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Series

Hydraulics

SECTION

A

HOW IT WORKS

HYDRA-STATIC DRIVE

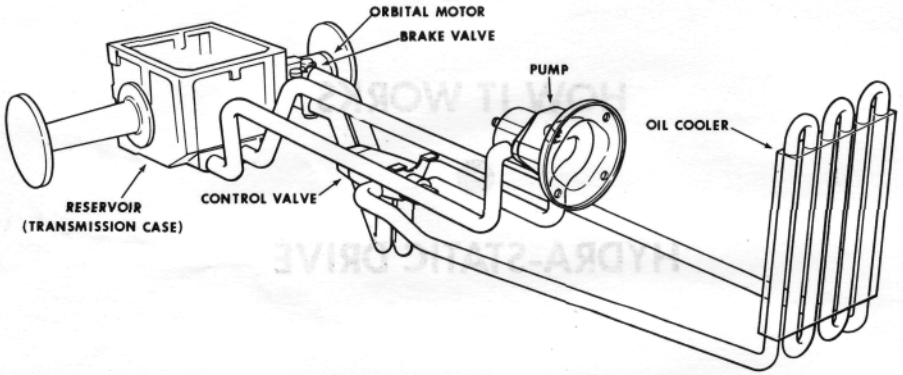
Rac. Form 9-77901

TABLE OF CONTENTS

INTRODUCTION

General

Hydra-Static Drive consists of a two speed spur gear transmission and reservoir, a gear type pump driven by the engine, a one spool control valve,brake valve, orbital motor and oil cooler.



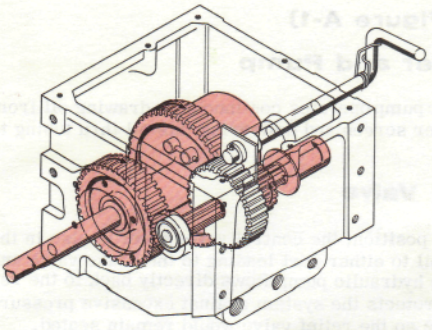
The Hydraulic Pump is mounted to and driven directly by the engine. The pump operates continuously whenever the engine is running, drawing oil from the reservoir (transmission case) and circulating this oil thru the control valve, brake valve, orbital motor, cooler and back to the reservoir.

The Control Valve contains the valve spool and relief valve. The valve spool contains lands and grooves to obtain metering control of the oil from the pump to the orbital motor or back to the reservoir. The spool is a three position spool, Forward, Neutral, and Reverse. The spool is manually moved by the operator either to or from these three positions. A system pressure relief valve is built into the control valve to protect the system components against excessive pressure damage.

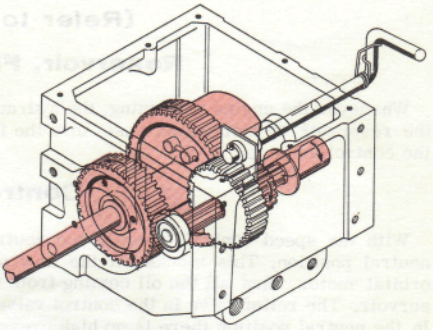
The Brake Valve is mounted to the orbital motor and controls the oil flow to and from the orbital motor from the control valve. When the brake is not applied, oil flows thru the brake valve to the orbital motor. When the brake is applied, the brake valve blocks the flow of oil to and from the orbital motor. The brake valve is controlled by a foot pedal located on the left hand side of the tractor.

The Orbital Motor is a positive displacement gerotor bi-directional type motor driven by pressurized hydraulic oil. The orbital motor consists of a rotor and stator, commutator, coupling shaft and body.

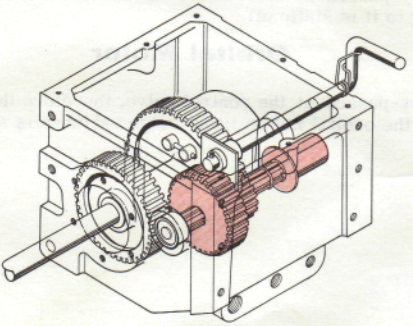
POWER PATHS



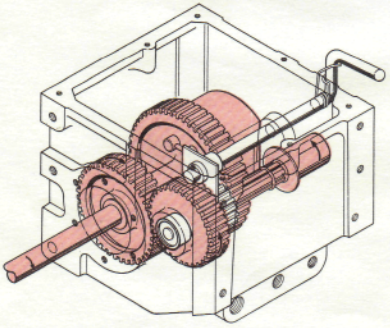
LOW RANGE FORWARD



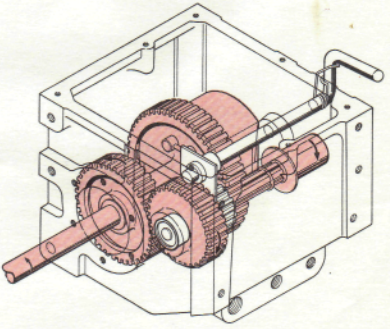
LOW RANGE REVERSE



NEUTRAL



HIGH RANGE FORWARD



HIGH RANGE REVERSE

OIL FLOW
Neutral

(Refer to Figure A-1)

Reservoir, Filter and Pump

Whenever the engine is running, the hydraulic pump operates continuously, drawing oil from the reservoir (transmission case) thru the filter screen and delivering this oil thru tubing to the control valve.

Control Valve

With the speed control lever in the neutral position, the control valve spool is also in the neutral position. This blocks off the flow of oil to either port leading to the brake valve and orbital motor, thus all the oil coming from the hydraulic pump flows directly back to the reservoir. The relief valve in the control valve protects the system against excessive pressure. In the neutral position,there is no high pressure so the relief valve would remain seated.

Brake Valve

The flow of oil is by-passed at the control valve, therefore the oil contained in the brake valve and tubes coming to it is static oil.

Orbital Motor

The flow of oil is by-passed at the control valve, therefore the orbital motor is unable to turn. The oil that is in the orbital motor, brake valve and tubes is static oil.

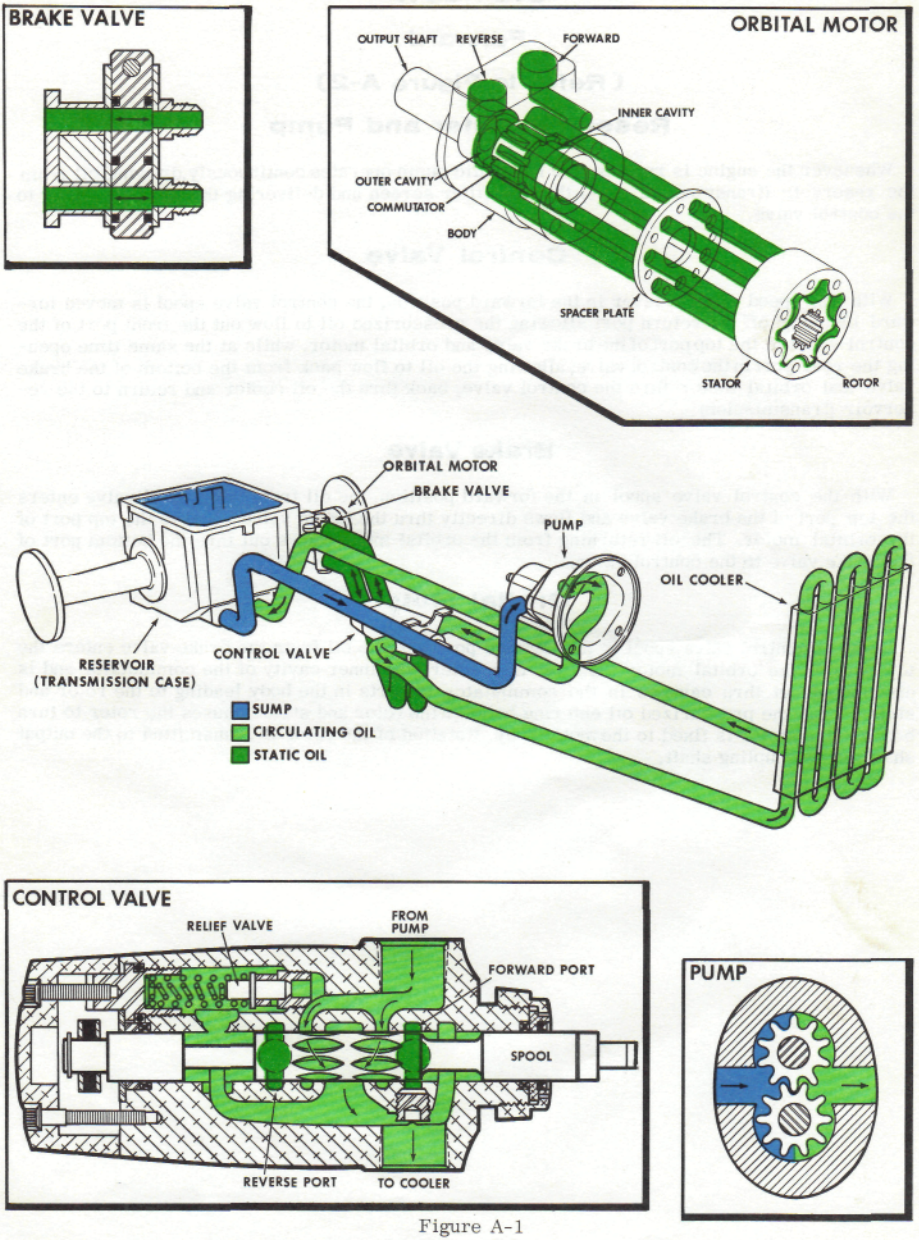


Figure A-1

OIL FLOW

Forward

(Refer to Figure A-2)

Reservoir, Filter and Pump

Whenever the engine is running, the hydraulic pump operates continuously,drawing oil from the reservoir (transmission case) thru the filter screen and delivering this oil thru tubing to the control valve.

Control Valve

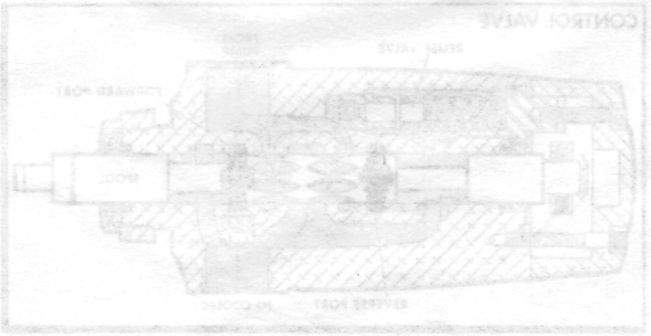
With the speed control lever in the forward position, the control valve spool is moved forward blocking off the return port allowing the pressurized oil to flow out the front port of the control valve to the top port of the brake valve and orbital motor, while at the same time opening the rear port in the control valve, allowing the oil to flow back from the bottom of the brake valve and orbital motor thru the control valve, back thru the oil cooler and return to the reservoir (transmission).

Brake Valve

With the control valve spool in the forward position, the oil from the control valve enters the top port of the brake valve and flows directly thru the brake valve spool to the top port of the orbital motor. The oil returning from the orbital motor flows out thru the bottom port of the brake valve to the control valve.

Orbital Motor

With the control valve spool in the forward position, the oil from the brake valve enters the top port of the orbital motor. The oil then enters the inner cavity of the commutator and is distributed out thru cavities in the commutator to ports in the body leading to the rotor and stator. Thus the pressurized oil entering between the rotor and stator causes the rotor to turn because the stator is fixed to the motor body. Rotation of the rotor is transmitted to the output shaft thru a coupling shaft.



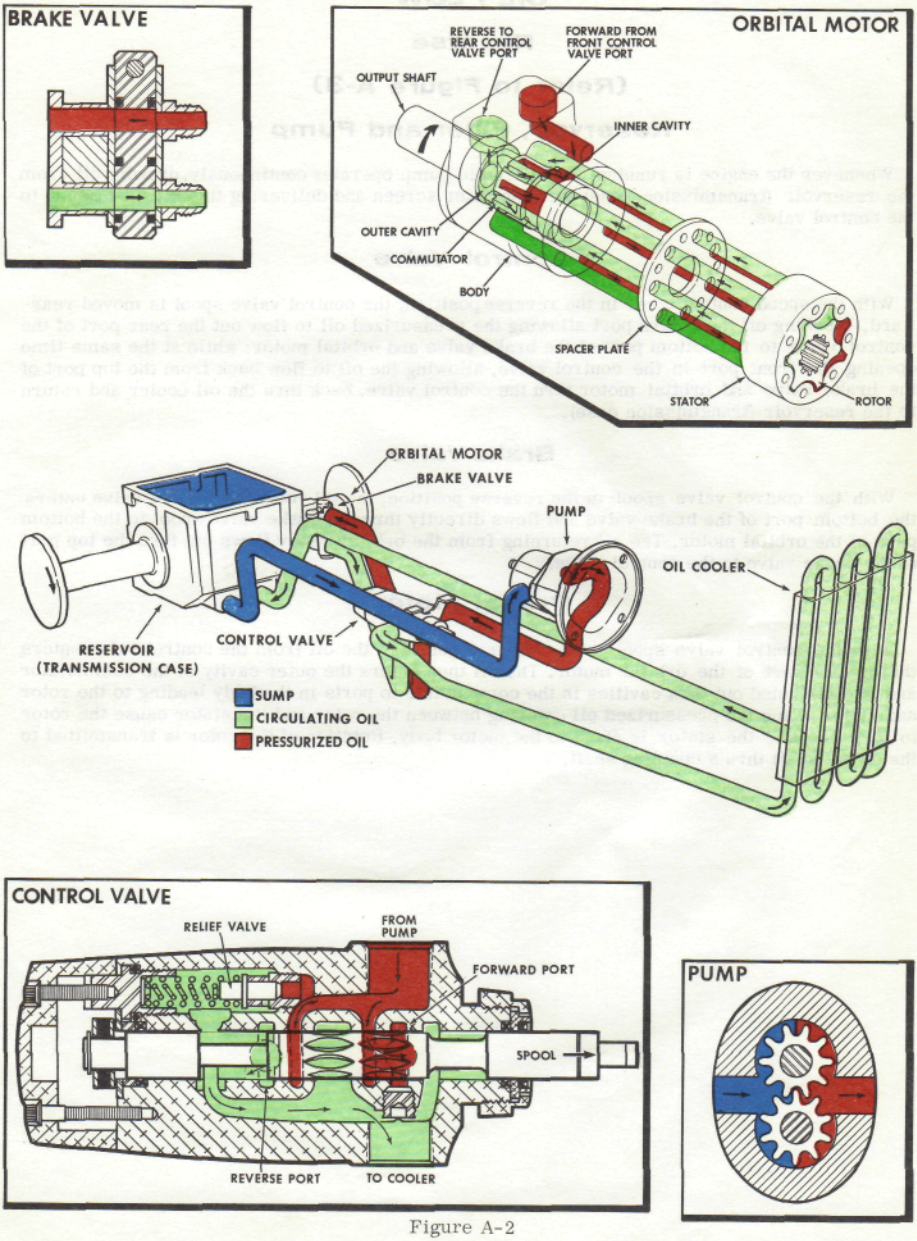


Figure A-2

OIL FLOW

Reverse

(Refer to Figure A-3)

Reservoir, Filter and Pump

Whenever the engine is running, the hydraulic pump operates continuously, drawing oil from the reservoir (transmission case) thru the filter screen and delivering this oil thru tubing to the control valve.

Control Valve

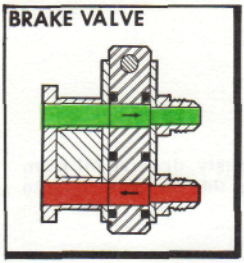
With the speed control lever in the reverse position, the control valve spool is moved rearward, blocking off the return port allowing the pressurized oil to flow out the rear port of the control valve to the bottom port of the brake valve and orbital motor; while at the same time opening the front port in the control valve, allowing the oil to flow back from the top port of the brake valve and orbital motor thru the control valve, back thru the oil cooler and return to the reservoir (transmission case).

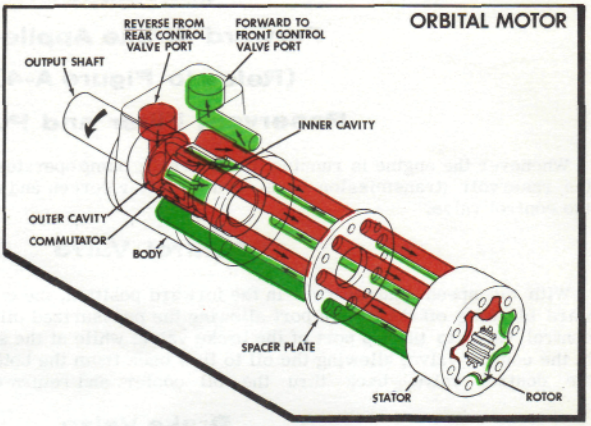
Brake Valve

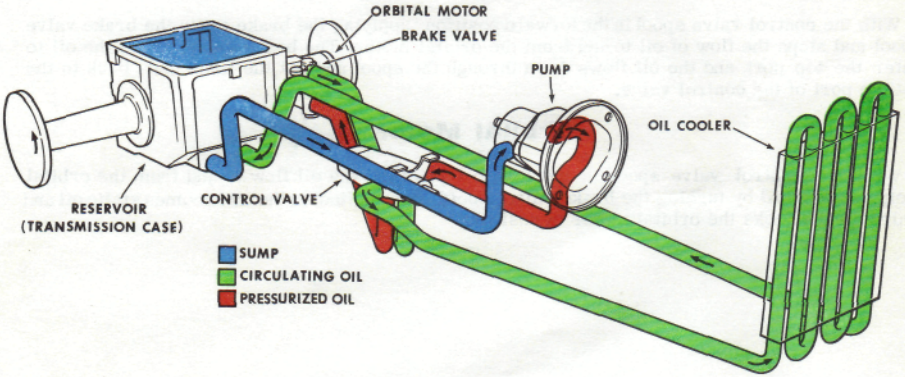
With the control valve spool in the reverse position, the oil from the control valve enters the bottom port of the brake valve and flows directly thru the brake valve spool to the bottom port of the orbital motor. The oil returning from the orbital motor flows out thru the top port of the brake valve to the control valve.

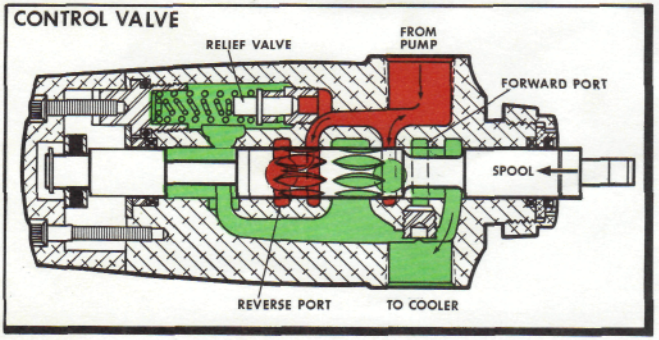
Orbital Motor

With the control valve spool in the reverse position, the oil from the control valve enters the bottom port of the orbital motor. The oil then enters the outer cavity of the commutator and is distributed out thru cavities in the commutator to ports in the body leading to the rotor and stator. Thus the pressurized oil entering between the rotor and the stator cause the rotor to turn because the stator is fixed to the motor body. Rotation of the rotor is transmitted to the output shaft thru a coupling shaft.









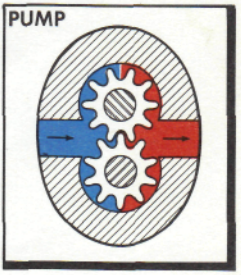


Figure A-3

OIL FLOW

Forward-Brake Applied

(Refer to Figure A-4)

Reservoir, Filter and Pump

Whenever the engine is running, the hydraulic pump operates continuously, drawing oil from the reservoir (transmission case) thru the filter screen and delivering this oil thru tubing to the control valve.

Control Valve

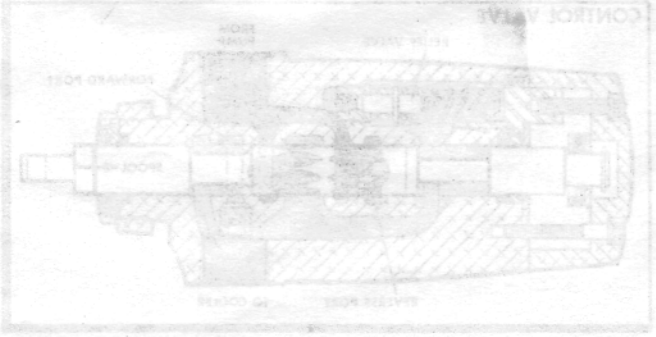
With the speed control lever in the forward position, the control valve spool is moved forward blocking off the return port allowing the pressurized oil to flow out the front port of the control valve to the top port of the brake valve; while at the same time opening the rear port in the control valve, allowing the oil to flow back from the bottom port of the brake valve thru the control valve, back thru the oil cooler and return to the reservoir (transmission).

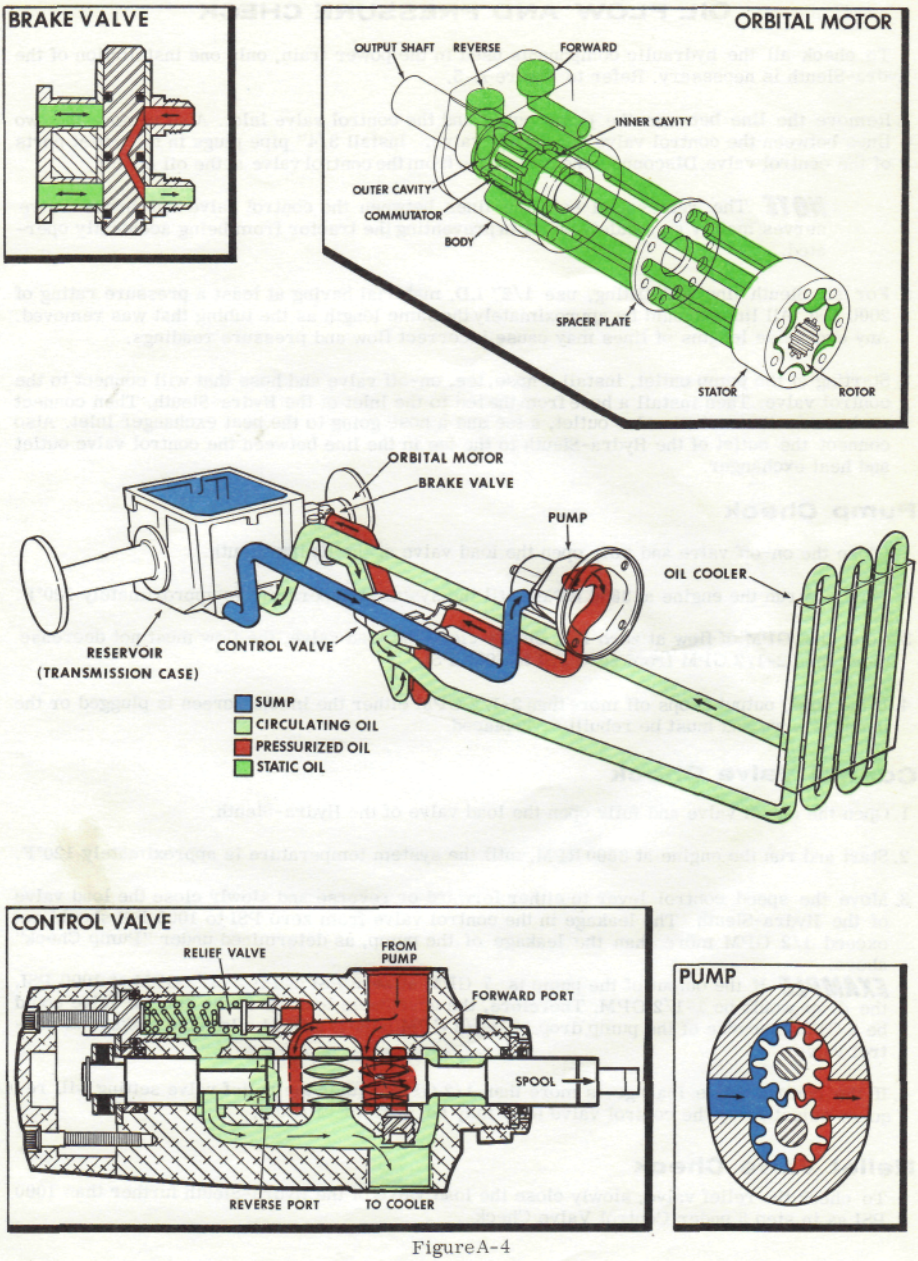
Brake Valve

With the control valve spool in the forward position, applying the brake turns the brake valve spool and stops the flow of oil to and from the orbital motor. The brake valve allows the oil to enter the top port and the oil flows down through the spool and out the lower port back to the bottom port of the control valve.

Orbital Motor

With the control valve spool in the forward position, the oil flow to and from the orbital motor is blocked by turning the brake valve spool (brake applied) so the oil becomes static oil and hydraulically locks the orbital motor in position.





FigureA-4

OIL FLOW AND PRESSURE CHECK

To check all the hydraulic components used in the power train, only one installation of the Hydra-Sleuth is necessary. Refer to Figure A-5.

1. Remove the line between the pump outlet and the control valve inlet. Also remove the two lines between the control valve and brake valve. Install 3/4" pipe plugs in the outlet ports of the control valve. Disconnect the return line from the control valve at the oil cooler.

   NOTE The removal of both the lines between the control valve and brake valve serves mainly as a safety factor in preventing the tractor from being accidently operated.

2. For all Sleuth line and fitting, use 1/2" I.D. material having at least a pressure rating of 2000 PSI. All lines should be approximately the same length as the tubing that was removed. Any excessive lengths of lines may cause incorrect flow and pressure readings.

3. Starting at the pump outlet, install a hose, tee, on-off valve and hose that will connect to the control valve. Then install a hose from the tee to the inlet of the Hydra-Sleuth. Then connect a hose to the control valve outlet, a tee and a hose going to the heat exchanger inlet. Also connect the outlet of the Hydra-Sleuth to the tee in the line between the control valve outlet and heat exchanger.

Pump Check

1. Close the on-off valve and fully open the load valve of the Hydra-Sleuth.

2. Start and run the engine at 3600 RPM until the system temperature is approximately 120°F.

3. Note the GPM of flow at zero PSI. Slowly close the load valve, the flow must not decrease more than 2-1/2 GPM from zero PSI to 1000 PSI.

4. If the pump output drops off more than 2-1/2 GPM either the intake screen is plugged or the pump is worn and must be rebuilt or replaced.

Control Valve Check

1. Open the on-off valve and fully open the load valve of the Hydra-Sleuth.

2. Start and run the engine at 3600 RPM, until the system temperature is approximately 120°F.

3. Move the speed control lever to either forward or reverse and slowly close the load valve of the Hydra-Sleuth. The leakage in the control valve from zero PSI to 1000 PSI should not exceed 1/2 GPM more than the leakage of the pump, as determined under "Pump Check" above.
   EXAMPLE If the output of the pump is 7 GPM at zero PSI and is 5-1/2 GPM at 1000 PSI, the drop would be 1-1/2 GPM. Therefore, the acceptable leakage at the control valve could be 2 GPM, because of the pump drop of 1-1/2 GPM plus 1/2 GPM allowable leakage at control valve.

4. If the control valve leakage is more than 1/2 GPM, either the relief valve setting will require adjusting or the control valve body may be worn or cracked.

Relief Valve Check

1. To check the relief valve, slowly close the load valve of the Hydra-Sleuth further than 1000 PSI as in step 3 under Control Valve Check.

Relief Valve Check(continued)

2. The relief valve should open between 1250-1500 PSI. If the relief valve opens at a higher or lower pressure, the relief valve can be adjusted.

3. To Decrease Relief Valve Pressure: the relief valve adjusting plug can be turn out one half turn (only) which will reduce the pressure setting approximately 100 PSI - or shims can be removed, reducing the relief valve pressure setting approximately 200 PSI per shim.

4. To Increase Relief Valve Pressure: the relief valve adjusting plug can be turned in one half turn (only) which will increase the pressure setting approximately 100 PSI or shims can be added, increasing the pressure setting approximately 200 PSI per-shim. There should never be a total of more than five shims used in the relief valve.

Control Valve Recheck

1. Repeat the steps 1 thru 4 under control valve check. If the leakage exceeds 1/2 GPM more than the leakage of the pump at 1000 PSI, at full governed no load engine speed, the control valve housing is cracked valve housing is cracked or worn and must be replaced.

Orbital Motor and Brake Valve

If the Hydraulic Pump and Control Valve checks out as described above and adequate tractor performance cannot be obtained, inspect the brake valve spool for wear or damage and re-place if necessary. If the brake valve does not have to be replaced, the orbital motor will have to be rebuilt or replaced.

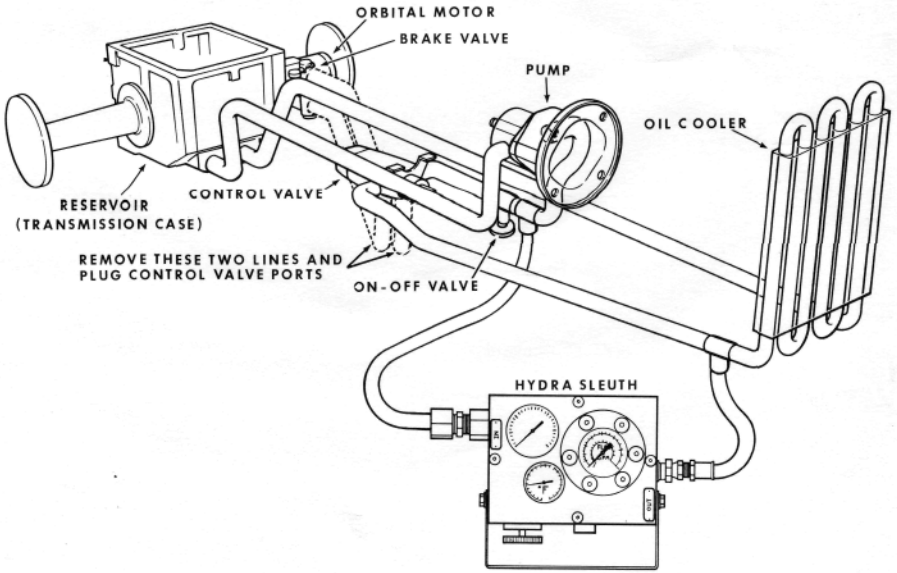
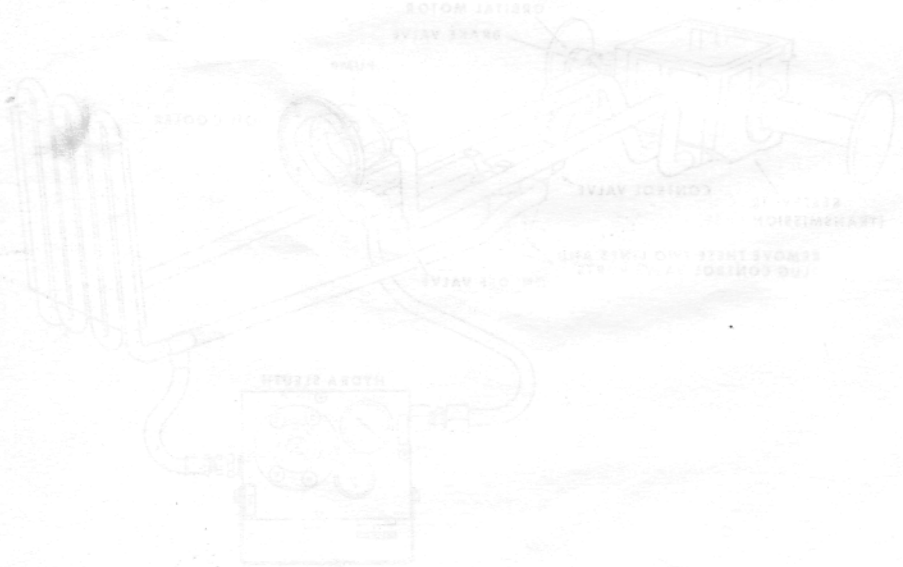


Figure A-5



NOTE The J I Case Company reserves the right to make improvements in design or changes in specifications at any time without incurring any obligation to install them on units previously sold.