HYDRAULIC SYSTEM TROUBLESHOOTING GUIDE FOR ZINEX A5 DIAMOND DRILL

The A5 drill is composed of several hydraulic modules, each being supplied by its own pump and pressure filter. In the systematic troubleshooting process it is important to remember that the system is not overly complicated and each module can be isolated from the other by the use of JIC caps and plugs. Always begin from the pump and work forward through the system step by step. Jumping from component to component and 'guessing' what the problem may be can not only be very costly but can actually take more time in the end to correctly identify the source of the problem. Sometimes there is more than one problem in a hydraulic breakdown so it is important to fix the known problem (i.e. leaks, breakage) before continuing with the rest of the tests.

The most important thing to remember though is system cleanliness; a poorly maintained system will have many failures due to contamination and abuse. A hydraulic system can last anywhere from 20 years to 20 minutes depending on how it is maintained.

This guide will run through each of the hydraulic components and describe typical problems that could occur in the system and their possible solutions. It will also give detailed instructions on how to return your A5 drill to factory settings after a repair has been made.

DO NOT USE YOUR HANDS TO FEEL FOR LEAKS IN A HYDRAULIC SYSTEM! PRESSURE INJECTED OIL IS EXTEMELY SERIOUS AND CAN LEAD TO DEATH.

Always wear safety approved eyewear and look for leaks rather than feel for them.

Procedure for setting the A5 drill Hydraulic system

This is to be used when replacing any major component in the system or if a well meaning operator has adjusted anything outside of normal operating parameters.

An over adjusted valve or pump can lead to catastrophic failure, excessive downtime and loss of life and limb.

The only components that are set at the Zinex factory are: Main pump load sense, maximum volume on main pump, float valve, chuck/foot pressure reducing valve, last pump (smallest) compensator, slowfeed/float/hoist directional valve relief, wire line port relief's and main valve bank spike relief. For the sake of this guide everything that can be set will be reviewed.

Caliper measurements of the screw settings will be listed after the description on how to set the pressures.

MAIN PUMP:

There are 3 adjustments on this pump; compensator, load sense and maximum volume. The compensator sets the maximum pressure limit for the fast feed and rotation (4500psi). The load sense is your stand-by pressure and it is adjusted to minimize fast feed chatter. The drill will run at this pressure in neutral. Maximum volume is set to provide 40 GPM to the rotation motor which in turn will provide just over 1500 RPM on the drill bit in high gear and the swash adjustment on the dash screwed in.

First, set the load sense adjustment. If this setting is too low you will not be able to reach maximum pump pressure. Start by running the diesel at an idle, then loosen the lock nut on the lower of the two screws on the pump compensator, it is also the one furthest from the pump (you will require a 13mm wrench and a 4mm Allen key). Watch that you do not contact the spinning driveshaft. Turn this screw in until you hear the engine bog down and the pump load up, now back the screw out until the pump just comes off stroke and the engine load decreases. It may take several attempts to get the right spot. Lock the nut once you have the right setting. If the load sense setting is too high, you will not be able to start the engine, if it is too low, the feed cylinder will chatter or hop when fast feeding up or down. If you have a drill with a spike relief installed, there is a port to measure the load sense on the front of the relief block. Use a Stauff test fitting or screw a gauge (0-6000 psi) directly into the ¼" NPT port. You are looking for a pressure of about 700-800 psi.

Second, set the pump compensator. Have the head all of the way down or all of the way up. Start by loosening the lock nut on the inboard upper adjustment screw and turning the screw almost all the way ***out***. If you have a spike relief installed, screw this ***in*** one

full turn. Now set the diesel engine speed to 1500-2000RPM. If you have a helper, have them hold the fast feed lever out or in depending on where the head is. The idea is to deadhead the feed cylinder at one end or the other. With the lever engaged, turn the screw in until 4500 psi is achieved on the rotation gauge. If only one person is doing the adjustment, the pressure will have to be set in stages by going back and forth between the dash and the pump adjustment. Turn the spike relief screw back out that one full turn to return it to the original setting. Detailed setting of this valve is described later.

Lastly, set the maximum volume stop on the pump. This is located on the back top of the pump furthest from the shaft on the main pump. You will require a 1-3/16" wrench, a 10mm Allen key and a tachometer. If you do not have a tachometer a flow meter can be used on the 'B' port of the main hose bulkhead with the flow going away from control panel. Have the head at the bottom of the feed frame and screw the set screw in about ¾" of the way. Run the diesel engine at 2200 RPM and engage the Rotation, measure the speed of the spinning chuck. You are looking for a speed of 1500-1550 RPM or 40 GPM if you are using a flow meter. You will need to stop the rotation to be able to adjust the maximum volume screw in or out depending on if you need to speed up or slow down. Turning the screw out (counter-clockwise) will make the chuck spin faster; turning it in (clockwise) will make it spin slower.

SECOND PUMP:

This pump is factory set by Eaton, so if you are replacing the pump as a complete unit it does not need to be adjusted once installed.

If the pump does need to be reset, first disconnect the water pump and plug the two ½" JIC lines. Install a 1000 psi pressure gauge in the pump outlet with a ½" JIC run tee or off of the top port on the pump (this is a #3 ORB port and fittings are not very common, so the run tee method is recommended). You will require a 7/16" wrench and a 1/8" Allen key. Undo the lock nut for the smaller of the two adjustments which is the one closest to the shaft. Undo the lock nut on the second adjustment and turn this one out two turns. Turn on the diesel and observe the pressure gauge, you are looking for a pressure of 250 psi. Turn the screw out counter-clockwise to lower the pressure or turn in clockwise to increase the pressure. DO NOT ENGAGE THE WATER VALVE AT THIS TIME! GAUGE RUPTURE WILL RESULT! Lock the nut of the smaller adjustment once this is complete. Next, turn off the diesel and remove the 1000 psi gauge and install a 5000 psi gauge. Turn the diesel back on, open the water flow control valve and engage the water pump control lever. Turn the larger adjustment screw in clockwise to increase the pressure or turn out counter-clockwise to decrease the pressure. The pressure needs to be set at 3000 psi. Lock the nut once this is complete.

THIRD PUMP and MIDDLE DIRECTIONAL VALVE: (SMALLEST)

This pump is also factory set by Eaton, so if you are replacing the pump as a complete unit, it does not need to be adjusted once installed. It is reset by Zinex for the purpose of setting the valve bank relief. The relief is always set higher than the pump compensator.

If the pump does need to be reset or if the smallest valve bank (middle) relief needs to be re-adjusted; first, install a 5000 psi gauge in the inlet line to this valve which comes from the middle pressure filter. Next, close the mud mixer ball valve as having it open will give faulty results. You will require a 7/16" wrench, 1/8" and 4mm Allen keys. Now undo the locknut on the pump compensator and turn this screw all the way in. Undo the locknut on the middle valve relief and turn this screw all the way out. Start the diesel and let it remain at an idle. Turn the middle valve relief screw in clockwise until 3350 psi is obtained on the gauge. Lock the nut for the relief and proceed to turn the pump pressure down by turning the pump adjustment screw out counter-clockwise. Turn the pressure down until 3000 psi is obtained on the gauge and then lock the nut on the pump adjustment. You will hear the pump coming off stroke as you turn the pressure down.

If you do not have a spare pressure gauge, you can remove both of the ¼" lines going to the hoist cylinders and plug one of them. Undo the line going into the rotation gauge and plug that ¼" line. Now install the unplugged ¼" line from the hoist onto the rotation gauge. When setting your pressures you will need to push or pull the hoist valve lever to be able to read the pressure on the gauge.

SPIKE RELIEF (IF INSTALLED):

This relief is installed on all later drills and is available as an upgrade kit to all A5 drills produced before August 2008. The relief is mounted onto the main rotation valve bank with a vent line going back to the tank. It was installed to take some of the hammer out of the system and add longevity to the components.

To set this valve you will require a 9/16" wrench and 5/32" Allen key. Undo the lock nut and turn the adjustment screw all the way out counter-clockwise. Have the head at one end or the other as we need to dead-head the feed cylinder for this adjustment. Start the diesel and turn it up to full throttle. Pull or push the fast feed lever to dead-head the cylinder and observe the pressure on the rotation gauge. You will need to disengage the lever to adjust the screw. Turn in the adjustment screw clockwise until you achieve 2000 psi; now turn the screw in half turn increments, stopping each time to note the pressure on the gauge. Each half turn should yield a 500 psi increase. Keep going until you reach 4000 psi. Once you reach this stage, turn the screw in one and an eighth turns. This should yield a set pressure of about 5100 psi, lock the nut on the screw and push or pull the fast feed lever to ensure the gauge reads 4500 psi. This is the pump pressure setting and you should not hear the pump coming on stroke when you engage the fast feed lever. The relief is set over 500 psi higher than the pump only to remove pressure spikes and should never be bypassing except when clipping a spike.

WIRELINE PORT RELIEFS:

To set these two relief valves you will need a flat blade screwdriver and a 12" crescent wrench. Start by disconnecting the wireline hydraulic lines and plugging them with ½" JIC plugs. Turn on the diesel and run at 2200 RPM. Undo the locknut on the first port relief which is located underneath the wireline control lever, **PULL** the handle to read the relief valve pressure on the rotation gauge. Turn the screw adjustment in clockwise to increase the pressure and out counter-clockwise to decrease the pressure. You are looking to set the valve to 3000 psi. Lock the nut and set the second relief. Setting the second port relief (located under the valve spring box directly opposite the first) is done in exactly the same way as the first, except that you will **PUSH** the lever in towards the dash to be able to read the pressure on the rotation gauge.

FLOAT VALVE:

This adjustment is located on the top back of the holdback block. With no rods in the head it is adjusted so the head has an upward movement when the 'float' function is engaged on the middle valve bank. To set this valve you will need a 9/16" wrench and a 5/32" Allen key. Start by undoing the locknut and turning the screw all the way out. Turn the diesel on and leave it at an idle. Have the head in the middle of the feed frame and engage the 'float' function on the middle valve bank. Turn the adjustment screw in clockwise until the head starts to rise upwards. Lock the nut and disengage the float function. If the head is at the bottom, it will take a little more pressure to 'pop' off of the bottom.

CHUCK/FOOT CLAMP PRESSURE VALVE:

This valve sets the pressure at which the chuck and the foot clamp (rod holder) release. If there is too little pressure, the rod holder will wear on the rod as it rotates. Another effect of too little pressure is the foot clamp grabbing the rods in either rods out or drilling mode due to the momentary pressure drop when fast feed is activated.

The gauge on the dash will tell you the foot clamp pressure only; it needs to remain at 1350-1500 psi. To set this you will need a 9/16" wrench and a 5/32" Allen key. The reducing valve for the clamps is located on the side of the large silver block (Sync block) which is mounted to the back of the dash panel. Look in the side of the hydraulic stand closest to the drill towards the Sync block and look for the two cartridges that have hex adjustments. You are looking for the cartridge closest to the dash panel with the long wrench flats. Have the diesel running at an idle and put the gold three-way selector valve in the drilling mode. Loosen the lock nut and turn the screw in clockwise to increase the pressure and counter-clockwise to decrease the pressure.

Temperature and air in the clamp lines will affect the pressure setting of the valve and you may need to adjust the valve once the drill has been in operation for a while.

Too much pressure will blow the seals out; too little pressure will have adverse operation.

MAIN FEED CYLINDER COUNTER-BALANCE VALVES

This is the black block that is mounted on the inside of the hydraulic stand that has two silver cartridges protruding from the bottom. The valve cannot be accurately set in the field and it is not recommended that it be adjusted. If it has been adjusted it can be reset to a factory setting by loosening the lock nut and, using a 3/16" Allen key, turn the screw all the way counter-clockwise. Once that has been done turn the screw in clockwise exactly 6 turns.

It is important to note that a counterbalance adjustment is exactly opposite to a relief adjustment. Turning the adjustment screw in clockwise will decrease the pressure while turning it out counter-clockwise will increase the pressure.

CARTRIDGES IN SYNC BLOCK AND ADJUSTMENT ON ROTATION MOTOR

There are two cartridges located in the sync block in locations 5A and 5B that have a screw type adjustment. Turning this screw in or out will have no affect and should not be preformed. The setting affects the pressure at which the cartridge valve shifts and has no bearing on sync block operation. See caliper settings to set these valves (if needed).

There is an adjustment on the rotation motor under the yellow cap that should not be readjusted either. This sets the threshold pressure and should be left alone. See caliper settings to reset if needed.

CALIPER SETTINGS

These measurements are of all the screw adjustments on the A5 drill. They are meant to provide a quick check of the hydraulic settings to see if you are in the range of where the adjustments were from factory.

All of these measurements were made with digital calipers using the depth function from the top of the screw to the top of the lock nut. The lock nut must be tight for these checks.

5A & 5B: 0.352"-0.366"
Middle valve relief: 0.260"-0.280"
Foot clamp valve: 0.279"-0.293"
Float: 0.270"
Spike relief: 0.320"
Pump 1 comp: 0.297"
Pump 1 L/S: 0.392"
Pump 1 Max Vol: 0.3125" (5/16")
Pump 2 comp: 0.241"
Pump 2 L/S: 0.422"
Pump 3 comp: 0.218"

Wire line relief's: 0.250"
Rotation motor threshold: 0.735"

This section is a troubleshooting reference and is listed in order of each of the main components.

MAIN PUMP (Kawasaki):

Problem: Leak coming from face of pump

Solution: Determine if oil is coming from shaft seal or recessed hex plug located above the shaft. The plug is not easily seen as it is hidden by the mounting bracket. Pump seal is a Kawasaki part number P-PTCV48V and the plug has an ORB (900 series) #12 O-ring.

Problem: Leak coming from join between pumps

Solution: Replace O-ring and add silicone sealant such as orange RTV to aid in sealing. O-ring for spot between pump 1 and 2 is **2-155/N1490** and between pump 2 and 3 is **2-042/N1490.**

Problem: Pump is noisy, as in making a chattering, popping noise similar to the sound of gravel going through pump.

Solution: Pump is cavitating; air is explosively decompressing inside the pump and can cause damage over time. Make sure suction line fittings are tight and hose is not damaged. Sometimes a blown shaft seal or O-ring can let air in but not let oil out.

Problem: Pump will not go to maximum pressure of 4500 psi.

Solution: Total pump failure is very uncommon unless the tank has been run dry. If the system had been working at full pressure, the most likely cause is an obstruction in the 0.030" orifice located on the ¼" JIC fitting coming from the side of the main valve bank. Use air or an acetylene torch tip cleaner to clean the orifice out and re-install. If the orifice is clear and you are using 68wt hydraulic oil in a cold time of year, you will need to wait for the oil to warm up before being able to proceed with normal operation. Run the rotation for 10 minutes (no rods in head) with no cooling water to do this. If the load sense setting is too low, this will also affect maximum pump pressure. See setting the main pump for instructions on how to do this.

If you do suspect excessive pump wear or pump failure you can check the case flow coming from the side port of the pump there should be an absolute maximum of 4 GPM. This is best done with a flow meter as running the hose into a bucket is not only dangerous but is also an inaccurate way of checking case flow. The maximum volume stop can be adjusted out to compensate somewhat for a worn pump. Enlist the help of a local hydraulic shop to do a full load test of the pump either in the shop or in the field.

Problem: Total loss of hydraulics

Solution: Check the shaft and keyway on the main pump for breakage.

SECOND PUMP AND WATER PUMP SYSTEM:

The water pump system is a very simple one in regards to it only has five components in it. If you suspect one faulty part, bypass it with the aid of JIC unions. Further explanation will be given below.

Problem: Water pump system is getting excessively hot.

Solution: Heat can sometimes be a trouble to accurately trace as the heat can be coming from an unrelated component. It is best to let the entire system cool down and restart once the components have cooled sufficiently. Once everything has cooled down, run the system and use either your hands or an infrared temperature gun to look for hot spots.

First check the water pump for excessive bypass, if this is the culprit it will heat up before everything else. A case flow check can be done as well to determine the extent of the damage.

Second, check the control valve is fully engaged. A partially opened valve will generate heat from the oil going over a sharp edged surface. Slop in the valve lever might be evident.

Third, check for a plugged filter. The oil can heat up if the oil is flowing over the filter bypass.

Forth, check for a faulty flow control valve. These valves have been known to fail even though there is only three parts to them. Check for full movement on the knob; you should be able to go from fully closed to fully open with no problems.

Problem: Water pump is running very slowly and will not get up to speed no matter how much the flow control is opened.

Solution: First, check the condition of the pressure filter. Look for a large amount of metal contamination being evidence of a pump failure. Replace pump, try to determine why pump failed and continue. Remember to open suction valve.

Once filter has been checked and pump failure has been eliminated you can check the flow control and directional valve by bypassing them with JIC unions. Start by removing the two lines going to the flow control and joining them together. Turn the system on and engage the water pump directional valve to see if the water pump spins at full RPM. If it does not; reconnect the flow control, turn it all the way closed and bypass the directional valve. Do this by joining the lower flow control line to the rear most valve port line and then join the front most valve port line to either the tank line from this valve or another tank line that is easily accessed. The load sense line will need to be teed into the pump pressure line to bypass the load sense function. Turn the system on and engage the water

pump by opening the flow control valve. Turn the valve from fully closed to fully open and check for full water pump operation.

Third, check the correct operation of the load sense. If the load sense is faulty it will only allow the water pump to get up to 250 psi. Tee the load sense line into the pump pressure line and operate the system. This will nullify the load sense and the pump will run at full pressure all of the time.

Forth, check water pump motor. The best way to do this is to first check the shaft to ensure the keyway is not damaged and then do a case flow test on the motor. If the motor is excessively worn, a lot of oil will flow from this port.

Problem: Water pump does not work at all.

Solution: First check to see if the hoist, mud mix or slow feed still works. If they do not, then the shaft of the second pump has snapped and will need to be replaced.

Second, check the pressure filter for massive amounts of metal contamination being evidence of pump failure. Check the return filter as well for evidence of water pump failure.

Third, check the flow control valve for failure.

Forth, disengage the water pump motor from water pump and run it to check for water pump failure.

THIRD PUMP AND SLOW FEED/FLOAT/HOIST VALVE (Middle)

Problem: Slow feed/float/hoist does not work.

Solution: Check the shaft of the third pump for breakage. If this is the case the rear of the second pump shaft is most likely damaged as well. Replace damaged parts.

Problem: Middle valve is getting excessively hot

Solution: The relief valve is bypassing. No oil should be flowing through this valve in neutral. See setting of the third pump and middle valve for instructions on how to properly set these. If setting has been done properly, the relief valve could have become damaged in that either the spring could have broken or the relief seat could have become scored. Disassemble and inspect as necessary.

Problem: Slow feed pressure is too low.

Solution: Either pump or relief is out of adjustment. See settings for procedure on how to reset.

NOTE: Feed pressure will drop to zero if the slow feed flow control is fully opened while drilling. You still have maximum bit pressure if holdback is at zero, and the feed gauge is at zero as 3000 psi is still on the rod end of the cylinder.

MAIN VALVE BANK (ROTATION/FAST FEED/WIRELINE)

Problem: Rotation lever does not detent in the forward position.

Solution: There are two handle travel limit screws on the handle box. Loosen the locknut (8mm wrench) and turn the bottom screw out until the handle is able to detent. The top screw will limit the handle travel away from the dash and is used to set the how fast the head will spin when breaking rods. This is set at Zinex so there is only 1 inch of handle movement.

Problem: Fitting in inlet cover or inlet cover itself has developed a crack and is leaking oil.

Solution: STOP DRILLING IMMEDIATELY! If there is a spike relief installed, it is set too high. If there is no spike limiting relief installed, order one from Zinex as well as a replacement cover. The relief comes preset and no further adjustments will be required.

Problem: Fast feed chatters or jumps when traveling up or down in a slow to moderate speed.

Solution: There are a number of solutions to fix this problem, some drills have the problem worse than others, and some do not have the problem at all.

The first thing that can immediately be done, to get you by if the problem is really bad, is to put the middle valve into the float position.

Next step would be to ensure there is an orifice mounted on the load sense line of the main valve bank, then adjust the load sense setting as outlined in the setting of the main pump section.

Next, ensure all of the fittings and hoses for the feed cylinder are tight. One of the hoses can be taken off of the bulkhead on the head to see if air is trapped in the line. If air is continually found, air is still being drawn in from somewhere. Air will cause spongy and erratic operation.

Lastly, if the problem still persists, a new fast feed spool can be obtained from Zinex to replace the existing one. A couple of different spools might need to be tried before getting one that will work properly.

Problem: Wire line will run away when handle is pushed only slightly and takes moving the lever in the opposite direction to stop the wire line.

Solution: Heavier H rod core barrel will have a tendency to do this more than others. Having a dry tube will facilitate the runaway as well as there is no water to slow the barrel. Having the head at 90 degrees also makes this problem worse as the barrel is not slowed by the rod walls. If the wire line is moving too quickly, the wire spool will overrun and turn the motor into a pump. The wire line motor is able to draw oil from the anti-cavitation check in one port relief and push the oil against the other port relief. This will make a chattering/popping noise. There is no real solution to this problem but to turn the two port relief's in ¾ of a turn each. This is only to be done when using the heavier core barrels and will cause the wire line motor to have a shortened lifespan. Pulling the lever in the opposite direction is the most common practice and is a form of dynamic braking. Just do not pull or push the lever from one extreme to the other. Good judgment and common sense are to be used here.

Problem: Valve is getting excessively hot.

Solution: Check that there is adequate cooling water going through the cooler and then check that the spike relief is not bypassing. If the spike relief is bypassing then the vent line will become screaming hot.

Problem: Rotation will only go to a pressure less than 4500 psi (typically 1500-2000)

Solution: First run the head to one extreme or the other and deadhead the cylinder. While holding the lever in or out, note the pressure on the gauge. If the gauge reads anything less than 4500 psi first check the orifice as outlined in the main pump trouble-shooting section and then follow the setting of the pressures guide. Next check the spike relief is not bypassing. If the pressure reads 4500 psi with the feed cylinder deadheaded, then the rotation motor is worn out and will need to be rebuilt.

Problem: Feed cylinder will not stay up

Solution: Counter-Balances are faulty. Replace both cartridges.

Problem: You are not able to fast feed up while the rotation is running.

Solution: This normal. If the rotation is running at 3500 psi, this is the priority in the circuit. If you go to fast feed up, the head will come up off of the bottom, but if the pressure drops because there is no more load on the bit, the head will no longer feed up due to the pressure dropping below what is needed to fast feed the head up. The head will only come up if there is sufficient drag on the bit or rods because the pressure is high enough. If you need to raise the head while drilling, use the holdback function while slow feeding to come back up or turn the rotation off momentarily.

ROTATION MOTOR:

Problem: Rotation will only go to a pressure less than 4500 psi (typically 1500-2000)

Solution: See problem above.

Problem: Rotation pressure or speed will drop down and then go back up once handle is jogged.

Solution: First, replace the swash cartridge located on the dash panel. If problem persists, see problem and solutions above.

Problem: Head will not get up to full RPM.

Solution: First verify that the wire line and the fast feed are functioning as normal. Next, turn the swash cartridge fully clockwise and back the other way. If RPM does not increase or decrease, replace the swash cartridge.

Problem: Hydraulic oil is getting into head

Solution: Shaft seal and O-ring on motor are blown. Replace O-ring and shaft seal. Fluidseal part numbers **BABSL060080070/V** for shaft seal and **MORV1144031/N90** for O-ring. These are available for order through any hydraulic shop.

HOLDBACK/SLOWFEED/FLOAT MANIFOLD:

Problem: Float will not operate or head falls instead of raises when float is engaged.

Solution: Either adjust float cartridge as outlined in the adjustment section or replace cartridge.

Problem: Cylinder will not feed when slow feed is engaged.

Solution: First check that the holdback pressure is zero, then check that the slow feed flow control on the dash has not seized up. Next remove and check the three sun cartridges (DKDC-XHN) to see if there is a visible obstruction in the valve or an O-ring has blown. Lastly, remove and check the both the float and holdback cartridges for damage or blown O-rings. Repair as necessary.

Problem: There is not enough pressure on slow feed.

Solution: See third pump trouble-shooting

Problem: **Feed cylinder is pulsing or chattering on slow feed (at very low speed)**

Solution: The seals inside the cylinder are sticking and slipping against the cylinder wall. Use Caterpillar Oil additive to prevent stick slip, Caterpillar part number **1U-9891**. Once the additive has been put in, cycle the feed cylinder using fast feed about twenty times. This will remove the problem. All drills manufactured after April 2008 will have this additive already added to the hydraulic oil. It is a good idea to add another jug if you drain and replace the hydraulic oil.

If you suspect that the counter-balances or the sync block might be playing into a problem on the slow feed circuit, you can isolate the slow feed manifold by plugging and capping the tees where they join into the counterbalance block. You will have to raise the head using the float and lower using slow feed.

Problem: **Feed cylinder rises when slow feed in engaged.**

Solution: Hold back pressure is too high. Either turn the holdback knob all the way out, or if this is already done, replace the holdback cartridge as it is most likely faulty or has a damaged O-ring. A plugged tank line on the float block will also make the head rise.

SYNCRONIZING BLOCK:

Problem: **Synchronization out of sequence**

Solution: The most common problem with the sync block is the gold three way lever being knocked out of adjustment. You should always start the sync block trouble-shooting by ensuring that this valve is in its proper place. Here is how to set it up:

1 – Remove the nut holding the knob onto the valve while pressing the gold piece down with your other hand to prevent losing the spring and detent underneath.
2 – While still holding the gold piece down, hold your other hand underneath to catch the pieces that fall out as you remove the gold lever assembly.
3 - Remove the gold lever assembly.
4 - Look underneath the gold assembly and locate the knurled nut with a square hole.
5 - Pop the nut out of the lever assembly using a punch or a bolt.
6 - Put the nut on the valve stem protruding from the sync block overtop of the spring.
7 - Push the nut down to engage the stem flats and turn the nut clockwise as far as possible.
8 - Use grease to hold the spring and detent in the bottom of the gold lever and place lever assembly on the valve stem taking great care to line up the detent button in the hole at the 5 O'clock position on the small plate. The best way to do this is to rotate the gold assembly clockwise as you find the detent hole. Restart the procedure if the stem has been moved. Hold the assembly down.
9 - While holding the gold assembly down, install the nut and tighten.

Problem: **Chuck and/or foot are opening up slowly.**

Solution: Remove red push button valve and inspect O-rings for damage.

Problem: **Chuck opening up at wrong time or foot clamp grabbing the rods when not supposed to. Chuck will either remain closed all of the time or open up slowly when not supposed to in either rods in or rods out. In drilling mode while fast feeding the chuck will also open up slowly.**

Solution: There are several valves in the sync block that can affect different things at different times. In this case it was found that the DCCC cartridge in location 6A on the manifold had jammed partially open and allowed oil to either flow when not required or restrict oil flow when required.

Problem: **If the synchronization does not work but the red push button will make the chuck and foot clamp open.**

Solution: Replace the cartridge in location 6A

Problem: **Chuck opens up in drilling mode while fast feeding up**.

Solution: Cartridge in location 4A is faulty. Replace cartridge.

Problem: **In rods out mode, operation is the same as rods in.**

Solution: Cartridge in location 4B is faulty. Replace cartridge.

Problem: **Foot clamp does not work or is slow to release**.

Solution: Cartridge in location 5A is faulty. Replace cartridge.

Problem: **Chuck does not work or is slow to release**.

Solution: Cartridge in location 5B is faulty. Replace cartridge.

While trouble-shooting the synchronizing block it is possible to remove each cartridge in turn and inspect for damage to the inner spool or to one of the numerous O-rings on the cartridge body. Sometimes you will be able to notice a small piece of grit jamming the spool or that the spool is in a position to block only half of a port.

A spare cartridge kit is handy to have as it allows you a reference as you look at each cartridge in turn and compare where the inner spool is sitting in relation to the good cartridge spool. This also minimizes down time as you have the pieces already on hand to make the repair instead of waiting hours or days for a replacement.