Engagement and Monitor Unit (EMU) Diagnostic Trouble Codes—Standard Controls

NOTE: Perform visual inspection of components prior to diagnostics and tests. These conditions my affect diagnostics and test results.

NOTE: Diagnose malfunction charts are arranged from most probable and simplest to verify.

The engagement and monitor unit (EMU) diagnostic trouble codes may be viewed on the EMU. See Reading Diagnostic Trouble Codes. (Group 9015-20.)

LW86157,0000454 -19-31JAN08-1/1

F9D0 — Coolant Temperature Sensor Input at 0 Volts

Short to ground in signal circuit from engine coolant temperature sensor (B5) or sensor malfunction. Engine coolant temperature sensor signal at engagement and monitor unit (EMU) is less than 0.27 volts. Coolant temperature gauge is at left most position and "ERROR" appears on EMU display.

LW86157,0000455 -19-13JAN10-1/5

Coolant Temperature Sensor Input at 0 Volts Diagnostic Procedure

LW86157,0000455 -19-13JAN10-2/5

1 Connector Check	Key switch OFF.	
	Check engagement and monitor unit (EMU) J1 connector (X6), cab harness-to-engine harness 12-pin connector (X2), and engine coolant temperature sensor (B5) connector for corrosion, loose fit, bent/pushed out terminals or crimp malfunctions. See Engine Harness (W1) Component Location. See Cab Harness—Standard (W2) Component Location, or see Cab Harness—Deluxe (W12) Component Location. (Group 9015-10.)	**YES:** Go to Wire Harness Check.
	Are connectors in good condition?	**NO:** Repair or replace connector(s) or terminal(s) as needed.

LW86157,0000455 -19-13JAN10-3/5

2 Wire Harness Check	Key switch OFF.	
	Disconnect EMU J1 connector (X6).	
	Disconnect engine coolant temperature sensor (B5).	
	Using a multimeter, check for continuity to ground at pin C (wire X01 YEL) of EMU J1 connector (X6).	**YES:** Short to ground in wire harness. Repair or replace harness. See Engine Harness (W1) Wiring Diagram. See Cab Harness—Standard (W2) Wiring Diagram, or see Cab Harness—Deluxe (W12) Wiring Diagram. (Group 9015-10.)
	Is continuity to ground indicated?	**NO:** Go to Component Check.

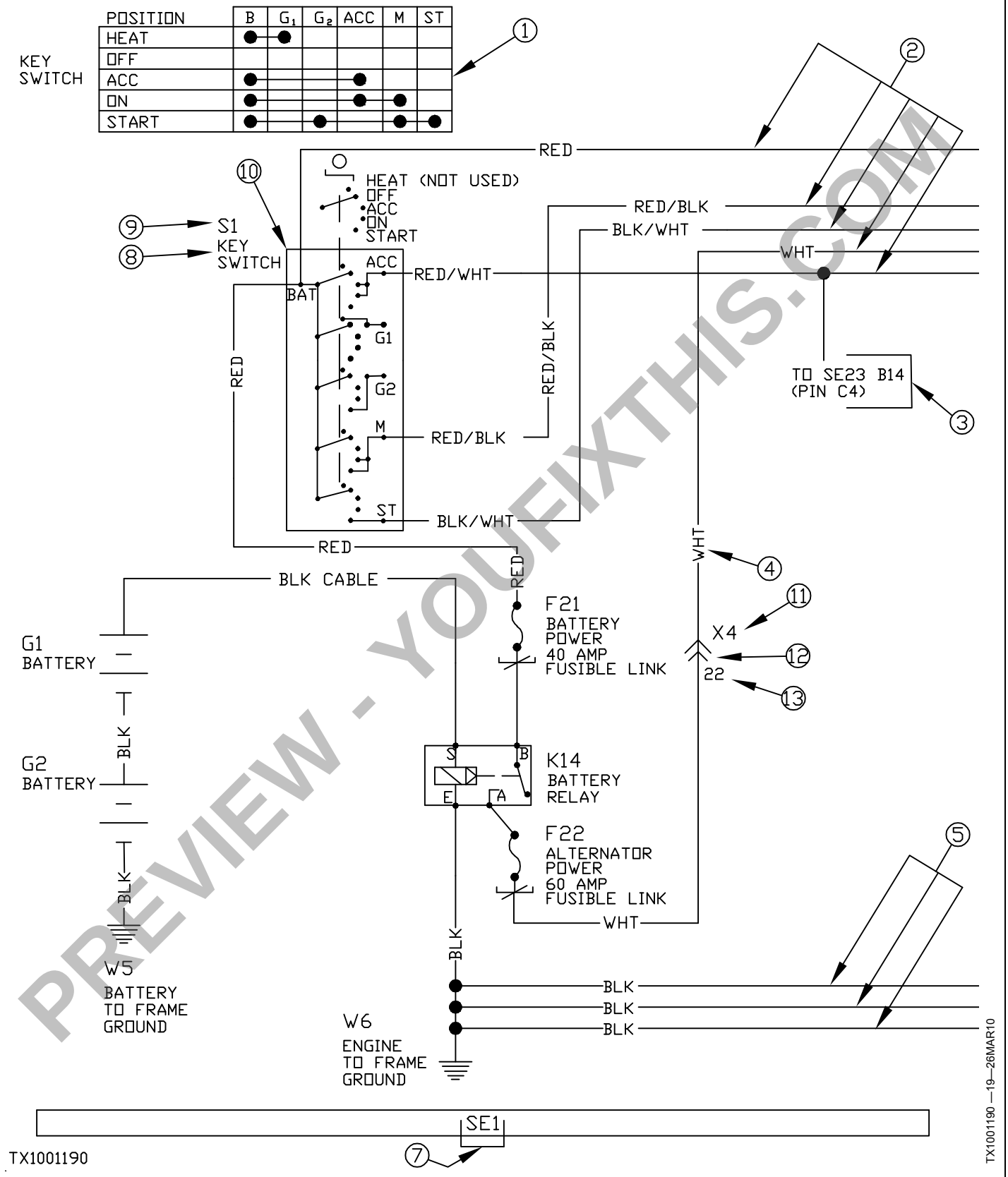
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LW86157,0000455 -19-13JAN10-4/5

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System Functional Schematic Diagram



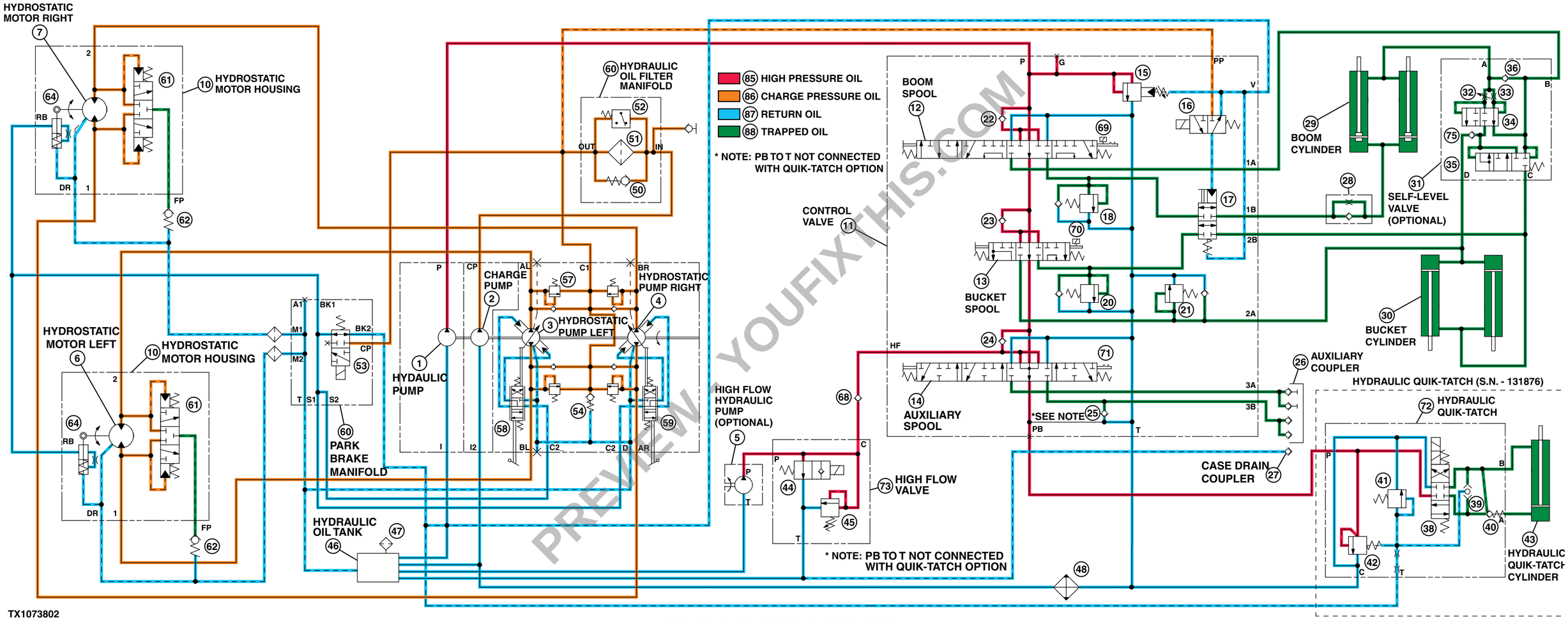
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Hydraulic System Schematic—Single Speed (S.N. —150522)

TX1073802 —UN—22MAR10



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Hydraulic System Schematic—Single Speed (S.N. —150522)

KK70125,0000A11 -19-18MAR10-1/2

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Throttle Position Sensor Remove and Install

NOTE: The following procedures cover machines equipped and not equipped with air conditioning.

Machines Not Equipped With Air Conditioning

1. Remove front attachment and park machine on flat level surface.
2. Raise boom and engage boom lock.
3. Lift engine cover and remove side shields.
4. Disconnect negative battery cable.
5. Remove alternator belt. See Replacing Fan and Alternator Belt. (Operator's Manual.)
6. Remove alternator. See Alternator Remove and Install. (Group 0400.)

IMPORTANT: Prevent damage to electrical system. Protect wires disconnected from alternator B+ terminal from contacting frame and shorting electrical system.

7. Protect wires disconnected from alternator B+ terminal from contacting frame.

NOTE: Unless damaged, nut driver can be reused during assembly.

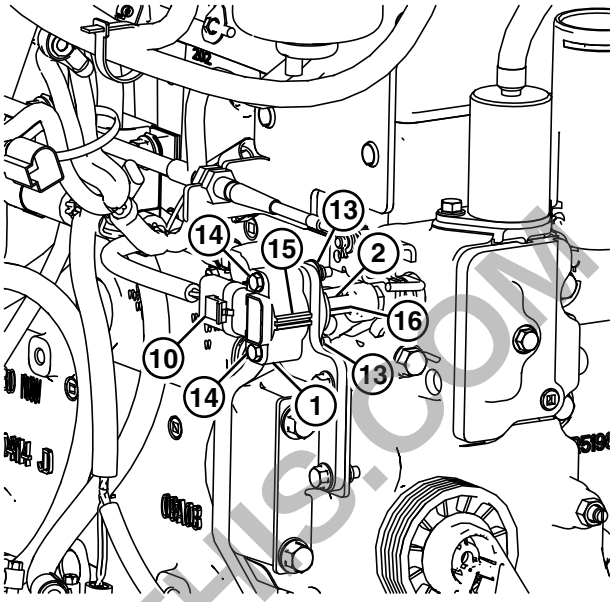
8. Disconnect harness connector (10).
9. Remove throttle position sensor (1) and nut driver (2).
10. Repair or replace parts as necessary.

IMPORTANT: Avoid internal damage to sensor from over rotation. Throttle position sensor engaged with nut driver can only rotate 180°. Place engine speed control lever in slow idle position or speed sensor may be damaged.

11. Place engine speed control lever in slow idle position.

IMPORTANT: Nut driver must be aligned with throttle position sensor. If nut driver is not aligned, engine speed control linkage will not function properly.

12. Align line (16) with sight (15).
13. Install throttle position sensor and nut driver.
14. Connect harness connector (10).
15. Place engine speed control arm to fast idle position. Control arm must return to slow idle position on its own. If control arm does not return to slow idle position, check alignment of nut driver and throttle position sensor.
16. Check throttle position sensor voltage using engagement and monitor unit (EMU).
    a. Connect negative battery cable.



TX1041439 —UN—29APR08

1— Throttle Position Sensor
2— Nut Driver
10— Throttle Position Sensor Harness Connector
13— Nut (2 used)
14— Cap Screw (2 used)
15— Sight
16— Line

    b. Check throttle position sensor output voltage using EMU. See Engagement and Monitor Unit Data Items—EH Controls. (Group 9015-20.)
    c. Compare to specification.

Specification	
Throttle Position Sensor—Output Voltage (slow idle, minimum)	0.65 V
Throttle Position Sensor—Output Voltage (fast idle, maximum)	4.35 V

    d. If either value is outside of specification, adjust throttle position sensor. Remove sensor and adjust nut driver one flat in relation to governor nut on engine. Recheck voltages using EMU.
    e. Disconnect negative battery cable.
17. Install alternator. See Alternator Remove and Install. (Group 0400.)
18. Install fan and alternator belt. See Replacing Fan and Alternator Belt. (Operator's Manual.)
19. Perform Throttle Position Sensor Calibration—EH Controls. (Group 9015-20.)
20. Install side shields and lower engine cover.
21. Lower boom.

Machines Equipped With Air Conditioning

Continued on next page

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3 Component Check	Turn key switch OFF.	
	Check resistance through engine coolant temperature sensor (B5). See Electrical Component Specifications. (Group 9015-20.)	**YES:** Checks complete.
	Is sensor resistance within specifications?	**NO:** Replace engine coolant temperature sensor (B5).

LW86157,0000455 -19-13JAN10-5/5

F9D5 — Coolant Temperature Sensor Input at 5 Volts

Open circuit in wire harness to engine coolant temperature sensor (B5), either signal or ground; engine coolant temperature sensor (B5) malfunction. Engine coolant temperature sensor signal at engagement and monitor unit (EMU) is 4.96 volts or greater. Coolant temperature gauge is at left most position, and "ERROR" appears on EMU display.

LW86157,0000456 -19-13JAN10-1/5

Coolant Temperature Sensor Input at 5 Volts Diagnostic Procedure

LW86157,0000456 -19-13JAN10-2/5

1 Connector Check	Key switch OFF.	
	Check EMU J1 connector (X6), EMU J2 connector (X7), cab harness-to-engine harness 12-pin connector (X2), and engine coolant temperature sensor (B5) connector for corrosion, loose fit, bent/pushed out terminals or crimp malfunctions. See Engine Harness (W1) Component Location. See Cab Harness—Standard (W2) Component Location, or see Cab Harness—Deluxe (W12) Component Location. (Group 9015-10.)	**YES:** Go to Wire Harness Check.
	Are connectors in good condition?	**NO:** Repair or replace connector(s) or terminal(s) as needed.

LW86157,0000456 -19-13JAN10-3/5

2 Wire Harness Check	Key switch OFF.	
	Disconnect EMU J1 connector (X6).	
	Disconnect EMU J2 connector (X7).	
	Disconnect engine coolant temperature sensor (B5).	
	Using a multimeter, check continuity of wire X01 YEL between pin C of EMU J1 connector (X6) and engine coolant temperature sensor (B5) connector.	
	Check continuity of wire R01 BLK between pin A of EMU J2 connector (X7) and engine coolant temperature sensor (B5) connector.	**YES:** Go to Component Check.
	Is continuity indicated?	**NO:** Open circuit in wire harness. Repair or replace harness. See Engine Harness (W1) Wiring Diagram. See Cab Harness—Standard (W2) Wiring Diagram, or see Cab Harness—Deluxe (W12) Wiring Diagram. (Group 9015-10.)

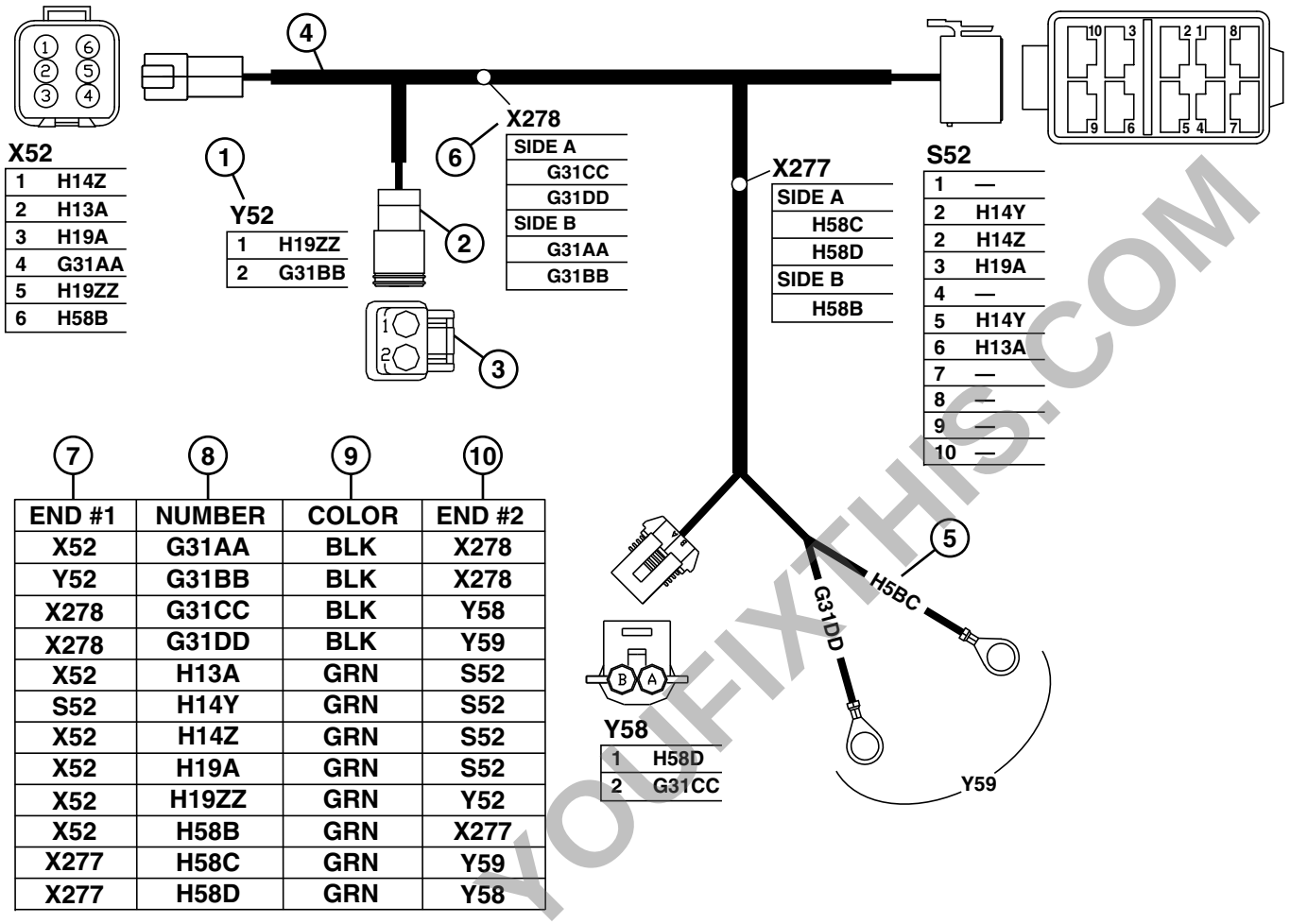
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Wiring Diagram



7 END #1	8 NUMBER	9 COLOR	10 END #2
X52	G31AA	BLK	X278
Y52	G31BB	BLK	X278
X278	G31CC	BLK	Y58
X278	G31DD	BLK	Y59
X52	H13A	GRN	S52
S52	H14Y	GRN	S52
X52	H14Z	GRN	S52
X52	H19A	GRN	S52
X52	H19ZZ	GRN	Y52
X52	H58B	GRN	X277
X277	H58C	GRN	Y59
X277	H58D	GRN	Y58

TX1020361

Wiring Diagram Example

1— Component Identification Number
2— Connector
3— Connector End View
4— Wire Harness
5— Wire Number
6— Wire Splice
7— Wire End #1 Termination Location
8— Wire Number
9— Wire Color
10— Wire End #2 Termination Location

Each harness on the machine is drawn showing connectors, wires, and splices. A “W” component identification number identifies harnesses. (W6, Etc.) The harness is drawn showing spatial arrangement of components and branches.

A component identification or connector number (1) identifies each component. The harness branch (4) is terminated by a top or side view of the connector (2). If more than one wire is supplied to the connector, a harness side connector end view (3) is provided. Each wire number is labeled for the appropriate pin. If only one wire is supplied to the connector, the wire number (5) is indicated.

An “X” component identification number of 100 or higher identifies splices (6). Each splice lists side A wires and side B wires to differentiate the side of the harness that the wires come from.

A wire legend is provided for each harness. A component identification number is listed in the “END #1” column (7) to indicate the termination location of one end of a wire. In the center, the wire number (8) and wire color (9) are listed. A component identification number in the “END #2” column (10) identifies the opposite end of the wire.

Component Location Diagram

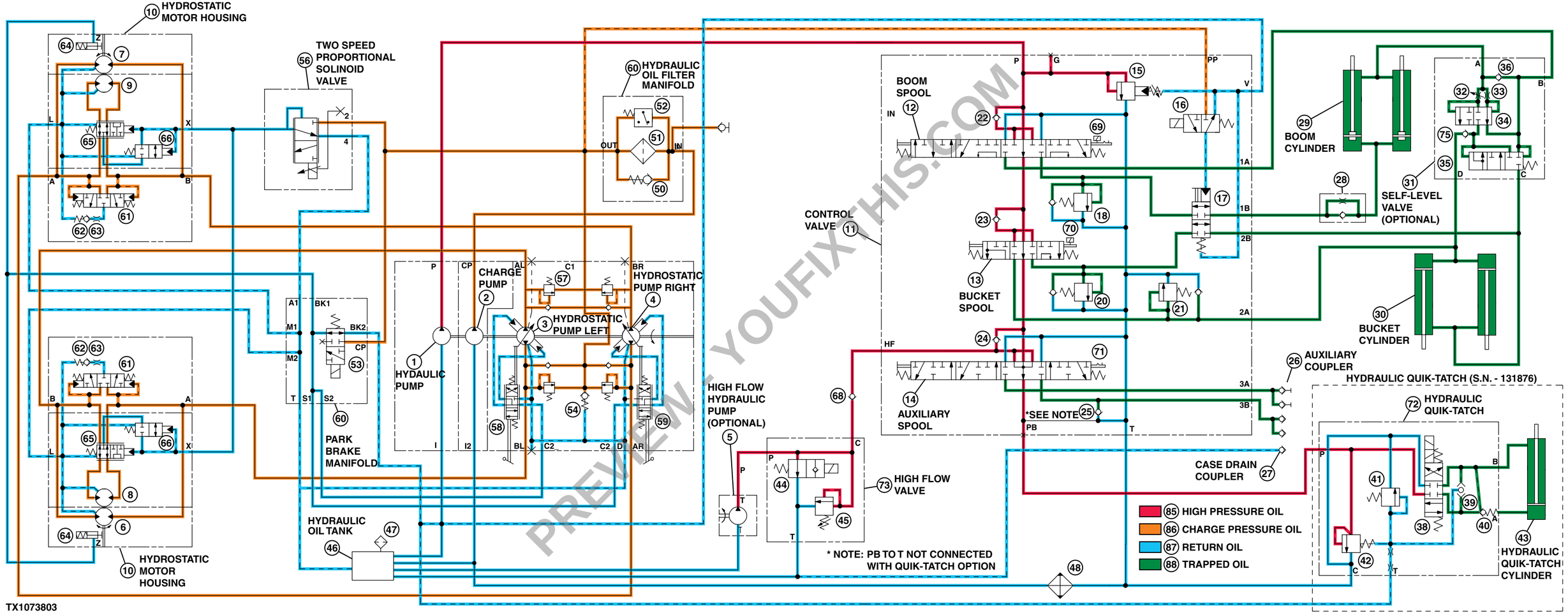
The Component Location Diagram is a pictorial view by harness showing location of all electrical components, connectors, harness main ground locations and harness band and clamp location. Each component will be identified by the same identification letter/number and description used in the System Functional Schematic Diagram.

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Hydraulic System Schematic—Two Speed (S.N. —150522)

TX1073803 —UN—22MAR10



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Hydraulic System Schematic—Two Speed (S.N. —150522)

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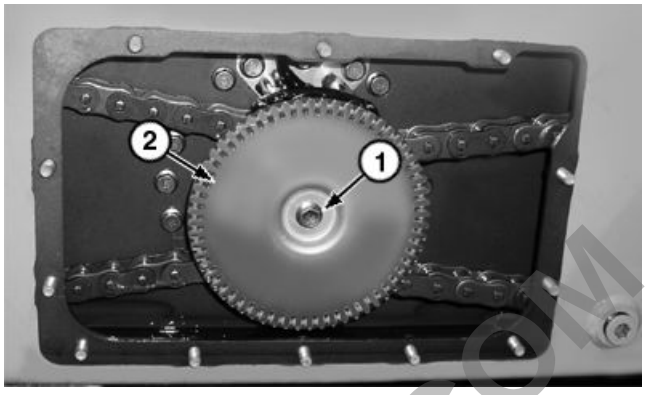
Motor Speed Sensor Remove and Install

The procedures to remove and install the motor speed sensors are different between machines equipped with single speed or two speed hydrostatic motors. This group covers skid steer loaders equipped with either single speed or two speed motors.

Single Speed

1. Remove front attachment and park machine on flat level surface.
2. Raise boom and engage boom lock.
3. Raise cab. See Raising Operator's Station. (Operator's Manual.)
4. Remove floor plate for access to motor speed sensor connectors.
5. Remove chain case access plate. See Chain Case Access Plate Remove and Install. (Group 0250.)
6. Remove cap screw (1).
7. Remove disk (2) and washer (3).

1— Cap Screw
2— Disk
3— Washer



TX1038699A —UN—18MAR08



TX1038698A —UN—18MAR08

Motor Speed Sensor Disk

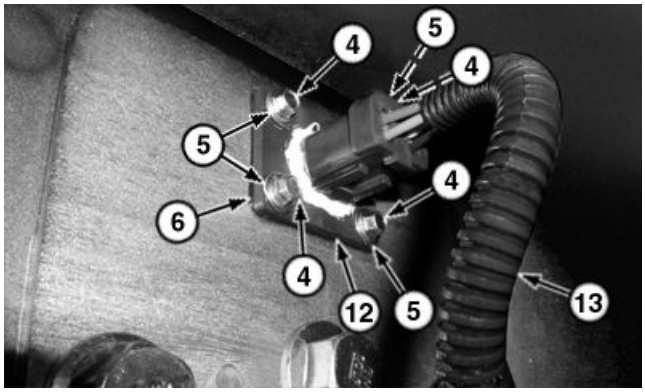
JH38101,00009E5 -19-30APR08-1/10

8. Disconnect motor speed sensor harness (13).

NOTE: Gasket (6) may stay attached to main frame when removing plate (12).

9. Remove plate (12). Remove and discard gasket (6).

4— Cap Screw (4 used)
5— Washer (4 used)
6— Gasket
12— Plate
13— Motor Speed Sensor Harness



TX1038697A —UN—25MAR08

Motor Speed Sensor Harness

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Recognize Safety Information

This is the safety alert symbol. When this symbol is noticed on the machine or in this manual, be alert for the potential of personal injury.

Follow the precautions and safe operating practices highlighted by this symbol.

A signal word — DANGER, WARNING, or CAUTION — is used with the safety alert symbol. DANGER identifies the most serious hazards.

On the machine, DANGER signs are red in color, WARNING signs are orange, and CAUTION signs are yellow. DANGER and WARNING signs are located near specific hazards. General precautions are on CAUTION labels.



T133555 —UN—15APR13

T133588 —19—28AUG00

TX03679,00016CC -19-03JAN07-1/1

Follow Safety Instructions

Read the safety messages in this manual and on the machine. Follow these warnings and instructions carefully. Review them frequently.

Be sure all operators of this machine understand every safety message. Replace operator's manual and safety labels immediately if missing or damaged.



T133556 —UN—24AUG00

TX03679,00016F9 -19-31JAN07-1/1

Operate Only If Qualified

Do not operate this machine unless the operator's manual has been read carefully, and you have been qualified by supervised training and instruction.

Operator should be familiar with the job site and surroundings before operating. Try all controls and machine functions with the machine in an open area before starting to work.

Know and observe all safety rules that may apply to every work situation and work site.

TX03679,00016FA -19-03JAN07-1/1

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General Information

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3 Short to Power Check	Key switch OFF. Glow plug relay (K2) disconnected. EMU J1 connector (X6) disconnected. Turn key switch ON. Check for voltage on wire E03 WHT at pin G of EMU J1 connector (X6). Is voltage indicated?	**YES:** Short to power in wire harness. Repair or replace harness. See Engine Harness—EH Controls (W31) Wiring Diagram. See Cab Harness—EH Controls (W32) Wiring Diagram. (Group 9015-10.) **NO:** Go to next step in this check.
	Turn key switch OFF. Check EMU J1 connector (X6), cab harness-to-engine harness connector (X41), and glow plug relay (K2) connections for any damage, corrosion, or debris that could cause short to power condition for E03 WHT wire. Are connectors in good condition and free of corrosion and debris?	**YES:** Go to next step in this check. **NO:** Repair or replace connector. See Engine Harness—EH Controls (W31) Wiring Diagram. See Cab Harness—EH Controls (W32) Wiring Diagram. (Group 9015-10.)
	Check for continuity between pin G (wire E03 WHT) of EMU J1 connector (X6) and other pins in same connector. Is continuity indicated between any circuits?	**YES:** Short circuit in wire harness. Repair or replace harness. See Engine Harness—EH Controls (W31) Wiring Diagram. See Cab Harness—EH Controls (W32) Wiring Diagram. (Group 9015-10.) **NO:** Go to Component Check.

KK70125,0000570 -19-12JAN10-5/6

4 Component Check	Key switch OFF. Check glow plug relay (K2). See Glow Plug Relay Check in Electrical Component Checks. (Group 9015-20.) Is relay resistance within specification and operating correctly?	**YES:** Checks complete. **NO:** Replace glow plug relay (K2).

KK70125,0000570 -19-12JAN10-6/6

000676.06 — Glow Plug Relay Output Out of Range High

Open circuit or short to ground in the wire harness to glow plug relay (K2).

KK70125,0000565 -19-22DEC09-1/6

Glow Plug Relay Output Out of Range High Diagnostic Procedure

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3 Wire Harness Check	Key switch OFF. Disconnect left motor speed sensor (B16) connector. See Electrohydraulic Controller Harness (W35) Component Location. (Group 9015-10.) Disconnect HCU J1 connector (X44). Using a multimeter, check continuity of M05 PUR wire between pin 2 of speed sensor connector (harness side) and pin B2 of HCU J1 connector (X44). Check continuity of M06 PUR wire between pin 4 of speed sensor connector (harness side) and pin A1 of HCU J1 connector (X44). Is continuity indicated?	**YES:** Go to next step in this check. **NO:** Open circuit in wire harness. Repair or replace harness. See Electrohydraulic Controller Harness (W35) Wiring Diagram. (Group 9015-10.)
	Key switch OFF. Left motor speed sensor (B16) disconnected. HCU J1 connector (X44) disconnected. Check for continuity to ground at pin 2 (M05 PUR) and pin 4 (M06 PUR) of speed sensor connector (harness side). Is continuity to ground indicated?	**YES:** Short to ground in wire harness. Repair or replace harness. See Electrohydraulic Controller Harness (W35) Wiring Diagram. (Group 9015-10.) **NO:** Go to next step in this check.
	Key switch OFF. Left motor speed sensor (B16) disconnected. HCU J1 connector (X44) disconnected. Disconnect HCU J2 connector (X45). Check for continuity between wires in left motor speed sensor (B16) connector. Is continuity between wires indicated?	**YES:** Short circuit in wire harness. Repair or replace harness. See Electrohydraulic Controller Harness (W35) Wiring Diagram. (Group 9015-10.) **NO:** Go to Sensor Check.

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KK70125,0000515 -19-02DEC09-5/6

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1 Controller Check	Program hydraulic control unit (HCU) with correct software.	
	Operate machine and check for DTCs.	**YES:** Hydraulic control unit (HCU) malfunction. Replace HCU.
	Does DTC return?	**NO:** Checks complete.

KK70125,0000544 -19-03DEC09-3/3

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- S26 — Electric Quik-Tatch Switch (S.N. 131877—) (SE16, W28)
- V5 — Alternator Diode (SE2, W1)
- V6 — Right 12 Volt Power Switch Diode (W9)
- V7 — Left 12 Volt Power Switch Diode (W9)
- V8 — 8-Button Controller Suppression Diode 1 (W15)
- V9 — 8-Button Controller Suppression Diode 2 (W15)
- V10 — 8-Button Controller Suppression Diode Block (W15)
- W1 — Engine Harness (W1)
- W2 — Cab Harness—Standard (W2)
- W3 — Front Chassis Harness—Standard (W3)
- W4 — Backup Alarm Harness (W4)
- W5 — Dual Flasher Harness (W5)
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- W8 — Wiper Harness (W8)
- W9 — 12 Volt Auxiliary Power Harness (W9)
- W10 — Beacon Harness (W10)
- W12 — Cab Harness—Deluxe (W12)
- W13 — Front Chassis Harness—Deluxe (W13)
- W15 — 8-Button Controller Harness (W15)
- W18 — Operator Convenience Package Harness (S.N. —170536) (W18)
- W19 — Operator Convenience Package Harness (W19)
- W20 — Battery to Frame Ground (SE1)
- W21 — Alternator Ground (W1)
- W22 — Hydraulic Oil Filter Housing Ground (W1)
- W23 — Engine Harness to Frame Ground (W1)
- W24 — Solenoid Ground (W1)
- W25 — Cab Harness Ground (W2 or W12)
- W28 — Electric Quik-Tatch Harness (S.N. 131877—) (W28)
- W29 — Helper Fan Control Harness
- W30 — Helper Fan Tee Harness
- X1 — Cab Harness to Engine Harness 5-Pin Connector (W1, W2 or W12)
- X2 — Cab Harness to Engine Harness 12-Pin Connector (W1, W2 or W12)
- X3 — Cab Harness to Engine Harness 12-Pin Connector (W1, W2 or W12)
- X4 — Cab Harness to Front Chassis Harness 6-Pin Connector (W12, W13)
- X5 — Engine Harness to Front Chassis Harness 8-Pin Connector (W1, W3, W13)
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- X7 — Cab Harness to Engagement and Monitor Unit 14-Pin Connector (J2) (W2 or W12)
- X8 — Cab Harness to Air Conditioner and Heater Harness 3-Pin Connector (W7, W12)
- X9 — Cab Harness to Air Conditioner and Heater Harness 6-Pin Connector (W7, W12)
- X10 — Remote Start Box Connector (SE2, W1)
- X11 — Engine Harness Accessory Power Connector (W1)
- X12A — Cab Harness Accessory Power Connector (SE19)(W2 or W12)
- X12B — Cab Harness Accessory Power Connector (SE19)(W2 or W12)
- X15 — 8-Button Controller Harness to Attachment 14-Pin Connector (W15)
- X16 — 8-Button Controller Harness to 8-Button Controller 6-Pin Connector (W15)
- X17 — 8-Button Controller Harness to 8-Button Controller 2-Pin Connector (W15)
- X18 — Door Switch (canopy machines) (SE4, W2 or W12)
- X20 — Operator Convenience Package Power 2-Pin Connector (W2)
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- X37 — Helper Fan Harness to Helper Fan Tee Harness 1-Pin Connector (W29 and W30)
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- X39 — Helper Fan Tee Harness to B10 1-Pin Connector (W29)
- X55 — Cab Connector—If Equipped (SE19)(W37) or (W38)
- X100 — Splice (W3, W13)
- X101 — Splice (W3, W13)
- X102 — Splice (W13)
- X103 — Splice (W4)
- X104 — Splice (W4)
- X105 — Splice (W2 or W12)
- X106 — Splice (W2 or W12)
- X107 — Splice (W2 or W12)
- X108 — Splice (W2 or W12)
- X109 — Splice (W2 or W12)
- X110 — Splice (W2 or W12)
- X111 — Splice (W2 or W12)
- X112 — Splice (W12)
- X113 — Splice (W12)
- X114 — Splice (W12)
- X115 — Splice (W12)
- X116 — Splice (W1)
- X117 — Splice (W1)
- X118 — Splice (W1)
- X119 — Splice (W1)
- X120 — Splice (W1)
- X121 — Splice (W1)
- X122 — Splice (W1)
- X123 — Splice (W1)
- X124 — Splice (W1)
- X125 — Splice (W1)
- X126 — Splice (W1)
- X127 — Splice (W6)
- X128 — Splice (W6)
- X129 — Splice (W5)
- X130 — Splice (W8)
- X131 — Splice (W8)

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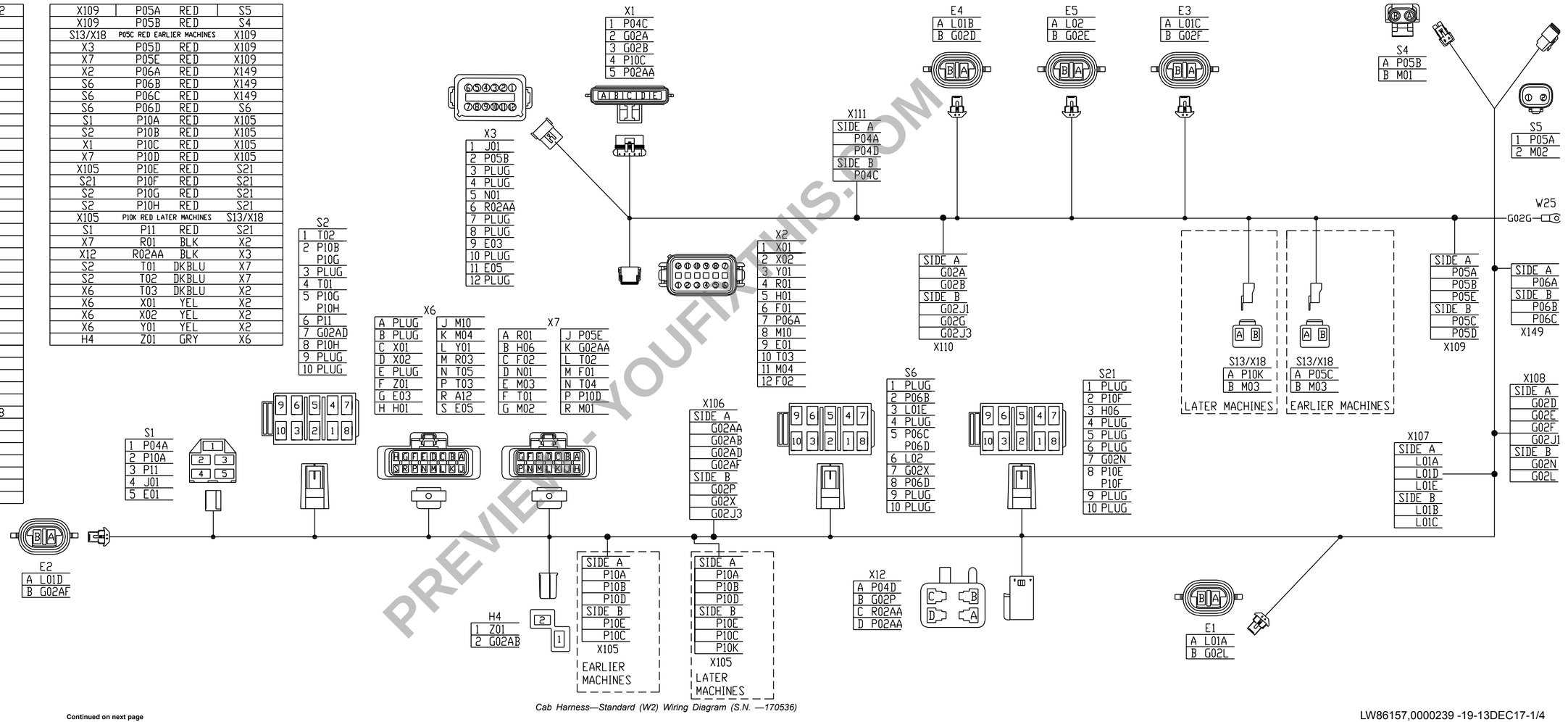
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Cab Harness—Standard (W2) Wiring Diagram

XJ1248620 —UN—14DEC17

END #1	NUMBER	COLOR	END #2
S1	E01	WHT	X2
X6	E03	WHT	X3
X6	E05	WHT	X3
X7	F01	YEL	X2
X7	F02	YEL	X2
X1	G02A	BLK	X110
X1	G02B	BLK	X110
E4	G02D	BLK	X108
E5	G02E	BLK	X108
E3	G02F	BLK	X108
X110	G02G	BLK	W25
X110	G02J1	BLK	X108
X110	G02J2	BLK	X106
X108	G02L	BLK	E1
X108	G02N	BLK	S21
X106	G02P	BLK	X12
X106	G02X	BLK	S6
X7	G02AA	BLK	X106
H4	G02AB	BLK	X106
S2	G02AD	BLK	X106
E2	G02AF	BLK	X106
X6	H01	DKGRN	X2
X7	H06	DKGRN	S21
S1	J01	TAN	X3
E1	L01A	BRN	X107
E4	L01B	BRN	X107
E3	L01C	BRN	X107
E2	L01D	BRN	X107
S6	L01E	BRN	X107
S6	L02	BRN	E5
X7	M01	PUR	S4
X7	M02	PUR	S5
X7	M03	PUR	S13/X18
X2	M04	PUR	X6
X6	M10	PUR	X2
X7	N01	YEL	X3
X12	P02AA	RED	X1
S1	P04A	RED	X111
X1	P04C	RED	X111
X1	P04D	RED	X111

X109	P05A	RED	S5
X109	P05B	RED	S4
S13/X18	P05C RED EARLIER MACHINES		X109
X3	P05D	RED	X109
X7	P05E	RED	X109
X2	P06A	RED	X149
S6	P06B	RED	X149
S6	P06C	RED	X149
S6	P06D	RED	S6
S1	P10A	RED	X105
S2	P10B	RED	X105
X1	P10C	RED	X105
X7	P10D	RED	X105
X105	P10E	RED	S21
S21	P10F	RED	S21
S2	P10G	RED	S21
S2	P10H	RED	S21
X105	P10K RED LATER MACHINES		S13/X18
S1	P11	RED	S21
X7	R01	BLK	X2
X12	R02AA	BLK	X3
S2	T01	DKBLU	X7
S2	T02	DKBLU	X7
X6	T03	DKBLU	X2
X6	X01	YEL	X2
X6	X02	YEL	X2
X6	Y01	YEL	X2
H4	Z01	GRY	X6



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Cab Harness—Standard (W2) Wiring Diagram (S.N. —170536)

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E2—Right Front Work Light
E7—Right Front Flasher Light
H4—Engagement and Monitor Unit Warning Alarm
K5—Dual Flasher Relay
K6—High-Flow Relay
M4—Windshield Wiper Motor
S1—Key Switch
S2—Park Brake Switch
S6—Work Lights Switch
S7—Dual Flasher Switch
S8—High Flow Switch
S12—Windshield Wiper and Washer Switch
S26—Electric Quik-Tatch Switch
X6—Cab Harness to Engagement and Monitor Unit 16-Pin Connector (J1)
X7—Cab Harness to Engagement and Monitor Unit 14-Pin Connector (J2)
X105—Splice
X106—Splice

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1— Continued on Page 1 of 3
2— Continued on Page 3 of 3
E1— Left Front Work Light
E6— Left Front Flasher Light
R3— Cab Temperature Control Dial
R6— CAN Termination Resistor 1
S4— Seat Switch
S5— Seat Belt Switch
S9— Air Conditioner and Heater Blower Motor Switch
S12— Windshield Wiper and Washer Switch
S13— Door Switch (cab machines)
S19— Air Conditioner Switch
S21— Auxiliary Hydraulic Override Switch
S26— Electric Quik-Tatch Switch
W25— Cab Harness Ground
X8— Cab Harness-to-Air Conditioner and Heater Harness 6-Pin Connector
X9— Cab Harness-to-Air Conditioner and Heater Harness 3-Pin Connector
X12— Cab Harness Accessory Power Connector
X18— Door Switch (canopy machines)
X20— Operator Convenience Package Power 2-Pin Connector
X23— Right Joystick 6-Pin Connector
X24— Right Joystick 12-Pin Connector
X41— Cab Harness-to-Engine Harness 47-Pin Connector
X42— Cab Harness-to-Engine Harness 8-Pin Connector
X52— Left Joystick 10-Pin Connector
X53— Left Joystick 8-Pin Connector
X54— Left Joystick 6-Pin Connector
X80— Joystick Fuse Block
X216— Wire Splice M12
X217— Wire Splice M13
X218— Wire Splice R13
X219— Wire Splice M12
X220— Wire Splice M13
X221— Wire Splice R13
X222— Wire Splice G02
X223— Wire Splice G02
X225— Wire Splice H03
X226— Wire Splice L01
X227— Wire Splice P02
X228— Wire Splice P02
X229— Wire Splice P04
X230— Wire Splice P05
X231— Wire Splice P06
X232— Wire Splice P09
X233— Wire Splice P10
X234— Wire Splice P21
X235— Wire Splice P22

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A2—Engagement and Monitor Unit
A4—Hydraulic Control Unit (HCU)
A5—Left Joystick
A6—Right Joystick
B15—Auxiliary Proportional Control Switch
H4—Engagement and Monitor Unit Warning Alarm
K7—Air Conditioner Compressor Clutch Relay
S25—Left Joystick Two Speed Switch (if equipped)
S27—Float Enable Switch
S28—Left Joystick Auxiliary Switch
S29—Right Joystick Aux 2A Switch
S30—Right Joystick Aux 2B Switch
S31—Left Joystick Aux 3A Switch
S32—Left Joystick Aux 3B Switch
S34—Left Joystick Horn Switch
X6—Cab Harness-to-Engagement and Monitor Unit 16-Pin Connector (J1)
X7—Cab Harness-to-Engagement and Monitor Unit 14-Pin Connector (J2)
X8—Cab Harness-to-Air Conditioner and Heater Harness 6-Pin Connector
X23—Right Joystick 6-Pin Connector
X24—Right Joystick 12-Pin Connector
X43—Cab Harness-to-Engagement and Monitor Unit 12-Pin Connector (J3)
X44—Hydraulic Controller Harness-to-Hydraulic Control Unit 32-Pin Black Connector (J1)
X45—Hydraulic Controller Harness-to-Hydraulic Control Unit 48-Pin Brown Connector (J2)
X46—Hydraulic Controller Harness-to-Hydraulic Control Unit 32-Pin Grey Connector (J3)
X53—Left Joystick 8-Pin Connector
X54—Left Joystick 6-Pin Connector
Y5—Park Brake Solenoid
Y6—Two Speed Solenoid
Y23—Male AUX Port Pilot Solenoid
Y24—Female AUX Port Pilot Solenoid

The engagement and monitor unit (EMU) uses information from the machine sensors to display information to the operator and to shutdown the machine under abnormal conditions. The engagement and monitor unit also uses operator input from switches and sensors to control certain machine functions.

On electrohydraulic (EH) control machines, the EMU is part of the control circuit for the hydrostatic and hydraulic systems. Within the EH circuit, the EMU manages the following items:

- Operator interlocks to enable hydrostatic and hydraulic systems
- Valve power to the HCU for the hydraulic and hydrostatic solenoids
- Operator display of information
- Audible alarm to alert the operator
- Main auxiliary hydraulics
- High / low (two speed) shifting of the hydrostatic motors—if equipped

The EMU communicates with the other controllers in the EH circuit using the controller area network (CAN). For more information on the EMU within the EH controls circuit, see Electrohydraulic Controls Circuit Theory of Operation. (Group 9015-15.)

Air Filter Restriction Switch (B1)

The air filter restriction switch is a normally open switch that closes when a restriction is detected. When the switch closes, it grounds terminal L on the engagement and monitor unit (EMU) J2 connector X7. This illuminates the air filter restriction indicator on the instrument panel and the EMU generates a diagnostic trouble code (DTC). See Electrical Component Specifications for component specifications. (Group 9015-20.)

Hydraulic Oil Temperature Sensor (B2)

The hydraulic oil temperature sensor is a variable resistance temperature sensor. The resistance is sensed at terminal D of the engagement and monitor unit (EMU) J1 connector X6. Information from this sensor is used to display hydraulic oil temperature to the operator, warn the operator when the hydraulic oil temperature is too high, determine if the glow plugs are to be energized, and to auto shutdown the machine when hydraulic oil temperature reaches a predetermined temperature. For more information on auto shutdown, see below. For more information on sensor, see Electrical Component Specifications. (Group 9015-20.)

Hydraulic Oil Filter Restriction Switch (B3)

The hydraulic oil filter restriction switch is a normally open switch that will close when the pressure differential across the hydraulic oil filter is greater than specification. When the switch closes, it grounds terminal C of the engagement and monitor unit (EMU) J2 connector X7. If the temperature of the hydraulic oil is above 38°C (100°F), after a 60 second delay, the hydraulic oil filter restriction indicator illuminates on the instrument panel and the EMU generates a diagnostic trouble code (DTC).

Fuel Level Sensor (B4)

The fuel level sensor is a variable resistance fuel level sensor. The resistance is sensed at terminal L of the engagement and monitor unit (EMU) J1 connector X6. Information from this sensor is used to display the fuel level to the operator and to warn the operator when the fuel level is low. When fuel is low, the operator will be warned by a series of three warnings. The first and second warnings consist of a message on the EMU display and three beeps of the engagement and monitor unit warning alarm. The third warning starts immediately after the second warning and consists of a message on the EMU display and a single beep of the engagement and monitor unit warning alarm every 60 seconds. The message displayed on the EMU display is “Low Fuel” until the SELECT or MENU buttons are pushed. For more information on sensor, See Electrical Component Specifications. (Group 9015-20.)

Coolant Temperature Sensor (B5)

Continued on next page

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8 CAN Circuit Short-to-Ground Check	Key switch OFF.	
	Using a multimeter, measure continuity between pin D (CAN Low) and pin A (ground) of Service ADVISOR connector.	
	Using a multimeter, measure continuity between pin C (CAN High) and pin A (ground) of Service ADVISOR connector.	**YES:** A short to ground exists in CAN circuit. Disconnect each harness and check for continuity to ground at pin A of Service ADVISOR connector. Repair or replace harness that has short-to-ground condition.
	Is continuity indicated?	**NO:** Go to next step in this check.
	Key switch OFF.	
	Using a multimeter, measure continuity between pin D (CAN Low) and machine ground.	
	Using a multimeter, measure continuity between pin C (CAN High) and machine ground.	**YES:** A short to machine ground exists in CAN circuit. Disconnect each harness and check for continuity to machine ground. Repair or replace harness that has short-to-ground condition.
	Is continuity indicated?	**NO:** Go to CAN High/CAN Low Short Check.

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

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

Continued on next page

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1— Hydraulic Pump
2— Charge Pump
3— Left Hydrostatic Pump
4— Right Hydrostatic Pump
11— Control Valve
26— Auxiliary Coupler (2 used)
29— Boom Cylinder (2 used)
30— Bucket Cylinder (2 used)
46— Hydraulic Oil Tank
48— To Hydraulic Oil Cooler
55— Hydraulic Oil Filter Manifold
60— Park Brake Solenoid Valve Manifold

Continued on next page

TE14778,00001F2 -19-09JAN08-2/14

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1— Hydraulic Pump
2— Charge Pump
3— Hydrostatic Pump Left
4— Hydrostatic Pump Right
5— High Flow Hydraulic Pump (optional)
6— Hydrostatic Motor Left—Single Speed
7— Hydrostatic Motor Right—Single Speed
8— Hydrostatic Motor Left—Two Speed
9— Hydrostatic Motor Right—Two Speed
10— Hydrostatic Motor Housing
11— Control Valve
12— Boom Spool
13— Bucket Spool
14— Auxiliary Spool
15— System Relief Valve
17— Port Lock Spool
18— Boom Up Circuit Relief and Anticavitation Valve
20— Bucket Rollback Circuit Relief and Anticavitation Valve
21— Bucket Dump Circuit Relief and Anticavitation Valve
22— Boom Lift Check Valve
23— Bucket Lift Check Valve
24— Auxiliary Lift Check Valve
26— Auxiliary Coupler
27— Case Drain Coupler
28— Flow Rate Orifice and Check Valve
29— Boom Cylinder (2 used)
30— Bucket Cylinder (2 used)
31— Self-Level Valve (optional)
32— Adjustable Orifice
33— Orifice
34— Flow Divider Valve
35— Unloader Valve
36— Check Valve
44— High Flow Solenoid Valve
45— High Flow Relief Valve
46— Hydraulic Oil Tank
47— Hydraulic Oil Tank Breather
48— Hydraulic Oil Cooler
50— Hydraulic Oil Filter Bypass Valve
51— Hydraulic Oil Filter
52— Hydraulic Oil Filter Restriction Switch
53— Park Brake Solenoid Valve
54— Charge Pressure Relief Valve
55— Hydrostatic Filter Manifold
56— Two Speed Proportional Solenoid Valve (optional)
57— Hydrostatic Pump Make-Up Check Valve (4 used)
58— Steering Control Valve Left
59— Steering Control Valve Right
60— Park Brake Solenoid Valve Manifold
61— Hydrostatic Motor Shuttle Valve (2 used)
62— Hydrostatic Motor Relief Valve (2 used)
63— Orifice (2 used)
64— Park Brake (2 used)
65— Speed Shift Spool (2 used)
66— Speed Selector Valve (2 used)
68— Check Valve
73— High Flow Valve (optional)
75— Check Valve
83— Plug
300— High Pressure Oil
301— Return Oil
302— Trapped Oil
304— Charge Pressure Oil
B11— Auxiliary Hydraulic Spool Neutral Switch
Y2— Boom Spool Lock Solenoid
Y3— Bucket Spool Lock Solenoid
Y4— Port Lock Solenoid Valve

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5 Bucket Lift Check Valve	Check bucket lift check valve. See Control Valve Disassemble and Assemble—EH Controls. (Group 3160.) Is lift check valve functioning correctly?	**YES:** Go to Hydraulic Cylinder Leakage. **NO:** Replace lift check valve.

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6 Hydraulic Cylinder Leakage	Check hydraulic cylinders for leakage. See Cylinder Identification. (CTM120519.) Are hydraulic cylinders leaking?	**YES:** Repair or replace hydraulic cylinders. **NO:** Go to Bent or Damaged Cylinder Rods.

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7 Bent or Damaged Cylinder Rods	Check cylinders for bent or damaged rods. Are cylinder rods bent or damaged?	**YES:** Repair or replace cylinder rods. See Cylinder Identification. (CTM120519.) **NO:** Go to Control Valve Not Functioning Properly.

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8 Control Valve Not Functioning Properly	Inspect control valve. See Control Valve Disassemble and Assemble—EH Controls. (Group 3160.) Is control valve worn or spools bent or binding in bores?	**YES:** Repair or replace control valve. **NO:** Done.

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Bucket Drifts Up—EH Controls

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Bucket Drifts Up Diagnostic Procedure

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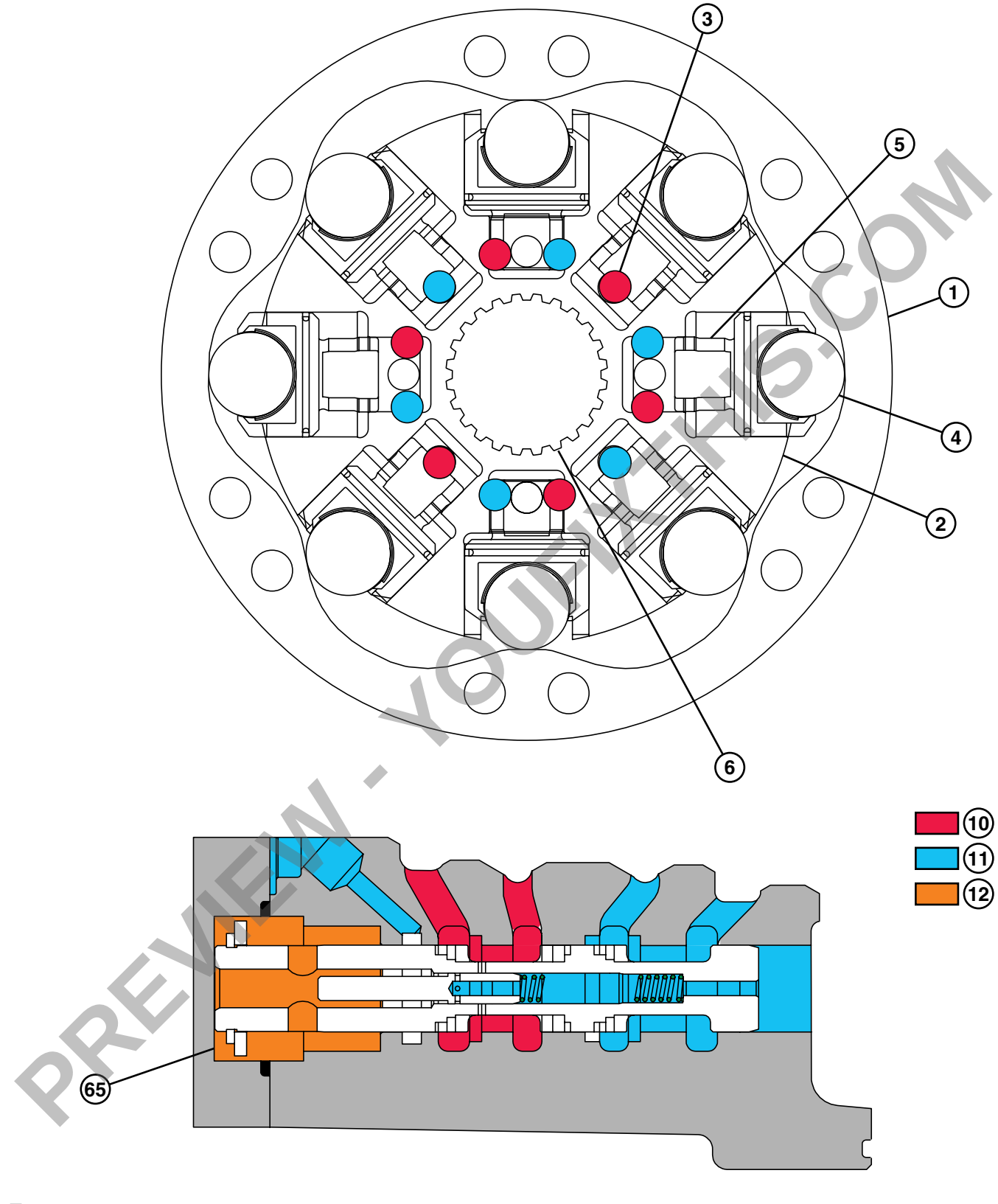
1 Diagnostic Trouble Codes (DTCs)	Check engagement and monitor unit (EMU) for any DTCs. See Reading Diagnostic Trouble Codes. (Group 9015-20.) Are DTCs present?	**YES:** Diagnose and repair displayed DTCs. See Diagnostic Trouble Codes (DTCs). (Group 9001.) **NO:** Go to Drift Check.

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Slow Speed Operation

1— Cam
2— Carrier
3— Manifold
4— Piston Follower
5— Piston
6— Output Shaft
10— Pressure Oil
11— Return Oil
12— Charge Pressure Oil
65— Speed Shift Spool

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15. Record pump flow reading.

325 Skid Steer Loader—Specification

New, Typical Hydrostatic Pump—Flow Rate.....106.0 L/min—Approximate
28.0 gpm—Approximate

Used, Minimum Hydrostatic Pump—Flow Rate.....84.8 L/min—Approximate
22.4 gpm—Approximate

328 Skid Steer Loader—Specification

New, Typical Hydrostatic Pump—Flow Rate.....117.3 L/min—Approximate
31.0 gpm—Approximate

Used, Minimum Hydrostatic Pump—Flow Rate.....93.8 L/min—Approximate
24.8 gpm—Approximate

16. Repeat procedure for right pump using right forward port (82) or right reverse port (83).
17. If flow is low:
    - Verify engine speed at fast idle.
    - Disconnect linkage from levers on pump. Operate levers manually. If flow is now ok, check linkage and adjust as necessary.
    - Verify proper control lever travel. See Tracking Adjustment. (Group 9026-25.)
    - Inspect steering linkage.
    - Verify charge oil supply is sufficient.
    - Repair or replace tandem hydrostatic pump.
18. Remove M8 x 30 cap screws from both yokes of steering levers securing steering levers in an upright position.
19. Remove remote start box.
20. Lower cab. See Raising Operator's Station. (Operator's Manual.)
21. Raise skid steer loader and remove blocking.See Raising and Blocking Machine. (Operator's Manual.)
22. Start skid steer loader and lower boom.

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