1 INTRODUCTION

The information contained in this manual provides insight in how a progressive grease distribution system works and how to trouble shoot a progressive system.

2 OPERATING PRINCIPLE

Any pump may be used in a progressive system. What makes a progressive system progressive is the progressive divider valves which divide flow as long as grease is being pumped into the divider valve. Figure 1 shows how grease progresses through the divider valve.

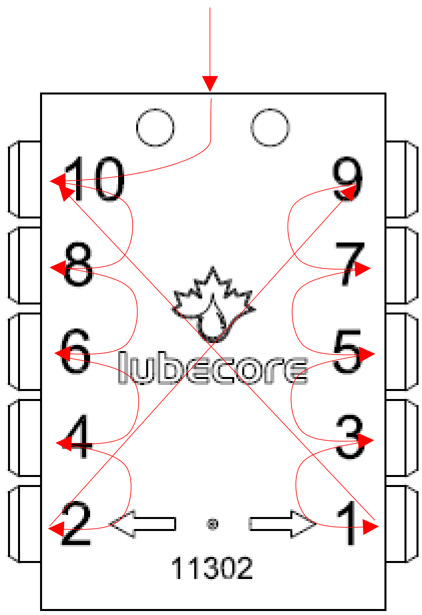


Figure 1

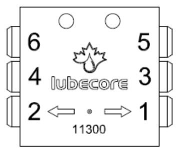
One side of the block delivers grease and then flow switches over to the other side. In the example shown in Figure 1 grease flows in the pattern 10-8-6-4-2 then switches over to 9-7-5-3-1. For a more indepth discussion on how a progressive divider valve works refer to Lubecore General Manual 013, “Modular Progressive Automated Lubrication System”

In order for the valve to continuously operate grease must be allowed to flow out of the open ports in the side of the valve. If one of the grease points fed by the block will not take grease the progressive cycle is interrupted by a hydraulic lock within the progressive divider valve. The pump feeding the valve will continue pumping, pressure will increase until either:

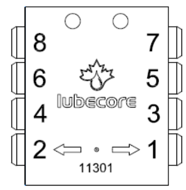
1. Grease point with higher resistance begins accepting grease as system pressure rises.
2. Grease point will not accept grease and the entire system will stop flowing, causing the pressure relief valve at the pump to relieve the system pressure.
3. In the case of no pressure relief valve the system will stop delivering grease to any point.

3 VOLUME DIVISION

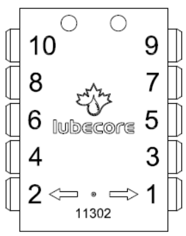
The volume delivered to each port in a progressive system is the reciprocal of the number of ports in the valve. For example, each port in a 10 port valve delivers 1/10 of the total volume pumped into it to each of its ports; an eight port valve delivers 1/8 of the total volume pumped into it to each of its ports and so on as illustrated in Figure 2. Lubecore provides divider valves in 6, 8, 10, 12, 14, 16, and 18 port configurations.



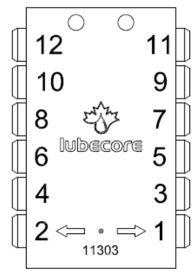
1/6 inlet volume will be delivered from each port



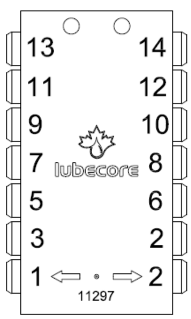
1/8 inlet volume will be delivered from each port



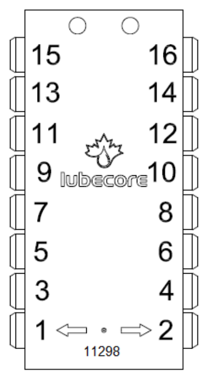
1/10 inlet volume will be delivered from each port



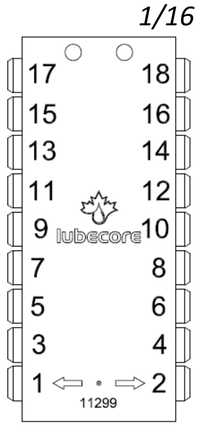
1/12 inlet volume will be delivered from each port



1/14 inlet volume will be delivered from each port



1/16 inlet volume will be delivered from each port



1/18 inlet volume will be delivered from each port

Figure 2

The arrow ports must be used unless the ball between ports 1 and 2 is removed. The location of this inner ball is shown in Figure 3.

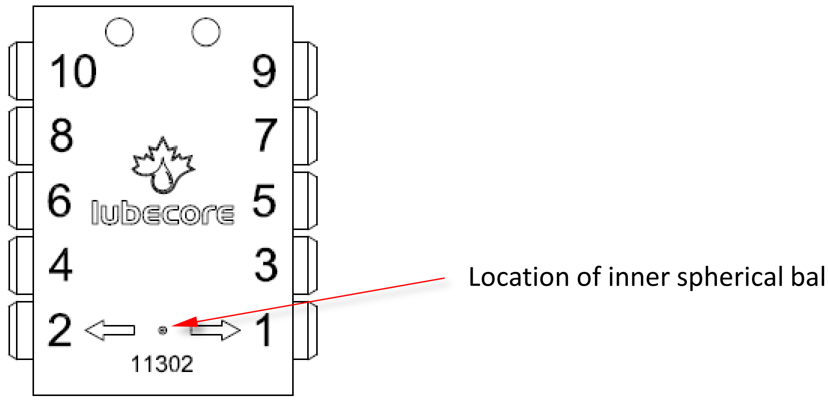


Figure 3

Divider valves can also be set up with a series of plugs and outlets. Examples of how this can be done are shown in Figure 4.

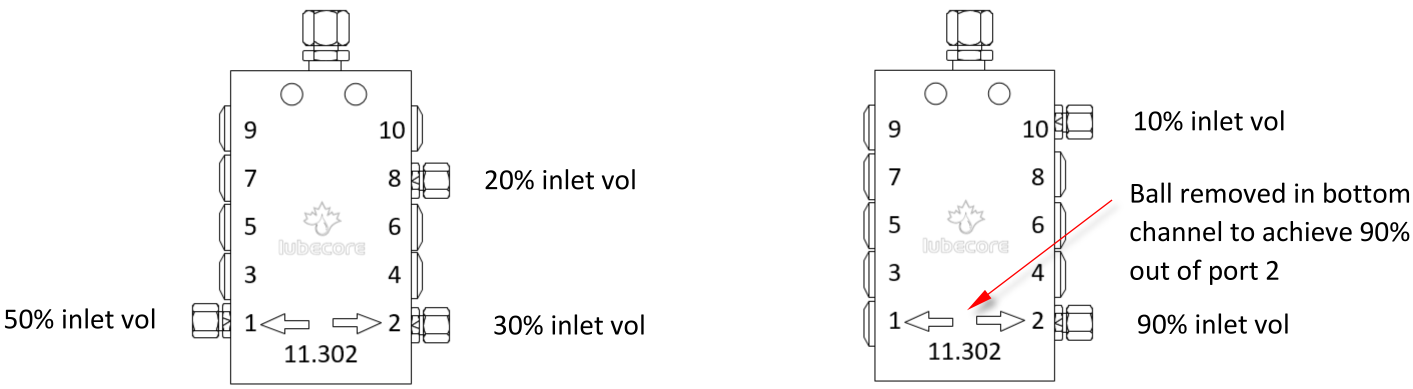


Figure 4

4 SYSTEM PRESSURE AND CYCLING

The pressure required to cycle a block when lines are connected to it is approximately 10-20 bar or 150 to 300 psi. A pressure gauge should be installed in the pump outlet line to give an indication of the pressure in the system as the pump operates as shown in Figure 5. Not all grease points on a piece of equipment will allow grease to enter at the same pressure. The pressure in the system will fluctuate based on the pressure required to deliver to a given grease point. Figure 6 shows an example of how a system would respond to three grease points all accepting grease at different pressures. The pressure gauge installed in the inlet line will fluctuate according to the bearing flow resistance.

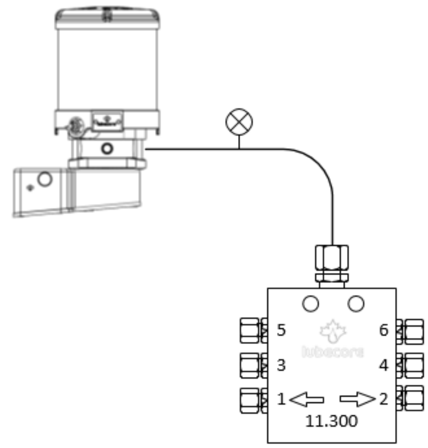


Figure 5

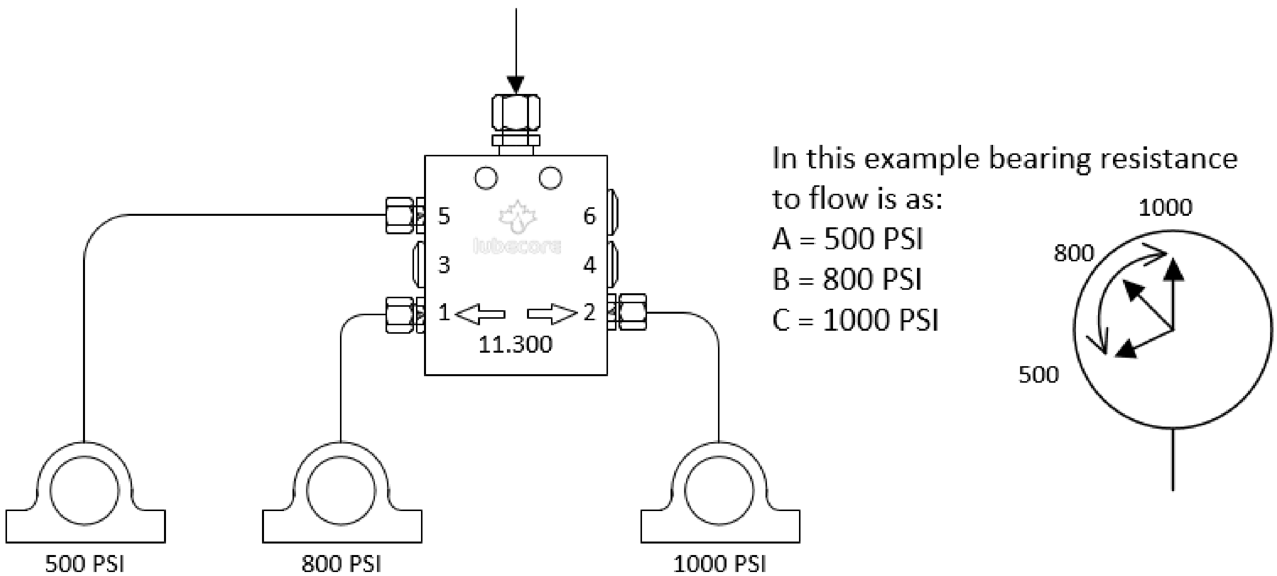


Figure 6

When a volume of grease is delivered by the pump the block will begin its cycle wherever it left off. For example three subsequent pump cycles might deliver grease to the bearings in the following manner:

Cycle 1: C A B C A B C

Cycle 2: A B C A B C A

Cycle 3: B C A B C A

This is important to understand as the needle on the pressure gauge can end up sitting anywhere between 500 and 1000 psi when the pump is off.

5 SYSTEM VOLUME DIVISION

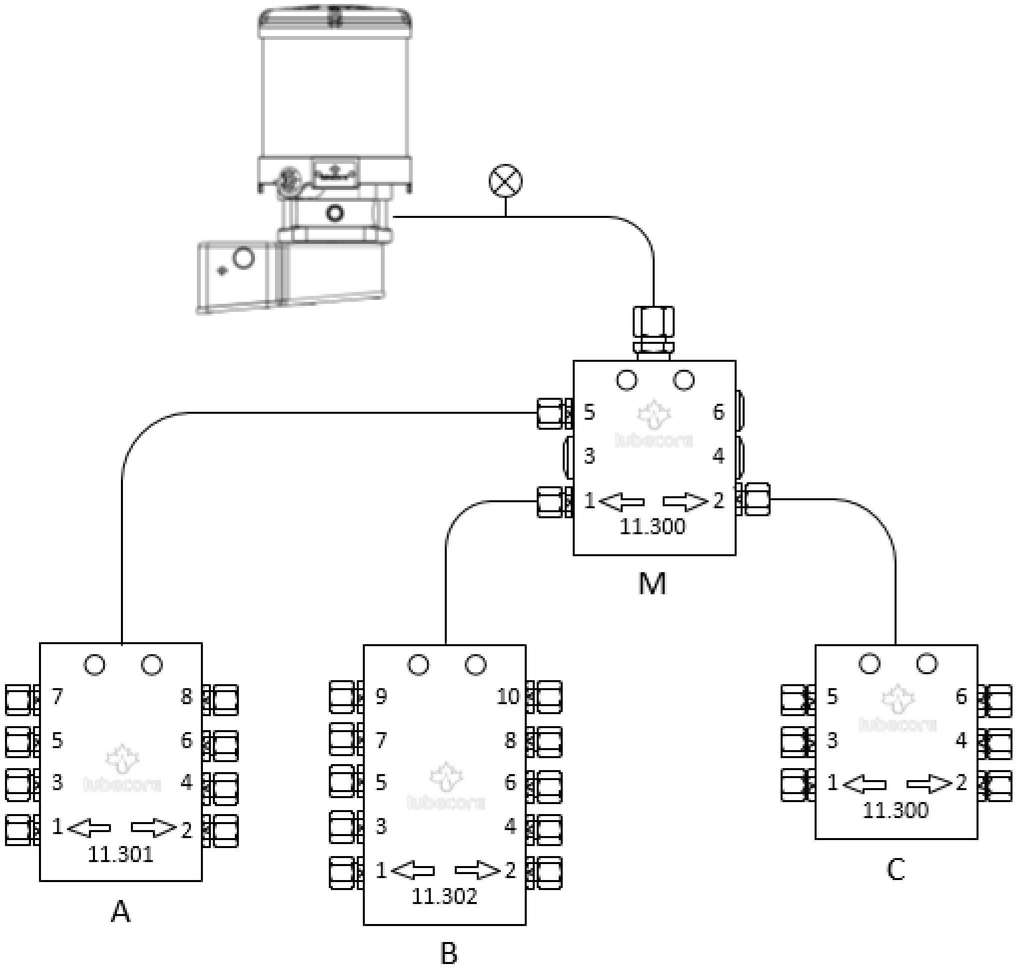


Figure 7

Most progressive system layouts are two level systems where the first level accomplishes a primary division of grease volume for different areas of a piece of equipment and the second level delivers grease to the grease points. Figure 7 shows a system that operates in the following manner:

- The pump delivers to the main valve M
- M delivers 50% (or 3/6) of the pump volume to valve C
- M delivers 33% (or 2/6) of the pump volume to valve B
- M delivers 17% (or 1/6) of the pump volume to valve A
- C delivers 1/6 of the 50% to each line (8.33% of pump volume)
- B delivers 1/10 of the 33% to each line (3.33% of pump volume)
- A delivers 1/8 of the 17% to each line (2.09% of pump volume)

This way grease point volume required can be created by subdividing the total pump flow through the progressive divider valves.

6 TROUBLE SHOOTING

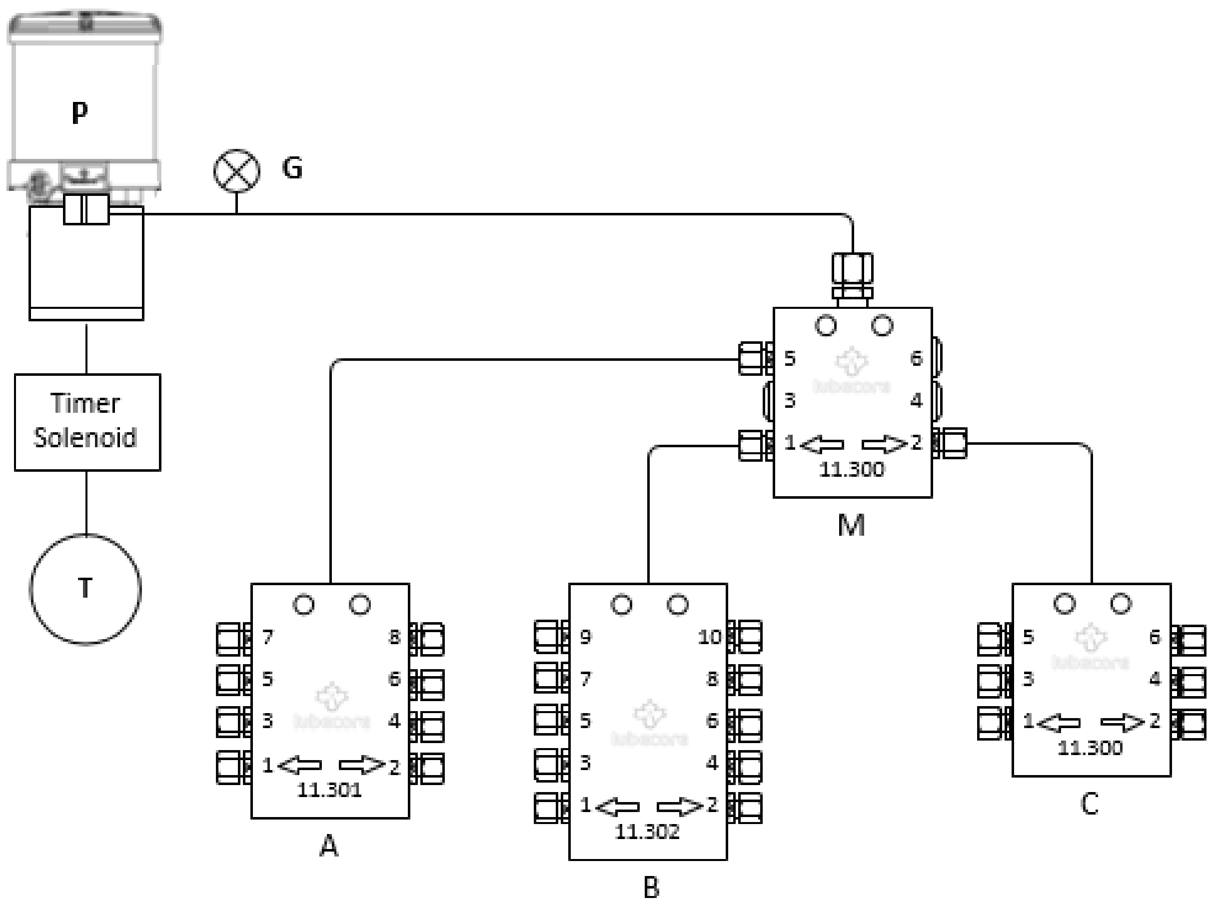


Figure 8

Figure 8 show a system with a single stroke pneumatic pump P. A timer is combined with an air solenoid and connected to tank T. M is the main progressive valve. A, B, and C are the secondary progressive valves. A pressure gauge G is in the mainline at the pump outlet.

The system is not greasing.

Trouble shooting steps

1. Check for power at the timer. LED must be blinking (Use LUBECORE LCC 2015-004 for 12 and 24 volt)
2. Check the air pressure at the timer. It should be 100 to 120 psi.
3. Activate a single cycle with a magnet or manually with a screw driver on the solenoid.
4. Observe the pressure gauge. If the pressure gauge doesn't move, remove the air line from the bottom of the pump and confirm that air is being delivered.
5. If no air is being delivered and there is an air supply at the timer / solenoid, the solenoid is plugged or not venting. Clean solenoid air passageways or replace.

6. If 110+ psi air is being supplied to the pump and no grease pressure develops, remove the mainline from the pump and activate a single cycle on the pump while observing if grease is coming out of the pump outlet.

    Possible causes for no grease

    a. There is an air pocket in the pump reservoir requiring the pump to be bled. If this is the case cycle the pump several times until an air free 15cc of grease is delivered in one cycle. After the pump is blead install a ¼" plug into the pump outlet to confirm the pump pressure. At 100 to 120 psi air pressure the pump should produce approximately 2500 psi grease pressure.
7. If the pump is well bled and doesn't hold 2500 psi at 120 psi air tank pressure, the pump has an internal leak. To correct the leak follow the procedure in LUBECORE LCC 2017 – 005
8. When the pump holds pressure, reconnect the mainline to the pump outlet. Activate a grease cycle and observe the pressure gauge. The gauge should spike to 2000+ psi and then slowly drop. How slowly the gauge needle drops depends on factors such as temperature, grease viscosity or the flow resistance in the grease points. When a system is experiencing a downstream blockage the grease pressure will not drop but stay at max pump pressure at around 2500 psi.
9. Ultimately check for evidence of fresh grease at the grease points. Crack some lines loose and observe grease drips being delivered at the end of grease lines.

CHECK FOR EVIDENCE OF FRESH GREASE AT THE GREASE POINT. IF YOU SEE EVIDENCE OF FRESH GREASE AT THE GREASE POINT YOU KNOW YOUR SYSTEM IS FUNCTIONING.

OTHER PRACTICAL TIPS.

1. If you understand the progressive operating principal trouble shooting is very simple. If you see things that do not make sense like over greasing at some points and NO grease at other points; check and make sure all your secondary check valves are torqued at 95-100 inch-pound. The valve body and check valve are sealed together with a brass crush ring and therefore proper torqueing is required at these connection points

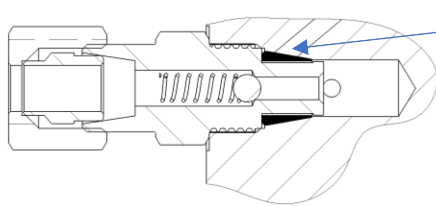


Figure 9

2. Check if the ball between port 1 and 2 is removed or not. Remove check valves 1 and 2 or check valve and plug 1 and 2 and stick a pin (smaller than 3 mm OD: smallest Allen key or a large paperclip straightened out)

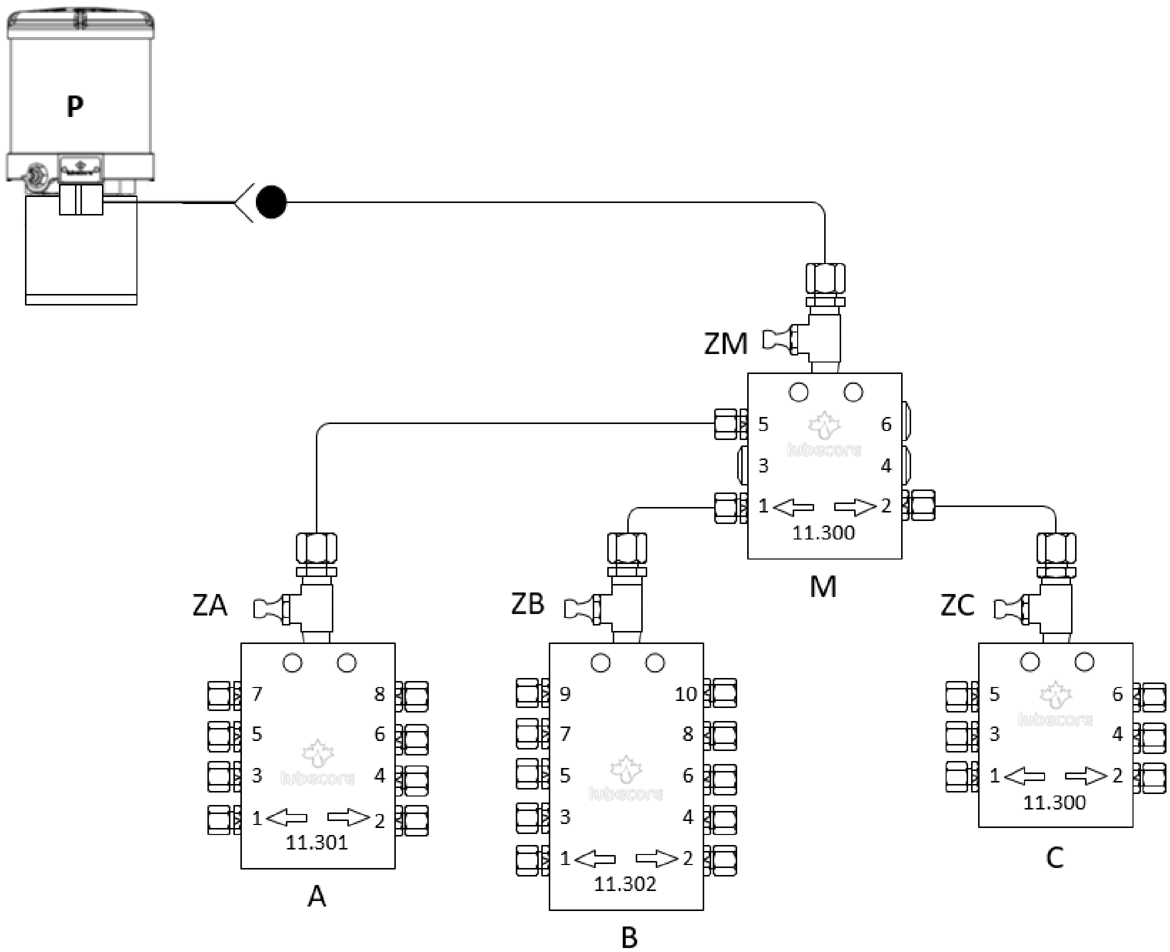


Figure 10

Figure 10 shows more detail regarding the system shown in Figure 8. In Figure 10 pump P is shown along with a check valve at the pump outlet. There are check valves at each outlet of blocks M, A, B, and C. The inlet to each block features a street tee in which the inlet line fitting and a zerk fitting are installed. ZM, ZA, ZB, and ZC are the zerk fittings at each block.

When the pump is blocked as discussed in trouble shooting point 8 proceed as follows

1. Leave the system under pressure
2. Go to secondary valves A, B, and C with a manual grease gun equipped with a pressure gauge.
3. Check valve A by manually pumping grease into zerk ZA. The valve should shuttle and dispense grease. If the valve is not shuttling, remove the secondary lines one at a time until the block begins to shuttle under the influence of the manual grease gun. The blockage in the system is at the end of the line last removed from the block before it began shuttling. The joint at the end of the grease line must be freed up to allow grease to flow into it again.

4. Repeat step 3 for valves B and C.
5. If all the lines are off of a valve and it still will not shuttle, the valve is clogged and requires replacement.
6. If the secondary valves A, B, and C are shuttling the blockage is in the main valve M.
7. Remove the grease lines from valve M that feed valves A, B, and C one at a time to confirm it is not a blocked line. Replace any blocked lines found.
8. Replace valve M is no blocked lines are found in step 7.

   Note: Lines should be removed at the by removing the line ferrule compression nut not the fitting at it's base. If check valves are removed from by the base inadvertently they must be reinstalled and torqued to 95 to 100 in-lbs. There should be no leaks between the valve outlet check valves and the valve body after installation.