Hitch and Hydraulic System for 500 Crawler Tractor

Service Manual

GSS-1380

CASE IH AGRICULTURE

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SPECIAL SERVICE TOOLS REQUIRED

FES 1-2 - 3000 psi gauge
FES 43-1 - Relief valve adjusting tool
FES 43-2 - Special tapped plug
FES 51A - Flo-Rater
FES 57-1 - Seal installing tool
FES 57-2 - Valve seat remover
FES 57-3 - O-ring and packing gland remover
FES 58-2C - 1/2" x 1/2" Connector
FES 58-2D - 1/2" x 3/8" Connector
FES 88 - Spanner wrench
FES 94-3 - 3/8" x 1/4" NPT Connector
FES 98-12 - 1/2" x 7/8" - 14 Connector
FES 98-18 - 1/2" Service tee

SPECIFICATIONS

Gresen Control Valve

Relief valve cracking pressure . . . . . 1800 psi
Relief valve seat torque . . . . . 30 ft. lbs.

Spring Specifications

Spring Description	Free Length (inches)	Total Number of Coils	Test Length (inches)	Test Load (pounds)
Relief valve	1-9/32	6-1/2 ± 1/2	1-3/32	300 ± 30
Float spool centering	1-25/32	6-1/2	1-1/4	25
Relief valve	1-21/32	8-1/2	1-1/2	135
Three-way spool centering	1-9/64	5	15/16	23
Detent	7/16	4-1/2	23/64	60
Four-way spool centering	1-11/64 ± 1/32	4-1/4 ± 1/2	15/16	27 ± 3

Husco Control Valve

Relief valve cracking pressure
Main relief valve . . . . . 2000 psi
Pilot relief valve . . . . . 1850 to 1950 psi

Spring Specifications

Spring Description	Free Length (inches)	Total Number of Coils	Test Length (inches)	Test Load (pounds)
Relief valve poppet	1-15/16	10	1-5/8	112
Relief valve pilot	1-1/32	12	7/8	18
Check valve poppet	1-3/8	20	9/16	65
Float spool detent	1-13/16	20	1-1/4	17.5
Standard spool return	3-1/16	9	1-1/16	45.4
Float spool return	5-5/16	15	1-21/32	45

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Hydraulic Pumps

Spring Specifications

Spring Description	Free Length (inches)	Total Number of Coils
Check ball - (12 & 17 GPM)	21/32	16 ±1/4
Check ball - (9 GPM)	1-1/4	15

*Pump output at 1800 engine rpm (no load)

Engine mounted (Gas) (9 GPM Pump) (3712 pump rpm)	. . . . .	8.35 gpm
(Diesel) (10 GPM Pump) (2285 pump rpm)	. . . . .	8.7 gpm
Front mounted (PTO driven) (Gas or Diesel) (12 GPM Pump)	. . . . .	10.9 gpm
(Gas or Diesel) (17 GPM Pump)	. . . . .	15 gpm

*Output readings are based on Hy-Tran fluid at 90° - 120°F at 100 psi below relief valve setting.

T.I.R. (total indicated runout) of adapter bore in front crankshaft pulley (inch)	.005
T.I.R. of adapter when mounted in front pulley (inch)	.010
T.I.R. of front pump drive shaft (inch)	.0015
T.I.R. of pump bore in mounting bracket (inch)	.015
T.I.R. of front pump drive shaft when installed on tractor (inch)	.050
T.I.R. of pump mounting bracket to engine (squareness) (inch)	.015

Wear Tolerances

Pump	10 GPM	12 GPM	17 GPM
Gear tip to bore clearance (max.) (inch) . .	.004	.003	.003
Bearing I.D. (max.) (inch).	.6885	.691	.752
Gear shaft diameter (min.) (inch)	.683	.685	.746
Gear thickness (min.) (inches)	.950	1.107	1.137

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TROUBLE SHOOTING

One of the most common complaints regarding hydraulic systems is overheating.

The maximum desirable hydraulic fluid operating temperature is 180°F. The hydraulic fluid, O-rings and seals are tested at or above 250°F.

Short periods of operation above 180°F. will not be harmful to O-rings, seals or hydraulic fluid. However, the fluid loses much of its lubricating ability at higher temperatures, so bearings and gears could be damaged. Temperatures this high indicate a malfunction. Find the cause!

The fact that some part of the hydraulic system is too hot for bare hands is not a sign of harmful heat. Temperatures of 120° - 130° are too hot for comfort on bare hands. Measure the temperature of the fluid, using an accurate thermometer.

IMPORTANT NOTE:

Before investigating any service problem on the hydraulic system, the following must be checked:

1. Fluid level.
2. Condition of filters.

NOTE: Paper elements should be replaced before testing system.

3. Efficiency of the hydraulic pump or pumps.
4. External leakage.
5. Age, condition and type of fluid.
6. Air in the system or suspended in the fluid.
7. Fluid operating temperature.

Problem	Cause
Machine will not lift load.	1. Low operating pressure. 2. Excessive load. 3. Leaking fluid. 4. Relief valve(s) faulty. 5. Worn cylinder packing or damaged cylinder tube. 6. Inefficient pump. 7. Foamy fluid--wrong fluid, or air being sucked into system. 8. Valve obstruction-clean thoroughly. 9. Clogged filter-clean-use new fluid or strain present fluid, discard if in doubt. 10. Pump suction air leak, due to loose connections. 11. Low fluid level.

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g. Secure the dial indicator arm in the adapter hub with a one-quarter inch capscrew. Install the pump mounting bracket without the pump. Position the indicator to read the T.I.R. of the pump bore in the mounting bracket. Rotate the crankshaft and record the reading. Refer to specifications. Shift the mounting bracket to correct any excessive T.I.R. reading.

h. To check the face of the mounting bracket for squareness with the engine, install the dial indicator as described in "g" above. Position the dial indicator to read on the face of the bracket. Rotate the crankshaft and record the reading. Refer to specifications. Correct any excessive reading by shifting the mounting bracket.

6. Connect the pump inlet and outlet lines. Be certain to install the clamp on the pressure line, if removed.

7. Connect the lower radiator hose connection.

8. Install the front radiator guard and refill the radiator.

9. Refill the reservoir with all cylinders retracted.

10. Refer to the following section for break-in procedure.

Break-In of All Repaired Pumps

Test Stand Run-In

If a hydraulic test stand is available on which the pump can be mounted and operated against full pressure and at test speed, the following procedure is recommended for break-in and test.

1. Start pump and run for two minutes at zero pressure. Be sure that test stand reservoir is filled and that all inlet and outlet lines are open.

2. By restricting pump discharge line through the FES 51A Flo-Rater or with a needle or globe valve, raise discharge pressure to 500 psi for 10 seconds and lower to zero pressure for 10 seconds. Continue this procedure for five minutes.

CAUTION: Do not apply pressure for more than 10 second intervals.

3. Stop pump and rotate drive shaft coupling by hand to determine if drive shaft is free. If it cannot be turned freely, remove and rebuild pump.

4. Resume test and apply 1000 psi for 10 second intervals, intermittently for five minutes.

CAUTION: Do not apply pressure for more than 10 second intervals.

5. Stop pump and check freeness as in step (3) above. Check for possible leaks at mating surfaces of housing and cover and around seal assembly and the assembly capscrews.

6. Repeat steps (4) and (5) at 2000 psi for three minutes.

7. Be sure oil level is up to normal in oil reservoir. Start pump and run pressure to 1000 psi and run flow test with the FES 51A Flo-Rater.

Testing on Engine

If a shop test stand is not available, the following alternate break-in and test procedure may be used:

NOTE: Be certain to keep reservoir filled during tests.

1. Mount repaired pump in place on tractor and run pump at one-quarter engine speed for five minutes at zero pressure.

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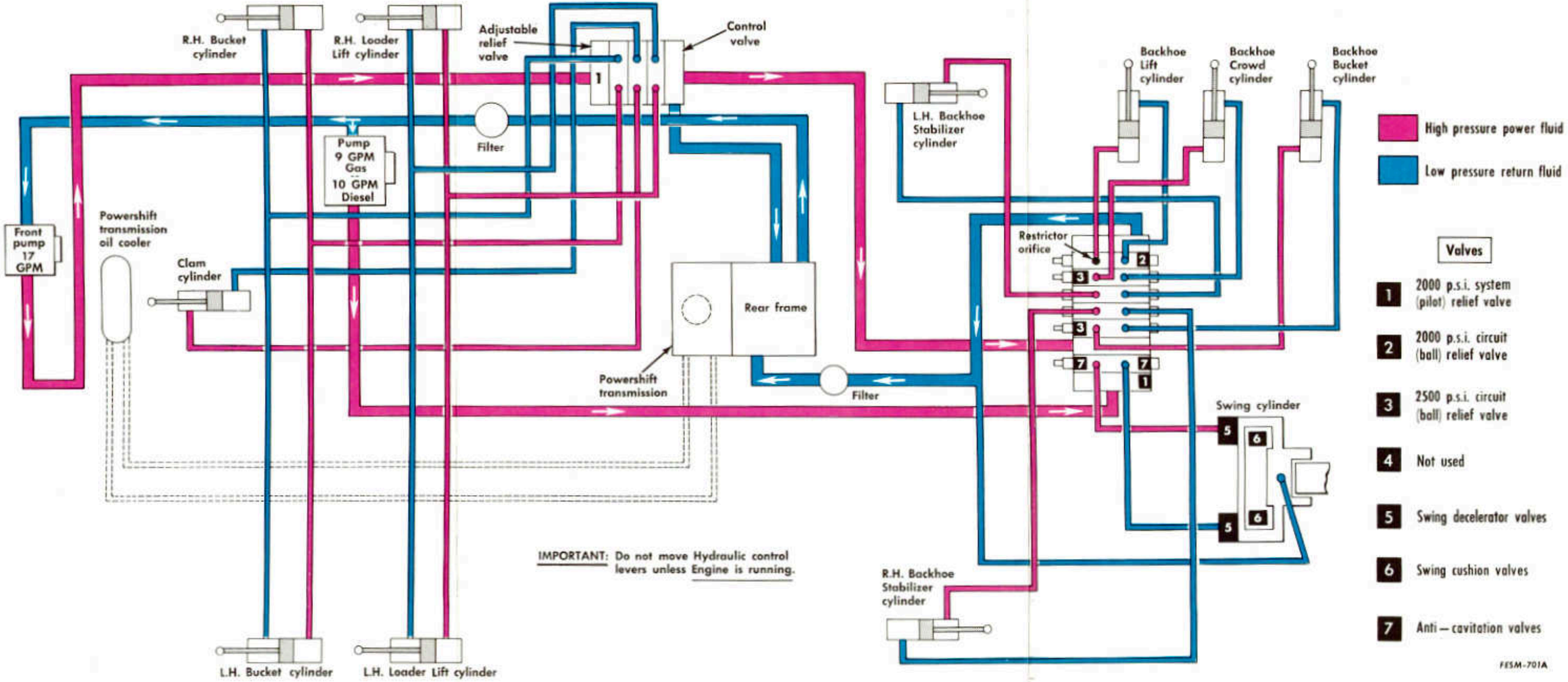
HYDRAULIC CIRCUITS

Following are schematic diagrams of the hydraulic circuits used on the 500 crawler tractor. The application of a back-hoe in conjunction with equipment other than the International Loader with the Drott 4-in-1 bucket will be similar to that shown for this application.

The hydraulic equipment should never be moved without the engine running to prevent overfilling the reservoir and cavitating the cylinders.

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