SERVICE MANUAL

W110D
Stage IV
Wheel Loader

Part number 48083725
English
February 2017

NEW HOLLAND CONSTRUCTION

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System Function Overview

This section provides a detailed explanation of how the Pressure and Flow Compensated (PFC) pump compensator controls the pump.

When the engine is off, the pressure regulator spool **(FR1)** and the flow regulator spool **(FR2)** are spring loaded to the closed position. The counterbalance spring pushes the swash plate to the full flow position. At start-up, pump output flow is available to the steering and loader valve. The steering and loader control systems are closed center design. The oil supply from the PFC pumps are blocked with the controls in neutral. With all controls in neutral, the LS pressure will be vented to tank pressure. Pump outlet pressure is internally ported to the non spring end of the flow regulator spool **(FR2)**. Pump outlet pressure pushes on the left end of the flow regulator spool **(FR2)** overcoming the flow regulator spring **(5)**. Pump outlet pressure is then ported through the flow regulator spools to the control piston **(2)**. The control piston **(2)** then pushed the swash plate towards minimum displacement. The pump then delivers only the flow required to maintain the flow regulator spring **(5)** pressure.

The flow regulator spring **(5)** is adjustable. Typically this spring does not require adjustment. If adjustment is required, use the table below for the specifications. The flow regulator pressure of the first pump **(34A)** must be adjusted to specification. The adjustment of the flow regulator pressure of second pump **(33A)** is lower than the first pump. If one compensator is adjusted, the opposite compensator must also be checked and adjusted. Measure both the pump outlet pressure and the LS pressure for the pump. Adjust the flow regulator spool to the pressure differential specification. DO NOT activate any of the controls while making the adjustment, as the gauge may be damaged. It is preferable to have a shutoff valve at the gauge to protect it from overpressure. The first pump flow regulator pressure must **3 – 4 bar** (**44 – 58 psi**) higher than the adjustment of the second pump flow regulator. It is preferable to use the same gauge to make both of these adjustments to assure accuracy. The pump outlet pressure would be approximately **24 – 35 bar** (**348 – 508 psi**).

Model	Pump 1 Delta P	Pump 2 Delta P
W110D and W130D	**22 – 25 bar** (**319 – 362 psi**)	Not applicable
W170D	**28 – 30 bar** (**406 – 435 psi**)	**24 – 26 bar** (**348 – 377 psi**)

When the steering or loader control system is activated, pump output pressure is available to the control spools. When the loader circuit is activated, oil flow across the spool causes a pressure drop (Delta P) between the (PFC) pump outlet pressure **(4)** and the LS signal pressure **(6)** back to the pump compensator. Pump output flow is delivered to the inlet of the loader control valve through the steering priority valve.

When the pump outlet pressure **(4)** is higher than the LS signal pressure **(6)** plus the spring force **(5)**, the flow regulator spool **(FR2)** will gradually shift to send pump outlet oil **(4)** to the control piston **(2)** to reduce the output of the pump. The flow regulator spool **(FR2)** will remain in balance between the pump outlet pressure **(4)** on the left end and the LS pressure **(6)** plus the spring force **(5)** on the right end of the spool. The control piston **(2)** will move the swash plate **(3)** so that the flow from the pump will maintain the specified differential pressure (Delta P).

The pressure at which the flow control spool **(2)** shuts the pump down is adjustable. The flow control spool of the second pump is to be adjusted approximately **4 bar** (**58 psi**) lower than the flow regulator on the first pump. Any time that the pump is at less than full displacement, the flow control spool **(2)** will maintain the Delta P. At less than full flow delivery of the 1st pump, the difference between pump outlet pressure and the LS pressure (Delta P) will be the higher pressure setting of the 1st pump compensator. When the 1st pump is at maximum flow, the difference between pump outlet pressure and the LS pressure (Delta P) will be the lower pressure setting of the 2nd pump. If the load in the bucket would require **138 bar** (**2000 psi**) pump outlet pressure to raise the load, the signal pressure would be **138 bar** (**2000 psi**) minus Delta P.

The maximum pressure available to loader hydraulic system is controlled by loader main relief valve located in the loader valve **(7)**. The loader main relief connects between the LS signal pressure and the tank passage in the loader valve **(7)**. When the LS signal pressure is restricted, the pump will not be able to deliver flow above that pressure. The steering signal relief valve located in the steering priority valve limits the maximum pressure available to the signal line from steering control circuit to the spring end of the piston pump flow control spool **(FR2)**.

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B. If there are no problems, replace the Engine Control Unit **A-ECU**.

Wiring harnesses - Electrical schematic sheet 18 (55.100)

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58157 - (DTC E32D)-ECU internal failure - Sensor 5 volt supply 2

NOTE: *refer to the Engine Service Manual for more details.*

Context:
The Engine Control Unit (ECU) provides three independent **5.0 V** voltage supplies for sensors. These voltages are monitored by hardware within the ECU to make sure they are within a given range. If sensor supply 2 reference voltage is out of range, this fault will occur.

Cause:
The ECU sensor supply reference voltage is out of range.

Possible failure modes:

1. Faulty fuel filter pressure sensor B-9112 or sensor supply wire.
2. Faulty fan speed sensor B-9103 or sensor supply wire. (if equipped)
3. Faulty fuel filter clogging pressure sensor B-9006 or sensor supply wire.
4. Faulty inlet water pump pressure sensor B-9011 or sensor supply wire.
5. Faulty accelerator pedal position sensor B-9011 or sensor supply wire. (if equipped)
6. Faulty exhaust gas absolute pressure sensor B-9005 or sensor supply wire. (if equipped)

Solution:

1. Verify that fault is present and active.

   Use the Electronic Service Tool (EST) to check the status of this fault.

   A. If the fault is present and active, continue with Step **2**.

   B. If the fault is no longer present or in an inactive state, the fault may be intermittent and not currently active. Continue with Step **4**.

2. The ECU monitors this fault continuously. Disconnect each connector one at a time and use the EST to monitor the status of this fault code.

   - Pre filter pressure sensor B-9112 connector **X-9179**

   - Fan speed sensor B-9103 connector **X-9103**

   - Pre filter clogging pressure sensor B-9006 connector **X-9019**

   - Inlet water pump pressure sensor B-9011 connector **X-9027**

   - Accelerator pedal position sensor B-9011 connector **X-9100** (if equipped)

   - Exhaust gas absolute pressure sensor B-9005 connector **X-9018**

   A. If the fault code is eliminated after a connector disconnection, the relevant component has failed. Replace the relevant component.

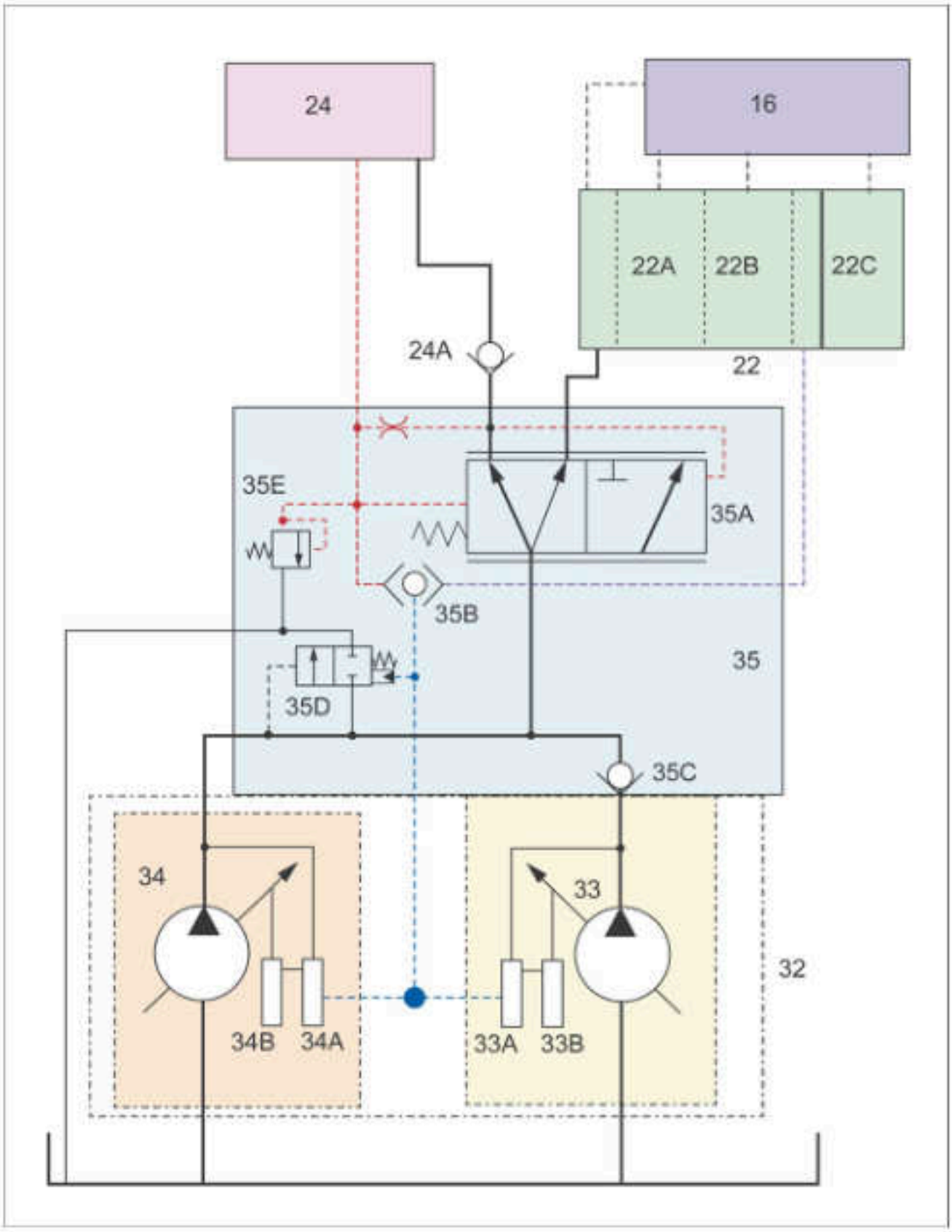
   B. If the fault code has not been eliminated after connector disconnection, leave all of the connectors disconnected and continue to Step **3**.

3. Check the all of the supply 2 circuits for a short circuit condition.

   The key must be in the ON position.

   Use a multimeter to perform the following voltage check:

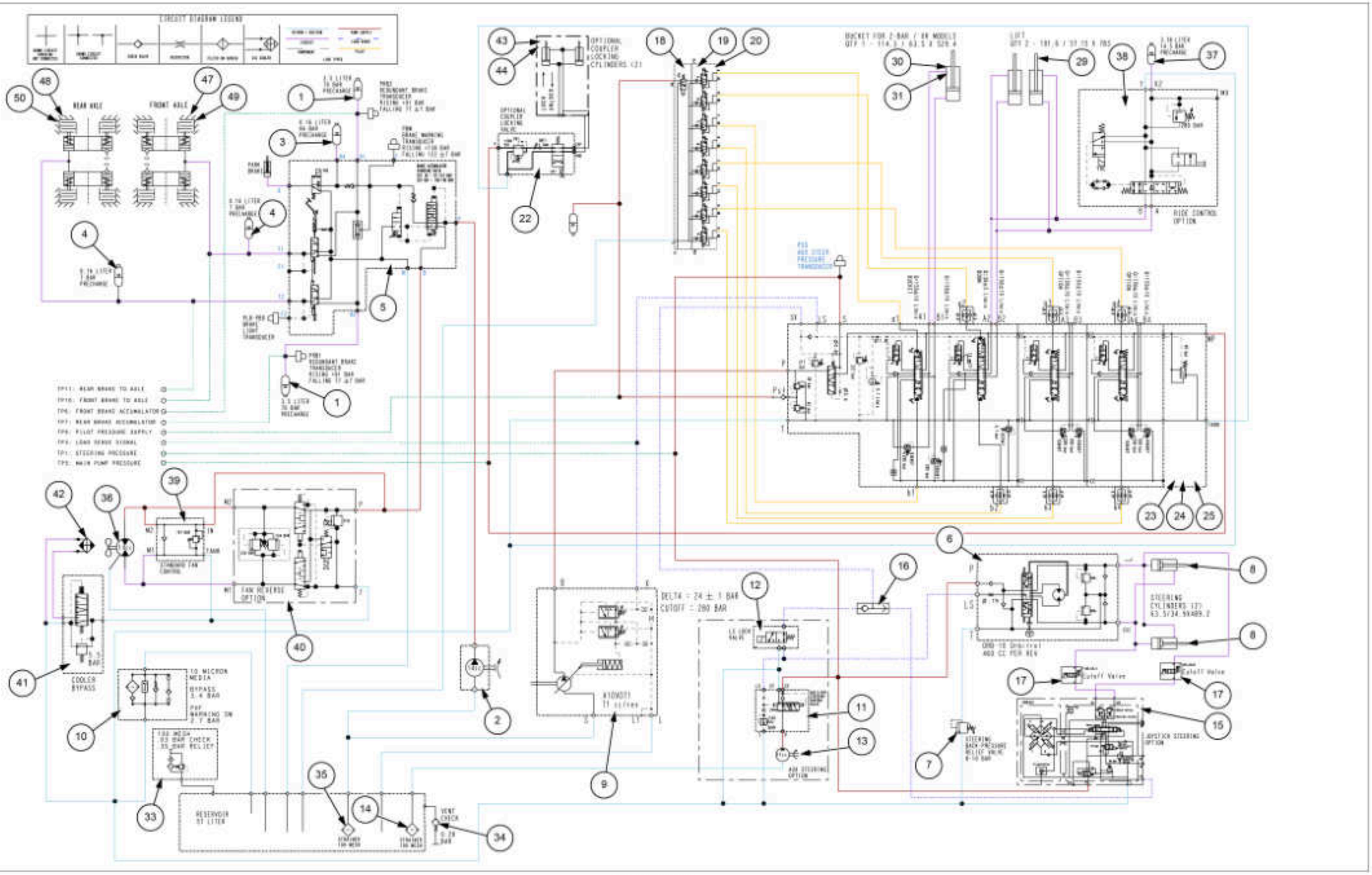
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Component Flow Chart

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