SERVICE MANUAL

FR9040 / FR9050 / FR9060 / FR9080 / FR9090

Forage Harvester

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MidWestTech | New Holland FR9040, FR9050, FR9060, FR9080, FR9090 Forage Harvester Service Manual | Publication 47500830

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The electrical displacement control (**EDC**) is a current driven control requiring a Pulse Width Modulated (**PWM**) signal. Pulse width modulation allows more precise control of current to the solenoids. The **PWM** signal causes the solenoid pin to push against the porting spool, which pressurizes one end of the servo piston **4A**, while draining the other. Pressure differential across the servo piston **4A** moves the swash plate. A swash plate feedback link, opposing control links, and a linear spring provide swash plate position force feedback to the solenoid. The control system reaches equilibrium when the position of the swash plate spring feedback force exactly balances the input command solenoid force from the operator. As hydraulic pressures in the operating loop change with load, the control assembly and servo/swash plate system work constantly to maintain the commanded position of the swash plate.

When driving at a constant speed and load, the condition of the swash plate is static, which means that the sum of all forces on it is equal to zero. The pressure in the **FWD** and **REV** line depends on the ground drive load. On flat and climbing road, there will be high pressure in the **FWD** line, the transmission is then in the "drive mode". The power train is from the diesel engine towards the wheels. When the machine goes downhill, there will be high pressure in the **REV** line, but the oil flow will still be in the same direction. The transmission is in the "brake mode". The power train is from the wheels towards the diesel engine. This is similar to the hydrostatic stop.

Pump command and pump / motor functioning - REV driving

Driving in reverse is completely similar to the **FWD** mode described above as the system is completely symmetrical. The solenoid operation change to the other side resulting in a proportional movement of the pump swash plate in the **REV** direction, and high pressure oil is being pumped towards the hydrostatic motor in the **REV** line, and the **FWD** line is connected to the charge pressure. The position of the flushing spool inside the motor is towards the other side, and flushing now occurs out of the **FWD** side.

Pump command and pump / motor functioning - stopping

When driving at a constant speed, the oil flow in the closed loop is constant and proportional to the speed of the machine. When the pump is brought to neutral in order to stop the machine (control current set at zero), the (still unchanged) ground speed and motor **RPM**, will create a brake pressure in the reverse line, as the (destroked) pump cannot cope with the present oil flow. At this point, both pressure sides will switch, as well as the motor flushing and pump charging. The kinetic energy of the machine has become the prime mover, driving the hydrostatic motor as a pump, whereby the hydrostatic pump is acting as a motor, driving the diesel engine as a load.
It is the intrinsic braking power or the engine which will determine whether the power coming from the pump can be handled without too much increase of the engine speed. Due to the load coming from the pump, an engine speed increase is normal and this goes together with an increasing breaking torque. At the beginning of the braking phase, the torque from the pump is maximum (maximum pressure and maximum displacement), but as the machine speed goes down, the pump displacement will decrease and so will the torque towards the engine. During this dynamic process, a too high engine speed increase (overspeeding) must be avoided. Therefore, in some machine configurations (weight, speed and engine size), an additional measure is necessary to avoid overspeeding of the engine.

If this integrated speed limiter (**ISL**) function is applicable, see **Pump - Hydrostatic schema with integrated speed limiter (ISL) (29.218)**. The heart of this feature is formed by the pressure regulator valve **14** of which the function is to limit and adjust the high pressure to a well defined level (determined by the braking capacity of the engine). It is set by means of the pilot valve **13** which, for this application is set at **140 bar** (**2030 psi**). The back side of the pilot valve is connected to charge pressure. The valve opens when the setting pressure is achieved, allowing the pressure regulator valve **14** to close and start its function. In a dynamic way, a constant output pressure of approximately **170 bar** (**2465 psi**) is maintained (**140 bar** (**2030 psi**) + charge pressure), resulting in a limited drive torque from the pump towards the engine. The pressure on the hydrostatic motor remains maximum, as determined by the pressure limiter valve **2**, so the braking capacity of the hydrostatic system on the vehicle is not influenced. Due to the pressure differential across the pressure regulator valve **14**, part of the braking energy is transferred into heat inside the closed loop, but continuously removed from it by the flushing system inside the hydrostatic motor. As the machine slows down, the flow in the closed loop will further decrease, and as a result the orifice **16** will start its function. While taking an increasing part of the flow, this orifice enables the pressure regulator valve **14** to close, together with an increasing pressure at the pump. In this way the torque from the pump is kept at a constant level (decreasing displacement is compensated by increasing pressure), and the braking capacity of the engine is used as much as possible. To allow for reverse driving (reversed flow and high pressure at the **REV** side), a check valve **15** is installed.

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Air conditioning - Troubleshooting General

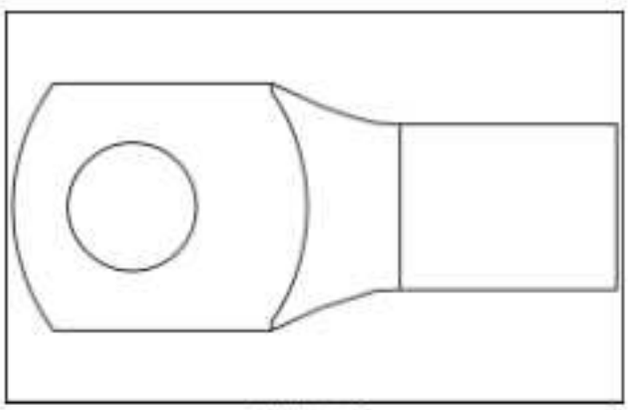
Problem	Possible Cause	Correction
Fault Code indicated in display window.	System problem.	Refer to **Air conditioning - Troubleshooting Fault Codes (50.200)**.
No heat	The heater core supply and/or return hose(s) shutoff valve(s), located at the engine, are closed or restricted.	Open the heater core shutoff valve(s).
	The heater core is restricted and/or blocked.	Check the flow through the heater core. The inlet and outlet hose temperatures should be directly related to engine temperature.
	Heater control valve malfunction.	Refer to troubleshooting test - **Cab heater - Testing (50.100)**
Insufficient cooling	The ATC control panel is in defrost mode.	Press the mode control button to turn the defrost off.
	The evaporator coil and/or filter is dirty.	Visually inspect the components. Clean the components as necessary.
	The condenser core is dirty.	Visually inspect the components. Clean the components as necessary.
	Compressor drive belt slipping.	Visually inspect. Adjust as necessary.
	Faulty expansion valve operation.	Refer to troubleshooting - **Expansion valve - Test (50.200)**.
	Evaporator icing up.	Refer to troubleshooting - **Air conditioning - Problem solving Pressure chart (50.200)**.
	Low refrigerant charge.	Refer to troubleshooting - **Air conditioning - Problem solving Pressure chart (50.200)**.
	High refrigerant charge.	Refer to troubleshooting - **Air conditioning - Problem solving Pressure chart (50.200)**.
	Water valve malfunction.	Operate engine at **1500 RPM** to warm engine coolant. Operate the A/C system at maximum cooling. Install stem thermometer in mid-cab louver and record temperature. Close heater core supply and return shutoff valves at engine. Wait a few minutes and check the temperature. If the temperature drops, refer to troubleshooting - **Cab heater - Testing (50.100)**.
No air flow/reduced air flow.	The automatic temperature control set point and the cab temperature are approximately equal to temperature.	The system is operating properly.
	The cab air filter is dirty.	Clean and/or replace the cab air filter as necessary.
	The blower motor is inoperable.	Refer to troubleshooting - **Blower potentiometer - Testing (55.051)**
No cooling.	A/C Mode switch not on.	Turn A/C Mode switch on.
	Incorrect system pressures.	Refer to troubleshooting - **Air conditioning - Problem solving Pressure chart (50.200)** .
	Insufficient air flow through evaporator.	Check air filter. Check evaporator core and clean as necessary. Refer to troubleshooting - **Air conditioning - No flow from louvers. (50.200)**

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Ground 6 - Cab - Bottom Side Inner

Connector X-205-C Ground 6			
Position	Wire number	Circuit reference	Electrical schematic frame
1	CA-196 (BL)	Ground	**Wire harnesses - Electrical schematic frame 34 (55.100)**
	CA-038 (BK)		**Wire harnesses - Electrical schematic frame 04 (55.100)**
	CA-012 (BK)		**Wire harnesses - Electrical schematic frame 03 (55.100)**
	CA-054 (BK)		**Wire harnesses - Electrical schematic frame 08 (55.100)**
	CA-274 (BK)		**Wire harnesses - Electrical schematic frame 21 (55.100)**
	CA-281 (BK)		
	CA-275 (BK)		
	CA-419 (BK)		**Wire harnesses - Electrical schematic frame 01 (55.100)**
	CA-418 (BK)		
	CA-752 (BK)		**Wire harnesses - Electrical schematic frame 29 (55.100)**
	CA-009 (BK)		**Wire harnesses - Electrical schematic frame 02 (55.100)**

NOTE: *For the wiring color code refer to,* ***Electrical system - Electrical standard (55.000).***

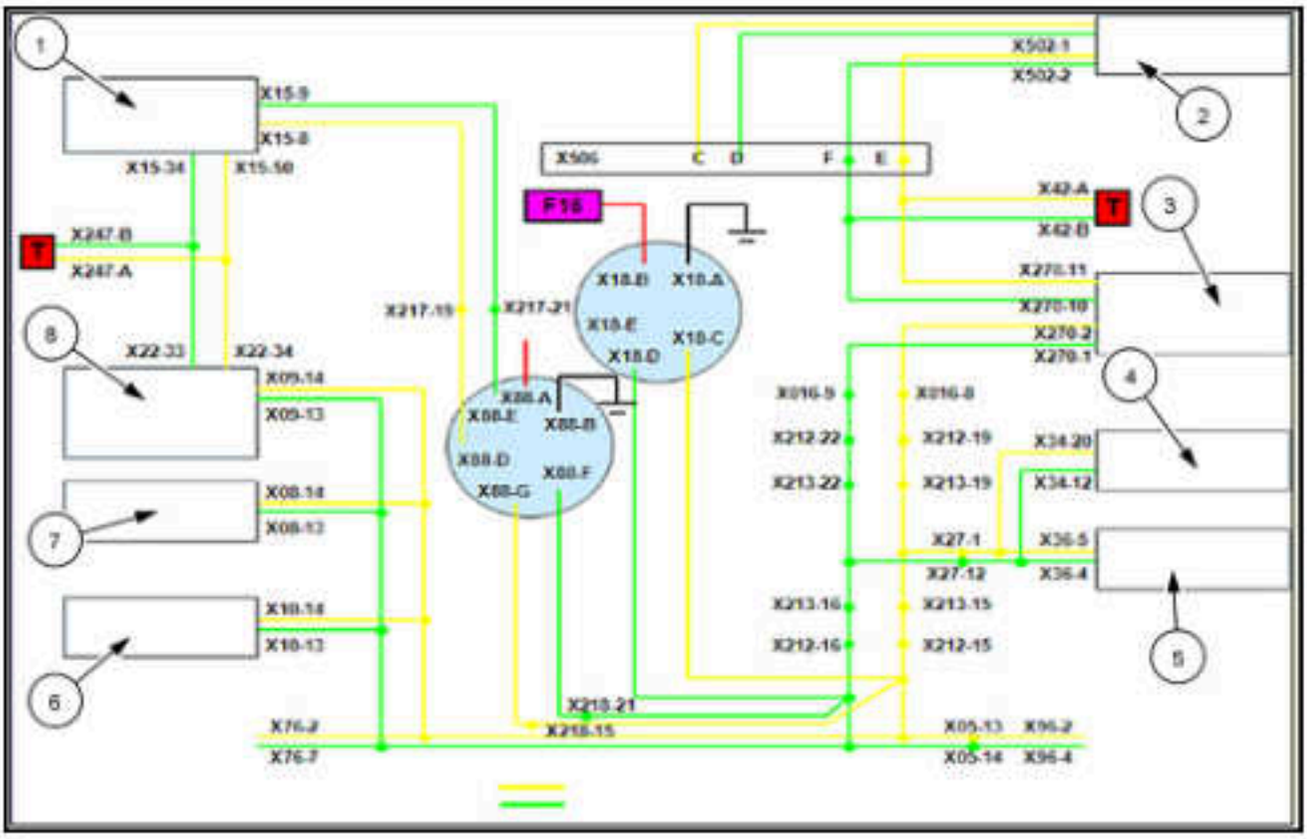


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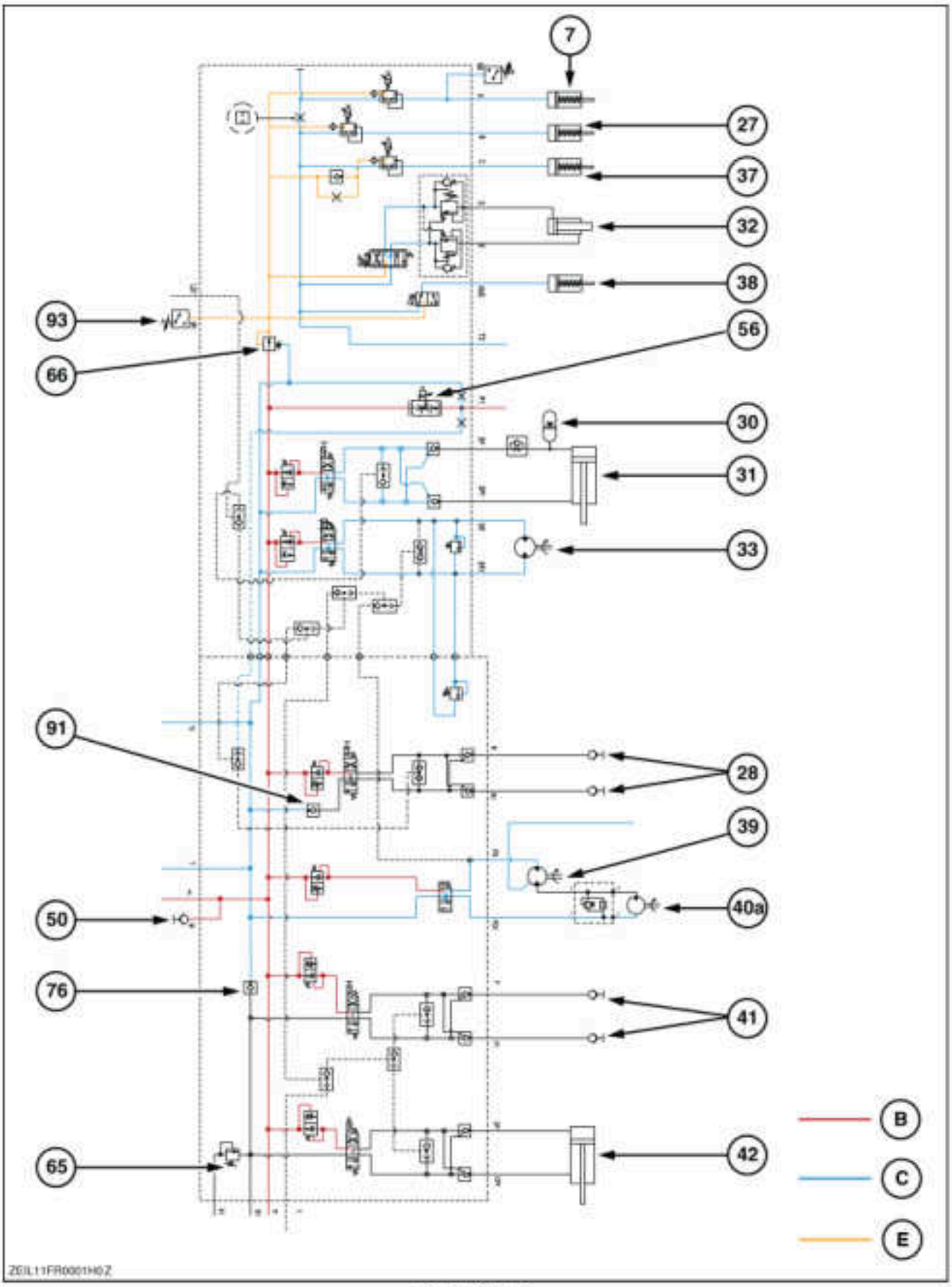
Cab Main Harness

NOTE: *For connector service tools refer to,* ***Wire harnesses - Special tools 3 (55.100).***

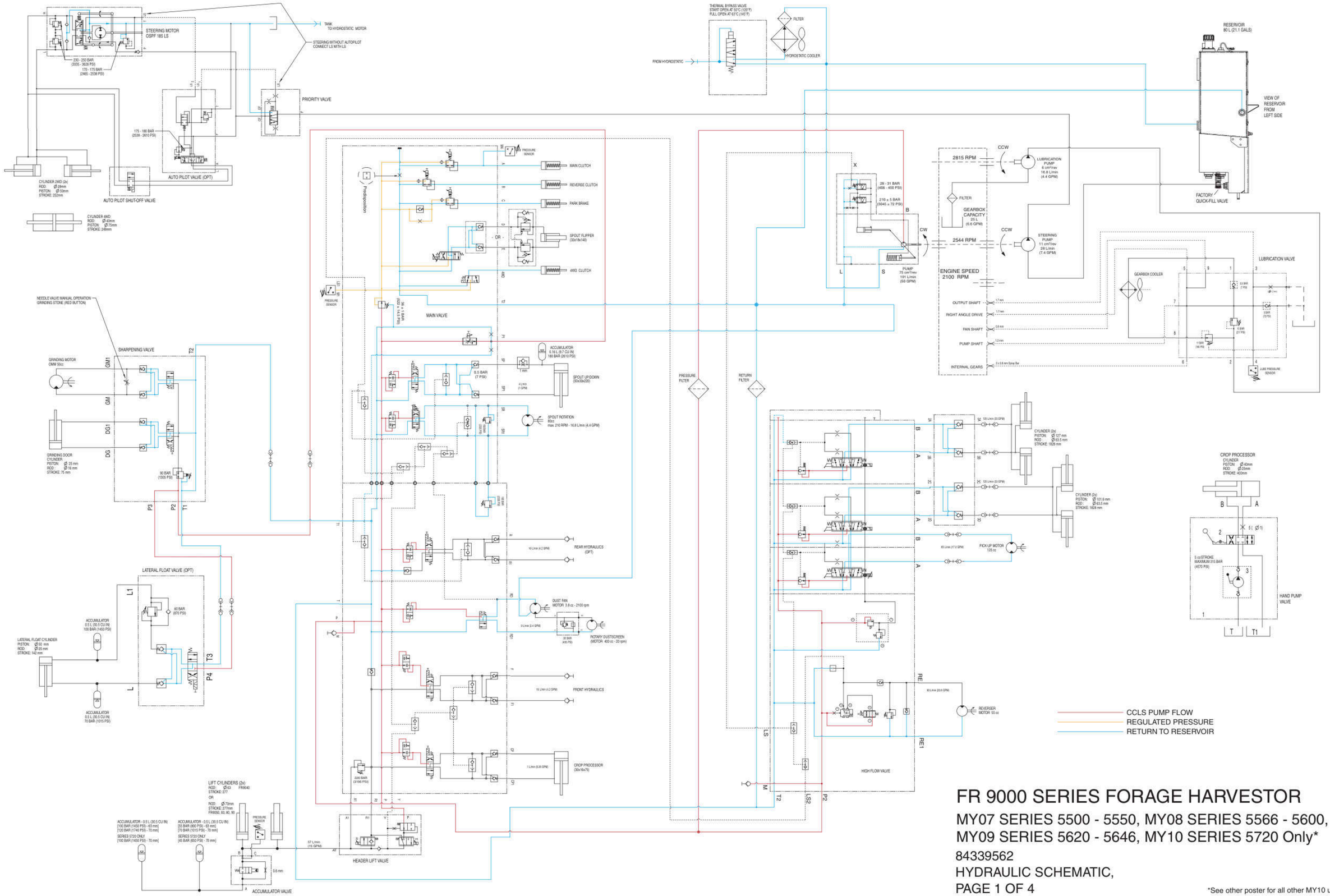
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MY07 SERIES 5500 - 5550, MY08 SERIES 5566 - 5600, MY09 SERIES 5620 - 5646, MY10 SERIES 5720 Only*

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HYDRAULIC SCHEMATIC,

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*See other poster for all other MY10 units

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