SERVICE MANUAL

T8.320 / T8.350 / T8.380 / T8.410 / T8.380 SmartTrax™ / T8.410 SmartTrax™ Powershift Transmission (PST)

Tractor

PIN ZFRE05001 and above

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MidWestTech | New Holland T8.320, T8.350, T8.380, T8.410 SmartTrax PST Tractor Service Manual | Publication 47917989

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Hydraulic systems - Dynamic description - System pumps with Powershift transmission

T8.380 SmartTrax™ PST TIER 4B [ZFRE05001 -]	
T8.410 SmartTrax™ PST TIER 4B [ZFRE05001 -]	

The tractor uses three hydraulic pumps which are driven through a drive housing on the right side of the range transmission. The pump drive housing gears are driven by the Power Take-Off (PTO) drive line and all the pumps turn at approximately 1:41 times engine speed. A Pressure and Flow Compensating (PFC) piston pump is attached to the front of the pump drive housing, while the tandem gear pump is attached to the rear of the pump drive housing.

The front section of the tandem gear pump supplies the thermal bypass valve, an auxiliary filter and then joins the charge pump circuit. The rear section supplies charge flow to the PFC pump(s). The PFC pump supplies flow to the priority regulator valve, which directs flow first to the steering system and then to remote valves, three point hitch circuit and supplies all regulated pressure needs.

All hydraulic lines are equipped with O-ring face seals to ensure reliable, vibration-resistant connections.

Charge/lubrication pump

The charge/lubrication pump is the rear section of the dual gear pump and it is used to supply the main PFC pump with a charged inlet condition to prevent cavitation. The pump also supplies lubrication requirements for the transmission.

The pump draws oil from the transmission housing through a 100 mesh suction screen. The pump flow is directed across the main filter assembly to provide clean charge and lubrication oil.

The pump flow rate at rated speed **2820 RPM**(**2000 RPM** engine speed) is **187.0 l/min** (**49.0 US gpm**).

Cooling/filtration/auxiliary charge pump

The cooling/filtration/auxiliary charge pump is the front section of the tandem gear pump. The pump draws oil from the system reservoir through a 100 mesh suction screen. The pump flow passes into the thermal bypass valve, the thermal bypass valve will send flow onto the oil cooler at temperatures above **82 °C** (**180 °F**) . The thermal bypass valve will bypass the cooler at temperatures below **82 °C** (**180 °F**). Whether the cooling/filtration/auxiliary charge pump flow bypasses oil cooler , or not all the flow passes through the auxiliary filter.

Out of the auxiliary filter the cooling/filtration/auxiliary charge flow joins up with the charge pump flow at the downstream side of the main filter head.

The pump flow rate at rated speed of **2820 RPM** (**2000 RPM** engine speed) is **105.0 l/min** (**27.5 US gpm**).

Pressure and flow compensated (PFC) piston pump

The axial piston pump has a variable flow output and can operate at variable pressures. The pump matches the hydraulic power output to the actual load requirements to ensure maximum efficiency and the minimum use of fuel.

The pump inlet is charged to prevent cavitation. The pump output flow is supplied to the priority regulator valve. The priority regulator valve gives top priority to the steering system and trailer brake circuit. Once the steering system and trailer brake circuits are satisfied the priority regulator valve supplies pump flow to the remote auxiliary valves, the three point hitch valve and onto the pressure regulator portion of the priority regulator valve. The pressure regulator portion of the valve maintains the regulated pressure at **22.4 - 24.5 bar** (**325 - 355 psi**).

The maximum pump flow rate for the standard pump at rated speed of **2820 RPM** (**2000 RPM** engine speed) is **177.0 l/min** (**46.5 US gpm**).

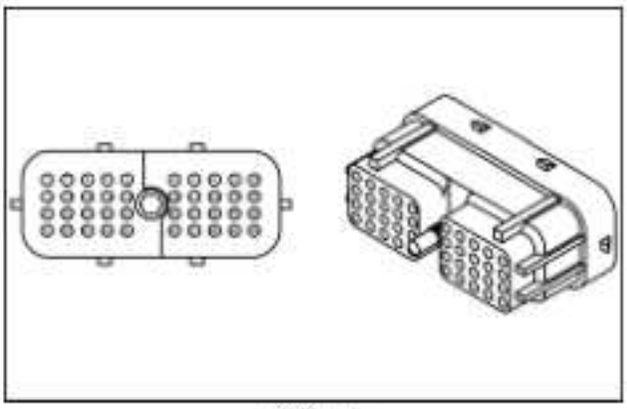
NOTE: *The standard pump system delivers approximately* ***113.6 l/min*** *(****30.0 US gpm****) through a single remote section. This is due to resistance created by oil flowing through restrictive passage ways and long lengths of tubing or hose.*

Optional high flow PFC piston pump

An optional high flow PFC piston pump is available. The high flow rate maximum pump flow rate at rated speed of **2820 RPM** (**2000 RPM** engine speed) is **239 l/min** (**63 US gpm**).

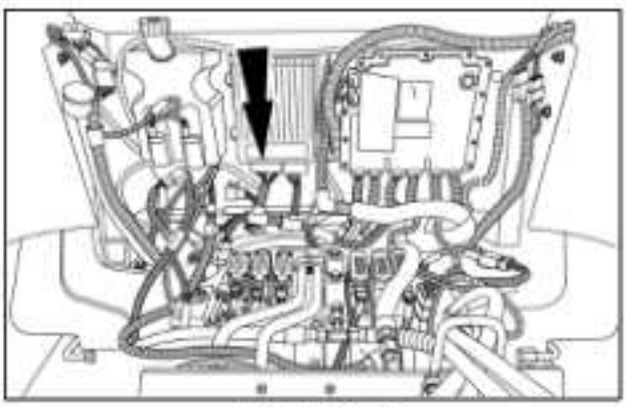
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X-407 - AUTOGUIDANCE CONTROLLER [A-010] (87706495) (Female)



87706495 7

87706495



RAIL1479X082AAA 8

Pin	From	Wire	Description	Color-Size	Frame
1	**X-290 (Female) pin 7** TO OUTSIDE CAB HARNESS	AG-219A	CLEAN GROUND	BK - 0.8	**SHEET 18**
2	**X-299 (Male) pin 2** TO AUTOGUIDANCE HARNESS	AG-413	RS 232 RX	TN - 0.8	
3	**X-290 (Female) pin 13** TO OUTSIDE CAB HARNESS	AG-222B	CAN HI (SEC)	WH - 0.8	**SHEET 46**
9	SP-420A-P-X	AG-420C	STEERING ANGLE GROUND (-)	BK - 0.8	**SHEET 37**
10	**X-290 (Female) pin 6** TO OUTSIDE CAB HARNESS	AG-419A	S.V. RIGHT SOURCE	YE - 0.8	**SHEET 18**
11	**X-290 (Female) pin 8** TO OUTSIDE CAB HARNESS	AG-345A	SWITCHED B +	OR - 1.0	
12	**X-299 (Male) pin 1** TO AUTOGUIDANCE HARNESS	AG-414	RS 232 GROUND	WH - 0.8	
13	**X-290 (Female) pin 14** TO OUTSIDE CAB HARNESS	AG-482B	CAN LO (SEC)	BL - 0.8	**SHEET 46**
17	**X-290 (Female) pin 9** TO OUTSIDE CAB HARNESS	AG-1617	QUAD A	TN - 0.8	**SHEET 18**
18	**X-290 (Female) pin 11** TO OUTSIDE CAB HARNESS	AG-418	STEERING POT SIG	YE - 0.8	**SHEET 37**
20	**X-290 (Female) pin 4** TO OUTSIDE CAB HARNESS	AG-962A	S.V. LEFT SOURCE	YE - 0.8	**SHEET 18**
21	**X-299 (Male) pin 4** TO AUTOGUIDANCE HARNESS	AG-421B	PPS IN	GY - 0.8	
28	SP-420A-P-X	AG-420B	STEERING ANGLE GND (+)	BK - 0.8	**SHEET 37**

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4106-Rear remote no.1 - spool movement too low

NOTE: *Each remote valve consists of a valve body and a pilot head. The pilot contains the extend and retract solenoids, a sensor to determine spool position, as well as a microprocessor. The pilot head can only be serviced as a compete assembly. The microprocessor controls the extend and retract solenoids and reports the position of the main spool over the CAN bus to the Armrest Control Unit (ARU) and the lower display on the Instrument Control Unit (ICU).*

Cause:
Low spool movement detected at the pilot head for remote valve 1.

Possible failure modes:

1. Incorrect hydraulic pressure
2. Faulty pilot head on the remote valve.
3. Worn spool in the valve body.

Solution:

1. Check if the error code is still active.

   Clear the error code and test the system for normal operation.

   A. Fault code does not redisplay. Return unit to field operation and monitor for recurring problem.

   B. Fault codes redisplays. Continue to step **2**.
2. Check the regulated circuit hydraulic pressures. See hydraulic testing in this manual for more information.

   A. Pressures are incorrect. Repair or replace component(s) as required. Return unit to field operation.

   B. Pressures are correct. Continue to step **3**.
3. Download the most current software into all remote valves. (All pilot heads must be at the same software level.)

   Renumber the remote valves.

   Calibrate the armrest control levers using the procedure in this manual. When calibration is complete, set all timers to continuous and set the flow controls to continuous.

   Calibrate the remote valves using the procedure in this manual.

   Test remote system operation.

   A. Error code does not redisplay. Return unit to field operation.

   B. Error code redisplays. Continue to step **4**.
4. Remove the pilot head from the remote valve causing the error code.

   Press on the end of the spool with your thumb to test operation.

   Spool should move freely within the bore and extend out slightly – approximately **9.350 mm** (**0.368 in**) – beyond the body surface.

   A. Spool does not move freely. Continue with step **6**.

   B. Spool moves freely. Continue with step **5**.
5. Swap the pilot head causing the error with another pilot head.

   Retest system operation.

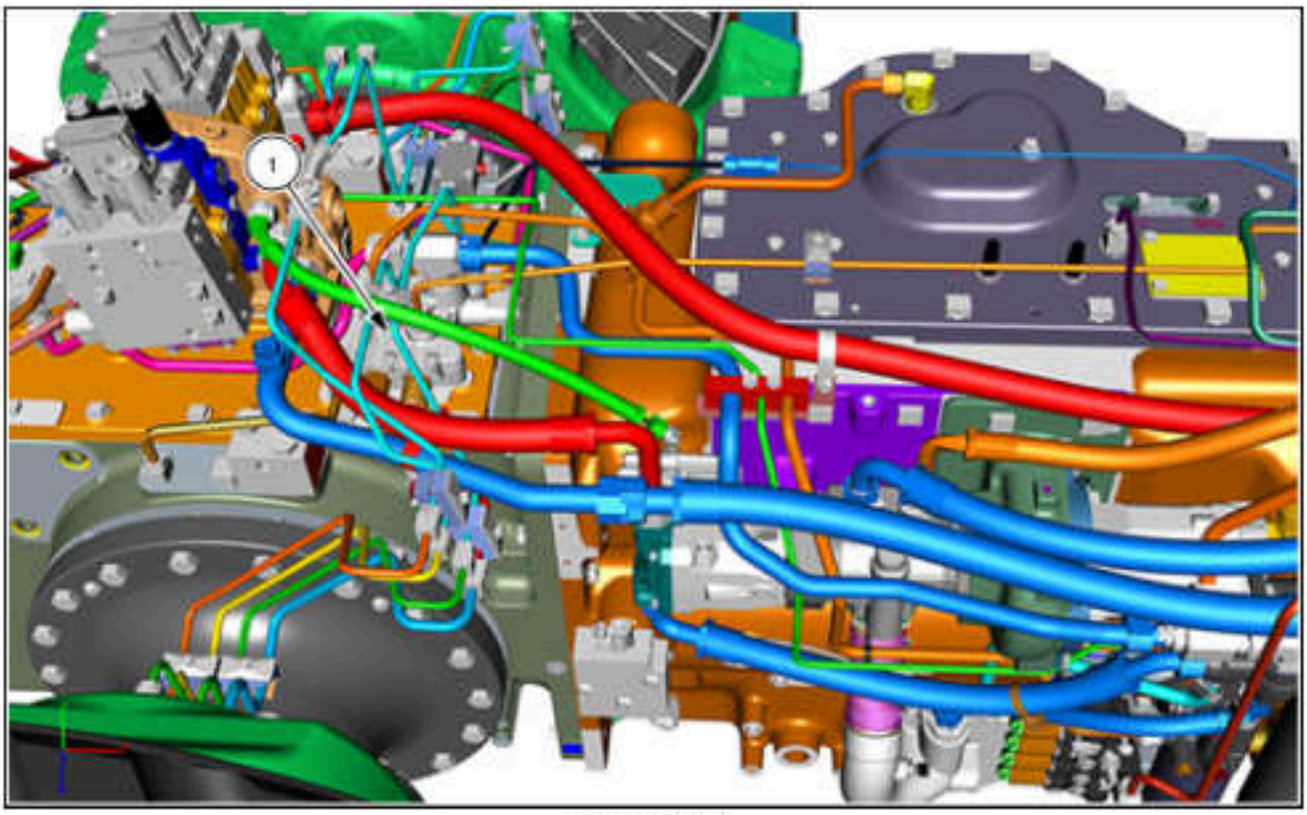
   A. Error code follows the pilot head move. Replace the pilot head. Return unit to field operation.

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Power Take-Off (PTO) control valve - Dynamic description

T8.380 SmartTrax™ PST TIER 4B [ZFRE05001 -]	
T8.410 SmartTrax™ PST TIER 4B [ZFRE05001 -]	

The Power Take-Off (PTO)/differential lock/lube valve is located on top of the rear frame housing. The PTO/differential lock/lube valve controls the PTO and differential lock operation and distributes lube flow.



RAIL141P0481220A 1

1. PTO/differential lock/lube valve	

The regulated pressure circuit supplies the PTO and differential lock functions. The regulated supply to both the PTO and differential lock is limited to **22.4 - 24.5 bar** (**325 - 355 psi**). The supply to the PTO clutch and differential lock are internally ported through the rear frame assembly.

The charge/lube circuit supplies the lubrication functions of the valve for these lubrication points: differential lock, pinion, front and rear hydro bearings, rear axle final drives, and service brakes. The amount of lube to the left and right brakes is controlled with the lube solenoid valve. The lube solenoid is used by the Tractor Control Unit (TCU) to minimize lube to the brakes and direct oil to the lube points when the brakes are not applied. When the brakes are applied, a signal from brake pedal switch energizes the lube solenoid to increase flow to the brakes.

The Tractor Control Unit (TCU) controller lubricates the rear axle final drive when these conditions are met:

- engine speed is above **1400 RPM**
- or ground speed is above **35 km/h** (**22 mph**)
- and oil temperature is above **65 °C** (**149 °F**).

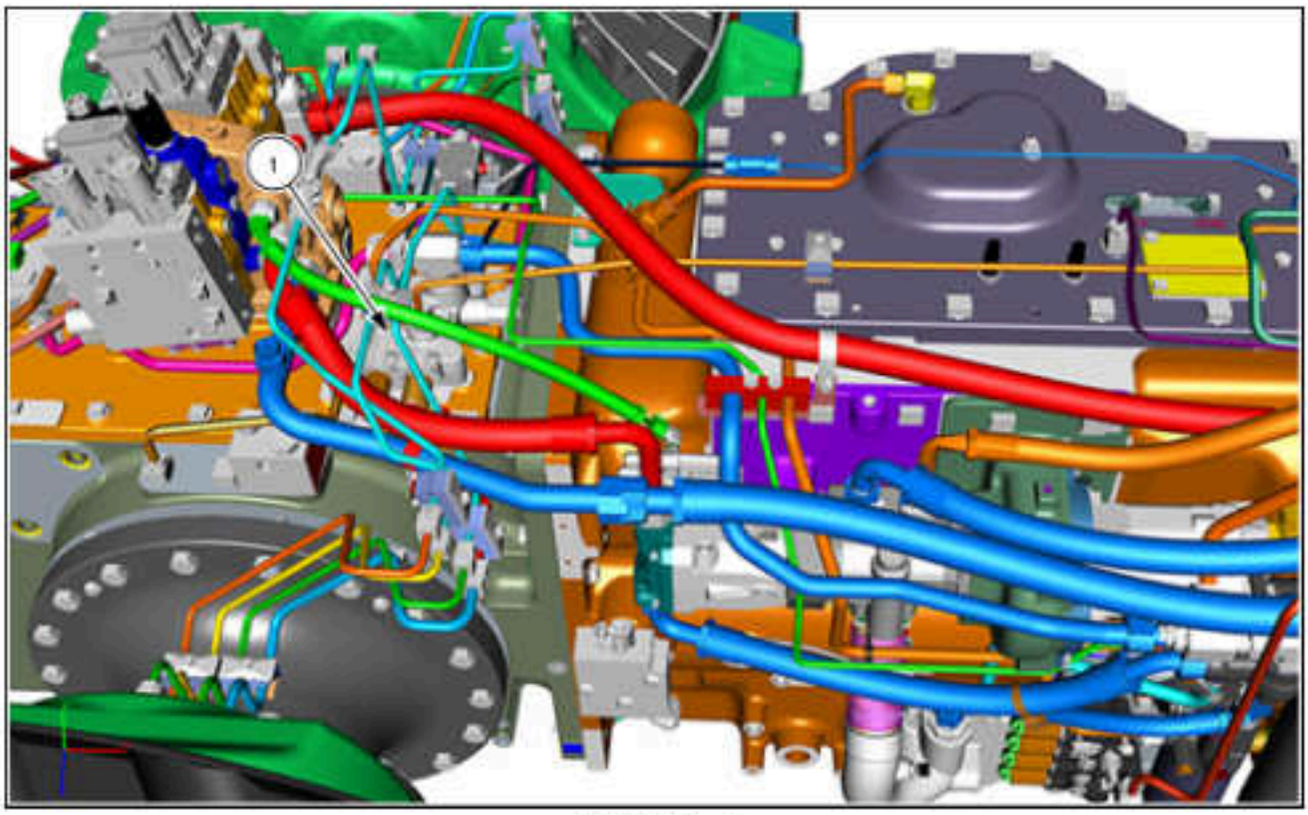
When the TCU detects no ground speed or when transmission temperature is below **65 °C** (**149 °F**), the lubrication solenoid is deenergized, which blocks lube oil flow to the rear axle final drives.

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Differential lock control valve - Dynamic description

T8.380 SmartTrax™ PST TIER 4B [ZFRE05001 -]	
T8.410 SmartTrax™ PST TIER 4B [ZFRE05001 -]	

The Power Take-Off (PTO)/differential lock/lube valve is located on top of the rear frame housing. The PTO/differential lock/lube valve controls the PTO and differential lock operation and distributes lube flow.



RAIL14TRD481204A 1

1. PTO/differential lock/lube valve	

The regulated pressure circuit supplies the PTO and differential lock functions. The regulated supply to both the PTO and differential lock is limited to **22.4 - 24.5 bar** (**325 - 355 psi**). The supply to the PTO clutch and differential lock are internally ported through the rear frame assembly.

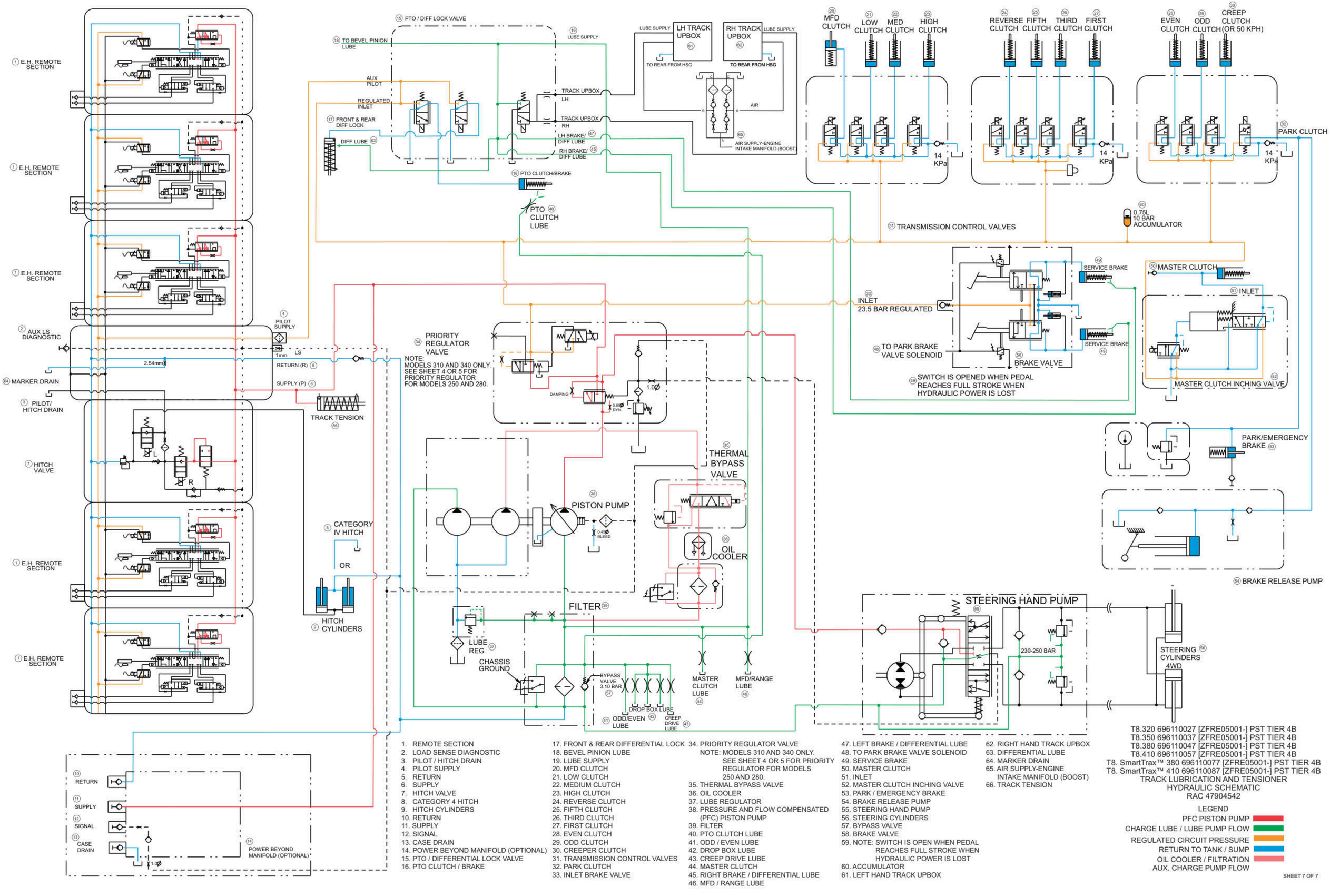
The charge/lube circuit supplies the lubrication functions of the valve for these lubrication points: differential lock, pinion, front and rear hydro bearings, rear axle final drives, and service brakes. The amount of lube to the left and right brakes is controlled with the lube solenoid valve. The lube solenoid is used by the Tractor Control Unit (TCU) to minimize lube to the brakes and direct oil to the lube points when the brakes are not applied. When the brakes are applied, a signal from brake pedal switch energizes the lube solenoid to increase flow to the brakes.

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- engine speed is above **1400 RPM**
- or ground speed is above **35 km/h** (**22 mph**)
- and oil temperature is above **65 °C** (**149 °F**).

When the TCU detects no ground speed or when transmission temperature is below **65 °C** (**149 °F**), the lubrication solenoid is deenergized, which blocks lube oil flow to the rear axle final drives.

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1. REMOTE SECTION
2. LOAD SENSE DIAGNOSTIC
3. PILOT / HITCH DRAIN
4. PILOT SUPPLY
5. RETURN
6. SUPPLY
7. HITCH VALVE
8. CATEGORY 4 HITCH
9. HITCH CYLINDERS
10. RETURN
11. SUPPLY
12. SIGNAL
13. CASE DRAIN
14. POWER BEYOND MANIFOLD (OPTIONAL)
15. PTO / DIFFERENTIAL LOCK VALVE
16. PTO CLUTCH / BRAKE
17. FRONT & REAR DIFFERENTIAL LOCK
18. BEVEL PINION LUBE
19. LUBE SUPPLY
20. MFD CLUTCH
21. LOW CLUTCH
22. MEDIUM CLUTCH
23. HIGH CLUTCH
24. REVERSE CLUTCH
25. FIFTH CLUTCH
26. THIRD CLUTCH
27. FIRST CLUTCH
28. EVEN CLUTCH
29. ODD CLUTCH
30. CREEPER CLUTCH
31. TRANSMISSION CONTROL VALVES
32. PARK CLUTCH
33. INLET BRAKE VALVE
34. PRIORITY REGULATOR VALVE
    NOTE: MODELS 310 AND 340 ONLY. SEE SHEET 4 OR 5 FOR PRIORITY REGULATOR FOR MODELS 250 AND 280.
35. THERMAL BYPASS VALVE
36. OIL COOLER
37. LUBE REGULATOR
38. PRESSURE AND FLOW COMPENSATED (PFC) PISTON PUMP
39. FILTER
40. PTO CLUTCH LUBE
41. ODD / EVEN LUBE
42. DROP BOX LUBE
43. CREEP DRIVE LUBE
44. MASTER CLUTCH
45. RIGHT BRAKE / DIFFERENTIAL LUBE
46. MFD / RANGE LUBE
47. LEFT BRAKE / DIFFERENTIAL LUBE
48. TO PARK BRAKE VALVE SOLENOID
49. SERVICE BRAKE
50. MASTER CLUTCH
51. INLET
52. MASTER CLUTCH INCHING VALVE
53. PARK / EMERGENCY BRAKE
54. BRAKE RELEASE PUMP
55. STEERING HAND PUMP
56. STEERING CYLINDERS
57. BYPASS VALVE
58. BRAKE VALVE
59. NOTE: SWITCH IS OPEN WHEN PEDAL REACHES FULL STROKE WHEN HYDRAULIC POWER IS LOST
60. ACCUMULATOR
61. LEFT HAND TRACK UPBOX
62. RIGHT HAND TRACK UPBOX
63. DIFFERENTIAL LUBE
64. MARKER DRAIN
65. AIR SUPPLY-ENGINE INTAKE MANIFOLD (BOOST)
66. TRACK TENSION

T8.320 696110027 [ZFRE05001-] PST TIER 4B
T8.350 696110037 [ZFRE05001-] PST TIER 4B
T8.380 696110047 [ZFRE05001-] PST TIER 4B
T8.410 696110057 [ZFRE05001-] PST TIER 4B
T8. SmartTrax™ 380 696110077 [ZFRE05001-] PST TIER 4B
T8. SmartTrax™ 410 696110087 [ZFRE05001-] PST TIER 4B

TRACK LUBRICATION AND TENSIONER HYDRAULIC SCHEMATIC
RAC 47904542

LEGEND
- PFC PISTON PUMP
- CHARGE LUBE / LUBE PUMP FLOW
- REGULATED CIRCUIT PRESSURE
- RETURN TO TANK / SUMP
- OIL COOLER / FILTRATION
- AUX. CHARGE PUMP FLOW

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