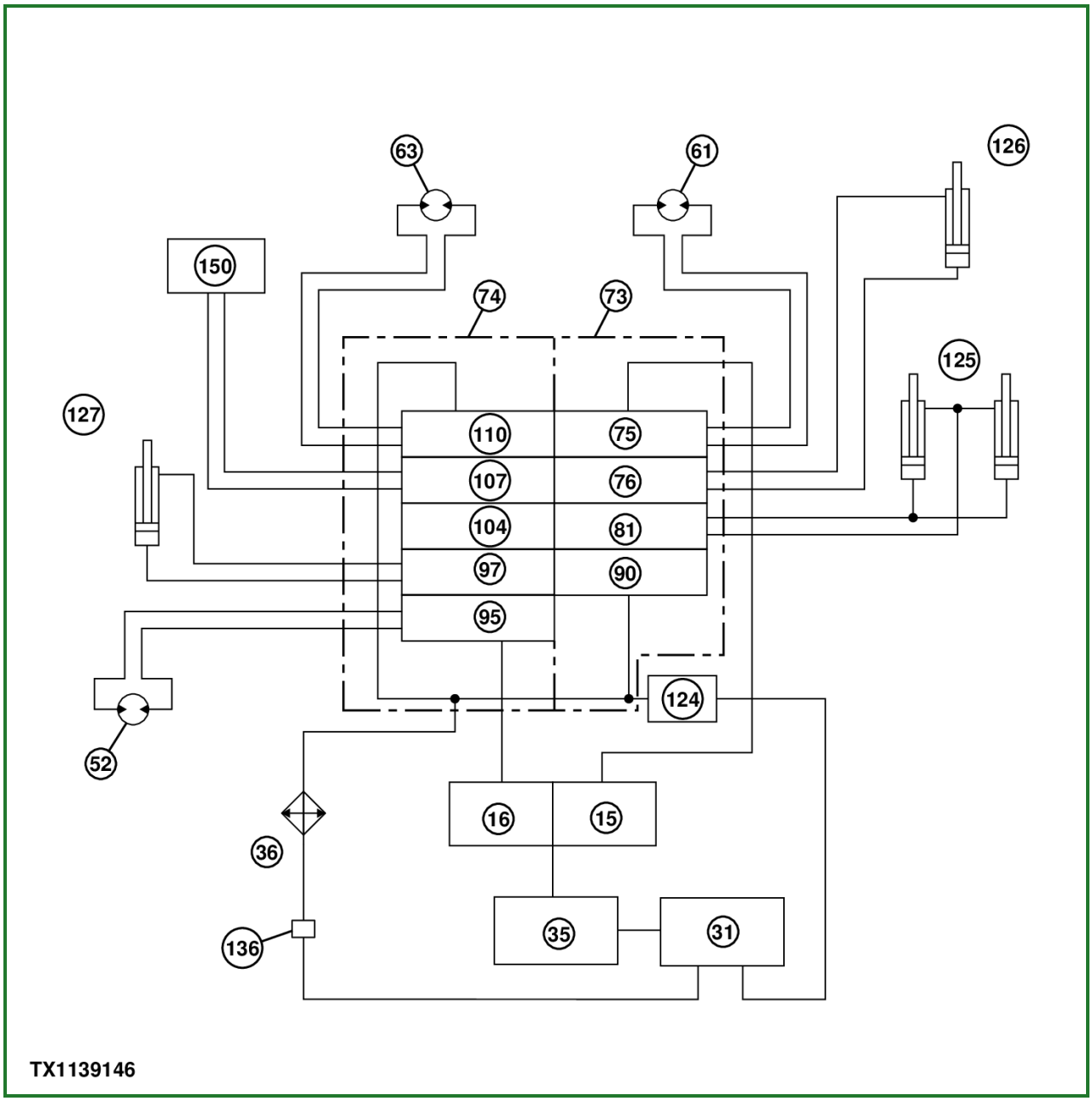
# Hydraulic System Diagram and Operation




TX1139146

**TX1139146-UN: Hydraulic System Diagram**

**LEGEND:**

15 - Pump 1

16 - Pump 2

31 - Hydraulic Oil Tank

35 - Suction Screen

36 - Hydraulic Oil Cooler

52 - Swing Motor

61 - Right Travel Motor

63 - Left Travel Motor

73 - Right Control Valve (4-spool)

74 - Left Control Valve (5-spool)

75 - Right Travel Spool

76 - Bucket Spool

81 - Boom 1 Spool

90 - Arm 2 Spool

95 - Swing Spool

97 - Arm 1 Spool

104 - Boom 2 Spool

107 - Auxiliary Spool

110 - Left Travel Spool

124 - Hydraulic Oil Cooler Bypass Valve

125 - Boom Cylinders

126 - Bucket Cylinder

127 - Arm Cylinder

136 - Restriction Valve

150 - Auxiliary Attachment

Main hydraulic system is open-center hydraulic system.

The main pump consists of pump 1 (15), pump 2 (16) in a common housing, the pump drive gearbox, and coupling. A pilot pump is mounted to the gearbox adjacent to pump 2. Pump 2 is driven directly by the engine through the coupler. Pump 1 and the pilot pump are driven by pump 2 through the gear train in gearbox. The engine to pump gear ratio for pump 1, pump 2, and pilot pump is 1:1.

As viewed from the right side of machine, pump 1 is to the right (towards the front of machine) and pump 2 is to the left (towards the rear of machine).

Hydraulic oil flow is through suction screen (35), out of the hydraulic oil tank (31), and through the suction line to the pumps. Pump 1 delivers supply oil to the right control valve (4-spool) (73). Pump 2 delivers supply oil to the left control valve (5-spool) (74). Supply oil is routed to motors (52, 61, and 63), cylinders (125, 126, and 127) and auxiliary attachment (150) by valve spools (75, 76, 81, 90, 95, 97,104, 107, and 110) 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.

Return oil from the motors and cylinders is routed into return passages in control valve by the valve spools. From the return passages, return oil flows out of control valve, through hydraulic oil cooler (36), through the restriction valve (136), 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 the return passage of control valve. The back pressure ensures a flow of makeup oil to keep the swing motor case full of oil and a flow of oil through the anticavitation valves to prevent cylinder cavitation.

The hydraulic oil cooler bypass valve (124) opens to route return oil around hydraulic oil cooler and directly to hydraulic oil tank when resistance to flow through oil cooler becomes high because the oil is cold (high viscosity), there is a surge of return oil, or oil cooler becomes plugged. The pressure setting for the bypass valve is higher than the restriction valve.

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