
HYDRAULIC OIL SYSTEM

TROUBLE-SHOOTING

SPRAYERS:

COLUMBIA A-17

COLUMBIA A-18

COLUMBIA CROSS

COLUMBIA TANDEM

COLUMBIA VORTEX

CONDOR AM-12

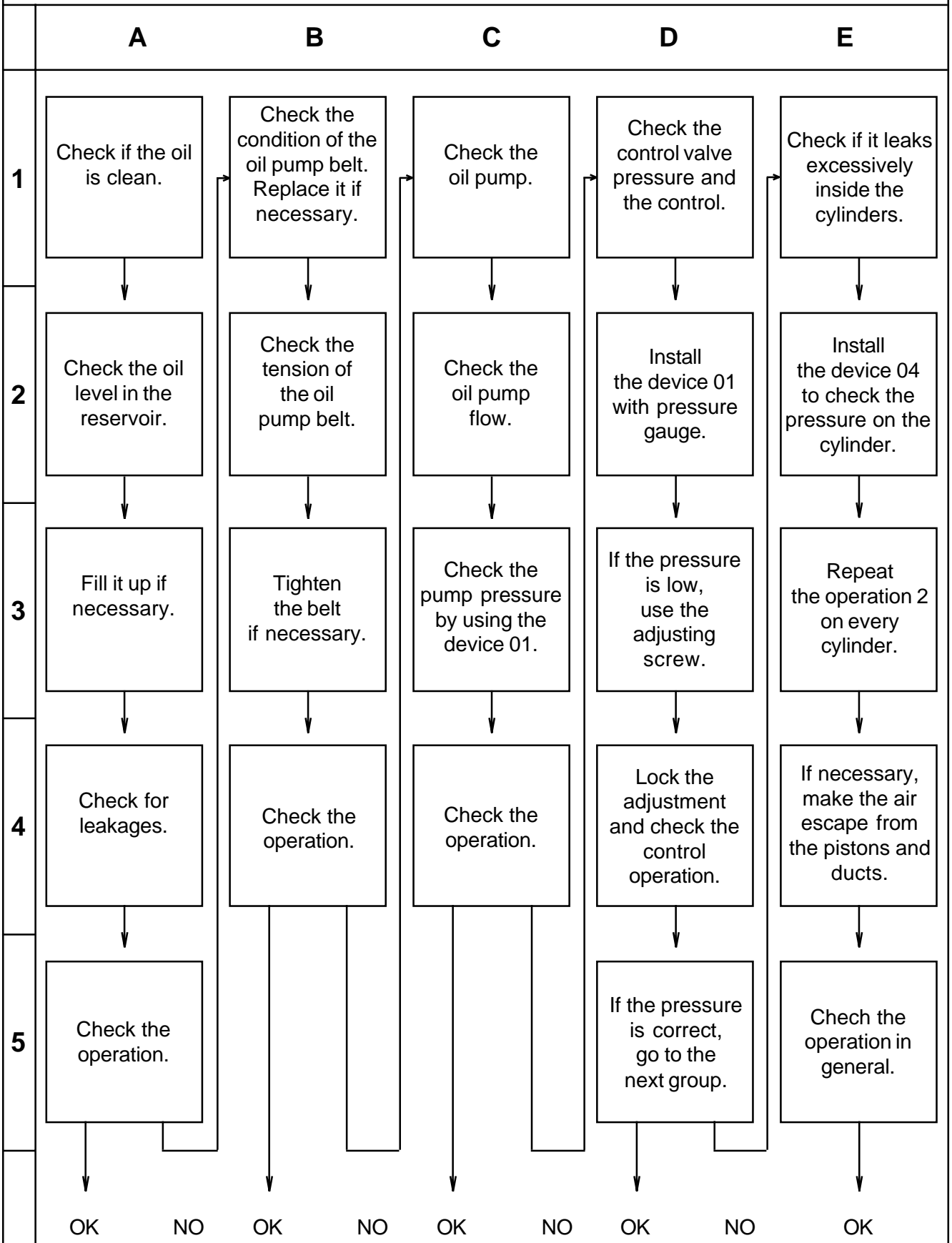
CRUZADOR 3000

JATÃO SUPER 600

UNIPORT 2000

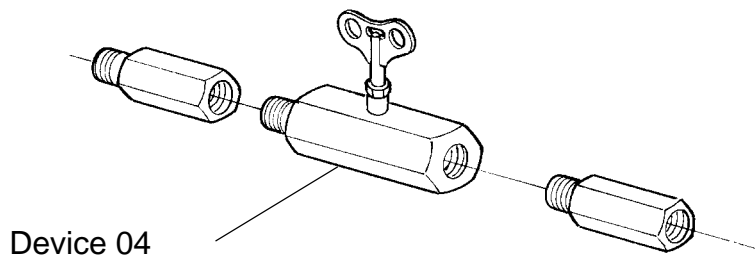
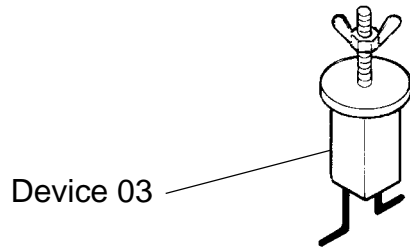
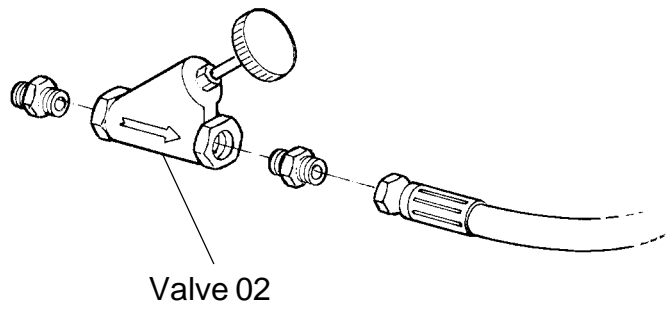
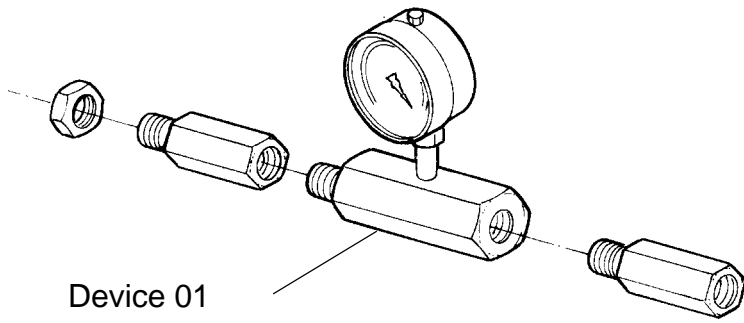
TROUBLE-SHOOTING

INOPERATIVE SYSTEM. EX: BOOM AND FRAME RAISE SLOWLY OR DO NOT RAISE.



Instructions in details follow.

PTO: 540 rpm



TROUBLE-SHOOTING ON THE HYDRAULIC SYSTEM

PROBLEM:

Ex.: Inoperative system - BOOM AND FRAME RAISE SLOWLY OR DO NOT RAISE.
DUCT DOES NOT MOVE OR MOVES SLOWLY.

WARNING:

BEFORE STARTING TO TROUBLE-SHOOT, MAKE SURE THE SPRAYER, PUMP, CONTROL VALVE, CYLINDERS, HOSES AND FITTINGS ARE CLEAN TO PREVENT CONTAMINATION.

GROUP "A"

1 - CHECK THE OIL CONDITIONS

1.1- The oil must be clean, free from impurities (water, residues, etc.) both in the circuit and in the reservoir.

1.2- If the oil is not clean, drain it all for cleaning.

NOTE: DO THE FOLLOWING TEST.

- Put some drops of oil on a paper filter. Then observe the circle made. If the in the center there is a dark spot, the oil is dirty, so it cannot be used. If the center is clear the oil can still be used.
- To check if there is water in the oil, take an aluminum paper (such as that used in the inside of cigarette pack) and put some drops of oil on it. Then use a lighter to warm under the aluminum paper. If the oil contains water, droplets will blow up, coming off the water.

1.3- Check if there is air in the oil.

- When there is air in the oil, some bubbles appear, and the oil starts to foam and its normal color changes.

- In case air is found, check where it is entering and correct.

2 - CHECK THE OIL LEVEL IN THE RESERVOIR

2.1- To check or complete the oil level in the reservoir, the sprayer must be positioned as for transportation, that is, with boom folded and on the rests;

2.2- Hydraulic oil specification: ISO VG-68;

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- 2.3- Oil brands recommended: RANDO HD68 - TEXACO
 TELLUS 68 - SHELL
 DTE 26 - MOBIL
 or similar oils;

2.4- Frequency of oil change: every 500 hours, or according to the result of the oil test;

2.5- Never mix hydraulic oils of different brands or types;

2.6- Total oil capacity (reservoir plus circuit):

Columbia A-17, A-18, Cross and Tandem ...	6 liters
Columbia Vortex	70 liters
Condor AM-12	4.8 liters
Cruzador 3000	17 liters
Jatão Super 600	4.7 liters
Uniport 2000	170 liters

3- CHECK LIST FOR LEAKAGE

- 3.1- Fittings: retighten them;
 3.2- Tubes: check for ruptures;
 3.3- Pressure hoses: check for ruptures;
 3.4- Pump: check the retainer, fastening body/screw;
 3.5- Control valve: check the fittings, body.

4- CHECK THE OPERATION

4.1- Run the sprayer and operate the control valve to move the boom and frame.
 Check the response time and compare it with the following:

COLUMBIA: A-17, A-18, Cross, Tandem and Columbia Vortex

Raising and lowering boom (left and right)	3 to 4 seconds
Raising the frame	4 to 5 seconds
Lowering the frame	3 to 4 seconds

CONDOR AM-12

Raising and lowering the boom (left and right)	6 to 7 seconds
Raising the frame	5 to 6 seconds
Lowering the frame	4 to 5 seconds

CRUZADOR 3000

Raising and lowering the frame	10 to 12 seconds
Raising the frame (in angle)	3 to 5 seconds
Raising the boom end	5 to 8 seconds
Unfolding the boom	12 to 14 seconds
Folding the boom	7 to 9 seconds

JATÃO SUPER 600

Rotating all the way to the left in the horizontal	7 to 9 seconds
Rotating all the way to the right in the horizontal	6 to 8 seconds
Moving all the way up or down in the vertical	1 to 2 seconds

UNIPORT 2000

Raising and lowering the frame	4 to 6 seconds
Raising the boom (in angle)	3 to 5 seconds
Unfolding the boom	11 to 12 seconds
Folding the boom	11 to 12 seconds

GROUP "B"

1- CHECK THE CONDITION OF THE OIL PUMP BELT AND REPLACE IF NECESSARY

- 1.1- Check for flexibility and ruptures;
- 1.2- Make sure it is clean; remove grease, oil, etc.

2- CHECK THE OIL PUMP BELT TENSION

- 2.1- Press the belt with the thumb; with a 2 kg load it should deflect from 3 to 5 mm.

3- TIGHTEN THE BELT IF NECESSARY

- 3.1- Check the belt tension periodically;
- 3.2- Loosen the 2 screws on the pump support;
- 3.3- Tighten the belt with the manual tightener;
- 3.4- Press the belt with the thumb; with a 2 kg load it should deflect from 3 to 5 mm.
- 3.5- Retighten the 2 screws.

ATTENTION:

OVERTIGHTENING THE BELT DOES NOT IMPROVE PERFORMANCE; ON THE OTHER HAND OVERTIGHTENING CAN DAMAGE THE PUMP.

4- CHECK THE OPERATION.

GROUP "C"

1 - CHECK THE OIL PUMP

1.1- Check if the inlet hose on the oil pump is not twisted or with internal rupture preventing the oil from flowing freely;

1.2- Check the the inlet and outlet fittings are correct: inlet-big fitting / outlet-small fitting.

2 - CHECK THE OIL PUMP FLOW

2.1- Detach the pressure line on the control valve, and with a funnel on the oil reservoir observe if the oil pump flow is normal (without throttling or putting pressure);

Oil pump flow rate at 540 rpm on the PTO

Sprayer	Flow rate (L/min)
Cruzador 3000	11.0
Columbia A-18, Cross, Tandem and Condor AM-12	8.0
Columbia Vortex	72.0
Jatão Super 600	6.5
Columbia A-17	6.4

Oil pum flow rate at 1,800 rpm on the engine

Sprayer	Flow rate (L/min)
Uniport 2000 - B/D Racine (*)	120.0 / 12.0
- B/S Bosch (**)	20.0

(*) Pump for running the spray pump and braking system

(**) Pump for running the boom raising and steering system

2.2- If the flow rate checked was not as specified and no obstruction was found in the feeding line, this means there are problems with the pump and it requires replacement.

3 - CHECK THE PUMP PRESSURE WITH THE DEVICE 01* WITH LIMITING VALVE 02*

3.1- Install the device 01 and limiting valve 02 on the pressure hose of the oil pump;

3.2- Install the device hose on the inlet (fill opening) of the reservoir to collect the oil during the test.

3.3- Run the pump, stop the oil flow with the needle-screw of the limiting valve, thus increasing the pressure, until reaching the pressure specified below for each model of sprayer:

Sprayer model	Pressure (kg/cm ²)
Cruzador, Uniport 2000	135
Columbia A-18, Cross, Tandem and Condor AM-12	120
Columbia Vortex	120
Jatão Super 600	120
Columbia A-17	100
Uniport 2000	120

- After reaching above pressures, release the pressure with the needle-screw.

- IF IT IS NOT POSSIBLE TO REACH THE DESIRED PRESSURE, the test is indicating that there are problems with the pump. Therefore, it is necessary to repair or replace the pump.

NOTE:

1 - ATTENTION! When starting to test, the limiting valve 02 must be completely open. In case it is closed the circuit can rupture and/or the pump can be damaged.

2 - REMEMBER: It is not the pump that determines the pressure level, but the resistance to the flow generated by the pump.

4 - CHECK THE OPERATION

* Use the test kit.

GROUP "D"

1 - CHECK THE ADJUSTMENT OF THE VALVE ON THE CONTROL LOCATED AT THE PRESSURE LINE INLET

NOTE: The reading must always be done with the piston at the end of its stroke.

2 - INSTALL THE DEVICE 01* ON THE INLET OF THE CONTROL

2.1- Run the pump and operate one of the control levers until the corresponding piston moves all the way. Hold the lever and check the pressure. With the oil in the proper working conditions the pressure must be as follows:

Sprayer model	Pressure (kg/cm ²)
Cruzador 3000	135 ± 10
Columbia A-18, Cross, Tandem and Condor AM-12	120 ± 10
Columbia Vortex	120 ± 10
Jatão Super 600	120 ± 10
Uniport 2000	120 ± 10
Columbia A-17	100 ± 10

NOTE: The pressure indicated for the **Vortex fan control**, with the oil in the proper working conditions, must be 140 kg/cm² (± 10).

3 - IF THE PRESSURE FOUND IS BELOW OR ABOVE THE PRESSURE INDICATED , PROCEED AS FOLLOWS (EXAMPLES):

3.1- Rexroth control: do not break the seal; replace the control and send it to JACTO.

3.2- Racine control:

a) Hold the screw with an Allen wrench 1/8" and loosen the lock nut with a box-end wrench 9/16"; then turn the Allen wrench clockwise from 1/8" to 1/4" of a turn and check if the pressure has been changed.

b) If the pressure has been changed, adjust the pressure as specified above.

c) If the pressure has not been changed, set the adjustment as it was before and remove the valve assembly with the box-end wrench 7/8". Remove the valve internal assembly with the device 03*. Check for impurities in the inside of the valve; remove if any. Then, proceed with the adjustment again as indicated below.

3.3- Racine control with electrovalves (Uniport 2000)

a) Follow the instruction in the item 3.2.

b) If the cylinders cannot be operated, test the electrovalves.

- The electrovalves are located on the upper and lower parts of the control.
- In the center of every electrovalve there is a screw for the mechanical test of the cylinder.
- Upper screw/valve - when turned clockwise it must actuate the cylinder rod.
- Lower screw/valve - when turned counterclockwise it must move the cylinder rod back.

NOTE:

This test must be made on the block corresponding to the cylinder that shows the problem.

Tighten this screw carefully.

After finishing the test, set the screw back all the way.

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- c) Electrovalve test
- Remove the electrovalves cover.
 - Identify the block corresponding to the cylinder that shows the problem.
 - Use a tube type spanner 3/4" to loosen the brass lock nut and remove the electrovalve coil, but do not detach the electric wires.
 - Turn on the sprayer switch and the switch corresponding to the electrovalve.
 - Put a metallic rod (it can be a screwdriver) in the center of the coil and check if there was magnetization. If not, check the electric circuit (see the operator's manual of the sprayer); if the electric circuit is ok, replace the coil.

- d) Install the coil again to complete the electrovalve assembly on the control.

ATTENTION: The brass nut is fragile, so apply only 0.1 N torque when tightening.

- 3.4- Hidrover control: proceed as described in the item 3.2 by using the following tools:

- Box-end wrench = 13 mm
- Allen wrench = 4 mm

4- LOCK THE ADJUSTMENT WITH THE LOCK NUT AND CHECK THE CONTROL OPERATION WITH THE DEVICE 01* ON ALL LINES.

- 4.1- If it operates properly, it means the control is ok.

4.2- If not, repeat the item 3.2 or 3.3 of this group in order to eliminate again problabe obstruction.

- 4.3- If it is not possible to adjust, replace the control.

5- IF THE PRESSURE IS CORRECT, GO TO THE NEXT GROUP.

*Use the test kit.

GROUP "E"

1- CHECK FOR EXCESSIVE INTERNAL LEAKAGE IN THE CYLINDERS

1.1- Without actuating the cylinder, put the device 04* on the inlet connection.

1.2- Operate the control and move (actuate) this cylinder to fill it with oil.

1.3- With the cylinder actuated, close the valve of the device 04 and wait the time required to check the rod displacement. The maximum displacement is 5 mm in 15 minutes.

1.4- If the displacement is below the specified, the cylinder is reproved.

1.5- If the displacement is above the specified, it means the cylinder shows excessive internal leakage, and so it needs repair or to be replaced.

1.6- If the cylinder keeps its position, and when you open the valve of the device 04 it moves, it means internal leakage in the control.

NOTE: Above procedure cannot be applied to the double-action cylinders on the sprayers Cruzador 3000, Jatão Super 600 and Uniport 2000.

- Cruzador 3000: cylinder for unfolding and folding the boom
- Jatão Super 600: cylinders for operating the air duct
- Uniport 2000: - cylinders for unfolding and folding the boom
- cylinders for unfolding and folding the boom ends

2- IF NECESSARY, REPEAT THE OPERATION 1 ON ALL CYLINDERS

3- IF NECESSARY, MAKE THE AIR ESCAPE FROM CYLINDERS AND DUCTS (TUBES)

PROCEDURE:

3.1- Actuate the piston all the way until the air escapes.

4- CHECK THE GENERAL OPERATION

ATTENTION:

- DO NOT REPLACE OLD COMPONENTS without first checking the conditions that can decrease the life of the parts replaced, such as contaminated oil, other damaged parts, etc.

- If it is necessary to replace components, and if the same should be sent for reconditioning, take care not to contaminate it internally by sealing it with the own plugs of the new component (or you may improvise plastic plugs) in order to make possible to analyse the cause of the problem and to recondition it.

For more information, please contact Jacto Export Technical Department
by fax number + 55 14 452 1012.