

# Standard Plumbing Practices Caterpillar Machines without Work Tool Auxiliary Hydraulics

## Summating Jaw Open/Close

When installing a shear or other attachment that requires 2 pump flow on a Caterpillar machine that has a standard hydraulic group, it is necessary to swap the stick and bucket circuits to achieve summated/2 pump flow. Since the bucket circuit and auxiliary circuit are on the same pump, there is no way to pick up 2 pump flow.

The orientation of the stick and bucket circuits must remain the same when the circuits are switched so the bore side of the bucket circuit will feed the bore side of the stick cylinder. The pilot lines operating these functions also must be swapped to maintain operational commonality. The stick circuit and auxiliary circuit are then summated to achieve 2 pump flow, and dual excavator control valves lessen the back pressure on jaw open/cylinder retract.

The stick circuit must be oriented so the rod/retract side of the stick circuit goes to the rod/retract side of the shear cylinder. If this orientation is not followed, there will be excessive back pressure while opening the jaw because the shear bore side oil is close to double that going into the cylinder rod side to retract it. The restricted cut in the excavator rod spool will cause a restriction to the large volume of oil trying to push through from the bore side of the shear cylinder.

Measuring oil pressure at the GB port of the regen valve will show pressures in the 2000-3000 psi range while the jaw is opening if the circuit orientation is not correct. When the orientation is correct, this pressure will usually be in the 1000-1800 psi range.

There will typically be two lines feeding the attachment from the boom tubes for jaw open/close but single line plumbing can be custom installed if the two spools/circuits are manifolded together at the base of the boom. If single lines are used, they must be at least -20 on machines 300 class and lower (150 gpm and less) and -24 on 400 class machines (over 150 gpm).

Once the circuit is correctly summated and oriented, there may be an issue with spiking when flow is reversed while the cylinder is deadheaded in either direction. There should be a smooth transition when going from full open to close and vice versa. It is typically necessary for a Caterpillar technician to plug a laptop into the ECU to slow the spool shift and pump initiation. You are not trying to slow the system flow, just how fast the spools and pumps shift.



This document is a quick reference only. It does not replace the product safety and operator's manuals, which must be followed by all operators and maintenance personnel.

## Rotation Plumbing

If you have a rotating attachment, it will be necessary to install a stack-on gear pump with a DO5 valve to achieve a rotate circuit. The DO5 valve should have pressure reducing, flow control and directional capabilities, and be of a motor control design.

## Case Drain

Attachments requiring a case drain need to be run through their own 12 gpm, 10-micron filter and directly into the suction side of the excavator hydraulic tank. Do not run it to any location that is returning oil through the excavator return filters in the tank.

For complete details about case drains, see [Tim's Tech Tip - Rotation Circuits Requiring a Case Drain](#).

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