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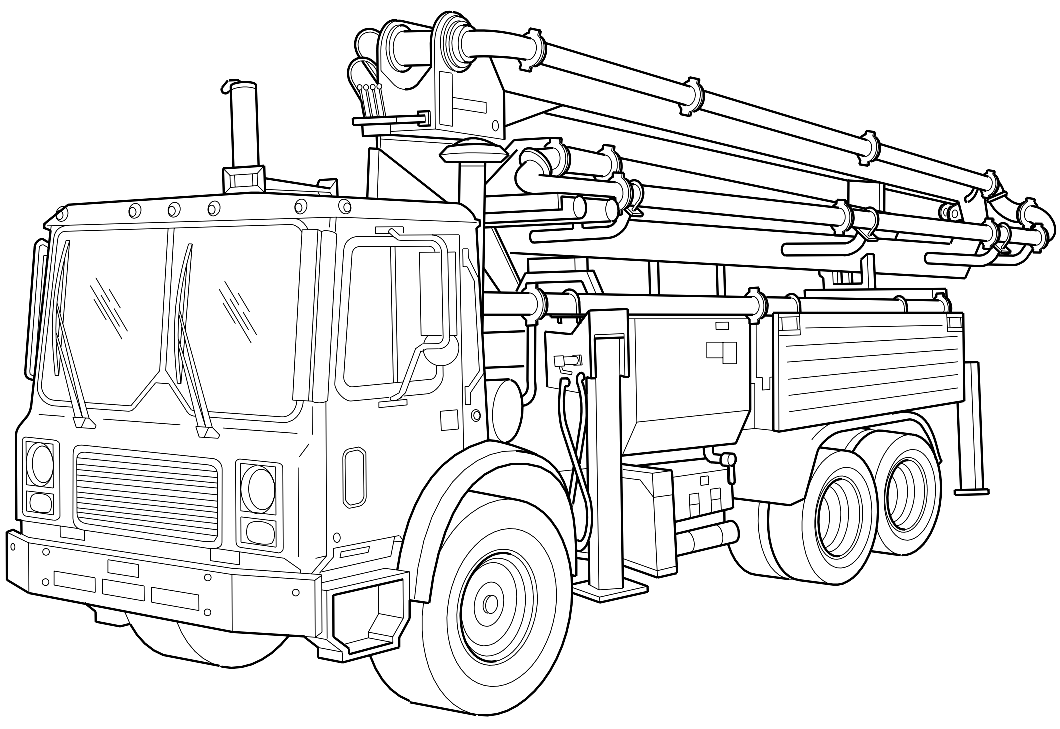
SCHWING
AMERICA INC.

GUIDE FOR TROUBLESHOOTING CONCRETE PUMPS



BPL 900 - KVM 28

DOCUMENT #699000

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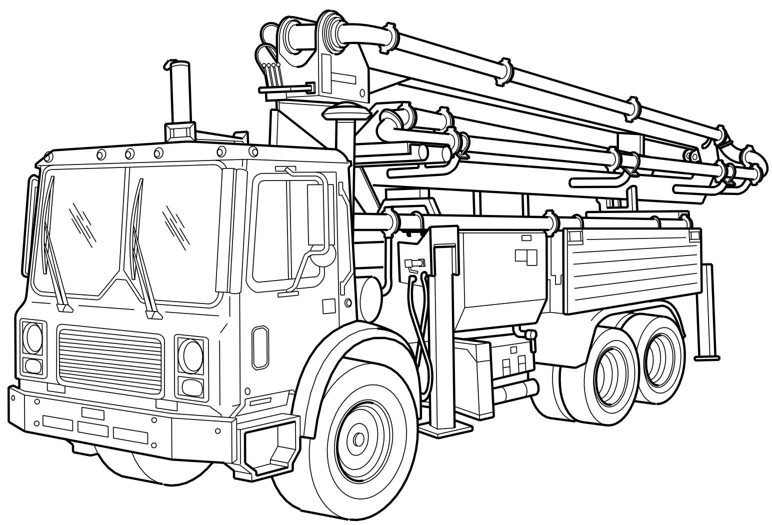
THIS MANUAL IS INTENDED TO ASSIST AUTHORIZED PERSONNEL WITH REPAIR OF CONCRETE PUMP EQUIPMENT. SCHWING AMERICA, INC. IS NOT RESPONSIBLE FOR DAMAGE OR ACCIDENTS CAUSED BY MISUSE, IMPROPER MAINTENANCE, OR NEGLECT OF THIS EQUIPMENT. THE EXISTENCE OF THIS GUIDE AND ITS CONTENTS DOES NOT NEGATE THE NEED TO USE COMMON SENSE WHEN WORKING WITH HYDRAULICALLY POWERED AND ELECTRICALLY CONTROLLED EQUIPMENT.

BPL 900/KVM 28 T.S.G.

Introduction

We try to manufacture our machines to be as reliable as possible in service. With concrete pumps of the BPL series, modifications to the hydraulic control system and to the operation of the rock valve, the reliability has been improved still further in service. If however, problems are experienced, they can usually be very quickly recognized and dealt with and this booklet has been compiled to allow you to check quite quickly and easily the probable cause of the failure or failures. We recommend that you read this booklet before the machine is put into service and that you thoroughly understand its contents so that you not only understand the machine's function, but are able to even anticipate a failure by noting regular or intermittent minor malfunctions, preventing expensive and time consuming breakdowns on site.

The following pages explain initial function checks, maintenance hints and tips and testing procedures which should be understood by concrete pump operators as well as maintenance personnel. Also included are color diagrams showing the stage by stage operation of the hydraulic circuit in section I.



Contact Information

If you have attempted to correct faults or troubleshoot a malfunction in the machine and you have been unable to solve the problem, we recommend that you contact our After Sales Service Department.

SCHWING America Service Department:

- TEL: 1-888-292-0262
- TEL: (651) 653 2299
- FAX: (651) 429 2112

BEFORE YOU CALL please make note of the following information so that our Service Technicians will be better able to help you:

1. Machine model and serial number (stamped on the machine serial plate on the left side of the subframe, behind the truck cab).
2. The hydraulic working pressure at the time the failure occurred.
3. Strokes per Minute of the concrete pump and engine rpm at the hydraulic working pressure time.
4. Pressure at which the main safety valve opens.
5. Length and diameter of the delivery pipeline including position, number and type of any bends used.
6. Quality and slump of concrete and if known, the mix design.

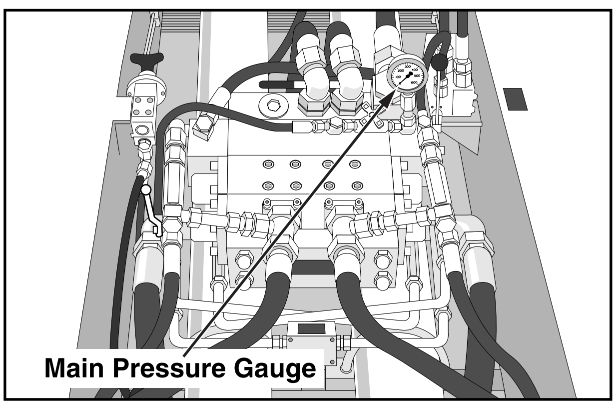
With the above information our experienced Service Technicians should be able to advise you by telephone what the trouble may be and the best way to correct the problem.

A. Pressure Gauges

The most important instrument for checking the concrete pump during operation, and for indication of possible defects is the *main pressure gauge*.

The safety pressure is the pressure at which the safety valve opens.

The *working pressure* is the pressure the concrete pump is operating at during the pumping operation. The pressure varies from job to job and it is not necessary to adjust the working pressure. In fact, the working pressure automatically increases enabling resistance of the concrete in the pipeline to be overcome. This resistance and therefore the working pressure is a direct result of the stiffness and coarseness of the concrete plus the length of the pipeline being used and finally the rate at which the concrete is being pumped. It is possible in extreme cases that the working pressure may increase up to 250 bar (3625 psi) depending of course on the pump model. Working pressures obviously cannot be higher than the pre-set safety pressure on the safety valves since these will open and relieve pressure. Safety pressures for the various concrete pump models are shown in the relevant machines' operating instructions books.



Basic guidelines

The working pressure should never be in excess of 90% of the pre-set safety pressure (not applicable for system III).

Where the working pressure exceeds 90% the pumping speed should be reduced and/or the "pumpability" of the concrete should be improved prior to pumping, and on each occasion the safety pressure must be checked. See also the booklet "Pumping Concrete and Concrete Pumps" for more information on concrete mix design.

As a pump operator you should check the working pressure several times during operation. After some weeks experience you will probably be able to estimate before starting any pumping operations how high the pumping or working pressure will be. Pressure checks are very important. We recommend you carry a spare gauge so that you are able to quickly replace this very important instrument on the job.

B. Oil Temperature

It is also very important to check operating oil temperatures during pumping especially on extended pours. Temperatures between 50 and 70 °C after approximately two hours pumping are quite normal. Temperatures of 80°C will not harm either the oil or the concrete pump but there is an indication of an irregularity within the hydraulic system because normal oil temperatures should not be this high. Try and establish the cause of this heat increase. Temperatures of over 80°C will break down the properties of the oil and the oil must be changed.

Note, if the pump is operating within an enclosed building or confined space it is very important to provide adequate ventilation.

OIL TEMPERATURE

C. Number of Strokes

The technical term "stroke" simply means the piston travel from one end of the cylinder to the other. Therefore when 21 strokes occur within one minute this will be the operating speed. The maximum design number of strokes per minute is 29.5. We recommend that you check the operating speed using a watch equipped with a second hand.

If pumping is required at any speed less than the maximum, the Stroke Limiter should be turned in (if equipped), or the engine should be slowed down, but not below 1500 rpm. At this speed damage could possibly be caused. If you have to pump slower than this we suggest you select a lower gear so that the engine will be working above 1500 rpm while giving the desired number of strokes per minute.

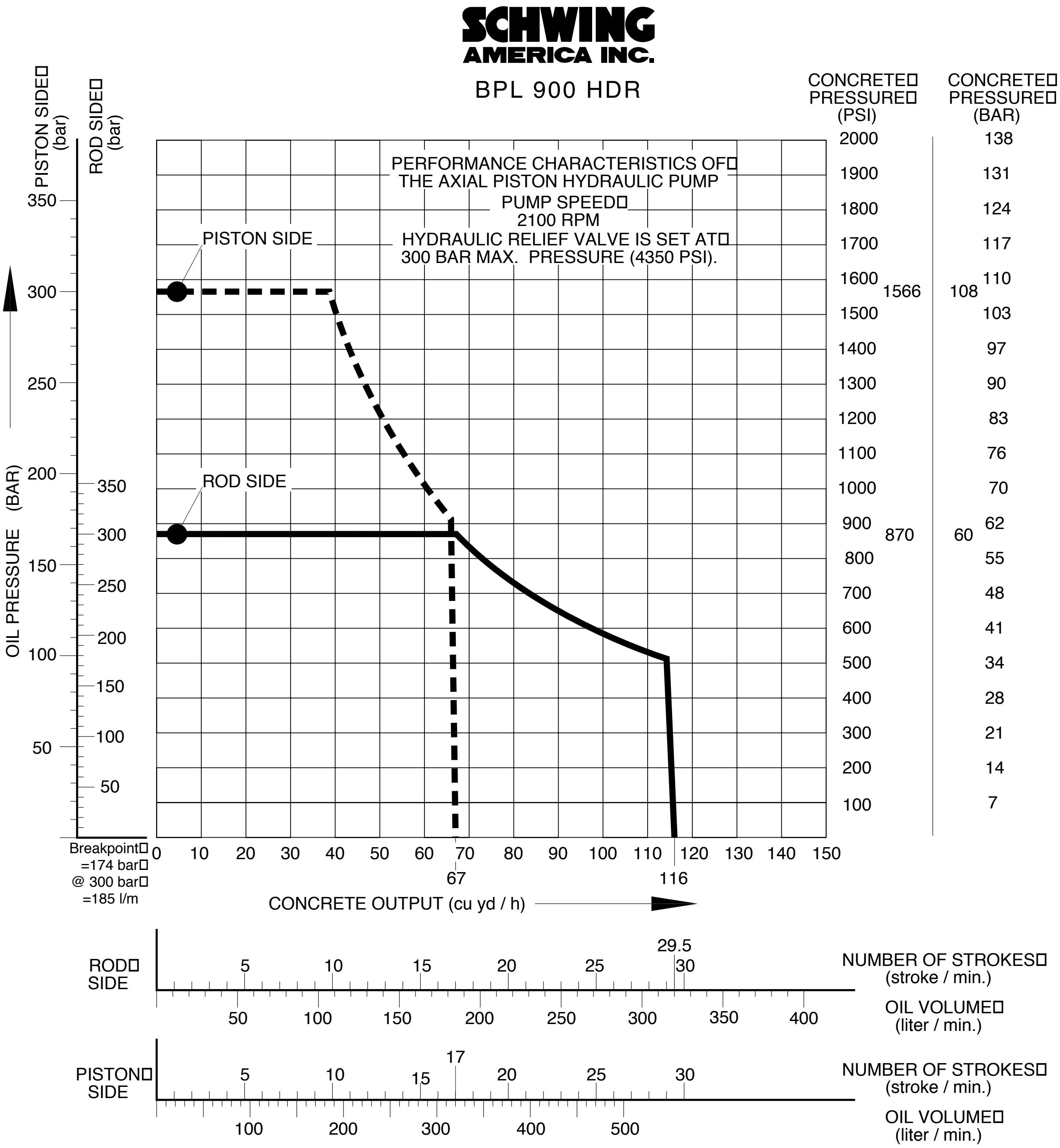
The maximum number of strokes possible to obtain are indicated on the build plate of your individual machine and they are also repeated in the operating instruction book under "technical data". The maximum number of strokes mentioned should be obtainable when the vehicle gear box is engaged in top or direct drive (generally in the proper gear) and when the vehicle engine is running at maximum governed revolutions providing that the pumping operation and the working pressure are lower than 150 bar (for BPL 900 with 140 hp). At higher pressures the main hydraulic pump automatically reduces its output. It has been purposely designed this way to prevent overload of the engine. However, do not misunderstand that the working pressure can of course be much higher but in this case it will be impossible to reach the maximum number of strokes simply because the hydraulic pump can now only deliver a reduced volume of oil in spite of the same input rpm. This is quite clearly explained on the output diagram where you will see the number of strokes and the corresponding output in relation to the working pressures. If the output diagram is not available in the instruction book, please request it either from the manufacturer or your distributor. It should also be your discipline to check as often as possible the number of strokes during your working day, then you will see for yourself there exists a direct relationship between the working pressure required and the number of strokes possible. The high working pressure also has an effect on the hydraulic pump automatically reducing its output and the number of strokes possible. Conversely a lower number of strokes intentionally produced by you will also reduce the working pressure. With a low number of strokes per minute the concrete will flow more slowly through the pipeline. For less concrete velocity the pistons absorb less power which means less pressure. Please pay due attention to these interconnected points, then you will get a better appreciation about the lay-in parts and life of the concrete pump.

Basic guidelines

1. At working pressures below 175 bar (3538 psi) (for BPL 900 with 140 hp) the number of strokes directly influences the working pressure. The lower or higher the number of strokes, the lower or higher the pressure will be as previously explained. Lower speeds of concrete flow will require lower operating pressures.
2. At working pressures above 175 bar (3538 psi) (for BPL 900 with 140 hp) the working pressure directly influences the number of strokes. The higher the pressure, the lower the number of strokes because the hydraulic pump will automatically reduce its output.

In general try to avoid pumping with the maximum number of strokes, only doing so when it is absolutely necessary. There is no advantage whatsoever if you are able to empty a ready mix truck of 8 yd^3 capacity within 5 minutes, leaving you a 10 minute wait for the arrival of the next ready mix truck. It is much better to pump slowly from the outset thus preserving the machine and your nerves while achieving considerable decrease in working costs due to decrease in wear.

PERFORMANCE CURVE - BPL 900 (103kW 140 hp)



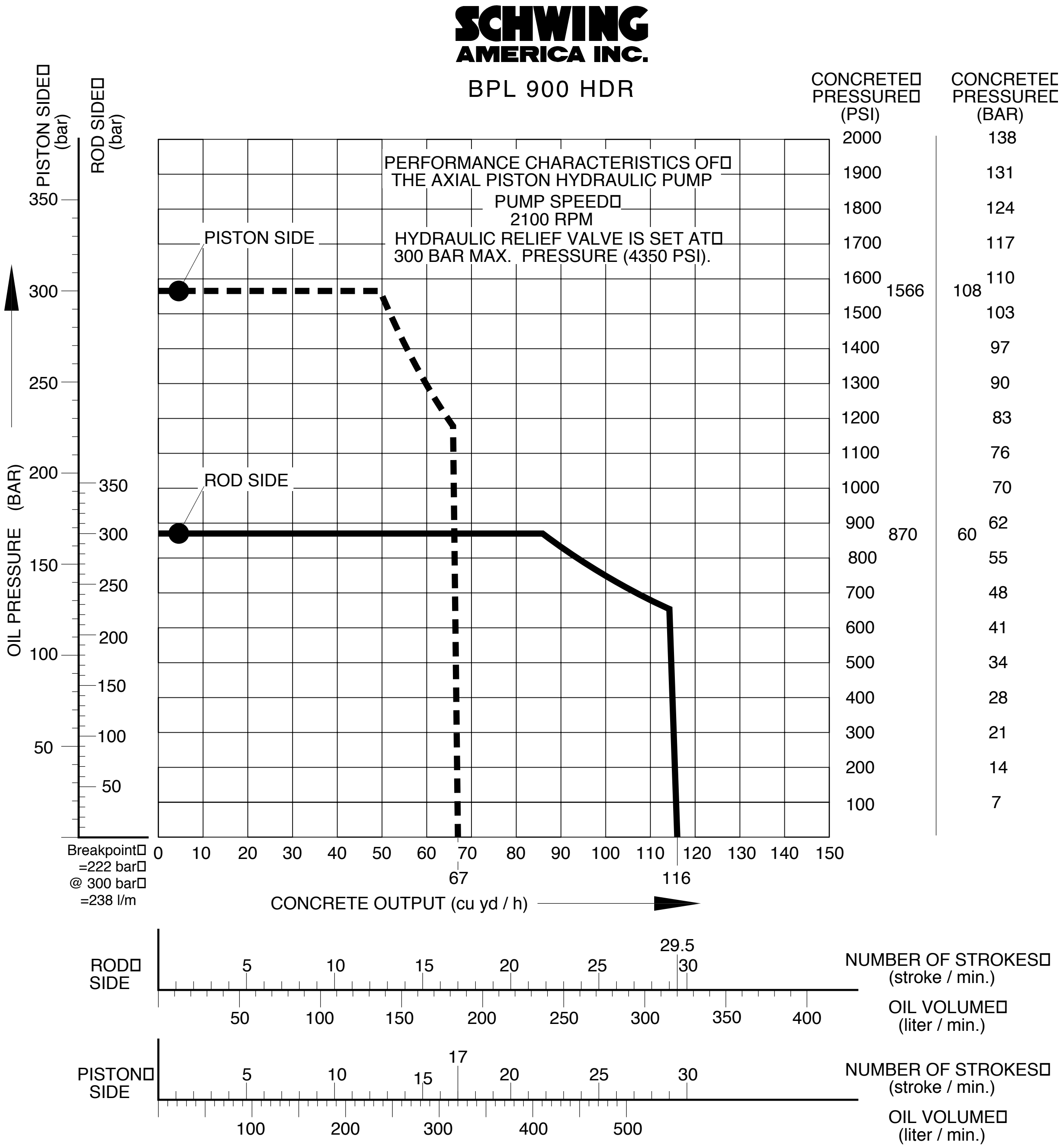
Differential Hydraulic Cylinder Bore dia. / Rod dia. x Stroke length	Material Cylinders Bore dia. x Stroke length	Hydraulic Pumps Type / KW
120 mm / 80 mm x 1600 mm	200mm x 1600 mm	2 x A7VO-80 2 x 51.5 KW

Slewing cylinder 80 / 45 x 185

SAIE 5240-087
Rev. 100296

THE PERFORMANCE CURVE INDICATES THAT THERE IS NO ALLOWANCE FOR FILLING EFFICIENCY OF THE CONCRETE CYLINDER.

PERFORMANCE CURVE - BPL 900 (132kW 177 hp)



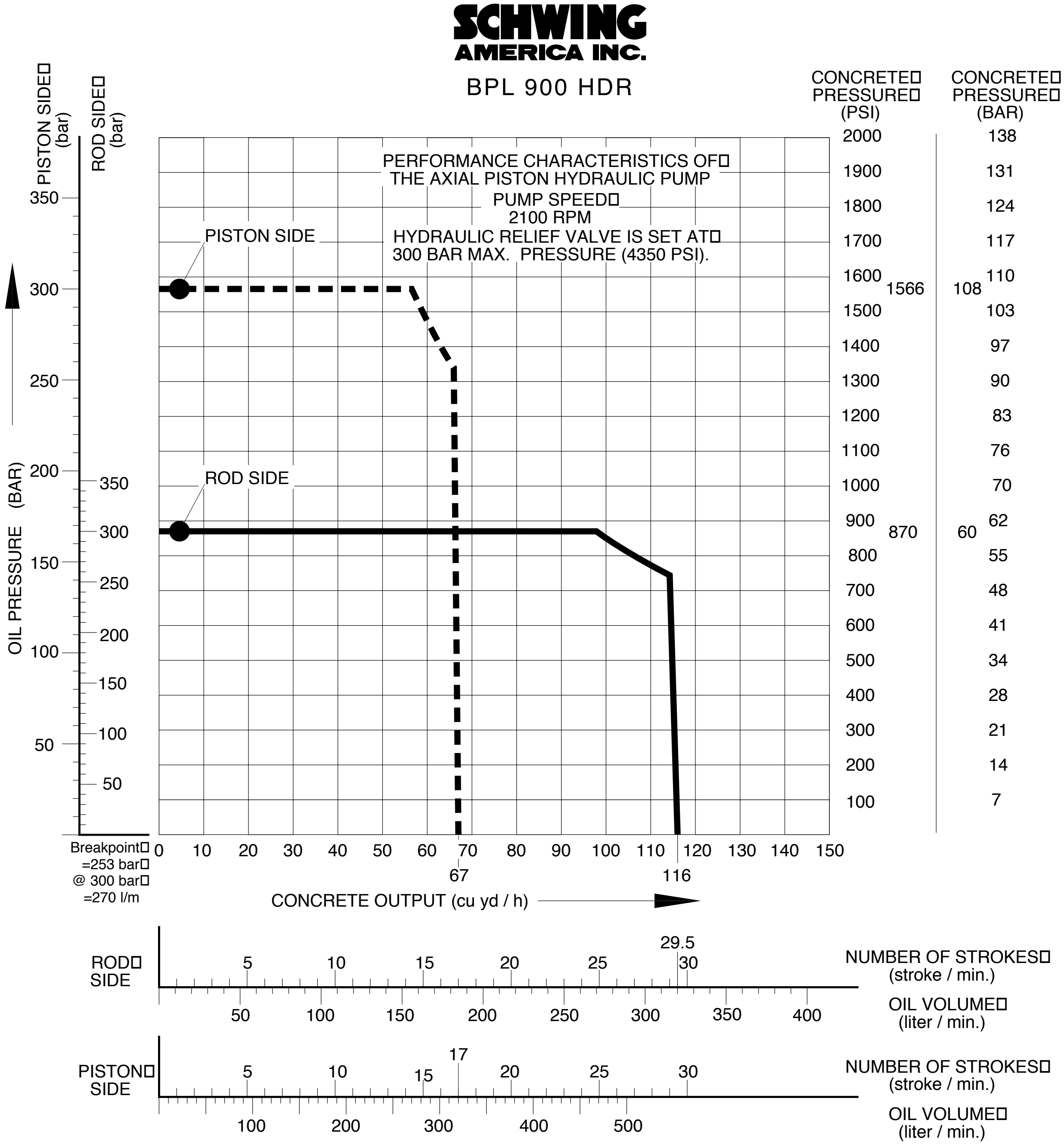
Differential Hydraulic Cylinder Bore dia. / Rod dia. x Stroke length	Material Cylinders Bore dia. x Stroke length	Hydraulic Pumps Type / KW
120 mm / 80 mm x 1600 mm	200mm x 1600 mm	2 x A7VO-80 2 x 66 KW

Slewing cylinder 80 / 45 x 185

SAIE 5240-088
Rev. 100296

THE PERFORMANCE CURVE INDICATES THAT THERE IS NO ALLOWANCE FOR FILLING EFFICIENCY OF THE CONCRETE CYLINDER.

PERFORMANCE CURVE - BPL 900 (150 kW 200 hp)



Differential Hydraulic Cylinder Bore dia. / Rod dia. x Stroke length	Material Cylinders Bore dia. x Stroke length	Hydraulic Pumps Type / KW
120 mm / 80 mm x 1600 mm	200mm x 1600 mm	2 x A7VO-80 2 x 75 KW

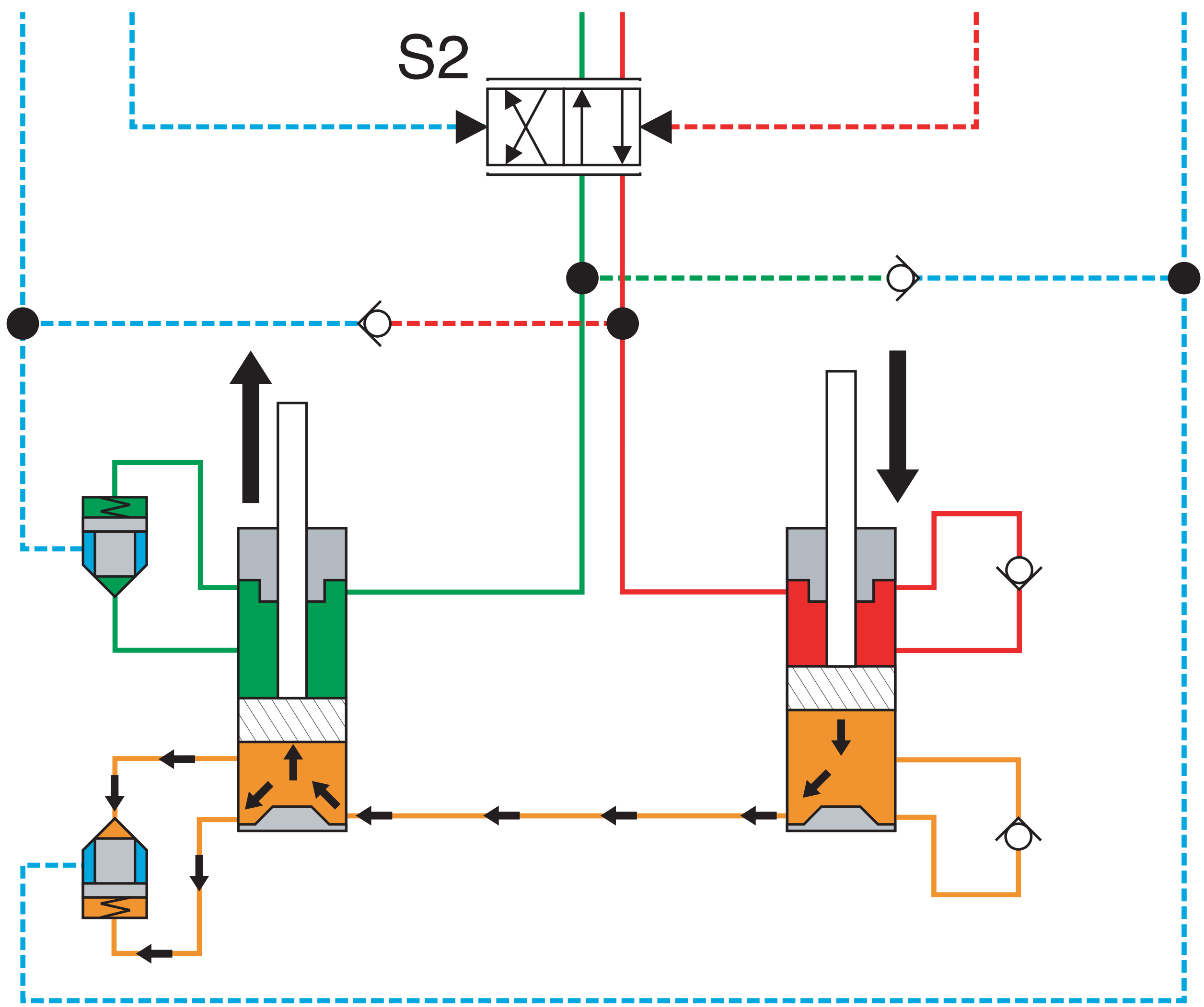
SAIE 5240-089
Rev. 100296

Slewing cylinder 80 / 45 x 185

THE PERFORMANCE CURVE INDICATES THAT THERE IS NO ALLOWANCE FOR FILLING EFFICIENCY OF THE CONCRETE CYLINDER.

D. Compensating Oil

The differential cylinders of BPL pumps are actuated at the rod end. In order to push cylinder (A) forward, pressure oil must be conveyed to the rod end (in front of piston) of cylinder (B). The piston of cylinder (B) then travels backward to the cylinder end. The ends of the two cylinders are interconnected with a hydraulic line allowing the oil to be displaced by piston (B) as it travels backwards through the line into cylinder (A) which forces its piston forward. On the alternate cycle the oil between the two pistons will then be pushed back from (A) to (B), still the same quantity of oil (which is termed compensating oil), transmitting power and movement from one differential to the other.



E. Checking Safety Valves

When investigating defects in a hydraulic system, it is important to check that the safety valve itself is functioning properly (see figure below).

First of all you should block the systems involved as follows:

System I - Concrete Pump

Close ball cock (1/4 turn valve)

System II - Agitator

Locate the agitator shutoff valve and close it. Note! If your unit does not have a shutoff valve, you can order one using part number 10004680 (valve) and part number 30303432 (tube). Contact the Schwing America Service Department at (651) 429-0999 for installation instructions.

If not equipped with a shut-off valve jam the agitator shaft with either suitable sized timber or similar.

System III - Water Pump and Compressor circuit

If you do not have compressor, put in compressor mode, otherwise block lines to the water pump.

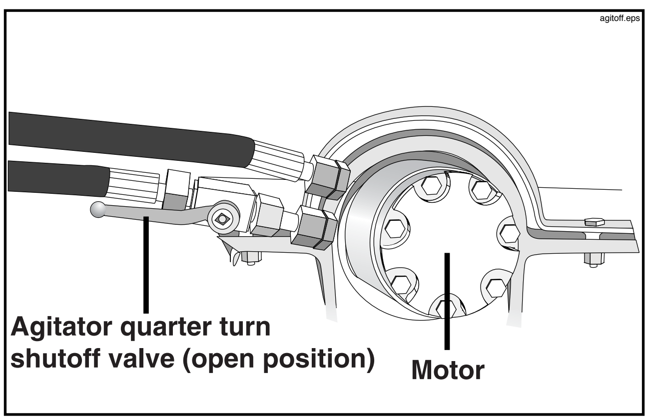
System IV - Placing Boom

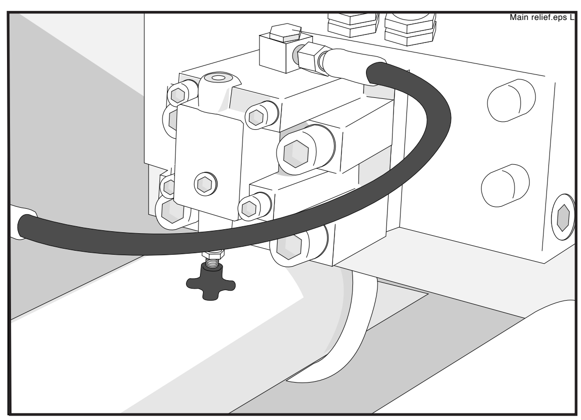
Close shutoff valve on jacking cylinder and activate outrigger hand valve to check outrigger relief.

Pressure out section 2 or 3 in retracted mode to check relief on boom hand valve.

With engine revolutions at maximum, and maximum output of the hydraulic pump respectively, the concrete pump, the agitator, the compressor and the jacking cylinders have to be engaged. Read off and note the safety pressures indicated for each system. Then repeat the tests at half speed or half hydraulic pump output, whichever applies.

If the gauge now indicates a pressure which is more than 10% below the pressure read at maximum revolutions or output, you can be sure that the safety valve for that particular system is malfunctioning and/or contaminated and has to be checked further.



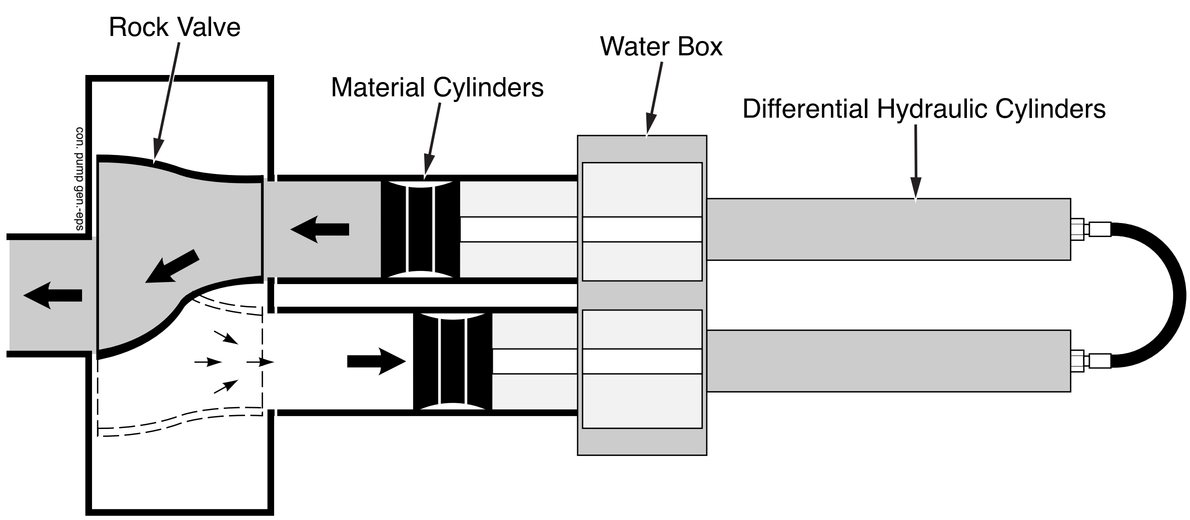


F. Selection and Changeover Operations

When the concrete pump control valve has been shifted to pumping mode (forward or reverse) all changeover operations are completed automatically, that is, the valve S2 (serving the differential cylinders) and S3 (serving the rock valve) are changed over automatically alternately once from the left and once from the right. The oil flows through the control line to the valve and pushes the selector piston in the valve to opposite sequence - the valve then has been changed over. This flow of oil has a technical term "changeover signal (impulse)". For each additional pumping stroke and movement of the rock valve it is necessary that the corresponding relevant valve switches over. One cycle of the concrete pump consists of four different strokes, they are left hand pumping stroke, one rock valve stroke, right hand pumping stroke and the rock valve strokes back. This means that there are four changeover operations, each of them caused by a changeover signal. Two of these signals arise when the left hand cylinder has reached its full stroke position at each end. These signals change over the valve S3. Once the rock valve has shifted a signal is sent to shift the S2. The signal transmitters within any one cycle are one from the left hand differential cylinder (to be precise the switching valves) and two from the rock valve signal ports. The signal receivers are the S2 and S3 valves respectively.

Check this against the changeover diagrams in the following pages. The hydraulic circuit described on the following page and in 11 operation sequence diagrams that follow applies to all modern SCHWING concrete pumps in the 900 model group with full hydraulic operation. The heavy color lines represent the working or power lines. The dotted color lines represent the change over or signal lines. The valve S1 is illustrated in the pumping position and the pressure line of the pump is connected to a pressure gauge (9) with a working range of 0 to 400 bar for pressure checks. There is also a safety valve (10) connected to the pressure line for protecting the hydraulic assemblies. From the safety valve exhaust the escaping oil flows into the return line and filter (7) back to tank.

There is a bypass valve in the safety valve (10). This valve can be actuated electro-magnetically either by direct or remote control. By switching OFF the valve (11) the hydraulic system will be without pressure and the concrete pump will be inoperable.



G. Hydraulic Schematic and Sequence Diagrams

The Hydraulic Schematic on the following page is for the BPL 900 Concrete Pump.

Following it are eleven sequence diagrams that show the stroke and signal phases for a complete pumping cycle.

Legend - Hydraulic Schematic BPL 900

1. Valve Body S1
2. Valve Body S2
3. Valve Body S3 with Orifice
4. Rock Valve Shifting Cylinder
5. Switching Valve, for maintaining constant stroke
6. Switching Valve, for maintaining constant stroke
7. Return Flow Filter
8. Oil Cooler
9. Gauge
10. Safety Valve
11. Forward/Reverse Agitator, Water Pump
12. Check Valve
13. Check Valve
14. Check Valve
15. Check Valve
16. Check Valve
17. Check Valve
18. Ball Cock\
19. Stroke Limiter
20. Hydraulic Pumps

Legend - Sequence Diagrams 1 thru 11 - BPL 900

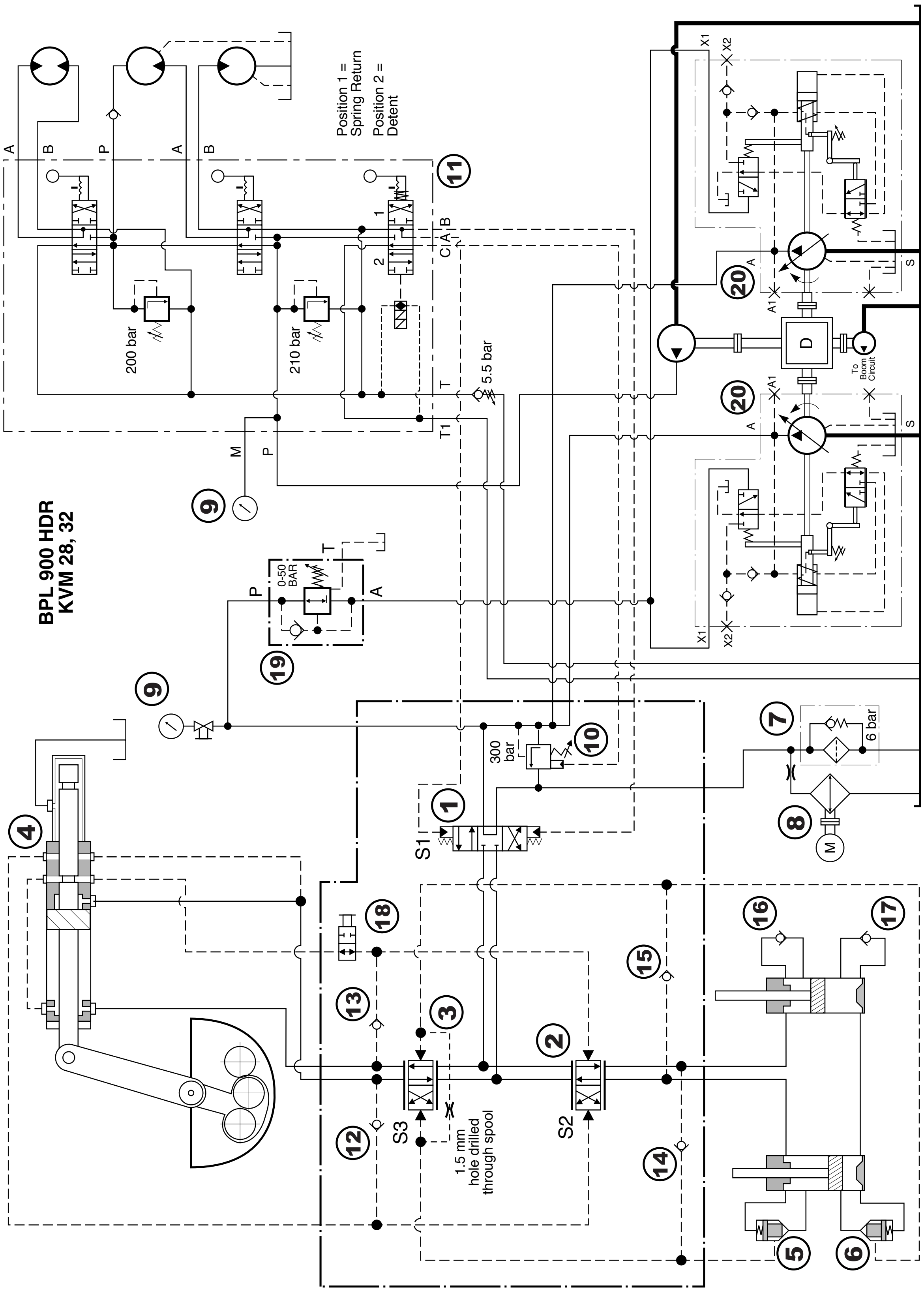
RED lines - high pressure.

YELLOW lines - rocking oil.

GREEN lines - low pressure.

BLUE lines - zero pressure (tank or oil at rest).

HYDRAULIC SCHEMATIC - BPL 900 HDR

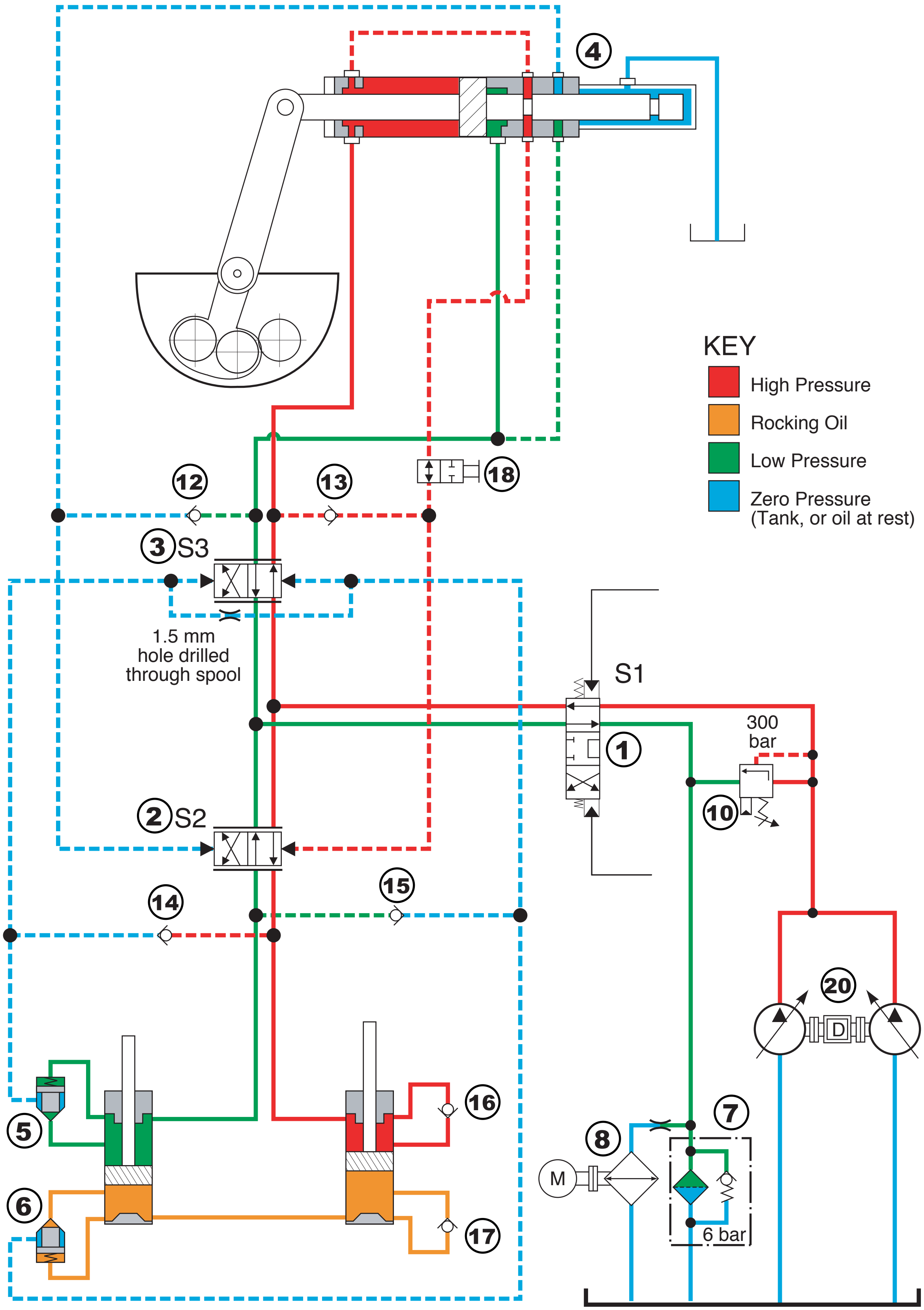


Explanation - Stroke Sequence Diagram 1

First working stroke

With S1 valve (1) in the forward position, and the S2 valve (2) in the left position oil flows to the right hand differential acting on the rod side. Oil from the piston side of the right hand differential oil is passed to the piston side of the left hand differential and the rod side oil of the left hand differential is directed back to tank via valves S2 and S1 and through the filter (7). Oil directed through the S3 has the rock valve shift cylinder held in the retracted (right) position so that concrete from the left hand material cylinder is being pushed into the delivery pipe line. Concrete from the hopper is being sucked into the right hand material cylinder.

STROKE SEQUENCE DIAGRAM #1



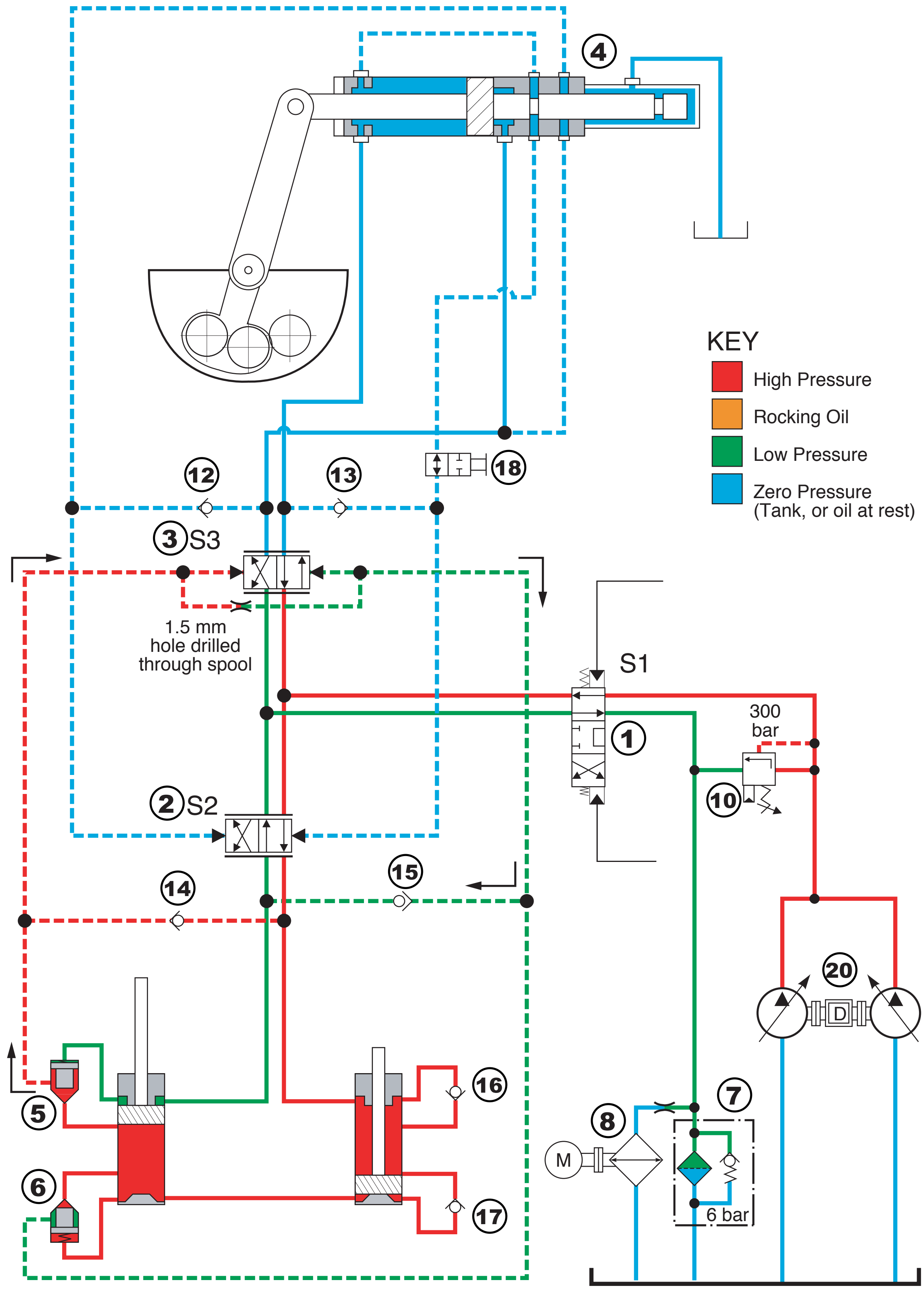
Explanation - Stroke Sequence Diagram 2

End of first working stroke

The differential cylinders have reached the end of their stroke position*. Switching valve (5) is sending a high pressure signal to the left hand end cap of S3 valve (3). Oil from the right hand end cap of the S3 valve (3) is relieved via check valve (15), the S2 valve (2), S1 valve (1), filter (7) and back to the hydraulic tank.

* NOTE: If the left hand differential has not fully extended at this point due to not enough loop oil, high pressure oil will continue to flow through check valve (17) on the right hand differential until the left hand differential is fully extended.

STROKE SEQUENCE DIAGRAM #2

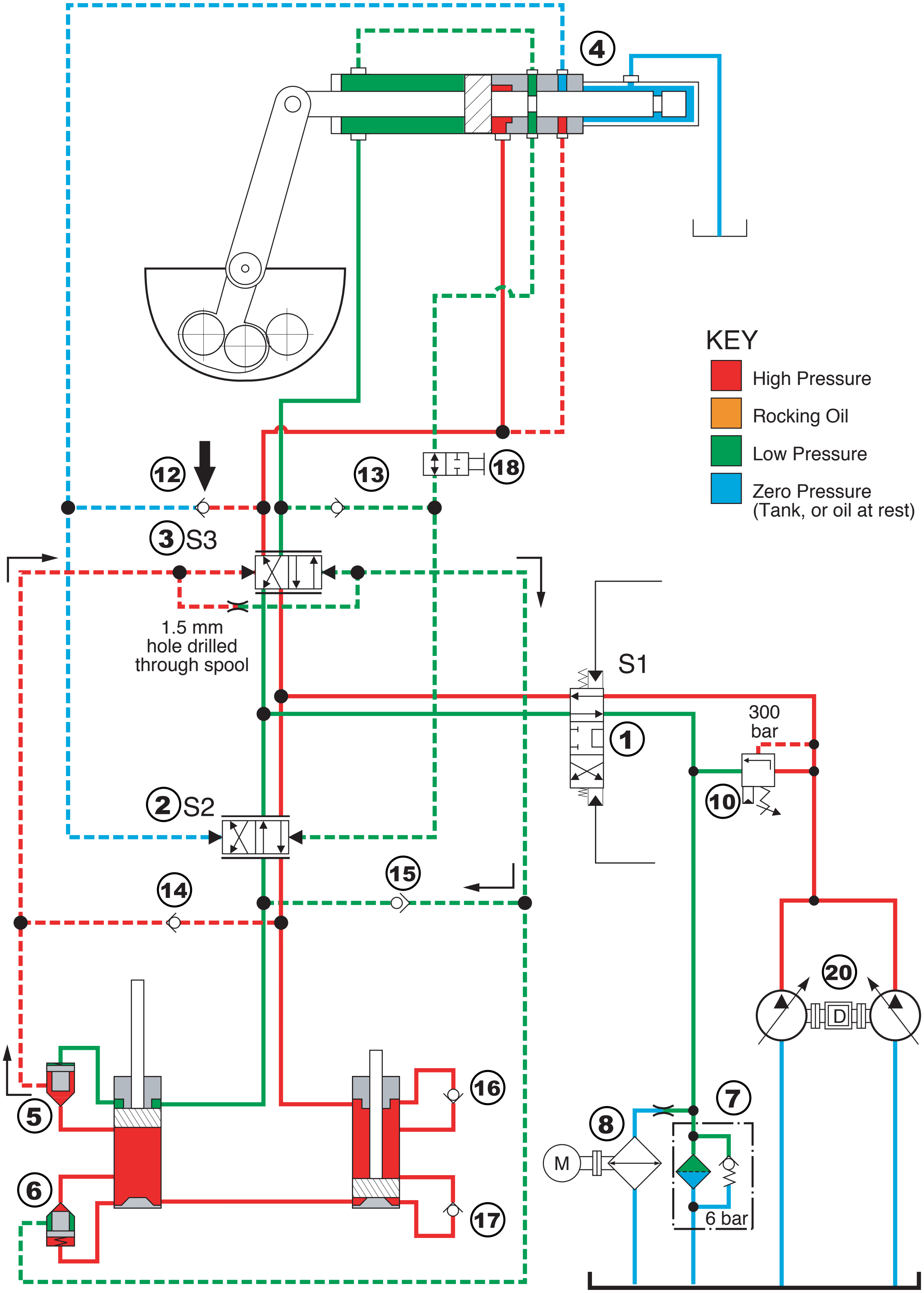


Explanation - Stroke Sequence Diagram 3

Rock valve cylinder getting oil to extend

High pressure oil from switching valve (5) has now shifted the S3 valve (3) fully to the right hand position. At this point the pressure oil to the rock valve shift cylinder (4) is changed and the right hand side of the cylinder is getting oil so that the cylinder will extend. Oil from the left hand side of the rock valve shift cylinder is routed to tank via valves (3, 1) and filter (7).

STROKE SEQUENCE DIAGRAM #3

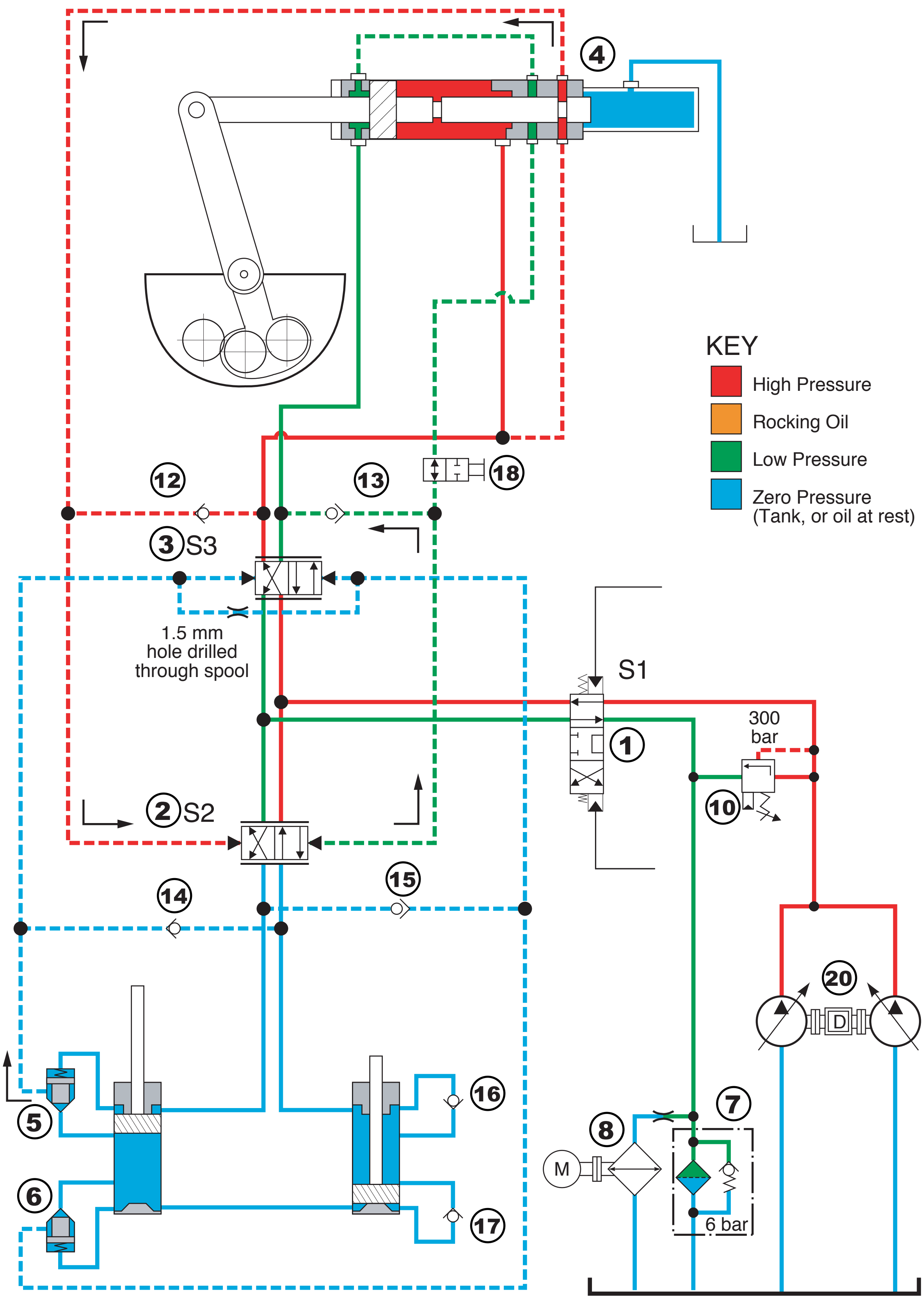


Explanation - Stroke Sequence Diagram 4

S2 valve getting signal to shift

The rock valve shift cylinder (4) has now fully extended. At this point a signal is sent to the left hand end cap of the S2 valve (2) from a signal port on the rock valve shift cylinder (4). As the S2 valve (2) shifts to the right oil from the right hand end cap of the S2 valve (2) is routed to the hydraulic tank via check valve (13), valves (3, 1) and the filter (7).

STROKE SEQUENCE DIAGRAM #4

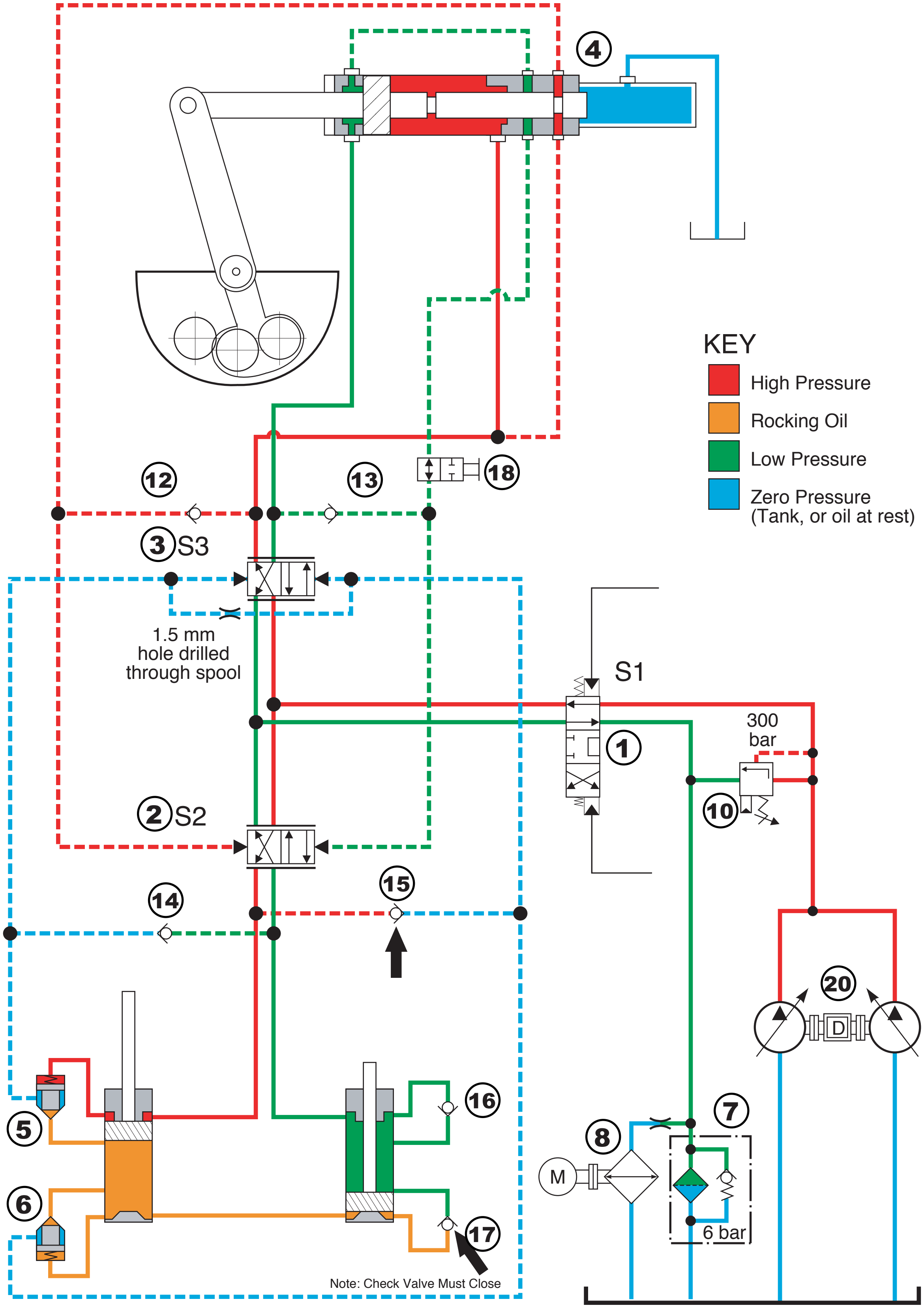


Explanation - Stroke Sequence Diagram 5

Left hand differential getting oil to move

With the S2 valve (2) fully shifted and held in the right hand position, pressure oil is routed through the S1 valve (1) and the S2 valve (2) to the rod side of the left hand differential cylinder. Please note that while the left hand differential cylinder is starting to retract, check valve (17) must close otherwise the right hand differential cylinder will not extend.

STROKE SEQUENCE DIAGRAM #5

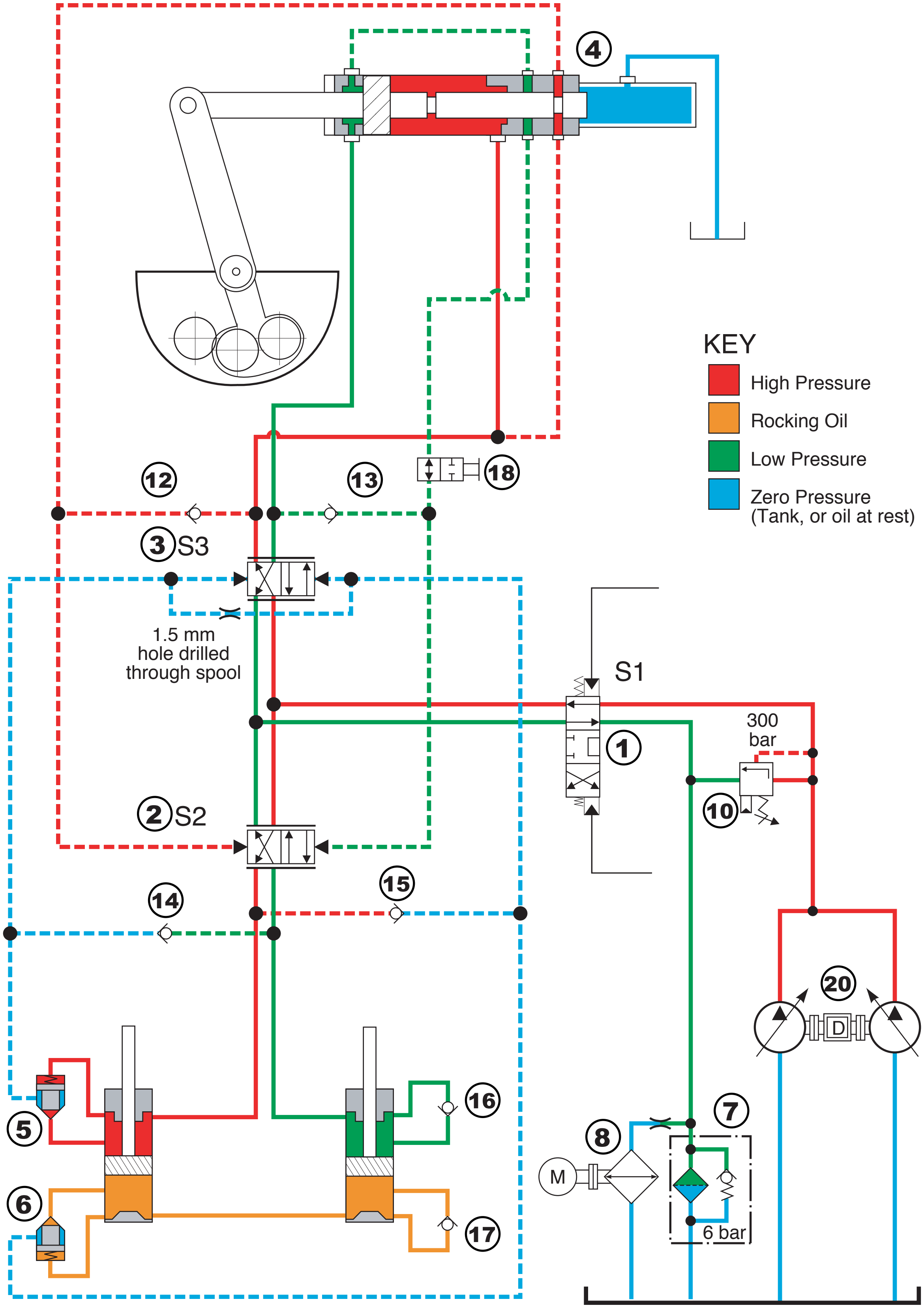


Explanation - Stroke Sequence Diagram 6

Middle of the second working stroke (diagram 6)

Pressure oil is being routed through the S1 valve (1) and S2 valve (2) to the rod side of the left hand differential cylinder causing it to retract. Oil from the piston side of the left hand differential cylinder is passed to the piston side of the right hand differential via the loop hose. The oil on the rod side of the right hand differential is going through valves (2 and 1), filter (7) and back to the tank. Oil directed through the S3 valve has the rock valve shift cylinder held in the extended position so that concrete from the right hand material cylinder is being pushed into the delivery pipe line and concrete from the hopper is being sucked into the left hand material cylinder.

STROKE SEQUENCE DIAGRAM #6



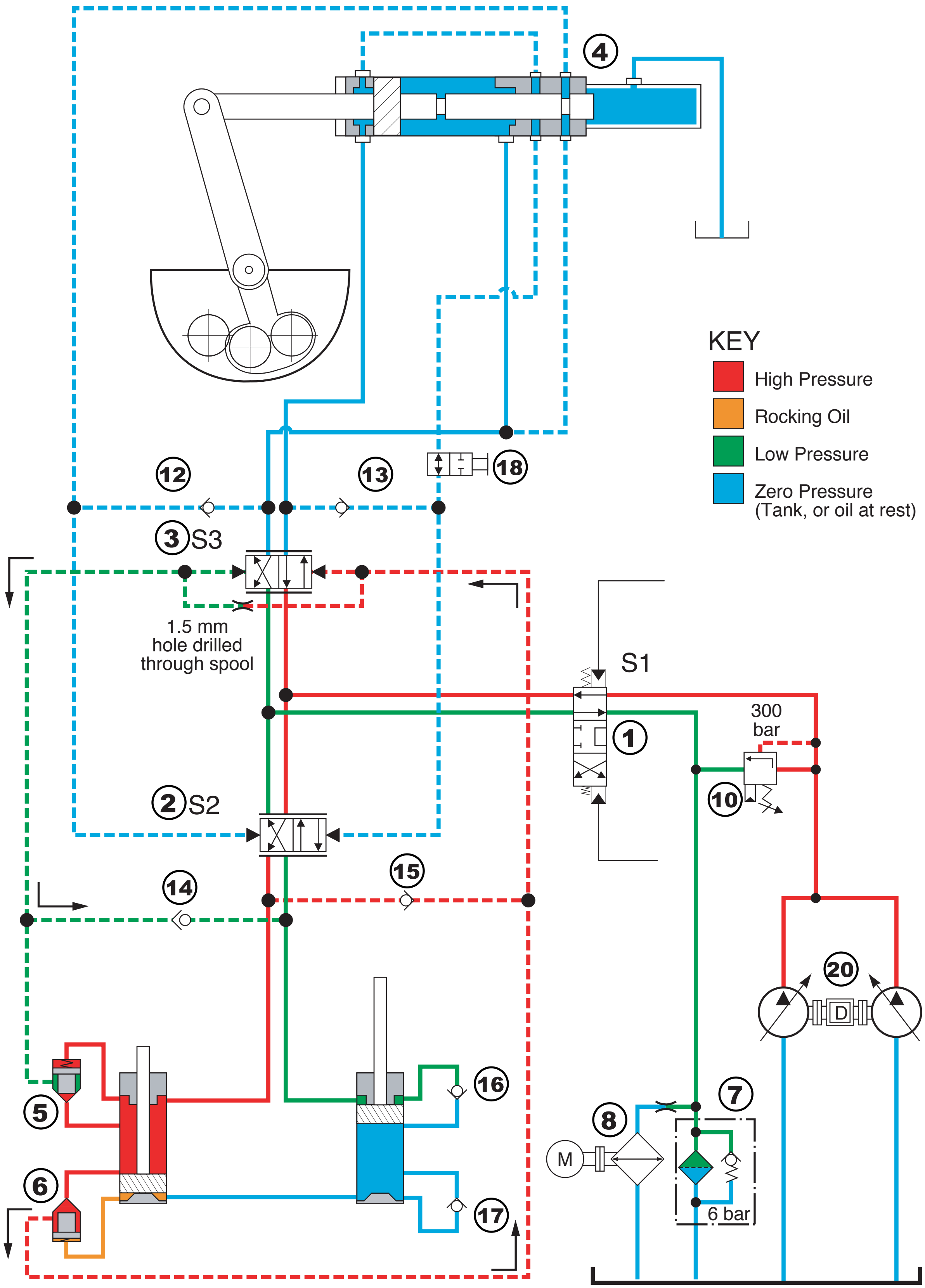
Explanation - Stroke Sequence Diagram 7

End of second working stroke (diagram 7)

The left hand differential cylinder has now fully retracted*. Switching valve (6) is sending a high pressure signal to the right hand end cap of the S3 valve (3). Oil from the left hand end cap of the S3 valve (3) is relieved via check valve (14), the S2 valve (2), S1 valve (1), filter (7) and back to the hydraulic tank.

* NOTE: If the left hand differential cylinder has not fully retracted at this point because of to much loop oil, high pressure oil will continue to flow through check valve (16) and back to the hydraulic tank until the left hand differential cylinder is fully retracted.

STROKE SEQUENCE DIAGRAM #7

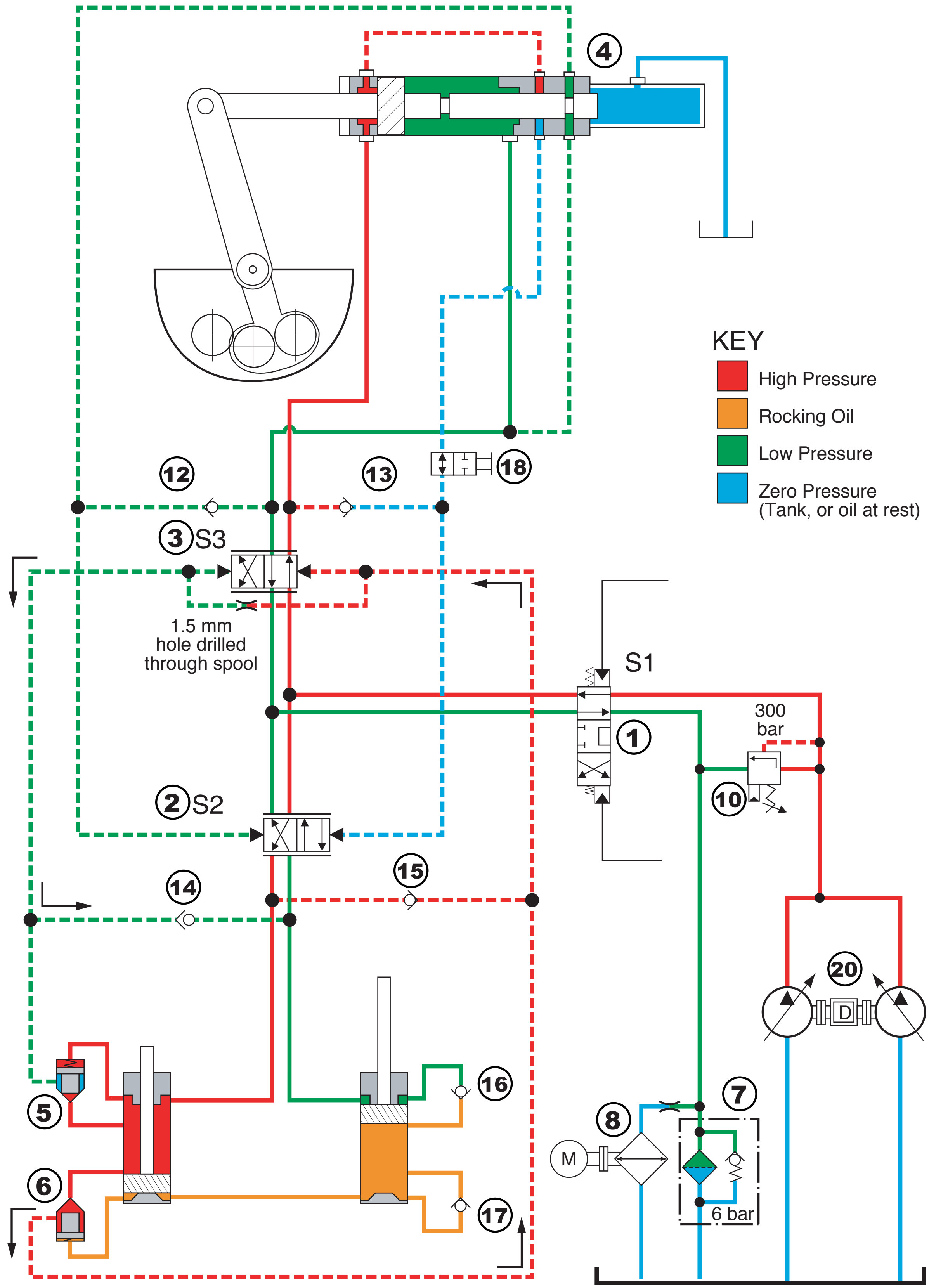


Explanation - Stroke Sequence Diagram 8

Rock valve cylinder getting oil to retract

High pressure oil from the switching valve (6) has not shifted the S3 valve (3) fully to the left hand position. At this point the pressure oil to the rock valve shift cylinder (4) is changed and the left hand side of the cylinder is getting oil so that the cylinder will retract. Oil from the right hand side of the rock valve shift cylinder (4) is being routed to tank via valves (3, 1) and filter (7).

STROKE SEQUENCE DIAGRAM #8

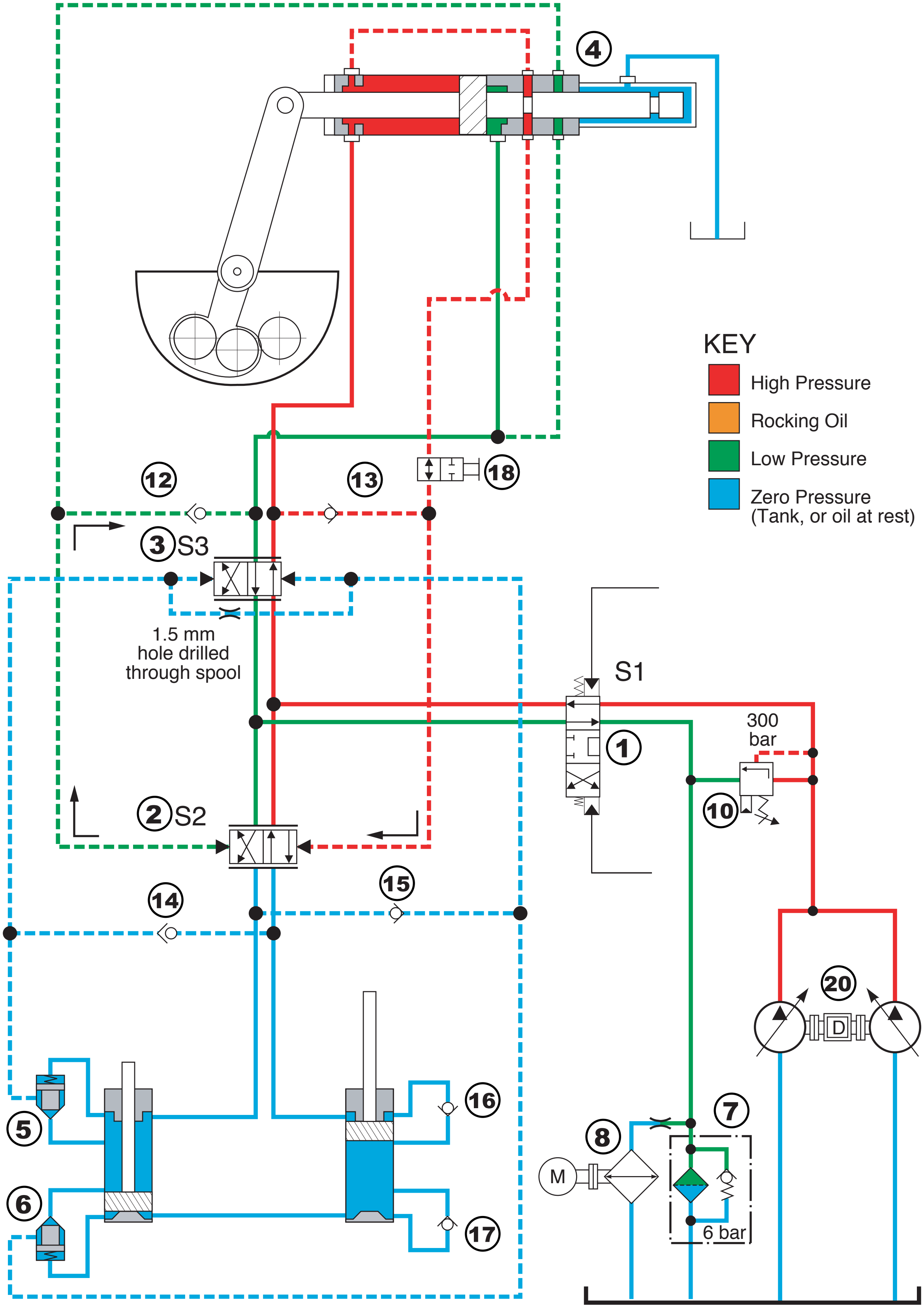


Explanation - Stroke Sequence Diagram 9

S2 valve getting signal to shift

The rock valve shift cylinder (4) has now fully retracted. At this point a signal is sent to the right hand end cap of the S2 valve (2) from a signal port on the on the rock valve shift cylinder (4). As the S2 valve (2) shifts to the left oil from the right hand end cap of the S2 valve (2) is routed to the hydraulic tank via check valve (12), valves (3, 1) and filter (7).

STROKE SEQUENCE DIAGRAM #9

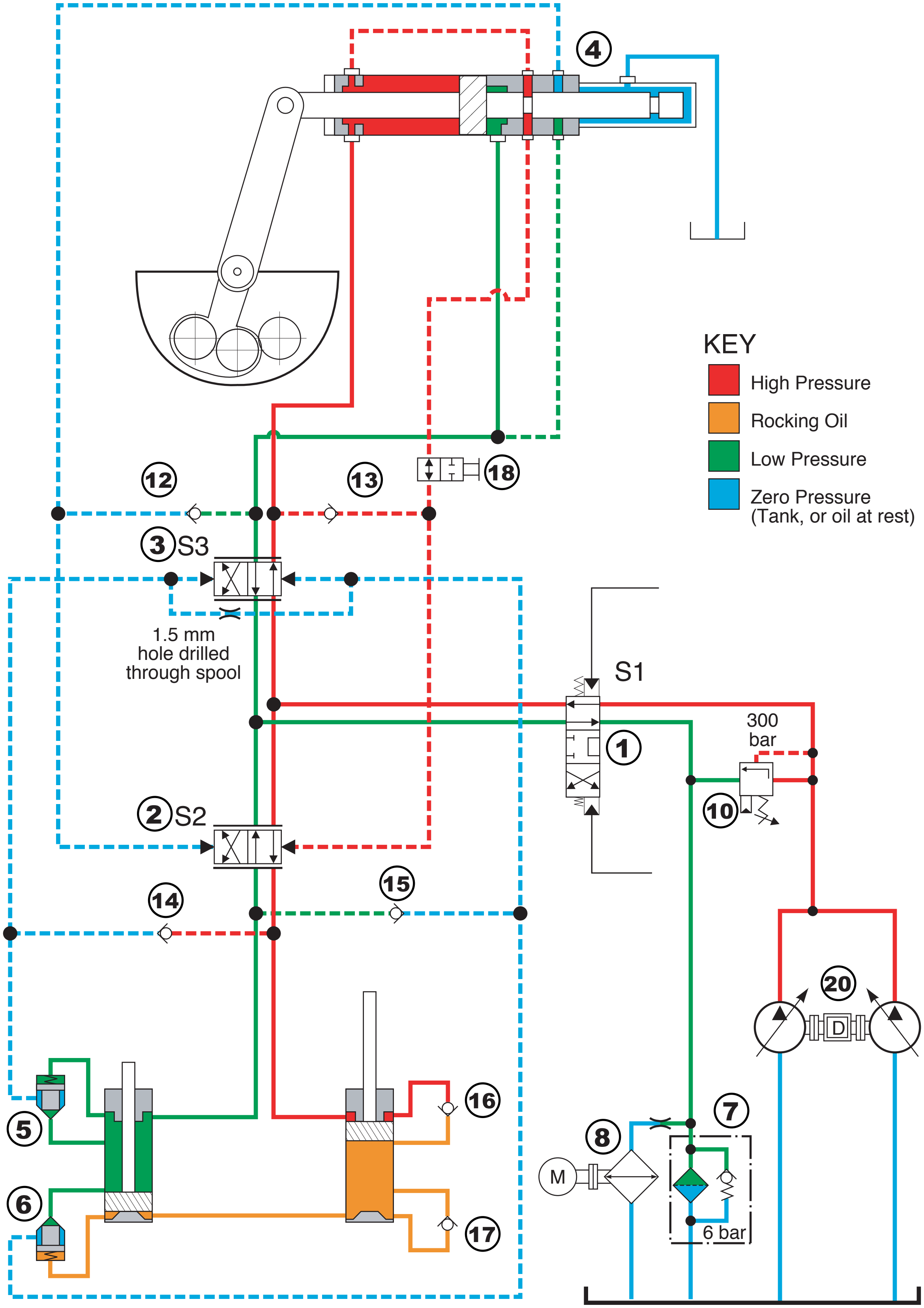


Explanation - Stroke Sequence Diagram 10

Right hand differential getting oil to move

With the S2 valve (2) fully shifted and held in the left position, pressure oil is routed through the S1 valve (1) and the S2 valve (2) to the rod side of the right hand differential cylinder. Please note that check valve (16) must close otherwise the right hand differential cylinder will not retract.

STROKE SEQUENCE DIAGRAM #10

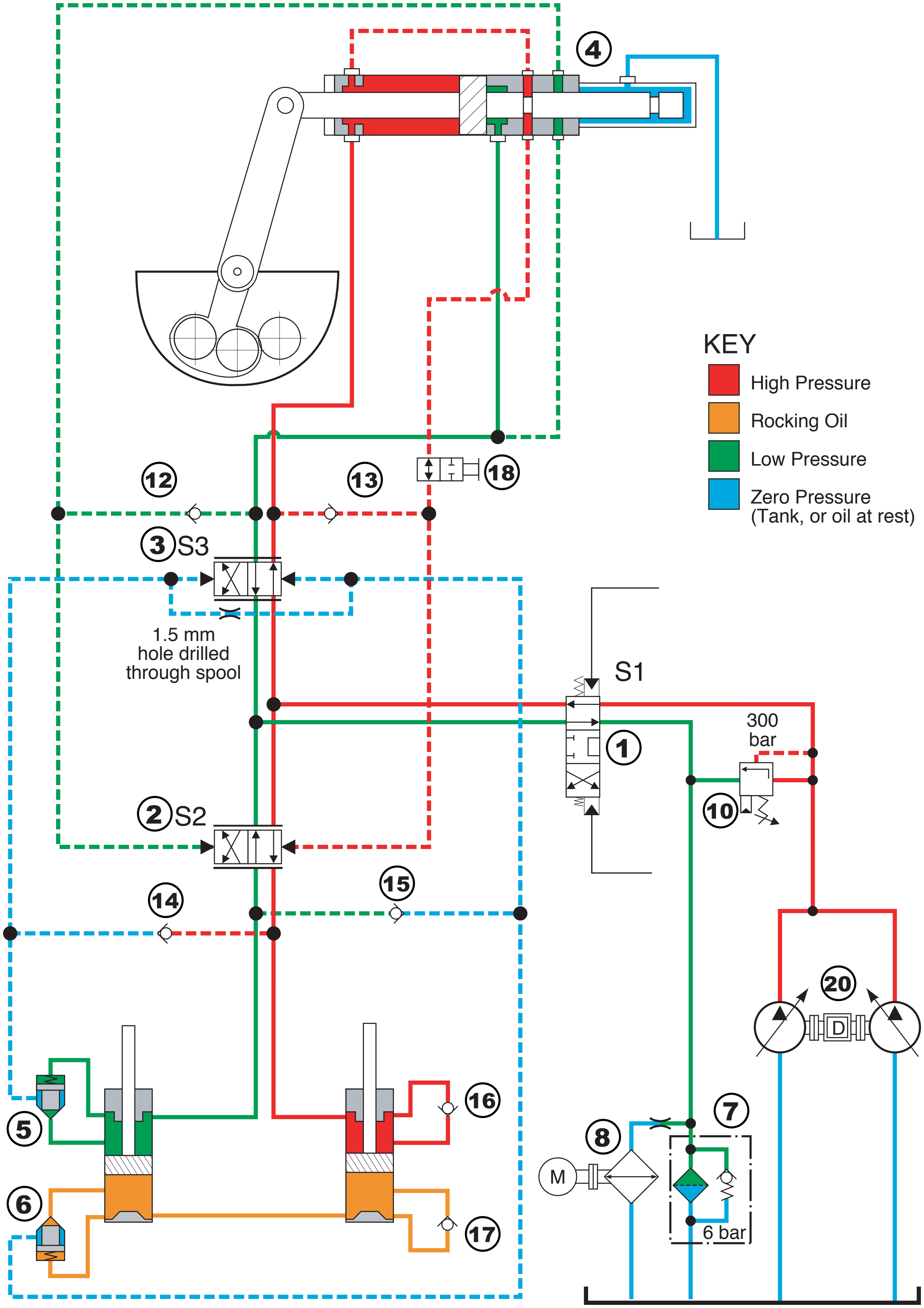


Explanation - Stroke Sequence Diagram 11

First working stroke

Refer to diagram 1 for explanation of first working stroke.

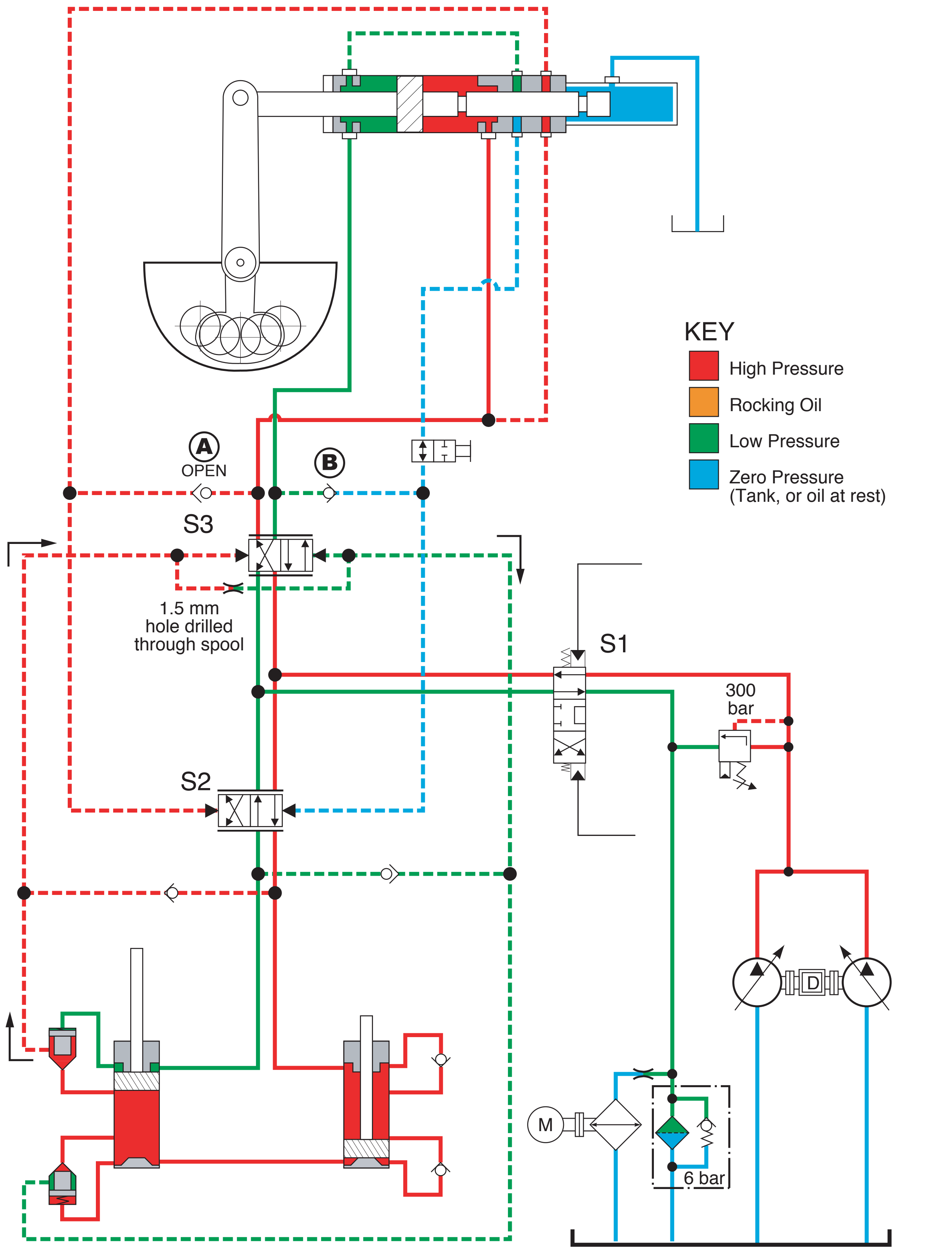
STROKE SEQUENCE DIAGRAM #11



H. Problems With the Concrete Pump

1. Differentials start to move before the rock valve has completely shifted.

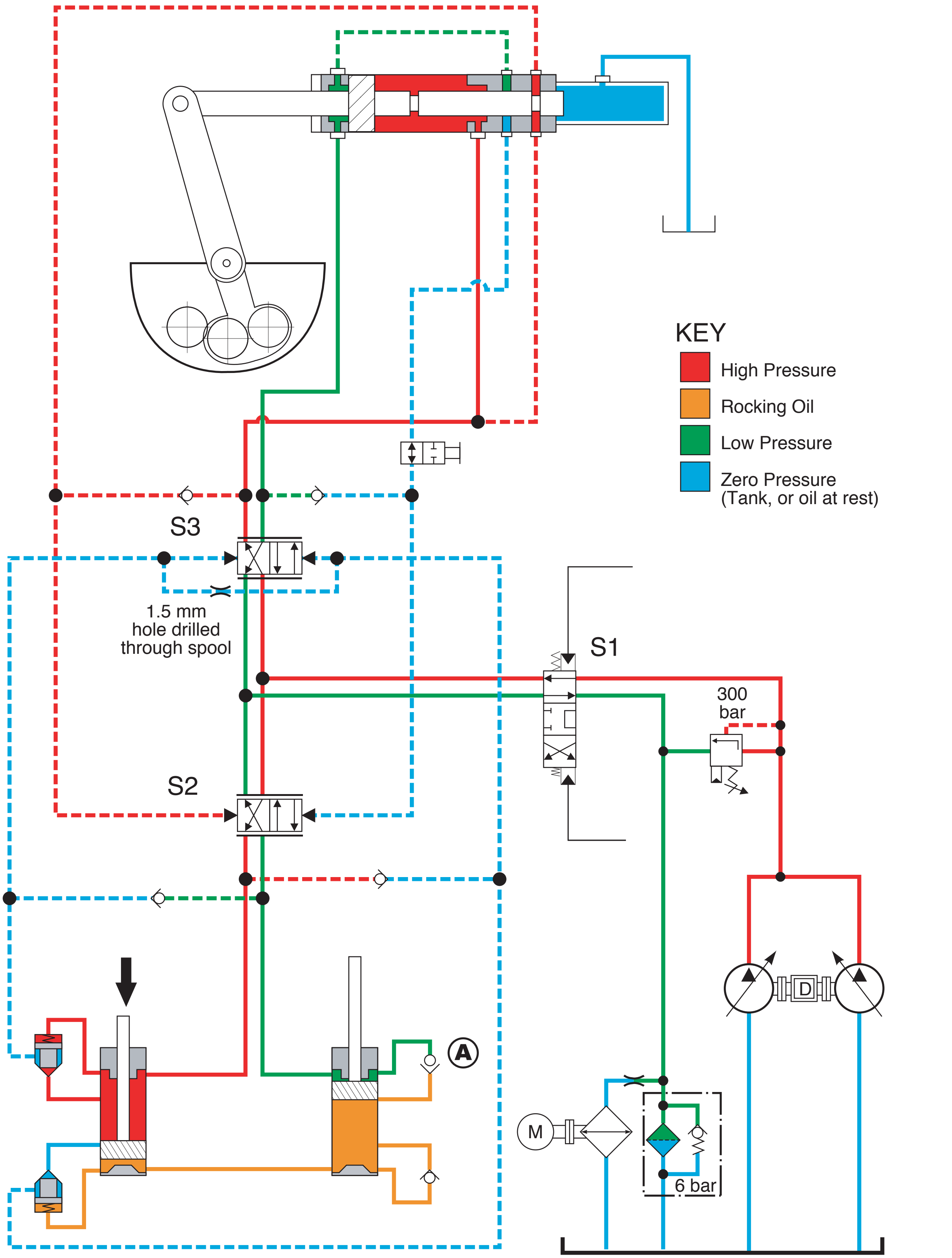
If check valve (A) is stuck open, the left hand differential would start to retract and the right hand differential would start to extend before the rock valve was completely shifted to the left. This would cause some of the concrete from the right hand material cylinder to be pumped back into the hopper. If the problem occurred while the right cylinder was extended and the left cylinder was retracted, check valve (B) has failed.


KEY
High Pressure
Rocking Oil
Low Pressure
Zero Pressure
(Tank, or oil at rest)
A
OPEN
B
S3
1.5 mm
hole drilled
through spool
S1
300
bar
S2
D
M
6 bar

H. Problems With the Concrete Pump

2. Before rock valve shifts to the right the unit builds high pressure, left differential continues to move, right differential has stopped.

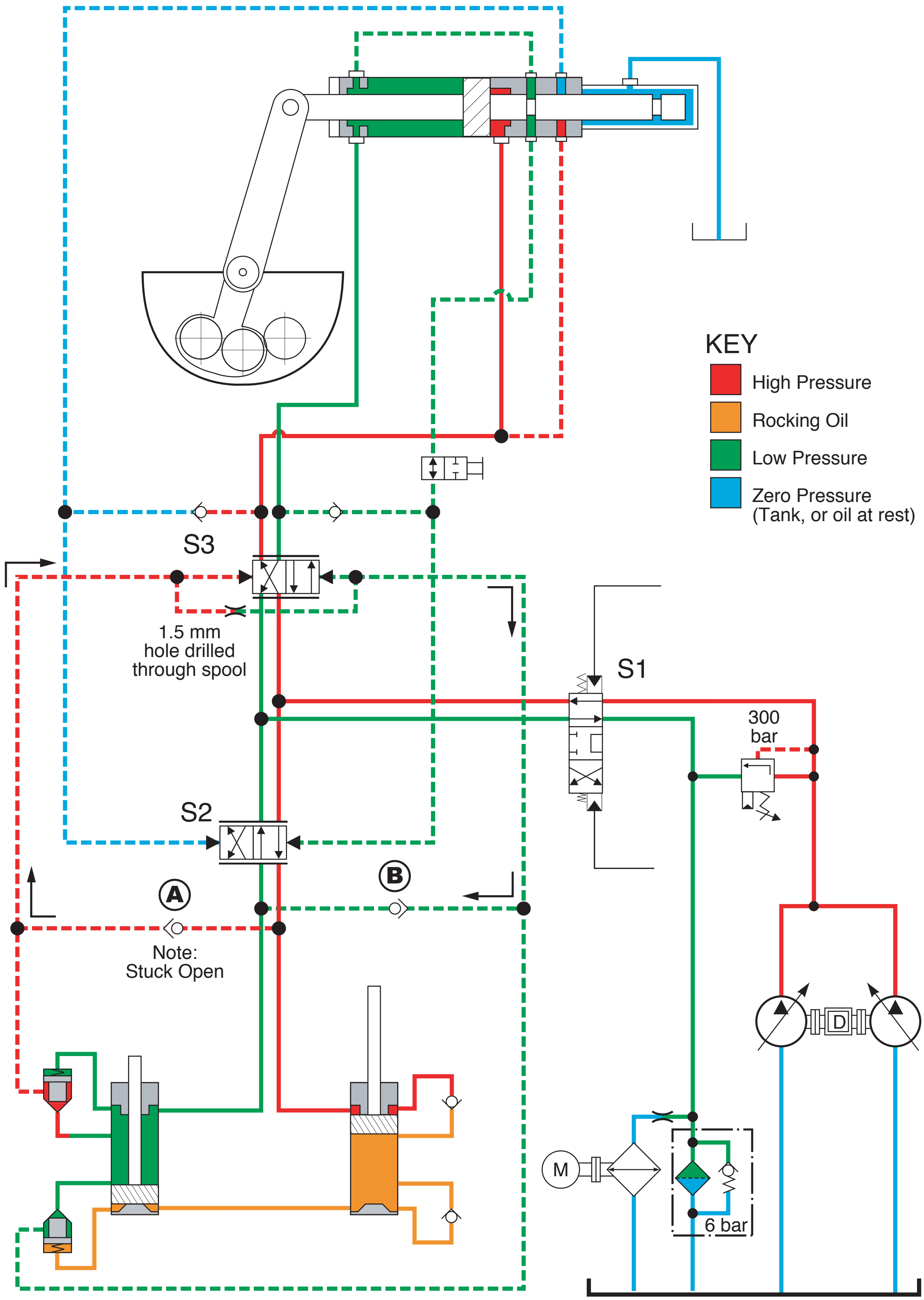
The unit has too much rocking oil and the right hand differential has reached it's stop. The left hand differential continues to get pressure oil to the rod side so that the excess rocking oil can be exhausted through check valve (A). As soon as the left hand differential has fully retracted a signal will be sent out of the switching valve to S3 valve.


KEY
High Pressure
Rocking Oil
Low Pressure
Zero Pressure
(Tank, or oil at rest)
S3
1.5 mm
hole drilled
through spool
S1
300
bar
S2
A
M
D
6 bar

H. Problems With the Concrete Pump

3A. Rock valve shifts and as soon as the differential cylinder shifts the rock valve shifts again (machine gunning).

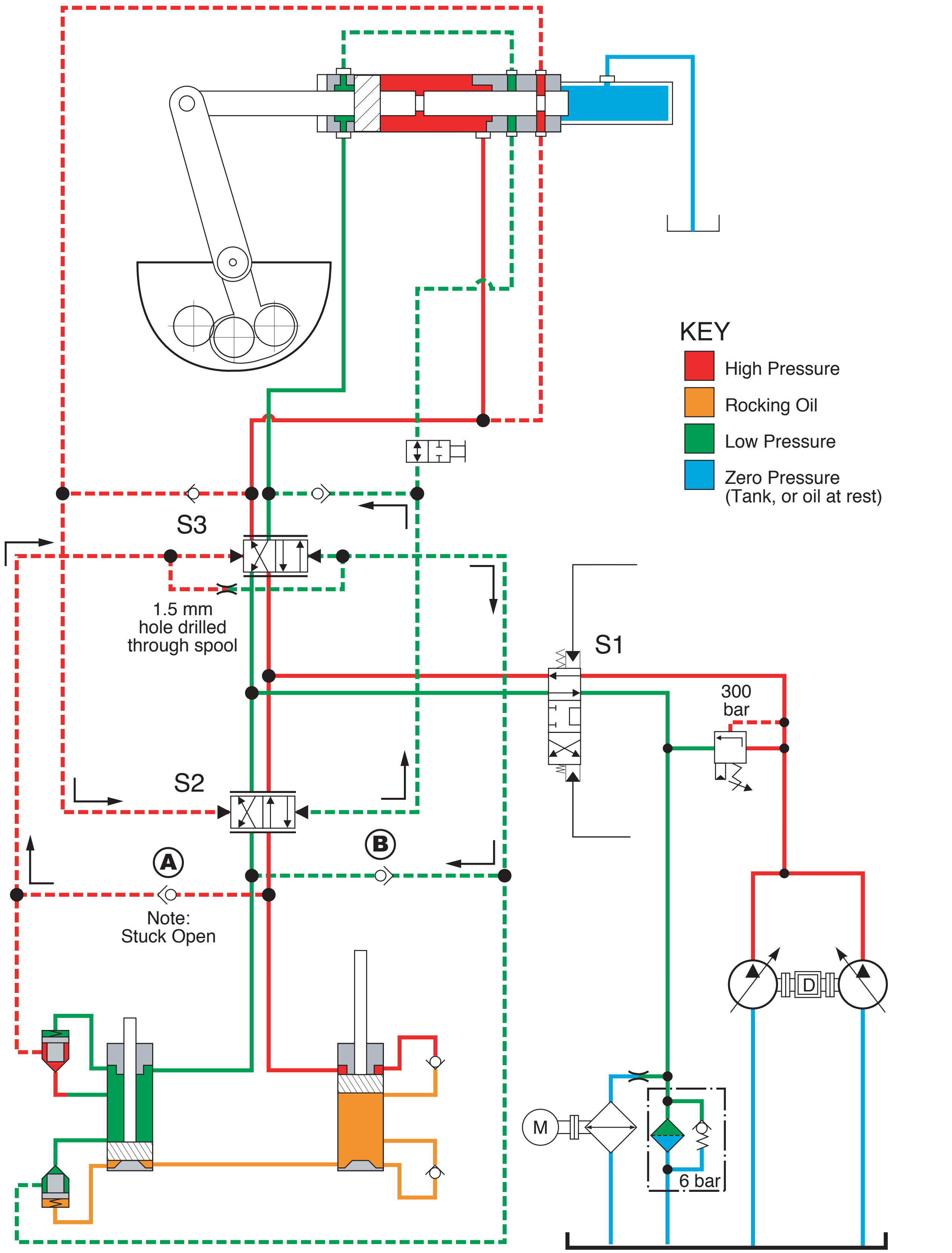
The rock valve has shifted to the right and a signal from the rock valve has shifted the S valve to the left. The pressure oil is supposed to go to the rod side of the right hand differential for the start of the next stroke. However since check valve (A) is stuck open and the pressure oil shifts the S3 valve to the right causing the rock valve to shift to the left. (See diagram 3B).


KEY
High Pressure
Rocking Oil
Low Pressure
Zero Pressure
(Tank, or oil at rest)
S3
1.5 mm
hole drilled
through spool
S1
300
bar
S2
A
B
Note:
Stuck Open
M
D
6 bar

H. Problems With the Concrete Pump

3B. Check valve (A) is stuck open and the pressure oil shifts the S3 valve to the right causing the rock valve to shift to the left.

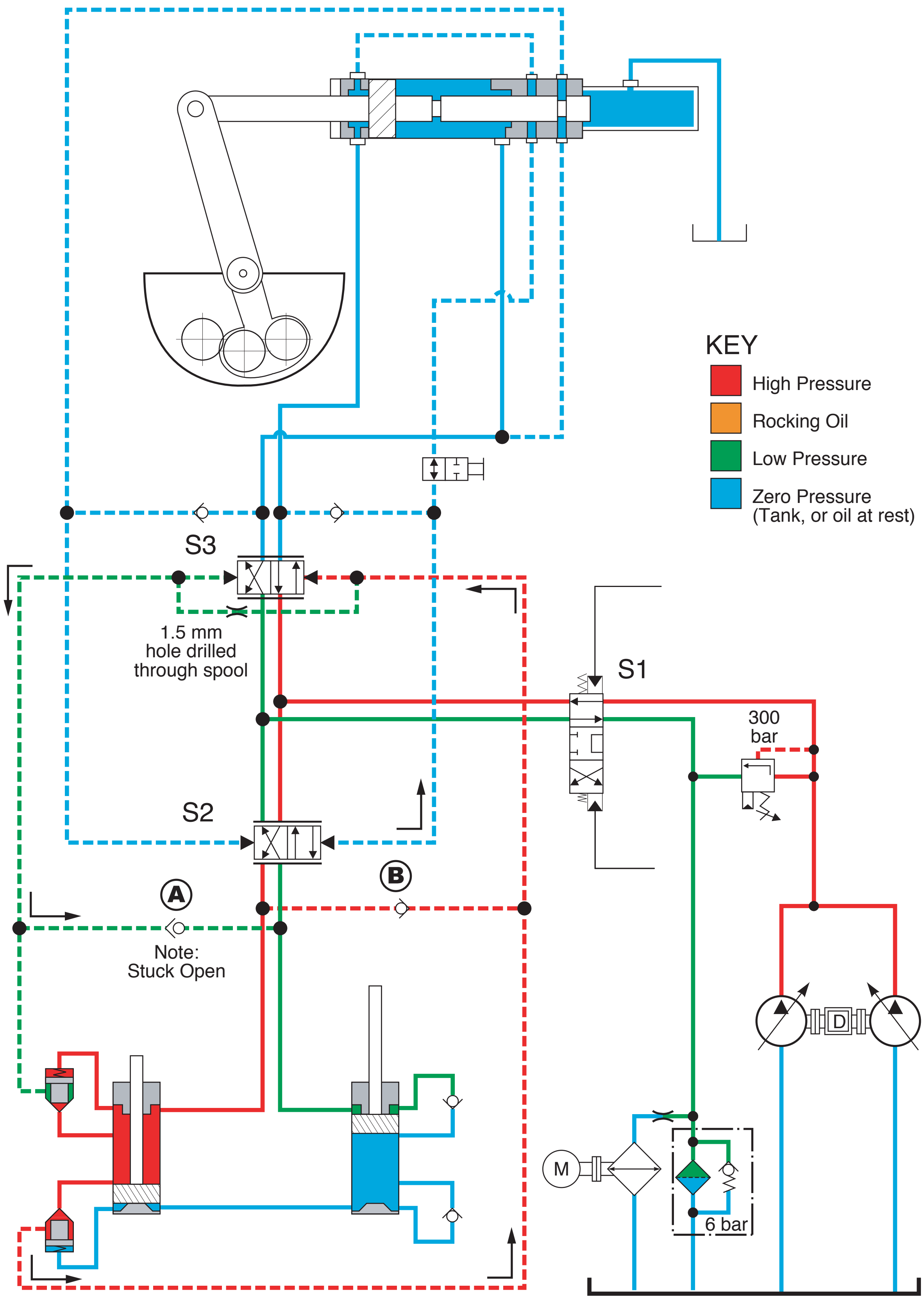
After the rock valve shifts to the left a signal is sent to the S2 valve to shift the direction of the differentials.


KEY
High Pressure
Rocking Oil
Low Pressure
Zero Pressure
(Tank, or oil at rest)
S3
1.5 mm
hole drilled
through spool
S1
300
bar
S2
A
B
Note:
Stuck Open
D
M
6 bar

H. Problems With the Concrete Pump

3C. The differentials are already in the end position for this mode so a signal is sent to the S3 valve and the rock valve will shift again to the right.

Thus we get the machine gun sound and no concrete output.

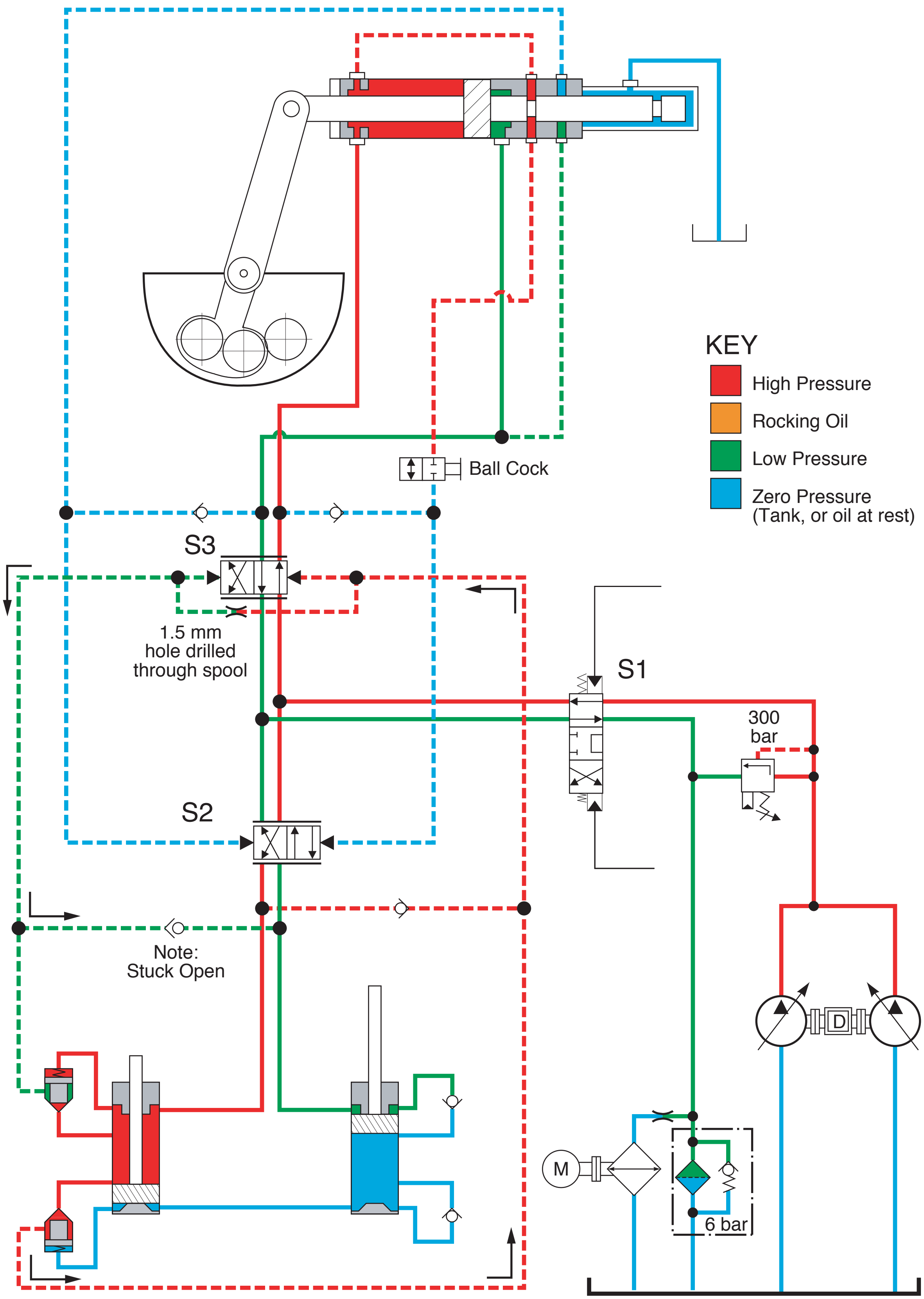

KEY
High Pressure
Rocking Oil
Low Pressure
Zero Pressure
(Tank, or oil at rest)
S3
1.5 mm
hole drilled
through spool
S1
300
bar
S2
A
B
Note:
Stuck Open
D
M
6 bar

H. Problems With the Concrete Pump

4. Rock valve shifts to the right and then the machine builds high pressure.

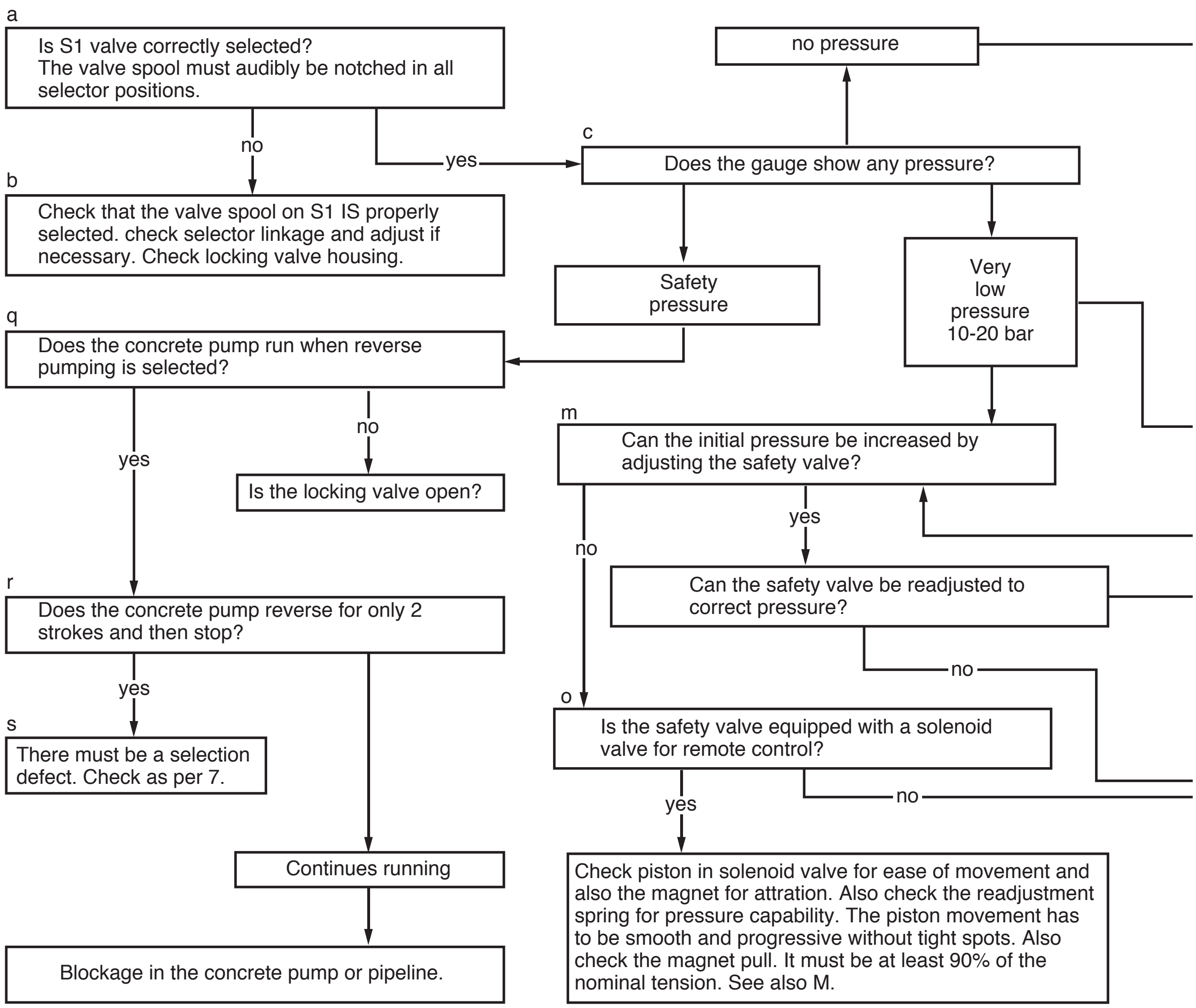
After the rock valve is done shifting to the right a signal is supposed to be sent to the right hand end cap of the S2 to shift it to the left, however the signal will not reach the S2 end cap because the ball cock is closed.

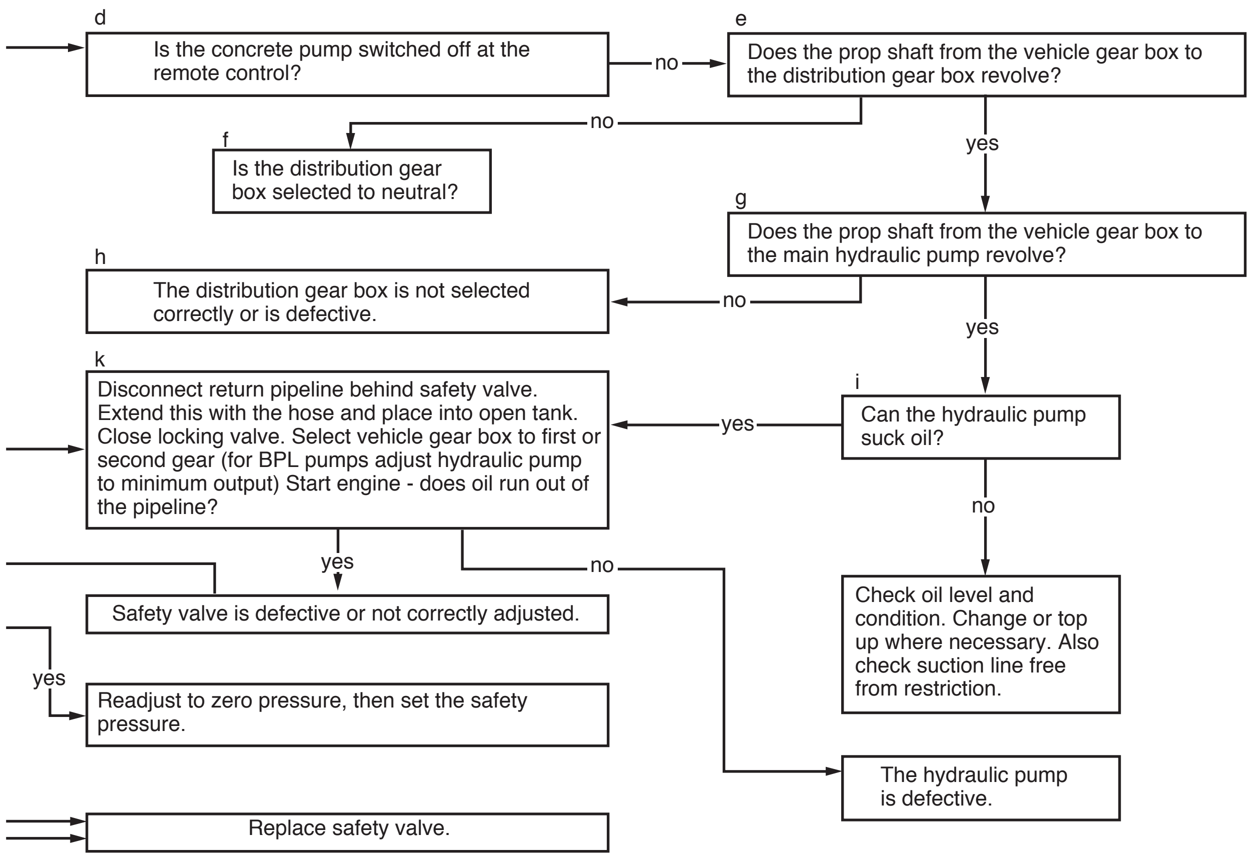
NOTE: If the ball cock was partially closed the machine would continue to stroke, however there would be a pressure spike between the time the rock valve is done shifting and the differential cylinders start moving.


KEY
High Pressure
Rocking Oil
Low Pressure
Zero Pressure
(Tank, or oil at rest)
Ball Cock
S3
1.5 mm
hole drilled
through spool
S1
300
bar
S2
Note:
Stuck Open
D
M
6 bar

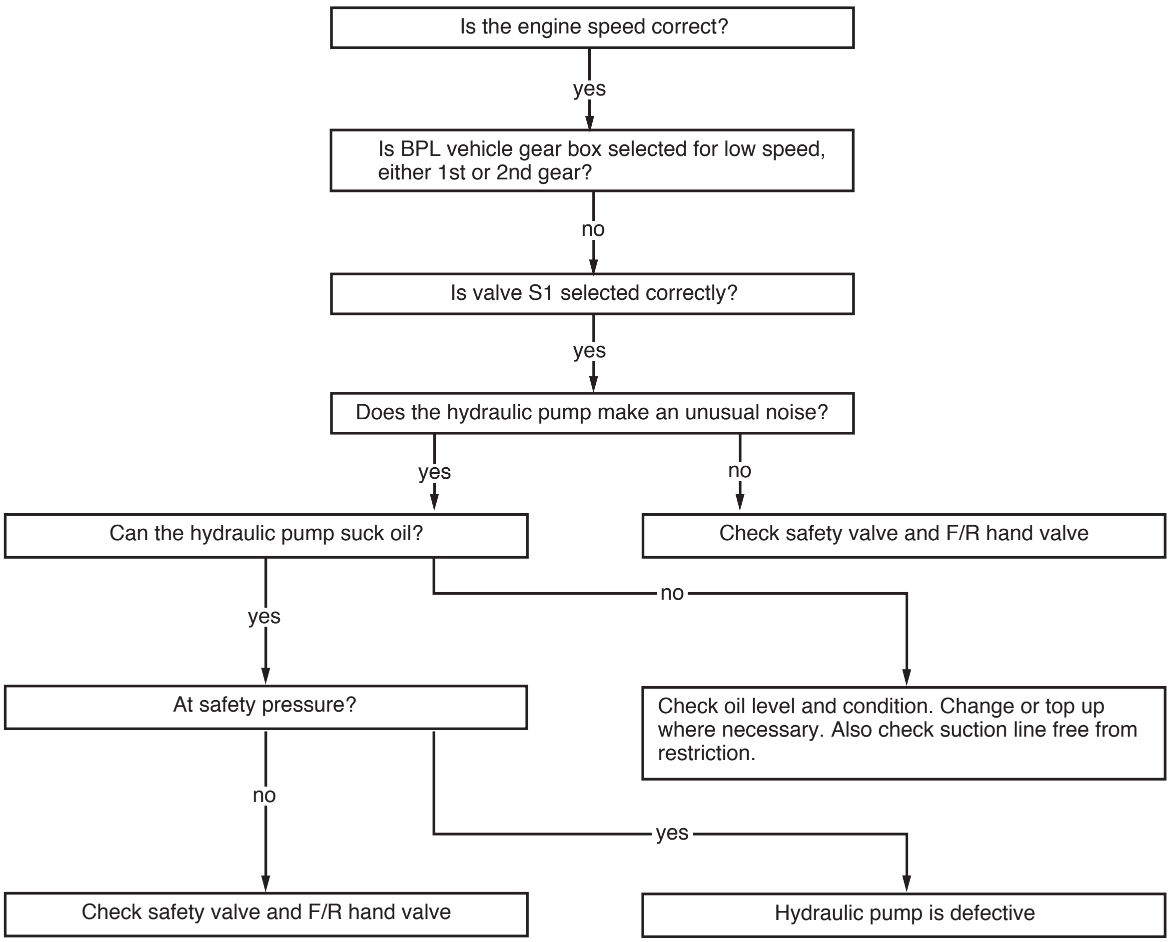
H. Problems With the Concrete Pump

5. Concrete pump does not work although it is switched on.




d
Is the concrete pump switched off at the remote control?
no
e
Does the prop shaft from the vehicle gear box to the distribution gear box revolve?
no
f
Is the distribution gear box selected to neutral?
yes
g
Does the prop shaft from the vehicle gear box to the main hydraulic pump revolve?
h
The distribution gear box is not selected correctly or is defective.
no
yes
k
Disconnect return pipeline behind safety valve. Extend this with the hose and place into open tank. Close locking valve. Select vehicle gear box to first or second gear (for BPL pumps adjust hydraulic pump to minimum output) Start engine - does oil run out of the pipeline?
yes
i
Can the hydraulic pump suck oil?
no
yes
no
Safety valve is defective or not correctly adjusted.
Check oil level and condition. Change or top up where necessary. Also check suction line free from restriction.
yes
Readjust to zero pressure, then set the safety pressure.
The hydraulic pump is defective.
Replace safety valve.

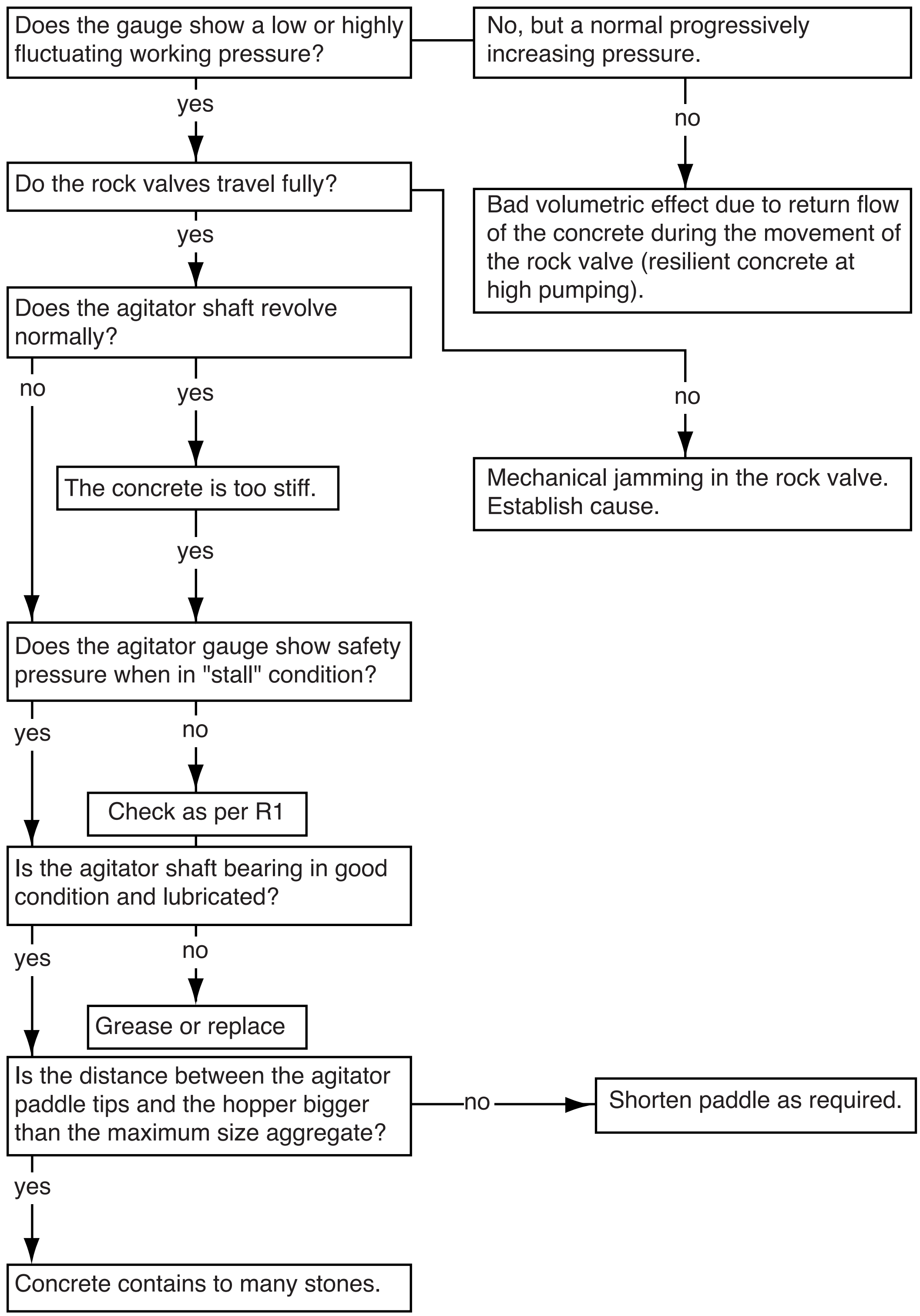
6. Concrete pump runs very slowly (few strokes) at very low pressure.



7. Concrete pump runs with normal number of strokes. The output is only half as high as it would correspond to the number of strokes. The gauge alternatively shows one stroke with normal pressure and another stroke with a very high pressure. The water level in the water box is rising and falling in the same sequence.

One ram has detached itself from the piston rod.

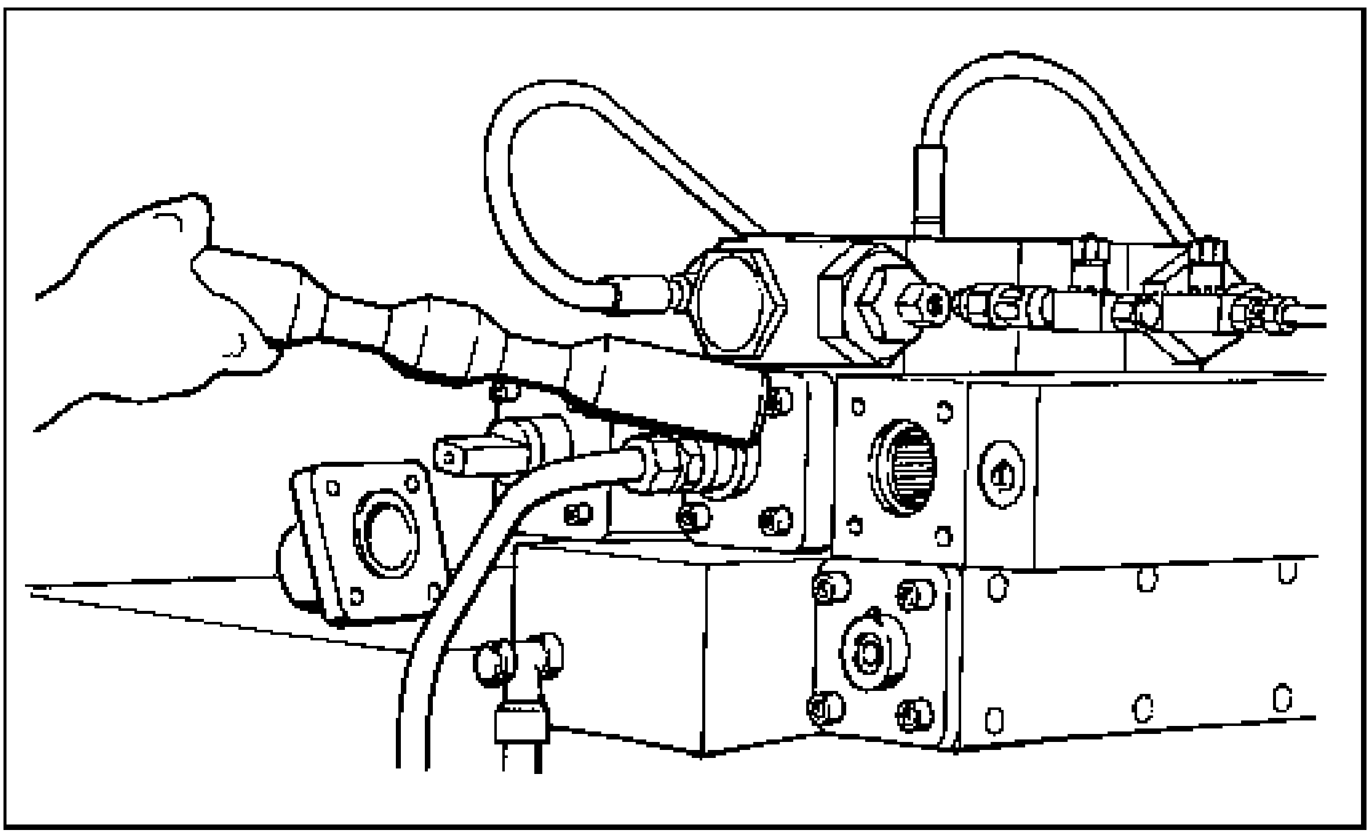
8. Concrete pump runs with normal number of strokes. The output is less than would correspond to the number of strokes.



9. After every 2nd stroke the concrete pump stops for a while. At this time the gauge indicates safety pressure. On the other stroke there is no interruption.

Does the "stalling happen?

- before the movement of the rock valve?
  - Check for too much rocking oil or bad orifice in the S3 spool.
- b after the movement of the rock valve
  - c Ball cock is partially closed or S2 has difficulty moving because of foreign bodies between the valve and control piston. Remove both end covers, push piston out, see figure below. Remove all foreign particles and deburr all edges of piston valve body.



10. The concrete pump runs with too many strokes. It looks as if it is running faster. In fact it is running at a constant speed but with a shorter stroke. Check the movement of the piston rods in the water box.

Check the movement of the piston rods in the water box

A

Both pistons are working in the front parts of the cylinders.

If the fixtures for the piston do not enter the water box or only enter partialy then there is too much compensating oil.

Check both cylinder piston rings, also cylinder feed lines and internal bore surface.

B

One piston operates in the front part of the cylinder, the other piston operates in the rear part of the cylinder.

Refer to trouble shooting item Number 3

11. The hydraulic oil tends to overheat - in excess of 80°C.

a. The safety valve is set too low and prematurely vents off oil back to tank.
   1. Check operation of safety valve (see G), replace where necessary.
b. The ball cock is not fully open.
c. The S1 valve does not fully engage.
d. The rock valve shift cylinder is defective.
e. The forward/reverse valve is defective.
f. The working pressure is nearly as high as the safety pressure.
g. Reduce pumping speed to reduce the working pressure requirement.
h. In nearly all cases of excessive oil heating the number of strokes will be found lower than normally obtained.
i. Safety valve vent not properly closed. If proper pressure can be achieved in reverse and not forward and S1 valve is working properly you must replace forward/reverse hand valve.
j. Pressure system only using the throttle valves. Note pressure. Pressurize system only using locking valve. If pressure is higher using locking valve check for bypass in differential cylinders.

I. Problems With the Placing Boom, Remote Control and Hydraulic Outriggers

M1. All boom functions can be operated manually but not with the remote control.

All boom functions can be operated manually but not with the remote control. Therefore check the following:

a. Is the main switch of the remote control on? (Item 8 on boom electrical schematic)
b. Is the cable plug fully pushed into the socket of the terminal box?
c. Is the ignition key of the vehicle fully pushed into the ignition lock?
d. Does the gauge for the pre-control pressure indicate a minimum of 6 bar?
e. Where a lower pressure is found the pre-control valve has to be readjusted to 7 bar.(Item 11 on boom hydraulic schematic)
f. Is the fuse in the terminal box in tact? (Item 9 on electrical schematic)
g. If items a-e check out OK, the main electric feed line, continuous duty solenoid, main fuse, and switch in the cab have to be checked against the circuit diagram for faults.

If the unit is a 1989 model or later and equipped with a bypass valve (Item 37, 38 on Hydraulic Schematic) you can disregard items c and f.

M2. One function can be controlled manually but not with the remote control.

a. An internal wire in the cable is loose at the terminal block of the junction box.
b. An internal wire at the respective switch in the remote control unit is loose or possibly the switch is defective.
c. An internal wire in the cable is broken. Check with an AVO meter or similar.
d. The plug contact on the solenoid of the non-working function is either loose or corroded.

For test purposes the plug contacts on the solenoid valve of the non-working function can be changed using one from a known working function. If this fails to effect a cure and the, non-working still does not function, then the defect has to be traced through the respective solenoid valve, pre-control valve, pre-control plumbing of hand valve

M3. No one boom function is available whether operated manually or by remote control.

When the function is being operated, does the operating gauge register?

1. Full pressure - see (a) below.
2. Lower pressure - see (b) below.

a. The orifice belonging to the boom function in the feed or return line is blocked. Alternatively the oil from the oil from the opposite side of the cylinder cannot exhaust back because the HER safety valve does not open. The spindle of the control piston for the valve is either broken or jammed. Try to actuate the control piston, replace either the piston or the complete valve. (see also M9)

b. The secondary safety valve in holding valve relevant to the boom motion is maladjusted or defective. Adjust the secondary safety valve (integrated with the HER safety valve) to a higher pressure. If half a turn of the setting pin does not provide a distinct pressure increase, the valve is defective. (see M8 for instructions on setting safety valve)

M4. One motion is very slow. Full pressure is available.

The oil from the opposite side of the cylinder can only flow very slowly into the return line. The orifice in the supply or return line of the relevant motion is blocked.

M5. The gas actuation via remote control does not function.

As under M2. as the speed operation is hydraulically controlled utilizing the pre-control pressure, all hints as under M1 (d) will apply analogously.

M6. The concrete pump cannot be

switched off with the remote control.

a. The switch on the remote control defective.
b. The relay in the distributor box of the remote control is defective.
c. The cable connections to the switch relay or solenoid valve are loose or corroded.
d. The piston on the backside of the forward/ reverse hand valve has come loose.
e. No pre-tension pressure in the system.
f. Solenoid valve for forward/reverse is defective.

M7. The lowering movements of the boom or the flyer are jerky. There is then a danger of breaking the boom.

a. The return oil can escape too fast from the cylinder. The orifice in the return line can be oversized due to wear. Refer to the circuit diagram to obtain correct diameter off the orifice assembly.
b. The hydraulic pump is not fed in sufficient quantity and therefore the effected cylinder side cannot be replenished in the required time. Check the oil tank level, suction line and hydraulic pump.

M8. Boom or fly assembly creeps down slowly even though the motion has not been selected.

The HER safety valve on the relevant cylinder side does not close fully or properly. It must be checked whether the leakage occurs on the check valve or on the secondary safety valve. To do this the boom must be brought into a position where the weight of the boom produces pressure in the relevant cylinder side. Simply arrange that the boom can still be in a position to creep down slowly but the HER safety valve is accessible for dismantling hoses. Shut truck off. The pressure line and the leakage oil line should be loosened.

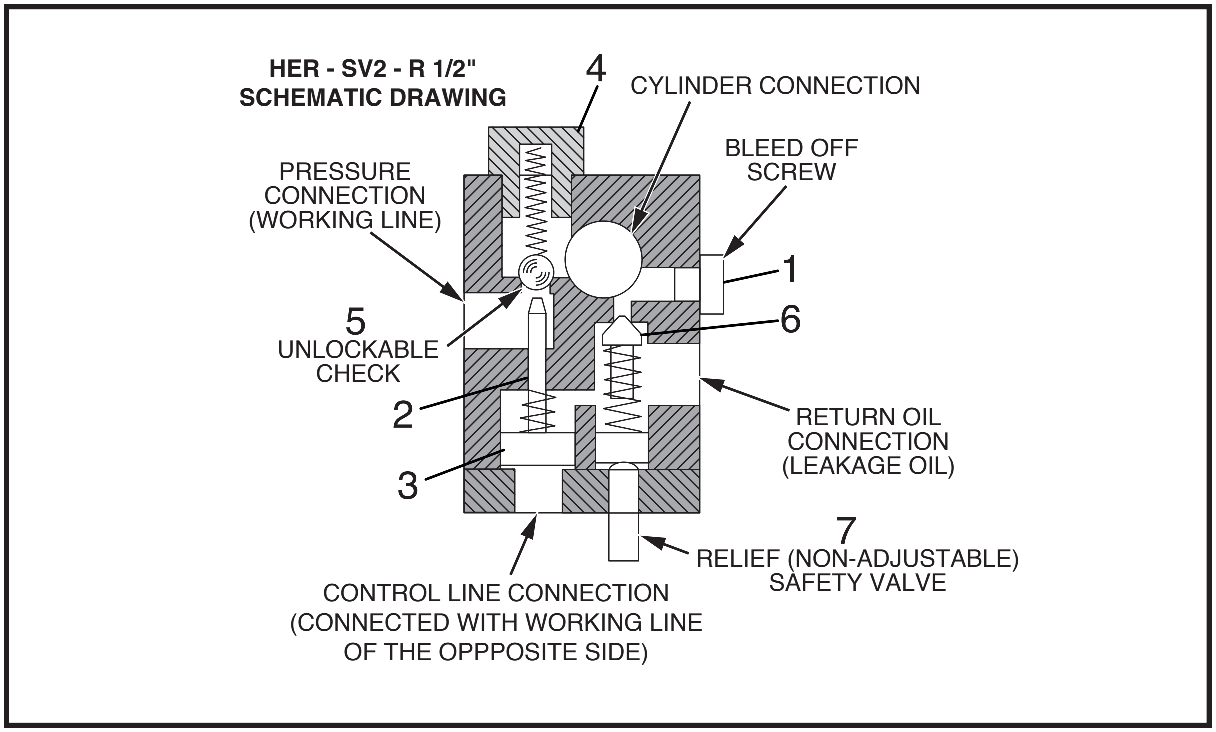
a. Oil seeps from high pressure connection. The check valve is no longer oil tight. After all pressure has been relieved from boom and cylinder replace HER safety valve.
b. Oil seeps from the leakage oil pipe connection. This means a secondary safety valve is set too low. As soon as the pressure pin (Pos. 7, see drawing on next page) is screwed in by 1/4 to 1/2 turn, the oil leakage and secondly the creeping of the boom should stop. However, if oil still seeps out, check the effectiveness of the cone in the seating. Before removal of the safety valve the boom must be supported in order to depressurize the cylinder.

The HER (hydraulically unlockable check valves) prevent the boom lowering in jerks should the high pressure line break. However, during the downward motion the oil must be able to flow from the cylinder. For this purpose the check valve must be open and this happens when the oil is conveyed to the opposite side of the cylinder and this pressure (min. 30 bar) opens the check valve via a control piston (Pos. 3).

The secondary safety valves protect the cylinders against excess pressure particularly when the oil pressure is added to the static pressure generated by the weight of the boom from the opposite cylinder side. Both pressures accumulate and would influence the efficiency and reliability of the cylinder and cylinder seals, if it were not for the secondary safety valve ability to absorb the excess pressure. Therefore the secondary safety valves must not be set to any desired pressure.

For precise adjustment, remove the locking screw (Pos. 1) on the HER safety valve and connect the pressure gauge. This gauge must show a measuring range of minimum 400 bar. For the correct pressure setting see the circuit diagram.

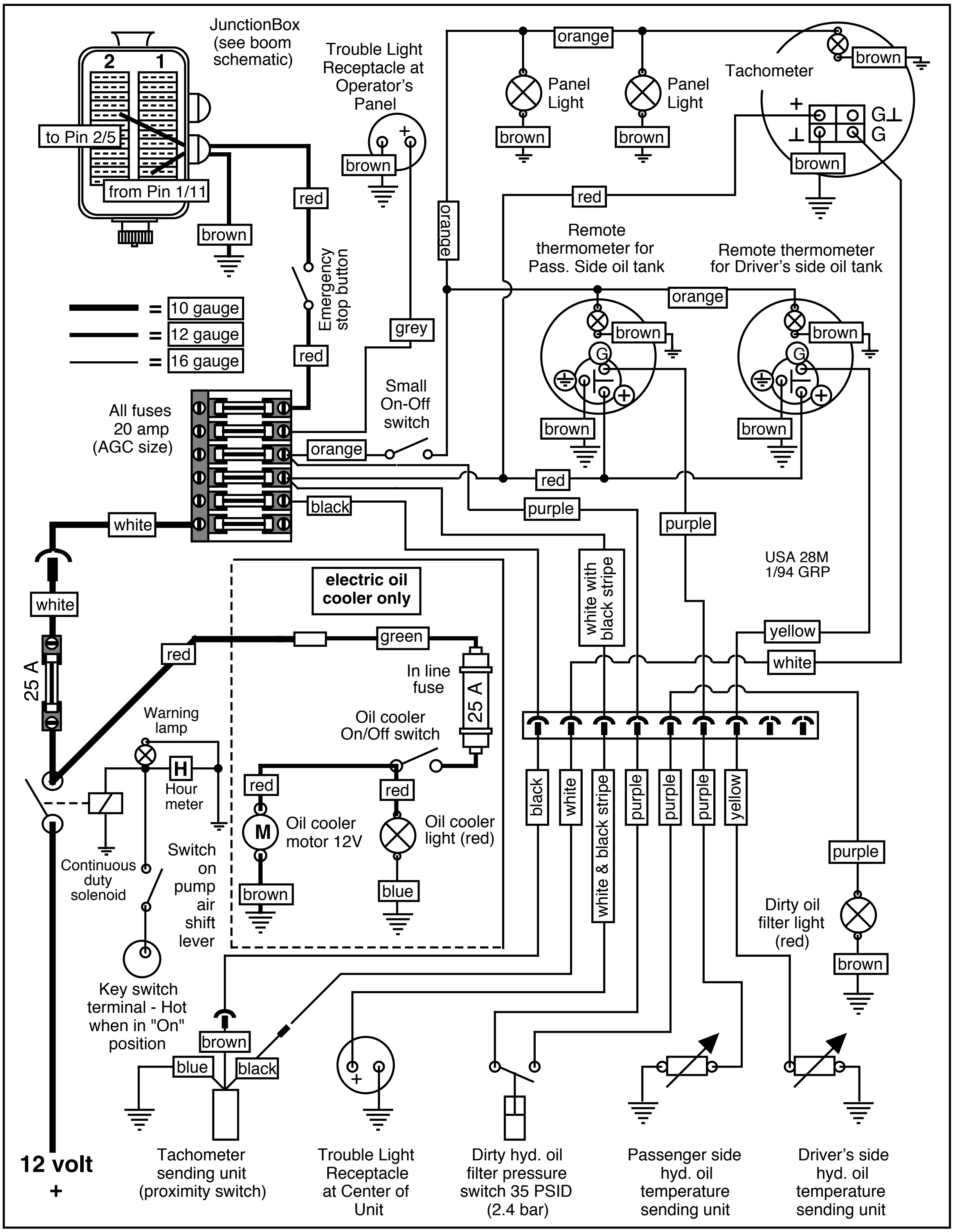
HER Schematic - Holding Valve



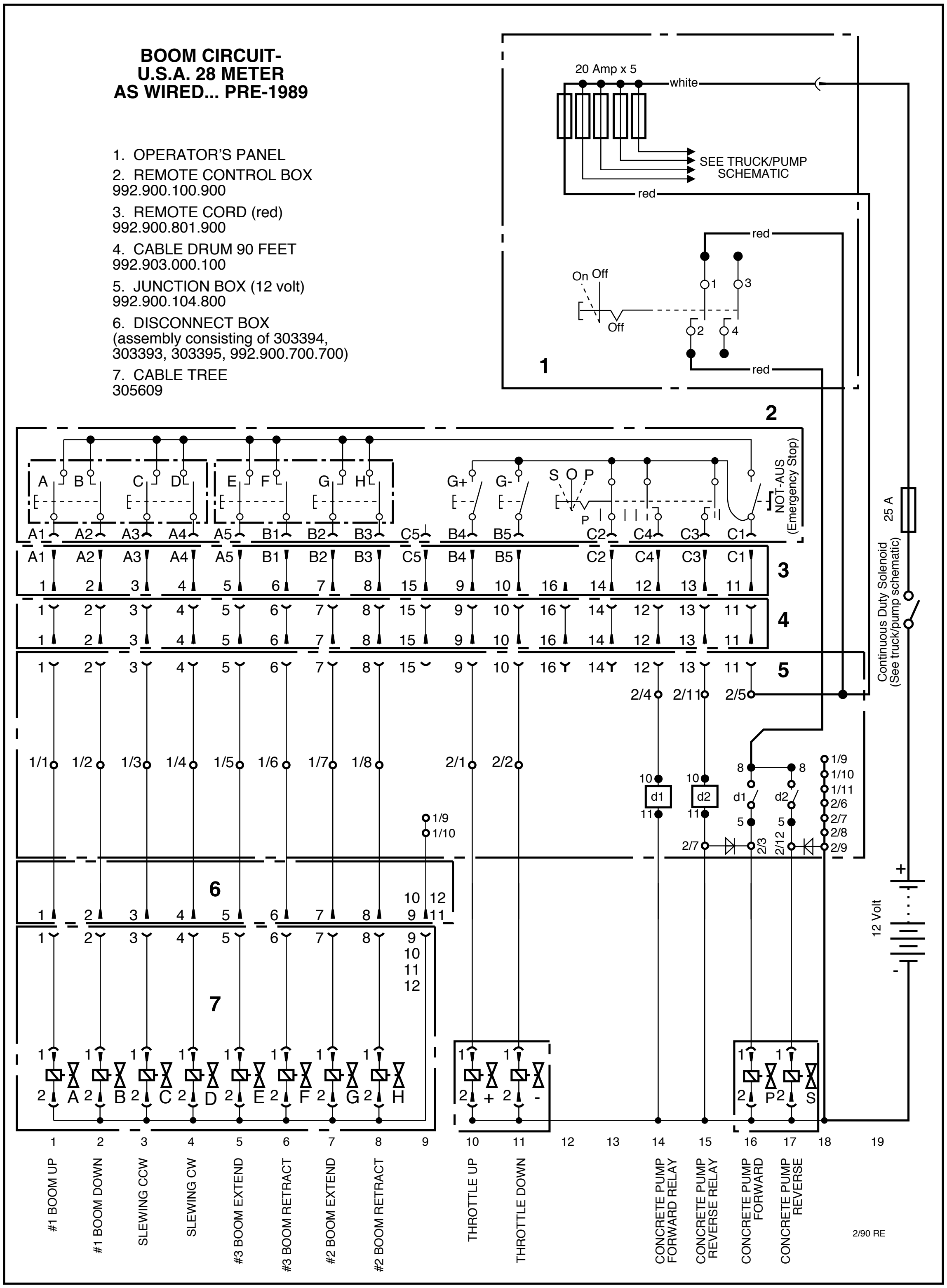
1. Gauge port plug
2. Spindle for control piston
3. Control piston
4. Locking plug for check ball and spring
5. Check ball and spring
6. Secondary safety valve
7. Pressure Pin

SCHWING AMERICA INC.

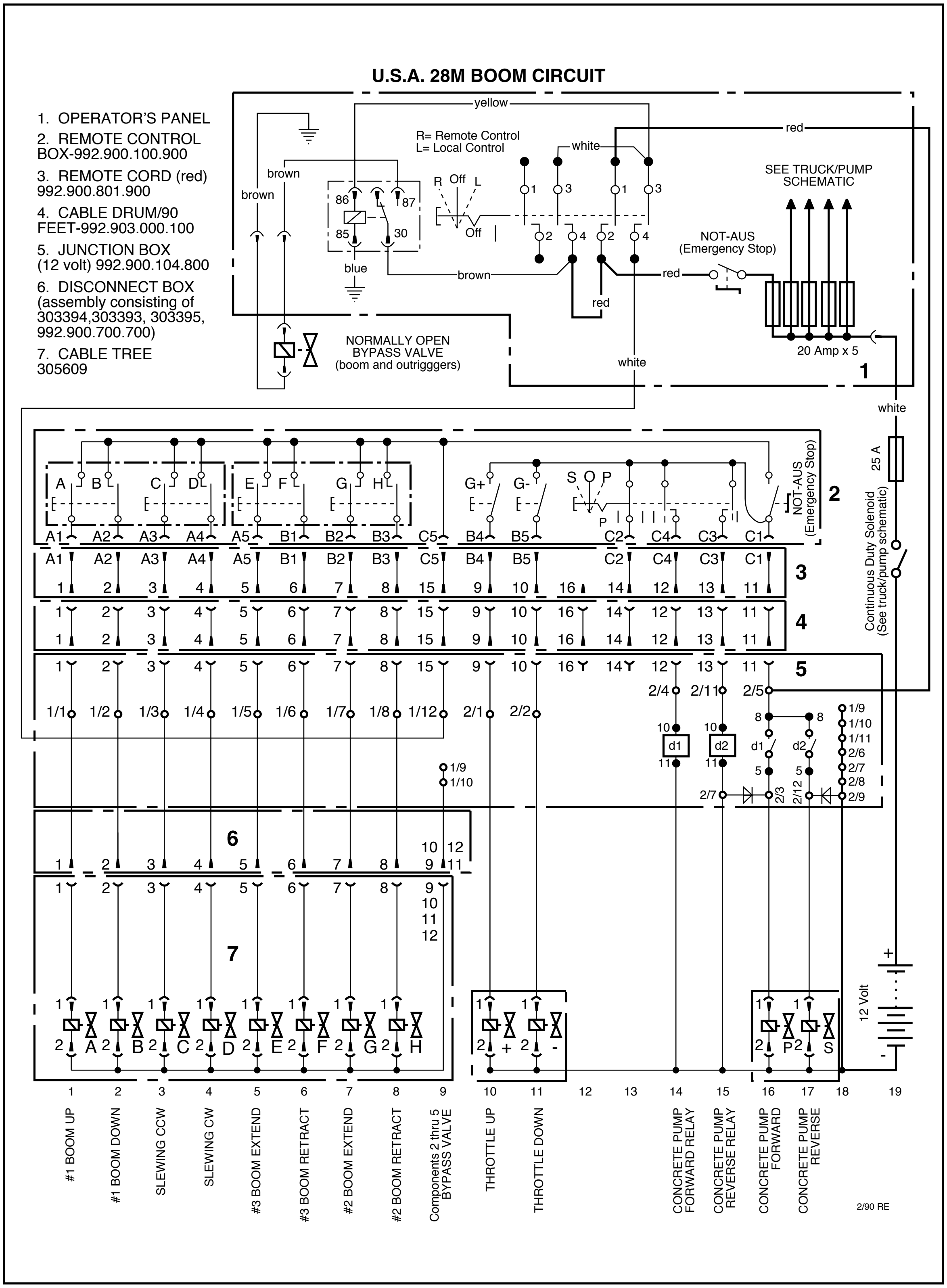
ELECTRICAL SCHEMATIC - KVM 28 BOOM & PUMP AS WIRED



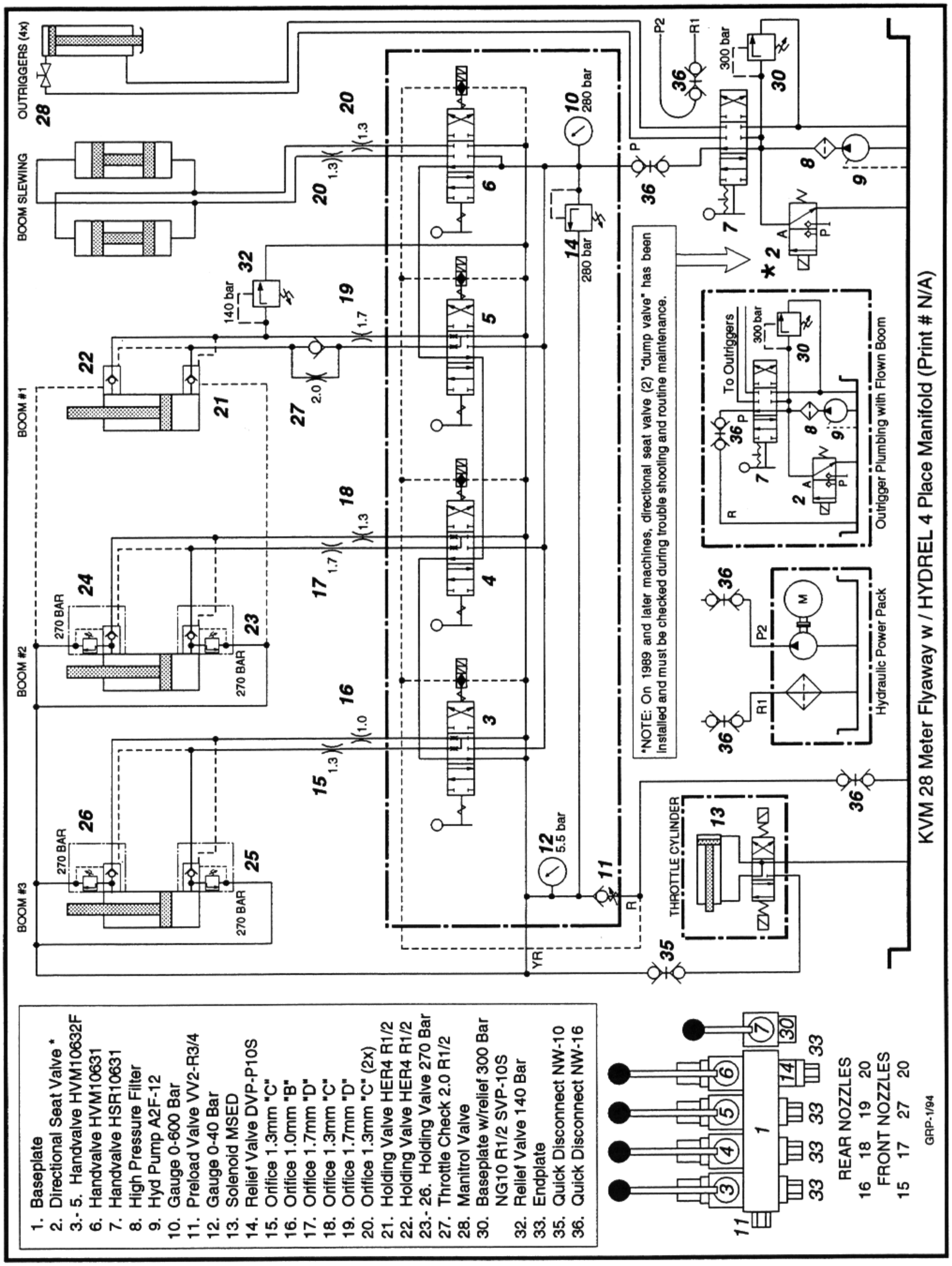
ELECTRICAL SCHEMATIC - KVM 28 AS WIRED (PRE-1989)



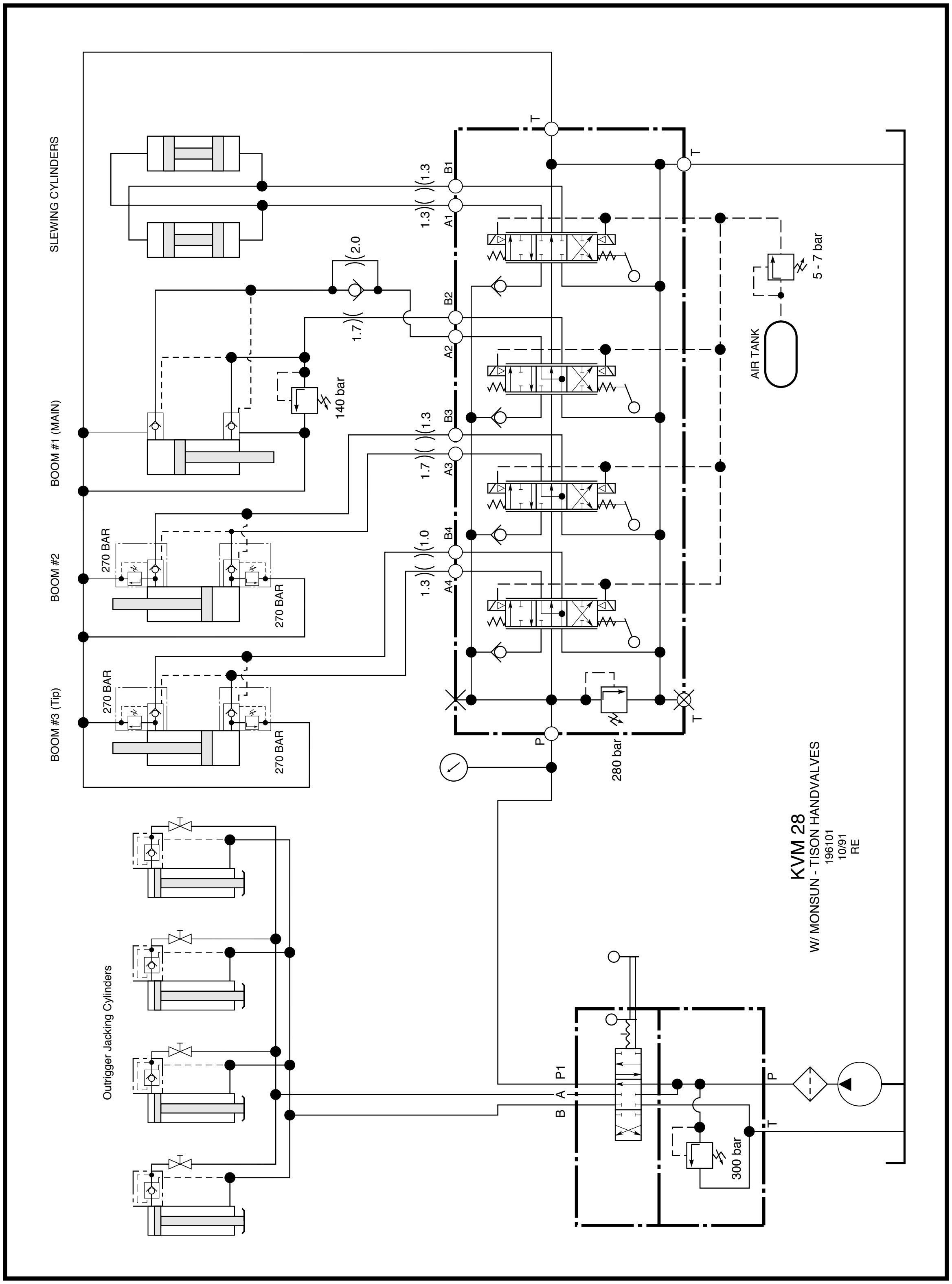
ELECTRICAL SCHEMATIC - KVM 28 AS WIRED (1989 AND LATER)



HYDRAULIC SCHEMATIC - KVM 28 BOOM

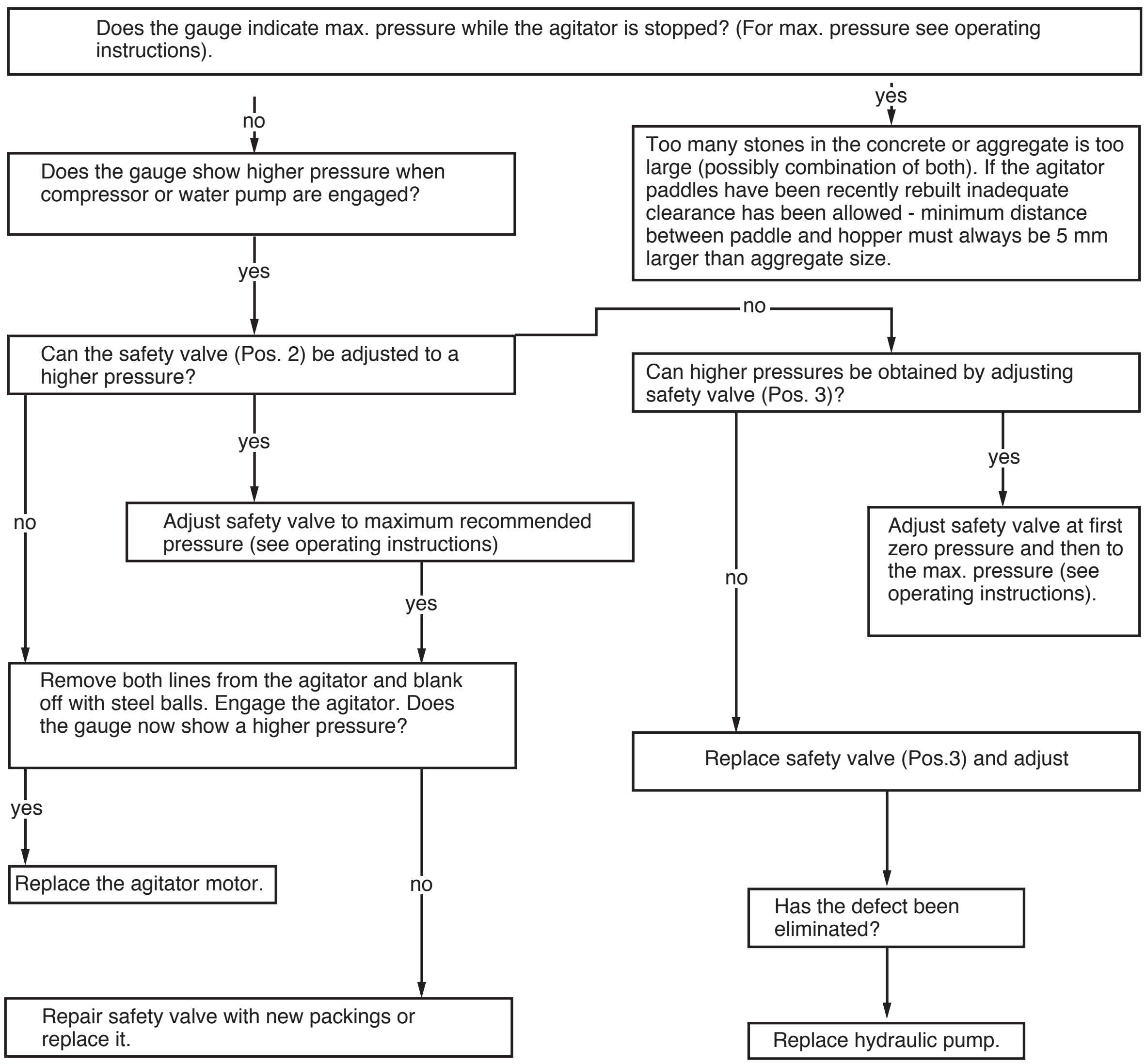


HYDRAULIC SCHEMATIC - KVM 28 BOOM w/ MONSUN-TISON VALVES

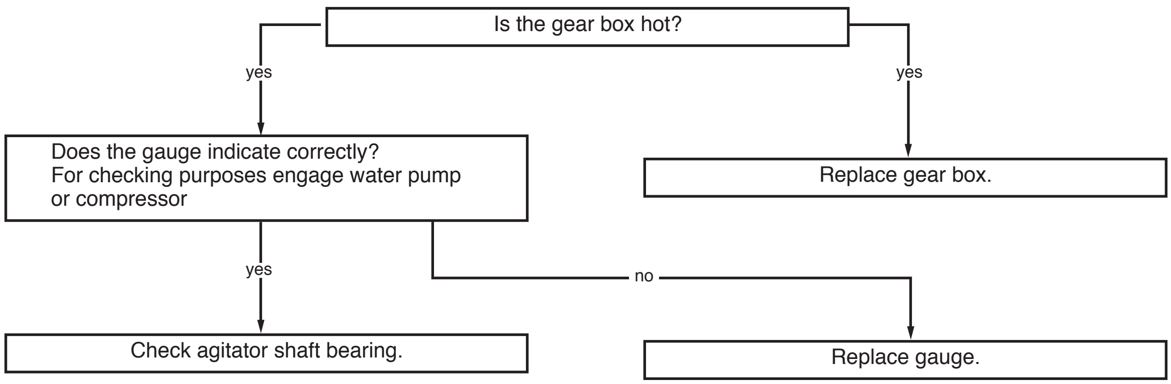


J. Problems With the Agitator

1R. The agitator stops frequently and can only be set in motion again after reversing briefly.



R2. The agitator runs with unexpectedly high pressure.

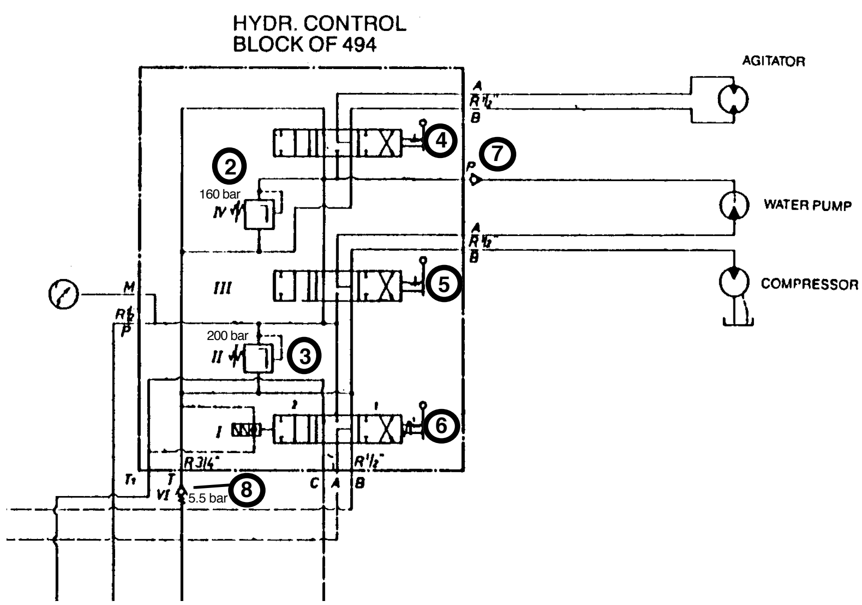


Hydraulic circuit diagram, agitator, compressor, water pump, forward/reverse

1) Base plate EV 192.001
2, 3) Safety valve cartridge SVP-10
4, 5) Hand gate valve HSR 10 632
6) Hand gate valve HVM-ROL 10632
7) Check valve
8 Pre-load valve VV-2-R 3/4”

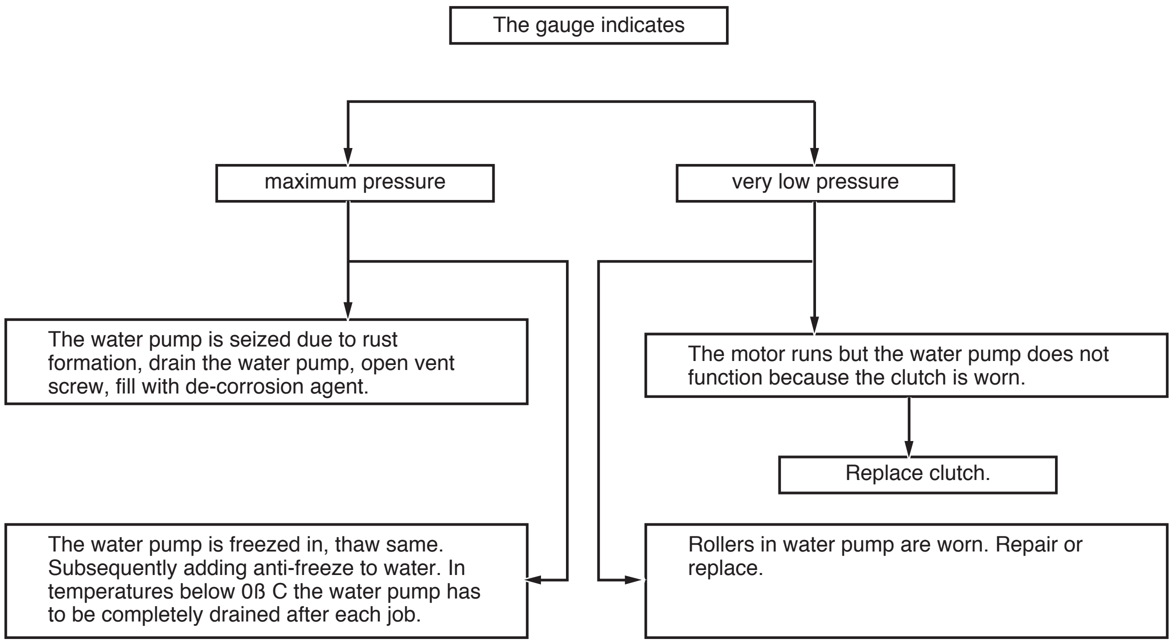
Pressure settings

2) 100 bar for gear box agitator
2) 00 bar for direct drive agitator
3) 200 bar
8) 5.5 bar



K. Problems With the Water Pump

W1. The water pump does not work although the tank is filled and the input is unobstructed.



W2. Insufficient water is pumped by the pump and pressure is low.