation solenoid within specification?	YES: Go to 2-Speed Harness Continuity Check. NO: Solenoid malfunction. Replace solenoid. MB00333,0000163 -19-12AUG15-4/8
3 2-Speed Harness Continuity Check	Ignition OFF. Disconnect attachment harness-to-2-speed harness connector (X87). See Attachment Harness (W17) Component Location. (Group 9015-10.) Check continuity between 2-speed activation solenoid valve (Y43) connector pin 1 and attachment harness-to-2-speed harness connector (X87) pin 4. Check continuity between 2-speed activation solenoid valve (Y43) pin 2 and attachment harness-to-2-speed harness connector (X87) pin 5. See 2-Speed Harness (W32) Wiring Diagram. (Group 9015-10.) Is continuity indicated in both circuits?	YES: Go to Attachment Harness Continuity Check. NO: Open circuit in 2-speed harness. Repair or replace harness. MB00333,0000163 -19-12AUG15-5/8
4 Attachment Harness Continuity Check	Disconnect attachment connector (X46). See Machine Harness (W2) Component Location. (Group 9015-10.) Check for continuity between attachment harness-to-2-speed harness connector (X87) pin 4 and attachment connector (X46) pin 13. Check continuity between attachment harness-to-2-speed harness connector (X87) pin 5 and attachment connector (X46) pin 17. See Attachment Harness (W17) Wiring Diagram. (Group 9015-10.) Is continuity indicated in both circuits?	YES: Go to Machine Harness Continuity Check. NO: Open circuit in attachment harness. Repair or replace harness. Continued on next page MB00333,0000163 -19-12AUG15-6/8

3 Voltage Check**Key switch in OFF position.**

Disconnect AFL solenoid pressure sensor (marked PS1) (B85).

Turn key switch to ON position.

Check voltage between pin 2 of AFL solenoid pressure sensor (marked PS1) (B85) and machine ground for approximately 0.0 V.

Is correct voltage indicated?

YES: Repair or replace harness. See appropriate harness.**NO:** Go to Harness Check.

DF89619,00B5DA0 -19-22JAN16-5/6

4 Harness Check**Key switch in OFF position.**

Disconnect AFL solenoid pressure sensor (marked PS1) (B85).

Disconnect main controller connectors (X31—X36).

Check for continuity between pin 2 of cab harness-to-main controller 24-pin connector B (X32) to all pins on all main controller connectors.

Is continuity indicated between any circuits?

YES: Circuit is short to power. Repair or replace harness. See appropriate harness.**NO:** Checks complete.

DF89619,00B5DA0 -19-22JAN16-6/6

011810.04 — Electric Lever Operating Pressure Sensor 1 Low Voltage*Auxiliary function lever (AFL) solenoid pressure sensor (marked PS1) (B85) signal voltage is low (below 0.1 V).*

DF89619,00B5DA1 -19-22JAN16-1/7

Auxiliary Function Lever (AFL) Solenoid Pressure Sensor (marked PS1) (B85) Low Input Diagnostic Procedure

DF89619,00B5DA1 -19-22JAN16-2/7

1 Connector Check**Key switch in OFF position.**

Check the following connectors for damage, corrosion, or debris:

- See Cab Harness (W1) Component Location. (Group 9015-10.)
 - Cab harness-to-machine harness 100-pin connector (X3).
 - Cab harness-to-main controller 24-pin connector B (X32).
 - Cab harness-to-main controller 26-pin connector F (X36).
- See Auxiliary Function Lever (AFL) Harness (W75) Component Location. (Group 9015-10.)
 - Auxiliary function lever (AFL) connector (X574).
- See Auxiliary Function Lever (AFL) Solenoid Harness (W76) Component Location. (Group 9015-10.)
 - AFL solenoid pressure sensor (marked PS1) (B85).
 - Auxiliary function lever (AFL) harness-to-auxiliary function lever (AFL) solenoid harness connector (X577).

Are connectors in good condition and free of corrosion and debris?

YES: Go to Component Check.**NO:** Repair or replace connectors. See appropriate harness.

Continued on next page

DF89619,00B5DA1 -19-22JAN16-3/7

5 Solenoid Check**Key switch in OFF position.**

AFL solenoid A (marked 1A) (Y61) disconnected.

Test AFL solenoid A (marked 1A) (Y61) and compare to specification. See Proportional Solenoid Test. (Group 9015-20.)

Is AFL solenoid A (marked 1A) (Y61) within specification?

YES: Checks complete.**NO:** AFL solenoid A (marked 1A) (Y61) malfunction. Replace solenoid.

DF89619,00B5DA6 -19-22JAN16-7/7

011817.02 — OPT Solenoid 2 Feedback Abnormal*Auxiliary function lever (AFL) solenoid B (marked 1B) (Y62) current above 920 mA and below 70 mA.*

DF89619,00B5DA7 -19-22JAN16-1/8

Auxiliary Function Lever (AFL) Solenoid B (marked 1B) (Y62) Abnormal Feedback Diagnostic Procedure

DF89619,00B5DA7 -19-22JAN16-2/8

1 Connector Check**Key switch in OFF position.**

Check the following connectors for damage, corrosion, or debris:

- See Cab Harness (W1) Component Location. (Group 9015-10.)
- Cab harness-to-main controller 31-pin connector A (X31).
- See Auxiliary Function Lever (AFL) Harness (W75) Component Location. (Group 9015-10.)
- Auxiliary function lever (AFL) connector (X574).
- See Auxiliary Function Lever (AFL) Solenoid Harness (W76) Component Location. (Group 9015-10.)
- Auxiliary function lever (AFL) solenoid B (marked 1B) (Y62).
- Auxiliary function lever (AFL) harness-to-auxiliary function lever (AFL) solenoid harness connector (X577).

Are connectors in good condition and free of corrosion and debris?

YES: Go to Component Check.**NO:** Repair or replace connectors. See appropriate harness.

DF89619,00B5DA7 -19-22JAN16-3/8

2 Component Check**Key switch in OFF position.**

Disconnect AFL solenoid B (marked 1B) (Y62).

Disconnect AFL solenoid A (marked 1A) (Y61).

Connect AFL solenoid B (marked 1B) (Y62) connector to AFL solenoid A (marked 1A) (Y61).

Clear MCZ diagnostic trouble codes.

Operate machine.

Check for active MCZ diagnostic trouble code 011817.02—OPT Solenoid 2 Feedback Abnormal.

Is code active?

Return connectors to appropriate solenoids after check is complete.

YES: Go to Continuity Check.**NO:** AFL solenoid B (marked 1B) (Y62) malfunction. Replace solenoid.

Continued on next page

DF89619,00B5DA7 -19-22JAN16-4/8

Engine Control Unit (ECU) Diagnostic Trouble Codes Group 20

Engine Control Unit (ECU) Diagnostic Trouble Codes

For additional information on the engine control unit circuit, see Engine Control Unit (ECU) Circuit Theory of Operation. (Group 9015-15.)

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Engine control unit diagnostic trouble codes (DTCs) can be displayed on the monitor, connection with Service ADVISOR™, or by connection with MPDr.

- See Reading Diagnostic Trouble Codes With Monitor Display. (Group 9015-20.)
- See Reading Diagnostic Trouble Codes With Service ADVISOR™ Diagnostic Application. (Group 9015-20.)
- See MPDr Application. (Group 9015-20.)

RH60123,00009E8 -19-09JUL12-1/1

000081.00 — High Exhaust Filter Differential Pressure (P2453)

Exhaust filter pressure difference is more than 60 kPa (0.6 bar) (8.7 psi).

For more information, see Isuzu engine manual 4HK1.

- Machine Symptom: Power loss
- Machine Operation: Operable, but steering not possible
- Engine Malfunction Indicator: ON

RH60123,00009E9 -19-02SEP16-1/1

000081.01 — Low Exhaust Filter Differential Pressure (P2452)

Exhaust filter pressure difference is less than 0.5 kPa (0.005 bar) (0.07 psi).

For more information, see Isuzu engine manual 4HK1.

- Machine Symptom: Power loss
- Machine Operation: Operable, but steering not possible
- Engine Malfunction Indicator: ON

RH60123,00009EA -19-12AUG15-1/1

000081.02 — Zero-Point Calibration of Exhaust Filter Differential Pressure Sensor is Abnormal (P2456)

Learning value is 4.5 kPa (0.045 bar) (0.65 psi) or more.

For more information, see Isuzu engine manual 4HK1.

- Machine Symptom: Power loss
- Machine Operation: Operable, but steering not possible
- Engine Malfunction Indicator: ON

RH60123,00009EB -19-12AUG15-1/1

000081.03 — Exhaust Filter Differential Pressure Sensor Circuit High Input (P2455)

Voltage at the exhaust filter pressure difference sensor is more than 4.89 V.

For more information, see Isuzu engine manual 4HK1.

- Machine Symptom: Power loss
- Machine Operation: Operable, but steering not possible
- Engine Malfunction Indicator: ON

RH60123,00009EC -19-12AUG15-1/1

000081.04 — Exhaust Filter Differential Pressure Sensor Circuit Low Input (P2454)

Voltage at the exhaust filter pressure difference sensor is less than 0.18 V.

For more information, see Isuzu engine manual 4HK1.

- Machine Symptom: Power loss
- Machine Operation: Operable, but steering not possible
- Engine Malfunction Indicator: ON

RH60123,00009ED -19-12AUG15-1/1

000091.02 — Accelerator Pedal Position Sensor 1-2 Correlation (P2138)

Opening amount difference between accelerator sensors 1 and 2 is 45% or more.

For more information, see Isuzu engine manual 4HK1.

- Machine Symptom: Power loss
- Machine Operation: Operable
- Engine Malfunction Indicator: OFF

RH60123,00009EE -19-12AUG15-1/1

010003.02 — Abnormal Injector Common 1 Circuit (P2146)

Injector charge voltage circuit of the common power supply 1 (injectors 1 and 4) has been opened, shorted to ground or voltage.

For more information, see Isuzu engine manual 4HK1.

- Machine Symptom: Rough idle, engine vibration, low power, dark smoke
- Machine Operation: Machine will not operate
- Engine Malfunction Indicator: ON

RH60123,0000A2C -19-12AUG15-1/1

010004.02 — Abnormal Injector Common 2 Circuit (P2149)

Injector charge voltage circuit of the common power supply 2 (injectors 2 and 3) has been opened, shorted to ground or voltage.

For more information, see Isuzu engine manual 4HK1.

- Machine Symptom: Rough idle, engine vibration, low power, dark smoke
- Machine Operation: Machine will not operate
- Engine Malfunction Indicator: ON

RH60123,0000A2D -19-12AUG15-1/1

010005.01 — Abnormal Charge Circuit (Bank 1) (P1261)

Injector charge voltage circuit of the common power supply 1 (injectors 1 and 4) has been opened.

For more information, see Isuzu engine manual 4HK1.

- Machine Symptom: Rough idle, engine vibration, low power, dark smoke
- Machine Operation: Machine will not operate
- Engine Malfunction Indicator: ON

RH60123,0000A2E -19-12AUG15-1/1

010006.01 — Abnormal Charge Circuit (Bank 2) (P1262)

Injector charge voltage circuit of the common power supply 2 (injectors 2 and 3) has been opened.

For more information, see Isuzu engine manual 4HK1.

- Machine Symptom: Rough idle, engine vibration, low power, dark smoke
- Machine Operation: Machine will not operate
- Engine Malfunction Indicator: ON

RH60123,0000A2F -19-12AUG15-1/1

010007.02 — Abnormal CPU Monitor IC (P0606)

No change of RUN-SUB pulse in 20 milliseconds.

For more information, see Isuzu engine manual 4HK1.

- Machine Symptom: Power loss
- Machine Operation: Operable, but steering not possible
- Engine Malfunction Indicator: ON

RH60123,0000A30 -19-12AUG15-1/1

010008.02 — Abnormal A/D Converter (P060B)

Analog/Digital conversion cannot be done.

For more information, see Isuzu engine manual 4HK1.

- Machine Symptom: Power loss
- Machine Operation: Operable, but steering not possible
- Engine Malfunction Indicator: ON

RH60123,0000A31 -19-12AUG15-1/1

010009.02 — Abnormal 5V-Electric Power Circuit #3 (P0697)

Voltage of 5 V power source circuits 3 or 7 is over 5.5 V or less than 4.5 V.

For more information, see Isuzu engine manual 4HK1.

- Machine Symptom: Rough idle, engine vibration, low power, dark smoke
- Machine Operation: Operable, but steering not possible
- Engine Malfunction Indicator: ON

RH60123,0000A32 -19-12AUG15-1/1

3 Continuity Check

Key switch in OFF position.

Disconnect monitor controller 28-pin connector A (X20) and fuel level sensor connector (B18).

Check for continuity between:

- Pin 1 on fuel level sensor connector (B18) and pin 24 on machine harness splice connector (X97).
- Pin 2 on fuel level sensor connector (B18) and pin 18 on monitor controller 28-pin connector A (X20).

Is continuity indicated?

YES: Go to Short Circuit Check.

NO: Repair or replace harness. See appropriate harness.

JL58967,000064A -19-10OCT16-5/6

4 Short Circuit Check

Key switch in OFF position.

Disconnect monitor controller 28-pin connector A (X20).

Check for continuity between pin 18 on monitor controller 28-pin connector A (X20) and machine ground.

Is continuity indicated?

YES: Short to ground. Repair or replace harness. See appropriate harness.

NO: Monitor controller malfunction.

Replace monitor controller. See [Monitor Controller \(DSZ\) Remove and Install](#). (Group 9015-20.)

JL58967,000064A -19-10OCT16-6/6

013334.02 — Radiator Coolant Error

- See [Controller Area Network 0 \(CAN 0\) Circuit Diagnostics](#). (Group 9001-10.)

Diagnose the diagnostic trouble codes (DTC) in the engine control unit (ECU), then clear codes and re-check DTCs.

- See [Engine Control Unit \(ECU\) Diagnostic Trouble Codes](#). (Group 9001-20.)

JL58967,00003D4 -19-14MAR16-1/1

014001.02 — Flash Memory Read/Write Error

JL58967,00003D5 -19-14MAR16-1/3

Flash Memory Read/Write Error Diagnostic Procedure

Flash Memory Read/Write Error in monitor controller.

JL58967,00003D5 -19-14MAR16-2/3

1 Diagnostic Trouble Code Check

Clear codes and check for code again.

Is diagnostic trouble code (DTC) 014001.02—Flash Memory Read/Write Error still present?

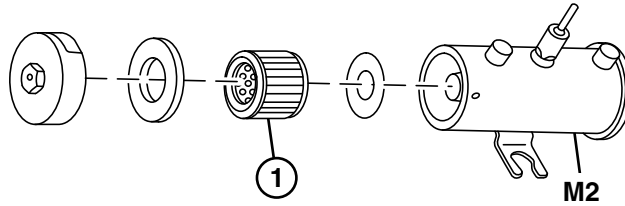
YES: Monitor controller malfunction.

Replace monitor controller. See [Monitor Controller \(DSZ\) Remove and Install](#). (Group 9015-20.)

NO: Monitor controller is OK.

JL58967,00003D5 -19-14MAR16-3/3

4 Fuel Transfer Pump



TX1207003 —UN—07JAN16

Fuel Transfer Pump Screen

1— Screen

M2—Fuel Transfer Pump

Remove and inspect screen (1) in fuel transfer pump (M2).

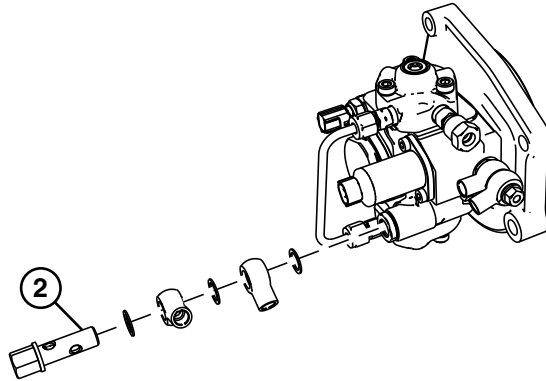
Is screen clear of debris?

YES: Go to Fuel Feed Valve.

NO: Replace screen.
Inspect fuel system for
source of debris.

JL58967,00003E4 -19-14MAR16-6/8

5 Fuel Feed Valve



TX1207004 —UN—07JAN16

Fuel Feed Valve

2— Fuel Feed Valve

Remove and inspect fuel feed valve. See Isuzu 4HK1 Interim Tier 4 Engine Manual.

Is valve clear of corrosion and debris and moving freely?

YES: Go to Supply Fuel System.

NO: Replace fuel feed valve. See Isuzu 4HK1 Interim Tier 4 Engine Manual.

JL58967,00003E4 -19-14MAR16-7/8

6 Supply Fuel System

Fill an approved container with clean prefiltered fuel. Install a clean hose to inlet of fuel transfer pump to container to bypass auxiliary (if equipped) and primary fuel filters.

Operate machine.

Does DTC 020110.02 become active?

YES: Replace fuel transfer pump.

NO: Go to next step in this check.

Thoroughly inspect fuel circuit for obstructions to fuel transfer pump. See Engine Fuel System Component Location. (Group 9010-05.)

YES: Replace auxiliary (if equipped) and primary filter headers.

Are all lines and hoses straight, clear of debris, and in good condition; not kinked, damaged, or collapsed?

NO: Repair or replace parts as necessary.

JL58967,00003E4 -19-14MAR16-8/8

5 Short to Ground Check

Turn key switch to OFF position.

Ambient air temperature sensor (B22) disconnected.

Air conditioner controller (ACF) (A7) disconnected.

Check continuity between pin 2 of sensor and machine ground.

Is continuity indicated?

YES: Repair or replace harness. See appropriate wiring diagram or schematic.

NO: Checks complete.

RH60123,00009C5 -19-02AUG12-7/7

18 — Short-Circuited Solar Radiation Sensor

Solar sensor (B21) circuit is open.

Additional References:

- See Air Conditioning System Cycle of Operation. (Group 9031-05.)
- See System Functional Schematic. (Group 9015-10.)
- See Temperature Sensor Test. (Group 9015-20.)

RH60123,00009C6 -19-02AUG12-1/6

Short-Circuited Solar Radiation Sensor Diagnostic Procedure

RH60123,00009C6 -19-02AUG12-2/6

1 Connector Check

Turn key switch to OFF position.

Check the following connectors for damage, corrosion, or debris:

- Solar sensor (B21). See Heater and Air Conditioner Harness (W41) Component Location. (Group 9015-10.)
- Air conditioner controller (ACF) (A7). See Heater and Air Conditioner Harness (W41) Component Location. (Group 9015-10.)

Are connectors in good condition and free of corrosion and debris?

YES: Go to Voltage Check.

NO: Repair or replace harness. See appropriate wiring diagram or schematic.

RH60123,00009C6 -19-02AUG12-3/6

2 Voltage Check

Turn key switch to OFF position.

Solar sensor (B21) disconnected.

Turn key switch to ON position.

Check for voltage at:

- Pin 1 of sensor for approximately 5 V.
- Pin 2 of sensor for 0.0 V.

Is correct voltage indicated?

YES: Go to Continuity Check.

NO: Repair or replace harness. See appropriate wiring diagram or schematic.

Continued on next page

RH60123,00009C6 -19-02AUG12-4/6

Section 9005

Operational Checkout Procedure

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CAUTION: To avoid possible injury or death to operator or others. The rear view camera image is designed to supplement other safety practices and is not intended to be the sole method of collision avoidance. Always be alert and aware of the surroundings when operating this machine.

Turn key switch to ON position.

When the default screen (5) is displayed, press monitor dial (2) on the switch panel.

LOOK: Does main menu (1) display?

Rotate monitor dial to highlight settings menu.

Press monitor dial.

LOOK: Does settings menu display?

At settings menu, rotate monitor dial to highlight rear view camera monitor.

Press monitor dial to display rear view camera monitor menu.

LOOK: Does rear view camera monitor menu display?

Press monitor dial to turn camera ON (enable).

Press home button (4).



TX1087390A —UN—27JAN11

Rear View Image

6—Rear View Image

LOOK: Does rear view image (6) display on default screen?

Repeat above steps.

At rear view camera monitor menu, press monitor dial to turn camera OFF (disable).

Press home button.

LOOK: Does default screen appear without rear view image?

YES: Go to next check.

NO: Menus do not display. Check monitor 5 A fuse (F14) (marked MONITOR). See Fuse and Relay Specifications. (Group 9015-10.)

NO: See Rear Camera Harness (W19) Component Location and see Rear Camera Harness (W19) Wiring Diagram. (Group 9015-10.)

Continued on next page

TZ24494,0000F9A -19-10FEB14-13/57

LOOK: Do dig and travel functions operate?

IMPORTANT: Avoid connector damage. Do not install connector with impact wrench or power tools. Over torquing will result in permanent damage to connector. Torque only to specification.

Specification

100-Pin Connector (X3)—Torque.....10 N·m
89 lb.-in.

YES: Go to next check.

NO: See Cab Harness (W1) Wiring Diagram. (Group 9015-10.)

See Pilot Shutoff Switch Harness (W11) Wiring Diagram. (Group 9015-10.)

See Pilot Shutoff Circuit Theory of Operation. (Group 9015-15.)

See Pilot Control Valve Operation. (Group 9025-05.)

Continued on next page

TZ24494,0000F9A - 19-10FEB14-24/57

Operational Checkout Procedure

Fully actuate swing function. Swing counterclockwise 90 degrees and then release lever.

LOOK: Does upperstructure stop within 45 degrees (1/8 turn) or less after releasing lever?

NO: Perform Swing Motor Leakage Test. (Group 9025-25.)

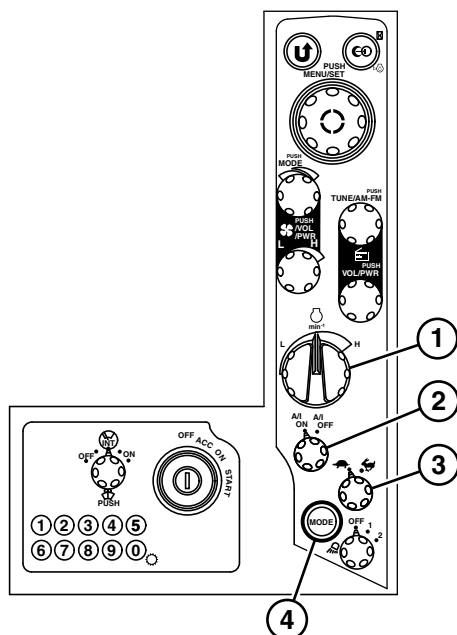
Perform Swing Motor Crossover Relief Valve Test and Adjustment. (Group 9025-25.)

NO: Check swing valve spool and spring. See Control Valve Front (6-Spool) Disassemble and Assemble. (Group 3360.)

Continued on next page

TZ24494,0000F9A -19-10FEB14-35/57

Bucket Regenerative Valve Operation Check



TX1086753 —UN—11JAN11

Switch Panel

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

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

Press power mode button (4) until PWR (power) mode is displayed on monitor.

Actuate boom up, arm out and bucket dump functions.

Actuate boom down function, arm in function, and then bucket curl function.

LOOK: Does the bucket move smoothly through the complete cycle and not hesitate when it goes to the curl position?

YES: Go to next check.

NO: Check bucket regenerative valve. See [Bucket Regenerative Valve Circuit Operation](#). (Group 9025-05.)

Continued on next page

TZ24494,0000F9A -19-10FEB14-47/57

Turn temperature control/mode switch (5) clockwise to maximum heat position.
LOOK: Does vent position change?
LOOK: Does temperature setting increase?
FEEL: Does warm air come from the vents?
 Turn temperature control/mode switch counterclockwise to maximum cold position.
LOOK: Does vent position change?
LOOK: Does temperature setting decrease?
FEEL: Does cool air come from the vents?
 Press blower speed switch.
LISTEN: Does air conditioner compressor clutch solenoid "click"? (Air conditioner and heater are ON in manual mode.)
LOOK: Does AUTO display go OFF?
 Turn temperature control/mode switch clockwise to maximum heat position.
LOOK: Does vent position change?
LOOK: Does temperature setting increase?
FEEL: Does warm air come from the vents?
 Turn temperature control/mode switch counterclockwise to maximum cold position.
LOOK: Does vent position change?
LOOK: Does temperature setting decrease?
FEEL: Does cool air come from the vents?
 Press temperature control/mode switch.
LOOK: Does vent position change?
 Repeat for all four vent positions.
LOOK: Does vent position change each time switch is pressed?
 Press blower speed switch.

LOOK: Are air conditioner and heater OFF? (Press blower speed switch to start air conditioner and heater.)

IMPORTANT: Avoid connector damage. Do not install connector with impact wrench or power tools. Over torquing will result in permanent damage to connector. Torque only to specification.

Specification

100-Pin Connector (X3)—Torque.....10 N·m
 89 lb.-in.

YES: Checks complete.

NO: Heater fan does not blow air. Check air conditioner and heater 20 A fuse (F3) (marked HEATER). [See Fuse and Relay Specifications](#). (Group 9015-10.)

NO: Check wiring harness. [See System Functional Schematic](#), [see Cab Harness \(W1\) Wiring Diagram](#), and [see Heater and Air Conditioner Harness \(W41\) Wiring Diagram](#). (Group 9015-10.)

NO: Check system operation. [See Heater and Air Conditioner Operational Checks](#). (Group 9031-25.)

TZ24494,0000F9A -19-10FEB14-57/57

The engine speed is controlled by the following items:

- Engine speed dial (1)
- Power mode
 - H/P (high power)
 - PWR (power)
 - ECO (economy)
- Work mode
- Travel HP (high power) mode control
- Heater control
- Auto-idle control
- Auto warm-up control
- Idle speed-up control
- ECO control

Engine Speed Dial

The purpose of the engine speed dial is to control the engine speed via operator input.

The main controller (MCZ) uses input signals from the engine speed dial, hydraulic pressure sensors, and temperature sensors to determine appropriate engine speed. The main controller then sends a signal via controller area network (CAN) to the engine control unit (ECU). The ECU then sets engine rpm.

H/P (High Power) Mode

The purpose of H/P mode is to increase engine speed using certain hydraulic functions.

The main controller sends a signal to the ECU via CAN to raise engine rpm when the following conditions are met:

- Power mode: H/P.
- Work mode: Bucket.
- Engine speed dial set to fast idle.
- Arm in, boom up, or a combination of both functions actuated.
- Pump delivery pressure high.

PWR (Power) Mode

The function of PWR mode is to control the engine speed from slow idle to fast idle in response to the position of the engine speed dial.

ECO (Economy) Mode

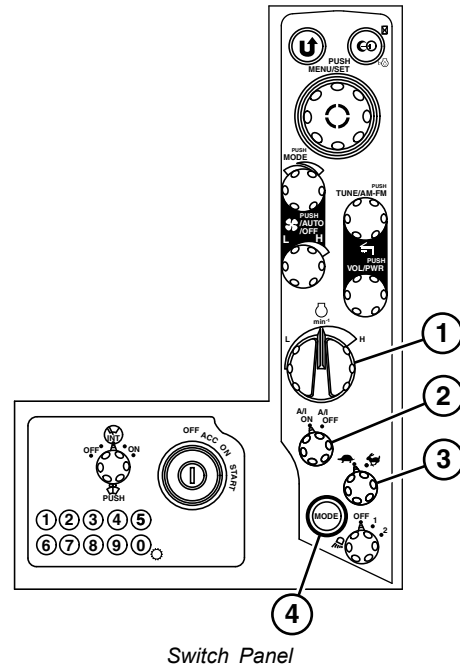
The purpose of ECO mode is to lower engine speed to reduce fuel consumption and noise level.

The main controller receives input signals from the engine speed dial, power mode button (4), and pump delivery pressure sensors, and then sends a signal via CAN to the ECU to reduce engine rpm when the following conditions are met:

- Engine speed dial set to greater than ECO mode speed.
- Power mode: ECO.

Travel HP (High Power) Mode Control

The purpose of travel HP mode control is to increase engine speed for faster travel.



1— Engine Speed Dial
2— Auto-Idle Switch

3— Travel Mode Switch
4— Power Mode Button

The main controller uses input signals from the travel pressure sensor, engine speed dial, travel mode switch (3), and delivery pressure sensors to determine appropriate engine speed. The main controller then sends a signal via CAN to the ECU to increase engine speed when the following conditions are met:

- Engine speed dial set to fast idle.
- Travel mode switch is at fast (rabbit) speed position.
- Travel pressure sensor is on.
- Either pump 1 or pump 2 delivery pressure sensor must indicate high pressure.

Heater Control

NOTE: Heater control engine mode is independent of heating and air conditioning system operation. Operation of heating and air conditioning system will not change engine speeds.

The purpose of the heater control selection is to accelerate the warm-up speed of the cab heater by increasing the engine speed at low engine coolant temperature.

The main controller sends a signal via CAN to the ECU to increase the engine rpm when the following conditions are met:

- Engine speed dial set to fast idle.
- Engine coolant temperature is 5°C (41°F) or lower.
- Pilot shutoff lever in the locked (UP) position.

Heater control selection is activated when the key switch is turned ON and is deactivated if any other engine speed controls are activated.

TX1131978 —UN—28JUN13

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Explanation of Wire Markings

Electrical harness wires are identified by color, with no number stamped on wire. Wire numbers are used on some connector drawings simply as reference numbers, useful in tracing wires through the harness.

Some wires are solid wire colors. These would be identified by one color name such as RED or BLK or GRN.

Other wire colors are identified with two color names. These are solid wires with a narrow stripe. For example, a wire identified as RED/WHT would be a primarily RED wire, with a WHT stripe. A wire identified as WHT/RED would be a primarily WHT wire with a RED stripe.

Following is a listing of wire color abbreviations used on drawings.

- BLK—Black

- BLU—Blue
- BRN—Brown
- CABLE—Bare Wire
- DK GRN—Dark Green
- GRN—Green
- GRY—Grey
- LT BLU—Light Blue
- LT GRN—Light Green
- ORG—Orange
- PNK—Pink
- PUR—Purple
- RED—Red
- SK BLU—Sky Blue
- VLT—Violet
- WHT—White
- YEL—Yellow

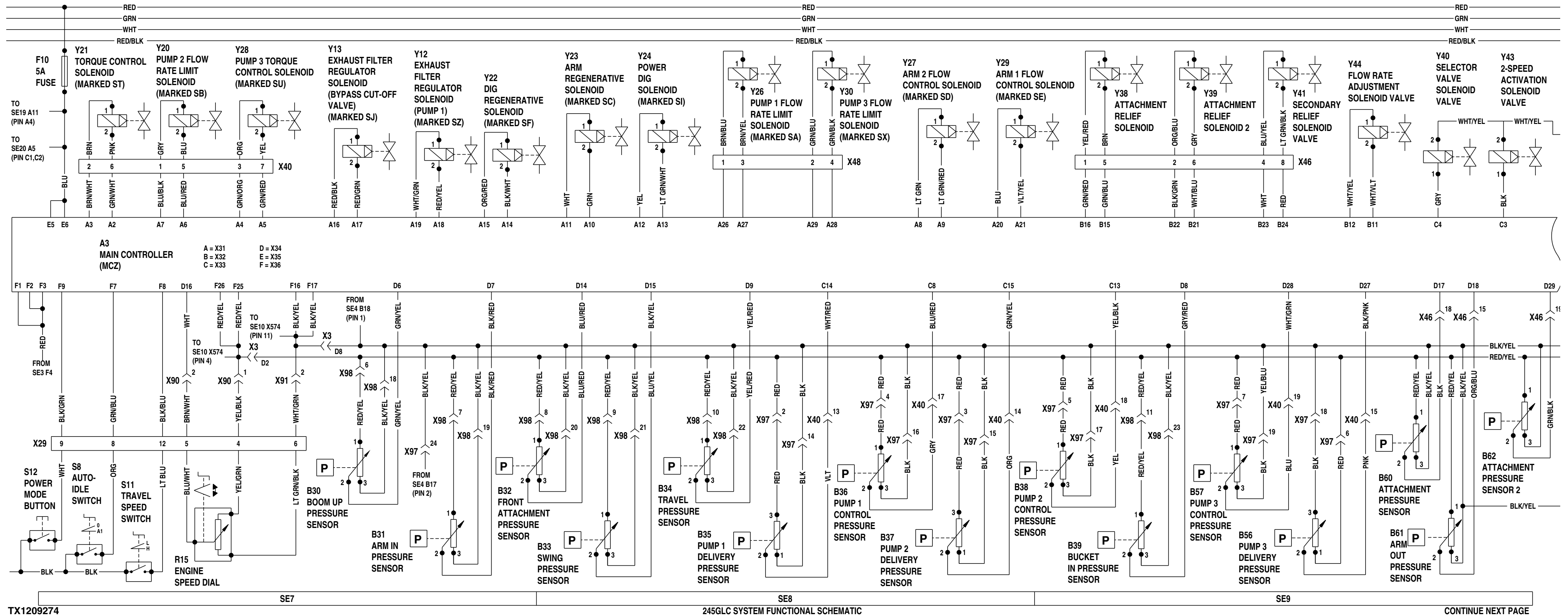
CW08338,0000D03 -19-28AUG12-1/1

- Y32—Boom 3 Spool Control Solenoid (marked A1) (SE10) (W43)
- Y34—Right Solenoid (marked SR/H) (SE27) (W61)
- Y35—Left Solenoid (marked SL/H) (SE27) (W61)
- Y38—Attachment Relief Solenoid (SE9) (W17)
- Y39—Attachment Relief Solenoid 2 (SE9) (W17)
- Y40—Selector Valve Solenoid Valve (SE9) (W17)
- Y41—Secondary Relief Solenoid Valve (SE9) (W17)
- Y43—2-Speed Activation Solenoid Valve (SE9) (W32)

- Y44—Flow Rate Adjustment Solenoid Valve (SE9) (W32)
- Y61—Auxiliary Function Lever (AFL) Solenoid A (marked 1A) (SE30) (W76)
- Y62—Auxiliary Function Lever (AFL) Solenoid B (marked 1B) (SE30) (W76)
- Y66—Secondary Pilot Shutoff Solenoid Valve (marked PiC) (SE30) (W76)

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CW08338,0000D05 -19-15SEP16-6/6

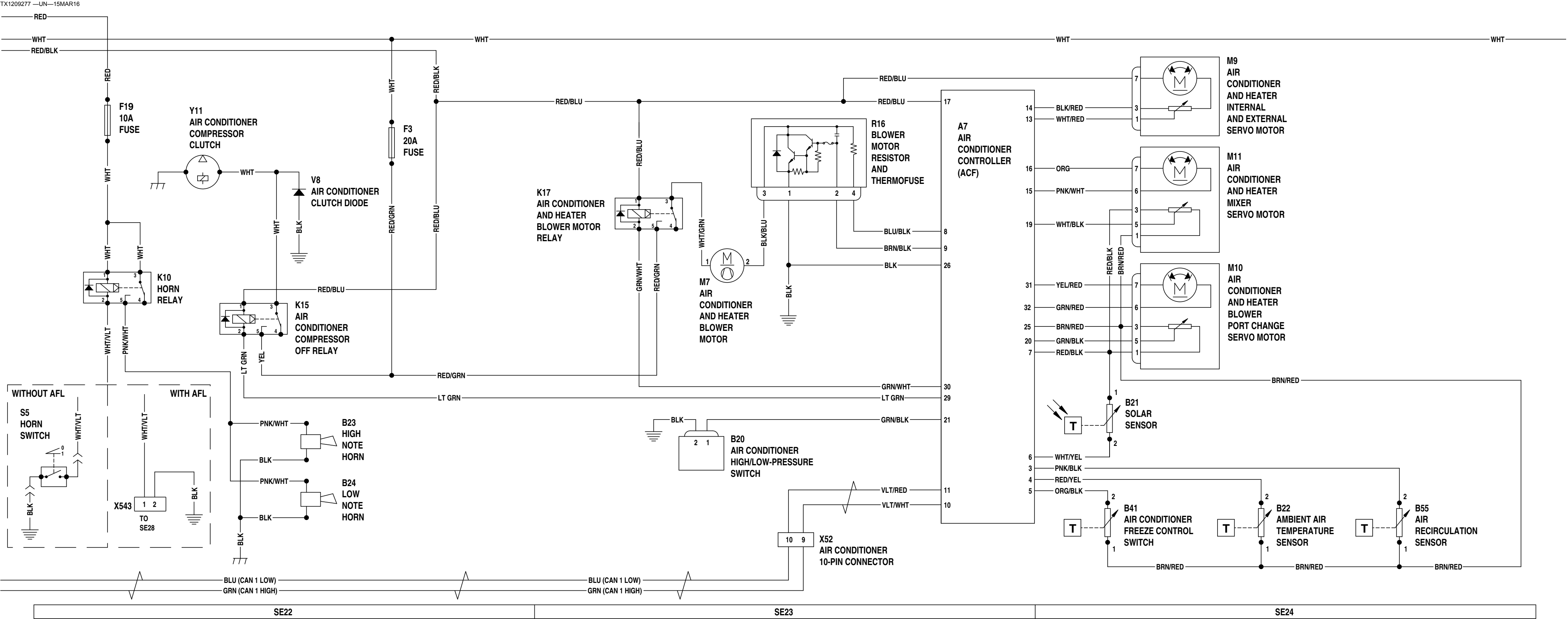


A1—Engine Control Unit (ECU)	B49— Exhaust Temperature Sensor 1 (DPF)	X9— Machine Harness-to-Engine Harness 20-Pin Connector	X101— Fuel Injector Harness Connector 1
A2—Variable Geometry Turbocharger (VGT)	B50— Exhaust Temperature Sensor 2 (DOC)	X14— Engine Control Unit (ECU)-to-Machine Harness 60-Pin Connector	Y1—Electronic Injector 1
B2—Camshaft Position Sensor	B51— Turbocharger Position Sensor	X15— Engine Control Unit (ECU)-to-Machine Harness 94-Pin Connector	Y2—Electronic Injector 2
B3—Manifold Air Temperature Sensor	R8—Engine CAN Termination Resistor	X40— Pump Harness-to-Machine Harness Connector	Y3—Electronic Injector 3
B4—Engine Coolant Temperature Sensor	X1—Service ADVISOR™ Diagnostic Connector	X71— Machine Harness-to-Service ADVISOR™ Harness 8-Pin Connector	Y4—Electronic Injector 4
B7—Turbocharger Boost Temperature Sensor	X5— Machine Harness-to-Engine Harness 32-Pin Connector	X72— Machine Harness-to-Service ADVISOR™ Harness 3-Pin Connector	Y14— Suction Control Valve
B11— Engine Oil Pressure Sensor	X7— Machine Harness-to-Engine Harness 14-Pin Connector		Y16— Turbocharger Actuator
B13— Fuel Filter Restriction Sensor			
B45— Barometric Pressure Sensor			
B48— Exhaust Differential Pressure Sensor			

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CW08338,0000D06 -19-15SEP16-10/20



TX1209277

245GLC SYSTEM FUNCTIONAL SCHEMATIC
System Functional Schematic (SE22—SE24) (8 of 10)

CONTINUE NEXT PAGE

CW08338,0000D06 -19-15SEP16-15/20

Continued on next page

B68— Secondary Hydraulic Oil Temperature Sensor	S33— Left Pilot Control Lever Switch A	X538— Auxiliary Function Lever (AFL) Right Grip Harness Connector (marked R_LEVER)	X574— Auxiliary Function Lever (AFL) Connector
B85— Auxiliary Function Lever (AFL) Solenoid Pressure Sensor (marked PS1)	S34— Right Enable Switch		X577— Auxiliary Function Lever (AFL) Harness-to-Auxiliary Function Lever (AFL) Solenoid Harness Connector
K31— Right Solenoid Relay A (marked RSW1)	S35— Left Enable Switch	X539— Auxiliary Function Lever (AFL) Left Grip Harness Connector (marked L_LEVER)	Y61— Auxiliary Function Lever (AFL) Solenoid A (marked 1A)
K32— Left Solenoid Relay B (marked LSW1)	S45— Auxiliary Function Enable Switch	X541— Auxiliary Function Lever (AFL) Right Switch Connector (marked R-SW)	Y62— Auxiliary Function Lever (AFL) Solenoid B (marked 1B)
K33— Left Solenoid Relay A (marked LSW3)	V22— Pilot Shutoff Solenoid Diode		Y66— Secondary Pilot Shutoff Solenoid (marked PiC)
S5— Horn Switch	X26— Optional Connector (2 used)	X542— Auxiliary Function Lever (AFL) Left Switch Connector (marked L-SW)	
S7— Power Dig Switch	X534— Right Auxiliary Solenoid Connector (marked SR/H)	X543— Auxiliary Function Lever (AFL) Horn Switch Connector	
S29— Auxiliary Function Lever (AFL) Proportional Control Switch	X535— Left Auxiliary Solenoid Connector (marked SL/H)	X544— Auxiliary Function Lever (AFL) Power Dig Switch Connector	
S31— Right Pilot Control Lever Switch A	X536— Right Auxiliary Function Lever (AFL) Connector (marked R_GRIP)		
S32— Left Pilot Control Lever Switch B	X537— Left Auxiliary Function Lever (AFL) Connector (marked L_GRIP)		

CW08338,0000D06 -19-15SEP16-20/20

Cab Harness (W1) Component Location

IMPORTANT: Avoid connector damage. Do not install connector with impact wrench or power tools. Over torquing will result in permanent damage to connector. Torque only to specification.

Specification

100-Pin Connector	
(X3)—Torque.....	10 N·m 89 lb·in

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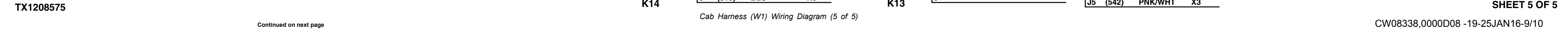
CW08338,0000D07 -19-02MAR16-1/3

System Diagrams

1— Continued on Sheet 3	X20— Monitor Controller (DSZ)	X22— Monitor Controller (DSZ)	X578— Not Used
X10— Machine Controller (BCZ)	28-Pin Connector A	16-Pin Connector D	
8-Pin Connector A	X21— Monitor Controller (DSZ)	X41— Data Converter Harness	
X11— Machine Controller (BCZ)	36-Pin Connector B	Connector	
20-Pin Connector B		X76— Cab Harness Connector 1	
		(not used)	

Continued on next page

CW08338,0000D08 -19-25JAN16-4/10



System Diagrams

1—Continued on Sheet 3
2—Continued on Sheet 3
3—Continued on Sheet 3
A2—Variable Geometry
Turbocharger (VGT)
B23—High Note Horn
B24—Low Note Horn

B32—Front Attachment Pressure
Sensor
E2—Boom Light
R8—Engine CAN Termination
Resistor
X3—Cab Harness-to-Machine
Harness 100-Pin Connector
X4—Cab Harness-to-Machine
Harness 32-Pin Connector

X14—Engine Control Unit
(ECU)-to-Engine Harness
60-Pin Connector
X15—Engine Control Unit
(ECU)-to-Engine Harness
94-Pin Connector
X46—Attachment Connector

X48—Attachment Connector 2
X104—Not Used
X105—Not Used
X109—Not Used

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CW08338,0000D0A -19-15SEP16-4/8

B1—Crankshaft Position Sensor	X6— Machine Harness-to-Engine	X8— Machine Harness-to-Engine	Y16— Turbocharger Actuator
B2—Camshaft Position Sensor	Harness 16-Pin Connector	Harness 1-Pin Connector	
X5— Machine Harness-to-Engine	X7— Machine Harness-to-Engine	X9— Machine Harness-to-Engine	
Harness 32-Pin Connector	Harness 14-Pin Connector	Harness 20-Pin Connector	

CW0833,0000BDD -19-06MAY14-4/4

Side Monitor Harness (W6) Wiring Diagram

TX1175094 —UN—17NOV14

NUMBER	COLOR	END #1	END #2
1	GRY	X12	X69
3	BLK/YEL	X12	X69
4	WHT	X12	X69
5	RED	X12	X69
6	LTGRN/RED	(612)	X13
7	WHT/YEL	(610)	X13
8	BLU	X13	(615)
11	BLU	(8)	W38
12	BLU/WHT	V17	X13
13	PNK	(1236)	V17
15	YEL/RED	X29B	X29A
16	GRN/WHT	X29A	X29B
17	RED/GRN	X29A	X29B
36	WHT	X68	X12
111	GRY	X68	X12
610	WHT/YEL	X26	X26
611	RED	X26	X26
612	LTGRN/RED	X26	X26
615	BLU	X26	X26
616	BLU/RED	X26	X26
617	RED/BLU	X26	X26
870	BLU/RED	X29A	X29B
1135	WHT	X12	X66
1160	ORG	X29B	X29A
1187	BLU/WHT	X29A	X29B
1189	BLU/PNK	X29A	X29B
1191	LTGRN	X29A	X29B
1219	RED	X29A	X29B
1221	BLK/GRN	X29A	X29B
1225	BLK/BLU	X29A	X29B
1231	WHT/GRN	X29A	X29B
1234	WHT/VLT	X29A	X29B
1236	GRN/WHT	X29A	X29B
1243	BRN/WHT	X29A	X29B
1269	YEL/BLU	X29A	X29B
1303	GRY	X66	X12

X12			
1	(1135)	WHT	X66
2	—		
3	(36)	WHT	X68
4	—		
5	(4)	WHT	X69
6	—		
7	—		
8	(5)	RED	X69
9	—		
10	(1303)	GRY	X66
11	(111)	GRY	X68
12	—		
13	(1)	GRY	X69
14	(3)	BLK/YEL	X69
15	—		
16	—		

		X12						
1	1135		36		4			5
9		1303	111		1	3		

1	(11)	BLU	(8)
---	------	-----	-----

W38

X26		
1	610	611
4	616	617

X26

3	612	611	610
6	615	617	616

X26			
1	(610)	WHT/YEL	X26
2	(611)	RED	X26
3	(612)	LTGRN/RED	X26
4	(616)	BLU/RED	X26
5	(617)	RED/BLU	X26
6	(615)	BLU	X26

X29B			
1	(1187)	BLU/WHT	X29A
2	(1191)	LT GRN	X29A
3	(1189)	BLU/PNK	X29A
4	(1269)	YEL/BLU	X29A
5	(1243)	BRN/WHT	X29A
6	(1231)	WHT/GRN	X29A
7	(15)	YEL/RED	X29A
8	(1160)	ORG	X29A
9	(1221)	BLU/GRN	X29A
10	(17)	RED/GRN	X29A
11	(16)	GRN/WHT	X29A
12	(1225)	BLK/BLU	X29A
13	(1234)	WHT/VLT	X29A
14	(1236)	GRN/WHT	X29A
15	(1219)	RED	X29A
16	(870)	BLU/RED	X29A

X29B

7								1
15	1231	1243	1269		1189	1191	1187	
870	1219	1236	1234	1225	16	17	1221	1160
16				8				

X29A

1										7									
1187	1191	1189			1269	1243	1231	15											
1160	1221	17	16	1225	1234	1236	1219	870											
8										16									

X29A			
1	(1187)	BLU/WHT	X29B
2	(1191)	LT GRN	X29B
3	(1189)	BLU/PNK	X29B
4	(1269)	YEL/BLU	X29B
5	(1243)	BRN/WHT	X29B
6	(1231)	WHT/GRN	X29B
7	(15)	YEL/RED	X29B
8	(1160)	ORG	X29B
9	(1221)	BLU/GRN	X29B
10	(17)	RED/GRN	X29B
11	(16)	GRN/WHT	X29B
12	(1225)	BLK/BLU	X29B
13	(1234)	WHT/VLT	X29B
14	(1236)	GRN/WHT	X29B
15	(1219)	RED	X29B
16	(870)	BLU/RED	X29B

X13			
1	—		
2	—		
3	—		
4	—		
5	—		
6	—		
7	(12)	BLU/WHT	V17
8	—		
9	(7)	WHT/YEL	(610)
10	(6)	LTGRN/RED	(612)
11	(8)	BLU	(615)
12	—		
13	—		
14	—		
15	—		
16	—		
17	—		
18	—		
19	—		
20	—		

A 2x10 grid representing a periodic table. The top row has boxes at positions 1, 13, and 19. The bottom row has boxes at positions 8, 12, 17, and 18. A callout box labeled 'X13' points to the box at position 13. The grid is labeled with numbers 1 through 20 around the perimeter.

V17			
A	(12)	BLU/WHT	X13
K	(13)	PNK	(1236)

X68			
1	(36)	WHT	X12
2	(111)	GRY	X12

X66			
1	(1135)	WHT	X12
2	(1303)	GRY	X12

X69			
1	(5)	RED	X12
2	(3)	BLK/YEL	X12
3	(4)	WHT	X12
4	(1)	GRY	X12

TX1175094

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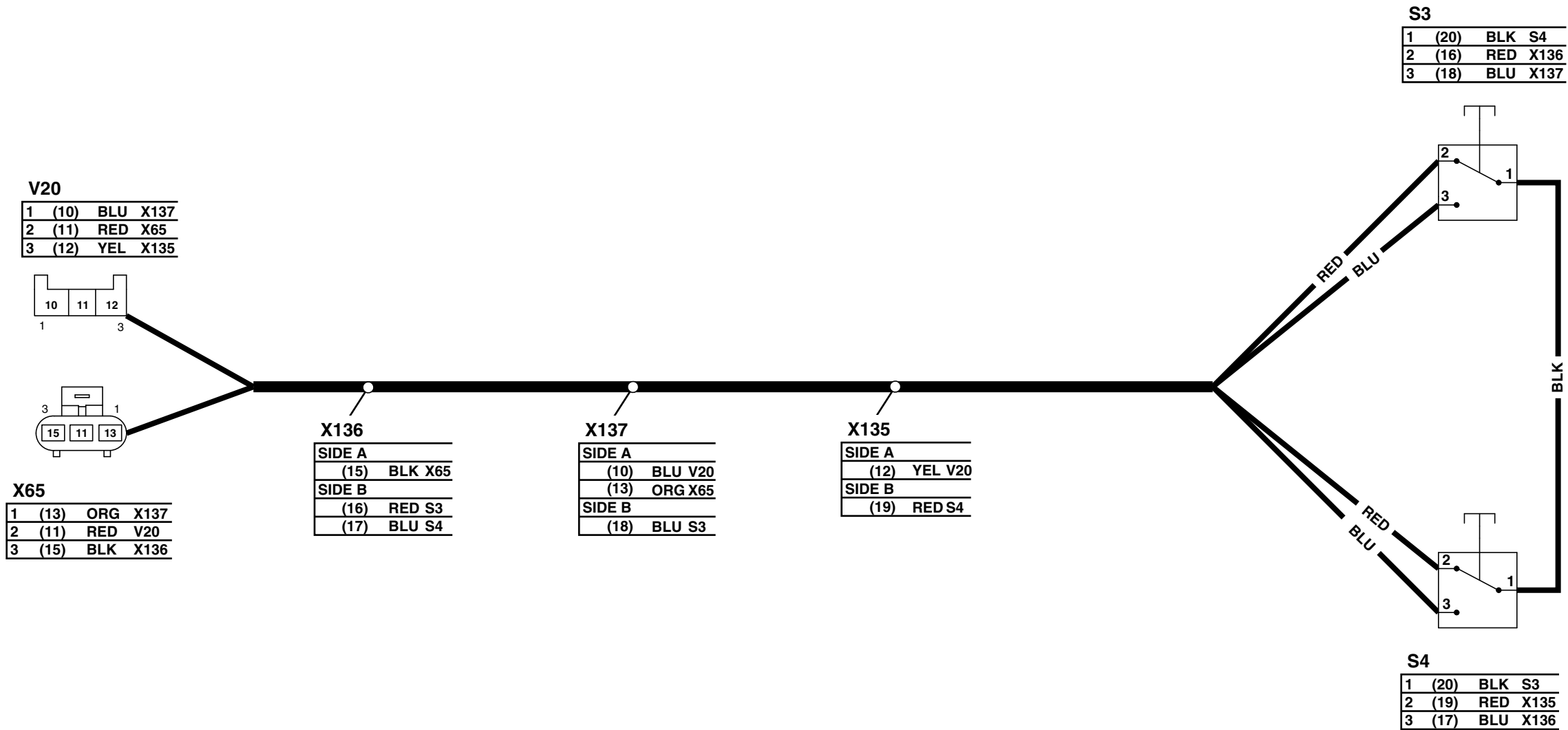
Side Monitor Harness (W6) Wiring Diagram

MB00333,0000241 -19-13JAN15-1/2

Pilot Shutoff Switch Harness (W11) Wiring Diagram

TX1087210 —UN—22FEB11

NUMBER	COLOR	END #1	END #2
(10)	BLU	V20	X137
(11)	RED	V20	X65
(12)	YEL	V20	X135
(13)	ORG	X65	X137
(15)	BLK	X65	X136
(16)	RED	X136	S3
(17)	BLU	X136	S4
(18)	BLU	X137	S3
(19)	RED	X135	S4
(20)	BLK	S3	S4



TX1087210

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Pilot Shutoff Switch Harness (W11) Wiring Diagram

CW08338,0000D14 -19-29MAY13-1/2

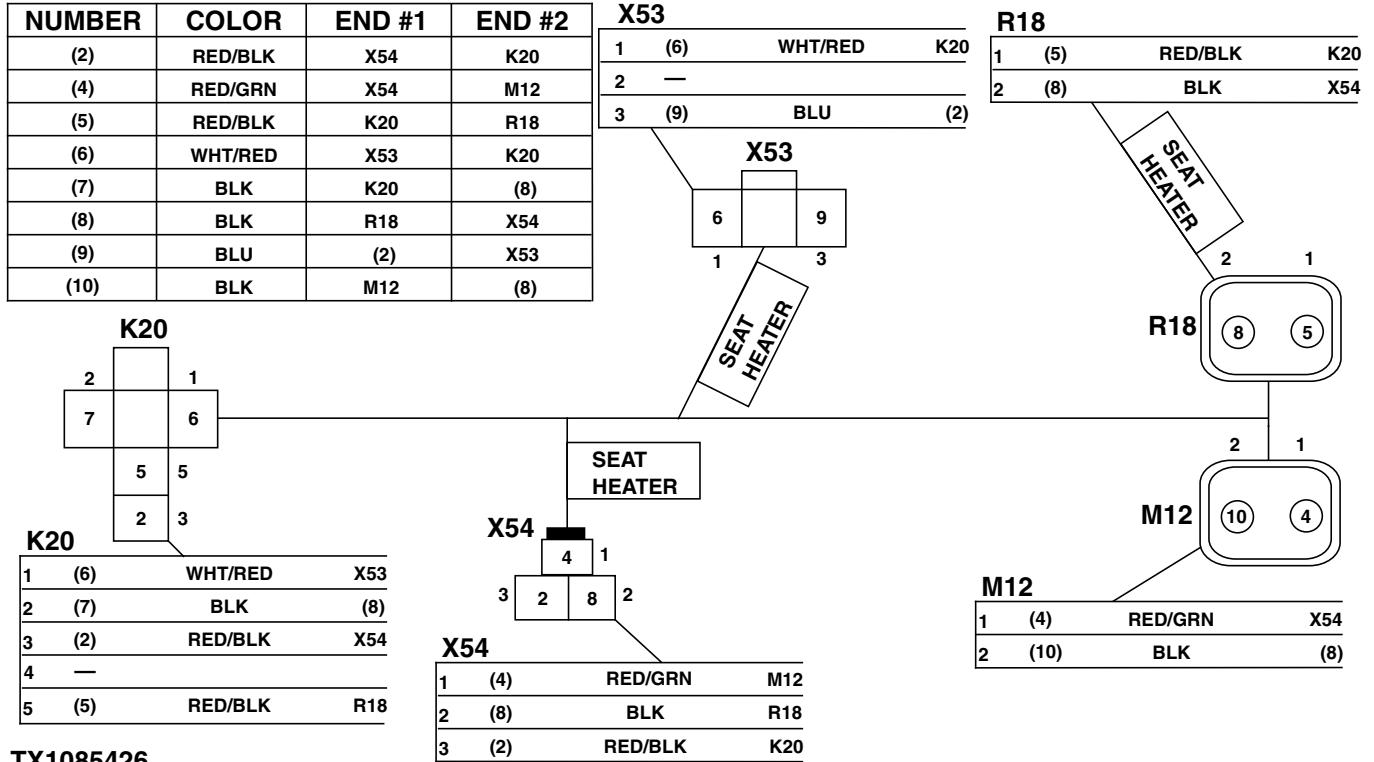
K20— Seat Heater Relay
M12— Seat Air Compressor
R18— Seat Heater (marked SEAT HEATER)
S62— Seat Heater Switch

W14—Heated Air Seat Harness
W24—Seat Heater Switch Harness
X53— Heated Air Seat Harness-to-Heated Seat Switch Harness 3-Pin Connector (marked SEAT HEATER)

X54— Auxiliary Fuse Box
Harness-to-Heated Air Sear Harness 3-Pin Connector (marked SEAT HEATER)

CW08338,0000D17 -19-28AUG12-2/2

Heated Air Seat Harness (W14) Wiring Diagram



TX1085426

Seat Heater Switch Harness (W14) Wiring Diagram

K20— Seat Heater Relay
M12— Seat Air Compressor Motor
R18— Seat Heater (marked SEAT HEATER)

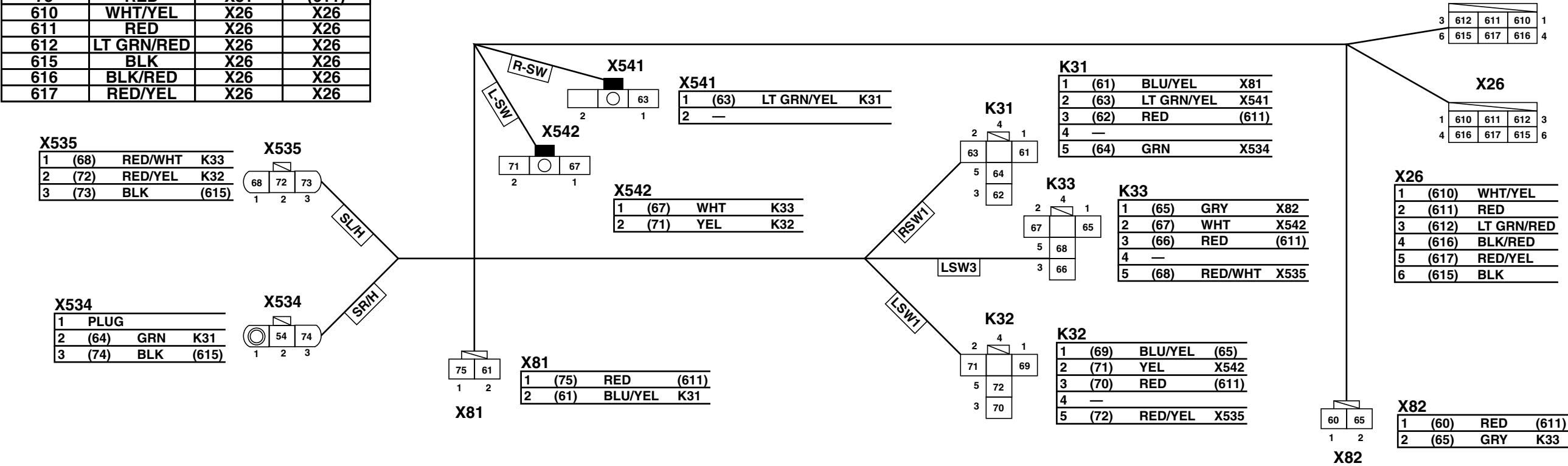
X53— Heated Air Seat Harness-to-Heated Seat Switch Harness 3-Pin Connector (marked SEAT HEATER)

X54— Auxiliary Fuse Box
Harness-to-Heated Air Seat Harness 3-Pin Connector (marked SEAT HEATER)

CW08338,0000D18 -19-28AUG12-1/1

TX1207858 —UN—15DEC15

NUMBER	COLOR	END #1	END #2
60	RED	X82	(611)
61	BLU/YEL	X81	K31
62	RED	K31	(611)
63	LT GRN/YEL	X541	K31
64	GRN	K31	X534
65	GRY	K33	X82
66	RED	K33	(611)
67	WHT	X542	K33
68	RED/WHT	K33	X535
69	BLU/YEL	K32	(65)
70	RED	K32	(611)
71	YEL	X542	K32
72	RED/YEL	K32	X535
73	BLK	(615)	X535
74	BLK	X534	(615)
75	RED	X81	(611)
610	WHT/YEL	X26	X26
611	RED	X26	X26
612	LT GRN/RED	X26	X26
615	BLK	X26	X26
616	BLK/RED	X26	X26
617	RED/YEL	X26	X26



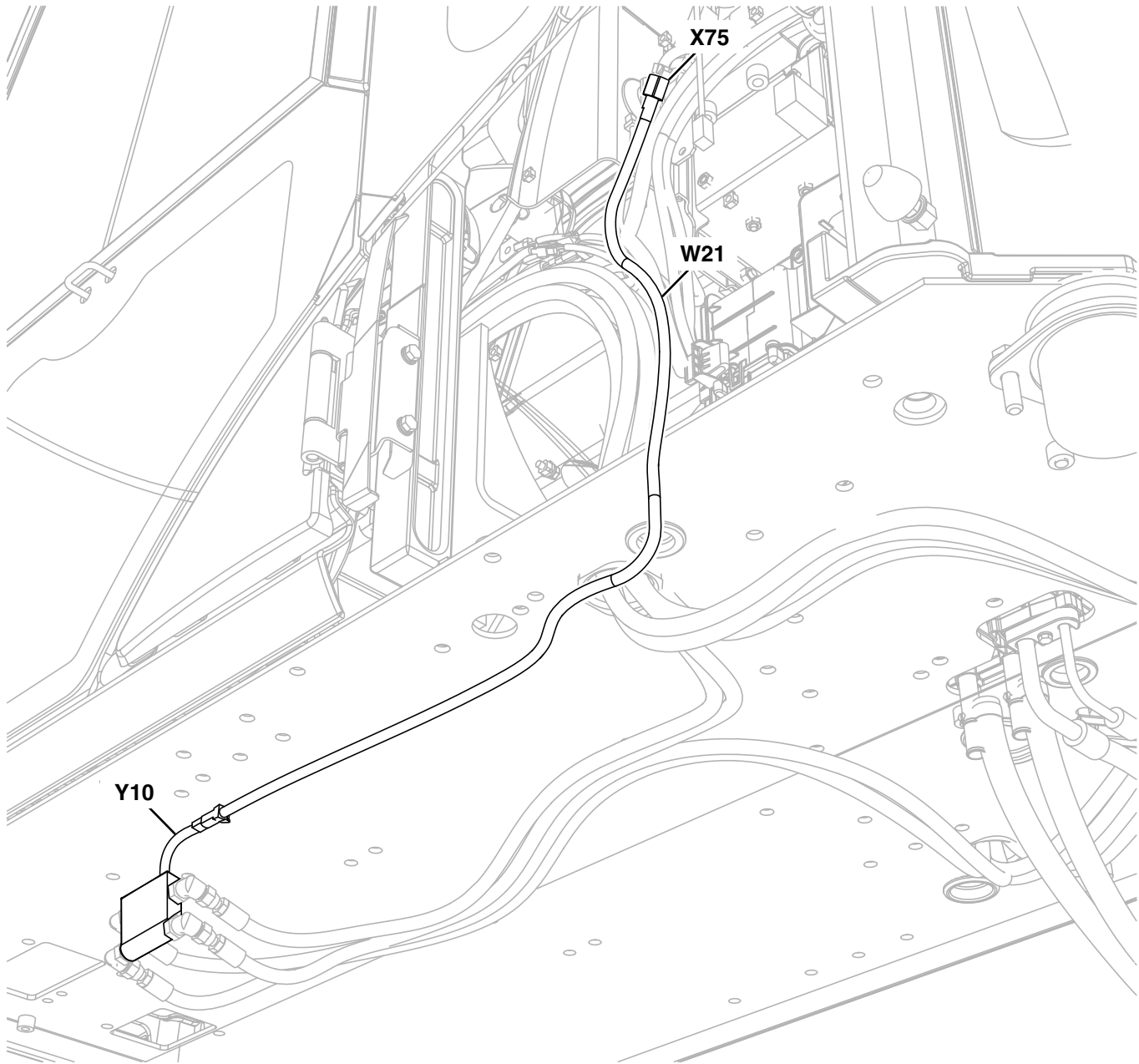
TX1207858

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Multi-Function Pilot Control Lever Harness (W15) Wiring Diagram (auxiliary function lever [AFL] equipped)

DF89619,00B5DAA -19-26FEB16-3/4

Pilot Shutoff Valve Harness (W21) Component Location



TX1087293

Pilot Shutoff Valve Harness (W21) Component Location

W21—Pilot Shutoff Valve Harness X75— Cab Harness-to-Pilot Shutoff Valve Harness Connector Y10— Pilot Shutoff Solenoid

TX1087293 —UN—25JAN11

CW08338,0000D23 -19-28AUG12-1/1

System Diagrams

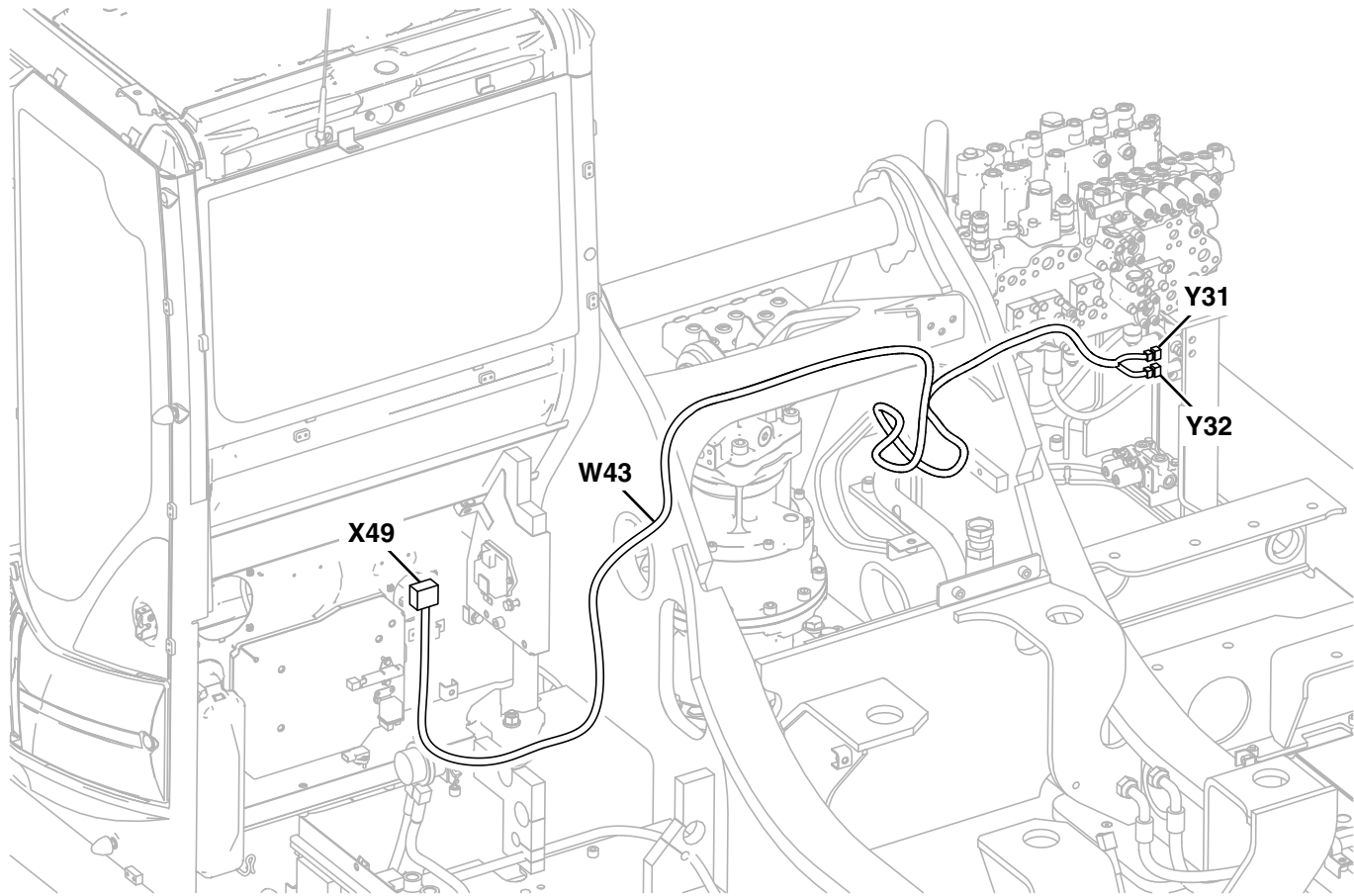
A5—Data Converter	W30—Data Converter Harness	X42— CAN 1 Connector
R10— Interface CAN Resistor 1	X41— Data Converter Harness Connector	X70— Data Converter Interface Connector

CW08338,0000D2F -19-30AUG12-2/2

A7—Air Conditioner Controller (ACF)	M7—Air Conditioner and Heater Blower Motor	M11— Air Conditioner and Heater Mixer Servo Motor	X300— 7 RED/BLK Splice
B41— Air Conditioner Freeze Control Switch	M9—Air Conditioner and Heater Internal and External Servo Motor	R16— Blower Motor Resistor and Thermofuse	X301— 17 RED/BLU Splice
B55— Air Recirculation Sensor	M10— Air Conditioner and Heater Blower Port Change Servo Motor	X51— Air Conditioner 4-Pin Connector	X302— 25 BRN/RED Splice
K15— Air Conditioner Compressor Off Relay		X52— Air Conditioner 10-Pin Connector	X303— 26 BLK Splice
K17— Air Conditioner and Heater Blower Motor Relay			

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Spool Control Harness (W43) Component Location



TX1121331

Spool Control Harness (W43) Component Location

W43—Spool Control Harness	Y31— Arm 3 Spool Control Solenoid (marked A2)	Y32— Boom 3 Spool Control Solenoid (marked A1)
X49— Cab Harness-to-Spool Control Harness Connector		

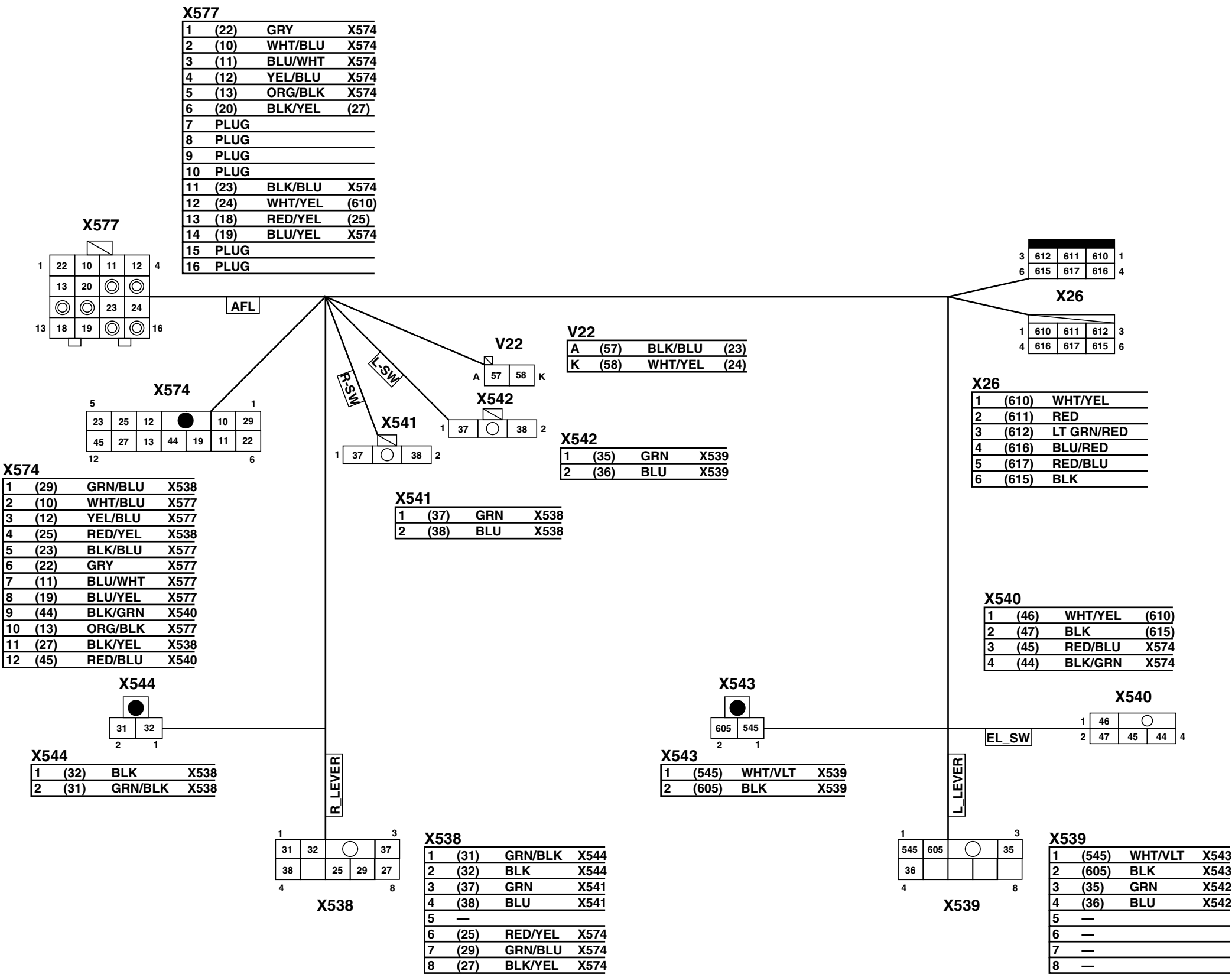
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CW08338,0000D35 -19-28AUG12-1/1

Auxiliary Function Lever (AFL) Harness (W75) Wiring Diagram

TX1207859 —UN—15DEC15

NUMBER	COLOR	END #1	END #2
10	WHT/BLU	X577	X574
11	BLU/WHT	X577	X574
12	YEL/BLU	X577	X574
13	ORG/BLK	X577	X574
18	RED/YEL	(25)	X577
19	BLU/YEL	X577	X574
20	BLK/YEL	X577	(27)
22	GRY	x574	X577
23	BLK/BLU	X574	X577
24	WHT/YEL	X577	(610)
25	RED/YEL	X538	X574
27	BLK/YEL	X538	X574
29	GRN/BLU	X538	X574
31	GRN/BLK	X538	X544
32	BLK	X538	X544
35	GRN	X539	X542
36	BLU	X539	X542
37	GRN	X538	X541
38	BLU	X538	X541
44	BLK/GRN	X574	X540
45	RED/BLU	X574	X540
46	WHT/YEL	X540	(610)
47	BLK	X540	(615)
57	BLK/BLU	V22	(23)
58	WHT/YEL	V22	(24)
545	WHT/VLT	X539	X543
605	BLK	X543	X539
610	WHT/YEL	X26	X26
611	RED	X26	X26
612	LT GRN/RED	X26	X26
615	BLK	X26	X26
616	BLU/RED	X26	X26
617	RED/BLU	X26	X26



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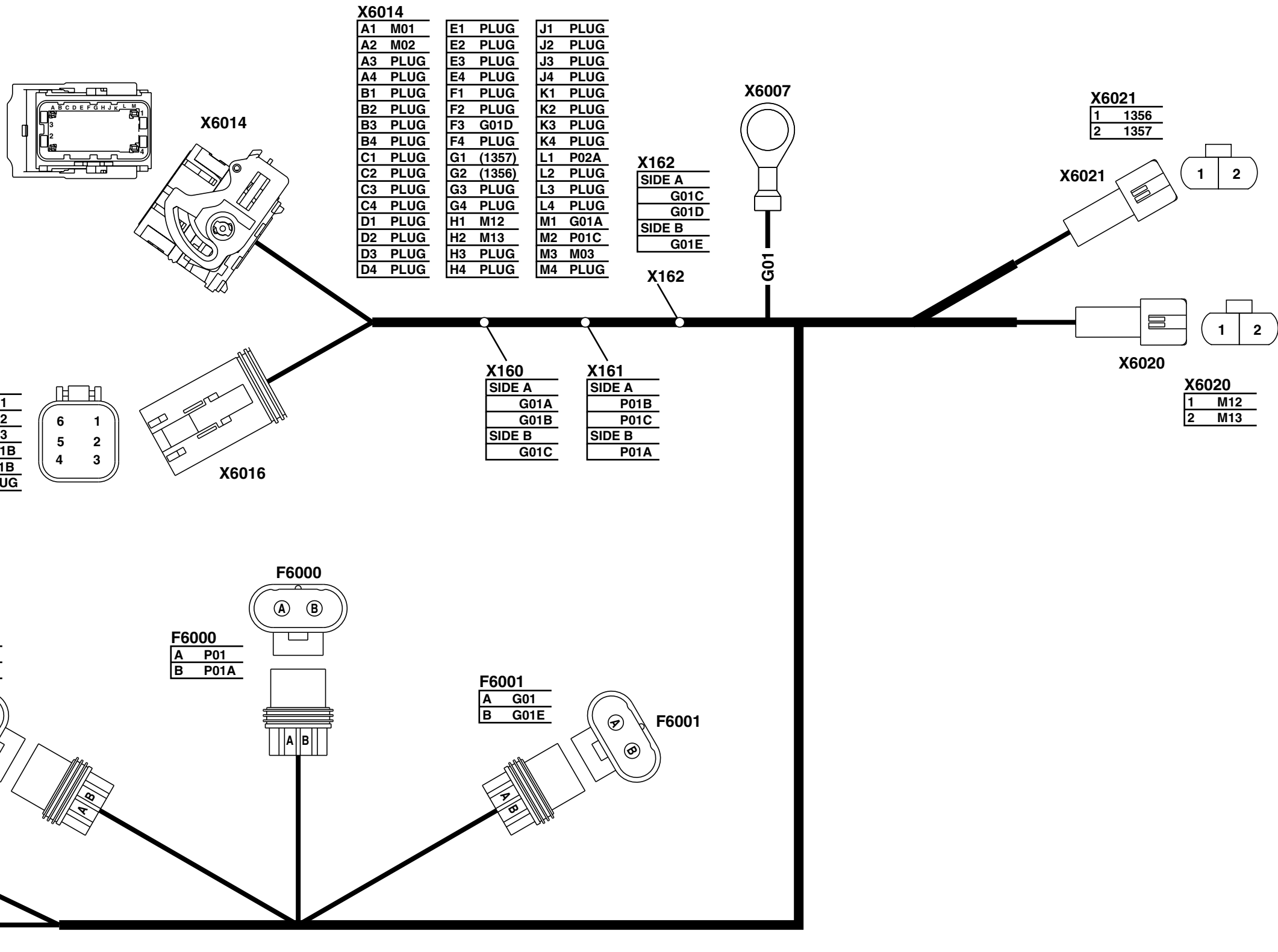
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JDLink™ Harness (W6004) Wiring Diagram

TX1120088 —UN—28AUG12

END #1	NUMBER	COLOR	END #2
X6021	1356	LT GRN	X6014
X6021	1357	YEL	X6014
X6011	G01	BLK	F6001
X160	G01A	BLK	X6014
X6016	G01B	BLK	X160
X160	G01E	BLK	F6001
W6007	G02	BLK	X6014
X6014	M01	PUR	X6016
X6014	M02	PUR	X6016
X6014	M03	PUR	X6016
X6020	M12	YEL	X6014
X6020	M13	LT GRN	X6014
K19	P01	RED	F6000
X161	P01A	RED	F6000
X6016	P01B	RED	X161
X6014	P01C	RED	X161
K19	P02	RED	F6002
X6014	P02A	RED	F6002



TX1120088

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Continued on next page

JDLink™ Harness (W6004) Wiring Diagram

CW08338,0000D3A -19-28AUG12-1/2

A1—Engine Control Unit (ECU)	F18— Idle Stop 5 A Fuse (marked IDLE STOP)	S4—Pilot Shutoff Switch 2	X20— Monitor Controller 28-Pin Connector A
A3—Main Controller (MCZ)	F60— Alternator 65 A Fuse	S6— Engine Stop Switch	X21— Monitor Controller 36-Pin Connector B
A4—Monitor Controller (DSZ)	F61— Battery 45 A Fuse	V1— Battery Relay Diode	X22— Monitor Controller 16-Pin Connector D
A5—Data Converter	G1—Battery	V3— Load Dump Relay Diode	X33— Cab Harness-to-Main Controller 17-Pin Connector C
A11— Machine Controller (BCZ)	G2—Battery	V4— Security Diode	X35— Cab Harness-to-Main Controller 24-Pin Connector E
F7— Start Position Signal 5 A Fuse (marked START)	G3—Alternator	V5— Starter Cut Relay Diode	X36— Cab Harness-to-Main Controller 26-Pin Connector F
F8— Engine Control Unit (ECU) 30 A Fuse (marked ECU)	K1—Load Dump Relay	V7— Start Relay Diode	X40— Pump Harness-to-Machine Harness Connector
F9— Radio Backup 10 A Fuse (marked BACK UP)	K4—Starter Cut Relay	V9— Pilot Shutoff Diode	X65— Cab Harness-to-Pilot Shutoff Switch Harness Connector
F10— Data Converter and Main Controller Battery Power 5 A Fuse (marked CONTROLLER)	K11— Idle Stop Relay	V10— Starter Protection Diode	
F11— Fuel Pump 5 A Fuse (marked FUEL PUMP)	K12— Accessory Cut Relay	V11— Accessory Cut Diode	
F14— Monitor 5 A Fuse (marked MONITOR)	K13— Key Cut Relay	V12— Starter Cut Diode	
F16— Glow Relay 5 A Fuse (marked GLOW RELAY)	K14— ECU Power Relay	V20— Pilot Shutoff Switch Diode	
F17— Power On 5 A Fuse (marked POWER ON)	K16— Glow Plug Relay	W37—Cab Harness Ground 3	
	K19— Battery Relay	X3— Cab Harness-to-Machine Harness 100-Pin Connector	
	K34— Starter Relay	X8— Machine Harness-to-Engine Harness 1-Pin Connector	
	M1—Starter Motor	X10— Machine Controller 8-Pin Connector A	
	M2—Fuel Transfer Pump	X15— Engine Control Unit (ECU)-to-Machine Harness 94-Pin Connector	
	R1—Glow Plug 1		
	R2—Glow Plug 2		
	R3—Glow Plug 3		
	R4—Glow Plug 4		
	R13— Engine Control Unit (ECU) Resistor		
	S1— Key Switch		
	S3—Pilot Shutoff Switch 1		

Unswitched power is supplied to the following components:

- Battery Relay (K19)
- Key Switch (S1) [from battery 45 A fuse (F61)]
- Main Controller (MCZ) (A3) [from data converter and main controller battery power 5 A fuse (marked CONTROLLER) (F10)]
- Machine Controller (BCZ) (A11) [from data converter and main controller battery power 5 A fuse (marked CONTROLLER) (F10)]
- Monitor Controller (DSZ) (A4) [from radio backup 10 A fuse (marked BACK UP) (F9)]
- Data Converter (A5) [from data converter and main controller battery power 5 A fuse (marked CONTROLLER) (F10)]
- ECU Power Relay (K14) [from engine control unit (ECU) 30 A fuse (marked ECU) (F8)]
- Glow Plug Relay (K16)
- Load Dump Relay (K1)

Ignition ON

When key switch (S1) is placed in the ON position, current is applied from key switch pin ACC to pin 3 of accessory cut relay (K12). Utilizing the normally closed contacts of accessory cut relay, power is supplied through accessory cut diode (V11), next through monitor 5 A fuse (F14) to pin 17 of the monitor controller (DSZ) (A4), powering up the DSZ.

Key switch pin M also receives power, supplying idle stop relay (K11), accessory cut relay (K12), and key cut relay (K13) through idle stop 5 A fuse (F18). Utilizing the normally closed contacts of key cut relay, power is passed through pin 3 of key cut relay, next through load dump

relay diode (V3), then to pin S of battery relay (K19), energizing the battery relay. Ground is provided to pin E of battery relay from cab harness ground 3 (W37). When energized, the battery relay allows current to pass through to pin B of starter motor (M1) and pin B of starter relay (K34). Power is also passed through to alternator 65 A fuse (F60) providing a path from pin B of alternator (G3) to the batteries (G1 and G2). Current from load dump relay diode (V3) is also provided to pin R of alternator for excitation, and to fuel pump 5 A fuse (F11), providing power to fuel transfer pump (M2).

Power through pin 3 of key cut relay is also provided to glow plug relay (K16) through glow relay 5 A fuse (F16) and through power on 5 A fuse (F17) to pin 2 of engine stop switch (S6), pin 7 of data converter (A5) 17-pin connector, pin 134 of engine control unit (ECU)-to-machine harness 94-pin connector (X15), pin 4 of cab harness-to-main controller 24-pin connector E (X35), and pin 16 of monitor controller 28-pin connector A (X20), indicating the key switch is in the ON position. When the ECU receives indication of the key switch in the ON position, pins 136 and 114 of engine control unit (ECU)-to-machine harness 94-pin connector (X15) are connected to power, energizing ECU power relay (K14). With ECU power relay energized, battery power is passed to pins 67, 89, 111, and 133 of engine control unit (ECU)-to-machine harness 94-pin connector. Power from ECU power relay is also passed through engine control unit (ECU) resistor (R13) to pin 139 of engine control unit (ECU)-to-machine harness 94-pin connector.

Engine Start

A4—Monitor Controller (DSZ)	S23— Radio Volume and Power Switch	X12— Side Monitor 16-Pin Connector A	X29B— Cab Harness-to-Switch Panel Connector 5
A10— Monitor	S24— Radio Tuning Switch	X13— Side Monitor 20-Pin Connector B	X30— Cab Harness-to-Switch Panel Connector 4
A12— Rear Camera	S25— Monitor Dial	X18— Monitor 12-Pin Connector C	X64— Machine Harness-to-Rear Camera Harness Connector
A13— Side Monitor	S26— Back Button	X19— Monitor 2-Pin Connector G	X66— Cab Harness-to-Side Monitor Harness 2-Pin Connector 1
A14— Side Camera	S27— Home Button	X20— Monitor Controller 28-Pin Connector A	X68— Cab Harness-to-Side Monitor Harness 2-Pin Connector 2
B16— Air Filter Restriction Switch	S40— Hydraulic Oil Temperature Switch (if equipped)	X21— Monitor Controller 36-Pin Connector B	X69— Side Camera Harness-to-Side Monitor Harness 4-Pin Connector
B18— Fuel Level Sensor	S50— 0 Key	X22— Monitor Controller 16-Pin Connector D	X94— Machine Harness-to-Hydraulic Oil Temperature Switch Connector
B27— Hydraulic Oil Filter Restriction Switch (if equipped)	S51— 1 Key	X23— Monitor Controller 12-Pin Connector C	
B42— Engine Overheat Switch	S52— 2 Key	X24— Monitor Controller 2-Pin Connector G	
B43— Coolant Temperature Sensor	S53— 3 Key	X28— Cab Harness-to-Switch Panel Connector 2	
E5— Switch Panel Back Light 1	S54— 4 Key	X29A— Cab Harness-to-Switch Panel Connector 3	
E6— Switch Panel Back Light 2	S55— 5 Key		
E8— Switch Panel Back Light 4	S56— 6 Key		
S21— Blower Motor Speed Switch	S57— 7 Key		
S22— Temperature Control/Mode Switch	S58— 8 Key		
	S59— 9 Key		
	S60— Keypad		
	V17— Side Monitor Diode		
	X2— MPDr 6-Pin Connector		
	X4— Cab Harness-to-Machine Harness 32-Pin Connector		
	X5— Machine Harness-to-Engine Harness 32-Pin Connector		

Monitor (A10)—The monitor (A10) communicates directly with the monitor controller (DSZ). The monitor receives power from pin 3 and ground from pin 5 of DSZ connector (X23). Voltage is sent from pin 2 of DSZ connector (X23) to the monitor, indicating how dark or bright the backlight will be on the monitor depending on operator setting. The monitor has a built-in temperature sensor, which is not accessible. The monitor temperature sensor provides an indication to pin 6 of DSZ connector (X23) if the monitor temperature is too high. Pin 1 of DSZ connector (X23) illuminates the alert light when an alert or diagnostic trouble code (DTC) is present.

The DSZ outputs video signal from the rear camera (A12) on pins 1 and 2 of DSZ connector (X24) to the monitor when the rear camera is active.

Side Monitor (A13)—The side monitor receives battery power from pin 3, switched power from pin 1, and ground from pin 6 of optional connector (X26). The side monitor receives video signals from both the side camera (A14) and rear camera. Video from the side camera displays on the side monitor. Video from the rear camera can be displayed on the side monitor or passed to the monitor controller (DSZ) (A4) to be displayed on the main monitor (A10).

Rear Camera (A12)—The rear camera communicates directly with the DSZ. Power is provided to the rear camera from pin 2 and ground is provided from pin 3 of the DSZ connector (X22). The rear camera sends the video signal to pins 3 and 11 of the side monitor 16-pin connector A (X12). The signal can be used to display the video on the side monitor or passed to pins 1 and 9 of DSZ connector (X22), in which case the DSZ outputs the video signal to the main monitor (A10).

Side Camera (A14)—The side camera receives power from pin 8 and ground from pin 14 of the side monitor 16-pin connector A (X12). The side camera sends the video signal to 5 and 13 of side monitor 16-pin connector

A (X12). Video from the side camera is displayed on the side monitor.

MPDr Application—The MPDr application communicates directly with the monitor controller (DSZ). The DSZ communicates via the controller area network (CAN) with the other electronic controllers to provide information to MPDr.

The DSZ provides MPDr with 5 V power from pin 1 of DSZ connector (X20) and serial communication from pins 13 and 28 of DSZ connector (X20).

For more information on MPDr, see [MPDr Application](#). (Group 9015-20.)

Coolant Temperature Gauge—The coolant temperature sensor (B43) provides a variable resistance to the monitor controller (DSZ) as the engine temperature changes. The coolant temperature is then displayed on the monitor as the coolant temperature gauge. Coolant temperature sensor and engine coolant temperature sensor (B4) are both housed within the same sensor. For more information on engine coolant temperature sensor, see [Engine Harness \(W4\) Wiring Diagram](#). (Group 9015-10.)

Engine Overheat Indicator—The engine overheat switch (B42) passes ground to pin 15 of DSZ connector (X21) when engine temperature is too high. With ground at pin 15 of DSZ connector (X21), the engine overheat indicator is activated.

Hydraulic Oil Filter Restriction Indicator—Ground is passed to pin B13 of monitor controller (DSZ) (A4) when hydraulic oil temperature switch (if equipped) (S40) and hydraulic oil filter restriction switch (if equipped) (B27) are closed (hydraulic oil temperature is above 24°C [75°F] and a plugged hydraulic oil filter is sensed). When this condition exists for a minimum of 5—10 seconds, the hydraulic oil filter restriction indicator will illuminate.

Barometric Pressure Sensor (B45)—Barometric pressure sensor (B45) detects barometric pressure and sends a varying signal to the engine control unit (ECU) (A1). The varying signal represents the varying resistance of the barometric pressure sensor corresponding to the barometric pressure. The barometric pressure sensor receives supply voltage from pin 69, pin 135 for ground, and pin 87 for signal on engine control unit (ECU)-to-machine harness 94-pin connector (X15).

Preheat Control—The engine control unit (ECU) (A1) controls the use of preheat from the engine coolant temperature sensor (B4) and mass air flow (MAF)/intake air temperature (IAT) sensor (B44) signals. Glow plugs 1—4 (R1—R4) heat the air in each of the engine's combustion chambers. After the engine has started, the ECU maintains preheat to allow the engine to stabilize idling.

For additional information on the preheat circuit, [see Cold Weather Starting Aid](#). (Group 9010-05.)

Exhaust Gas Recirculation (EGR) Control—Exhaust gas recirculation (EGR) is the recirculation of engine exhaust gas into the intake manifold to mix with intake air. The recirculation of exhaust gas helps lower the combustion temperature and limits emissions of nitrogen oxides. The engine control unit (ECU) (A1) determines the amount based on inputs from the sensors on the engine.

The EGR consists of exhaust gas recirculation (EGR) valve actuator (M3) and exhaust gas recirculation (EGR) valve sensor (B47).

Exhaust Gas Recirculation (EGR) Valve Actuator (M3)—The engine control unit (ECU) (A1) calculates the opening and closing of the EGR valve according to engine speed, fuel flow rate, engine coolant temperature, barometric pressure, and intake air temperature. The ECU sends a signal to pins 5, 20, and 35 to control EGR valve actuator.

Exhaust Gas Recirculation (EGR) Valve Sensor (B47)—The EGR valve sensor receives supply voltage from pin 6 and pin 26 for ground on engine control unit (ECU)-to-machine harness 60-pin connector (X14). The engine control unit (ECU) (A1) calculates the position of the EGR valve using signals received from EGR valve sensor at pins 52, 53, and 54 on engine control unit (ECU)-to-machine harness 60-pin connector.

Engine Stop Control—If the engine will not stop when key switch (S1) is turned to the OFF position, moving the engine stop switch (S6) to the STOP position will force the engine control unit (ECU) (A1) to stop the engine.

The ECU determines the engine stop switch is in the STOP position when power flows from fuse (F17) through

the activated key cut relay (K13) to pin 121. With current at pin 121 on engine control unit (ECU)-to-machine harness 94-pin connector (X15), the ECU removes power to the electronic injectors (Y1—Y4) and suction control valve (Y14), causing the engine to stop. The ECU then de-energizes ECU power relay (K14), removing main power from the ECU.

Exhaust Filter Parked Cleaning—The exhaust filter parked cleaning switch (S16) allows the operator to perform a parked exhaust filter cleaning.

When key switch (S1) is in the ON position, current flows from pin M of key switch to pin 3 of key cut relay (K13) and through idle stop 5 A fuse (F18) to pin 1 of key cut relay. Utilizing the normally closed contacts of the key cut relay, current is sent through power on 5 A fuse (F17) to pin 1 of exhaust filter parked cleaning switch. When the engine control unit (ECU) (A1) has determined a parked exhaust filter cleaning is required, ground is provided to pin 5 of the exhaust filter parked cleaning switch from pin 40 of engine control unit (ECU)-to-machine harness 60-pin connector (X14), completing the circuit and activating the light emitting diode (LED). When exhaust filter parked cleaning switch is held for 3 seconds, pin 26 of engine control unit (ECU)-to-machine harness 60-pin connector is grounded, initiating the parked exhaust filter cleaning, if all requirements are met. For more information on exhaust filter parked cleaning, [see Exhaust Aftertreatment Circuit Theory of Operation](#). (Group 9015-15.)

For more information, see Isuzu engine manual 4HK1.

Exhaust Differential Pressure Sensor (B48)—The exhaust differential pressure sensor (B48) measures differential pressure before and after the exhaust filter detects the amount of particulate matter trapped on the exhaust filter. For more information on the exhaust differential pressure sensor, [see Exhaust Aftertreatment Circuit Theory of Operation](#). (Group 9015-15.)

Exhaust Temperature Sensor 1 (DPF) (B49)—Exhaust temperature sensor 1 measures the exhaust temperature before the diesel oxidation catalyst (DOC). For more information on the exhaust filter, [see Exhaust Aftertreatment Circuit Theory of Operation](#). (Group 9015-15.)

Exhaust Temperature Sensor 2 (DOC) (B50)—Exhaust temperature sensor 2 measures the exhaust temperature after the diesel oxidation catalyst (DOC). For more information on the exhaust filter, [see Exhaust Aftertreatment Circuit Theory of Operation](#). (Group 9015-15.)

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A3—Main Controller (MCZ)	H4—Travel Alarm	X35— Cab Harness-to-Main Controller (MCZ) 24-Pin Connector E	Y21— Torque Control Solenoid (marked ST)
B6—Engine Oil Level Sensor	R15— Engine Speed Dial	X36— Cab Harness-to-Main Controller (MCZ) 26-Pin Connector F	Y22— Dig Regenerative Solenoid (marked SF)
B30— Boom Up Pressure Sensor	S7— Power Dig Switch	X40— Pump Harness-to-Machine Harness Connector	Y23— Arm Regenerative Solenoid (marked SC)
B31— Arm In Pressure Sensor	S8— Auto-Idle Switch	X49— Cab Harness-to-Spool Control Harness Connector	Y24— Power Dig Solenoid (marked SI)
B32— Front Attachment Pressure Sensor	S11— Travel Speed Switch	X90— Not Used	Y27— Arm 2 Flow Control Solenoid (marked SD)
B33— Swing Pressure Sensor	S12— Power Mode Button	X91— Not Used	Y28— Pump 3 Torque Control Solenoid (marked SU)
B34— Travel Pressure Sensor	S13— Travel Alarm Cancel Switch	X97— Pump Harness Splice Connector	Y29— Arm 1 Flow Control Solenoid (marked SE)
B35— Pump 1 Delivery Pressure Sensor	X3— Cab Harness-to-Machine Harness 100-Pin Connector	X98— Machine Harness Splice Connector	Y31— Arm 3 Spool Control Solenoid (marked A2)
B36— Pump 1 Control Pressure Sensor	X29— Cab Harness-to-Switch Panel Connector 3	Y12— Exhaust Filter Regulator Solenoid (pump 1) (marked SZ)	Y32— Boom 3 Spool Control Solenoid (marked A1)
B37— Pump 2 Delivery Pressure Sensor	X31— Cab Harness-to-Main Controller (MCZ) 31-Pin Connector A	Y13— Exhaust Filter Regulator Solenoid (bypass cut-off valve) (marked SJ)	
B38— Pump 2 Control Pressure Sensor	X32— Cab Harness-to-Main Controller (MCZ) 24-Pin Connector B	Y20— Pump 2 Flow Rate Limit Solenoid (marked SB)	
B39— Bucket In Pressure Sensor	X33— Cab Harness-to-Main Controller (MCZ) 17-Pin Connector C		
B40— Hydraulic Oil Temperature Sensor	X34— Cab Harness-to-Main Controller (MCZ) 30-Pin Connector D		
B56— Pump 3 Delivery Pressure Sensor			
B57— Pump 3 Control Pressure Sensor			

Main Controller (MCZ) (A3)—The main controller (MCZ) uses inputs from the following sensors on the machine:

- Engine Oil Level Sensor (B6)
- Boom Up Pressure Sensor (B30)
- Arm In Pressure Sensor (B31)
- Front Attachment Pressure Sensor (B32)
- Swing Pressure Sensor (B33)
- Travel Pressure Sensor (B34)
- Bucket In Pressure Sensor (B39)
- Pump 1 Delivery Pressure Sensor (B35)
- Pump 1 Control Pressure Sensor (B36)
- Pump 2 Delivery Pressure Sensor (B37)
- Pump 2 Control Pressure Sensor (B38)
- Pump 3 Delivery Pressure Sensor (B56)
- Pump 3 Control Pressure Sensor (B57)
- Hydraulic Oil Temperature Sensor (B40)
- Engine Speed Dial (R15)
- Auto-Idle Switch (S8)
- Travel Speed Switch (S11)
- Power Mode Button (S12)
- Pilot Shutoff Switch 1
- Pilot Shutoff Switch 2

The MCZ controls the following solenoids:

- Exhaust Filter Regulator Solenoid (pump 1) (marked SZ) (Y12)
- Exhaust Filter Regulator Solenoid (bypass cut-off valve) (marked SJ) (Y13)
- Pump 2 Flow Rate Limit Solenoid (marked SB) (Y20)
- Torque Control Solenoid (marked ST) (Y21)
- Dig Regenerative Solenoid (marked SF) (Y22)
- Arm Regenerative Solenoid (marked SC) (Y23)
- Power Dig Solenoid (marked SG) (Y24)
- Arm 2 Flow Control Solenoid (marked SD) (Y27)
- Pump 3 Torque Control Solenoid (marked SU) (Y28)
- Arm 1 Flow Control Solenoid (marked SE) (Y29)
- Arm 3 Spool Control Solenoid (marked A2) (Y31)
- Boom 3 Spool Control Solenoid (marked A1) (Y32)

Main Controller (MCZ) Power Up (power and ground)

Unswitched battery power is available at pins 5 and 6 of the main controller (MCZ) connector E (X35) through data converter and main controller (MCZ) battery power 5 A fuse (F10). Ground is provided to pins 1 and 2 of MCZ connector F (X36).

When key switch (S1) is in the ON position, current flows from pin M of key switch to pin 3 of key cut relay (K13) and through idle stop 5 A fuse (F18) to pin 1 of key cut relay. Utilizing the normally closed contacts of the key cut relay, current is passed to pin 4 of MCZ connector E (X35) through power on 5 A fuse (F17), causing the MCZ to power up.

With the battery relay (K19) energized, current flows through alternator 65 A fuse (F60) to pin B of alternator (G3). From pin B of alternator, current flows through solenoid 20 A fuse (F4) to pins 1, 2, and 3 of the MCZ connector (X36).

Engine Speed Dial (R15)—The engine speed dial (R15) controls the engine speed according to the rotation angle of the dial. The main controller (MCZ) sends the equivalent to target engine speed to the engine control unit (ECU) (A1) via the controller area network (CAN).

- For more information on CAN communication, [see Controller Area Network \(CAN\) Theory of Operation](#). (Group 9015-15.)
- For more information on the ECU, [see Engine Control Unit \(ECU\) Circuit Theory of Operation](#). (Group 9015-15.)
- For more information on engine speed control, [see Engine Speed Control System Operation](#). (Group 9010-05.)

Power Mode Button (S12)—The power mode button (S12) allows the operator to cycle through three power modes: ECO (economy), PWR (power), and HP (high power).

Continued on next page

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A3—Main Controller (MCZ)
B34— Travel Pressure Sensor

F5— Travel Alarm 5 A Fuse
(marked OPT. 1 ALT)

H4—Travel Alarm
S13— Travel Alarm Cancel
Switch

The travel alarm circuit consists of a travel pressure sensor (B34), main controller (MCZ) (A3), travel alarm (H4), and a travel alarm cancel switch (S13).

The circuit is designed to warn bystanders of machine movement by signaling with an audible alarm any time the travel levers are moved.

When the travel levers are moved, travel pressure sensor (B34) senses pilot pressure and sends a signal to the MCZ. When signal is received from travel pressure

sensor, the MCZ provides access to ground to the travel alarm (H4) pin 1, activating the alarm.

When pressed, the travel alarm cancel switch (S13) applies ground to pin 3 of the travel alarm (H4). The travel alarm cancel switch (S13) must be pressed and released in order to cancel the alarm. The travel alarm must sound for 10 seconds before the travel alarm cancel switch will deactivate it. When the control levers are returned to the neutral position the travel alarm (H4) is reset.

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Machine Controller (BCZ) Circuit Theory of Operation

The machine controller (BCZ) controls lighting, windshield wiper, and windshield washer circuits.

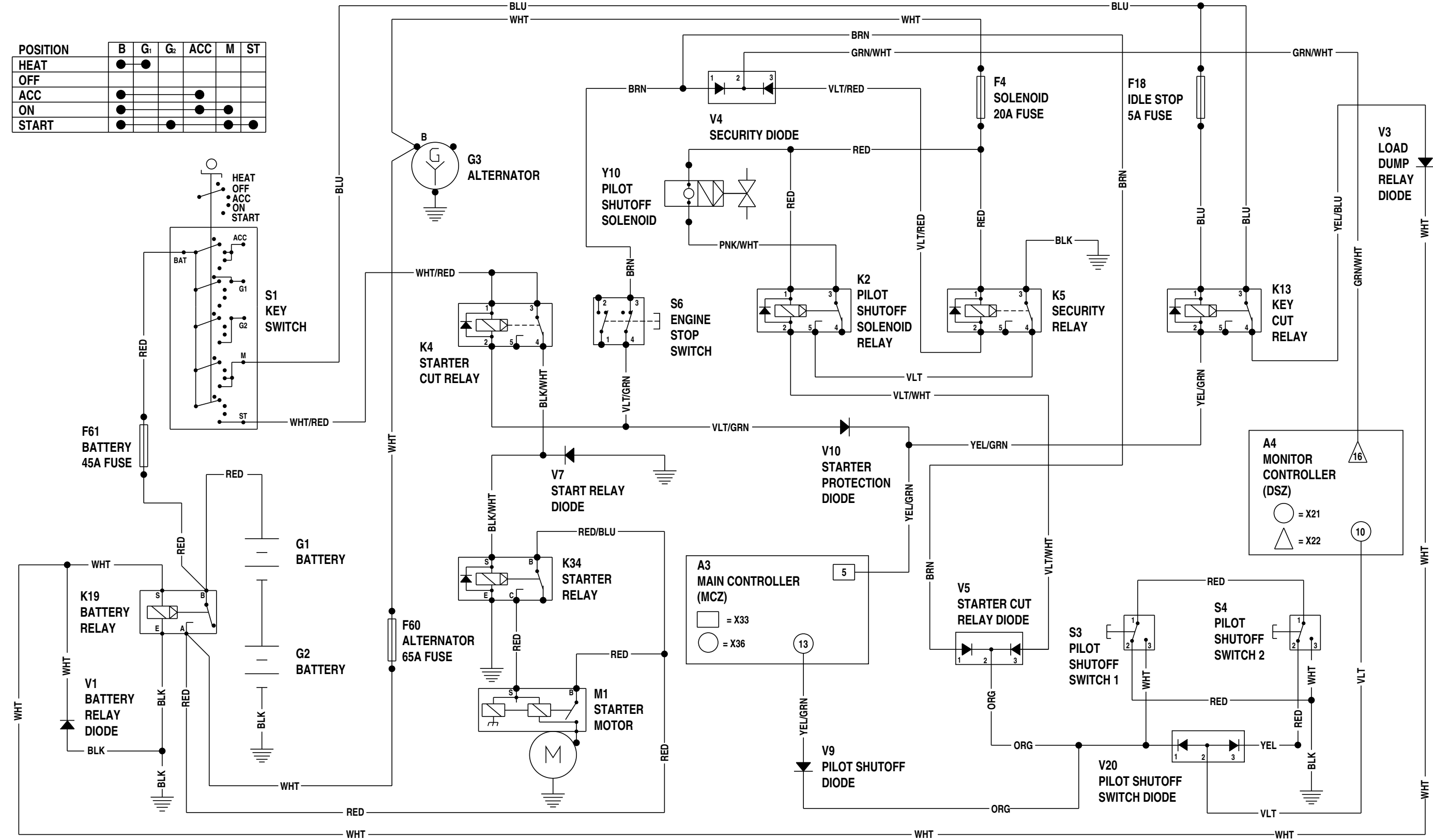
For more information on windshield wiper and washer circuit theory of operation, see Windshield Wiper and Washer Circuit Theory of Operation. (Group 9015-15.)

For more information on lighting circuit theory of operation, see Lighting Circuit Theory of Operation. (Group 9015-15.)

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Pilot Shutoff Circuit Theory of Operation

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TX1117856

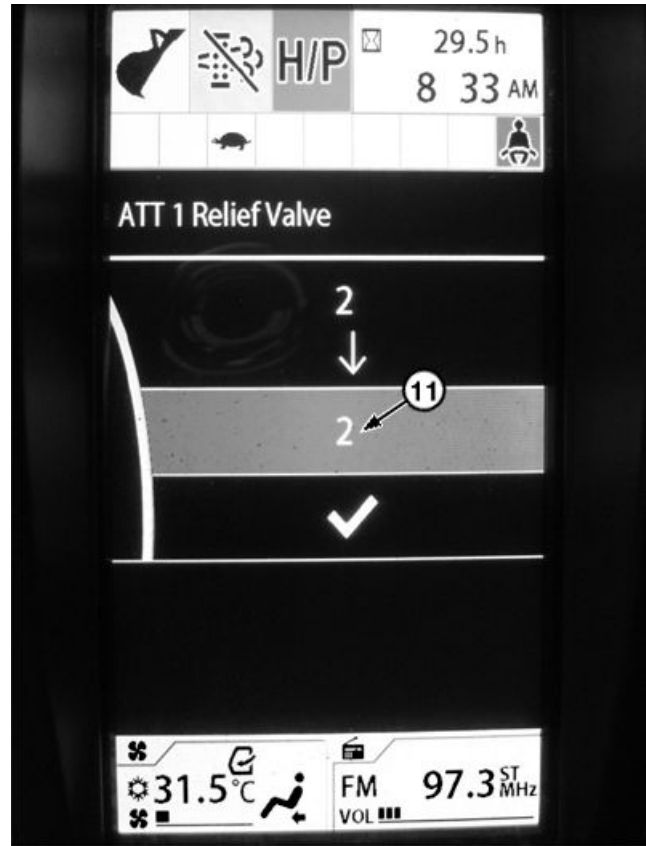
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Pilot Shutoff Circuit Theory of Operation Schematic

DW9628,0000529 -19-30AUG12-1/2

Secondary Hydraulic Relief Selector—The secondary hydraulic relief selector icon in the monitor controls the secondary relief solenoid valve (Y41). The secondary relief solenoid valve receives power from the travel alarm 5 A fuse (F5) and is grounded by the main controller (MCZ) pin 16. When the secondary relief solenoid valve is activated, pilot oil shifts the secondary relief shutoff valve, routing hydraulic oil from the high pressure lines of the attachment to the secondary relief valve. The relief pressure of the circuit will then be equal to the lowest setting of the two relief valves in the circuit. The secondary hydraulic relief selector status can be adjusted for each attachment using MPDr, Service ADVISOR™, and the monitor.

11— ATT 1 Relief Valve Setting



ATT 1 Relief Valve

DW9628,000052A -19-04NOV13-8/8

List of Machine Setting Items (Constant Change)

Item	Unit	Data
Air Conditioner Control Mode	0—10	Selection of air conditioner specification. 0: Unused (without an air conditioner) 1: STD Cab (middle) (with an air conditioner) 2: STD Cab (middle) (without an air conditioner) 3: STD Cab (large) (with an air conditioner) 4: STD Cab (large) (without an air conditioner) 5: US Cab (75US class) (with an air conditioner) 6: US Cab (75US class) (without an air conditioner) 7: US Cab (135US class) (with an air conditioner) 8: US Cab (135US class) (without an air conditioner) 9: US Cab (225US class) (with an air conditioner) 10: US Cab (225US class) (without an air conditioner)
Selector Valve Open Circuit Detection	0, 1	ON/OFF of malfunction evaluation. 0: OFF 1: ON
ATT Speed Deceleration Waiting Time	ms	The time when the increased engine speed is held at attachment operation speed increase control.

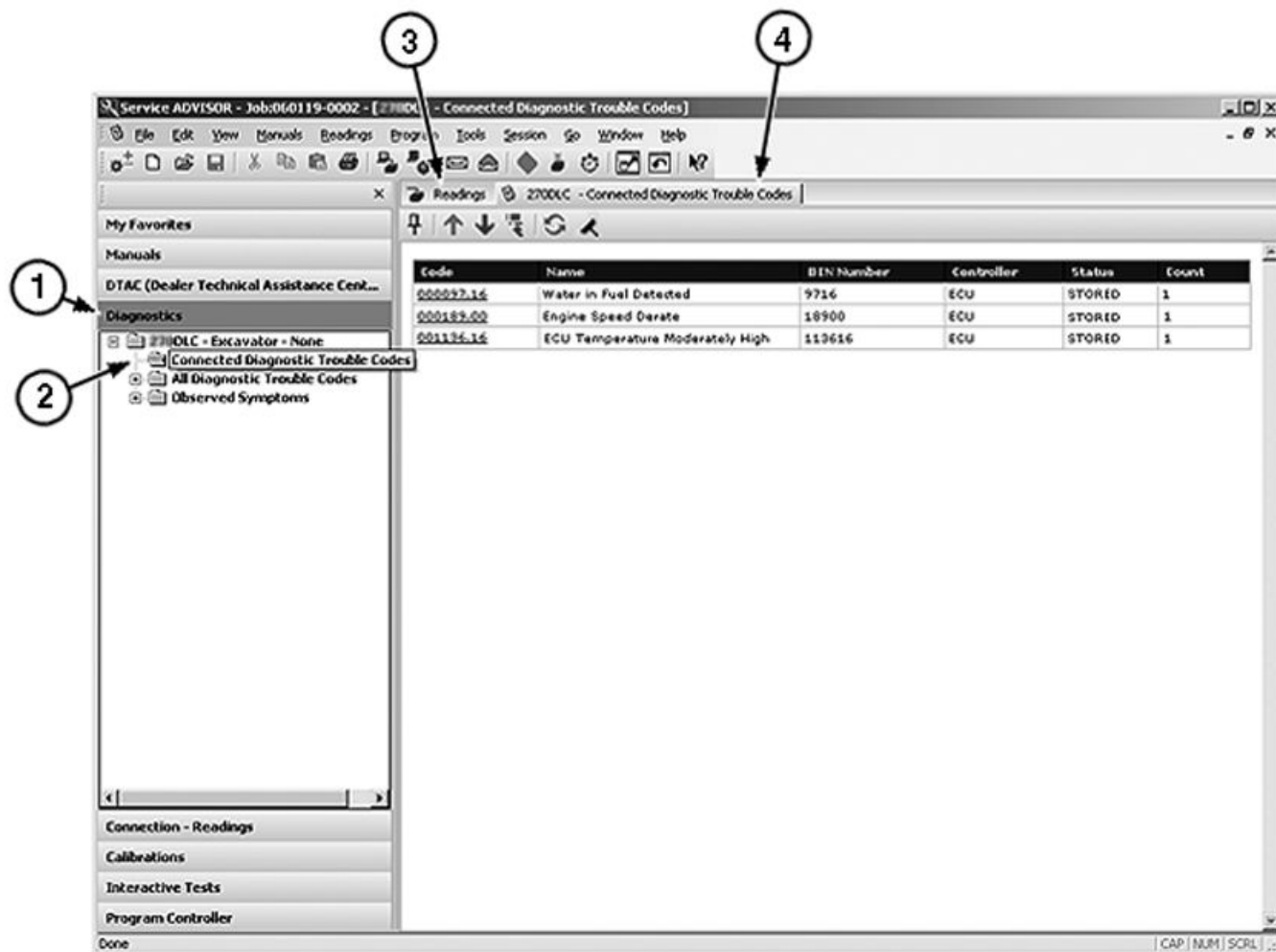
List of Adjustment (Constant Change)

Item	Unit	Minimum Adjustment	Adjustable Range	Initial Value
ECO Control Suspend	0, 1	-	0, 1	0
WU Control Suspend	0, 1	-	0, 1	0
Li Speed	min ⁻¹	10	0—400	0
WU Speed	min ⁻¹	10	-600—200	0
AI Speed	min ⁻¹	10	-250—400	0
PWR Mode Speed	min ⁻¹	10	-200—0	0
ECO Control Selection	0, 1	-	0, 1	1
Power Mode Memory Selection	0, 1	-	0, 1	0
Heater Control Selection	0, 1	-	0, 1	1
Work Mode Memory Selection	0, 1	-	0, 1	1
Power Mode Selection	0—2	-	0—2	0
Auto Shut-Down Control	0—2	-	0—2	0
Auto Shut-Down Set Timing Holding	0, 1	-	0, 1	0
Air Conditioner Control Mode	0—10	-	0—10	1
Selector Valve Open Circuit Detection	0,1	-	0,1	0
ATT Speed Deceleration Waiting Time	ms	40	0—300	0

Continued on next page

RH60123,0000991 -19-23APR13-2/4

Reading Diagnostic Trouble Codes with Service ADVISOR™ Diagnostic Application



Service ADVISOR—Diagnostic Trouble Codes

- 1—Diagnostics Shortcut Bar
2—Connected Diagnostic Trouble Codes Folder
3—Readings Tab
4—Connected Diagnostic Trouble Codes Tab

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

1. Connect service laptop to machine. See Park and Prepare for Service Safely. (Group 9015-20.)
2. Open Service ADVISOR™ and display appropriate model information.

3. From the Shortcut bar, click Diagnostics to open the Diagnostics shortcut bar (1).
4. Click the Connected Diagnostic Trouble Codes folder (2).

Service ADVISOR is a trademark of Deere & Company

Continued on next page

DW9628,0000537 -19-22FEB13-1/3

TX1002938A —UN—26JAN06

References

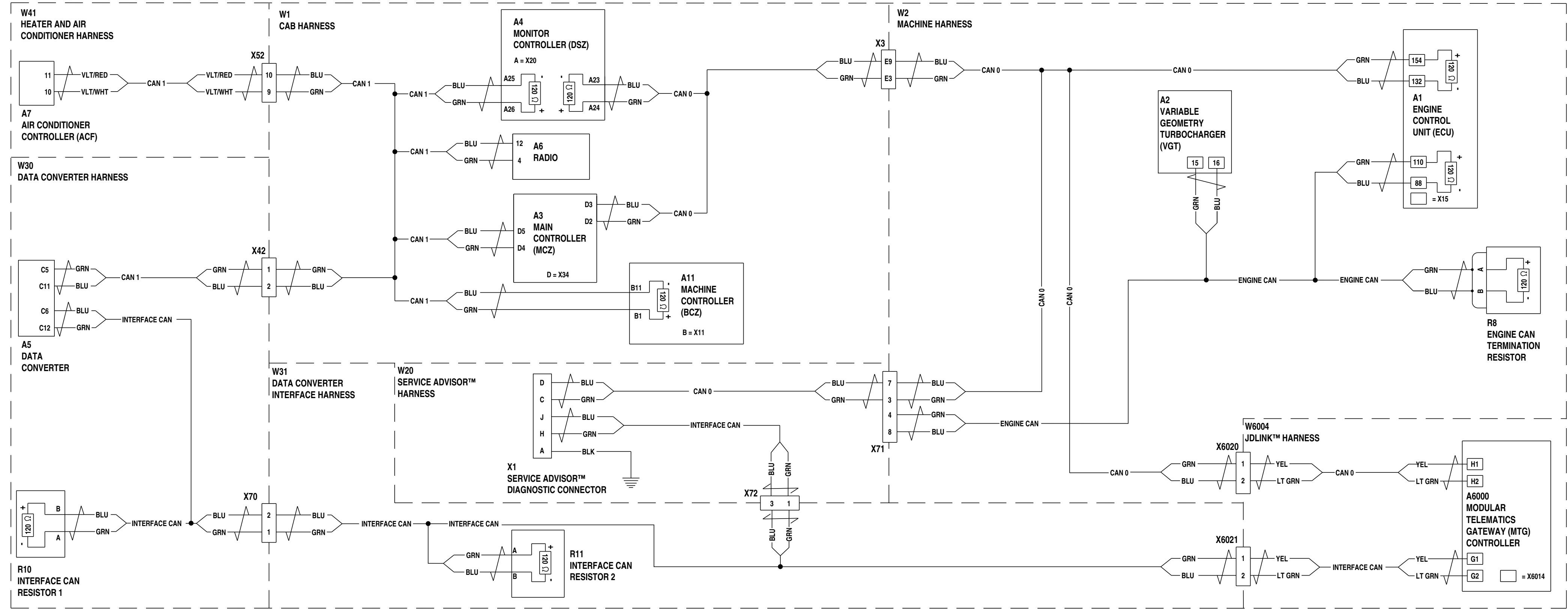
F14—Monitor 5 A Fuse (marked MONITOR)	Turn key switch ON. If monitor operates, fuse is OK.	Monitor will not operate.
F15—Cab Auxiliary Power Connector One 10 A Fuse (marked AUX)	Check with multimeter.	Cab auxiliary power connector will not operate.
F16—Start Aid 5A Fuse (marked SA)	If start aid works, fuse is OK..	Glow Relay Switch start aid will not operate.
F17—Power On 5 A Fuse (marked POWER ON)	Turn key switch to START. If engine starts, fuse is OK.	Engine will not start.
F18—Idle Stop 5 A Fuse (marked IDLE STOP)	Check with multimeter.	Controller feedback protection will not operate.
F19—Horn 10 A Fuse (marked HORN)	Turn key switch ON. Press horn switch. If horn operates, fuse is OK.	Horn will not operate.
F20—Optional Equipment 5 A Fuse (marked OPT. 3 BATT)	Check with multimeter.	Optional equipment will not operate.

Continued on next page

DW9628,000053A -19-03MAY12-2/3

Controller Area Network (CAN) Circuit Test

TX1249917 —UN—26MAR18



TX1249917

Continued on next page

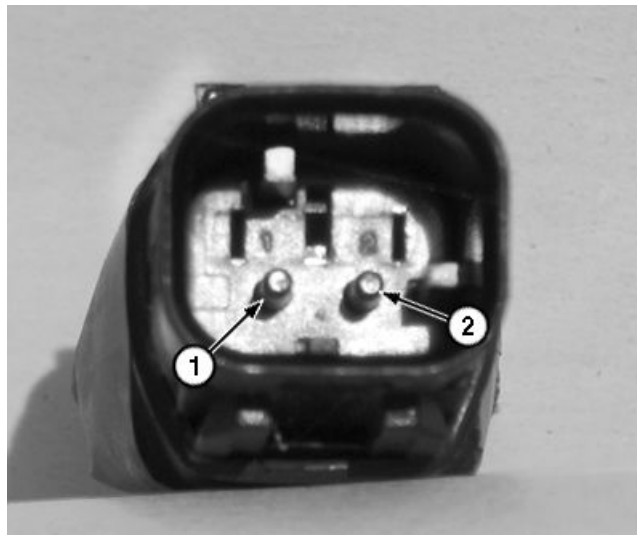
Controller Area Network (CAN) Circuit Test Schematic

MB00333,0000394 -19-14MAR18-1/10

Alternator Resistor Check

Turn key switch OFF.

Disconnect harness from alternator resistor (R13).



TX1095684A —UN—08AUG11

Alternator Resistor

1— Terminal 1

2— Terminal 2

Measure resistance across resistor terminals 1 and 2.

LOOK: Does the multimeter read 1350—1650 ohms?

YES: Alternator resistor is OK.

NO: Alternator resistor has failed. Replace the alternator resistor.

DW9628,0000541 -19-14AUG12-11/11

Battery Remove and Install

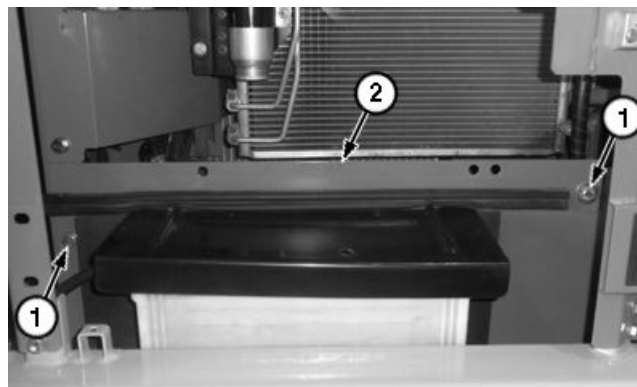
⚠ CAUTION: Prevent personal injury from exploding battery. Keep sparks and flames away from batteries.

Always remove grounded (-) battery clamp first and replace it last.

1. Park machine and prepare for service. See Park and Prepare for Service Safely. (Group 9000-01.)
2. Remove cap screws (1) and bracket (2).

1— Cap Screw (2 used)

2— Bracket



Bracket Removal

TX1119352A —UN—02AUG12

Continued on next page

DW9628,0000542 -19-22FEB13-1/4

Ash Reset

Ash reset is used to set new serial numbers of the diesel oxidation catalyst (DOC) and diesel particulate filter (DPF) when replacement is required.

IMPORTANT: Prevent possible machine damage. Neglect to perform ash reset procedure will result in delay of pressure activated regenerations. Delay will cause excess particulate matter (PM) to accumulate in the filter. Excess PM may lead to additional heat build up during regeneration causing filter to burn out. If ash reset is completed without replacing the DPF, frequent regenerations will occur.

1. Replace DOC or DPF. See Exhaust Filter Disassemble and Assemble. (Group 0530.)
2. Connect to machine using MPDr application. See MPDr Connection Procedure. (Group 9015-20.)

NOTE: Make appropriate selection based on work performed on machine.

3. Go to Functions>Engine/MF>MF Maintenance>Change the DOC, Change the CSF or Change the DOC and CSF, or Cleaning. Follow on-screen procedure.

NOTE: Internet access will be needed to complete the following steps and can be done after disconnecting from the machine.

4. When appropriate on-screen procedure is complete, upload information using MPDr.
5. Go to Upload.
6. Select Global e-Service, Upload all, OK.
7. Select OK.
8. Wait for upload to complete. Once upload is complete, confirmation should be received and select OK.

BD53302,0001A45 -19-02MAR15-1/1

Travel Alarm Remove and Install

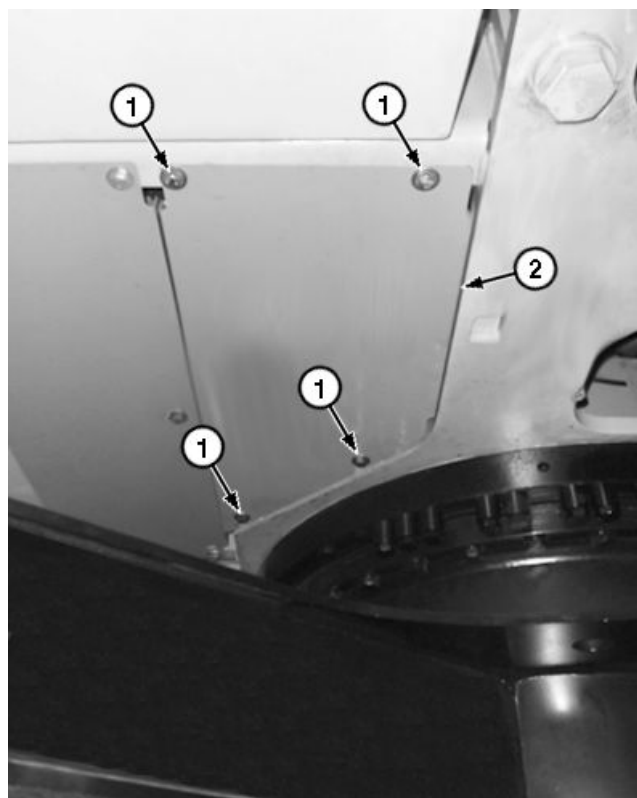
1. Park machine and prepare for service. See Park and Prepare for Service Safely. (Group 9000-01.)

NOTE: Travel alarm (H4) is located in the compartment below the front of the engine.

2. Remove cap screws (1) and cover panel (2).

1— Cap Screw (4 used)

2— Cover Panel



Cover Panel

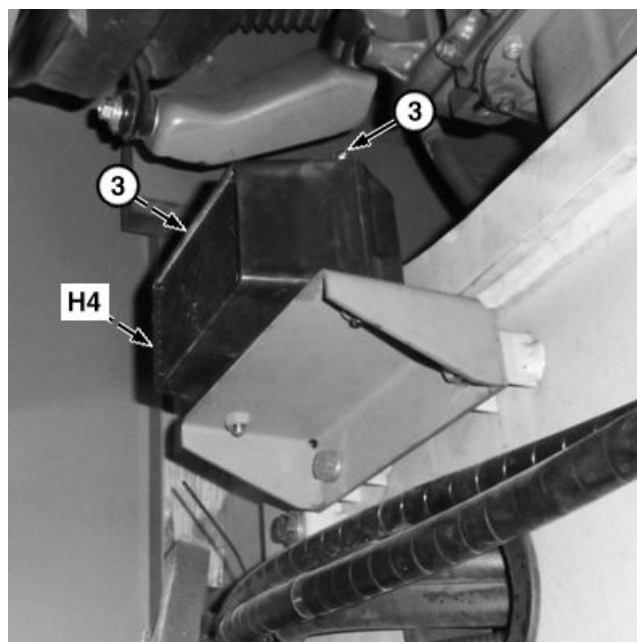
TX1120283A —UN—15AUG12

DW9628,000054D -19-26FEB13-1/2

3. Disconnect electrical connector (X86) from travel alarm (H4). See Travel Alarm Harness (W26) Component Location. (Group 9015-10.)
4. Remove cap screws (3) and remove travel alarm.
5. Repair or replace as necessary.
6. Install travel alarm and cap screws.
7. Connect electrical connector to travel alarm harness.
8. Install cover panel and cap screws.

3— Cap Screw (2 used)

H4—Travel Alarm

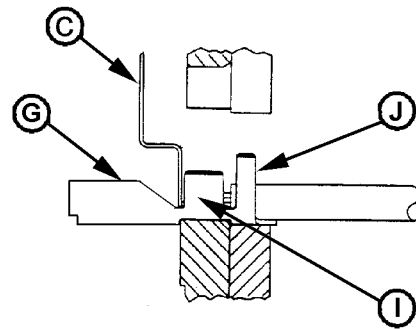
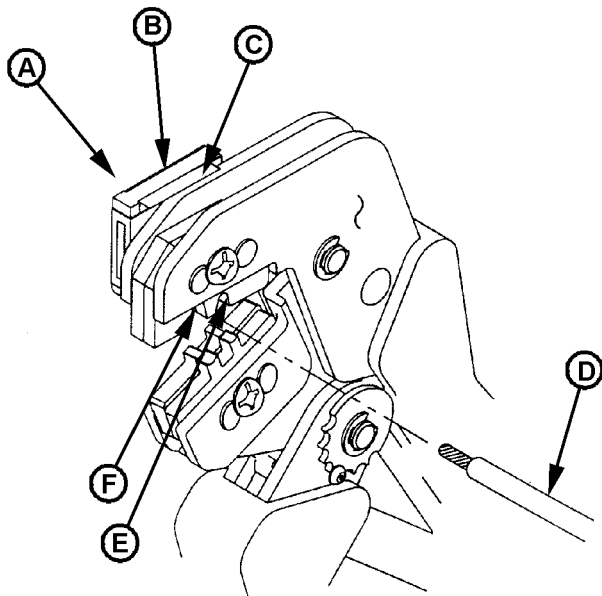


Travel Alarm

TX1120284A —UN—29AUG12

DW9628,000054D -19-26FEB13-2/2

Install CINCH™ Contact



T138057

Tool Position For Insertion

A—Top of Tool
B—Contact Support
C—Locator

D—Wire
E—Micro Timer Slot
F—Junior Timer Slot

G—Contact
I—Wire Tab
J—Insulation Tab

1. Hold JDG708 crimping tool so that the tool is facing you as shown (left side of graphic). Squeeze tool handles together and allow them to open fully.

IMPORTANT: Make sure that both sides of the insulation barrel are started evenly into the crimping section. Do NOT attempt to crimp an improperly positioned contact.

2. Position the contact so that the mating end of the contact (G) is on the locator side of the tool (C). Wire and insulation tabs (I and J) should point to top of tool (A). Butt wire tab (I) against the movable locator (C).
3. Hold the contact in position and squeeze the tool handles together until ratchet engages sufficiently to

hold the contact in position. Do NOT deform wire and insulation tabs (I and J).

4. Insert stripped wire into contact insulation and wire tabs until it is butted against locator (C).
5. Hold the wire in place. Squeeze tool handles together until ratchet releases. Allow tool handles to open and remove crimped contact.
6. Install contact into connector. (Go to procedure in this group.)

LD30992,00001AE -19-15MAY14-1/1

T138057 —UN—14FEB01

Noisy or Loose Track Chain

TZ24494,00008ED -19-23JAN13-1/5

Noisy or Loose Track Chain Diagnostic Procedure

TZ24494,00008ED -19-23JAN13-2/5

❶ Incorrect Track Sag Adjustment

Check track sag. [See Check and Adjust Track Sag.](#) (Operator's Manual.)

YES: Go to Loose Track Shoes.

Is track sag within specification?

NO: Adjust track sag.

TZ24494,00008ED -19-23JAN13-3/5

❷ Loose Track Shoes

Remove loose track shoes to clean material from between track shoes and links. Install track shoes and tighten cap screws in proper sequence. [See Track Shoe Remove and Install.](#) (Group 0130.)

YES: Go to Grease Leaking From Track Adjuster Seals, Grease Fittings, or Relief Valve.

Are track shoes properly installed and clean of debris?

NO: Clean and install track shoes properly.

TZ24494,00008ED -19-23JAN13-4/5

❸ Grease Leaking From Track Adjuster Seals, Grease Fittings, or Relief Valve

Check that grease fittings and valves are tight. Replace grease fittings or relief valves. For seal replacement, [see Track Adjuster and Recoil Spring Disassemble and Assemble.](#) (Group 0130.)

YES: Replace grease fitting, relief valve, or seals as necessary.

Are grease fittings, relief valves, or seals leaking?

NO: Diagnostic checkout complete.

TZ24494,00008ED -19-23JAN13-5/5

Tight Track Chain

TZ24494,00008EE -19-21JUN12-1/4

Tight Track Chain Diagnostic Procedure

TZ24494,00008EE -19-21JUN12-2/4

❶ Material Packing in Sprocket

Clean material from sprockets.

YES: Go to Track Sag Less Than Specification.

Is sprocket free of material?

NO: Clean material from sprockets.

TZ24494,00008EE -19-21JUN12-3/4

❷ Track Sag Less Than Specification

Check track sag. [See Check and Adjust Track Sag.](#) (Operator's Manual.)

YES: Diagnostic checkout complete.

Is track sag within specification?

NO: Adjust track sag.

TZ24494,00008EE -19-21JUN12-4/4

Hydraulic System Operation

Main hydraulic system is an open-center hydraulic system.

The main hydraulic pump housing contains a pilot pump (28), pump 1 (15), pump 2 (16), and pump 3 (149). Engine output is transmitted to pump 1, pump 2, pump 3, and pilot pump through a flex coupling. Engine output is transmitted from pump 1, pump 2, pump 3 drive shaft, and then to pilot pump drive shaft. The pilot pump is mounted on pump 2 end of housing. The pumps are driven at engine speed.

See Pump 1, Pump 2, Pump 3, and Drive Gear Case Operation. (Group 9025-05.)

See Pilot Pump, Pressure Regulating Valve, and Filter Operation. (Group 9025-05.)

Hydraulic oil flow is through suction screen, out of hydraulic oil tank, and through suction line to pumps. Pump 1 delivers high pressure oil to front control valve (6-spool). Pump 2 delivers high pressure oil to rear control valve (6-spool). Pump 3 delivers high pressure oil to swing

spool, boom 3 spool, arm 3 spool, and auxiliary 2 spool in the control valve. High pressure oil is routed to the motors and cylinders by valve spools for their respective function. Hydraulic oil tank is pressurized to ensure that oil flows from the tank, through the suction line, and into the pumps.

See Control Valve Operation. (Group 9025-05.)

See Control Valve Check Valves Identification and Operation. (Group 9025-05.)

Return oil from the motors and cylinders is routed into return passages in control valve by valve spools. From the return passages, return oil flows out of control valve, through hydraulic oil cooler, through restriction valve, and then through the return filter in the hydraulic oil tank. The restriction valve is used in the return line after the hydraulic oil cooler to create some back pressure in return passage of control valve. The back pressure ensures a flow of make-up oil to keep the swing motor case full of oil and a flow of oil through the anticavitation valves to prevent cylinder cavitation.

JB3888,0000964 -19-30AUG12-1/1

Pilot System Operation

See Hydraulic System Schematic as a reference for the hydraulic system operation. (Group 9025-15.)

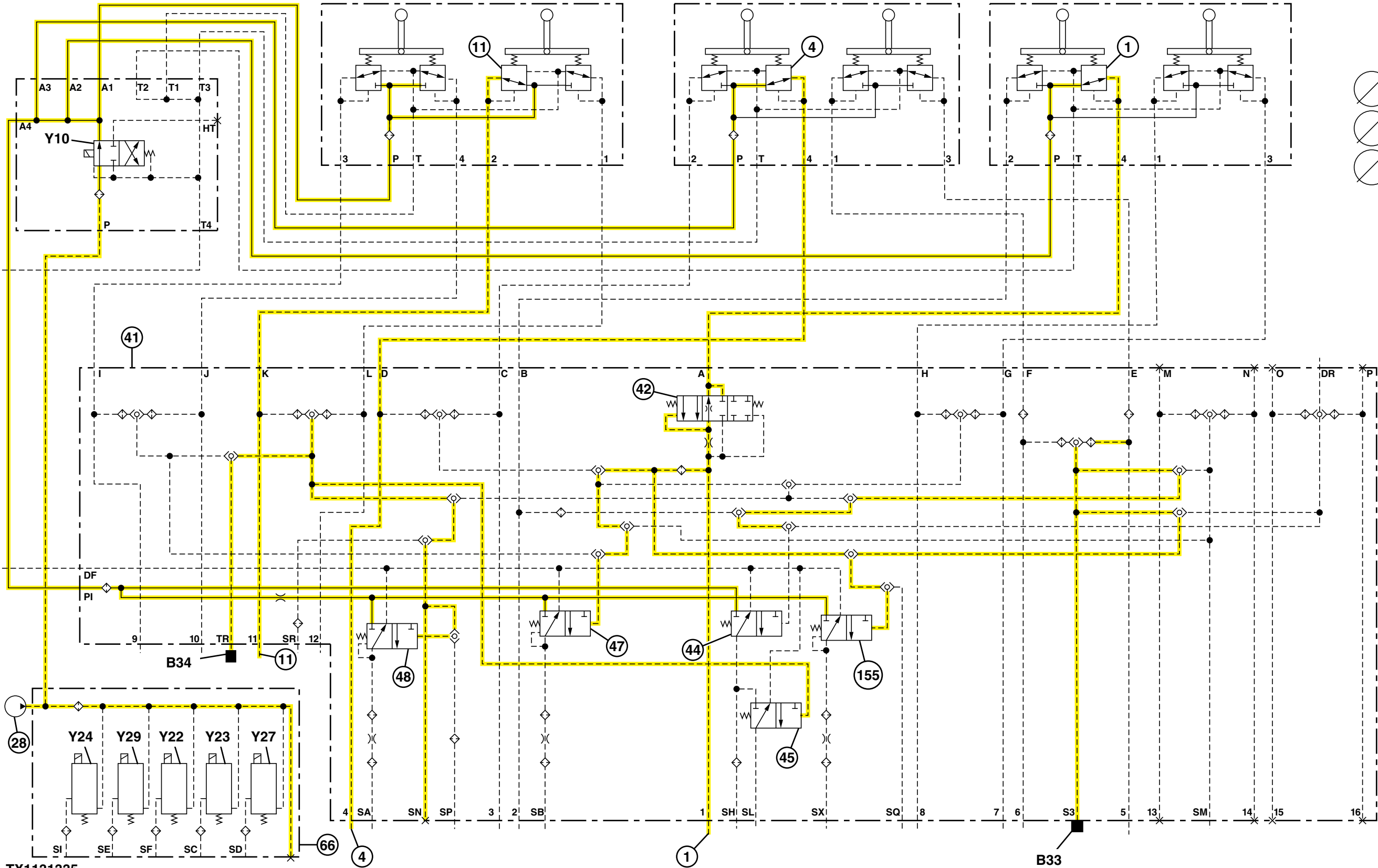
Pilot system is used to operate control circuits from pump 1, pump 2, and pump 3 regulators to shift the front and rear control valve spools, to release the swing park brake, and as a supply source for functions of the solenoid valve manifold.

The pilot pump supplies to the pilot system. From the pilot pump, oil flows to the pilot pressure regulating valve, which houses the pilot oil filter and pilot bypass valve. After leaving the filter, oil is supplied to the pilot shutoff valve, the pump regulators, and the solenoid manifold. When no functions are activated, the oil returns to hydraulic oil tank.

JB3888,0000965 -19-30MAR16-1/1

Pilot Operation of Control Valve Operation

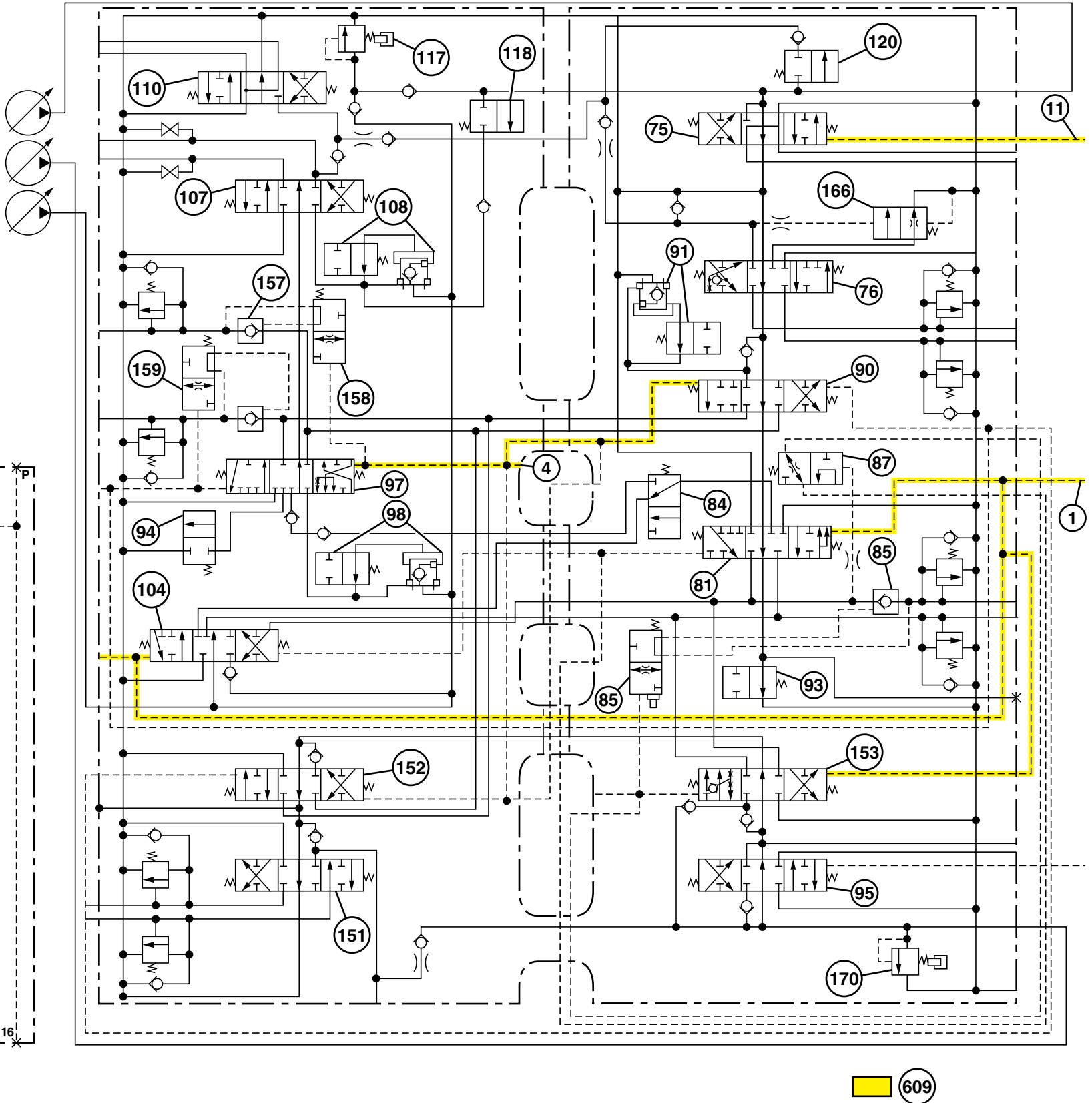
TX1131335 —UN—31MAY13



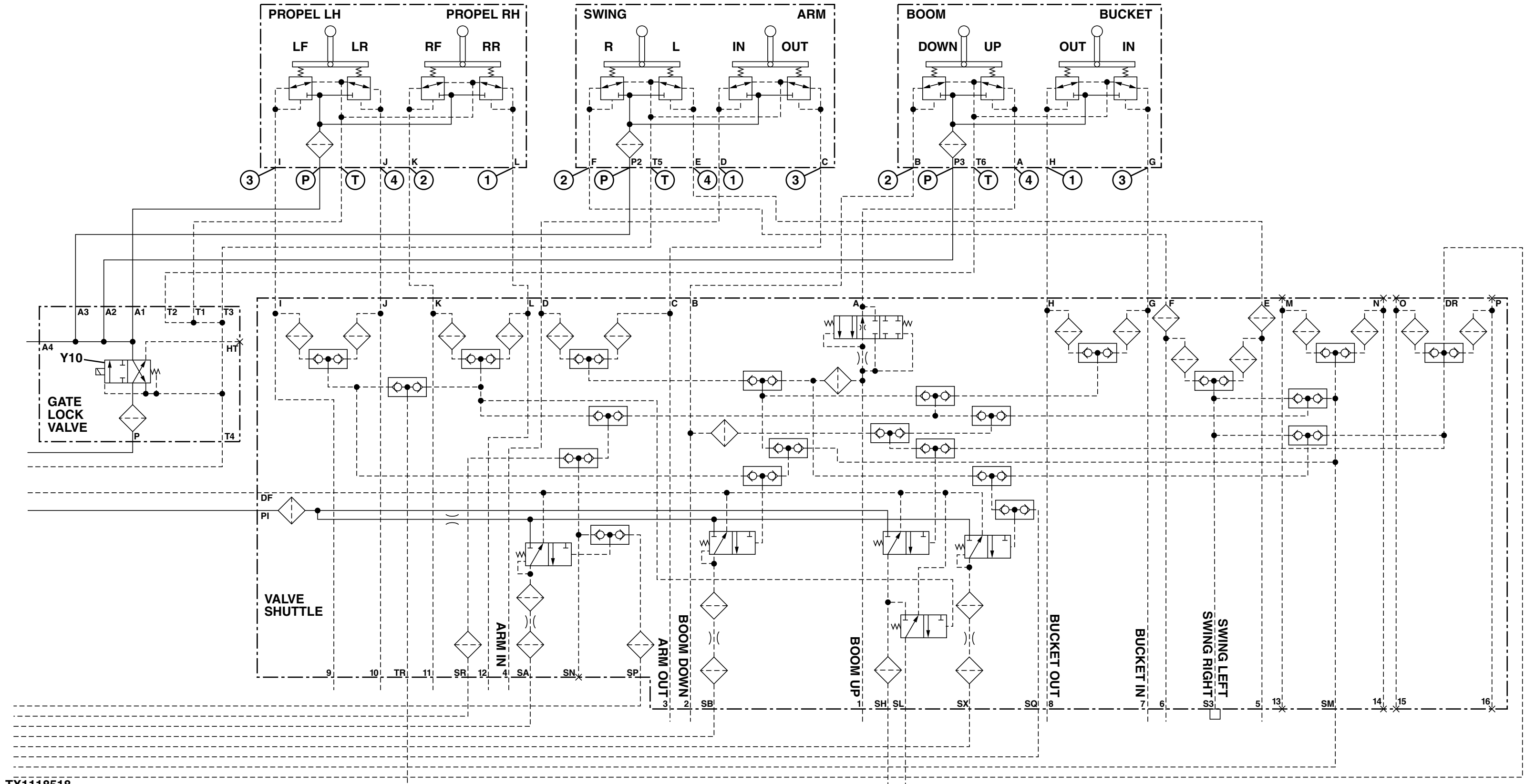
TX1131335

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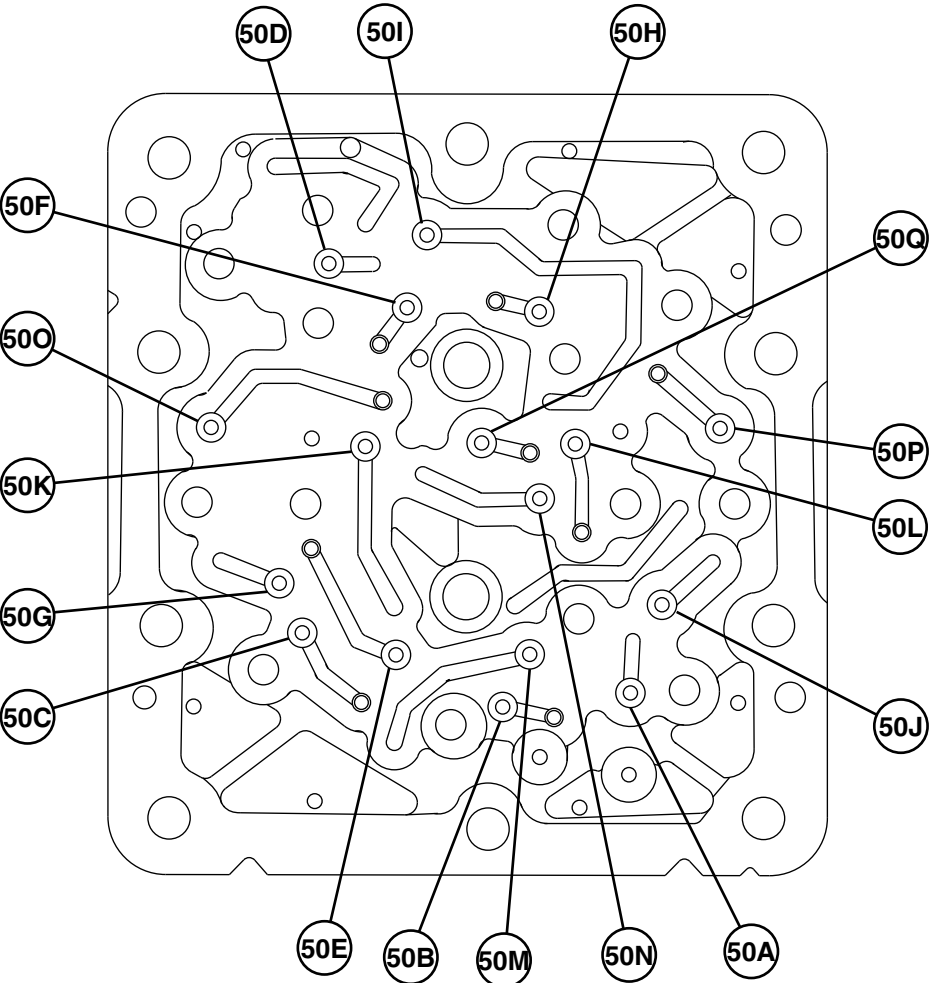
Pilot Operation of Control Valve Operation



JB3888,000068E -19-29MAY13-1/2

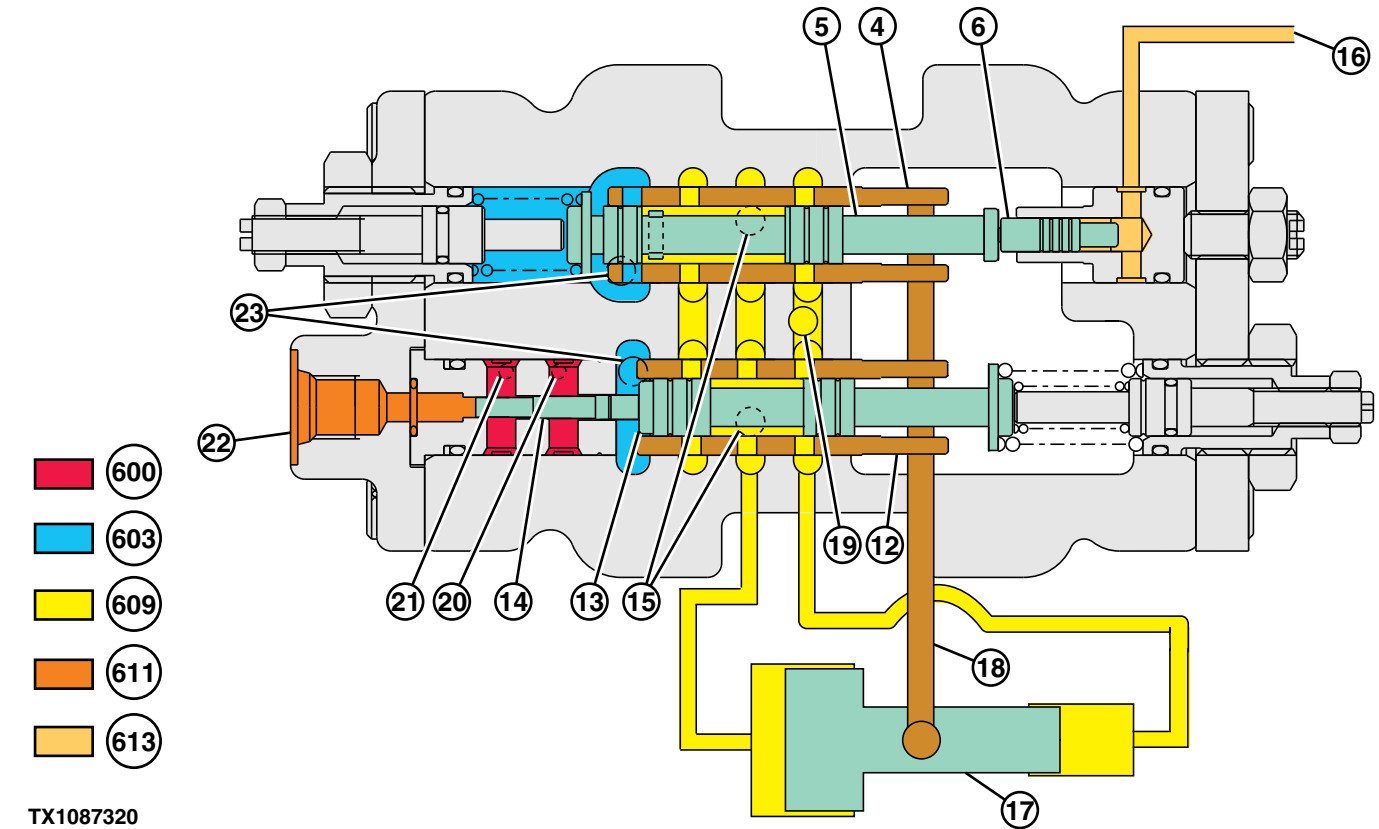


TX1118518



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JB3888,000096B -19-30MAR16-10/11



TX1087320

Pump Regulator Control by Speed Sensing Pilot Oil—Decreasing

- | | | | |
|----------------------------------|------------------------------|----------------------------|------------------------|
| 4—Remote Control Sleeve | 16—From Pump 1 or Pump 2 | 21— Pump 2 Pressure Inlet | 609— Pilot Oil |
| 5—Remote Control Spool | Flow Rate Pilot Valve (SA or | 22— Torque Sensing Port | 611— Charge Oil |
| 6—Piston | SB) | 23— Return to Pump Housing | 613— Reduced Pilot Oil |
| 12— Load Sleeve | 17— Servo Piston | 600— High Pressure Oil | |
| 13— Load Spool | 18— Feedback Link | 603— Lubrication Oil | |
| 14— Load Piston | 19— Pilot Oil Inlet | | |
| 15— To Large End of Servo Piston | 20— Pump 1 Pressure Inlet | | |

Pump Regulator Control by Speed Sensing Pilot Oil

Oil—As engine speed changes, the main controller calculates speed difference between target and actual engine speed. Main controller then actuates torque control solenoid valve to increase or decrease charge oil (611) pressure to torque sensing port (22) and load piston (14).

As load on engine increases, speed difference between target and actual engine speed increases. Main controller decreases voltage to torque control solenoid valve, which increases torque sensing pilot oil pressure to load piston. Torque sensing pilot oil along with high pressure oil shifts load spool so pilot oil (609) flows to large end of servo piston (15), decreasing flow rate (displacement). As flow rate of both pumps decreases, load on engine also decreases allowing actual engine speed to increase.

As load on engine decreases, speed difference between target and actual engine speed decreases. Main controller increases voltage to torque control solenoid valve, which decreases torque sensing pilot oil pressure to load piston. Spring shifts load spool in response to decreasing torque sensing pilot oil pressure, releasing oil from large end of servo piston to return in pump housing (23) allowing pump displacement to increase. As pump flow rate increases engine output is used more efficiently.

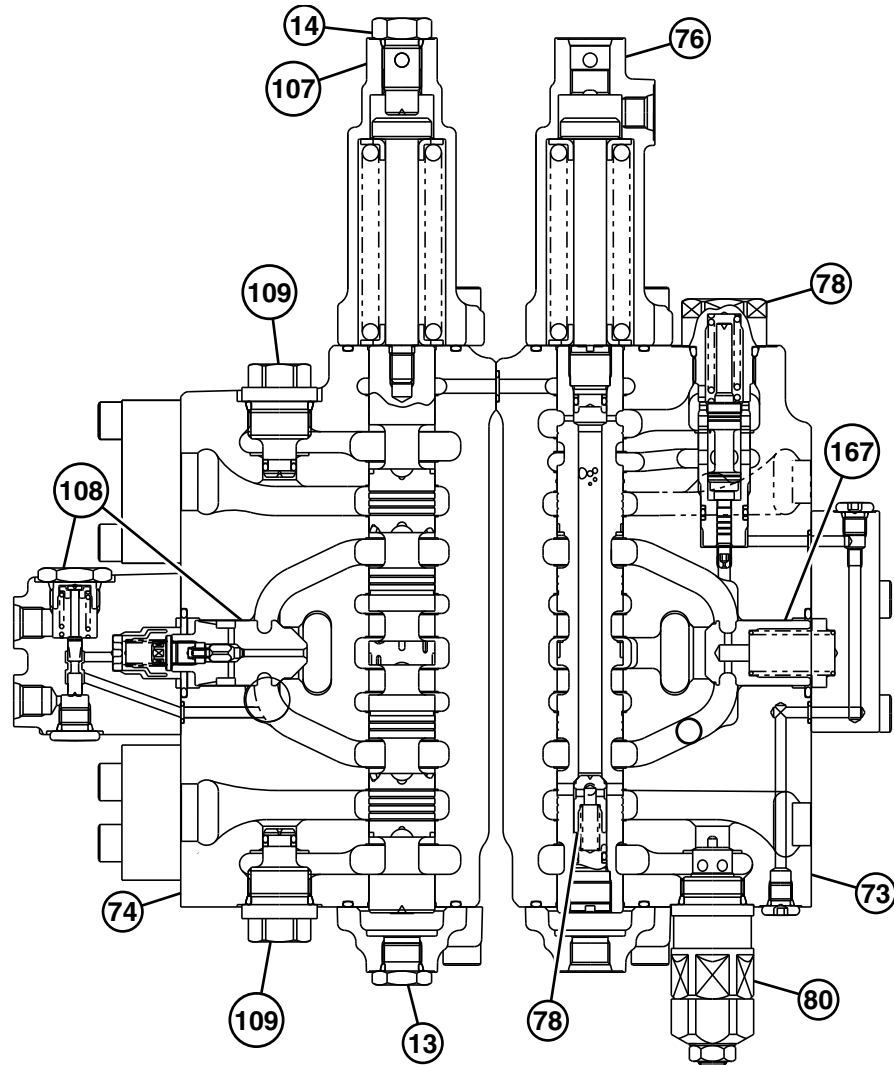
Also, actuating travel function at slow engine speed causes pump flow rate to increase. Flow rate is increased to prevent mistracking, which may occur at lower flow rate if there are any differences between pump 1 and pump 2 flow rates. Main controller processes voltage signals from engine speed dial, travel pressure sensor, and pump 1 and pump 2 pressure sensors. Main controller sends an increasing voltage to torque control solenoid valve, which decreases torque sensing pilot oil pressure to load piston. Springs shift load spool in response to decreasing torque sensing pilot oil pressure, releasing oil from large end of servo piston allowing pump flow rate (displacement) to increase. At increased flow rate, machine does not mistrack at slow engine speed. Increased flow rate continues even if dig function is actuated while traveling at slow engine speed. See Engine Speed Sensing Control Circuit Operation. (Group 9025-05.)

Pump Regulator Component Identification— Function of pump 1 and pump 2 regulators is to control pump 1 and pump 2 flow rates (displacement) in response to various oil pressure signals so pump drive torque does not exceed engine torque output power. Pump 1, pump 2, and pump 3 are equipped with a regulator and perform different functions.

Continued on next page

JB3888,000096D -19-13MAR18-5/6

TX1087320 —UN—27JAN11



TX1119476

Auxiliary and Bucket Valve Cross Sections From Rear

- | | | |
|-----------------------------------|---|---|
| 13— Plug—Auxiliary (pilot) | 76— Bucket Spool | 107— Auxiliary Spool |
| 14— Plug—Auxiliary (pilot) | 78— Bucket Regenerative Valve | 108— Auxiliary Flow Rate Control Valve (valve and poppet) |
| 73— Front Control Valve (6-spool) | 80— Bucket Curl Circuit Relief and Anticavitation Valve | 109— Plug |
| 74— Rear Control Valve (6-spool) | | 167— Load Check Valve (Bucket Tandem Circuit) |

See Bucket Regenerative Valve Circuit Operation for bucket regenerative valve (78). (Group 9025-05.)

Auxiliary spool (107) and auxiliary flow rate control valve (valve and poppet) (108) are used when optional

attachments are installed on the machine. See Auxiliary Flow Rate Control Valve Circuit Operation for auxiliary flow rate control valve. (Group 9025-05.)

Continued on next page

JJ03229,00004C4 -19-09DEC13-7/13

TX1119476 —UN—03AUG12

15— Pump 1 (front, 6-spool)	93— Bypass Shutoff Valve	113— Orifice—Left Travel Power Passage	161— Load Check Valve (Auxiliary 2 Tandem Circuit)
16— Pump 2 (rear, 6-spool)	94— Arm Regenerative Valve	115— Main Relief Valve Isolation Check Valve (P1)	162— Load Check Valve (Arm 3 Tandem Circuit)
44— Flow Combiner Valve Spool	95— Swing Spool	116— Main Relief Valve Isolation Check Valve (P2)	163— Load Check Valve (Boom 3 Parallel Circuit)
75— Right Travel Spool	97— Arm 1 Spool	117— Main Relief and Power Dig Valve	164— Load Check Valve (Boom 3 Tandem Circuit)
76— Bucket Spool	98— Arm 1 Flow Rate Control Valve (valve and poppet)	118— Auxiliary Function Flow Combiner Valve	165— Load Check Valve (Swing Tandem Circuit)
79— Bucket Dump Circuit Relief and Anticavitation Valve	99— Check Valve (lift check)—Arm 1 Regenerative Circuit	119— Check Valve—Auxiliary Function Flow Combiner Valve Circuit	166— Bucket Regenerative Cut Valve
80— Bucket Curl Circuit Relief and Anticavitation Valve	100— Check Valve (lift check)—Dig Regenerative Circuit	120— Travel Flow Combiner Valve	167— Load Check Valve (Bucket Tandem Circuit)
81— Boom 1 Spool	102— Arm In Circuit Relief and Anticavitation Valve	123— Orifice—Bucket Power Circuit	168— Overload Relief Valve With Make-Up Function (Auxiliary 2) (2 used)
84— Dig Regenerative Valve	103— Arm Out Circuit Relief and Anticavitation Valve	149— Pump 3	169— Arm Bottom Anti-Drift Valve (Check Valve)
85— Boom Reduced Leakage Valve (valve and check valve)	104— Boom 2 Spool	151— Auxiliary 2 Spool	170— Main Relief Valve and Power Dig Valve (P3)
87— Boom Lower Meter-In Cut Valve	105— Check Valve (lift check)—Boom 2 Power Circuit	152— Arm 3 Spool	
88— Boom Up Circuit Relief and Anticavitation Valve	107— Auxiliary Spool	153— Boom 3 Spool	
89— Boom Down Circuit Relief and Anticavitation Valve	108— Auxiliary Flow Rate Control Valve (valve and poppet)	157— Arm Rod Anti-Drift Valve (Check Valve)	
90— Arm 2 Spool	110— Left Travel Spool	158— Arm Rod Anti-Drift Valve (Selector Valve)	
91— Arm 2 Flow Rate Control Valve (valve and poppet)	111— Check Valve (lift check)—Left Travel Neutral Passage	159— Arm Bottom Anti-Drift Valve (Selector Valve)	
92— Check Valve (lift check)—Arm 2 Neutral Passage	112— Check Valve (lift check)—Left Travel Power Passage	160— Load Check Valve (Auxiliary 2 Parallel Circuit)	

For location of check valves and orifices in control valves, see [Control Valve Operation](#). (Group 9025-05.)

Check Valves (92, 111, 164, and 165): Check valves function as lift checks in the neutral passages.

Check Valves (105, 112, 160, 161, 162, 163, and 167): Check valves function as lift checks in the power passages.

Check Valve (lift check)—Dig Regenerative Circuit (100): Functions as a lift check for arm in function when dig regenerative solenoid valve is actuated. See [Dig Regenerative Valve Circuit Operation](#) for solenoid valve operation. (Group 9025-05.)

See [Control Valve Operation](#) for location and operation of dig regenerative valve. (Group 9025-05.)

Orifice—Left Travel Power Passage (113): Restricts the flow of high pressure oil from pump 2 (16) through the power passage to the left travel spool (110).

Check Valve (lift check)—Arm 1 Regenerative Circuit (99): During arm in regenerative operation when the arm regenerative valve (94) is closed, check valve (99) is pushed open when return oil from the rod end of arm cylinder becomes greater than high pressure oil from pump 2 (16). Return oil combines with the high pressure oil flow to the head end of arm cylinder preventing cavitation.

When high pressure oil pressure to the head end of arm cylinder is higher, all return oil from rod end flows to the return passage through the orifice (notch) in the arm 1 spool (97) and orifice in the arm regenerative valve. Return oil from the rod end only flows through the arm 1 spool to the return passage. The flow of return

oil from the rod end is blocked by the arm 2 spool. See [Arm Regenerative Valve Circuit Operation](#) for more information. (Group 9025-05.)

Operational Check: Arm in function is slow or lacks power when dig. Inspect check valve for leakage. Also inspect the orifice (notch) in arm 1 spool and the orifice in the arm regenerative valve for restriction.

Main Relief Valve Isolation Check Valve (P1) (115):

Pump 1 and pump 2 main relief and power dig valve (117) is used to limit the high pressure oil pressure. The higher pressure closes the check valve against the lower pressure so it cannot flow to the lower pressure side of control valve. The higher pressure is sensed by the main relief and power dig valve.

Operational Check: Pump 2 (16) high pressure oil pressure becomes hard to increase. To check, operate bucket dump function over relief and check pressure at pump 1. If pressure is less than main relief and power dig valve pressure setting, inspect isolation check valve (115). Also, power and neutral passage oil flow pressure for the pump 2 side of control valve is high because oil is flowing past the isolation check valve (115).

Main Relief Valve Isolation Check Valve (P2) (116):

Operational Check: Pump 1 (15) high pressure oil becomes hard to increase. Operate swing function at stall and check pressure at pump 2. If pressure is less than swing crossover relief valve pressure setting, inspect the isolation check valve (116). Also, neutral passage oil flow pressure for the pump 1 side of control valve is high because oil is flowing past the isolation check valve (116).

15— Pump 1
16— Pump 2
81— Boom 1 Spool
84— Dig Regenerative Valve
90— Arm 2 Spool
97— Arm 1 Spool
104— Boom 2 Spool
125— Boom Cylinder (2 used)

127— Arm Cylinder
149— Pump 3
600— High Pressure Oil
604— Return Oil
609— Pilot Oil
650— Electrical Voltage
A3— Main Controller (MCZ)

B30— Boom Up Pressure Sensor
B31— Arm In Pressure Sensor
B35— Pump 1 Delivery Pressure Sensor
B37— Pump 2 Delivery Pressure Sensor
B56— Pump 3 Delivery Pressure Sensor
Y22— Dig Regenerative Solenoid (marked SF)

The dig regenerative valve (84) improves arm control and prevents arm cylinder cavitation during the combined operations of boom up and arm in, by combining the return oil (604) from boom cylinder rod end with the pump high pressure oil (600) to the arm cylinder.

Under the following operating conditions; high hydraulic pump 1 (15) and pump 2 (16) delivery pressure, pilot oil pressure to the pilot cap for arm in, and boom up actuated, gravity can pull the arm in faster than the pump can supply oil to the arm cylinder head end. The operating conditions are sensed by the pump 1 delivery pressure sensor (B35) and pump 2 delivery pressure sensor (B37), arm

in pressure sensor (B31), and boom up pressure sensor (B30). The sensors send electrical voltage (650) signals to the main controller (MCZ) (A3). The main controller sends a voltage signal to the dig regenerative solenoid (Y22) to energize the coil. The solenoid valve then sends pilot oil pressure signal to shift the dig regenerative valve spool. The return oil from the boom cylinder (125) rod end is combined with high pressure oil from hydraulic pump 2 and routed through the arm 1 spool (97) to the arm cylinder (127) head end, increasing cylinder speed and preventing cavitation.

Continued on next page

JJ03229,00004CB -19-10MAR16-2/5



TX1088014

Bucket Regenerative Valve Section

Continued on next page

JJ03229,00004CD -19-30AUG12-2/3

- 15— Pump 1
- 16— Pump 2
- 76— Bucket Spool
- 90— Arm 2 Spool
- 91— Arm 2 Flow Rate Control Valve (valve and poppet)

- 97— Arm 1 Spool
- 126— Bucket Cylinder
- 127— Arm Cylinder
- 149— Pump 3
- 152— Arm 3 Spool

- 600— High-Pressure Oil
- 602— Low-Pressure Oil
- 604— Return Oil
- 606— Trapped Oil

- 609— Pilot Oil

NOTE: The degrees of priority to arm operation can be adjusted by monitor.

The function of arm 2 flow rate control valve (valve and poppet) (91) is to restrict the flow of high-pressure oil

(600) from pump 1 (15) to the arm 2 spool (90) during combined operation of arm roll-in and bucket roll-in and of auxiliary and arm roll-out.

JJ03229,00004CF -19-18MAY16-2/3

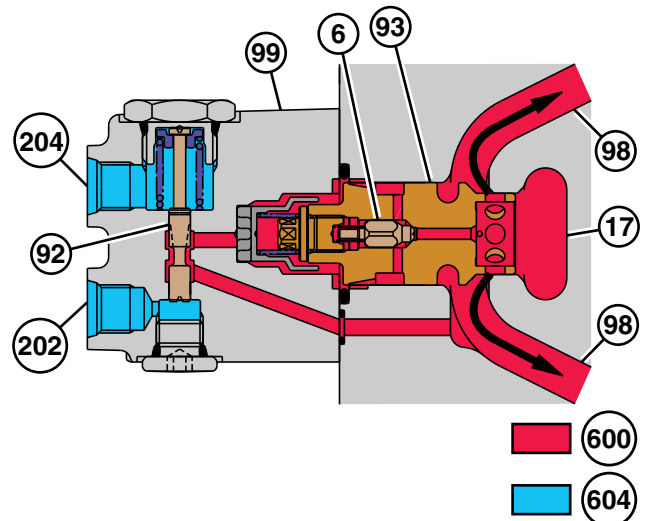
The switch valve (92) and poppet (93) of arm 2 flow rate control valve (99) are located in separate areas on the hydraulic control valve. The switch valve of the arm 2 flow rate control valve is located in the arm 2 valve section of the control valve. The poppet of the arm 2 flow rate control valve is located in a section between the arm 2 valve and the boom 1 spool section. For layout of the hydraulic control valve, see Control Valve Operation. (Group 9025-05.)

Normal Operation—High-pressure oil from pump 1 (17) opens the check valve (6) in the poppet of arm 2 flow rate control valve because the switch valve is open. The high-pressure oil flows through the check valve and switch valve to the arm 2 spool. As load increases, pressure increases pushing the poppet open and high-pressure oil flows through the poppet to arm 2 spool.

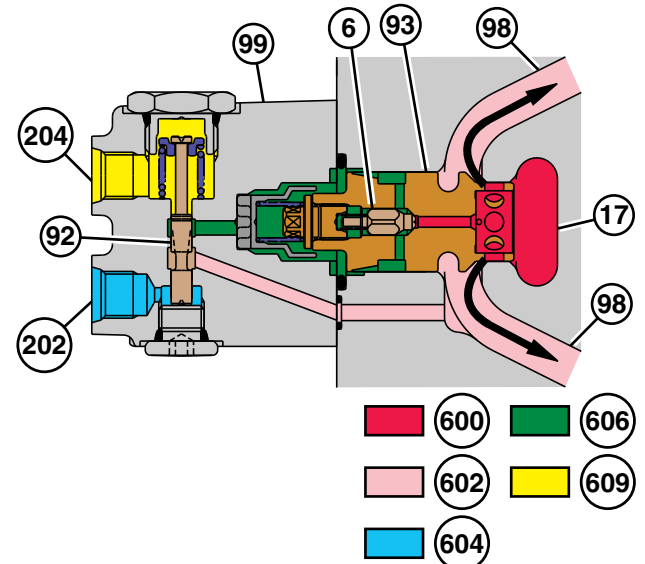
Combined Operation—During combined operation of boom up, arm in, and swing, the arm regenerative solenoid is activated. When activated, control pilot oil shifts the switch valve of the arm 2 flow rate control valve.

With the switch valve shifted, high-pressure oil is trapped on the backside of poppet, which forces the poppet towards the closed position. The poppet now restricts the flow of high-pressure oil to arm 2 spool. Consequently, more pump 1 high-pressure oil is available to the boom 1 spool, maintaining the boom up speed.

During combined operation, the arm in function is maintained by the pump 2 high-pressure oil and the arm 1 spool regenerative circuit. See Arm Regenerative Valve Circuit Operation. (Group 9025-05.)



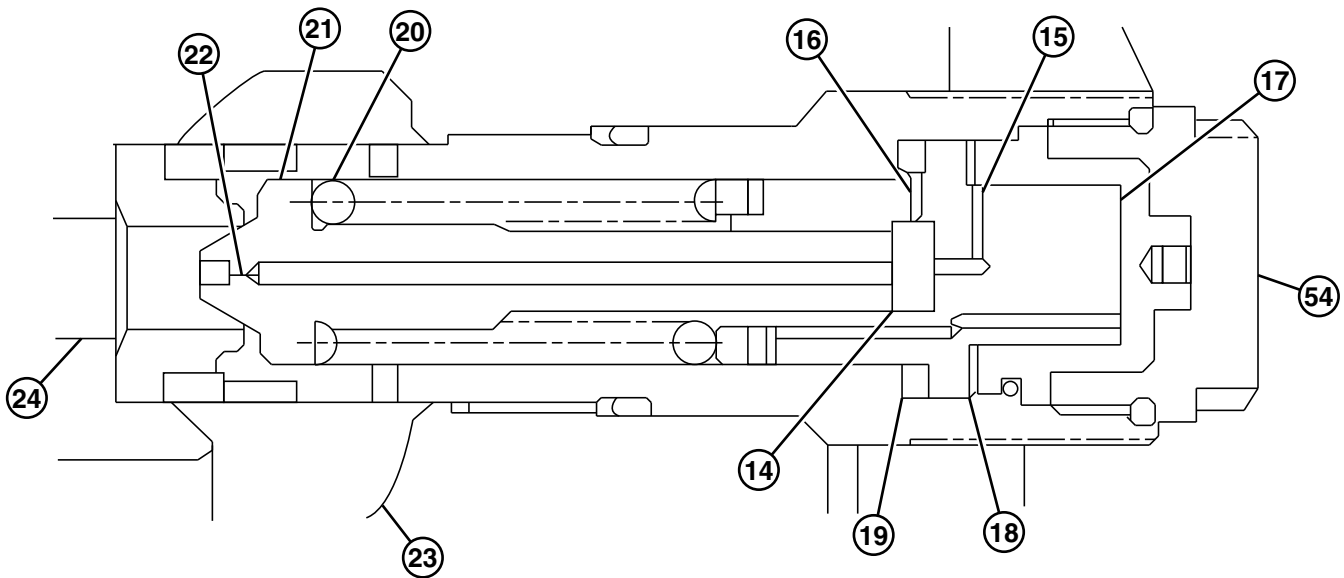
Arm 2 Flow Rate Control Valve (normal operation)



Arm 2 Flow Rate Control Valve (combined operation)

JJ03229,00004CF -19-18MAY16-3/3

- 6— Check Valve
- 17— From Pump 1
- 92— Switch Valve
- 93— Poppet
- 98— To Arm 2 Spool
- 99— Arm 2 Flow Rate Control Valve
- 202— To Solenoid Valve Manifold (port DM)
- 204— From Arm 2 Flow Control Solenoid Valve (SD)
- 600— High-Pressure Oil
- 602— Low-Pressure Oil
- 604— Return Oil
- 606— Trapped Oil
- 609— Pilot Oil

**TX1088116**

(exploded view) Crossover Relief Valve

14— Cavity
15— Passage
16— Passage
17— Piston

18— Cavity
19— Cavity
20— Spring
21— Poppet

22— Orifice
23— Low-Pressure Port
24— High-Pressure Port

54— Crossover Relief Valve

Swing Motor Crossover Relief Valve—The swing motor crossover relief valves (54) are direct-acting relief valves with a shock reducing function.

Low-Pressure Relief Operation (Shockless Function):

High-pressure at port (24) flows into cavity (14) through poppet (21). Pressure oil from cavity (14) flows into cavities (18 and 19) via passages (15 and 16). Cavity (18) is larger than cavity (19) so that the piston moves to the left. A pressure difference is created from one side of the poppet to the other. When pressure difference is increased more than spring force, the poppet is open and pressure oil flows to port (23). When piston reaches full stroke, the pressure difference is eliminated, the poppet is closed, and the pressure in the swing circuit will reach set pressure.

High-Pressure Relief Operation (Overload Prevention):

After the piston is moved full stroke, the spring is compressed and circuit pressure becomes the

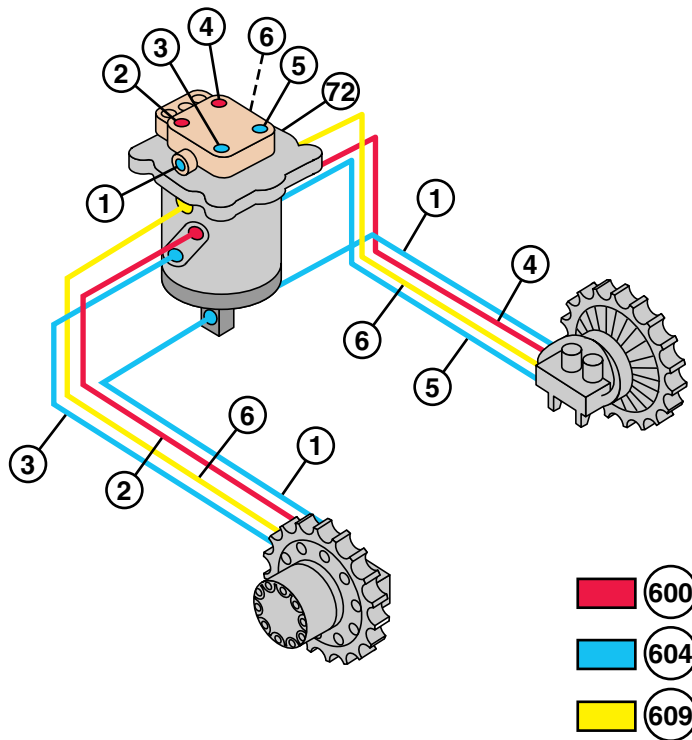
set-pressure. If high-pressure at port (24) increases more than the spring set-pressure, the poppet is open and low-pressure oil flows to port (23). When pressure at port (24) is reduced to the specified level, the poppet is closed by the spring force.

Swing Motor Make-Up Check Valve—When the swing control lever is returned to the neutral position while the upperstructure is in motion, the weight of the upperstructure will continue to turn the swing motor, which causes it to act like a pump. The flow caused by the pumping action of the swing motor cannot flow through the control valve because the work ports are blocked by the valve spool. The high-pressure oil is forced through the crossover relief valve. The make-up check valve (53) provides oil to the low-pressure side of the swing motor to prevent cavitation.

TX1088116 —UN—16FEB11

JB3888,000079C -19-20APR16-3/3

Center Joint Operation



TX1088186

1— Drain
2— Left Travel Forward
3— Left Travel Reverse

4— Right Travel Forward
5— Right Travel Reverse
6— Travel Speed Change

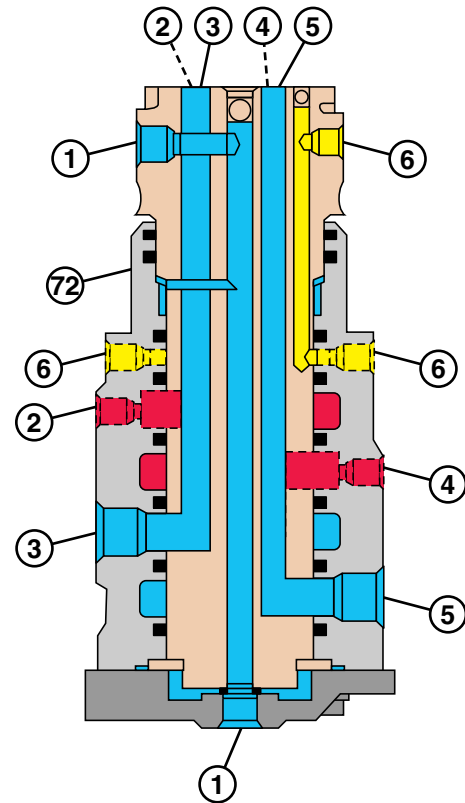
Center Joint

72— Center Joint
600— High-Pressure Oil
604— Return Oil

The center joint (72) is a 360° rotary manifold. It allows oil to flow to and from the travel motors without twisting hoses when the upper structure is rotated. The blade is optional.

The inner spindle is connected to the upper structure and the housing is connected to the undercarriage. The housing rotates about the spindle during swing operation.

Oil flows into and through the spindle to passages in the housing, and then out of the housing to the travel motors and the blade cylinders (optional). Sealing rings stop oil from leaking between the spindle and housing into adjacent passages.

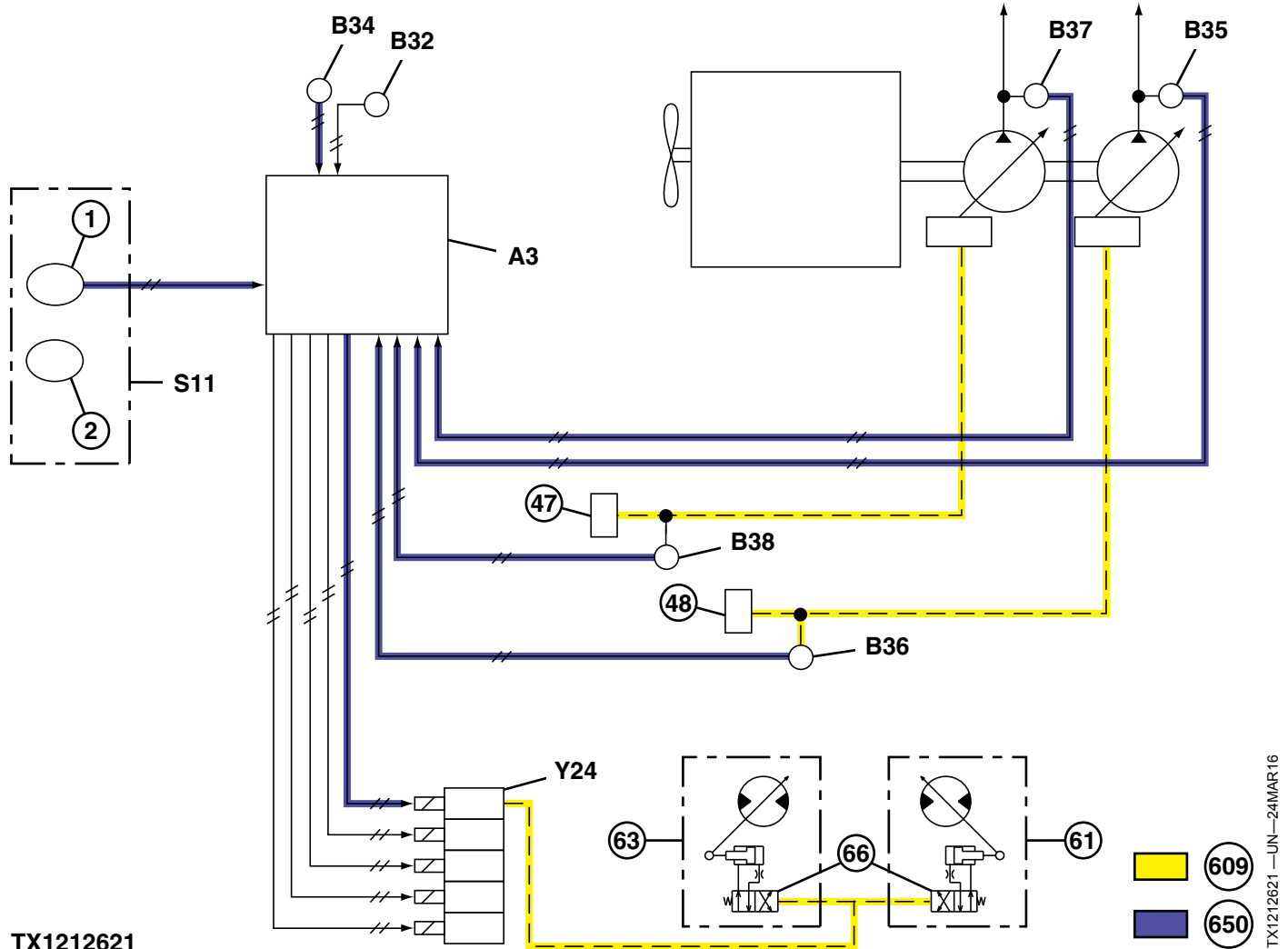


609— Pilot Oil

TX1088186 —UN—17FEB11

JB3888.000097F -19-14MAR16-1/1

Travel Motor Speed Circuit Operation



Travel Motor Speed Circuit Fast Speed Operation

- 1— Fast (rabbit) Speed
- 2— Slow (turtle) Speed
- 47— Pump 2 Flow Rate Pilot Valve (port SB)
- 48— Pump 1 Flow Rate Pilot Valve (port SA)
- 61— Right Travel Motor
- 63— Left Travel Motor

- 66— Travel Speed Change Valve
- 609— Pilot Oil
- 650— Electrical Voltage
- A3— Main Controller (MCZ)
- B32— Front Attachment Pressure Sensor (marked FRT)
- B34— Travel Pressure Sensor (marked TR)

- B35— Pump 1 Delivery Pressure Sensor (marked PP1)
- B36— Pump 1 Control Pressure Sensor (marked PC1)
- B37— Pump 2 Delivery Pressure Sensor (marked PP2)
- B38— Pump 2 Control Pressure Sensor (marked PC2)

- S11— Travel Mode Switch
- Y24— Power Dig/Travel Speed Solenoid (marked SI)

Travel Motor Slow (Turtle) Speed—When the travel mode switch (S11) is in the slow (turtle) speed (2) position, the power dig/travel speed solenoid (marked SI) (Y24) is de-energized. The travel speed change valve (66) is open to return through the power dig/travel speed solenoid (marked SI) (Y24), and the travel motors are at slow speed. See Travel Motor and Park Brake Valve Operation. (Group 9025-05.)

Travel Motor Fast (Rabbit) Speed—When travel mode switch is in the fast (rabbit) speed (1) position, the power dig/travel speed solenoid (marked SI) (Y24) is energized. Pilot oil (609) is routed to the travel speed change valve (66), and the travel motors are shifted to fast speed. See Travel Motor and Park Brake Valve Operation. (Group

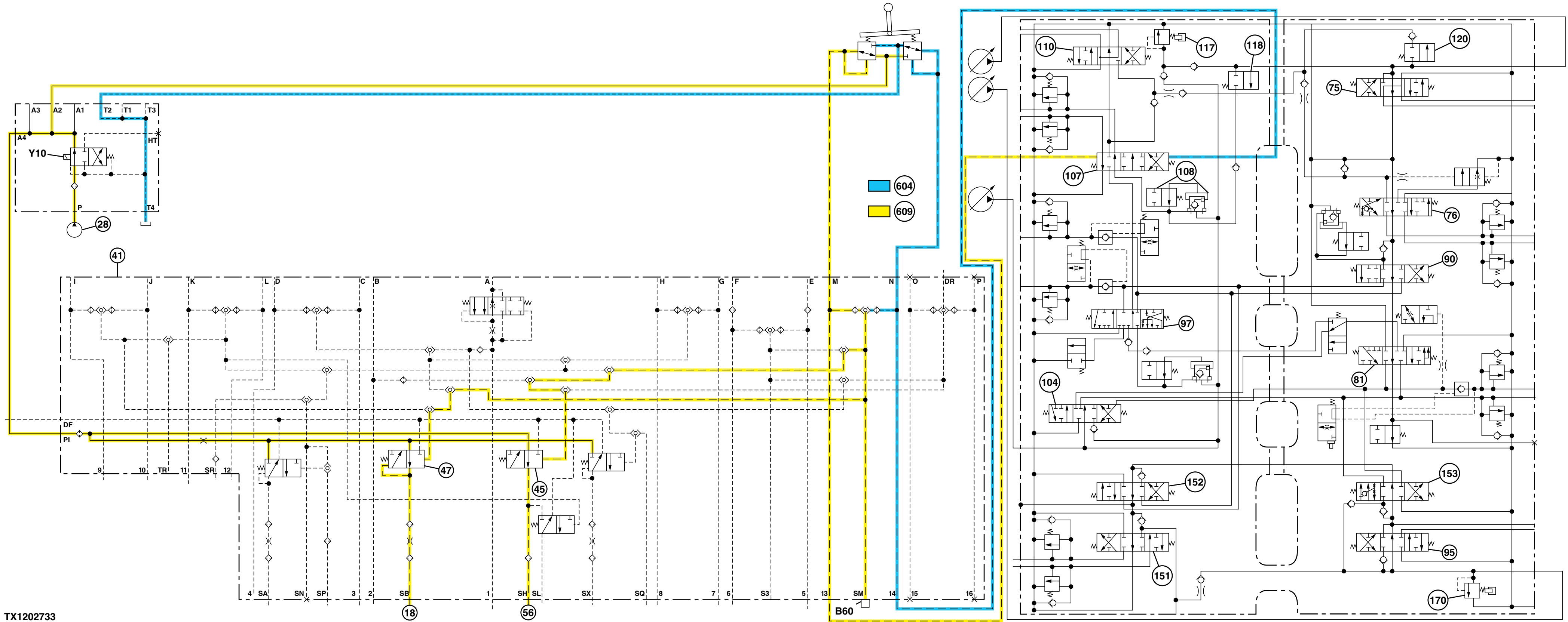
9025-05.) The power dig/travel speed solenoid (marked SI) (Y24) is energized only when all of the following conditions are met:

- Travel mode switch is in fast (rabbit) speed position.
- Travel pressure sensor is on.
- Front attachment pressure sensor is off.
- Either pump 1 or pump 2 delivery pressure sensor must indicate low pressure.
- Either pump 1 or pump 2 control pressure sensor must indicate high pressure.

For electrical circuit information, see System Functional Schematic, Component Location, and Wiring Diagram Master Legend. (Group 9015-10.)

Continued on next page

JB3888,0000981 -19-25APR16-1/4



TX1202733

Continued on next page

Auxiliary Pilot Control Valve Schematic (auxiliary spool shown shifted)

DF89619,00B5D4B -19-03NOV15-2/9

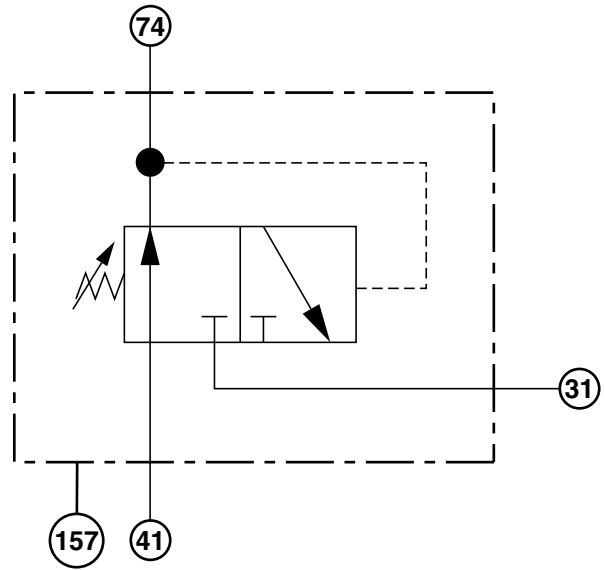
Flow Rate Pressure Reducing Valve Operation

The function of the flow rate reducing valve (157) is to control the amount of pump 1 flow that is directed to the auxiliary spool when combining auxiliary with a pump 1 function.

Pilot pressure is sent from pilot signal manifold port SN (41) when a pump 1 function is activated. The pilot oil is then routed through the flow rate pressure reducing valve (157) to left control valve (74). This shifts the auxiliary flow combiner valve to stop the flow of pump 1 high-pressure oil to the auxiliary spool, “de-combining” the flow. Flow rate reducing valve is adjustable, turn counterclockwise to give auxiliary priority flow over pump 1 functions or clockwise to give pump 1 functions priority over auxiliary.

When pilot oil pressure to left control valve exceeds set pressure of flow rate reducing valve, the valve shifts allowing pilot oil to left control valve to flow to hydraulic oil tank (31) allowing the auxiliary flow combiner valve to shift combining pump 1 and pump 2 high-pressure oil flow.

For more information, see [Two Pump Combined Flow Kit Operation](#). (Group 9025-05.)



Flow Rate Pressure Reducing Valve Schematic

- | | |
|--|-------------------------------|
| 31— To Hydraulic Oil Tank | 74— To Left Control Valve |
| 41— From Pilot Signal Manifold Port SN | (5-spool) |
| | 157— Flow Rate Reducing Valve |

JJ03229,00008E5 -19-20DEC13-1/1

TX1147652 —UN—14NOV13

Secondary Auxiliary Relief Valve Solenoid Valve Operation

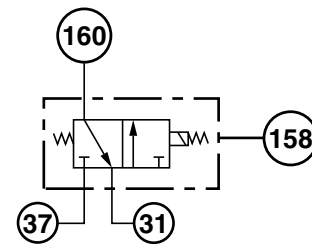
The function of the secondary auxiliary relief valve solenoid valve (158) is to shift secondary auxiliary relief control valve to open or close high-pressure oil flow to secondary auxiliary relief valve.

The secondary auxiliary relief valve solenoid valve is controlled by settings in MP Dr and Service ADVISOR™. See [Attachment Control Circuit Theory of Operation](#). (Group 9015-15.)

When the secondary auxiliary relief valve solenoid valve (158) is activated, valve is shifted and pilot oil from solenoid valve manifold port PE (37) is sent to secondary auxiliary relief control valve (160). This shifts the secondary auxiliary relief control valve to route high-pressure oil to the secondary auxiliary relief valve.

When the secondary auxiliary relief valve solenoid valve is deactivated, spring tension shifts the valve. Pilot oil to secondary auxiliary relief control valve is sent to hydraulic oil tank (31). This shifts the secondary auxiliary relief control valve to stop routing high-pressure oil to the secondary auxiliary relief valve.

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Secondary Relief Valve Solenoid Valve

- | | |
|--|--|
| 31— To Hydraulic Oil Tank | 158— Secondary Auxiliary Relief Valve Solenoid Valve |
| 37— From Solenoid Valve Manifold Port PE | 160— To Secondary Auxiliary Relief Control Valve |

For more information, see [Secondary Auxiliary Relief Kit Operation](#). (Group 9015-15.)

JJ03229,00008E6 -19-25NOV13-1/1

TX1147647 —UN—14NOV13

- | | | | |
|--|---|--|---|
| 18— To Pump 2 Regulator | 76— Bucket Spool | 118— Auxiliary Flow Combiner Valve | 170— Main Relief Valve and Power Dig Valve (P3) |
| 28— Pilot Pump | 81— Boom 1 Spool | 120— Travel Flow Combiner Valve | 604— Return Oil |
| 41— Pilot Signal Manifold | 90— Arm 2 Spool | 148— Auxiliary Pilot Solenoid Valve | 609— Pilot Oil |
| 45— Swing Park Brake Release Pilot Valve (port SH) | 95— Swing Spool | 149— Auxiliary Pilot Pressure Reducing Valve | B60— Attachment Pressure Sensor |
| 47— Pump 2 Flow Rate Pilot Valve (port SB) | 97— Arm 1 Spool | 151— Auxiliary 2 Spool | Y10— Pilot Shutoff Solenoid |
| 56— To Swing Park Brake | 104— Boom 2 Spool | 152— Arm 3 Spool | |
| 75— Right Travel Spool | 107— Auxiliary Spool | 153— Boom 3 Spool | |
| | 108— Auxiliary Flow Rate Control Valve | | |
| | 110— Left Travel Spool | | |
| | 117— Main Relief and Power Dig Valve (P1, P2) | | |

NOTE: Two way solenoid kit can be used on auxiliary high flow and auxiliary low flow.

The function of two way solenoid kit is to operate the auxiliary function from the left or right pilot control lever momentary and proportional switches.

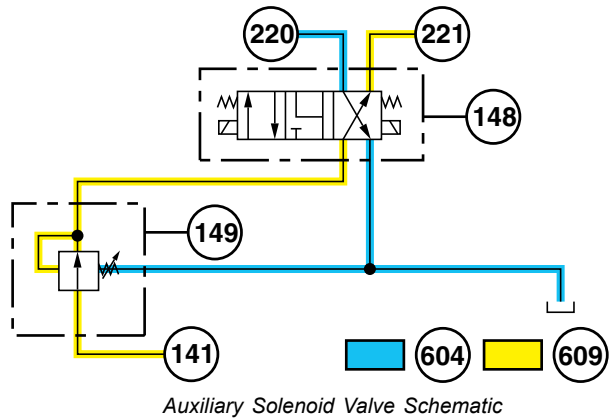
NOTE: The right pilot control lever switches are standard from the factory; left pilot control lever switches are a field kit installation.

Pressure Reducing Valve—The auxiliary pilot pressure reducing valve (149) reduces the pressure to the auxiliary pilot solenoid valve (148) to limit the control valve auxiliary spool movement. The pressure reducing valve is adjustable; turn the adjustment screw clockwise to increase pressure and counterclockwise to decrease pressure.

DF89619,00B5D4C -19-03NOV15-2/4

Auxiliary Solenoid Valve—When the auxiliary solenoid valve (148) is shifted, pilot oil (609) is sent to pilot signal manifold port M (221). Pilot signal manifold port 13 outputs pilot oil to the control valve auxiliary valve spool. This shifts the control valve auxiliary valve spool and high-pressure oil is output on port of the control valve to the auxiliary attachment.

- | | |
|--|--------------------------------------|
| 141— From Pilot Shutoff Valve | 221— To Pilot Signal Manifold Port M |
| 148— Auxiliary Solenoid Valve | 604— Return Oil |
| 149— Auxiliary Pressure Reducing Valve | 609— Pilot Oil |
| 220— To Pilot Signal Manifold Port N | |

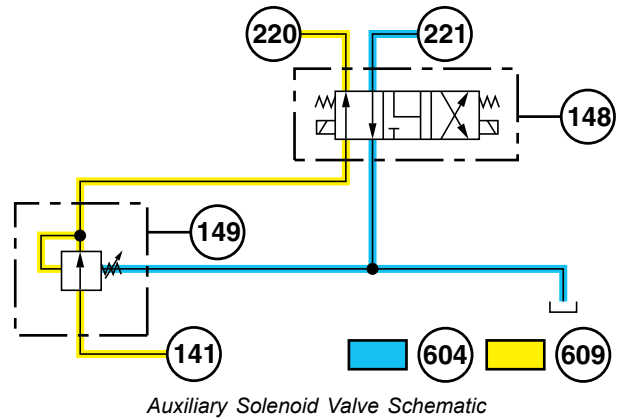


TX1136522 —UN—08AUG13

DF89619,00B5D4C -19-03NOV15-3/4

When the auxiliary solenoid valve (148) is shifted, pilot oil (609) is sent to pilot signal manifold port N (220). Pilot signal manifold port 14 outputs pilot oil to the control valve auxiliary valve spool. This shifts the control valve auxiliary valve spool and high-pressure oil is output on port of the control valve to the auxiliary attachment.

- | | |
|--|--------------------------------------|
| 141— From Pilot Shutoff Valve | 221— To Pilot Signal Manifold Port M |
| 148— Auxiliary Solenoid Valve | 604— Return Oil |
| 149— Auxiliary Pressure Reducing Valve | 609— Pilot Oil |
| 220— To Pilot Signal Manifold Port N | |



TX1136519 —UN—08AUG13

DF89619,00B5D4C -19-03NOV15-4/4

- | | | | |
|-----------------------------------|--|---|----------------|
| 13— Auxiliary (pilot) | 74— Rear Control Valve (6-spool) | 159— Secondary Auxiliary Relief Valve | 609— Pilot Oil |
| 14— Auxiliary (pilot) | 107— Auxiliary Spool | Y41— Secondary Relief Solenoid | |
| 15— Pump 1 | 149— Pump 3 | 160— Secondary Auxiliary Relief Control Valve | |
| 16— Pump 2 | 150— Auxiliary Attachment | 600— High-Pressure Oil | |
| 28— Pilot Pump | 158— Secondary Auxiliary Relief Valve Solenoid Valve | 604— Return Oil | |
| 37— Solenoid Valve Manifold | | | |
| 73— Front Control Valve (6-spool) | | | |

Secondary auxiliary relief kit is used when optional attachments are installed on the machine needing work port pressure relief.

NOTE: Secondary auxiliary relief will not work properly unless secondary auxiliary relief kit is installed on machine.

The function of the secondary auxiliary relief kit is to give pressure relief to high-pressure oil (600) work side

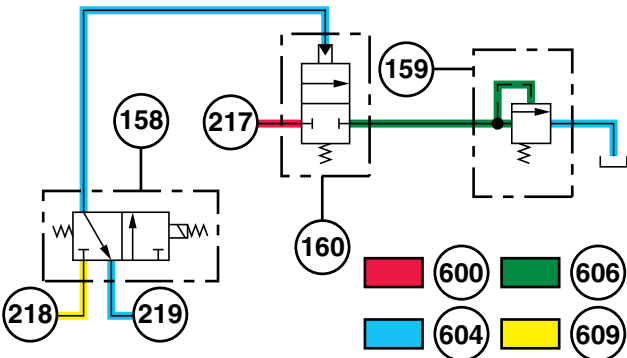
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line of attachments. The secondary auxiliary relief valve solenoid valve (158) is controlled by the main controller and is turned on or off through settings in MPDr or Service ADVISOR™. For more information, [See Attachment Control Circuit Theory of Operation](#). (Group 9015-15.)

JJ03229,00008F0 -19-02JAN14-2/4

Auxiliary Secondary Relief Solenoid Valve

De-Energized— When the secondary auxiliary relief valve solenoid valve (158) is de-energized, spring tension shifts secondary auxiliary relief valve solenoid valve to allow pilot oil (609) from secondary auxiliary relief control valve (160), to flow to hydraulic oil tank (219). With no pilot oil pressure to secondary auxiliary relief control valve (160) spring tension shifts secondary auxiliary relief control valve, blocking high-pressure oil (600) from auxiliary attachment work port (217) to secondary auxiliary relief valve (159).



Auxiliary Secondary Relief Solenoid Valve De-Energized

TX1135787 —UN—15MAY13

- | | |
|--|----------------------------|
| 158— Secondary Auxiliary Relief Valve Solenoid Valve | 219— To Hydraulic Oil Tank |
| 159— Secondary Auxiliary Relief Valve | 600— High-Pressure Oil |
| 160— Secondary Auxiliary Relief Control Valve | 604— Return Oil |
| 217— From Auxiliary Attachment Work Port | 606— Trapped Oil |
| 218— From Solenoid Valve Manifold | 609— Pilot Oil |

Continued on next page

JJ03229,00008F0 -19-02JAN14-3/4

All Hydraulic Functions Slow

JB3888,0000998 -19-21JAN13-1/15

All Hydraulic Functions Slow Diagnostic Procedure

JB3888,0000998 -19-21JAN13-2/15

1 Low Hydraulic Oil Level	Check hydraulic oil level. See Check Hydraulic Tank Oil Level. (Operator's Manual.) Is hydraulic oil at proper level?	YES: Go to Cold Hydraulic Oil. NO: Fill hydraulic tank to proper level.
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JB3888,0000998 -19-21JAN13-3/15

2 Cold Hydraulic Oil	Check hydraulic oil temperature. See Hydraulic Oil Warm-up Procedure. (Group 9025-25.) Does hydraulic oil temperature meet specification?	YES: Go to Oil Viscosity Too Heavy. NO: Perform hydraulic oil warm-up procedure.
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JB3888,0000998 -19-21JAN13-4/15

3 Oil Viscosity Too Heavy	Check hydraulic oil for proper viscosity. See Hydraulic Oil. (Operator's Manual.) Is specified hydraulic oil used?	YES: Go to Slow Engine Speed. NO: Use correct viscosity hydraulic oil for operating conditions.
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JB3888,0000998 -19-21JAN13-5/15

4 Slow Engine Speed	Check engine speed. See Engine Speed Control System Operation. (Group 9010-05.) Also see Main Controller (MCZ) Circuit Theory of Operation. (Group 9015-15.) Does engine speed meet specification?	YES: Go to Air Leak in Pump Suction Line. NO: Select correct engine speed.
----------------------------	--	--

JB3888,0000998 -19-21JAN13-6/15

5 Air Leak in Pump Suction Line	Inspect pump suction line for leaks. See Hydraulic System Component Location. (Group 9025-15.) Is pump suction line free of leaks?	YES: Go to Pump Control Pilot Pressure Signal Low. NO: Repair or replace pump suction line.
--	--	---

JB3888,0000998 -19-21JAN13-7/15

6 Pump Control Pilot Pressure Signal Low	Perform Pump Control Pilot Pressure Signal Test. (Group 9025-25.) Does pump control pilot pressure meet specification?	YES: Go to Pilot Circuit Malfunction. NO: Check pump 1, pump 2, or pump 3 flow rate pilot valve. See Pilot Signal Manifold Disassemble and Assemble. (Group 3360.)
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Continued on next page

JB3888,0000998 -19-21JAN13-8/15

All Dig Functions Slow or No Power

JB3888,00009A2 -19-21JAN13-2/5

1 Hydraulic System MalfunctionInspect hydraulic system for malfunctions. See All Hydraulic Functions Slow. (Group 9025-15.)

Is hydraulic system operating correctly?

YES: Go to Pilot Circuit Malfunction.**NO:** Repair or replace hydraulic system component causing malfunction.

JB3888,00009A2 -19-21JAN13-3/5

2 Pilot Circuit MalfunctionInspect pilot circuit for malfunction. See All Functions Cannot Be Operated. (Group 9025-15.)

Is pilot circuit operating correctly?

YES: Go to Pump 1, Pump 2, or Pump 3 Regulator Malfunction.**NO:** Repair or replace pilot circuit component causing malfunction.

JB3888,00009A2 -19-21JAN13-4/5

3 Pump 1, Pump 2, and Pump 3 Regulator MalfunctionCheck pump 1, pump 2, or pump 3 regulator. See Pump Regulator Test and Adjustment—Minimum Flow and see Pump Regulator Test and Adjustment—Maximum Flow. (Group 9025-25.)

Does pump 1, pump 2, or pump 3 regulator meet specification?

YES: Diagnostic checkout complete.**NO:** Repair or replace pump 1, pump 2, or pump 3 regulator. See Pump 1, 2, and 3 Regulator Remove and Install. (Group 3360.)

JB3888,00009A2 -19-21JAN13-5/5

Some Dig Functions Slow (Not All)

JB3888,00009A3 -19-21JAN13-1/8

Some Dig Functions Slow (Not All) Diagnostic Procedure

JB3888,00009A3 -19-21JAN13-2/8

1 Pilot Circuit MalfunctionInspect pilot circuit for malfunction. See All Functions Cannot Be Operated. (Group 9025-15.)

Is pilot circuit operating correctly?

YES: Go to Control Valve Leakage.**NO:** Repair or replace pilot circuit component causing malfunction.

Continued on next page

JB3888,00009A3 -19-21JAN13-3/8

Diagnostic Information

❶ Counterbalance Valve Spool Stuck, Oil Not Releasing From Piston Cavity

Inspect counterbalance valve. [See Travel Motor and Park Brake Disassemble and Assemble.](#) (Group 0260.)

YES: Go to Mechanical Malfunction of Travel Motor and Gear Case.

NO: Repair or replace counterbalance valve.

JB3888,00009AB -19-21JAN13-3/4

❷ Mechanical Malfunction of Travel Motor and Gear Case

Inspect travel motor and gear case for mechanical malfunction. [See Travel Motor and Park Brake Disassemble and Assemble.](#) (Group 0260.) Also [see Travel Gear Case Disassemble and Assemble.](#) (Group 0250.)

YES: Diagnostic checkout complete.

Is travel motor and gear case OK?

NO: Repair or replace travel motor or gear case.

JB3888,00009AB -19-21JAN13-4/4

Track Will Not Move in One Direction

JB3888,00009AC -19-21JAN13-1/7

Track Will Not Move in One Direction Diagnostic Procedure

JB3888,00009AC -19-21JAN13-2/7

❶ Pilot Circuit Malfunction

Inspect pilot circuit for malfunction. [See Pilot System Operation.](#) (Group 9025-05.)

YES: Go to Travel Motor Crossover Relief Valve Malfunction.

Is pilot circuit OK?

NO: Repair or replace pilot circuit malfunction.

JB3888,00009AC -19-21JAN13-3/7

❷ Travel Motor Crossover Relief Valve Malfunction

Inspect travel motor crossover relief valve. [See Travel Motor Crossover Relief Valve Test and Adjustment.](#) (Group 9025-25.)

YES: Go to Control Valve Stuck.

Is travel motor crossover relief valve OK?

NO: Repair or replace travel motor crossover relief valve. [See Travel Motor and Park Brake Disassemble and Assemble.](#) (Group 0260.)

JB3888,00009AC -19-21JAN13-4/7

❸ Control Valve Stuck

Inspect for stuck travel valve spool in control valve. For component location, [see Control Valve Operation.](#) (Group 9025-05.)

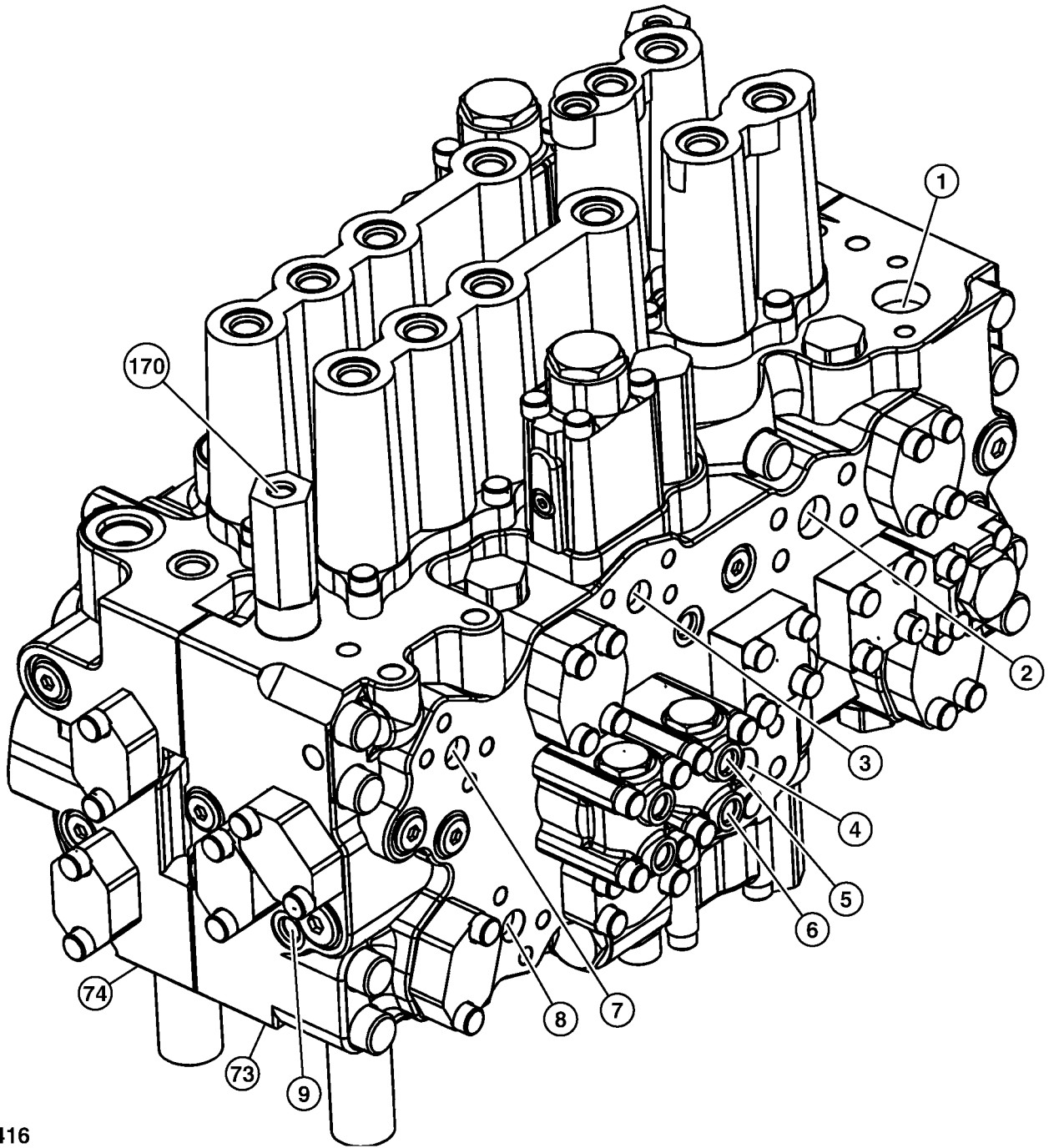
YES: Go to Counterbalance Valve Spool Stuck.

Does travel valve spool move freely?

NO: Repair or replace control valve components as necessary. [See Control Valve Front \(6-Spool\) Disassemble and Assemble.](#) (Group 3360.)

Continued on next page

JB3888,00009AC -19-21JAN13-5/7



TX1120416

Front Control Valve (6-spool)

- | | | |
|---|--|---|
| 1— To Hydraulic Oil Cooler | 6— To Arm 2 Flow Control Solenoid (marked SD) | 9— To Solenoid Manifold |
| 2— To Pump 2 | 7— To Center Joint Front Right Port—Right Travel Forward | 73— Front Control Valve (6-spool) |
| 3— To Arm Cylinder Rod End | 8— To Center Joint Rear Right Port—Right Travel Reverse | 74— Rear Control Valve (6-spool) |
| 4— To Arm Cylinder Head End | | 170— Main Relief and Power Dig Valve (P3) |
| 5— To Arm 1 Flow Control Solenoid (marked SU) | | |

Continued on next page

JB3888,000098D -19-24AUG12-2/3

TX1120416 —UN—16AUG12

Diagnostic Information

1—Port 1
2—Port 2
3—Port 3
4—Port 4
5—Pilot Control Shutoff Valve
6—From Solenoid Valve Manifold
(port PE)

39— Left Pilot Control Valve
40— Right Pilot Control Valve
41— Pilot Signal Manifold
A—Port A
A1— To Travel Pilot Controller

A2—Port A2
A3—Port A3
A4—Port A4
B—Port B
C—Port C
D—Port D
E—Port E
F—Port F
G—Port G
H—Port H

P—Port P
PI— Port PI
T—Port T
T1— From Travel Pilot Controller
T2— Port T2
T3— Port T3

Backhoe Pattern				
	Functions	Pilot Control Valve Ports	Pilot Signal Manifold Ports	
			Pilot Control Valve Side	Control Valve Side
Right Pilot Lever	Bucket Dump	1	H	8
	Arm Out	2	C	3
	Bucket Curl	3	G	7
	Arm In	4	D	4
		P	Pilot Shutoff Valve A2	
		T	Pilot Shutoff Valve T2	
Left Pilot Lever	Swing Right	1	F	6
	Boom Down	2	B	2
	Swing Left	3	E	5
	Boom Up	4	A	1
		P	Pilot Shutoff Valve A3	
		T	Pilot Shutoff Valve T3	

NOTE: Letters and numbers are located on housings next to ports.

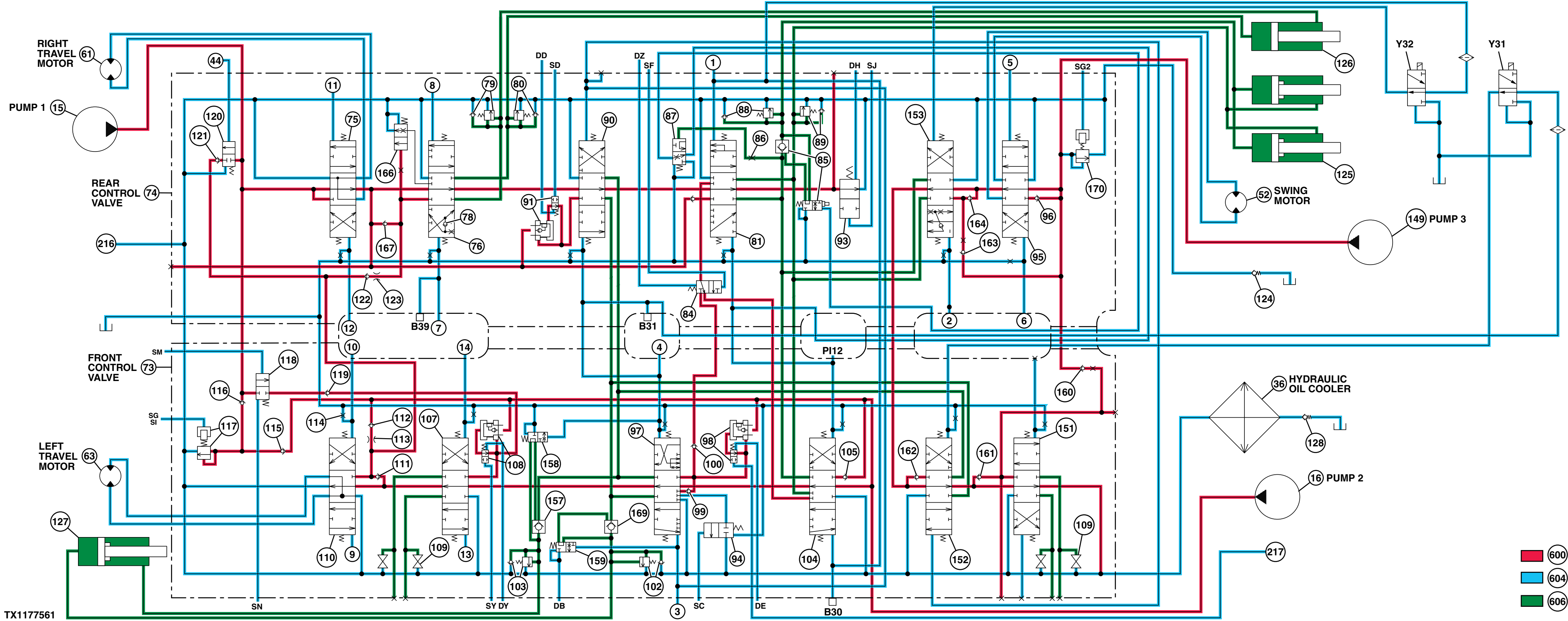
Pilot Control Valve-to-Pilot Signal Manifold Component Location—Backhoe Pattern

JB3888,000098A -19-16AUG12-2/2

Diagnostic Information

9— Left Travel Forward Port (pilot side)	41— Pilot Signal Manifold	161— Right Travel Forward	L— Right Travel Reverse Port (control side)
10— Left Travel Reverse Port (pilot side)	60— Right Travel Device	162— Left Travel Reverse	PI— Pilot Shutoff Solenoid Valve Port
11— Right Travel Forward Port (pilot side)	62— Left Travel Device	163— Right Travel Reverse	Y10— Pilot Shutoff Solenoid Valve
12— Right Travel Reverse Port (pilot side)	72— Center Joint	164— Return Line to Hydraulic Oil Tank	Y24— Power Dig Solenoid Valve (port SG)
37— Solenoid Valve Manifold	73— Front Control Valve (6-spool)	I— Left Travel Forward Port (control side)	
38— Travel Pilot Control Valve	74— Rear Control Valve (6-spool)	J— Left Travel Reverse Port (control side)	
	75— Right Travel Spool	K— Right Travel Forward Port (control side)	
	110— Left Travel Spool		
	160— Left Travel Forward		

JB3888,0000987 -19-24AUG12-2/2



TX1177561

Continued on next page

Control Valve Schematic

JB3888,0000986 -19-15JUL15-5/10

Diagnostic Information

15— Pump 1 (left)	37— Solenoid Valve Manifold	61— Right Travel Motor	126— Bucket Cylinder
16— Pump 2 (right)	38— Travel Pilot Control Valve	63— Left Travel Motor	127— Arm Cylinder
28— Pilot Pump	39— Left Pilot Control Valve	72— Center Joint	149— Pump 3 (center)
29— Pilot Filter and Bypass Valve	40— Right Pilot Control Valve	73— Front Control Valve (6-spool)	Y10— Pilot Shutoff Solenoid
30— Pilot Pressure Regulating Valve	41— Pilot Signal Manifold	74— Rear Control Valve (6-spool)	Valve
31— Hydraulic Oil Tank	52— Swing Motor	125— Boom Cylinder (2 used)	
36— Hydraulic Oil Cooler			

JB3888,0000985 -19-07MAY14-2/2

8. Install identification tags and disconnect all hydraulic hoses and lines. Close all openings using caps and plugs.

- See Hydraulic System Component Location. (Group 9025-15.)
- See Travel System Component Location. (Group 9025-15.)
- See Pilot Control Valve-to-Pilot Signal Manifold Component Location—Excavator Pattern. (Group 9025-15.)
- See Pilot Control Valve-to-Pilot Signal Manifold Component Location—Backhoe Pattern. (Group 9025-15.)

IMPORTANT: Airborne debris can cause premature hydraulic component failure. After hoses and lines are cleaned, close all openings with caps and plugs to minimize additional contamination.

9. Clean all hydraulic hoses and lines using JDG1770 Ultra Clean Hose Kit.

NOTE: During installation, fill hydraulic components, hoses, and lines with clean hydraulic oil to prevent a dry start-up.

10. Install all cleaned hydraulic components, hoses, and lines.

11. Install new hydraulic oil filters. See Replace Hydraulic Tank Oil Filter. (Operator's Manual.)

12. With all components installed, fill tank to proper level. See Drain and Refill Hydraulic Tank Oil. (Operator's Manual.)

13. Connect battery negative (-) cable.

IMPORTANT: Trapped air suddenly compressed in a cylinder can make enough heat to ignite the oil used for assembly, causing cap seal and ring damage. Start with cylinder rod retracted and the rod end filled with clean oil. Operate function to slowly extend rod. Procedure will eliminate most of the air and reduce the possibility of damage.

14. Remove remaining air from hydraulic system. Slowly operate all hydraulic functions without holding over relief valves.

15. Remove residual oil contaminants using JDG10712 Super Caddy. Perform General Hydraulic Oil Cleanup Procedure. (Group 3360.)

JB3888,0000662 -19-21JAN13-2/2

7. Run machine at specification.

Specification

Hydraulic	
Oil—Temperature.....	45—55°C
	110—130°F
Engine—Speed.....	Fast Idle
Work Mode	
Switch—Position.....	Dig Mode
Power Mode	
Button—Position.....	PWR (power) Mode
Auto-Idle	
Switch—Position.....	OFF

NOTE: Pressure reading displayed on the monitor is calculated from an electrical signal in the main controller (MCZ). The reading does not change when valve adjustment is made.

8. Operate boom up and arm in over relief. Record monitor and gauge pressure readings.
9. Calculate pressure range using the calculated reading from monitor and the specific tolerance provided.

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10. Verify that the actual reading from gauge is within the calculated pressure range from monitor.

NOTE: Actual reading from gauge must be within pressure range of monitor reading and tolerance.

Specification

Dig Regenerative	
Solenoid Valve (port	
SF)—Pressure.....	Monitor Reading $\pm$ 0.2 MPa
	Monitor Reading $\pm$ 200 kPa
	Monitor Reading $\pm$ 2.0 bar
	Monitor Reading $\pm$ 29.0 psi

NOTE: An example of monitor reading is given in the chart below for the dig regenerative solenoid valve.

Example of Calculated Reading From Monitor		
	Actuated	Non Actuated
Example Monitor Reading	3.19 MPa 3190 kPa 31.9 bar 463 psi	0.03 MPa 30 kPa 0.3 bar 4 psi

JB3888,00009DD -19-15AUG12-2/3

11. Adjust the solenoid valve (4) being tested as necessary.

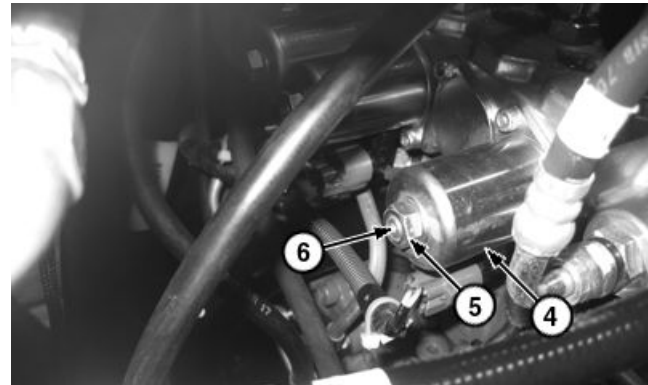
IMPORTANT: Avoid possible O-ring damage. Do not loosen adjusting screw more than two turns. Turning adjusting screw out too far may cause O-ring damage and leakage.

- a. Loosen nut (5).
- b. Turn adjusting screw (6) IN to increase pressure setting; turn adjusting screw OUT to decrease pressure setting. The length from end of adjusting screw-to-nut must not exceed 4 mm (0.157 in.).

Specification

Solenoid Valve Adjusting	
Screw—Pressure	
Change (approximate	
per 1/4 turn).....	0.111 MPa
	111 kPa
	1.11 bar
	16.1 psi
End of Adjusting	
Screw-to-Nut—Length	
(maximum).....	4 mm
	0.157 in.

- c. Hold adjusting screw and tighten nut to specification.



Solenoid Adjustment

4— Solenoid Valve
5— Nut

6— Adjusting Screw

Specification

Solenoid Valve Adjusting	
Screw-to-Housing	
Nut—Torque.....	5.0 N·m
	45 lb.-in.

12. Check pressure setting again.

JB3888,00009DD -19-15AUG12-3/3

TX1106359A —UN—25JAN12

Arm 3 and Boom 3 Control Solenoid Valve Test and Adjustment

SPECIFICATIONS

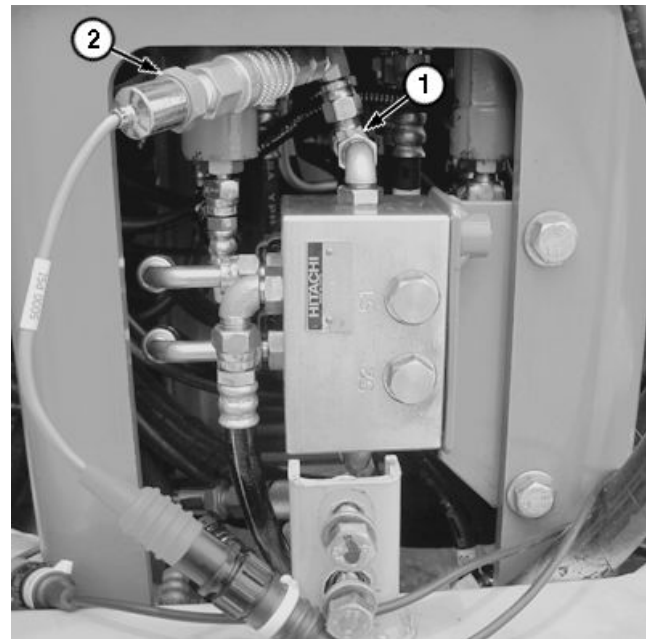
Hydraulic Oil Temperature	45—55°C 110—130°F
Engine Speed	Fast Idle
Work Mode Switch Position	Dig Mode
Power Mode Button Position	PWR (power) Mode
Auto-Idle Switch Position	OFF
Arm 3 and Boom 3 Control Solenoid Valve Pressure	Monitor Reading ± 0.2 MPa Monitor Reading ± 200 kPa Monitor Reading ± 2.0 bar Monitor Reading ± 29.0 psi Actual Reading From Gauge Must Be Within Pressure Range of Monitor Reading and Tolerance
Adjusting Screw Pressure Change (approximate per 1/4 turn)	0.069 MPa 69 kPa 0.69 bar 10 psi
End of Adjusting Screw-to-Nut Length (maximum)	4 mm 0.157 in.
Adjusting Screw-to-Housing Nut Torque	5.0 N·m 29 lb.-in.

SERVICE EQUIPMENT AND TOOLS

Adapter (1/4 M BSPP ORB x 7/16-20 M 37°)
JT02162 Transducer 35 000 kPa (350 bar) (5000 psi)
JT02156A Digital Pressure/Temperature Analyzer
Gauge 7000 kPa (70 bar) (1000 psi)

Purpose of this test is to check the output pressure from the arm 3 and boom 3 control solenoid valve is within specification.

- Release hydraulic oil tank pressure by pressing pressure release button at top of hydraulic oil tank. See Hydraulic Oil Tank Pressure Release Procedure. (Group 9025-25.)
- Remove plugs from arm 3 and boom 3 control solenoid valve test port (1).
- Install transducer (2) to upper and lower test ports.
- Connect JT02162 Transducer and JT02156A Digital Pressure/Temperature Analyzer or 7000 kPa (70 bar) (1000 psi) gauge to adapter (2).
- Connect the following test equipment to monitor the pump torque control valve pressure output reading, hydraulic oil temperature, and actual engine speed.
 - Monitor application. See Service Menu for instruction to actuate the service menu on monitor in cab. (Group 9015-16.)
Select the following items to display:
 - Pump 3 Torque P/S O/P
 - Hydraulic Oil Temperature
 - Actual Engine Speed
 - Service ADVISOR™ application. See Service ADVISOR™ Connection Procedure for instruction. (Group 9015-20.)



Arm 3 and Boom 3 Control Solenoid Valve

1— Test Port (2 used)

2— Transducer (2 used)

Select the following items to display:

- Pump 3 Torque P/S O/P
- Hydraulic Oil Temperature
- Actual Engine Speed

- MPDr application. See MPDr Connection Procedure for instruction. (Group 9015-20.)

Select the following items to display:

- Pump 3 Torque P/S O/P
- Hydraulic Oil Temperature
- Actual Engine Speed

- Warm hydraulic oil to specification. See Hydraulic Oil Warm-Up Procedure. (Group 9025-25.)
- Run machine at the following specification:

Specification

Hydraulic	
Oil—Temperature.....	45—55°C 110—130°F
Engine—Speed.....	Fast Idle
Work Mode	
Switch—Position.....	Dig Mode
Power Mode	
Button—Position.....	PWR (power) Mode
Auto-Idle	
Switch—Position.....	OFF

NOTE: Pressure reading displayed on the monitor is calculated from an electrical signal in the main controller (MCZ). The reading does not change when valve adjustment is made.

- Place all pilot control levers and pedals in the neutral position. Record the pressure readings from monitor and gauge.

Continued on next page

JB3888,00009E0 -19-27NOV13-1/2

9. Actuate the function over relief for circuit relief valve (79, 80, 88, 89, 102, and 103) being checked. Record pressure reading.

Specification

Bucket Curl—Pressure.....	39.2—40.2 MPa
	39 200—40 200 kPa
	392—402 bar
	5685—5830 psi
Bucket Dump—Pres- sure.....	39.2—40.2 MPa
	39 200—40 200 kPa
	392—402 bar
	5685—5830 psi
Arm In—Pressure.....	39.2—40.2 MPa
	39 200—40 200 kPa
	392—402 bar
	5685—5830 psi
Arm Out—Pressure.....	39.2—40.2 MPa
	39 200—40 200 kPa
	392—402 bar
	5685—5830 psi
Boom Up—Pressure.....	39.2—40.2 MPa
	39 200—40 200 kPa
	392—402 bar
	5685—5830 psi
Boom Down—Pressure.....	39.2—40.2 MPa
	39 200—40 200 kPa
	392—402 bar
	5685—5830 psi

NOTE: If the measured pressures for all functions are lower than the specified range, the probable cause is a decrease of main relief valve (117 and 170) setting pressure.

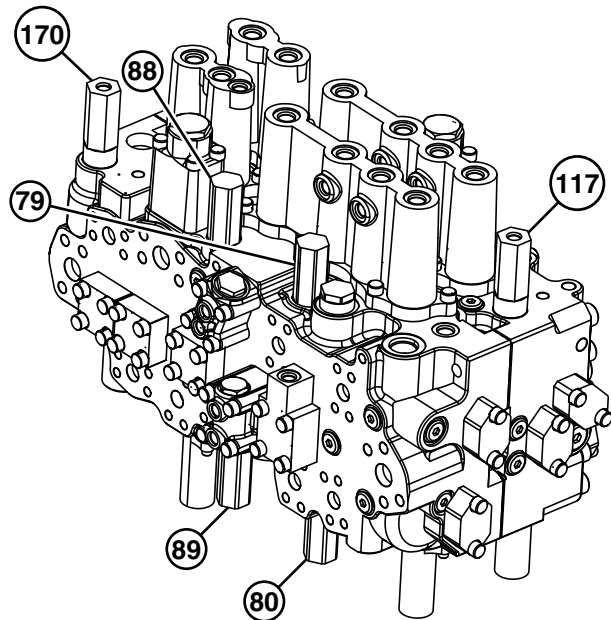
10. Adjust the circuit relief valve as needed. Turn adjusting screw in to increase pressure setting; turn adjusting screw out to decrease pressure setting. Hold screw and tighten nut to specification.

Specification

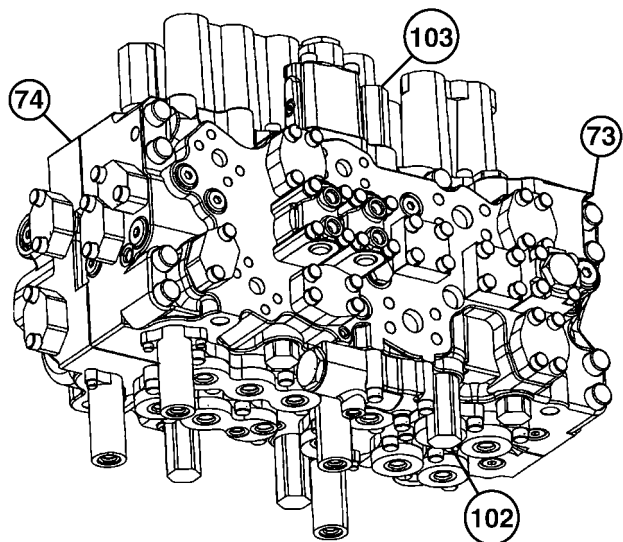
Circuit Relief Valve—Pressure Change (approximate per 1/4 turn).....	5.2 MPa
	5200 kPa
	52 bar
	754 psi
Circuit Relief Valve Adjusting Screw-to-Plug Nut—Torque.....	30 N·m
	22 lb·ft

11. Check pressures again.

12. Turn second adjusting plug of main relief and power dig valve out to its original setting. Check main pressure setting. For adjustment procedure, see Main Relief and Power Dig Valve Test and Adjustment. (Group 9025-25.)



6-Spool Side Circuit Relief and Anticavitation Valves (rear side shown)



6-Spool Side Circuit Relief and Anticavitation Valves (front side shown)

73— Front Control Valve (6-spool)	89— Boom Down Circuit Relief and Anticavitation Valve
74— Rear Control Valve (6-spool)	102— Arm In Circuit Relief and Anticavitation Valve
79— Bucket Dump Circuit Relief and Anticavitation Valve	103— Arm Out Circuit Relief and Anticavitation Valve
80— Bucket Curl Circuit Relief and Anticavitation Valve	117— Main Relief and Power Dig Valve (P1, P2)
88— Boom Up Circuit Relief and Anticavitation Valve	170— Main Relief Valve (P3)

Pump Flow Test

SPECIFICATIONS

Hydraulic Oil Temperature	45—55°C
Hydraulic Oil	113—131°F
Engine Speed	Fast Idle
Work Mode Switch Position	Bucket Mode
Power Mode Switch Position	PWR (power) Mode
Auto-Idle Switch Position	OFF
Maximum Flow Rate Adjusting Screw 13 mm Nut Torque	10 N·m 89 lb·in
Load Adjusting Cartridge 30 mm Nut Torque	30 N·m 22 lb·ft
Load Adjusting Screw 17 mm Nut Torque	10 N·m 89 lb·in

SERVICE EQUIPMENT AND TOOLS

Elbow Fitting (-16 M BSPP ORB x -16 M ORFS)
Flowmeter
T107068 Flange Fitting Split Clamp Half (code 62)
Test Hose (1020 mm [40 in] x 1 in hose with 90° flange fitting end, code 62)

NOTE: Flow rate specification is for one pump. This test requires two people to perform.

The purpose of test is to determine the pump condition. Test should be performed only if a comparison of actual machine cycle times to specified cycle times indicates low pump flow. Perform the following appropriate procedures before continuing test:

- See Pump Regulator Test and Adjustment—Minimum Flow. (Group 9025-25.)
- See Pump Regulator Test and Adjustment—Maximum Flow. (Group 9025-25.)
- For information on pump control pressure operation, see Pump 1, Pump 2, and Pump 3 Regulator Operation. (Group 9025-05.)
- See Torque Control Solenoid Valve Test and Adjustment. (Group 9025-25.)
- See Pump Control Pilot Pressure Signal Test. (Group 9025-25.)

Cylinder Drift Test—Boom, Arm, and Bucket

SPECIFICATIONS

Cylinder Drift Test—Boom, Arm, and Bucket

Hydraulic Oil Temperature	45—55°C 110—130°F
Bucket Load Weight (approximate)	1050 kg 2315 lb.
Boom Cylinder Drift (maximum allowable for 5 minutes)	20 mm 0.79 in.
Arm Cylinder Drift (maximum allowable for 5 minutes)	20 mm 0.79 in.
Bucket Cylinder Drift (maximum allowable for 5 minutes)	20 mm 0.79 in.
Bottom of Bucket-to-Ground Drift (maximum allowable for 5 minutes)	150 mm 5.91 in.
Boom Cylinder—Bucket Empty Drift (maximum allowable for 5 minutes)	5 mm 0.20 in.
Arm Cylinder—Bucket Empty Drift (maximum allowable for 5 minutes)	10 mm 0.39 in.
Bucket Cylinder—Bucket Empty Drift (maximum allowable for 5 minutes)	10 mm 0.39 in.
Arm Tip-to-Ground—Bucket Empty Drift (maximum allowable for 5 minutes)	90 mm 3.54 in.

SERVICE EQUIPMENT AND TOOLS

Tape Measure

Procedure is used to check the leakage past the cylinder piston seals, control valve spools, circuit relief valves, boom reduced leakage valve, and arm reduced leakage valve.

Drift Test—Bucket Filled

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

Specification

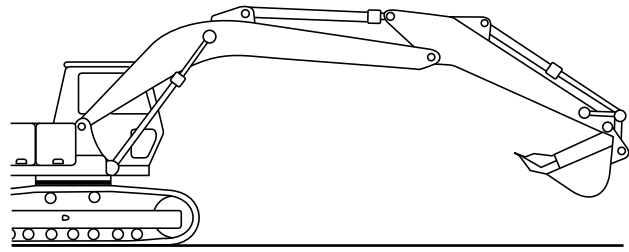
Hydraulic
Oil—Temperature.....45—55°C
110—130°F

2. Fill bucket with material.

Specification

Loaded Bucket—Weight
(approximate)—Weight..... 1050 kg
2315 lb.

3. Position arm cylinder so rod is extended approximately 50 mm (2.00 in.) from retracted position.



Machine Position—Loaded Bucket

TX1095487 —UN—28JUN13

4. Position bucket cylinder so rod is retracted 50 mm (2.00 in.) from extended position.
5. Position boom cylinders so bucket pivot pin is at same height as boom-to-main frame pin.
6. After 5 minutes, measure the amount of movement for boom, arm, and bucket cylinders. Also measure from bottom of bucket to the ground.

Specification

Boom Cylinder—Drift
(maximum allowable for
5 minutes)..... 20 mm
0.79 in.

Arm Cylinder—Drift
(maximum allowable for
5 minutes)..... 20 mm
0.79 in.

Bucket Cylinder—Drift
(maximum allowable for
5 minutes)..... 20 mm
0.79 in.

Bottom of Bucket-to-
Ground—Drift (maximum
allowable for 5 minutes)..... 150 mm
5.91 in.

Continued on next page

JB3888,00009D8 -19-07AUG12-1/2

Diagnostic Information

2 Cab Recirculating Air Filter Restriction Check	Check cab recirculating air filter for debris or air flow restrictions. Is cab recirculating air filter dirty or clogged with debris?	YES: Clean or replace cab recirculating air filter. See Clean Cab Fresh Air and Cab Recirculating Air Filters. (Operator's Manual.) NO: Go to Cab Seals Check. TZ24494,00008A9 -19-31MAY12-4/10
3 Cab Seals Check	Check windows and doors to make sure seals are in good condition. Are seals on all windows and doors in good condition?	YES: Go to Refrigerant Hose Restriction Check. NO: Repair or replace damaged or malfunctioning seals. TZ24494,00008A9 -19-31MAY12-5/10
4 Refrigerant Hose Restriction Check	Check refrigerant hoses. See Refrigerant Hoses and Tubing Inspection. (Group 9031-25.) Are any hoses kinked, pinched or collapsed?	YES: Reroute or re-index hoses. Replace kinked or collapsed hoses. See Heater and Air Conditioner Component Location. (Group 9031-15.) NO: Go to Condenser Air Flow Restriction Check. TZ24494,00008A9 -19-31MAY12-6/10
5 Condenser Air Flow Restriction Check	Check condenser fins for air flow restrictions. Are condenser fins clogged with debris?	YES: Clean condenser fins. NO: Go to Evaporator Core Air Flow Restriction Check. TZ24494,00008A9 -19-31MAY12-7/10
6 Evaporator Core Air Flow Restriction Check	Check evaporator core fins for restrictions. Are the evaporator core fins clogged with debris?	YES: Clean evaporator fins. NO: Go to Evaporator Core Fins Check. TZ24494,00008A9 -19-31MAY12-8/10
7 Evaporator Core Fins Check	Check evaporator core fins for frosting or freezing. Is there any ice or frost on evaporator core fins?	YES: Air conditioner freeze control switch not positioned correctly on evaporator core. Reposition air conditioner freeze control switch. NO: Go to System Operating Pressures Check. TZ24494,00008A9 -19-31MAY12-9/10

Continued on next page

2— Fresh Air Filter	13— Air Conditioner Compressor-to-Air Conditioner Condenser Hose	B41— Air Conditioner Freeze Control Switch	M10— Air Conditioner and Heater Blower Port Change Servomotor
4— Air Conditioner Condenser		B55— Air Recirculation Sensor	
5— Receiver-Dryer		K15— Air Conditioner Compressor Off Relay	M11— Air Conditioner and Heater Mixer Servomotor
6— Recirculated Air Filter	14— Air Conditioner Condenser-to-Expansion Valve Hose	K17— Air Conditioner and Heater Blower Motor Relay	R16— Blower Motor Resistor
7— Evaporator		M7—Air Conditioner and Heater Blower Motor	Y11— Air Conditioner Compressor Clutch
8— Expansion Valve	A4—Monitor Controller (DSZ)	M9—Air Conditioner and Heater Internal and External Servomotor	
9— Heater Core	A7—Air Conditioner Controller (ACF)		
10— Heater Core-to-Coolant Return Manifold Hose	B20— Air Conditioner High/Low Pressure Switch		
11— Cylinder Head-to-Heater Core Hose	B21— Solar Sensor		
12— Expansion Valve-to-Air Conditioner Compressor Hose			

TZ24494,00008AF -19-23AUG12-2/2

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