

**Sundstrand Hydro-Transmission**

*world's most complete family*

*of hydrostatic transmissions and control systems*

division of Sundstrand Corporation

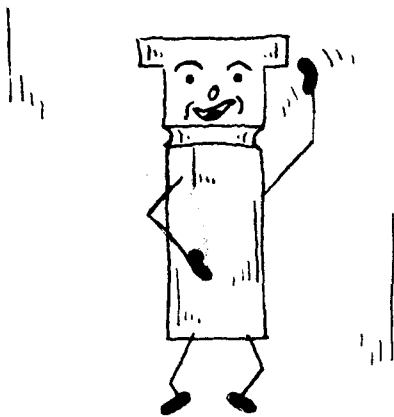


Bulletin 9551

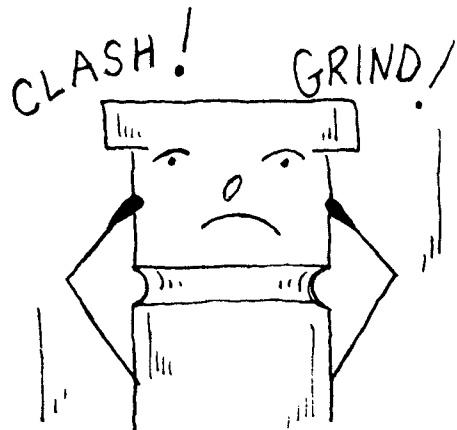
February 1969

# **SUNDSTRAND HYDRO-TRANSMISSION DIVISION**

## **Hydrostatic Transmissions**

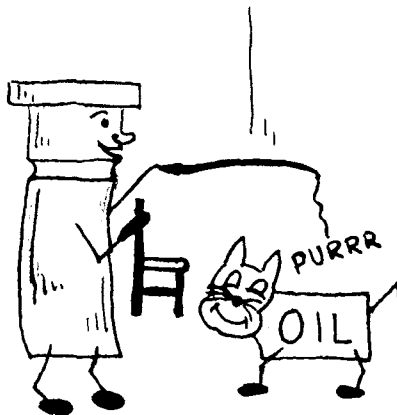


"Let me tell you how piston type hydraulic units work for you..."



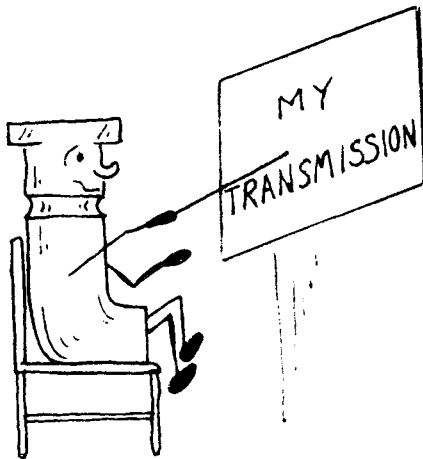
"You can now apply power without the inherent disadvantages of mechanical drives."

"The entire hydraulic transmission operates by controlling the oil."

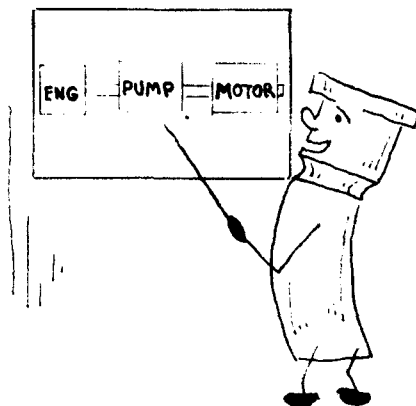


"Only 3 factors have to be considered when the transmission is used. These are: 1. Controlling the flow of oil in the units, 2. Controlling the direction the oil flows, and 3. Controlling the pressure of the oil. These are generally identified as:

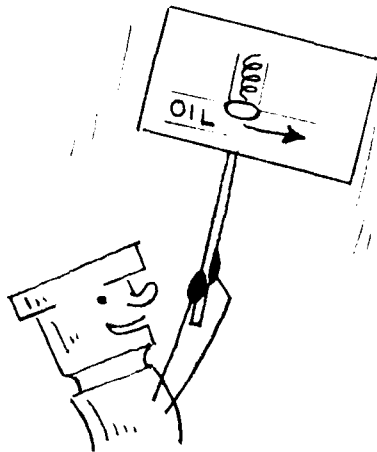
1. G.P.M. (Gallons per Minute)
2. Rotation (  $\longleftrightarrow$  )
3. P.S.I. (Pounds per Square Inch)



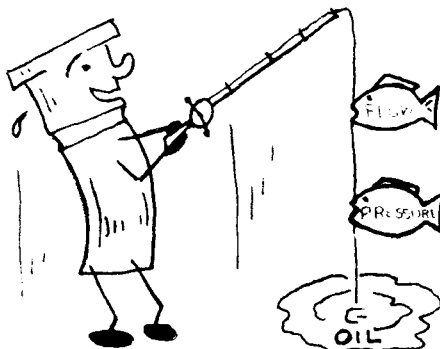
"Now let's see what my transmission consists of and what each part does!"



"To begin the transfer of power from an engine to the load, my pump takes the mechanical power of the engine and converts it to hydraulic power. Oil conveys the hydraulic power to my motor and it converts the hydraulic power back to mechanical for the output shaft!"



"Also in my transmission, I need a system of valves to protect my transmission, the machine and the operator. . ."



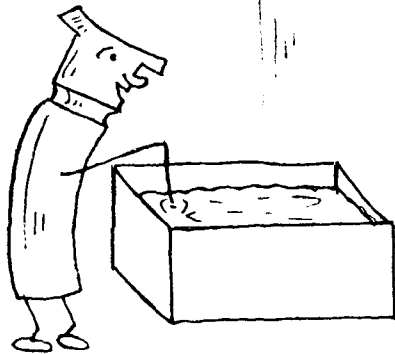
"I need the correct lines or hoses to handle the flow and pressure of the oil. . ."

"TAKE CARE OF ME & I WILL DO MY JOB!"

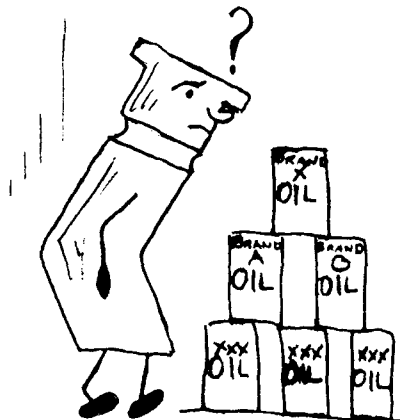
"While you are checking the machine on your scheduled maintenance, why not include the following items for me?"



1. Filter - Make sure it is doing its job and is not allowing dirt to enter my system.



2. Reservoir - Make sure the oil is to the full mark.



3. Oil - Make sure it is the recommended type and is clean.

SUNDSTRAND HYDRO-TRANSMISSION  
SERVICE BULLETIN  
TROUBLE SHOOTING PROCEDURE

1. System\* Will Not Operate in Either Direction

<u>Cause</u>	<u>Remedy</u>
A. System Low on Oil	<ol style="list-style-type: none"><li>1. Check oil level in reservoir and replenish if necessary. Use only approved oils. Consult the Owner's Manual.</li><li>2. Locate and fix leaks causing the loss of oil.</li></ol>
B. Faulty Control Linkage to Pump	<ol style="list-style-type: none"><li>1. Check the entire linkage, from control lever to pump arm, to make sure it is connected and free to operate as it should. Adjust linkage to pump arm. <u>Do Not</u> move pump arm to meet linkage.</li></ol>
C. Disconnected Coupling	<ol style="list-style-type: none"><li>1. Check to see that the coupling from the engine to the pump shaft and the coupling from the motor shaft to the driven mechanism is not slipping or broken.</li></ol>
D. Low or Zero Charge Pressure	<ol style="list-style-type: none"><li>1. Install pressure gage (capable of 600 PSI) in either the charge pump or in the side of the main pump.</li></ol>

\* The word "system" denotes both pump and motor plus all lines, valves, filters, controls, etc., leading to and in between them.

E. Low and Fluctuating  
Charge Pressure

1. Air in system. Air will also cause system to be noisy. Check all fittings, especially around filter, in the suction line and locate the point or points where air is being drawn into the system. Tighten fittings and joints where air leaks exist.
2. Charge pressure relief valve in the motor manifold stuck open. Pressure will be normal when the pump is in neutral but low when in stroke.
3. Internal damage to pump or motor.

F. Faulty Check Valves

1. Remove the two check valves located in the end cap of the pump under the charge pump and check the following:
  - a. Check valve to see if poppet or ball is missing.
  - b. Check to see if the valve seat is eroded.

NOTE: If any of the above conditions exist, replace both check valves.

G. Faulty High Pressure  
Relief Valve

1. Switch the two high pressure relief valves. If the system operates in the direction in which it would not operate before, one of the high pressure relief valves is inoperative. Both relief valves should be examined and the damaged relief valve replaced. Reinstall both relief valves and retest system.

B. Faulty High Pressure Relief Valve

1. Switch the two high pressure relief valves. If the system operates in the direction in which it would not operate before, one of the high pressure relief valves is inoperative. Both relief valves should be examined and the damaged relief valve replaced. Reinstall both relief valves and retest system.

C. One Check Valve Faulty

Follow instructions given in 1-F.

D. Faulty Displacement Control Valve  
(Located on Variable Displacement Units)

NOTE: Do Not change the position of any of the hex nuts or the slotted plug on the end of the control unless it is necessary to remove the control valve spool.

1. Disconnect control linkage at directional control arm. Move the control arm back and forth by hand. If it moves freely with no resistance, the control valve should be removed and checked for broken parts or a bent control shaft.

III. Neutral Difficult or Impossible to Find

<u>Cause</u>	<u>Remedy</u>
A. Faulty Linkage	<ol style="list-style-type: none"><li>1. Disconnect control linkage at directional control arm. If system now returns to neutral, the linkage to the control is out of adjustment or binding in some way.</li></ol>
B. Control Valve Out of Adjustment	<ol style="list-style-type: none"><li>1. See II-D NOTE.</li></ol>

C. Servo Cylinder Out of Adjustment

j. Reconnect control linkage.

1. Remove the two sleeve retainers.
2. Return the servo cylinders to their original position. When the proper position of the servo cylinders was established at the factory, both the servo cylinder and the pump housing were marked with corresponding scribed lines. Matching these lines will return the cylinder or cylinders to their original position and re-establish neutral.
3. Re-install the two sleeve retainers and restake, if necessary.

NOTE: Servo cylinders do not move out of position on their own. If they get out of adjustment it has to be done by human hands.

IV. System Operating Hot (Reservoir Temperature Above 180°)

<u>Cause</u>	<u>Remedy</u>
A. Oil Level Low	1. Replenish oil supply.
B. Oil Cooler Clogged	1. Clean cooler air passages.
C. Oil Cooler Being By-Passed	1. Cooler by-pass valve, if used, stuck open.
D. Clogged Filter or Suction Line	1. Replace filter. Clean or replace suction line.
E. Internal Leakage (Usually accompanied by loss of acceleration and power)	1. One of the high pressure relief valves may be stuck partially open. Install gages and read the charge pressure and operating pressure in both directions.



B. Hose or Tubing Not Properly Insulated

3. End of return line within the reservoir not submerged in oil.
1. Make sure hose or tubing is not touching any metal that can act as a sounding board for natural hydraulic hum.
2. Insulate hose and tubing clamps with rubber to absorb noise.

VI. Acceleration and Deceleration Sluggish

<u>Cause</u>	<u>Remedy</u>
A. Air in System	1. See Step V-A.
B. Low Charge Pressure	1. See Step 1-D.
C. Control Orifice Plug Partially Blocked	1. Remove the bolts that hold the control housing in place and check the orifice. If this is clean, remove the charge pump and blow clean air through the passage between the charge pump and control.
D. Internal Wear or Damage	1. See Step I-H.
E. Engine Lugs Down	1. Consult vehicle engine manual.