

Lawrence David Cable Operated Double Deck – Hydraulic System User Manual & Specifications

Revision 1

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1. Safety Information

Refer to the trailers operator's manual for all safety information.

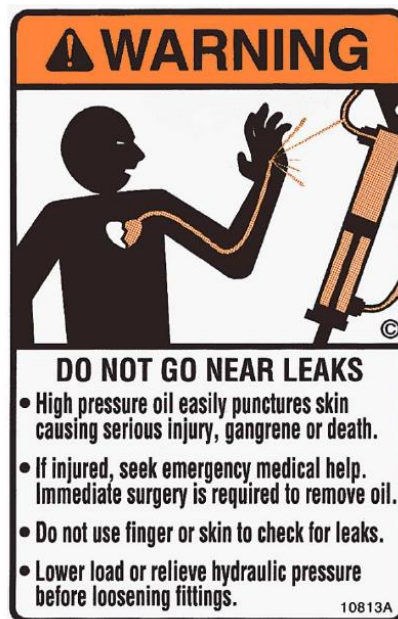
This manual is solely for the hydraulic system which cannot function without the electrical and mechanical systems fitted to the trailer, both of which are covered by separate documentation to this manual.

Caution: Hydraulic Fluid Under Pressure

Caution: The lifting deck cylinder and the connecting hose line could have fluid under pressure even when the system is off

Before conducting any inspection, maintenance or repair to the hydraulic system ensure:

- The lifting deck is fully lowered to relieve the hydraulic pressure
- All manual overrides located on the hydraulic solenoid valves are in the normal working positions (not in valve override positions)
- Electrical power is disconnected from the trailer
- **Refer to section 14.1 of this manual first: If conducting any inspection, maintenance or repair to the lifting deck hydraulic cylinder and connecting hose lines!**



2. Frequent System Checks

1. Visually inspect all hydraulic hoses and connections. Check for signs of leaks, hose damage and that all hoses are secured.
2. Check inside and the outside of the power unit cabinet for signs of leaks and that all electrical connections are secure
3. Failure to rectify any faults with the hydraulic system (components, hoses and connections) will cause safety risks and environmental risks.
4. Check the tank oil level

3. System Overview

The double deck hydraulic system comprises of a 24vDC electric motor driven hydraulic pump to provide hydraulic flow and pressure. The flow rates and pressures are controlled by various control valves located in the same enclosure as the motor pump set. The only control valve located outside of the power unit enclosure is a load holding and speed control valve block that is integral to the main deck cylinder.

The hydraulic functions on the trailer are:

- Lifting Deck locks (4 x hydraulic cylinders)
- Main Lifting Deck (1 x hydraulic cylinder)

The deck is raised by applying flow and pressure to the piston side of the single main lifting deck cylinder, causing the cylinder rod to extend which in turn raises the deck by pulling a series of cables. The cylinder to cable ratio is 2:1 (for every 100mm of cylinder travel there is 200mm of deck travel).

To lower the main lifting deck the hydraulic locks are operated then the hydraulic motor pump set will turn off. A series of solenoid valves will stay energised (while the deck lower button is held) which allows the deck to lower under gravity.

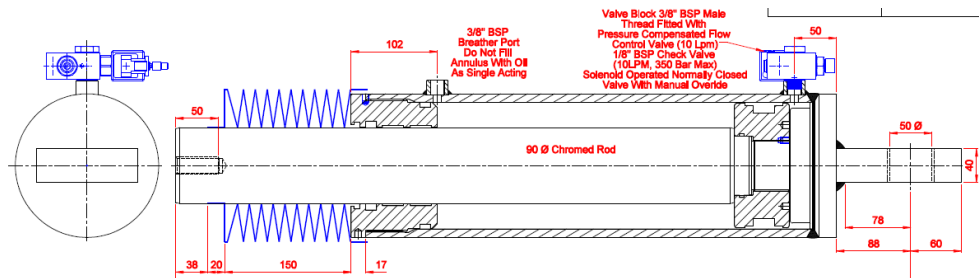
Within each deck column is a hydraulically operated mechanical lock; this is sprung loaded to the safe (locked) position and hydraulic pressure retracts the lock inside the column when the deck is moving.

The hydraulic system has a handpump for emergency use in case of an electrical failure or motor / pump failure.

4. Function Specifications and Solenoid Valve Locations

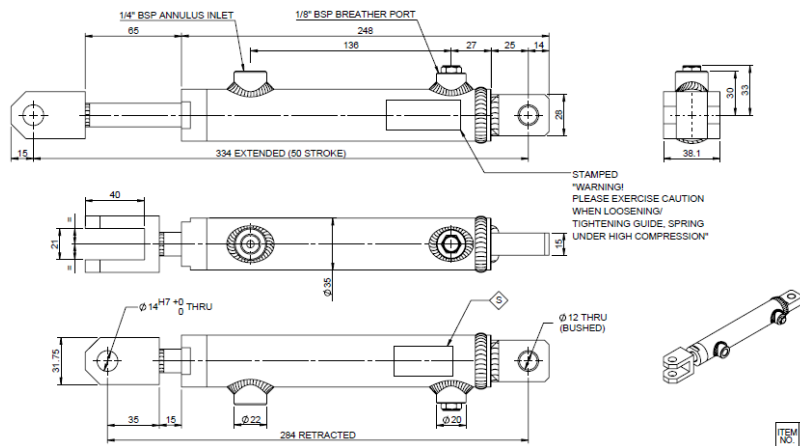
4.1 Lifting Deck

- 1 single acting cylinder: 150mm Bore x 90mm Rod x 860mm Stroke with integral valve block comprising of one load holding solenoid operated valve and one speed control valve
- 3/8" BSP Ports
- The available hydraulic pressure is limited by the setting of the main relief valve on the power pack which is set at 185Bar (nominal), 170Bar cracking.

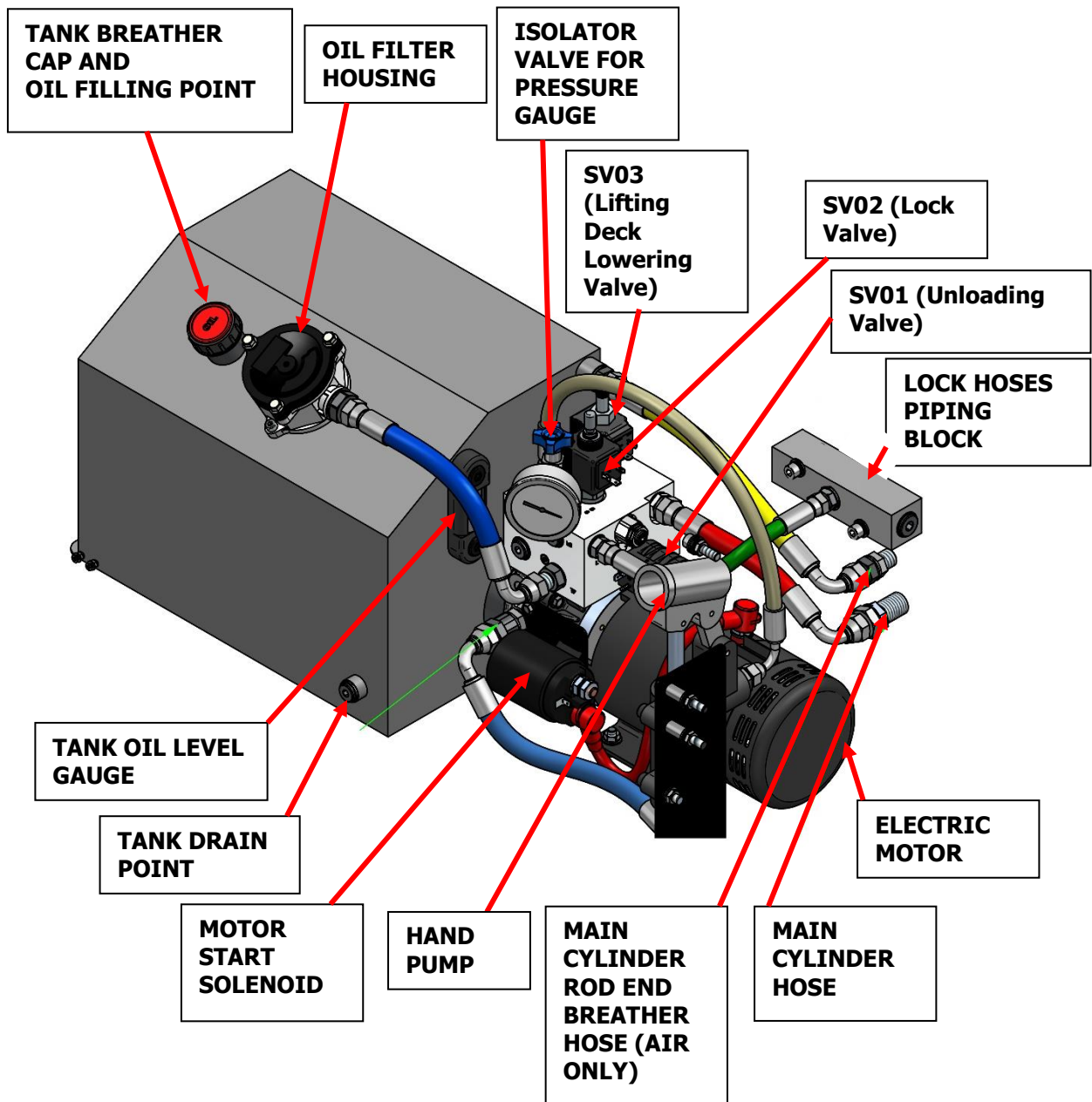


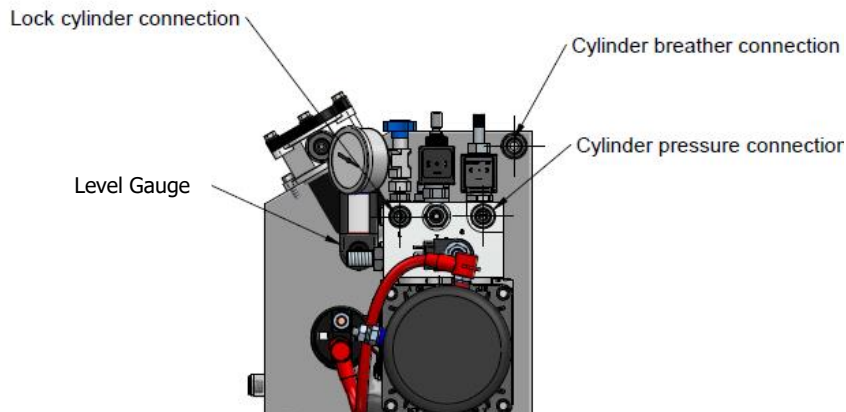
4.2 Lifting Deck Locks

- Spring extend, hydraulic retract cylinders; 25mm Bore x 16mm Rod x 55 mm stroke
- 1/4" BSP Ports.
- The locks are operated by a solenoid valve (solenoid on = locks off)
- The lock cylinders are subject to the setting of a service line pressure relief valve which is set at 85 bar.

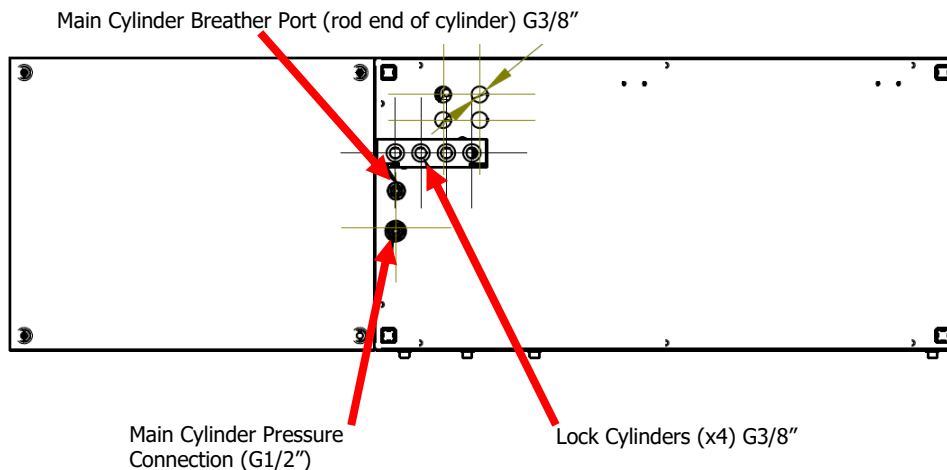


5. Overview of Power Unit





6. Hose connections on rear of power unit enclosure



7. Pump Motor Set Specification

24vDC 3kW Fan Cooled Motor with integral thermal cut out, coupled to a 2.7cc Pump.

The starter solenoid is 300amp heavy duty.

The motor will automatically cut out if it gets too hot. Allow to cool before restarting.

8. Solenoid Valve Specifications

All valve solenoids are 24vDC

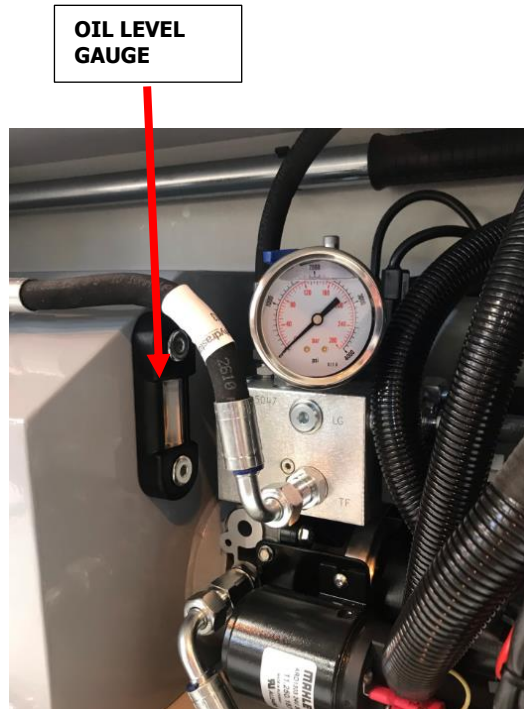
9. Oil Specification

Fuchs Renolin B 46 HVI

Lawrence David to supply oil safety datasheet

10. Checking the oil level

1. Ensure:
 - the trailer is level
 - the deck is fully lowered
2. The oil level can be seen in the sight gauge.
3. The oil level must be close to the top of the gauge (when the moving deck is fully lowered)

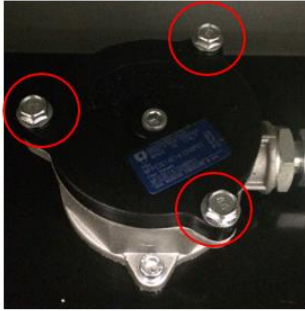


11. Adding oil to the system

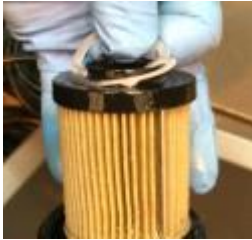
1. Oil must only be added to the tank when the lifting deck is fully lowered
2. Do not operate the hydraulic system when the oil cap is removed
3. Always add the correct grade of oil to the system (see section 9)
4. Clean equipment must be used to add oil to the system; it is advisable to use a filtration transfer pump if possible. If contamination is induced to the system the reliability will be compromised and likely result in an expensive repair bill along with the cost of the trailer being out of service.
5. Ensure the hydraulic system is electrically isolated - ensure that nobody at the rear of the trailer can operate the hydraulic functions
6. Unscrew the filler cap (see section 5) and add oil to the reservoir whilst watching the oil level on the tank level gauge
7. Refit the filler cap and clean any spilt oil

12. Replacing the oil filter element

1. Ensure the hydraulic system is electrically isolated - ensure that nobody at the rear of the trailer can operate the hydraulic functions
2. Ensure the work area is clean – wipe any dirt away from the filter housing and surrounding area. Prepare a clean surface to place parts down during the procedure.
3. Remove the three retaining screws shown:



4. Lift off the black housing and place on a clean surface
5. Pull the element out of the housing



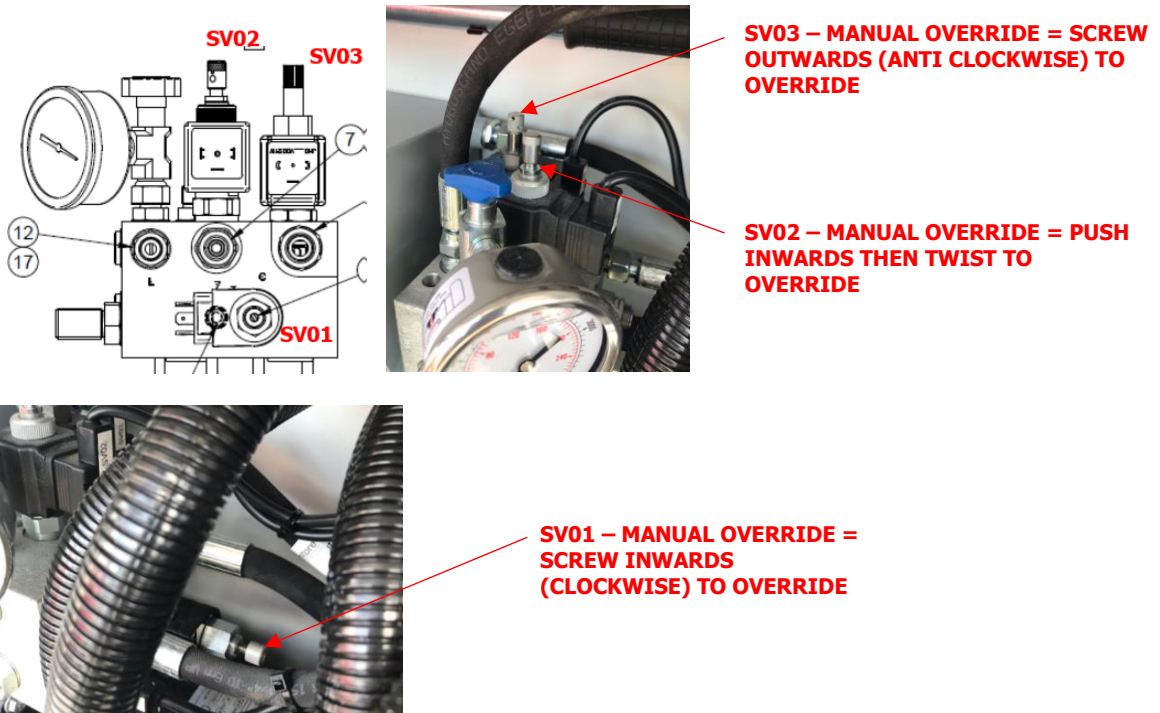
6. Remove the packaging from the new element and place in the bowl
7. Re-assemble the filter housing and replace the housing screws – tighten evenly. Clean all spilt oil from the work area.

13. Lifting Deck Manual Operation

Ensure no person is present inside the trailer during manual operation and no person can enter the trailer during manual operation.

If the deck is in the raised position the deck must first be lifted slightly so the locks can be retracted, before attempting to lower the deck.

NOTE: HAND PUMP OPERATION IS A 2 PERSON OPERATION; 1 PERSON TO OPERATE THE VALVE OVERRIDES AND HAND PUMP, THE OTHER TO REMAIN AT THE REAR OF THE TRAILER TO WATCH THE DECK MOVEMENTS AND ENSURE THE OPERATION SAFETY.



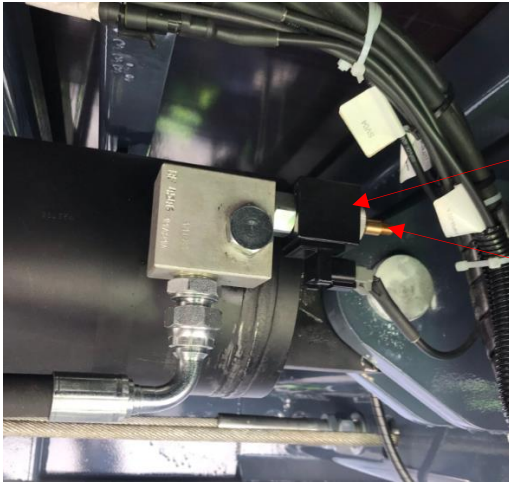
HAND PUMP OPERATION: DECK ABOVE LOCKS

1. OPEN THE GAUGE ISOLATOR VALVE (SEE SECTION 5 DIAGRAM) SO THE PRESSURE GENERATED BY HAND PUMP OPERATION IS VISIBLE ON THE GAUGE
2. OPERATE MANUAL OVEIRDE ON SV01 + SV02 + SV03
3. OPERATE HAND PUMP ENOUGH FOR THE DECK TO RAISE TO CLEAR THE LOCKS
4. RELEASE MANUAL OVERRIDE ON SV02 + SV03
5. OPERATE HAND PUMP TO RETRACT LOCKS AND THEN OPERATE MANUAL OVERRIDE ON SV02 TO HOLD THE LOCKS IN
6. RELEASE MANUAL OVERRIDE ON SV01
7. ENGAGE MANUAL OVERRIDE ON SV03
8. OPERATE MANUAL OVERRIDE ON SV04 WHICH IS LOCATED ON THE MAIN CYLINDER **(SEE PHOTO ON NEXT PAGE)** AND HOLD WHILE DECK LOWERS
9. WHEN THE DECK IS LOWERED RELEASE THE MANUAL OVERRIDE
10. RELEASE THE MANUAL OVERRIDE ON SV03 AND SV02

HAND PUMP OPERATION: DECK BELOW LOCKS

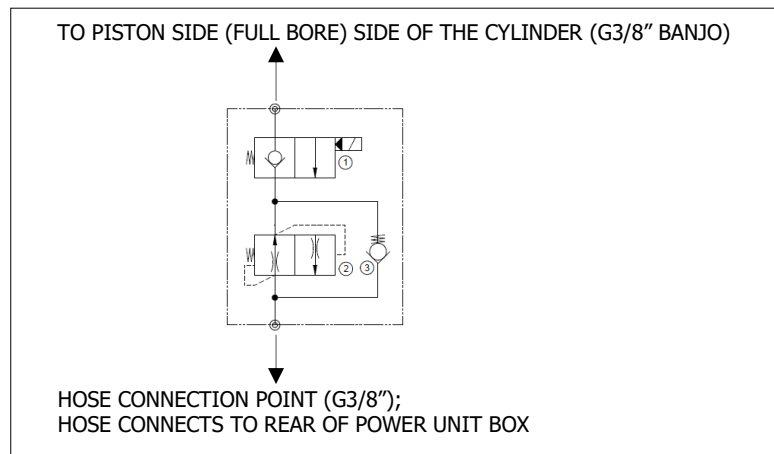
1. ENGAGE MANUAL OVERRIDE ON SV03
2. OPERATE MANUAL OVERRIDE ON SV04 AND HOLD WHILE DECK LOWERS
3. RELEASE THE MANUAL OVERRIDE ON SV03

14. Lifting Deck Cylinder Safety Valve Block - located on the lifting deck cylinder mounted under the trailer.



SVO4 – LIFTING DECK LOWERING VALVE

MANUAL OVERRIDE OPERATION; PULL THE OVERRIDE OUTWARDS AND HOLD. LETTING GO OF THE PLUNGER RETURNS THE VALVE TO THE NORMAL POSITION



Key to above figure:

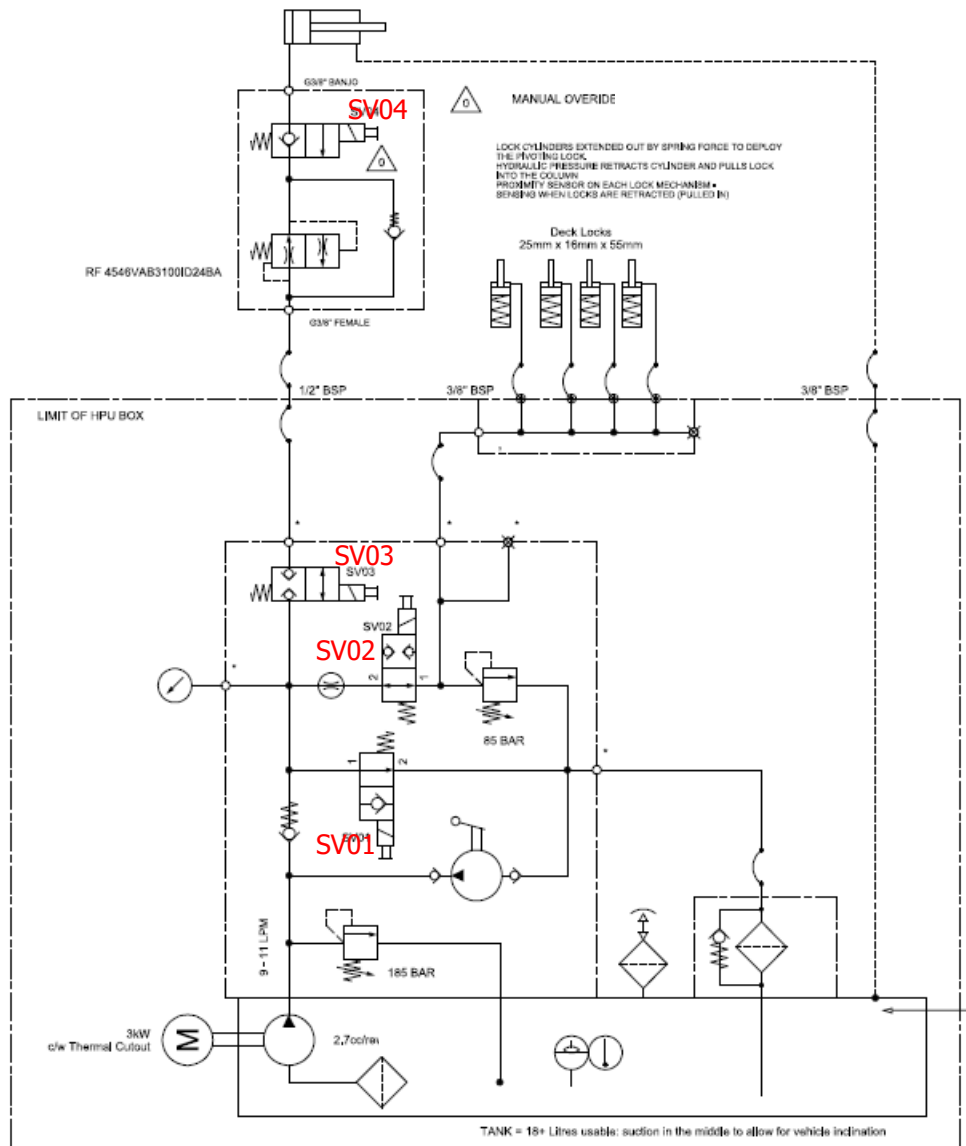
- (1) Solenoid Operated Valve; in the de-energised position oil flows through the valve to raise the deck. Only when the valve is energised will oil be allowed to pass through the valve to tank (deck lowering).
- (2) Pressure Compensated Flow Control Valve – to control the speed of flow during lifting deck lowering (this is not adjustable)
- (3) Check valve. Allows pump flow to bypass the flow control (2) during deck raise, but forces oil through the flow control (2) during deck lowering.

14.1 RELIEVING THE PRESSURE IN THE MAIN CYLINDER AND MAIN CYLINDER HOSE LINES.

BEFORE ATTEMPTING ANY INSPECTION, REPAIR OR MAINTENANCE TO THE HYDRAULIC CYLINDER OR CYLINDER VALVE BLOCK OBSERVE THE FOLLOWING PROCEDURES;

1. ENSURE THE LIFTING DECK IS FULLY LOWERED
2. OPERATE THE MANUAL OVERRIDE SV03 LOCATED IN THE POWER UNIT (SEE SECTION 13)
3. OPERATE THE MANUAL OVERRIDE SV04 (LOCATED ON THE CYLINDER) FOR 2 SECONDS AND RELEASE. THIS WILL RELIEVE ANY PRESSURE TO TANK.
4. RETURN THE MANUAL OVERRIDE SV03 TO ITS NORMAL POSITION

15. Hydraulic Circuit



16. Sequence of events / solenoid valve energisations

RAISE DECK:

MOTOR ON, THEN SV01 = ON.

WHEN ALL LOCKS ARE SENSED AS IN SV02 = ON, SV03 = ON - DECK RAISES

WHEN DECK RAISE STOPPED = MOTOR + SV01 + SV02 + SV03 = OFF

LOWER DECK:

THE DECK WILL ALWAYS RAISE SLIGHTLY (TO CLEAR THE LOCKS) BEFORE LOWERING

(1) MOTOR ON, SV01 + SV02 + SV03 = ON (FOR X SECS - DECK RAISES SLIGHTLY), THEN SV03= OFF (DECK STOPS)

(2) SV02 = OFF, WHEN LOCKS SENSED AS RETRACTED SV02=ON, SV01=OFF MOTOR = OFF

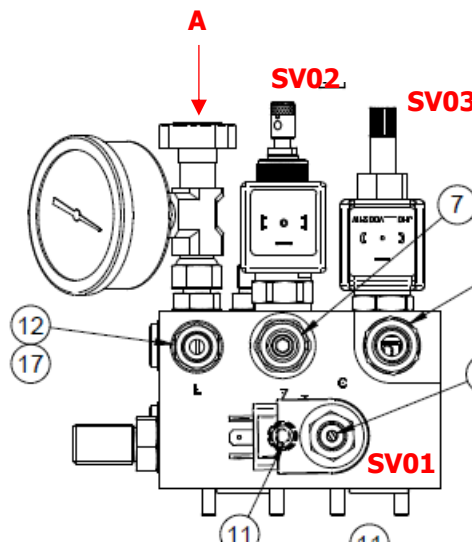
(3) SV03 + SV04 = ON - DECK LOWERS (GRAVITY DOWN)

(4) WHEN DECK LOWERING IS STOPPED SV02 + SV03 + SV04= OFF.

17. Reading the main pressure setting

(Note: two person operation)

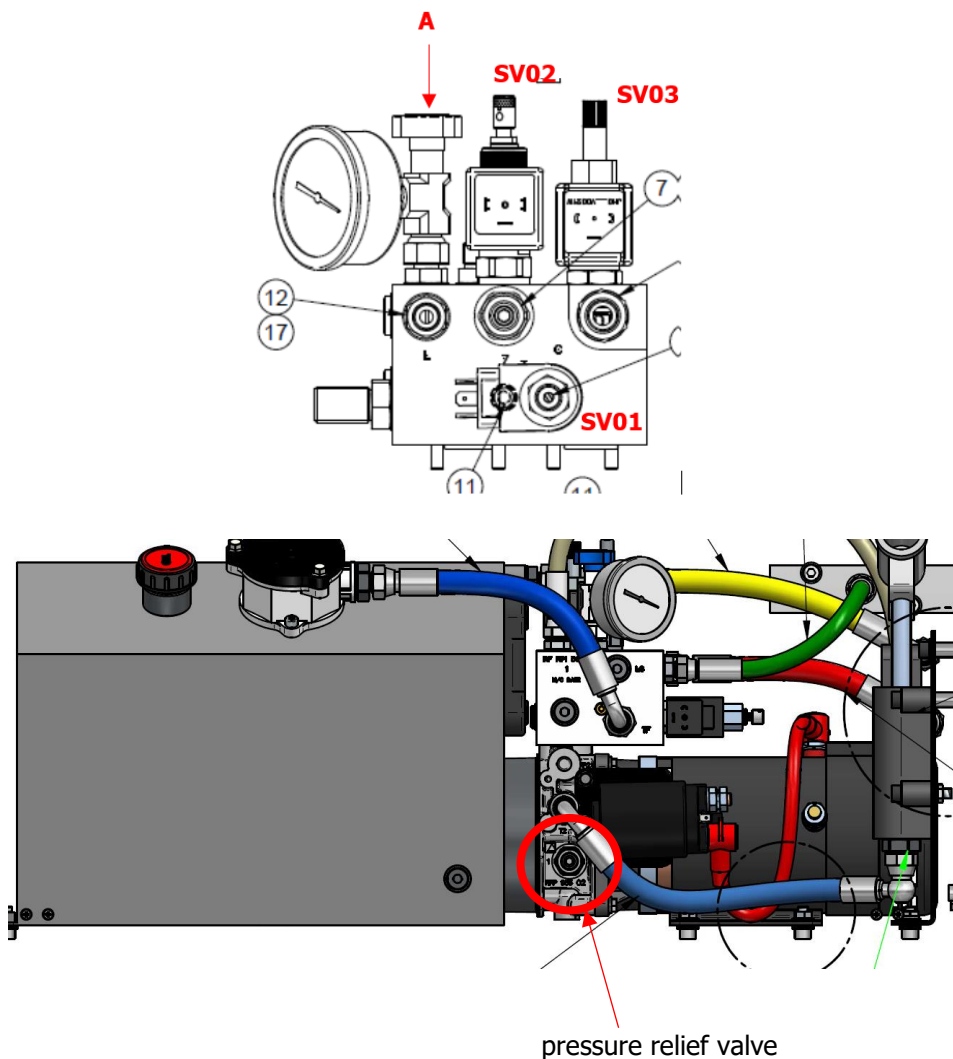
- a. Unscrew the gauge isolation valve (A) (counter clockwise)
- b. Disconnect the electrical plug from SV03
- c. Operate the manual override on SV01 (screw inwards)
- d. Operate the manual override on SV02 (push inwards then twist)
- e. Whilst watching the visual pressure gauge have the second person press the deck up function at the rear of the trailer: the motor will start but the deck will not move, the pressure will quickly rise on the gauge, note the pressure reading of the gauge and the tell the second person to let go of the button to stop the motor.
- f. Return the manual override on SV01 and SV02 to normal positions
- g. Re-connect the electrical connection for SV03 – ensure the screw is tightened!
- h. Close the isolation valve (A)



18. Adjust main system pressure (Note: two person operation)

NOTE: ADJUSTMENT MUST ONLY BE MADE BY LAWRENCE DAVID LTD

- a. Unscrew the gauge isolation valve (A) (counter clockwise)
- b. Disconnect the electrical plug from SV03
- c. Operate the manual override on SV01
- d. Operate the manual override on SV02
- e. Whilst watching the visual pressure gauge have the second person press the deck up function at the rear of the trailer: the motor will start but the deck will not move, the pressure will quickly rise on the gauge, note the pressure reading of the gauge and the tell the second person to let go of the button to stop the motor.
- f. To adjust the setting of the pressure relief valve, hold the hex key in the centre of the valve, slacken the lock nut then adjust the valve as required (clockwise to increase, counter-clockwise to decrease). ONLY ADJUST VERY SLIGHTLY. Tighten the lock nut then re-check the pressure setting as per (e.) above.
- g. Return the manual override on SV01 and SV02 to normal position
- h. Re-connect the electrical connection for SV03 – ensure the screw is tightened!
- i. Close the isolation valve (A)



19. Spares List

Item Description	Part Number	Part Number Description
24v Motor	Z-EMDC2EJMML	24Vdc Mot 3kW D125, Thermal Sw, Fan Cooled
Motor Drive Shaft	Z-PTSA19001	Shaft Adr 19mm 80 Frame
Motor Start Solenoid	Z-ESDC2DA	24Vdc Start solenoid, Heavy Duty 300Amp
Motor Solenoid Cable	Z-PTCS12004	Starter Cable 25mm2-300ctrs (10/10)
Electrical Terminal Boot for Start Solenoid Cable	Z-PTLBT8CAB25001	PVC Boot 8mm Stud/25mm2 Cable
Hydraulic Pump	Z-PMPGEC27WD	Pump-2.7cc-Tang-CW Thru bolts-Tang-End Ports
Pump Drive Coupling	Z-PTOC0003	Oldham coupling. V ser71/80Fr, S ser100 Fr motors
Power Pack Pump Suction Strainer	Z-PTSF0005	Suction strainer Stl Cyl 65
Hand-pump Suction Strainer (in tank)	Z-PTSF0006	Suction strainer Stl Cyl 43
Replacement 10 micron filter element for return filter	PT-FIL8MF0301A10HBP1	Tank top return filter, 10 micron element
Tank Filler Breather	Z-PTFBTMDF34	Filler Breather G3/4" with dip stick
SV01 (pump unloader valve)	D-PBS2C0K	SZ08 2W NO Pop MO Knob, 38Lpm 240Bar
SV03 Deck Lower Valve (power unit manifold)	T-HBS2L0K	2W NC BI POP, SIZE 8,MO
SV02 Lock Valve	FP-EBS2K0K	Sz8 Sol Vlv 2W NO Double Lock, TWIST DETENT MO
Relief Valve (locks only)	OW-VMD1C2	RV 3/4"-16, 20-110 Bar Max, Scr Adj, 20lpm
Check Valve - inside Port 8 of valve block	LCV-VUB1G014	G1/4" Chk Vlv Rev Flow 20Lpm 350Bar <0.5Bar Crack
SV01 Coil	D-PHC24	Coil 24Vdc DIN
SV03 Coil	T-JHC24	Coil 24Vdc - HB sol Vlvs
SV02 Coil	FP-C13B20HA	Coil 24V 20W
Deck Cylinder Valve Block / Complete Assembly	RF 4546VAB3100ID24BA	Sol Op Ban Mtd Lock Vlv MO 10Lpm 24Vdc Deutsch
Knob for Manual Override on Deck Cylinder Valve Block	PT-KN0K0141	Knob (red) Modified to suit valve thread
SV04 Coil (located on Deck Cylinder Valve Block)	V-CCS0AC24A008	Coil, 24Vdc, 18W, Deutsch
Main Relief Valve (located on port plate)	OW-VMD1C3	Size 08 RV DA 20Lpm 100-210Bar
Hand Pump Handle / Lever	Z-HPLPM270	HP lever 600 long
Hand Pump	Z-HPPM02010SL	HP Line mtd 20cc, c/w lever & RV. G038
63mm Pressure Gauge	PT-GASP061	Pres Gauge 0-280bar 63mm G1/4" rear entry
Hydraulic hose, Return	PT-PIPSP0313	Hydraulic Hose Assembly
Hydraulic hose, Hand pump suction	PT-PIPSP0314	Hydraulic Hose Assembly
Hydraulic hose, Hand pump pressure	PT-PIPSP0315	Hydraulic Hose Assembly
Hydraulic hose, Locks	PT-PIPSP0316	Hydraulic Hose Assembly
Hydraulic hose, Main cylinder breather	PT-PIPSP0317	Hydraulic Hose Assembly
Hydraulic hose, Main cylinder pressure	PT-PIPSP0318	Hydraulic Hose Assembly
Tank Level Gauge	Z-PTLGA	Level Gauge M10-76 Ctrs