Maintenance Section

VT* & VS
500 • 605 • 650 • 800
Range of Twin Engined
& Hydrostatic Sweepers
From Manufacture
Sequence No. 07/2057

* With Stage 3a/Tier 3 Auxiliary Engines

Part No 02617-4-M

Revision Level 16

CHAPTER P

Page Issue Levels

Description

This chapter lists each page in the Maintenance section, it's issue level and whether it has changed since the previous revision level. Changed pages are indicated by the letter 'C' in the changed column, and new pages by the letter 'N'.

P Chapter - Page Issue Levels

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P1	16	C	P2	16	C
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7 Chapter - Scheduled Maintenance

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8 Chapter - Hydraulic System

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9 Chapter - Electrical System

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9 Chapter - Electrical System continued .....

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9:35	05		9:36	05	
9:37	05		9:38	05	
9:39	08		9:40	05	
9:41	05		9:42	05	
9:43	09		9:44	09	
9:45	09		9:46`	09	
9:47	09		9:48	09	
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9:53	09		9:54	09	
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10 Chapter - Water System

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11 Chapter - Pneumatic System

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12 Chapter - Wearing Items

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13 Chapter - Remove and Refit Procedures

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14 Chapter - Fault Diagnosis

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15 Chapter - Service Tools

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15.13	01		15.14	01	
15.15	01		15.16	01	

16 Chapter - Warranty

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17 Chapter - Health and Safety

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CHAPTER 7

Scheduled Maintenance

Table of Contents

INTRODUCTION

REGULAR MAINTENANCE

It is impossible to over emphasise the importance of regular maintenance, inspection and running adjustments to maintain efficiency and obtain trouble free service from the machine.

Attention is drawn to the recommendation in the Auxiliary Engine Handbook relating to the post delivery check over.

The maintenance schedule specified are for average operating conditions. Under particularly dry and dusty conditions, it is essential that more frequent attention is given to:

1 Air cleaner servicing.
2 Engine oil changes.
3 Fluid oil changes.
4 Gearbox oil changes.
5 Hydraulic oil changes.

A flap is provided in the rear valance of the engine mounting tub to give access to the engine when carrying out servicing and for cleaning spilt oil etc. from under the tub floor which could be a fire hazard.

Attention to the servicing of air cleaners fitted to both auxiliary and vehicle engines is of vital importance as clean air is essential for the proper functioning and ultimate life of an engine. Badly serviced air cleaners can allow dust particles to be directly induced into the internal working surfaces with a resulting rapid increase in engine wear and eventually complete failure. This also applies to any air leaks occurring between the air cleaner and the engine inlet manifold. See separate instructions for Air Cleaner Servicing.

It is important that the following Safety Precautions are observed when working on the machine.

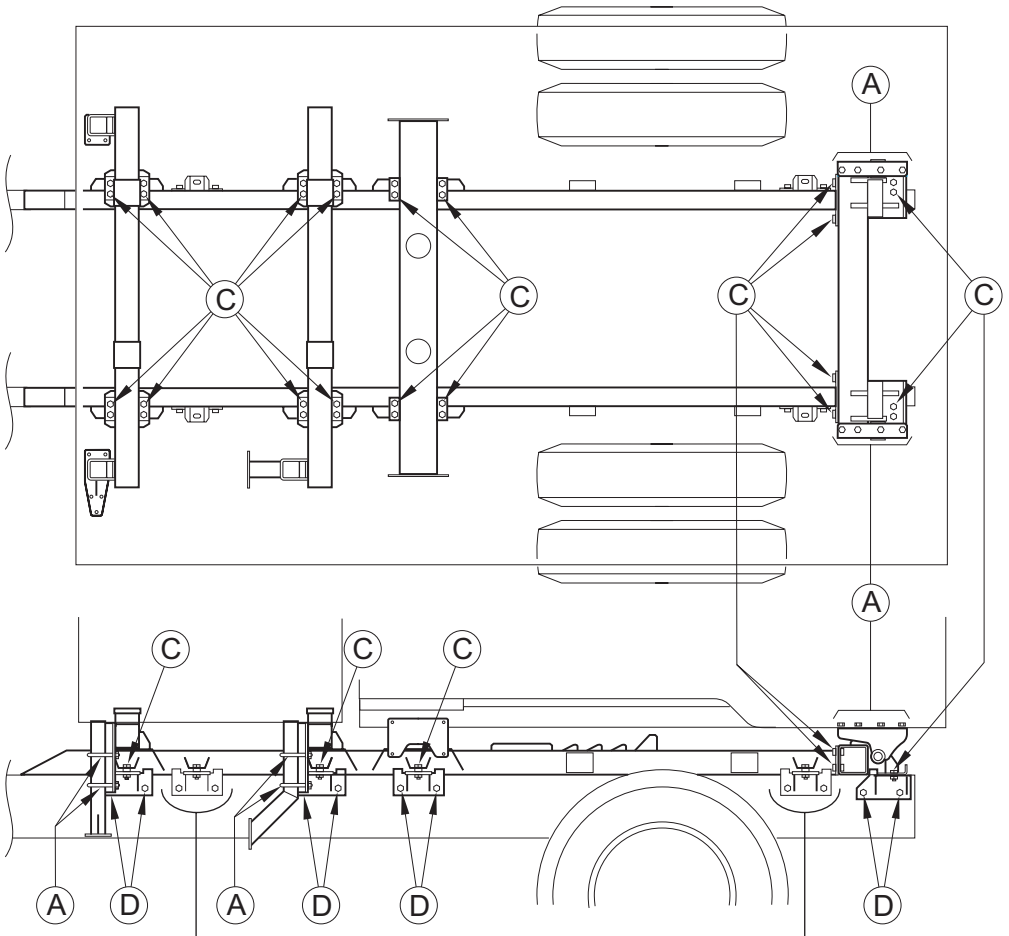
Safety Precautions

- **Ensure the machine is standing on firm, level ground and there are no obstructions above or to the rear before raising the body.**
- **Ensure the safety prop is used at all times when working under the body.**
- **Ensure operators are fully conversant with the controls and operation.**
- **Isolate the air in the systems locker before working on any pneumatically operated or controlled equipment.**
- **Disconnect or isolate the vehicle battery when working on the electrical system.**
- **Ensure the auxiliary engine is switched off once the channel brush has been lowered for adjustment.**
- **Be aware of the safety instructions relative to the suction fan given in the equipment maintenance notes.**
- **Keep hands, loose clothing, hair etc. well clear of moving parts.**
- **Do not climb on the engine walkways unnecessarily or approach the fan inlet whilst the engine is running.**
- **Do not grasp any part of the engine or exhaust system without first ascertaining whether it has cooled sufficiently to avoid scalding.**
- **Do not use ill-fitting tools such as spanners that may slip and cause injury.**
- **Use approved safety platforms/gantries when working above ground level. Get a second person to check periodically when only one person is working on access equipment or inside the body.**
- **The use of 'needle stick gloves' is recommended when changing brushes, using the wanderhose/Littasnatch and when cleaning out the machine.**

SECURITY OF SWEEPING EQUIPMENT

It is necessary to check every six months the security of various components as part of the maintenance programme.

These fixings are detailed on the illustration below.



95MA. 024

'A' = M12 Standard 'B' = M12 Grade 10.9 'C' = M14 Grade 10.9
'D' = M12, M14 Grade 10.9 or M16 Standard depending on chassis

Torque Settings

M12 Standard = 95 Nm (70 lbf/ft)	M14 Grade 10.9 = 215 Nm (160 lbf/ft)
M12 Grade10.9 = 135 Nm (100 lbf/ft)	M16 Standard = 235 Nm (150 lbf/ft)

CIRCUIT DIAGRAMS

A chart can be found overleaf to assist in finding the circuit diagram required.

The actual circuit diagrams will be found in the appropriate chapter.

WATER SYSTEM

SW511??? - Main Circuit
- a02 - Single Sweep
- b02 - Dual Sweep

SW512??? - Microtrap Option
- a02 - Single Sweep
- b02 - Dual Sweep

SW513z01 - SupaWash Hand Lance & Spray Bar

HYDRAULIC SYSTEM

SH521??? - Reservoir and System Services
- a01 - Twin Engine
- b01 - Single Engine

SH???a01 - Sweep System Circuit
- 522 - Single Sweep
- 523 - Dual Sweep

SH524z01 - Suction Fan & Load Discharge (Single Engine)

SH525z01 - Hydrostatic Transmission (Single Engine)

SH527z01 - Powaboom Wanderhose

SH528a04 - Secondary Pump Systems

SH529z01 - Combivac Nozzle

SH531??? - Pump Services
- a01 - Twin Engine
- b01 - Single Engine

SH532z01 - Wide Sweep Brush Speed Control Option

SH533??? - Front Brush Option
- a01 - Single Sweep
- b01 - Dual Sweep

SH534z01 - Water Pump Motor

PNEUMATIC SYSTEM

SP???a02 - Main Circuit
- 541 - Single Sweep
- 542 - Dual Sweep

SP543z02 - Recirculation Water

SP544z02 - AutoLok System

SP545z02 - Littasnatch

SP546z02 - Hydrodrive System

SP547z02 - Varagap

SP548z00 - Rear Wanderhose

SP549??? - Front Brush Option
- a01 - Single Sweep
- b01 - Dual Sweep

SP550??? - Mesh Shakers Option
- a02 - In Cab Controls
- b02 - Hopper Rear Controls

OPTIONAL EQUIPMENT SHOWN IN ITALIC TEXT

Johnston SWEEPERS LIMITED
CURTIS ROAD, DORKING, SURREY, UK. RH4 1XF

TITLE: FLUID FINDER DIAGRAM

ECN:	DRAWN BY:	DATE:
ED24626	RJD	06/11/08

MODEL: V RANGE

DRG. NO:	REVISION:
SF500z02	05

Type B - Electrical Diagram Index - SE550z10

TITLE: ELECTRICAL CIRCUIT DIAGRAM INDEX FOR TYPE B STAGE 3A ENGINES

ECN: ED24626 | DRAWN BY: SDM | DATE: 06/11/08
MODEL: VT & VS
DRG. NO: SE550z10 | REVISION: 05

Please refer to the Operator's Guide, Chapter 6, for the Routine Maintenance Schedules.

The following items are not covered in the Operator's Guide.

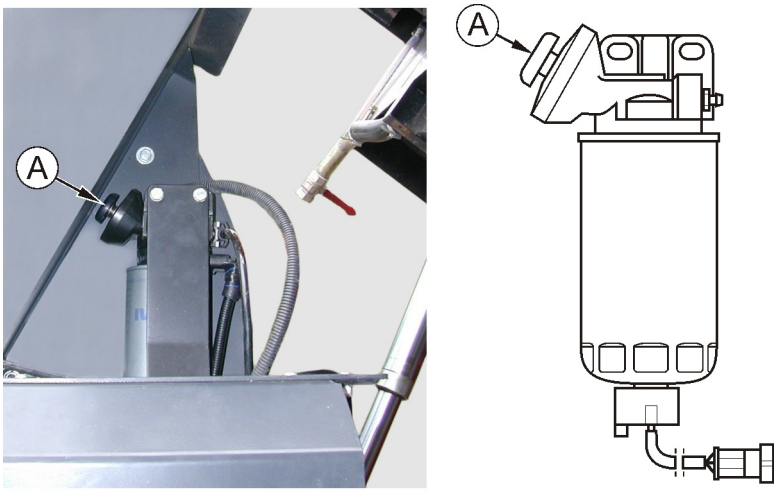
MAINTENANCE AND ADJUSTMENT INSTRUCTIONS

AUXILIARY ENGINE - FUEL SYSTEM BLEEDING

IVECO - HP Turbo Charged

Under no circumstances should injector pipes be loosened and the engine cranked. This engine uses very high injection pressures and will cause injury. The system is self priming by using the manual plunger on the fop of the fuel filter.

A = Manual Fuel Primer



95MA. 002

When starting the engine for the first time after bleeding the fuel system, or if the engine has run out of fuel, air pockets in the fuel system may prevent the engine from starting correctly. The procedure for priming the fuel system and removing the air pockets is as follows.

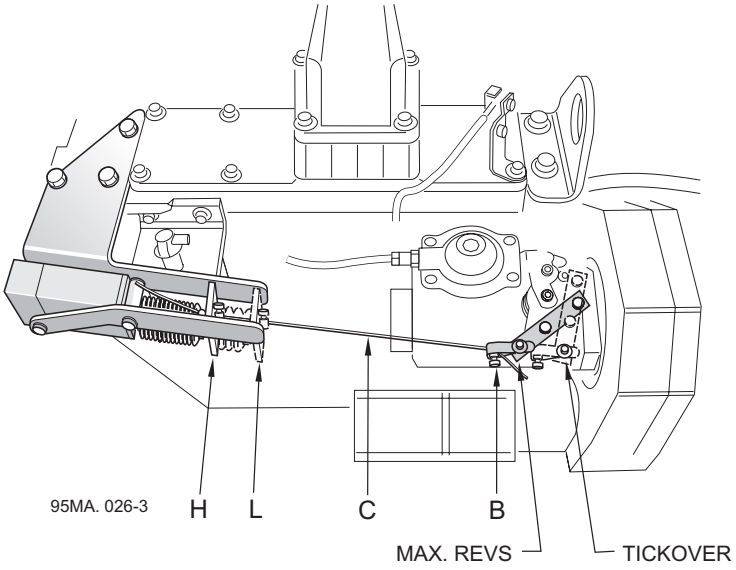
1 Locate the fuel priming pump on the fuel prefilter unit located on the left hand side of the vehicle above the fuel tank, as shown above right.

2 Alternatively, press and depress the priming button on the top to the pump/prefilter unit (A), as indicated, until it becomes difficult/stiff to operate (this may take several minutes).

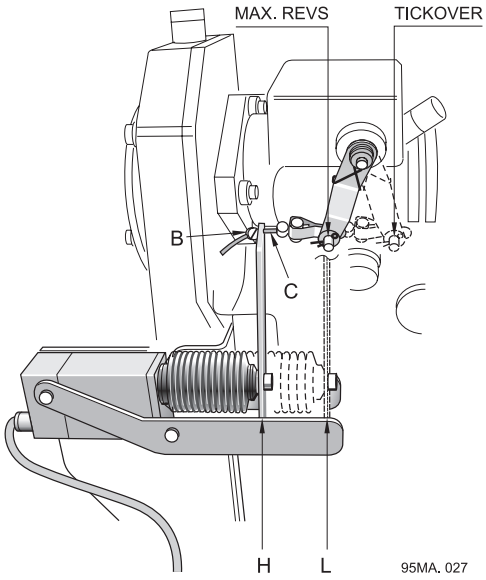
3 Crank the engine until the engine fires. The maximum cranking time should not exceed 15 seconds or damage to the fuel pump may occur. It may be necessary to repeat step two. Wait at least a minute for the battery to recover before recranking the engine.

THROTTLE SETTINGS

Iveco - Standard Power



John Deere - Standard Power



SET UP

Raise the body, operate the actuator to ensure that it is in the minimum speed position (L).

1 Check that the cable (C) is not under tension and that the arm (A) on the injector pump is resting against the engine idle adjuster screw. If not, loosen the screw in the cable nipple (B) to allow a little slack in the cable (C).

2 The following adjustments should be made with the fan outlet safety flap closed and a plate (suitably secured with clamp) completely blanking the fan inlet. Start auxiliary engine and allow to warm up.

3 Set throttle to idle. Check engine idle speed as shown in the table below. Adjust if necessary by way of the idle adjuster screw to give a smooth tickover.

4 Start engine. Actuate throttle control in cab to give maximum engine speed (H). Measure engine speed with tachometer and measure the off load speed as shown in the following table. At this speed setting ensure there is 0·25 - 0·5mm clearance between the arm and the maximum throttle screw.

5 Stop the auxiliary engine.

6 Remove fan inlet blanking plate before lowering the body.

Do not attempt to increase the 'off load' or 'flight speed' of the engine/fan impeller as these are safety critical items and have been preset at the factory

THROTTLE SETTINGS

These engines have their own ECU and the speeds are preset and can only be checked.

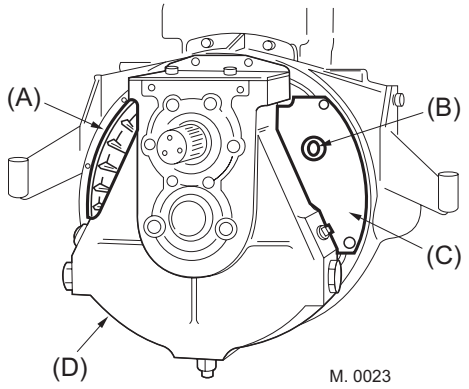
1 Raise the body.
2 With the fan safety flap closed and a plate (suitably secured with clamps) completely blanking the fan inlet.
3 Start the engine and allow to warm up.
4 Check the tickover speed and the maximum flight speeds. If these are incorrect, they must be reset by an authorised distributor.
5 **NOTE :** Remove the fan inlet blanking plate before lowering the body.

ENGINE TYPE	JOHNSTON PART NO.	IDLE SPEED Rev./Min.	MAXIMUM FLIGHT SPEED (Off Load) Rev./Min.
Iveco Stage 3a SP	283850-24	800	2200
Iveco Stage 3a HP	283805-24	800	2000
John Deere Tier 3 SP	283845-12	850	2200
John Deere Tier 3 HP	283791-12	800	2000

AUXILIARY ENGINE - FLUID FLYWHEEL

The fluid flywheel transmits power from the engine to the gearbox. Its design allows for the minium of maintenance, minimal mechanical wear and superior longevity to the remainder of the transmission system. With the correct attention it should last the life of the sweeper.

(A) Flywheel with side cover (C) removed.
(B) Flywheel filler/inspection port visible through side cover sight hole.
(C) Flywheel side cover.
(D) Step-up gearbox.



FLUID FLYWHEEL FILLING PORTS
(VIEWED WITH FAN CASE AND FAN REMOVED FOR CLARITY)

MAINTENANCE

After the first 50 hours operation check the fluid level; this operation must be carried out with the unit cold. Repeat this check every 500 hours. The fluid flywheel is fitted with a fusible plug which melts at 198°C (recognised by four equi-spaced indentations round the hexagonal socket). Oil should be replaced after 4,000 hours operation.

FILLING INSTRUCTIONS

Rotate flywheel (A) until its filler port aligns with sight hole (B) in either of the two flywheel side covers (C), approximately 2 o'clock and 10 o'clock. Remove the side cover and spacers. Remove filler plug using a 5/16 AF allen key and fill with Johnston Fluid Flywheel Oil, Part No. 39673-5 until it reaches the level of the port. During filling, carefully rock the flywheel to ensure that no air pockets form below the oil level.

DO NOT OVERFILL AS THIS WILL CAUSE THE UNIT TO OVERHEAT AND RAPID SEAL DETERIORATION WILL OCCUR

Replace the filler plug using thread sealant to ensure a good seal. Visually check for oil leaks and replace the flywheel cover.

DRAINING INSTRUCTIONS

Place a suitable drain tray under the flywheel housing if removing the Fan Case, remove filler plug and turn flywheel through 150° so that port is at lowest position.

If changing the oil use a propietry vacuum oil extractor/syringe after removing the filler plug.

HYDRAULIC OIL RESERVOIR

RENEWING THE RETURN FILTER
Unscrew cover (A) with a suitable spanner and lift out the cartridge element (B). Refit cartridge and screw on the cover, some force will be required to compress the carriage retaining spring.

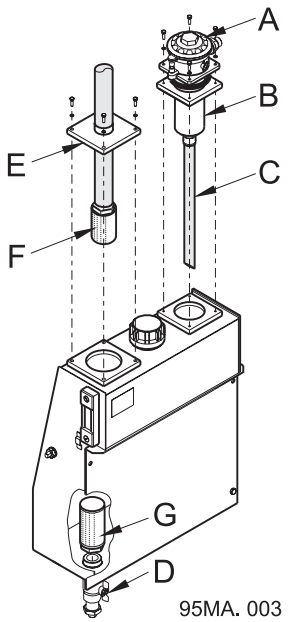
SYSTEM DRAINING
The oil can be changed by removing the return filter A and the element and inserting standard gauge equipment for extraction of oil from engine sumps and tanks.

RENEWING THE SUCTION FILTER
The filter is best changed whilst the system is empty to prevent contaminated oil entering the suction port when the filter is removed. The filter is changed as follows.

Release the four retaining screws and remove the return filter assembly (C). There should be enough slack to remove the filter assembly with the 3 hydraluic hoses connected. The suction filter (E) can be reached by hand via the port and are removed by unscrewing. Similarly, the filter (F) option can be unscrewed and replaced. After fitting a new filter, replace the cover ensuring the 'O' ring is seated in its groove.

SYSTEM REFILLING

The system capacity dry is 90 litres. Refer to Chapter 6 of the Operator's Guide detailing the correct oil level in the reservoir.



Please refer to the Operator's Guide Section 6 for the Routine Maintenance Schedules.

The following covers items not included in the above guide.

HYDRAULIC OIL RETURN FILTER

The filter should be changed every 1000 hours, however there is an integral filter indicator on the side of the filter head and, should this indicate red whilst the suction fan is operating, i.e. body raised, then the filter is contaminated and requires changing at an earlier interval.

This should only be changed when the oil is cold, as the system could be pressurised. Leave for 60 seconds after stopping for any pressure to be disapated before removing the return filter.

HYDRAULIC OIL RESERVOIR

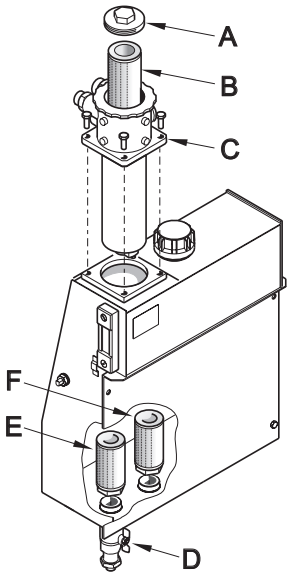
RENEWING THE RETURN FILTER
Unscrew cover (A) with a suitable spanner and lift out the cartridge element (B). Refit cartridge and screw on the cover, some force will be required to compress the carriage retaining spring.

SYSTEM DRAINING
The oil can be changed by removing the return filter A and the element and inserting standard gauge equipment for extraction of oil from engine sumps and tanks.

RENEWING THE SUCTION FILTER
The filter is best changed whilst the system is empty to prevent contaminated oil entering the suction port when the filter is removed. The filter is changed as follows.

Release the four retaining screws and remove the return filter assembly C. There should be enough slack to remove the filter assembly with the 3 hydraulic hoses connected. The suction filter (E) can be reached by hand via the port and are removed by unscrewing. Similarly, the filter (F option) can be unscrewed and replaced. After fitting a new filter, replace the cover ensuring the 'O' ring is seated in its groove.

SYSTEM REFILLING
The system capacity dry is 90 litres. Refer to Chapter 6 of the Operator's Guide detailing the correct oil level in the reservoir.



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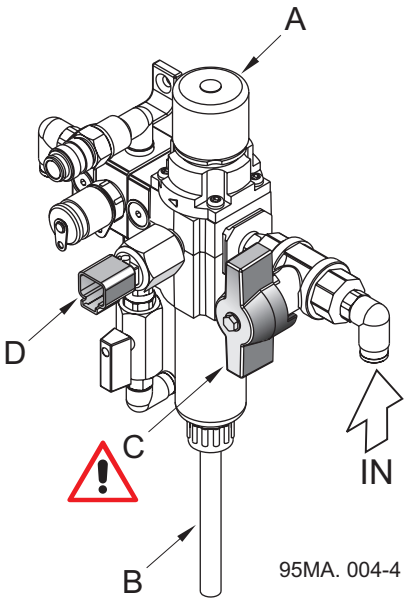
FILTER REGULATOR UNIT

Comprises of a combined air filter/pressure regulator. It is mounted in the systems locker.

Safety Precautions

The shut off valve must be used when servicing any item on the air system



The air filter unit incorporates a drain which automatically dumps accumulated water when the machine is shut down or when the air supply is isolated by the shut off valve (C). It can also be drained by pushing up the drain tube (B) that protrudes from the underside of the systems locker.

The pressure regulator (A) ensures the equipment is not over pressurised. It is factory set and sealed at 7·5 bar (108 psi).

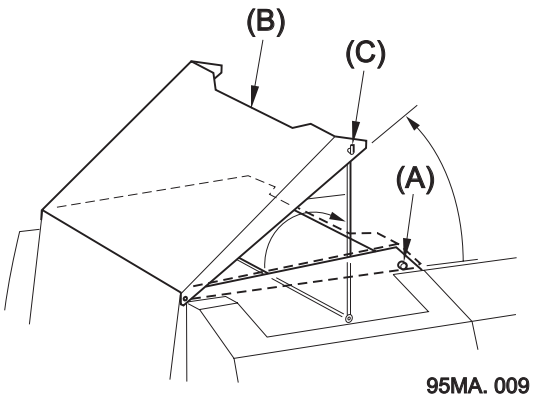
A pressure switch (D) is fitted to illuminate the low air pressure warning lamp on the cab switch panel.

COWL SILENCER ASSEMBLY

Safety platform/gantry to be used for this procedure

The silencer chamber in the roof of the cowl should be cleaned periodically or the performance of the machine could be adversely affected.

Access to the chamber is gained by first removing the two screws (A). raise the top cover (B) on the hinge and secure on the prop (C).



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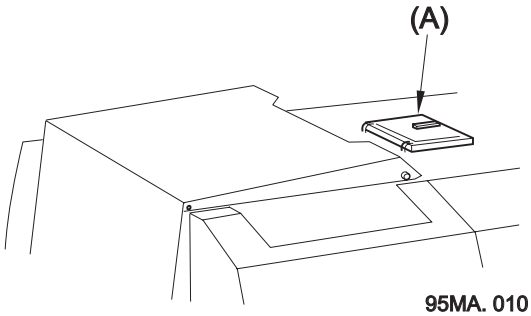
BODY ROOF DUCT INSPECTION PLATE/ACCESS DOOR OPTION

Safety platform/gantry to be used for this procedure

With mesh screens removed or lowered and the body raised (supported on its prop), clean the ducting in the top of the body using a broom and hosepipe. Access is gained by removing the top inspection plate, or hinged door (if option is fitted). Care should be taken not to get water into the fan case.



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PNEUMATIC CYLINDER MAINTENANCE

Periodically inspect the cylinder rods for damage, blemishes or build up of material such as tar, cement, paint etc. The rods can be cleaned with fine wire wool and/or spirit and should be kept clean to ensure long seal life.

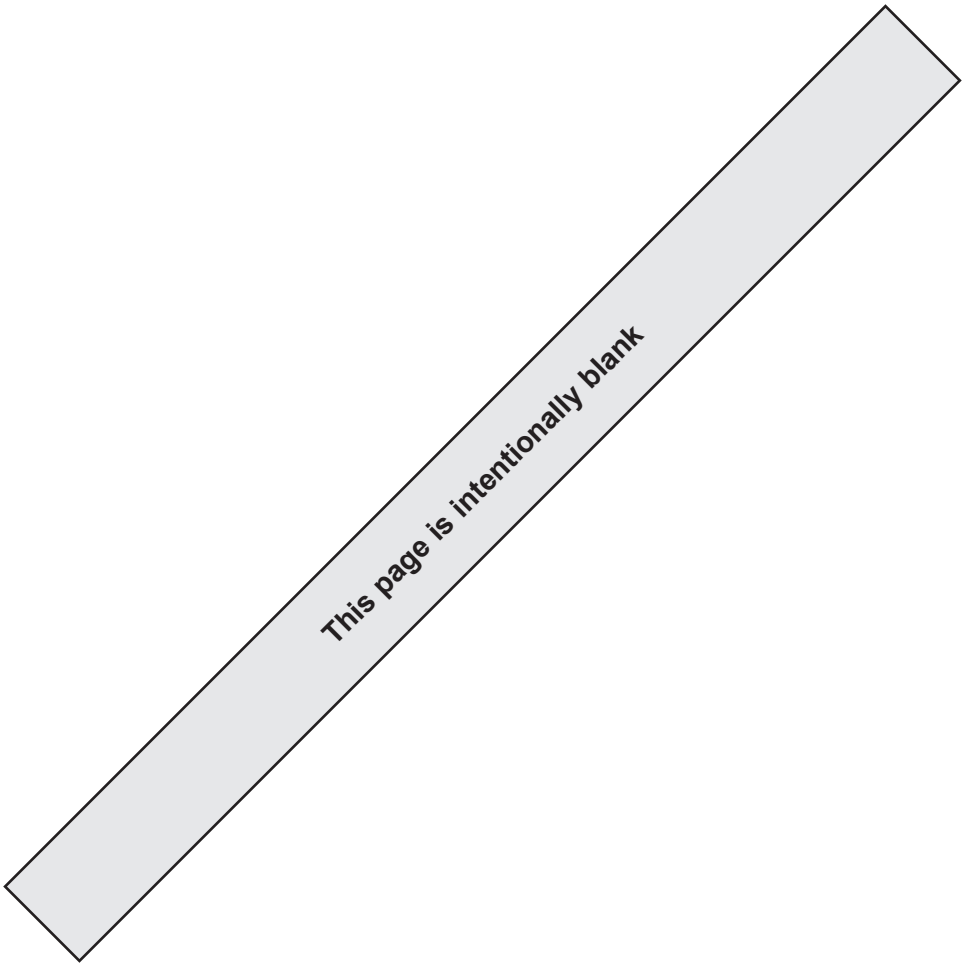
HYDRAULIC CYLINDER MAINTENANCE

Observe the notes on damage etc. described under pneumatic cylinders, especially with regard to the wide sweep brush slewing cylinder on dual sweep machines and the channel brush lift cylinder.
Avoid playing the water washdown hose over the body tip cylinder when in the fully raised condition.

CLEANING THE VEHICLE

With the advent of high pressure steam and washdown equipment, damage can be caused by playing this equipment onto the electrical control system, paintwork etc. and great care should be exercised when it is carried out.

Low pressure should always be used



Additional Information for

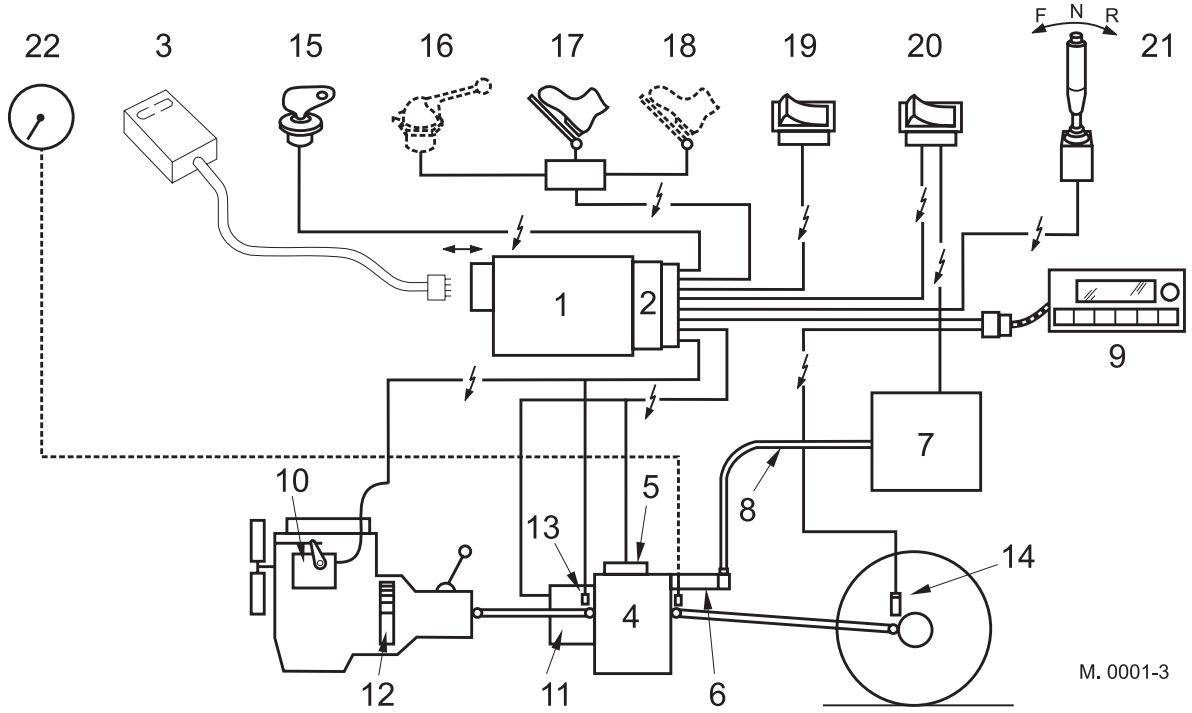
VS Range

Introduction

The VS Range is the latest generation of chassis mounted road sweepers. The drive systems when sweeping are controlled by an on board microprocessor, which embodies a suite of software programs to suit specific applications and duties. This system allows the chassis to be driven normally from A to B and hydrostatically when in the work mode. The engine is controlled by the chassis ECU.

To guard against EMC interference, the controller casing is metallic encased and fully grounded to earth, and complies with EEC 89/336.

A typical circuit for the dual-mode hydromechanical propulsion system showing the various connections to external switches and sensors system is shown below.

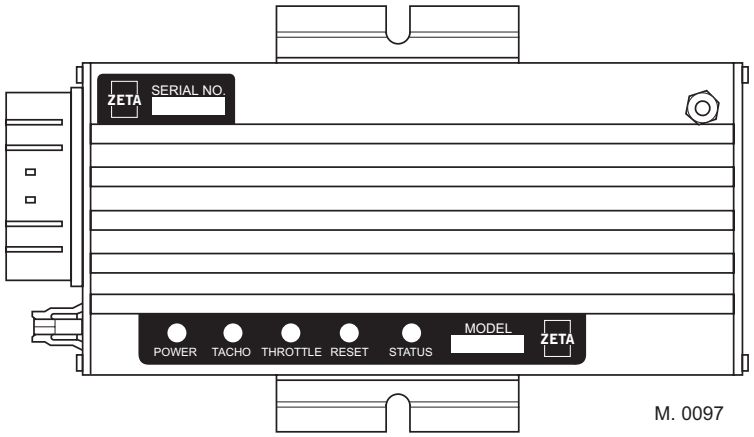


1. D-tec micro processor controller
2. Connection plug
3. Programmer unit
4. Hydrodrive Gearbox/Transmission
5. Engage switch
6. Shifter cylinder
7. Pneumatic control valves
8. Air line
9. Datalogger
10. Electronic fuel pump
11. Transmission pump
12. Engine flywheel
13. Engine speed sensor
14. Speed sensor - Datalogger
15. Existing Ignition
16. Dual control change-over option
17. Primary foot pedal
18. Secondary foot pedal
19. Throttle (switch or joystick) 3 position - spring centered
20. Hydrodrive engage/disengage
21. Direction control for hydrostatic drive
    N = Neutral
    F = Forward
    R = Reverse
22. Chassis Tachometer

With the advent of electronically controlled engines the D-Tec no longer controls the engine revs in work mode, it only controls the transmission.

The D-Tec controller module has five built-in status lamps in its upper surface, surrounded by a decal as shown below. These lamps provide indication of correct operation and assists in fault diagnosis if the need arises.

Top view of D-Tec Controller



Status Lamps

Power (green)

Lamp illuminates whenever the controller has electrical power applied to it.

Tacho (orange)

Lamp illuminates when the tachometer, using a Hall-Effect gear tooth sensor, correctly senses rotation whenever the engine runs above 300 rpm. If this lamp does not illuminate either the engine has stopped, the chassis gearbox is in neutral, or the sensor is positioned too far away from the tooth wheel in the case of the Hall-Effect sensors, or the electrical connections are disconnected in some way.

Throttle (yellow)

Lamp pulses progressively, increasing engine speed, increases pulse rate of lamp until 100% of throttle is achieved when lamp stays illuminated.

Reset (red)

Illuminates when there is a poor electrical connection, also illuminates when saving a setup parameter.

Status (yellow)

Lamp illuminates when ‘work’ mode is engaged.

Note: The D-Tec control unit is sealed and factory set, and cannot be adjusted. Inspection/testing of the unit can only be carried out with specialist equipment.

See Section 15 for D-Tec Set Up Procedure

REGULAR MAINTENANCE

It is impossible to over emphasise the importance of regular maintenance, inspection and running adjustments to maintain efficiency and obtain trouble free service from the machine.

Attention is drawn to the recommendation in the Chassis Handbook relating to the post delivery check over.

ENGINE MANAGEMENT ECU

Please note that the chassis manufacturers Engine Management System has been set in accordance with our requirements. If a malfunction of the ECU occurs and the component replaced then the parameters would require downloading and reset in the new component.

Failure to do this will cause the machine to malfunction.

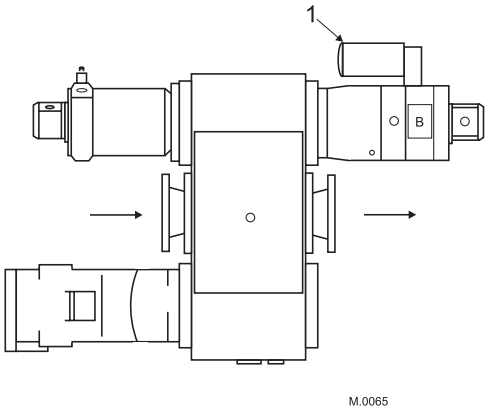
Safety Precautions

- **It is important that the Safety Precautions shown at the front of this chapter are observed when working on the VS machine.**

TRANSMISSION PUMP OIL FILTER REPLACEMENT

This filter should be changed every 500 hours.

With the vehicle engine not running, remove the filter alongside the transmission pump.



1. Transmission Pump Filter

Fit a new filter as quickly as possible to minimise the loss of any hydraulic oil. Ensure the correct filter is fitted, Part No 224-15, as this item is under pressure and 'Pattern Parts' may not be suitable.

Start engine and engage Hydrodrive. Allow system to tick over for a few minutes to purge air from the circuits.

CHAPTER 8

Hydraulic System

Table of Contents

GENERAL DESCRIPTION

The hydraulic system may be divided into four hydraulic circuits fed from a common hydraulic reservoir.

1 Sweep system and load discharge.

2 Options system for Supawash etc.

3 VS - Fan Drive

4 VS Only - Hydro drive system.

Hydraulic filtration is provided by suction filters within the hydraulic tank, together with replaceable type 'in line' return filter mounted externally on the upper face of the hydraulic tank.

CIRCUIT PRESSURES

Test points are provided on the hydraulic system to carry out pressure checks.

POINT NO.	FUNCTION	MACHINE TYPE
T1	Boost pressure, reverse pressure, antiskid	VS
T2	Pump control pressure	VS
T3	Boost pressure, forward pressure	VS
T4	Pump boost pressure	VS
T4B	Motor Pressure Control	VS
T5	Case pressure pump/motor	VS
T6	Coast pressure	VS
T7	Sweep sytem test point	VT & VS
T8	Fan drive system	VS
T9	Options system ie Supawash	VT & VS
GL	Body Lower	VT & VS

BODY DISCHARGE SYSTEM

Connect a suitable 250 bar gauge to Test Point T7 (see Valve Identification). Operate auxiliary engine at tick over, activate the body discharge system, press the rear door close button and read the pressure on T7. This should be 175 bar; adjust the discharge relief valve RV1 if necessary.

The system also has another relief valve of 80 bar on the body lower circuit to prevent damage to the body prop. To check pressure fit a 250 bar pressure gauge to Test Point GL. Operate the'body down' button and record the pressure, adjust RV4 if necessary.

The door locking valve unit DL and sequence valve is preset and cannot be adjusted on the machine.

Tip Cylinder Descent Control (PC Flow Valve)
The flow restrictor is adjusted so the body descent empty is in excess of 15 seconds.

Note: Do not run the pressure test for move than 30 seconds.

SWEEPING SYSTEM

Connect a suitable 250 bar gauge to Test Point T7 (see Valve Identification).

To check main relief valve 225 bar, first remove solenoid valve plug Y on the dual machine (Z on single). Start auxiliary engine, increase engine speed to maximum. Run the auxiliary engine at 2000 rpm. Operate RH wide sweep brush and one channel brush, screw speed control in to give maximum brush speed. The pressure reading should be 225 bar. **NB :** Brushes will not rotate.

Adjust relief valve RV2 if necessary. **NB :** Do not run the pressure test for more than 30 seconds.

SUPAWASH OPTION

Connect a 250 bar gauge to Test Point T9 (see Hydraulics, Chapter 28).

It is necessary to remove hose 105 in Port MA of the valve and seal with a suitable plug - the hose will also need capping. Run auxiliary engine (VT)/engage hydrodrive (VS) and select Supawash and take a pressure reading, adjust the relief valve if necessary to give 220 bar. Turn off Supawash and stop engine. Reconnect pipework.

Note: Do not run the pressure test for more than 30 seconds.

FAN DRIVE SYSTEM

Fit a 250 bar minimum pressure gauge to test point T8.

Open rear door, open inlet flap.

Run the truck engine and engage hydrodrive, engage work mode and raise the engine speed to maximum 1700 rpm.

There should be a nominal reading of 18 bar which is the standby pressure. If this requires adjustment see chapter 22 VS section.

Operate the fan switch in enviro mode (middle position). The reading on the pressure gauge should be 150 bar. If this requires adjustment the relief valve is shown in Chapter 28 VS section. Remove the sealing cap and adjust allen screw to give required pressure. Refit sealing cap. Only carry out adjustment when fan switch is in the off position.

Operate the fan switch in the Boost Mode. The pressure reading should be 175 bar. If this requires adjustment, the relief valve is shown in Chapter 1.

HYDRAULIC SYSTEM INITIAL OPERATION

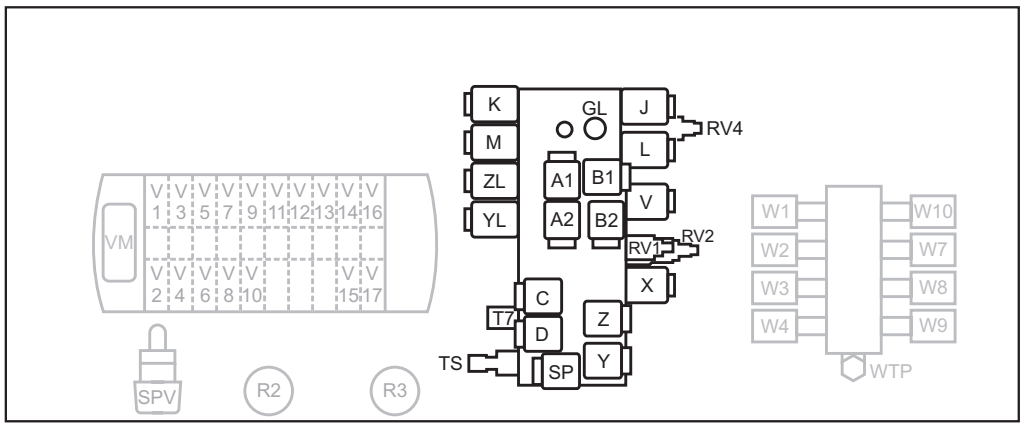
When the hydraulic system is first commissioned, or after changing a hydraulic hose on the hydraulic pumps on the body discharge circuit, it is necessary to purge any air from the system.

Firstly operate the electric discharge pump to open the rear door.

Then start the auxiliary engine on VT units, or engage the hydrodrive gearbox on VS units, and open and close the rear door three times to ensure all air is purged from the system.

Failure to carry out this procedure may cause the rear door locks to function incorrectly.

VALVE IDENTIFICATION



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VT & VS Modular Series Hydraulic System- Modus Operandi for Base System

	SOLENOIDS ENERGISED																	
OPERATION	D	X	C	Y	Z	A1	A2	B1	B2	J	K	L	M	V	SP	YL	ZL	DL
Operate WSB	√		√															
Extend WSB slew cylinder	√		√					√										
Retract WSB slew cylinder	√		√						√									
Operate LH CB motor		√			√													
Move LH CB out [Variabrush Option]		√			√												√	
Move LH CB in [Variabrush Option]		√			√	√												
Lift LH CB - other systems inert (for 8 seconds)	√					√												
Lift LH CB with WSB active (A1 for 8 seconds)	X		X			√												
Operate RH CB motor		√		√														
Move RH CB out (while operating)		√		√												√		
Move RH CB in (while operating)		√		√			√											
Lift RH CB - other systems inert (for 8 seconds)	√						√											
Lift RH CB with WSB & WP active (A2 for 8 seconds)	X		X				√											
Operate both channel brushes (Turbo & Hydro only)		√			√										√			
Close rear door and lock (+ DL via limit switch)	√									√	√							√
Unlock rear door cylinder and open	√										√							
Extend body tip cylinder (raise)	√											√	√					
Retract body tip cylinder (lower)	√												√					
Extend propping cylinder (enable) [Option]	√																	
Retract propping cylinder (disable) [Option]	√													√				
Powaboom (Option)	√	+ CONTROLS ON PENDANT UNIT																
Oil cool (motor) – VS Series only	ALWAYS ACTIVE																	
Water pump (motor)	ALWAYS ACTIVE																	

KEY: √ = solenoid energised
X = option of additional solenoid energised to fulfil function
WSB = wide sweep brush rush motor
CB = channel brush

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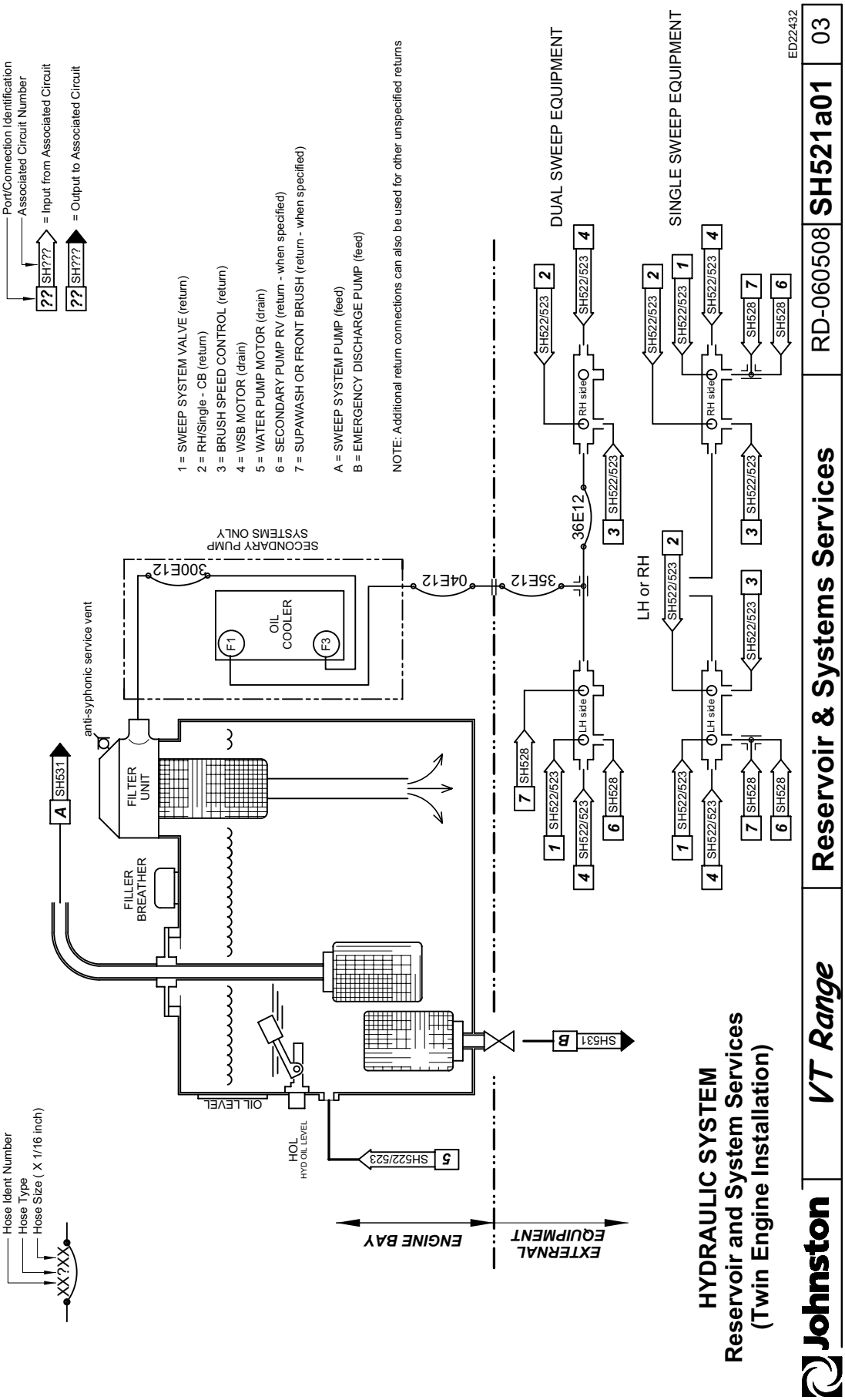
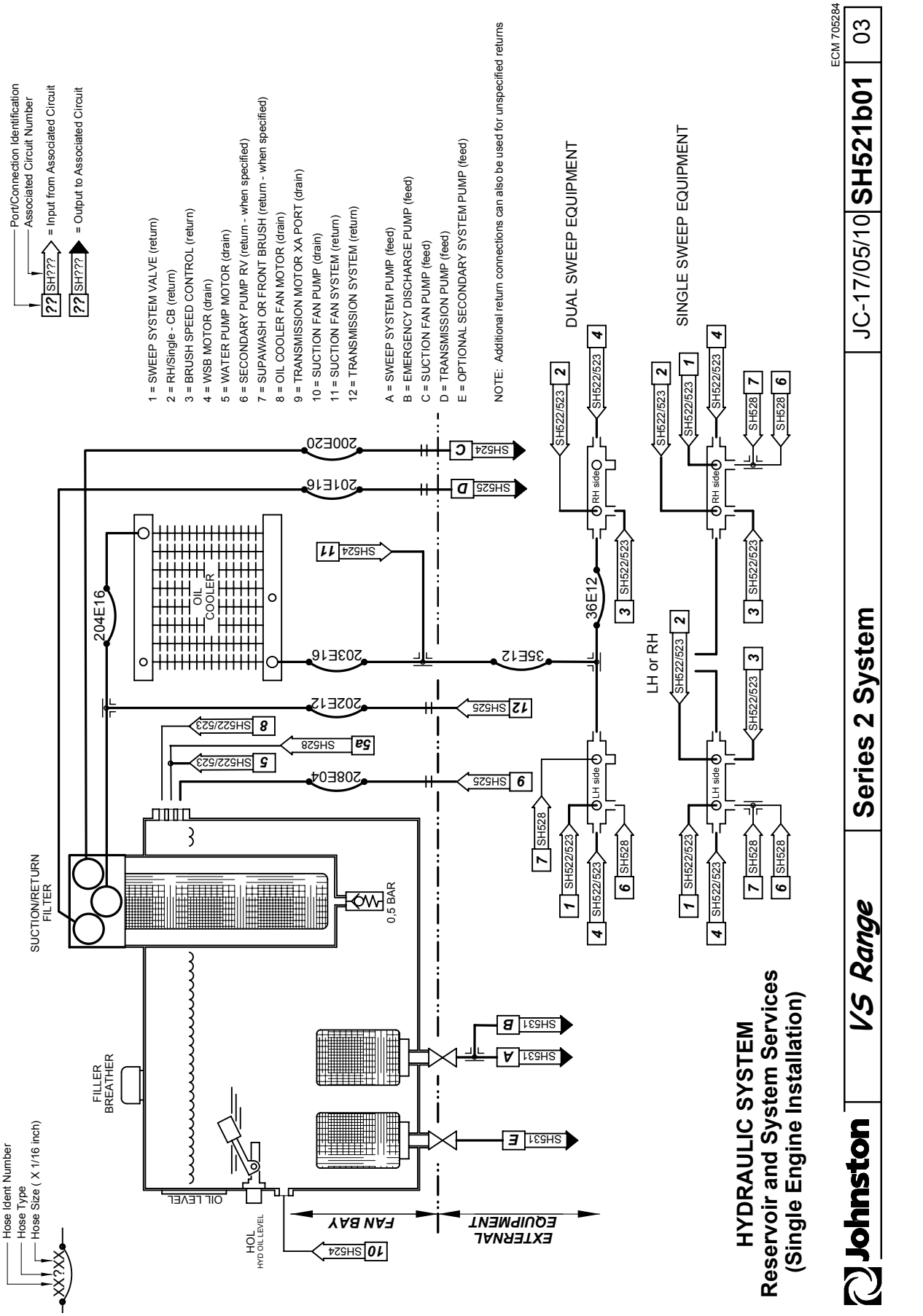
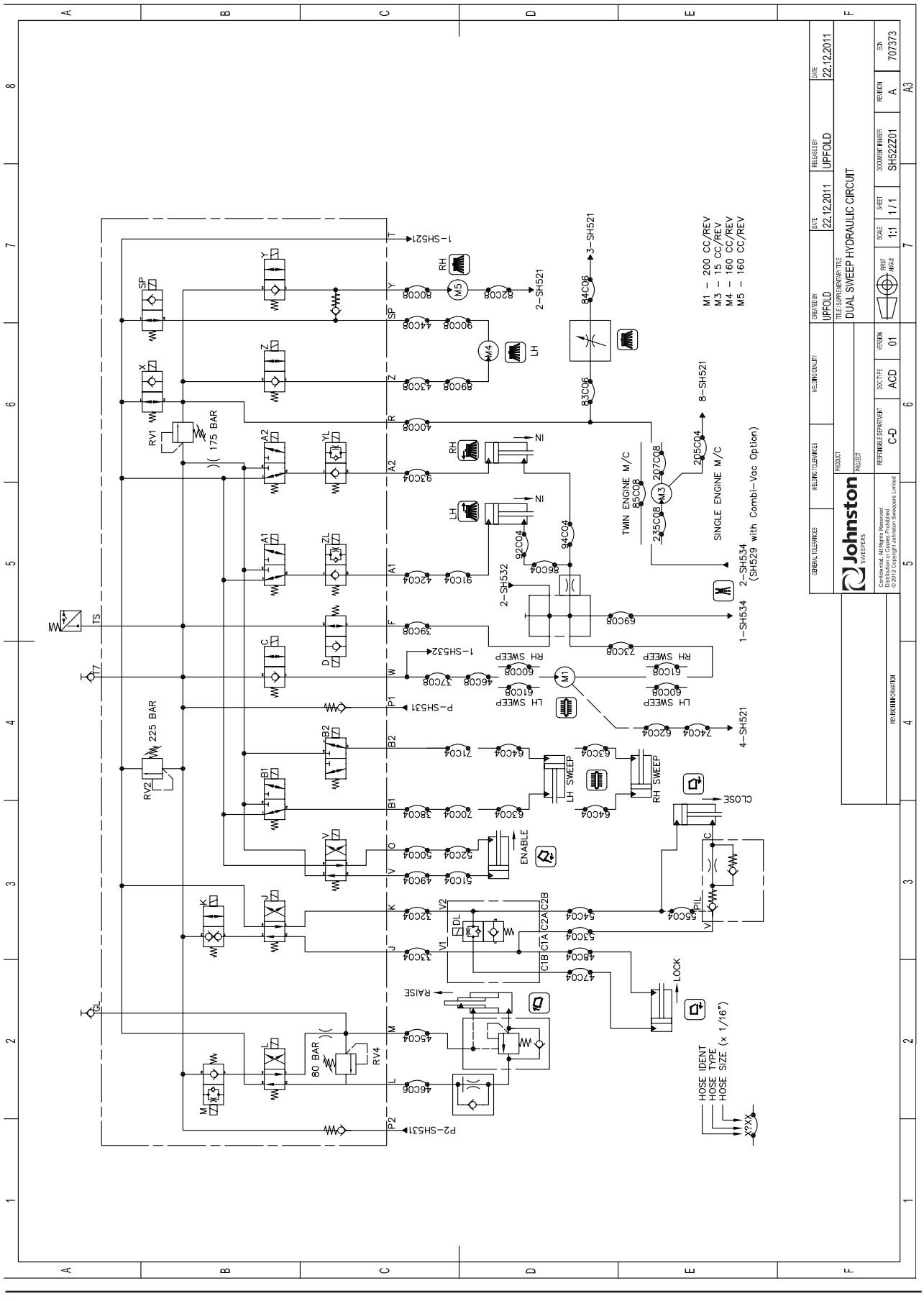
Reservoir and System Services - Diagram SH521a01



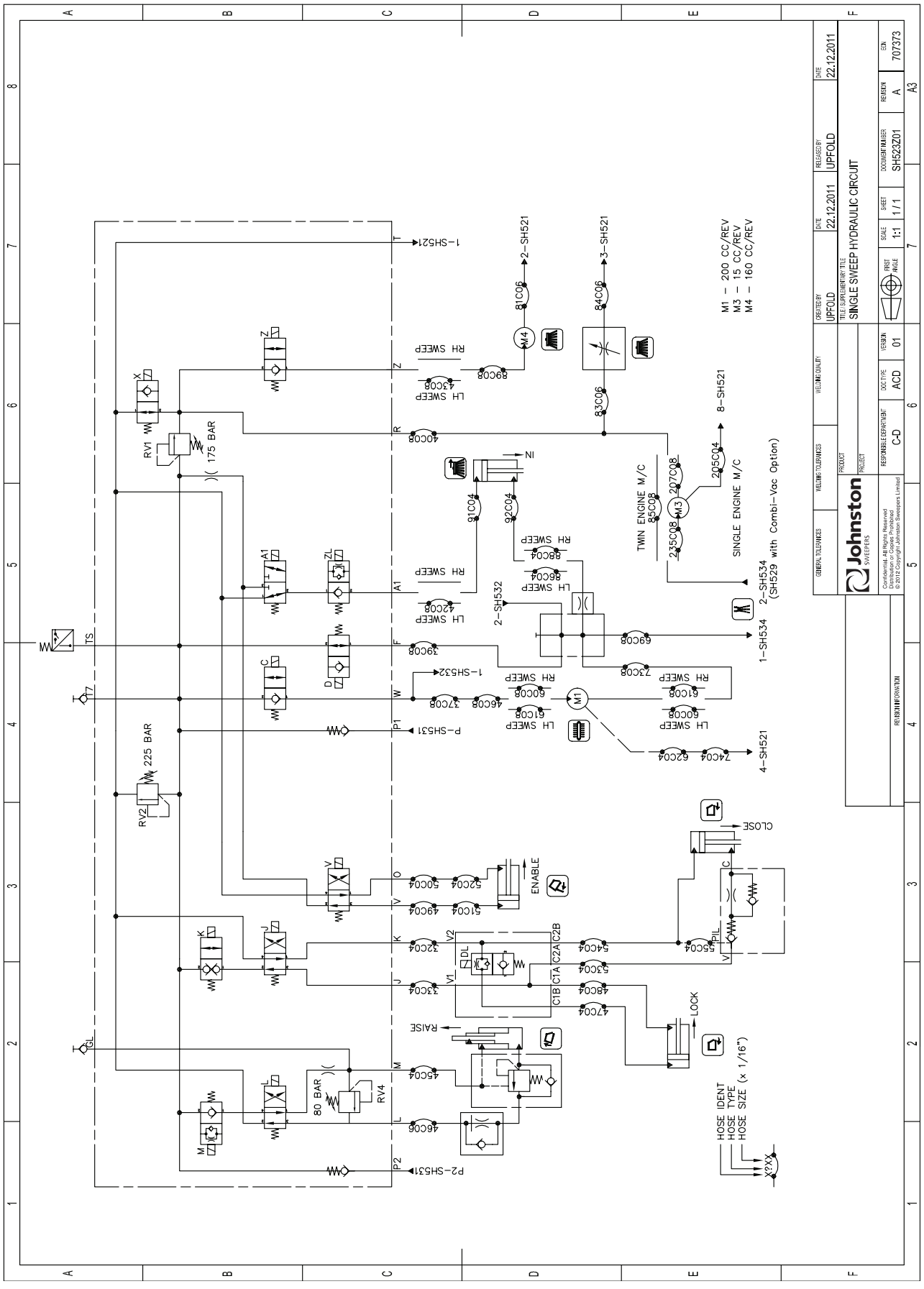
Reservoir and System Services - Diagram SH521b03



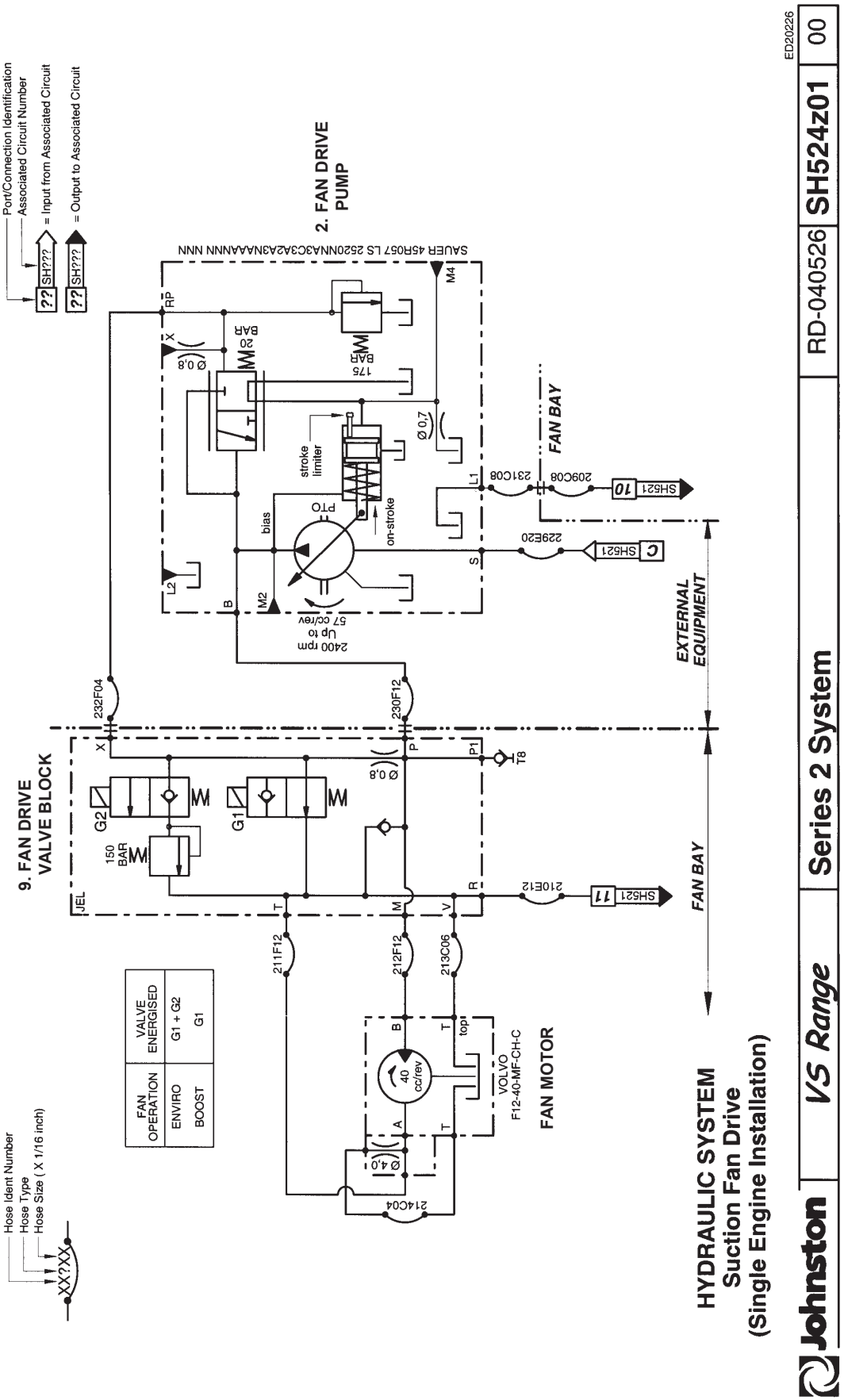
Dual Sweep/Discharge System - Diagram SH522z01



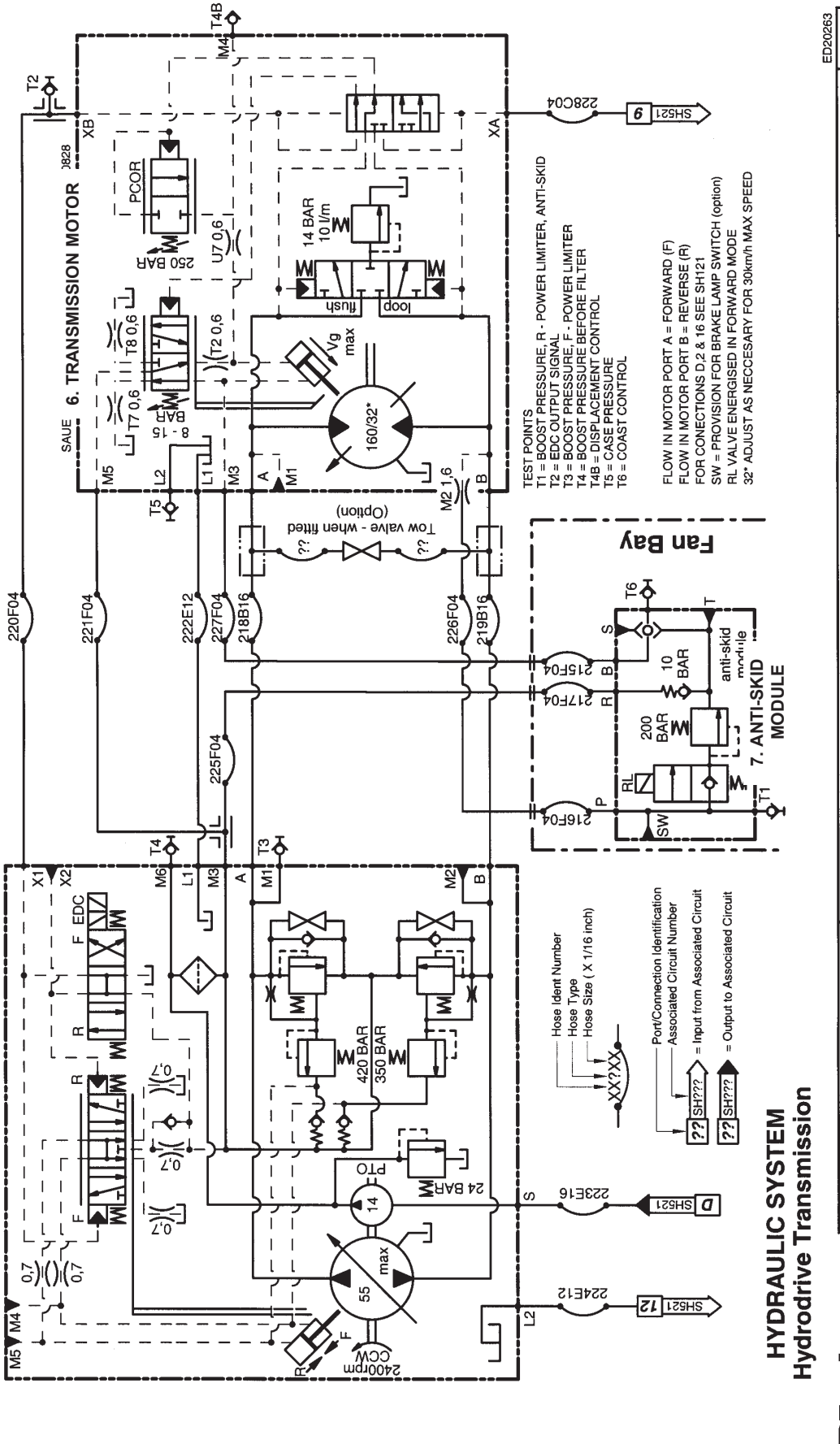
Single Sweep/Discharge System - Diagram SH523z01



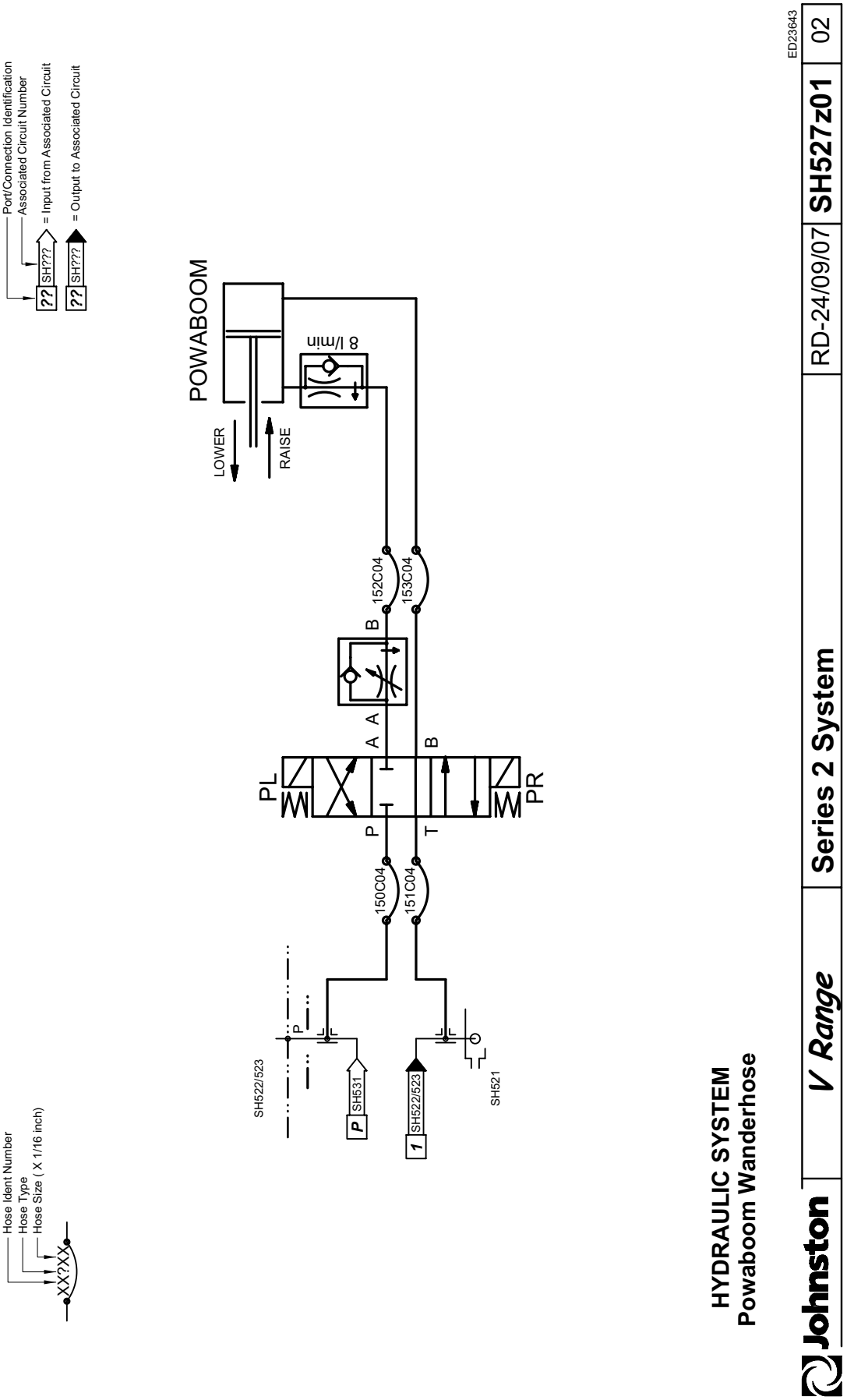
Fan Drive Diagram SH524z01



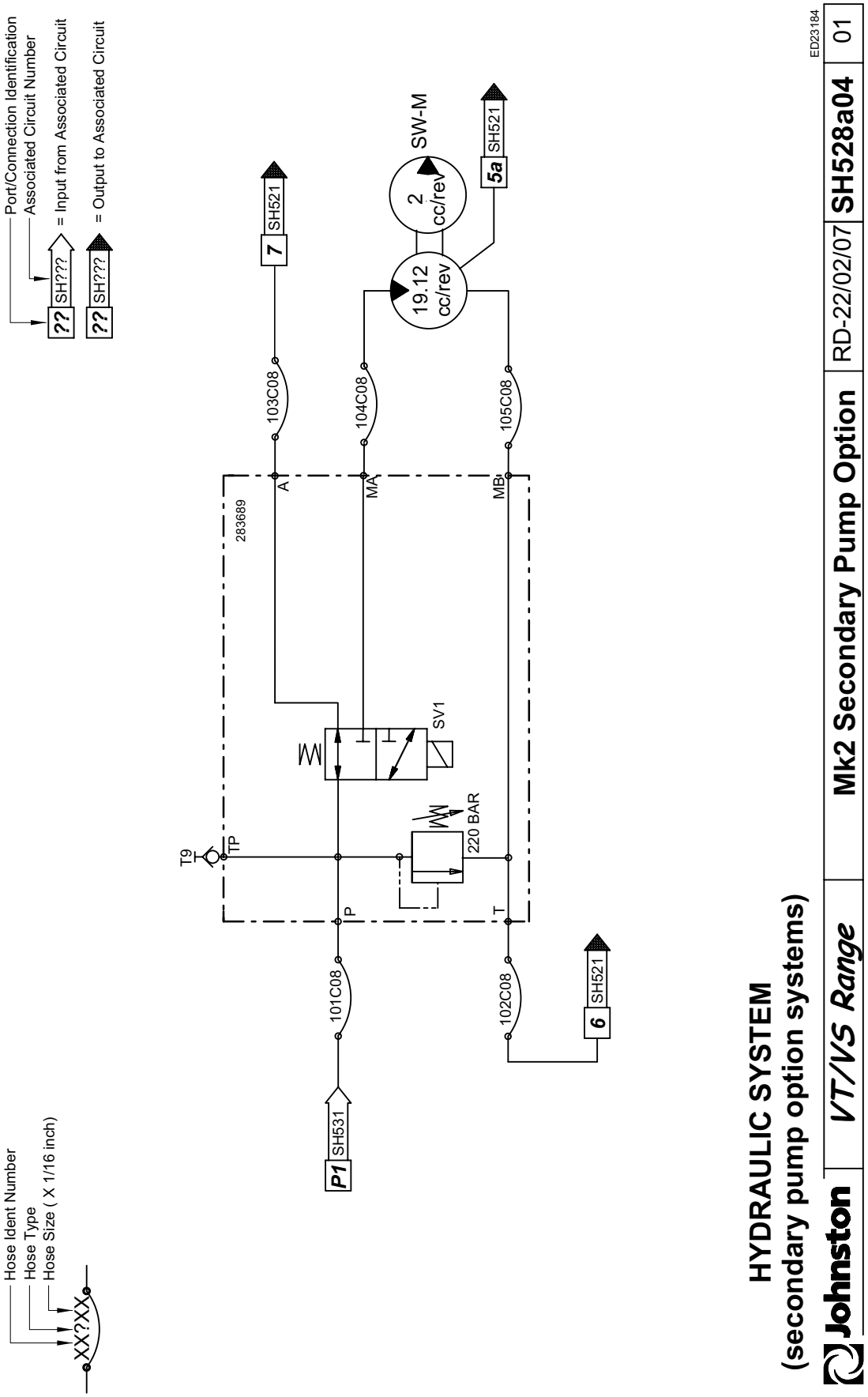
Hydrodrive Diagram SH525z01



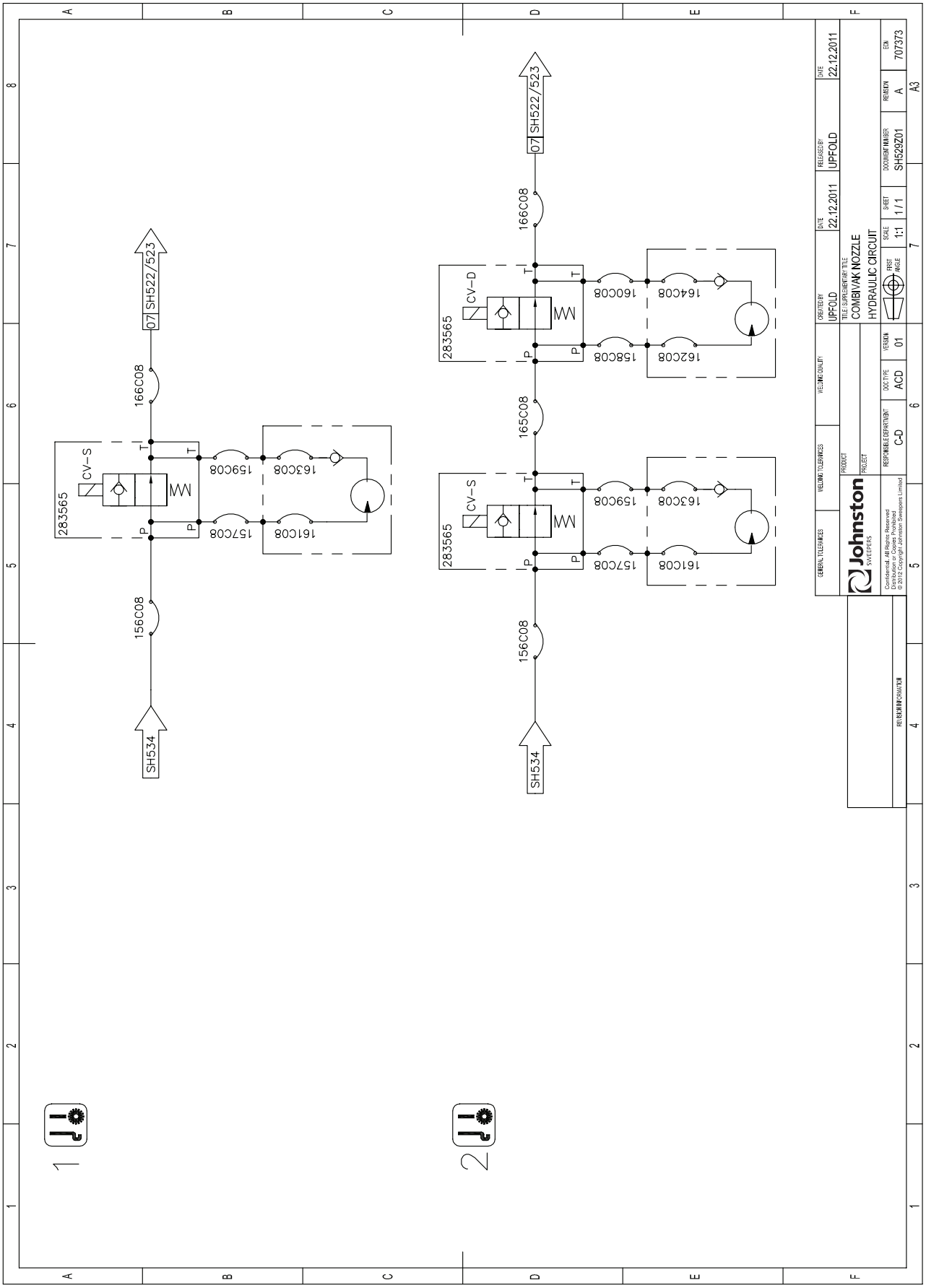
Powaboom - Diagram SH527z01



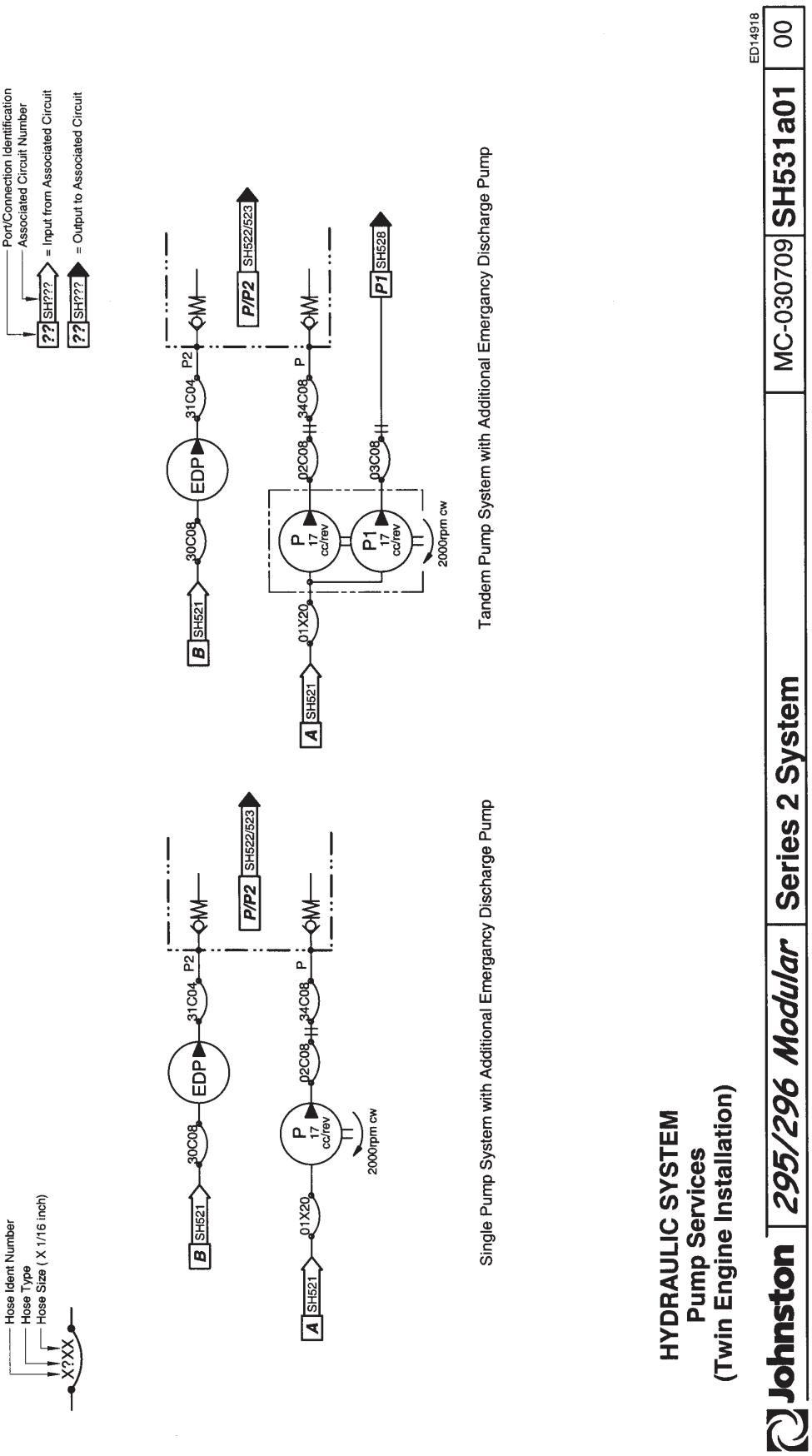
Type 'D' Secondary Pump Option Systems - Diagram SH528a04



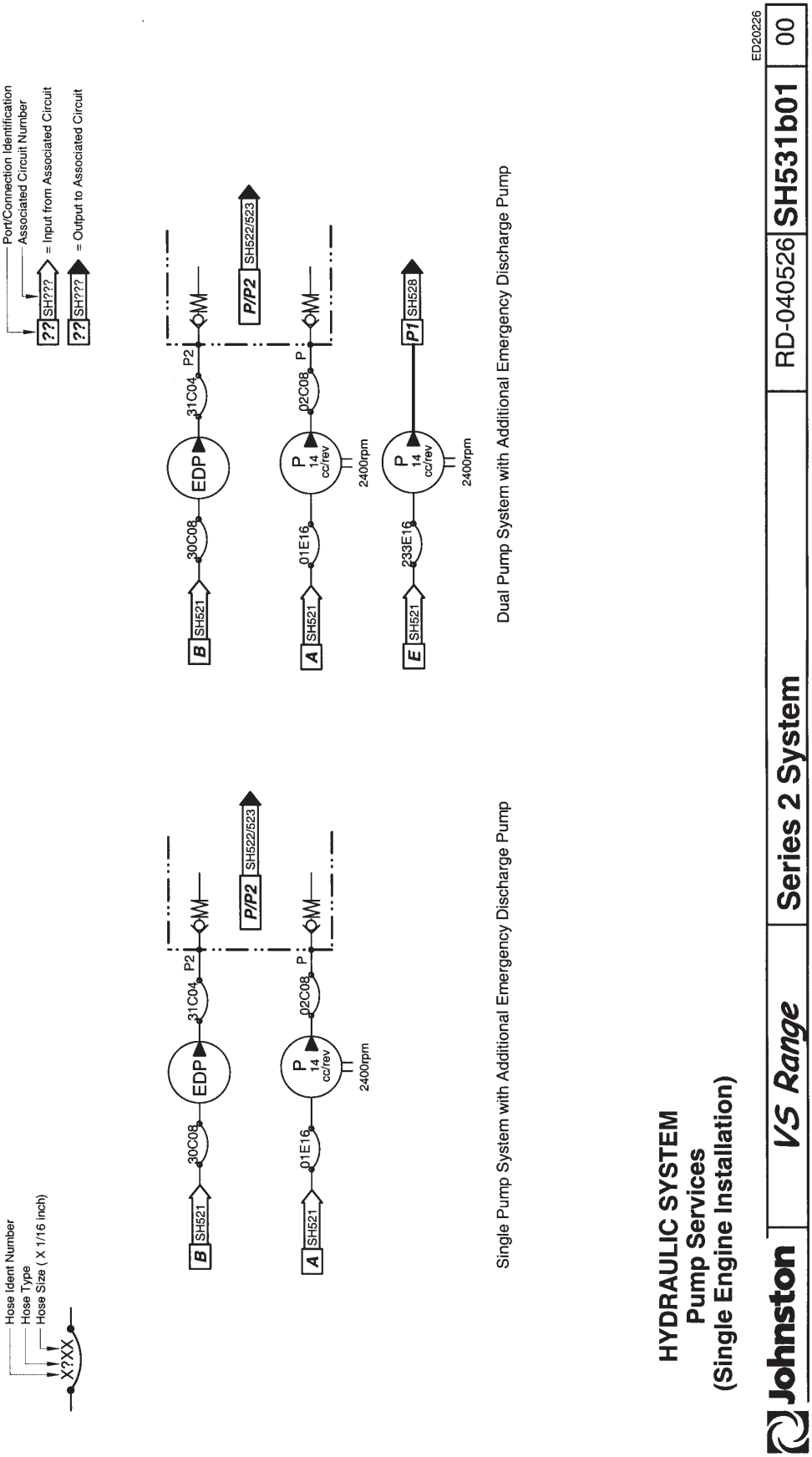
Combivak Nozzle Option - Diagram SH529z01



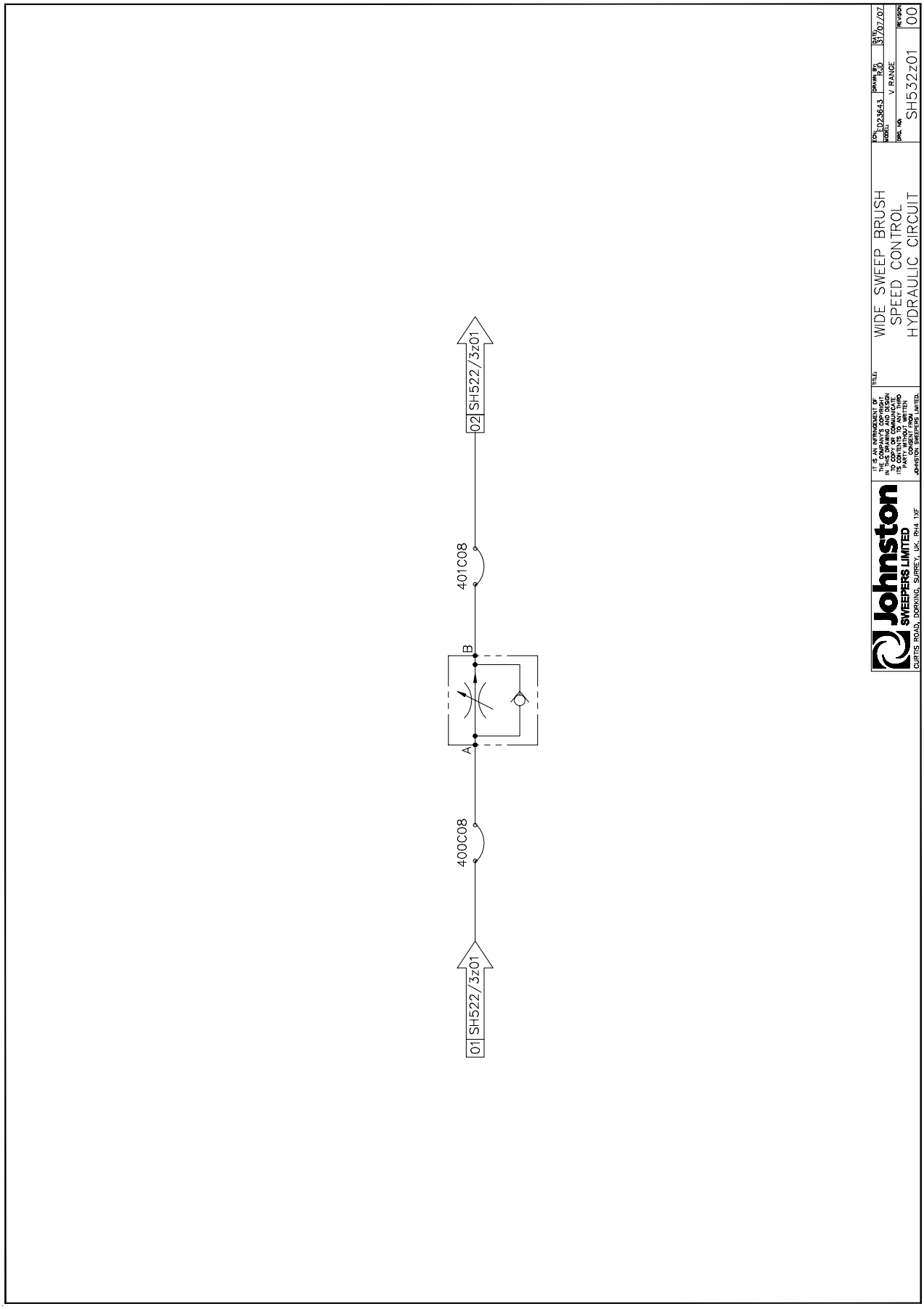
Pump Services - Diagram SH531a01



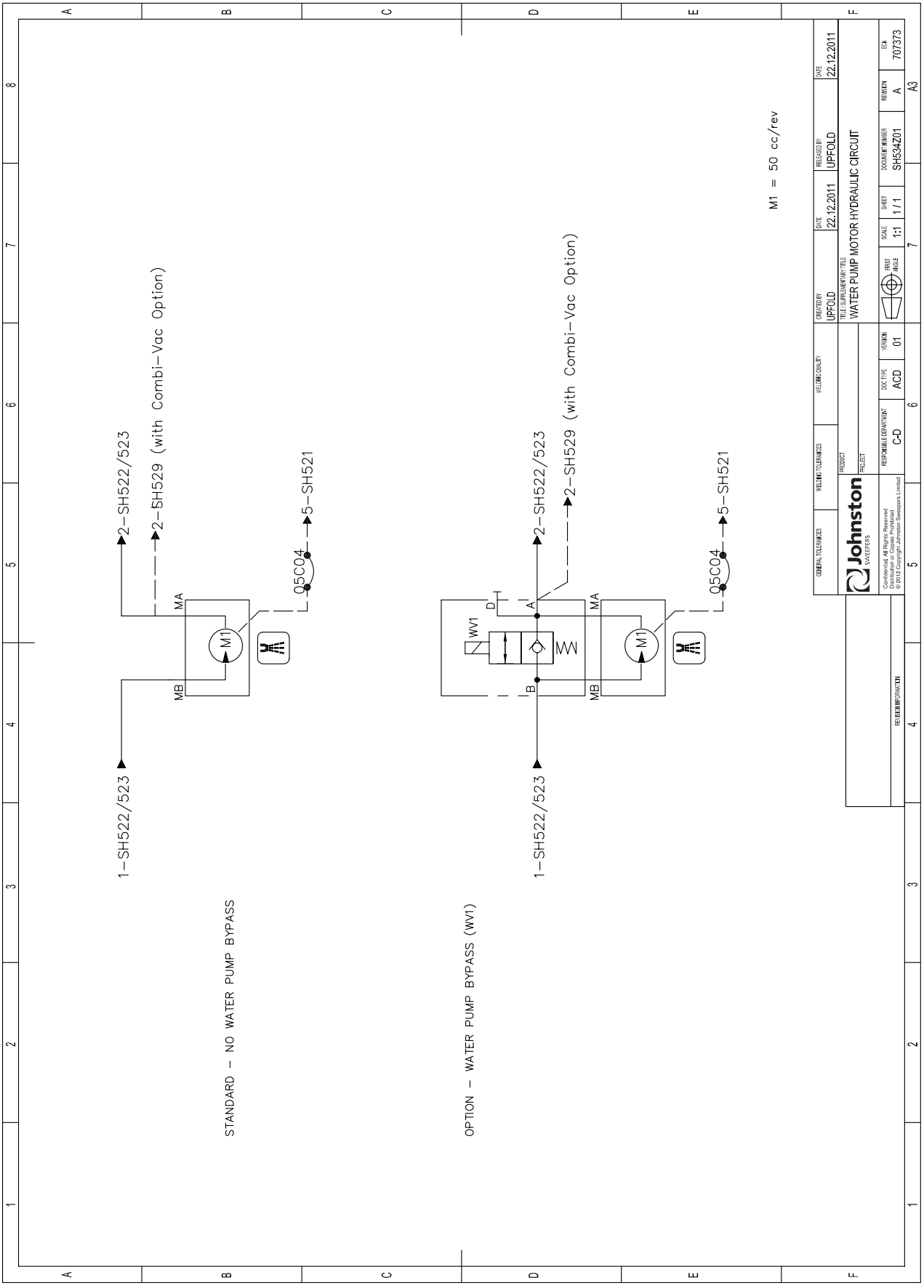
Pump Services - Diagram SH531b01



Wide Sweep Brush Speed Control - Option - Diagram SH532z01



Low Pressure Water Pump Shut Off - Option - Diagram SH534z01



CHAPTER 9

Electrical System

Table of Contents

NB - The electrical system uses Type B switches.

GENERAL DESCRIPTION

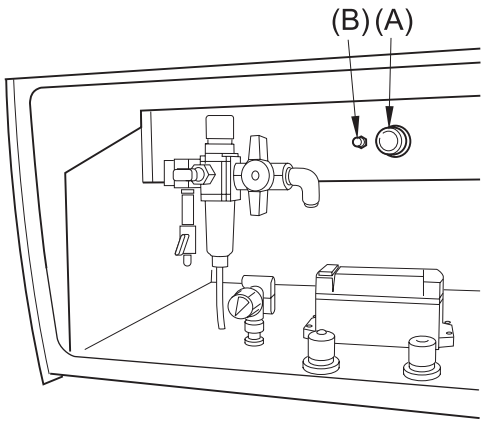
The system is integrated with that of the chassis in that it shares its battery and power source. The auxiliary engine is equipped with a second alternator to supplement power generation. The system activates all operational functions of the machine except channel brush speed regulation.

SYSTEM DESCRIPTION

The electrical system circuit diagrams are sub divided into modularised sub circuits and are identified by an eight digit code, i.e. SE511Z01. The first five digits identify the machine and a particular control feature, the last three digits identify variation and design status of the particular control feature. When the sixth digit is a 'Z', then there is only one design variation, thought there could be other variations identified by the seventh and eighth digits.

To assist fault finding and troubleshooting, the solenoids have an LED in the electrical connection plug which illuminate when power is achieved.

The electrical system is protected by various fuses - See Chapter 2.



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KEY

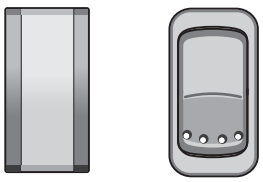
A = EDS

B = MCB

The main feed from the battery to the electrical system is protected by a circuit breaker (B) which is mounted in the systems wafer.

The button (B) will pop out when activated and is 'pushed in' to reset when the fault has been cleared.

The electrical system uses Type B switches, the Type A switch is shown below for reference only.

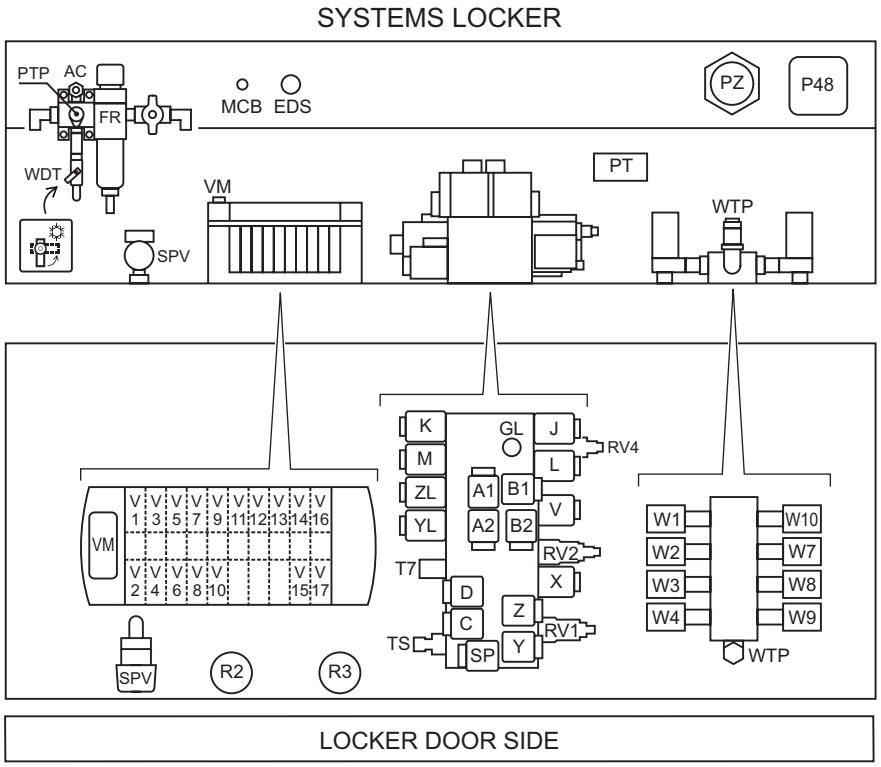


TYPE 'A' SWITCH

TYPE 'B' SWITCH

95MA. 037

COMPONENT IDENTIFICATION



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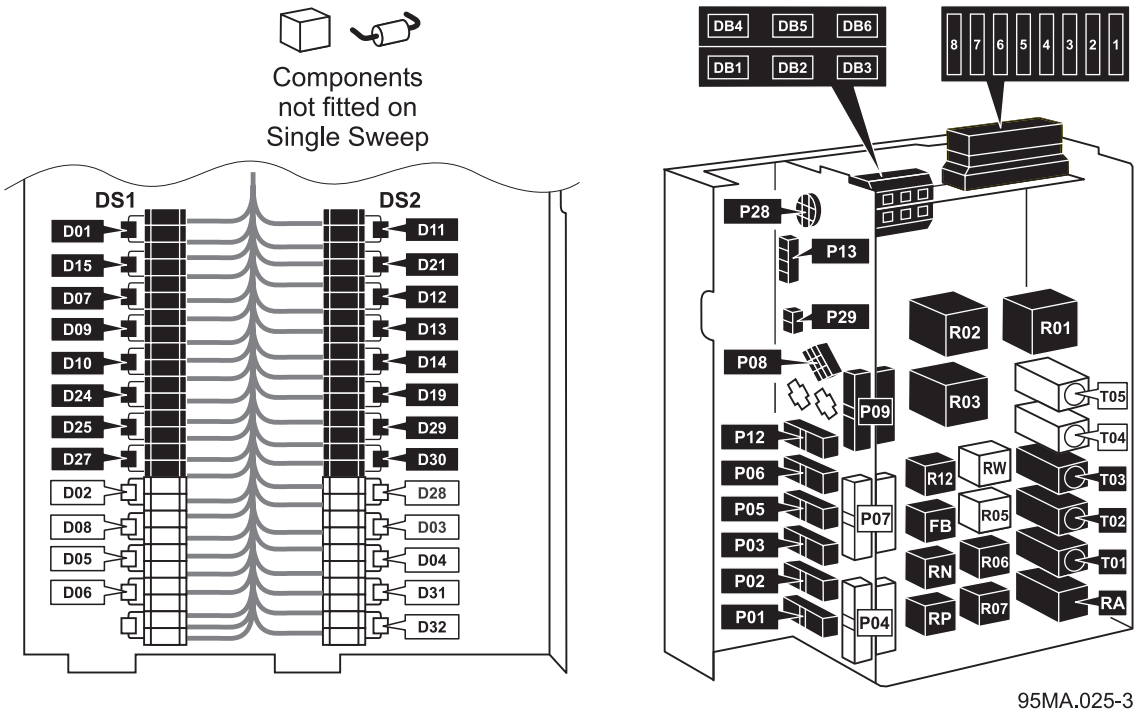
RELAY BOX
Dual sweep box shown



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Relays

Item	Description / Function	VT	VS	Location
R1	**Main power relay** Fuses 3-8	√	√	Relay Box
R2 to R4	***Not fitted***			***N/A***
R5	**Sweeping hours** Signal for wizard monitor Active with right hand nozzle	√	√	Relay Box
R6	**Discharge control** Pendant power supply	√	√	Relay Box
R7	**Supawash control** Active with full water tank switching negative between hydraulic valve and low water level lamp	√	√	Relay Box
R8	**Hydrodrive Select Interlock** Active with Hand brake and Clutch Switch	**X**	√	D-Tec Box
R10	**Suction Fan Control** Active With Reverse/Ergo Selected	**X**	√	Fan Pack Management Box
R11	**Transmission Control** Active with Forward Selected - Interrupted with Air Suspension Active	**X**	√	Fan Pack Management Box
R12	**Handbrake signal** discharge select (Only ever active if a positive signal is used)	√	√	Relay Box
R20	**Auxiliary engine ECU ignition** Interlock relay for timer relay 7	√	**X**	E/Man Box
R21	**Auxiliary engine ECU ignition** Interlock relay for oil pressure	√	**X**	E/Man Box
R22	**Auxiliary engine ECU ignition** Interlock relay for water temperature	√	**X**	E/Man Box
K1	**Auxiliary engine ignition** Active with auxiliary ignition switch - signals ECU	√	**X**	E/Man Box
P.C.B	**PCB Pendant control** Active with Pendant control Buttons	√	√	Relay Box
FB	**Front beacon** Active with beacon switch	√	√	Relay Box
PR2	**Provides power to fuses 3-6** Active with auxiliary ignition	√	√	Relay Box
PR3	**Provides power to sweep gear when Inert** Active with Program button or Reverse	√	√	Relay Box
PSM 1	**PTO 1 In PSM - Fixed Engine Speed** Active with Air Suspension	**X**	√	D-Tec Box
PSM 2	**WLI Lamp Control** Active with Air Suspension - Switches Off Lamp	**X**	√	D-Tec Box
PSM 3	**Hydrostatic Road Speed Reduction** Active with Air Suspension - Switches **–**Ve to R11 Transmission Control	**X**	√	D-Tec Box
PSM 4	**PTO 3** - **Feed Back** Active with Master Switch - Sends **–**Ve to PTO 3 - Feed Back	**X**	√	D-Tec Box

Relays (continued)

RA	**Auxiliary engine alternator charge lamp** Located in ignition switch	√	**X**	E/Man Box
RC	**Positive cranking** Provides a continuous earth to relay RS while auxiliary engine is cranking	√	**X**	E/Man Box
RFh	**Auxiliary engine fuel heater** Controlled by ECU	√	**X**	E/Man Box
RN	**Front brush control**	√	√	Relay Box
RP	**Autoprop control** Active with hopper raise switch deactivating valve v	√	√	Relay Box
RS	**Power relay for cranking** Active with crank button	√	**X**	E/Man Box
RT1	**External throttle** Active for speed down – switching negative	√	**X**	Subframe
RT2	**External throttle** Active for speed up – switching negative	√	**X**	Subframe
RTD 1	**Accelerator Pedal Change Over** Active with Master Switch	**X**	√	D-Tec Box
RTD 2	**Accelerator Pedal Change Over** Active with Master Switch	**X**	√	D-Tec Box
RW	**Simultaneous sweep** Active with LH CB – de-activates Y and activates SP	√	√	Relay Box
RX	**Work Mode** Active with Master Switch	**X**	√	D-Tec Box
RY	**Neutral Simulation** Active with Work Mode	**X**	√	D-Tec Box
RZ	**Anti-Crank / Alternator** Active with Ignition Only	√	**X**	E/Man Box J/D Only

Timer Relays

T1	**W/Sweep Powascrub** W/Sweep rotation delayed for duration of timer Powascrub active for duration of timer **Set to 0.5 sec -** activated by turning WSB on	√	√	Relay Box
T2	**L/H Channel brush auto out** Active for duration of timer **Set to 6.0 sec** - activated by turning L/H C/Brush on	√	√	Relay Box
T3	**L/H Channel brush auto in** Active for duration of timer **Set to 8.0 sec** - activated by turning L/H C/Brush off	√	√	Relay Box
T4	**R/H Channel brush auto out** Active for duration of timer **Set to 6.0 sec** - activated by turning R/H C/Brush on	√	√	Relay Box
T5	**R/H Channel brush auto in** Active for duration of timer **Set to 8.0 sec** - activated by turning R/H C/Brush off	√	√	Relay Box
T6	**Anti-Crank** **Set to 0.5 sec** - activated on releasing the Crank switch	√	**X**	E/Man Box
T7	**Auxiliary engine ECU ignition** **Set to 8.0 sec** - activated when pressing the Crank switch	√	**X**	E/Man Box

Resistors

Ident.	Description / Function	VT	VS	Location
RS1	Stage 3 Engine CAN 120R	√	X	E/Man Box
RS2	Simulates Accelerator Pedal 100R	√	X	E/Man Box
RS3	Simulates Accelerator Pedal 1k0	√	X	E/Man Box
RS4	Simulates Accelerator Pedal 910R	√	X	E/Man Box
RS5	Simulates Vehicle Road Speed 3k3	√	X	E/Man Box
RT	Simulates - Heatstart Relay	√	X	Engine Loom
???	Simulates Accelerator Pedal 300R	X	√	D-Tec Box
???	Simulates Accelerator Pedal 2k2	X	√	D-Tec Box

Diodes

Ident.	Description / Function	Location
D1	Operation – Valve D	Relay Box
D2	Operation – Valve D	Relay Box
D3	Wide sweep brush slew	Relay Box
D4	Wide sweep brush slew	Relay Box
D5	Operation – Valve X	Relay Box
D6	Operation – Valve X	Relay Box
D7	Nozzle water control	Relay Box
D8	Nozzle water control	Relay Box
D9	Park brake signal	Relay Box
D10	Operation – Valve K	Relay Box
D11	Program button isolate	Relay Box
D12	Operation – Valve D	Relay Box
D13	Operation – Valve D	Relay Box
D14	D.A.W. Operation during load discharge	Relay Box
D15	Earth for Powaboom	Relay Box
D16 to D18	***Vacant***	***N/A***
D19	Operation – Valve M	Relay Box
D21	Reverse signal isolation	Relay Box
D24	Varagap isolation	Relay Box
D25	Varagap isolation	Relay Box
D26	Auxiliary engine crank	E/Man Box

Diodes (continued)

D27	Program isolation	Relay Box
D28	Program isolation	Relay Box
D29	Timer relay isolation	Relay Box
D30	Timer relay isolation	Relay Box
D31	Timer relay isolation	Relay Box
D32	Timer relay isolation	Relay Box
D40	Auxiliary engine anti-crank	E/Man Box
D41	Auxiliary engine anti-crank	E/Man Box
D42	Auxiliary engine alternator charge lamp isolation	E/Man Box
DB1	Hydraulic oil level switch isolation	Relay Box
DB2	Rear door closed switch isolation	Relay Box
DB3	Low air pressure switch isolation	Relay Box
DB4	Auxiliary engine ignition isolation	Relay Box
DB5	Hopper raised switch isolation	Relay Box
DB6	Low water level switch isolation	Relay Box

Fuses

Ident.	Description / Function	Rating (A)	Location
MCB	Main Circuit Breaker	50amp@12V 30amp@24V	Systems Locker
F1	Rear Beacons	15	Relay Box
F2	Front Beacons / AWB	15	Relay Box
F3	Work lights / AWL	15	Relay Box
F4	Channel brush / Nozzle / Flaps	15	Relay Box
F5	Wide sweep brush / Supawash	15	Relay Box
F6	Discharge select / Pendant	15	Relay Box
F7	Auto lube / Cowl Work lamp / Audible Buzzer / Instrument Panel	15	Relay Box
F8	Auxiliary Ignition Supply / Switch Location LED's	15	Relay Box
F20	***Spare***		
F21	***Spare***		
FE1	Battery +Ve ECU	30	E/Man Box
FE2	Battery + Ve Diagnosis Plug	5	E/Man Box
FE3	Battery + Ve Power Supply to Relay **K1**	5	E/Man Box
FE4	Battery + Ve Power Supply to Relay **RFh**	15	E/Man Box
FE5	Battery + Ve Power Supply to Relay **RS**	15	E/Man Box
FE6	***Spare***		E/Man Box

Connectors P01 - P60

Ident.	No.Ways	Location	Harness Ref. (Female)	Harness Ref. (Male)
P01	17	Relay Box	283399 / 283502	283260
P02	17	Relay Box	283399 / 283502	283260
P03	17	Relay Box	283399 / 283502	283260
P04	17	Relay Box	283399	283265
P05	17	Relay Box	283399 / 283502	282022
P06	17	Relay Box	283399 / 283502	282022
P07	17	Relay Box	283399	282023
P08	9	Relay Box	283399 / 283502	282199
P09	17	Relay Box	283399 / 283502	283186
P10	3	Switch Panel	809308/809440	809312
P11	5	Switch Panel	950312	282053
P12	17	Relay Box	283399 / 283502	282022
P14	17	Switch Panel	950312	282020
P15	17	Switch Panel	950312	282022
P16	17	Switch Panel	950312	282022
P17	17	Switch Panel	950312	282023
P18	9	Switch Panel	950312	283853
P19	7	Switch Panel	809441	809440
P20	7	Chassis Cab	809441	809442
P21	5	Switch Panel	950312	283233//809308/809440
P21-A	5	Switch Panel	809308/809440	Not used
P22	17	Switch Panel	950312	282022
P23	3	Switch Panel	809313	809308
P24	11	Switch Panel	809309	809308
P25	13	Chassis Cab	809309	809310

Connectors P01 to P60 (continued)

Ident.	No.Ways	Location	Harness Ref. (Female)	Harness Ref. (Male)
P26	2	Chassis Cab	809309	809311
P28	***7***	***Relay box***	**283399/283502**	**283440-1/283440/2**
P26 to P30	***Not used***			
P31	8	Subframe	282062	282063
P32	8	Powaboom Pend.	282063	282061
P33 to p47	***Not used***			
P48	48	Systems locker	283260	282063
P49 to p50	***Not used***			
P51	9	Switch Panel	950312	283186
P52 to P53	***Not used***			
P54	8	Fr. Brush Control	Not yet issued	Not yet issued
P55	8	Fr. Brush Control	Not yet issued	Not yet issued
P56 to P60	***Not used***			

Connectors Axx - Zxx

Ident.	No.Ways	Location	Harness Ref. (Female)	Harness Ref. (Male)
AL	2		Autoloc	283261/809311/809442
AL-A	2		Not used	809357
AL-D	2		809357	Not used
AL-E	2		809357	Not used
AWL	2	Subframe	293774	283235
BEAC	5	Chassis Cab		283186
BL	8	Subframe	283261	283262
C2	3	Chassis Cab	809313	809206
CAM	5	Chassis Cab		283186
CWL	2	Body	282456	283262
CV	4	Subframe	283566	283260
DAW	2	Power Pack	30/184	283263
DD1	17	Relay Box	283398	283399
DG1	2	Man/Box	283857	283857
DL	2	Subframe	283261	281907
DR	3	Subframe	283261	282187
DS1	17	Relay Box	283399 / 283502	283501
DS2	13	Relay Box	283399 / 283502	283501
DT	33	DTec Box		
DT01	13	DTec Box		
DX1	17	Switch Panel		
DX2	17	DTec Box		
EC	12	Edge Cutter	809442	809444
EDP	1	Subframe	281938	283261

Connectors Axx to Zxx

Ident.	No.Ways	Location	Harness Ref. (Female)	Harness Ref. (Male)
ESC(A)	4	Subframe	282020 (282060 ext. throttle)	282020
ESC(B)	4	Subframe	282020	282020 (282060 ext. throttle)
FB1	2	Relay Box	Not yet issued	Not yet issued
FLS	2	Fuel Tank	281967	283263
GP	23 (VS)	Power Pack	282049 – VS	282050 – VS
HOL	2	Hydraulic Tank	48/328	283263
HR	1	Body	283261	Hopper Raised Switch
L-BEAC	2	Body	282793	283262
LH-AWL	2	Body	293774	Worklight
LRML	2	Body	Marker Light	283262
LS	2	Body	282186	283262
LW	2	Body	48/238	283261
ML	2	Subframe	807613 – DAF LF55 807617 – Volvo 807718 – Iveco 807908 – MAN 807586 – Scania	283261
NP	2	Subframe	*Not used*	283261
OPS	2	Power Pack	Fitted on Iveco stage 3 Engine.	283851 Iveco Stage 3 .
PB	3	Subframe	282065	282062, 282160, 282161
PC	3	Subframe	282062, 282160, 282161	283261
PCI	17	Cab	283186	283222 – Daf 283223 – Iveco 283224 – Man 283227 – Renault 283429 – Mercedes 809760 -- Scania
PCB1	10	Relay box	283399/283502	283646-1
PCB2	8	Relay box	283399/283502	283646-1
PE	31	Power Pack	283851 Iveco Stage 3 282050 – Hydrostatic	283852 Iveco Stage 3 282135 – Hydrostatic

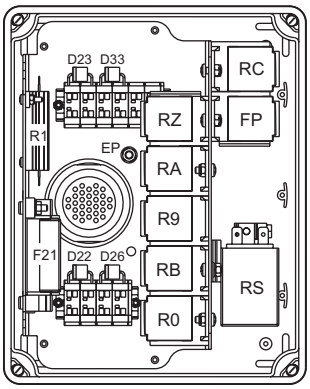
Connectors Axx to Zxx (continued)

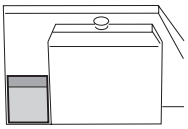
Ident.	No.Ways	Location	Harness Ref. (Female)	Harness Ref. (Male)
PP	17	Power Pack	282020	282050 – Hydrostatic 283851 Iveco Stage 3
PS	4	Front Brush/ Edge Cutter	809205	809204/809442
PT	6	Power Pack	283263	283264
PZ	29	Systems Locker	283265	283264
R-BEAC	2	Body	282793	283262
RH-AWL	2	Body	293774	Worklight
RRML	2	Body	Marker Light	283262
RT1	2	Channel Brush	282508	282053
RT2	2	Channel Brush	282508	282053
SC	12	Front Brush	809310	809204
SF	12	Subframe	283260	283261
SV	2	Subframe	282069	283260
WD	2	Subframe	282456	283265
WS	2	Subframe	282456	283260
VB	12	Front Brush	809314	809204

Rev. WD 234 issue 01

Powapack Management Box

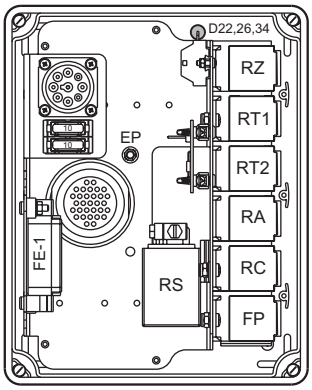
John Deere Tier 3 Standard Power

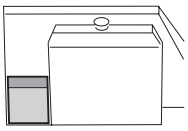




95EC.004-8M

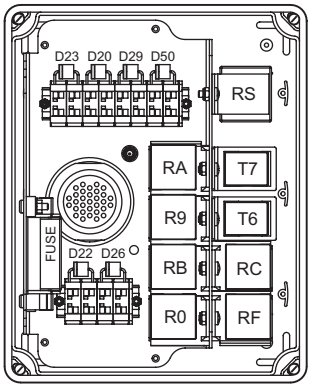
John Deere Tier 3 High Power

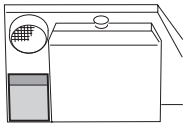




95EC.004-9M

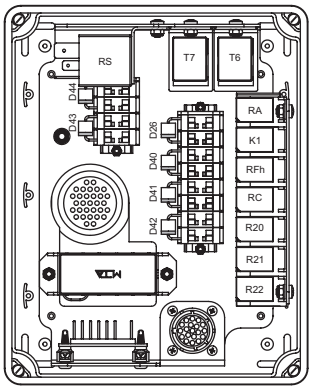
Iveco Stage 3a Standard Power

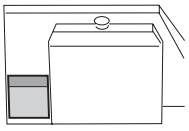




95EC.006-13M

Iveco Stage 3a High Power

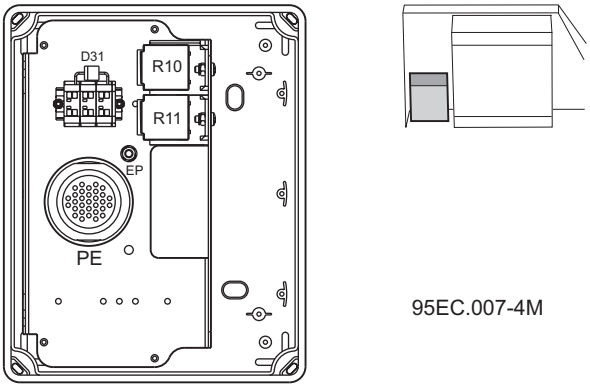




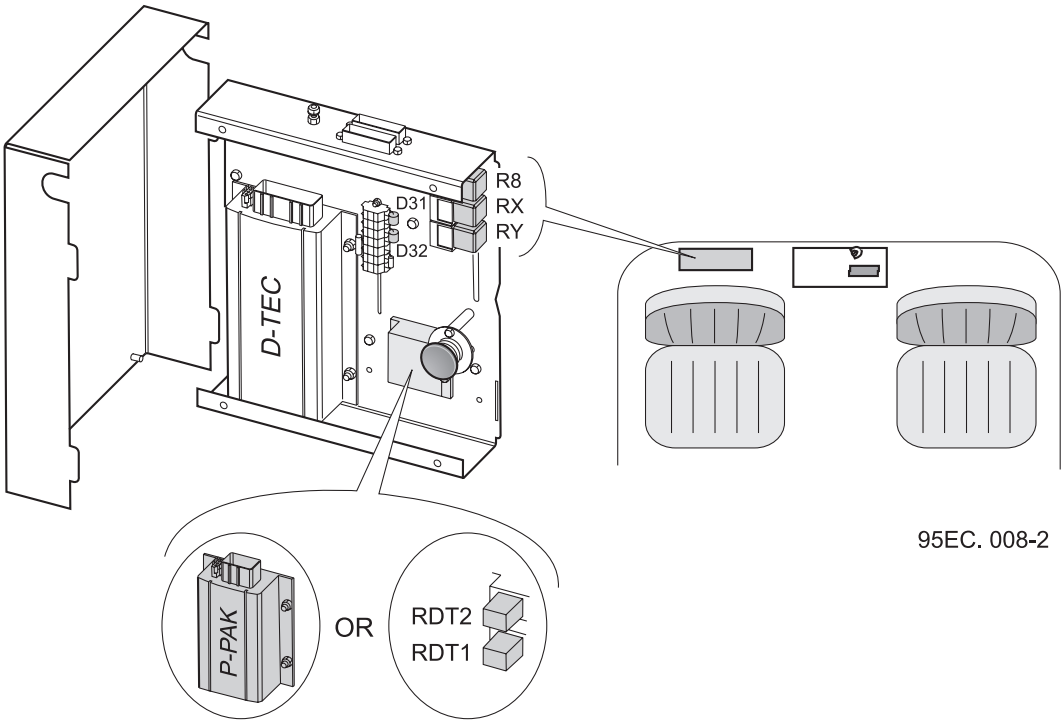
95EC.005-8M

Powapak Management Box

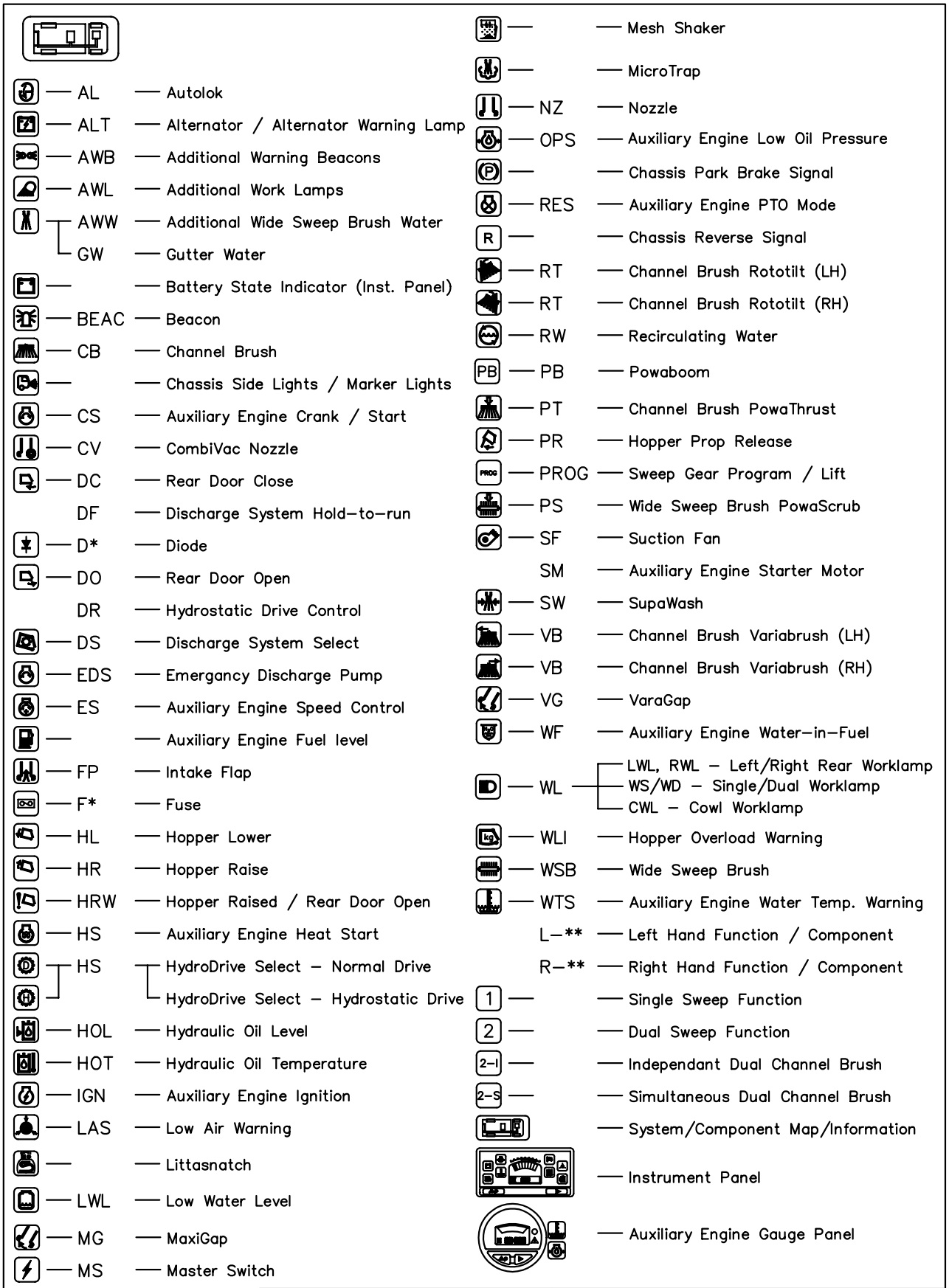
Hydrostatic - VS



D-Tec Box in Cab - VS



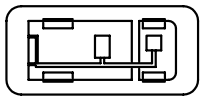
Type B Switches - Electrical Components Diagram - SE550z11



Type B Switches - Electrical Components Diagram - SE550z12

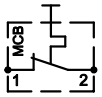
CABLE IDENTIFICATION

WIRE COLOUR CODE							
CODE	COLOUR	CODE	COLOUR	CODE	COLOUR	CODE	COLOUR
B	BLACK	T	ORANGE	U	BLUE	W	WHITE
N	BROWN	Y	YELLOW	P	PURPLE	K	PINK
R	RED	G	GREEN	S	SLATE	LG	L GREEN

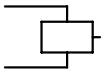


−16−R/W− ELECTRICAL CABLE − 0.50mm² (16/0.20)
R/W OR −32−R/W− ELECTRICAL CABLE − 1.00mm² (32/0.20)
R/W OR −28−R/W− ELECTRICAL CABLE − 2.00mm² (28/0.30)
R/W OR −44−R/W− ELECTRICAL CABLE − 3.00mm² (44/0.30)
R/W OR −65−R/W− ELECTRICAL CABLE − 4.50mm² (65/0.30)

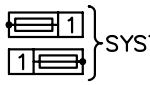
SHIELDED ELECTRICAL CABLE
MULTI−CORE ELECTRICAL CABLE



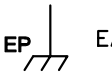
SYSTEM CIRCUIT BREAKER



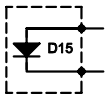
VALVE COIL TERMINATION



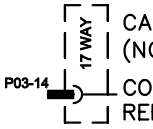
SYSTEM FUSE / IDENT



EARTH TERMINATION STUD

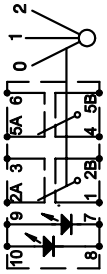


SYSTEM DIODE

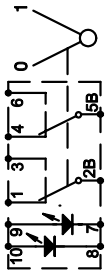


CABLE CONNECTOR (NO OF CONNECTORS)
CONNECTOR REFERENCE

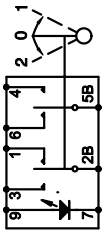
MAIN FUNCTION SWITCHES (10−8 FUNCTION, 9−7 LOCATION)



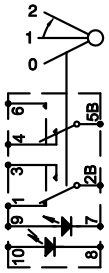
3 POSN.



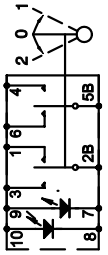
2 POSN.



3 POSN. SPRING CENTRE

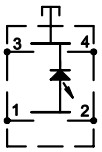


3 POSN. SPRING RETURN 2−1

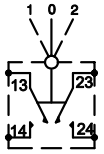


3 POSN. SPRING CENTRE (C/W FUNCT LIGHT

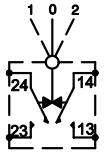
OTHER FUNCTION SWITCHES



PUSH BUTTON FUNCTION SWITCH

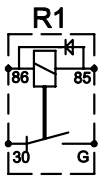


JOYSTICK 2 POSITION

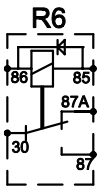


JOYSTICK 3 POSITION SPRING CENTRE

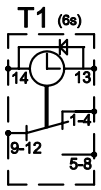
CONTROL RELAYS & SWITCHES



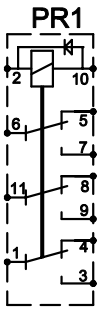
2 POLE POWER RELAY



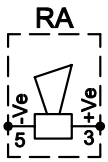
3 POLE MINIATURE POWER RELAY



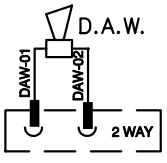
TIMER RELAY



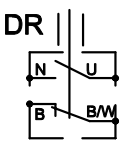
THREE CHANNEL CHANGE−OVER RELAY



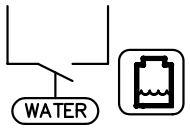
AUDIBLE WARNING (IN−CAB)



AUDIBLE WARNING (IN−POWAPAK)



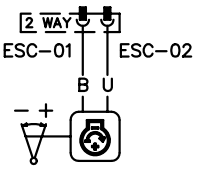
LIMIT SWITCH



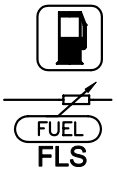
FLUID LEVEL SWITCH

AUXILIARY ENGINE COOLANT TEMPERATURE SWITCH

AUXILIARY ENGINE OIL PRESSURE SWITCH



AUXILIARY ENGINE THROTTLE ACTUATOR



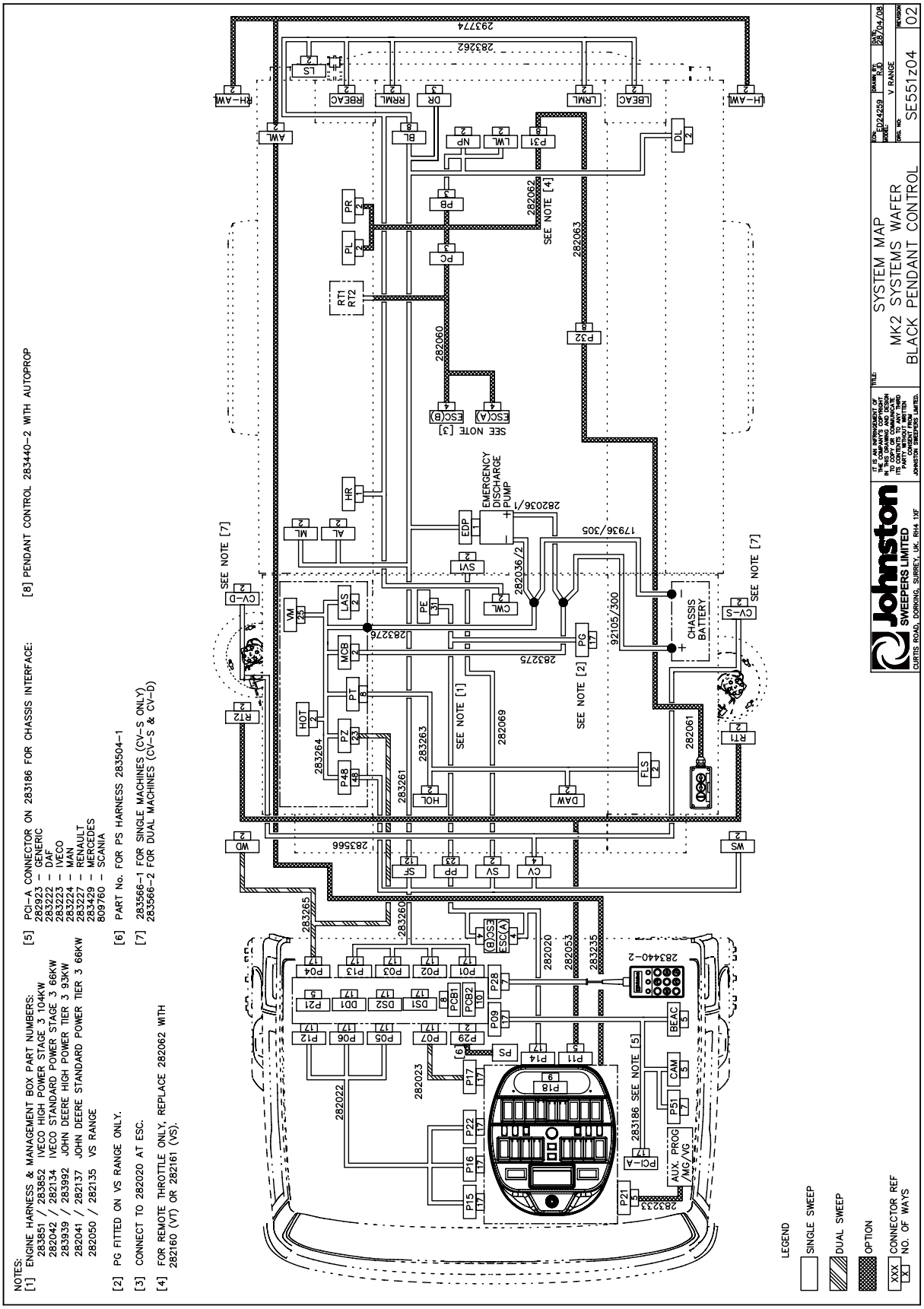
FLUID LEVEL SENDER

Johnston SWEEPERS LIMITED
CURTIS ROAD, DORKING, SURREY, UK. RH4 1XF

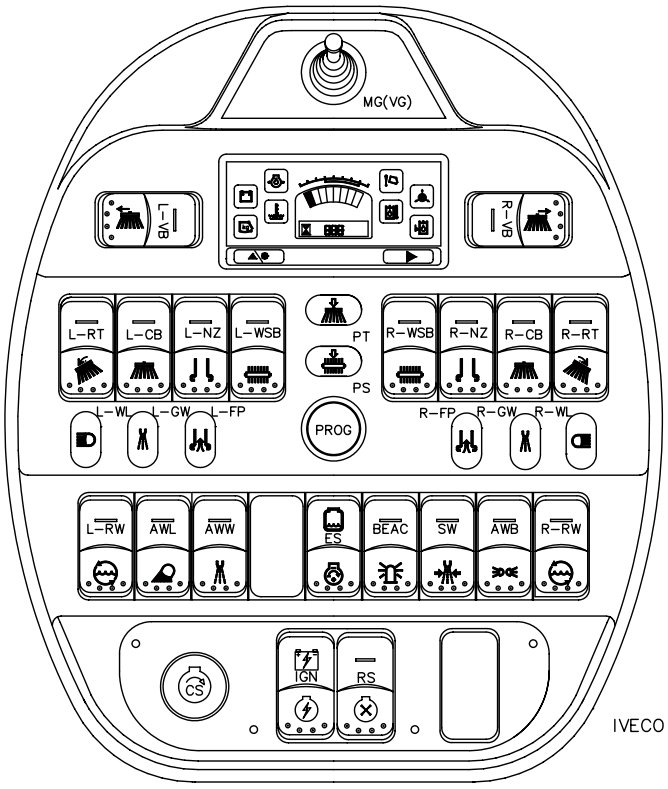
ELECTRICAL COMPONENT IDENTIFIER

ECN	DRAWN BY	DATE
ED22842	SKM	07/11/06
MODEL: VT & VS		
DWG. NO: SE550z12		REVISION: 00

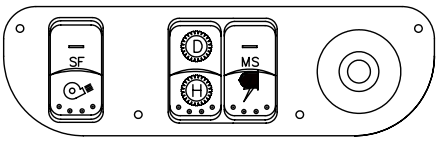
System Map Mk II Systems Wafer Black Discharge Pendant Diagram - SE551z04



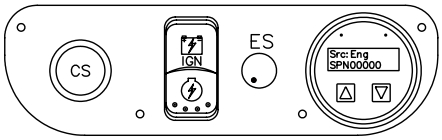
Switch Panel Diagram Stage 3a Engines - SE552z04



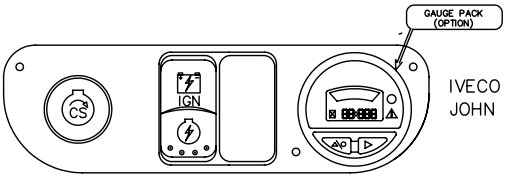
IVECO S3A HIGH POWER



HYDROSTATIC



JOHN DEERE TIER3 HIGH POWER

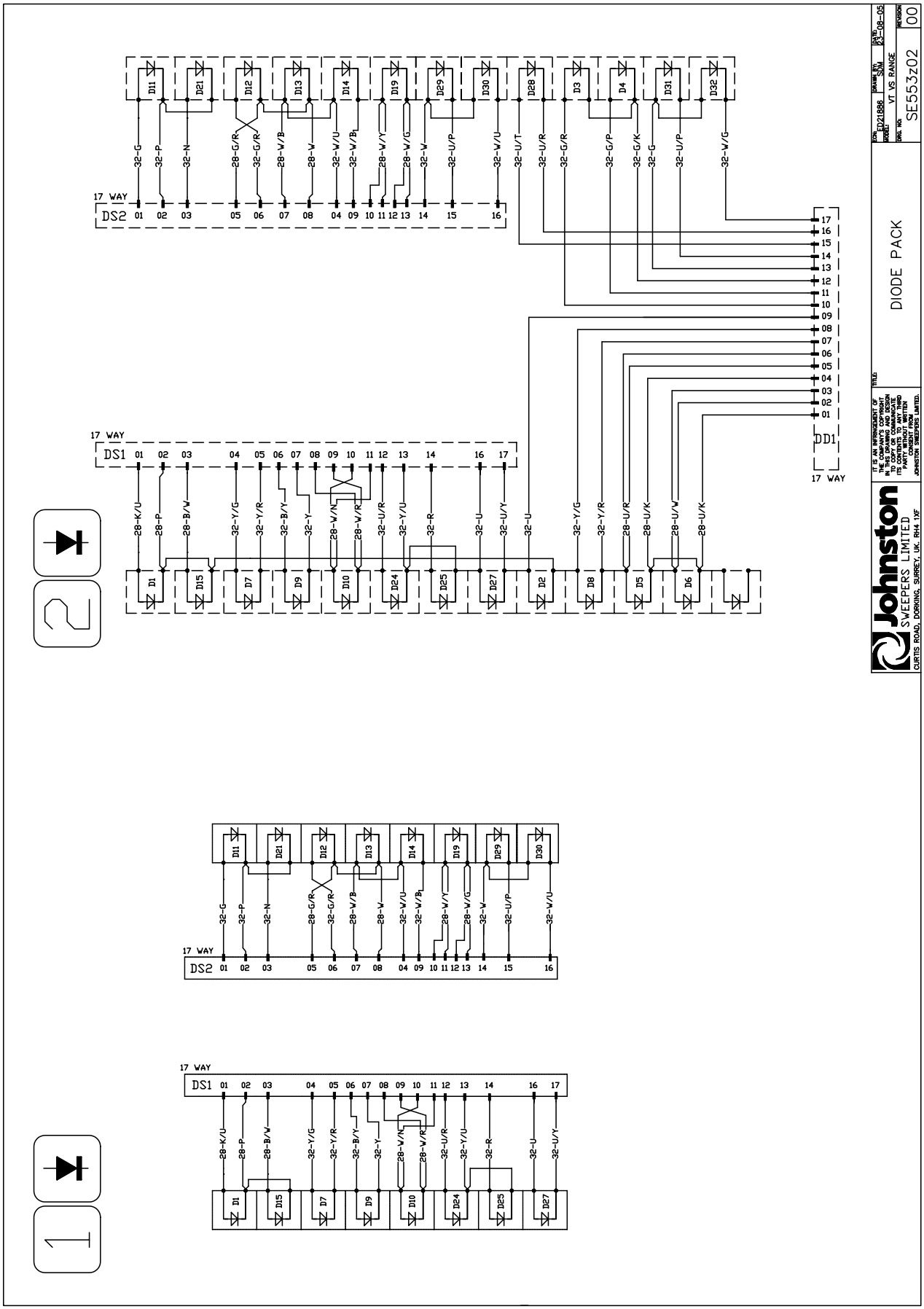


IVECO STAGE3 STANDARD POWER
JOHN DEERE TIER3 STANDARD POWER

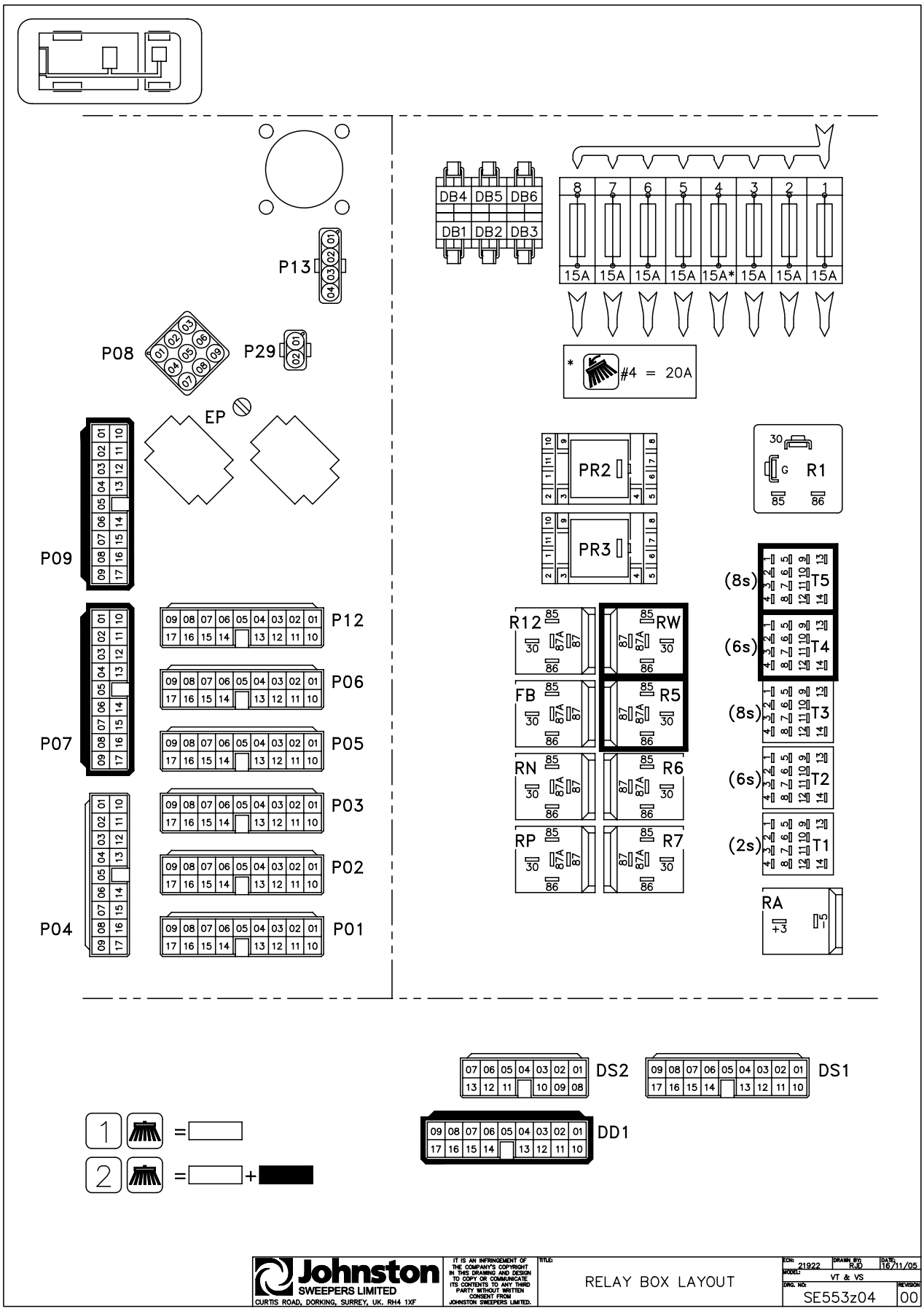
*DS SWITCH ONLY FITTED ON LEGACY PANELS

Johnston SWEEPERS LIMITED, CURTIS ROAD, DORKING, SURREY, UK. RH4 1XF	IT IS AN INFRINGEMENT OF THE COMPANY'S COPYRIGHT IN THIS DRAWING AND DESIGN TO COPY OR COMMUNICATE ITS CONTENTS TO ANY THIRD PARTY WITHOUT WRITTEN CONSENT FROM JOHNSTON SWEEPERS LIMITED.	TITLE: SWITCH PANEL LAYOUT FOR STAGE/TIER 3A AUXILIARY ENGINES	DCN: ED24259 DRAWN BY: SDM DATE: 24/04/08 MODEL: VT & VS	DRG. NO: SE552z04 REVISION: 01

Diode Pack Diagram - SE553z02



Relay Panel Diagram - SE553z04



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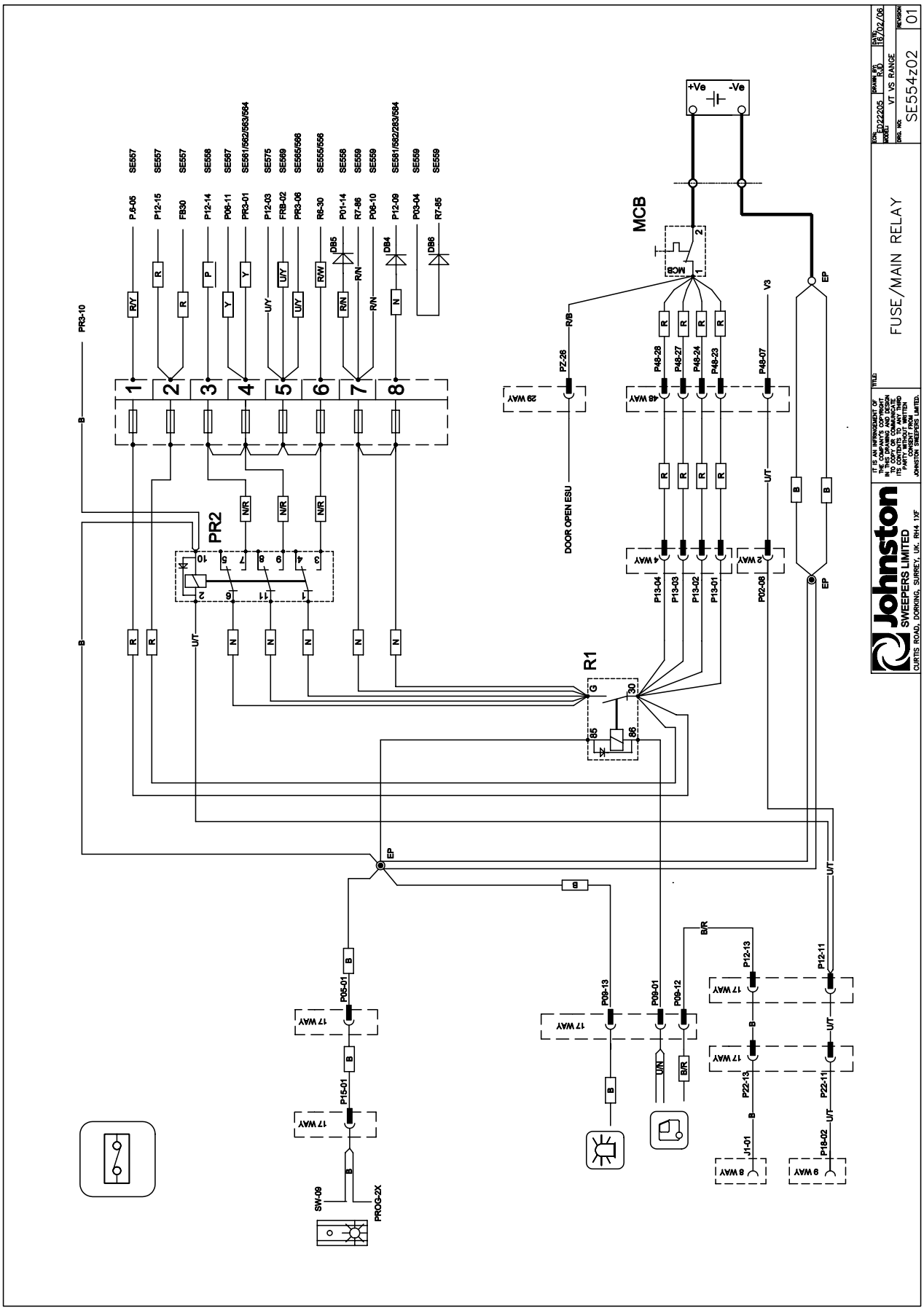
CURTIS ROAD, DORKING, SURREY, UK. RH4 1XF

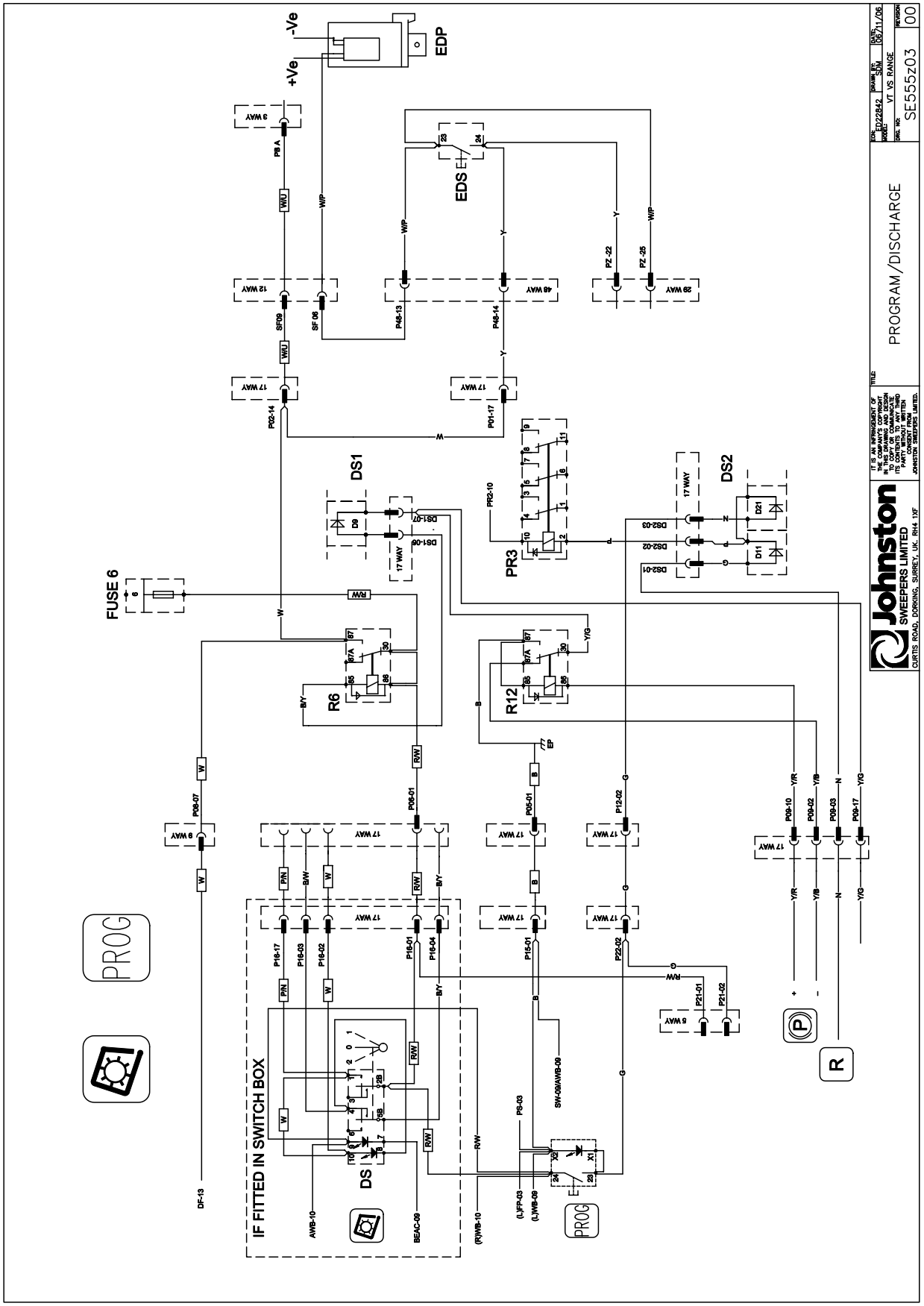
TITLE: RELAY BOX LAYOUT

ECN: 21922 | DRAWN BY: RJD | DATE: 16/11/05
MODEL: VT & VS
DRG. NO: SE553z04 | REVISION: 00

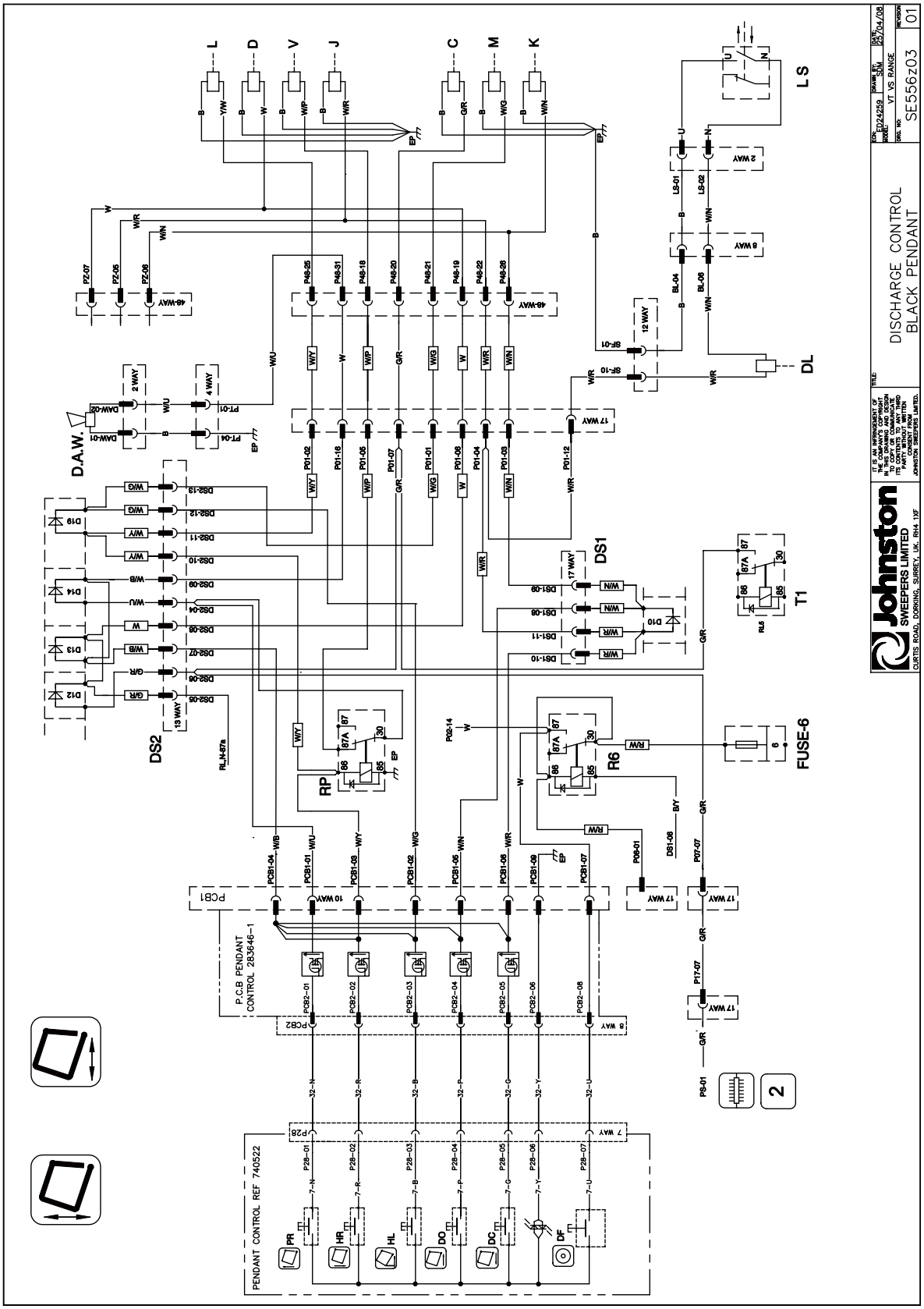
Fuse / Main Relay Diagram - SE554z02



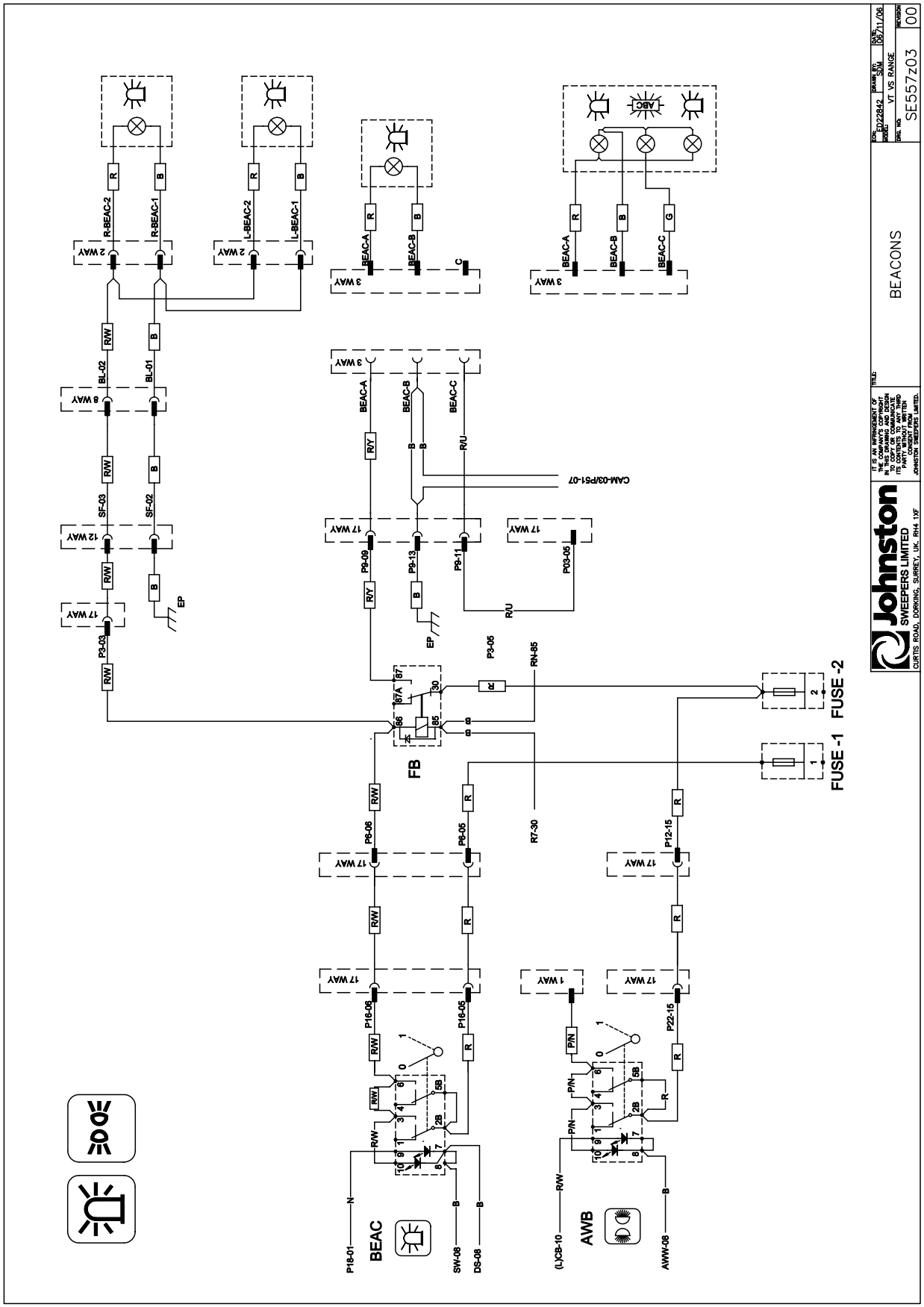
Program & Discharge Diagram Type B Switches - SE555z03



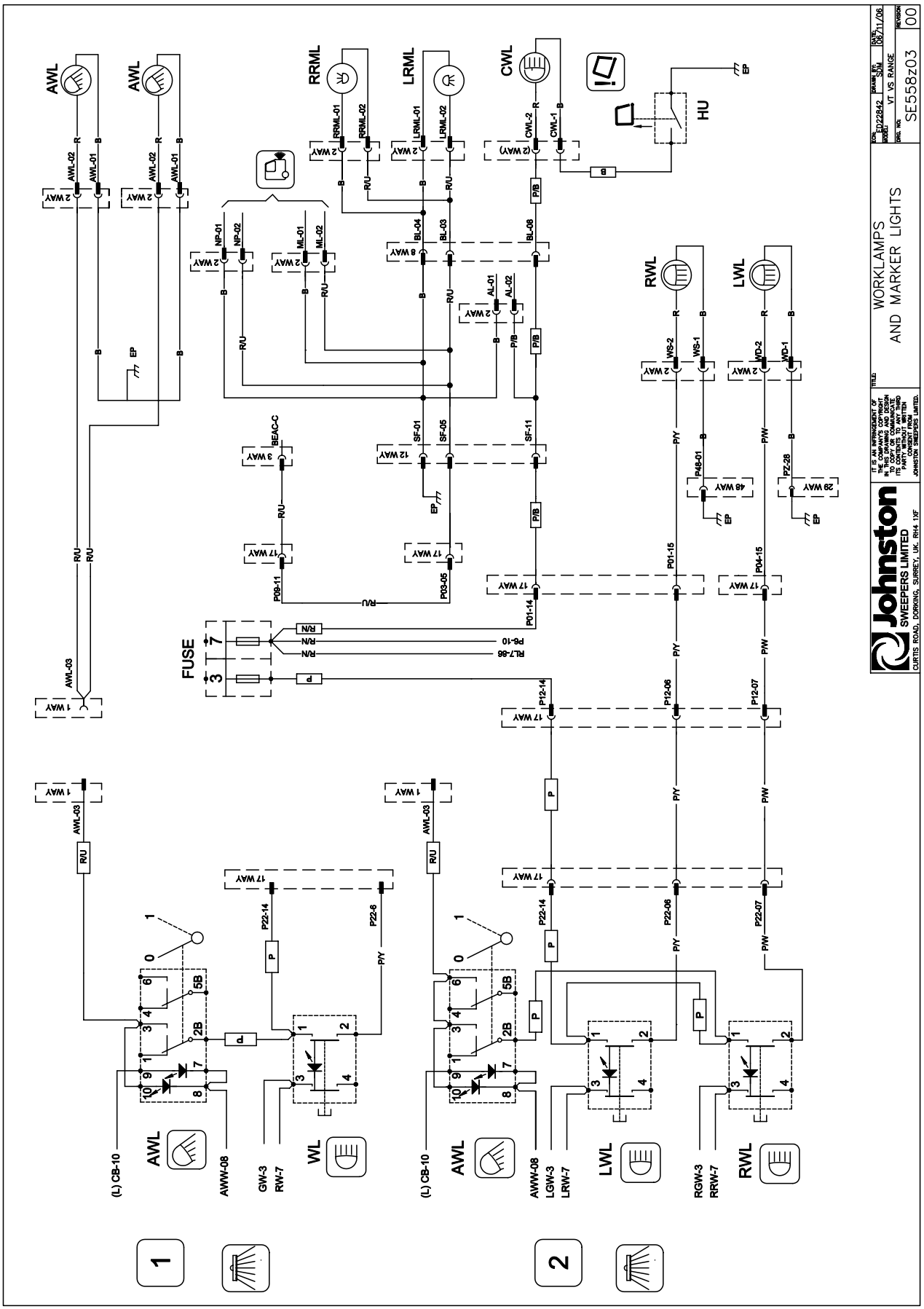
Black Discharge Control Pendant Diagram - SE556z03



Beacons Diagram Type B Switches - SE557z03



Worklamps & Marker Lights Diagram Type B Switches - SE558z03



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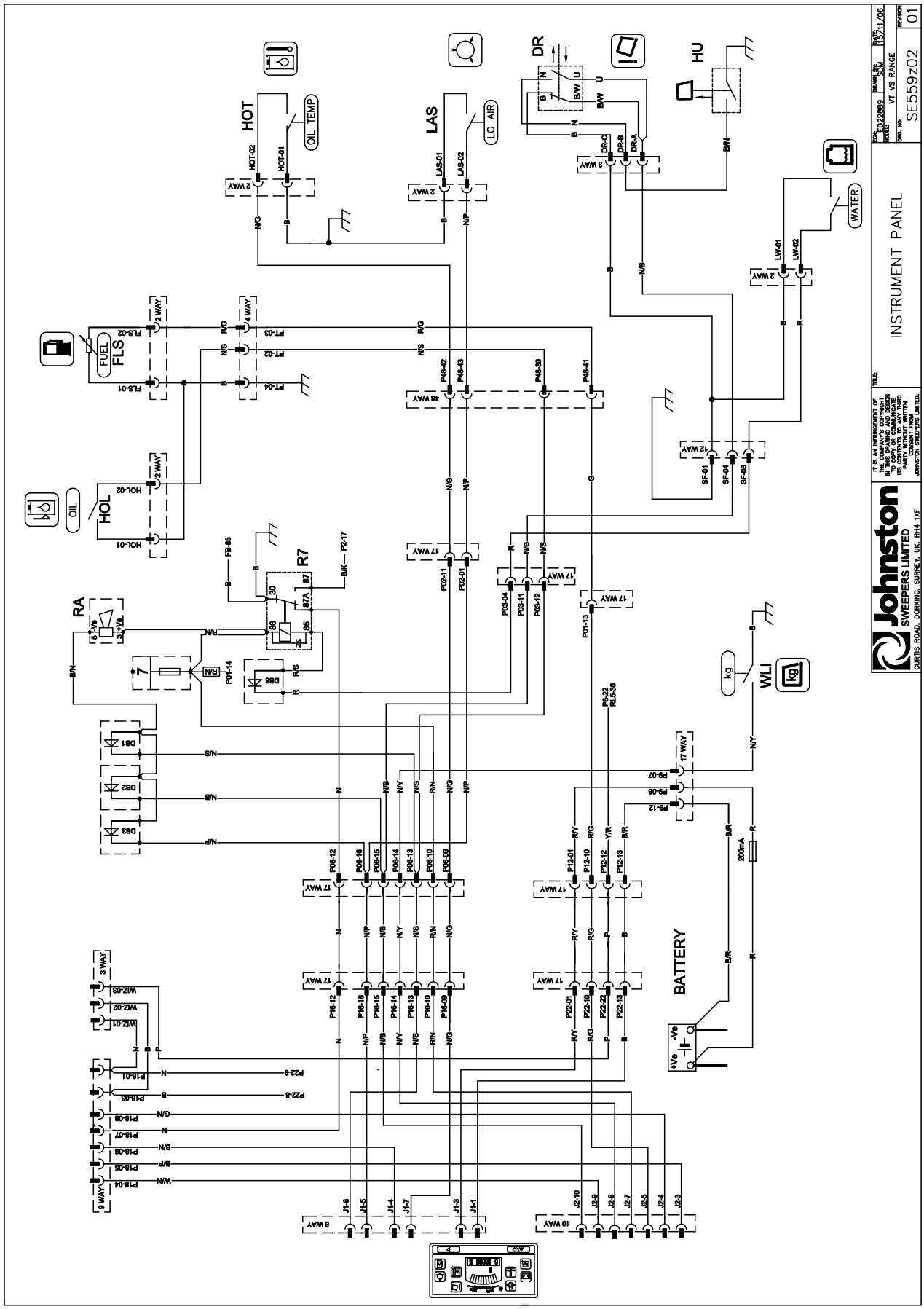
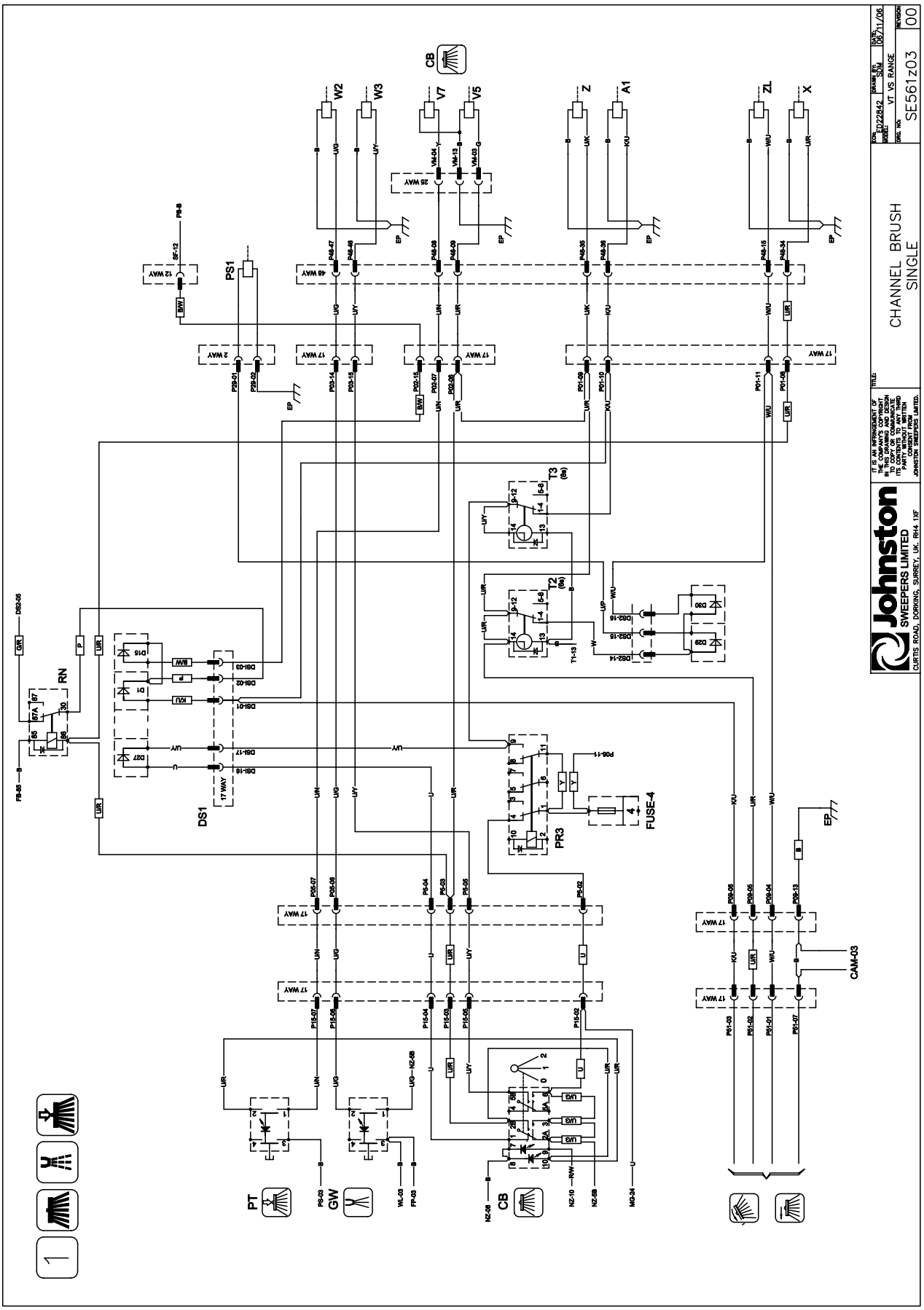
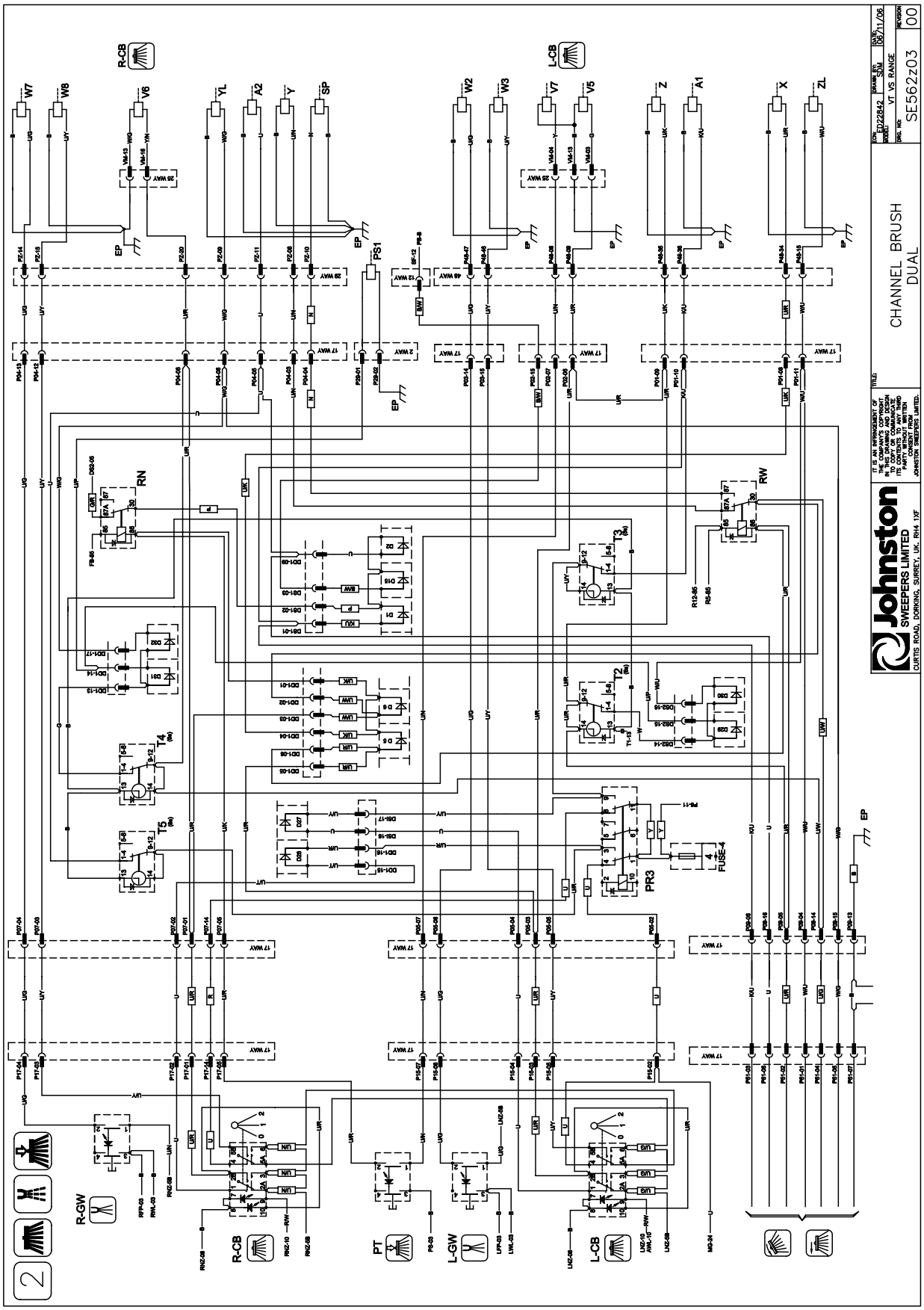


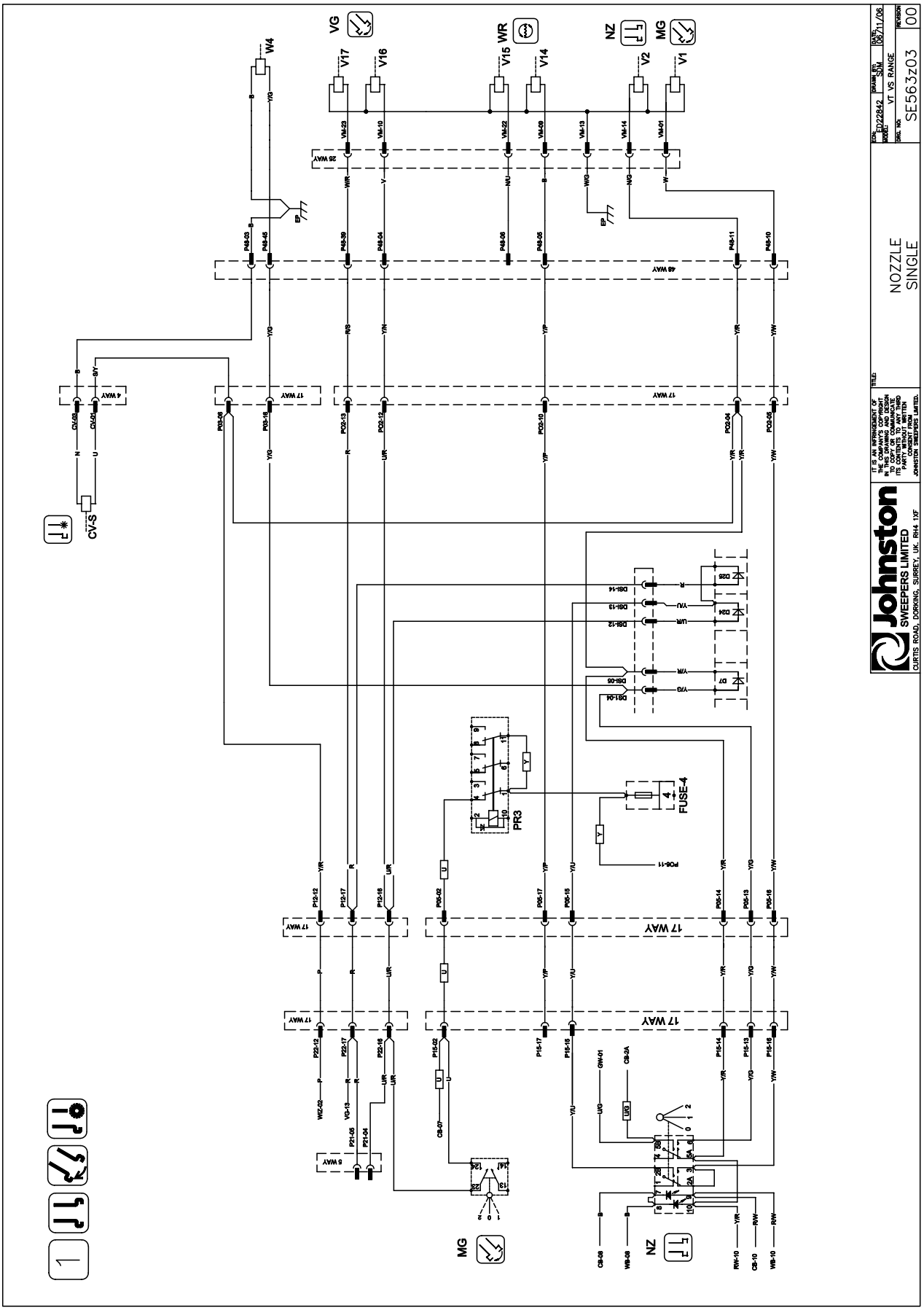
Channel Brush Single Sweep Diagram Type B Switches - SE561z03



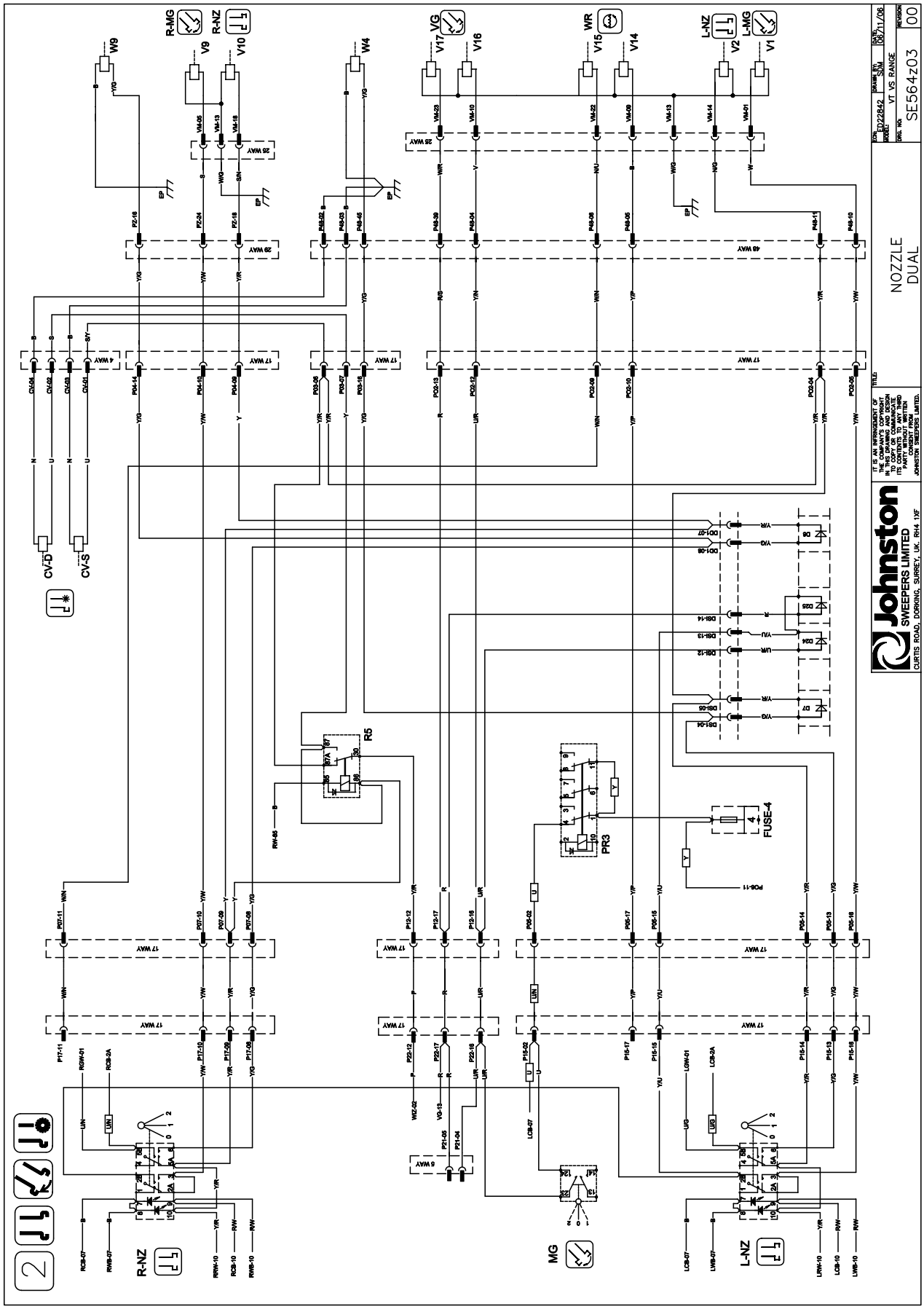
Channel Brush Dual Sweep Diagram Type B Switches - SE562z03



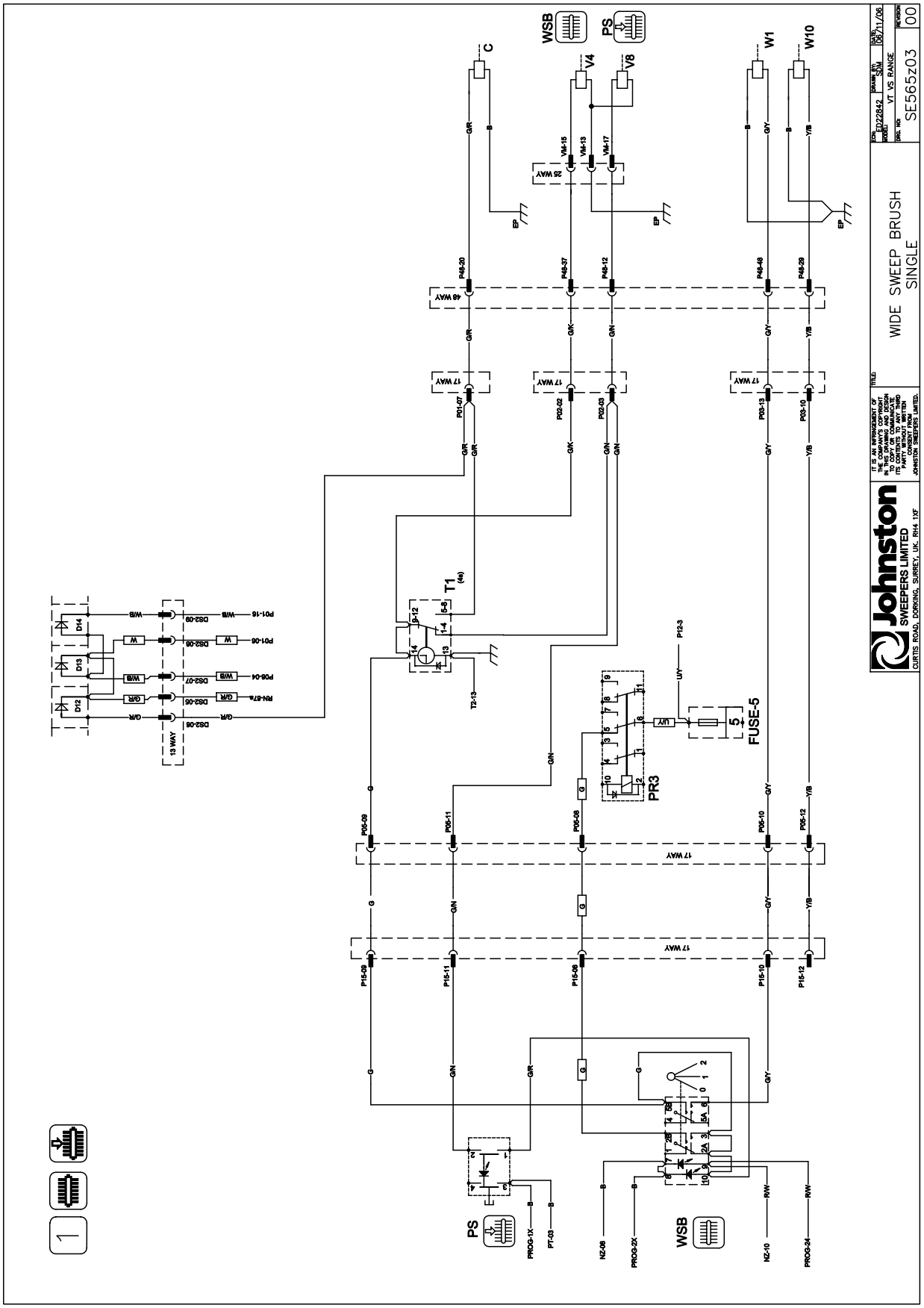
Nozzle Single Sweep Diagram Type B Switches - SE563z03



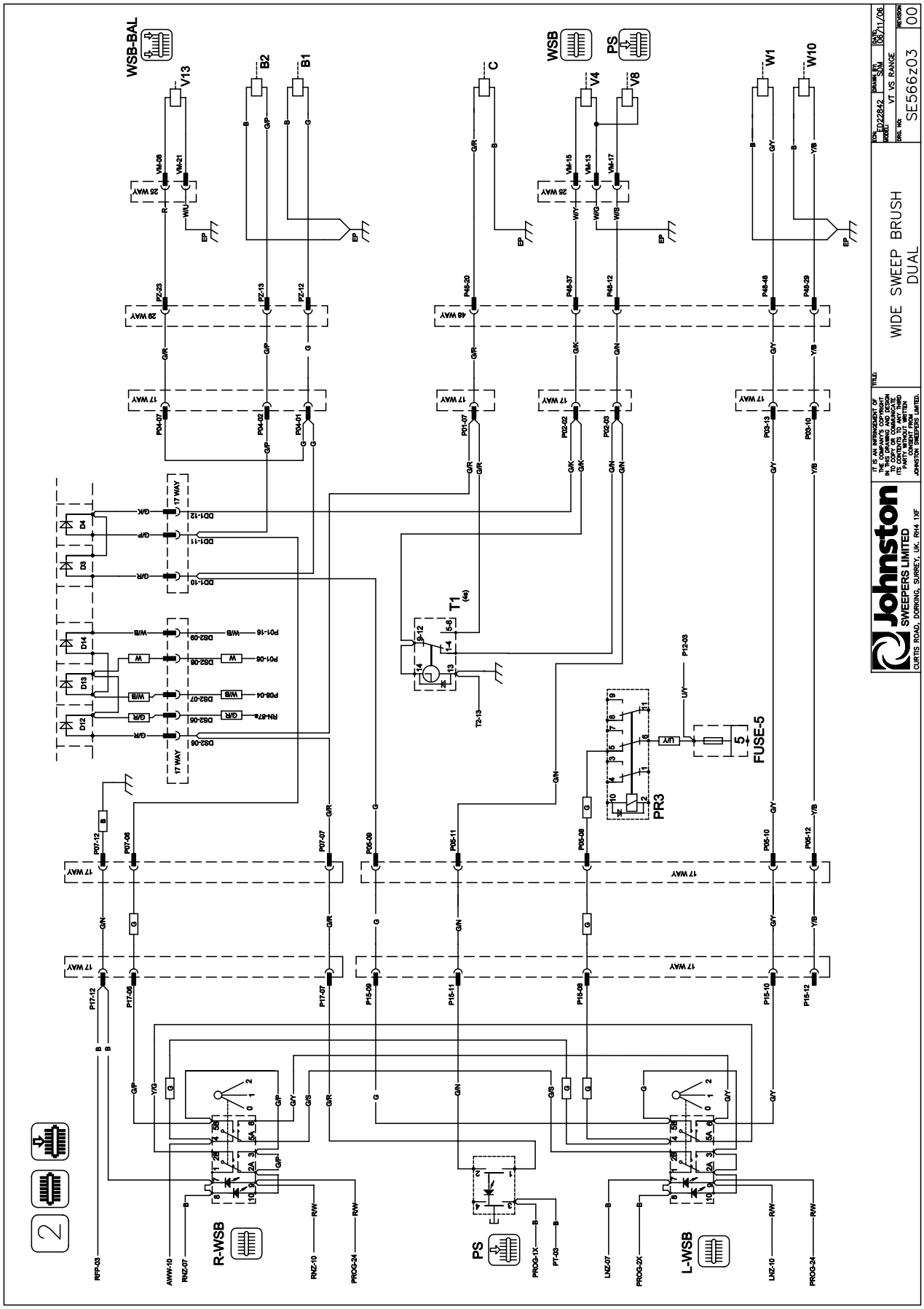
Nozzle Dual Sweep Diagram Type B Switches - SE564z03



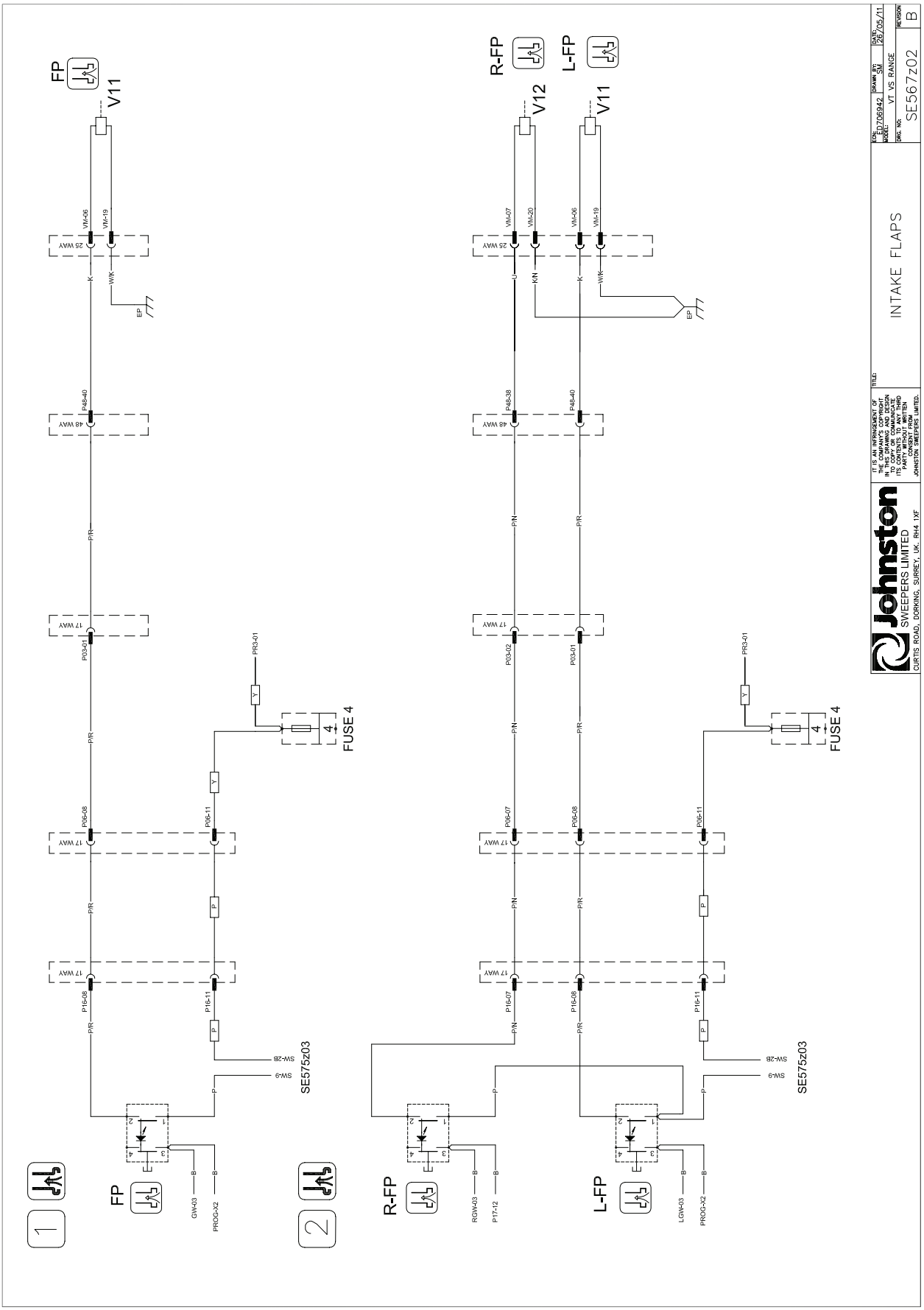
Wide Sweep Single Diagram Type B Switches - SE565z03



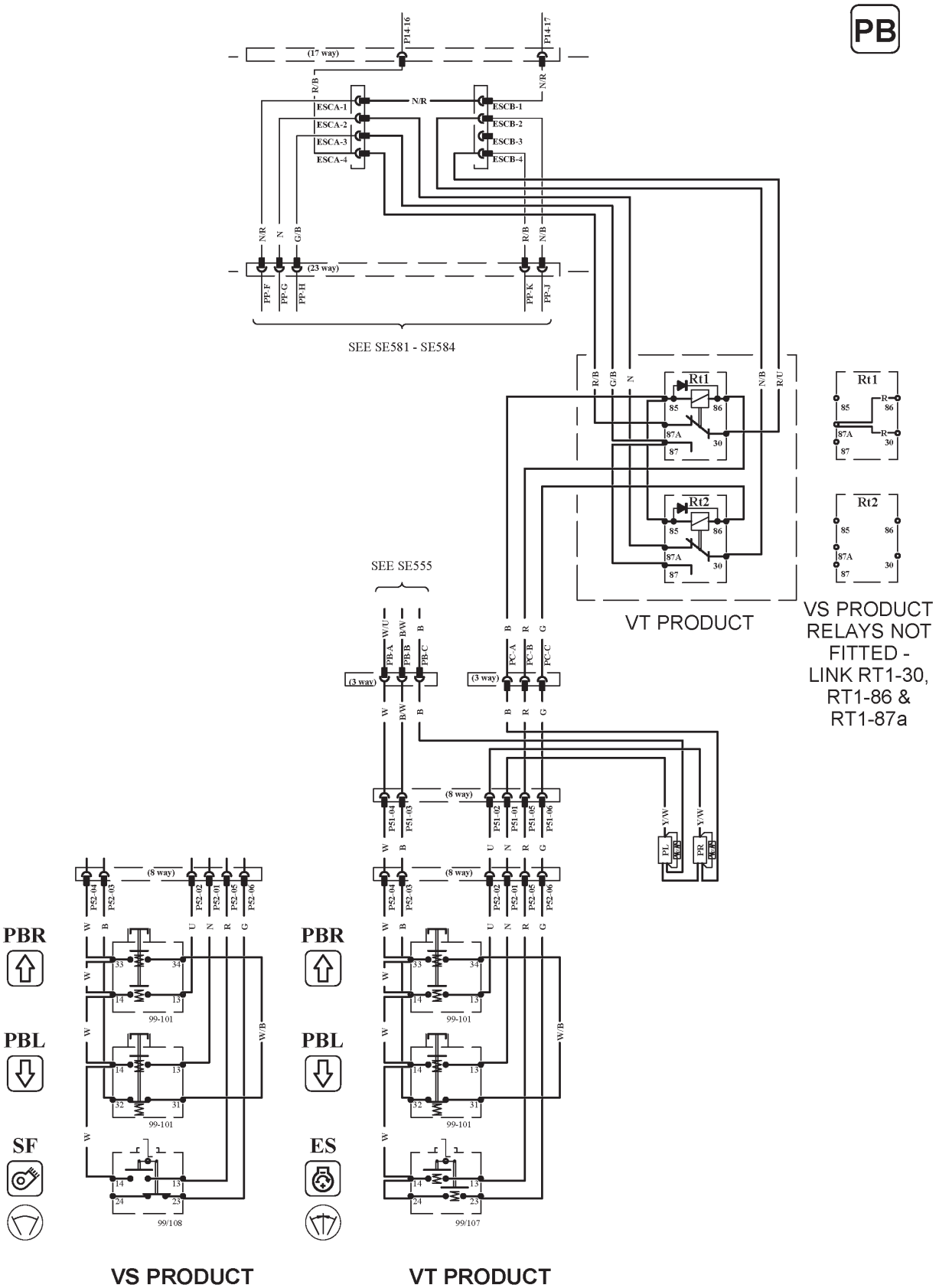
Wide Sweep Dual Diagram Type B Switches - SE566z03



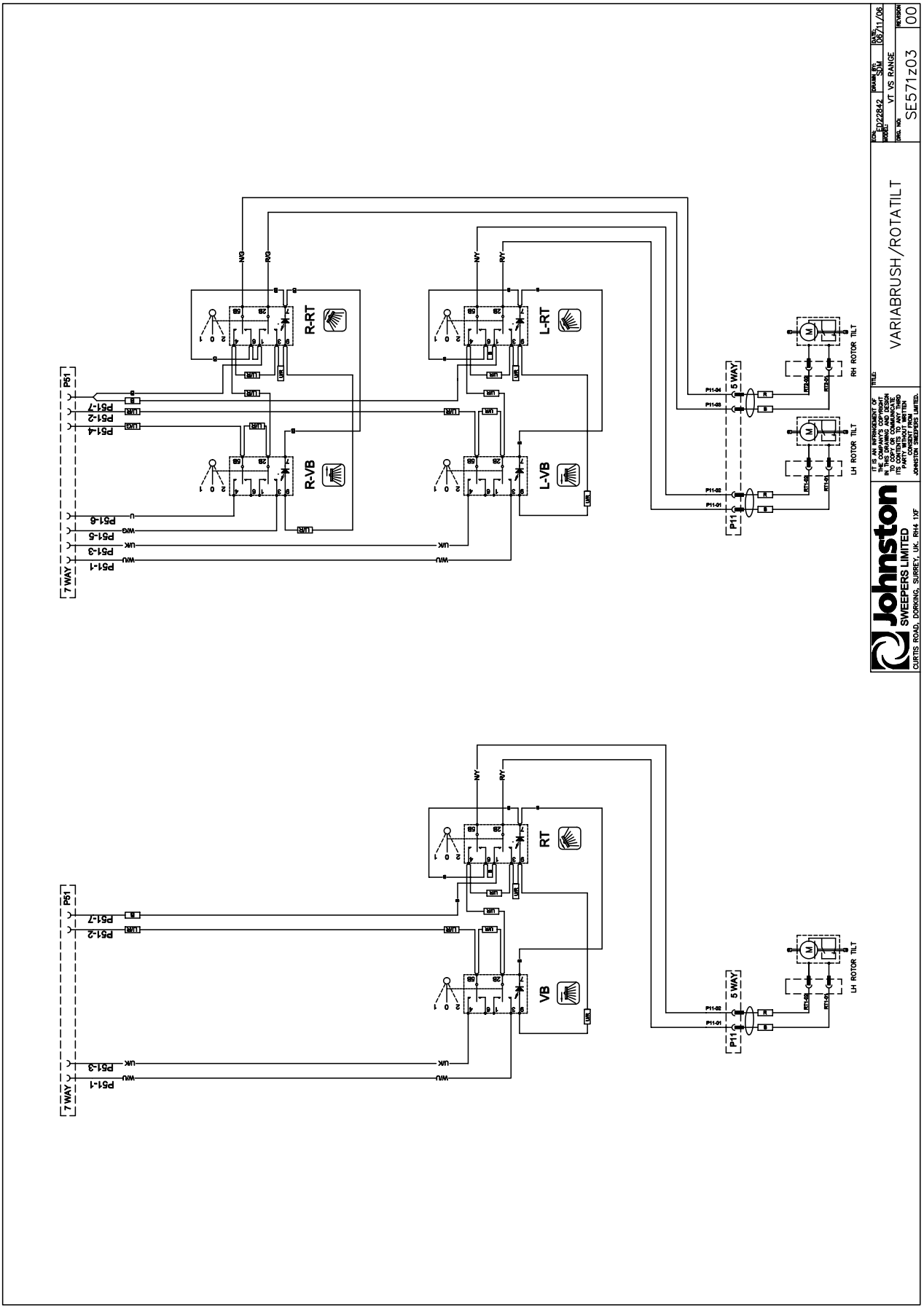
Intake Flaps Diagram - SE567z02



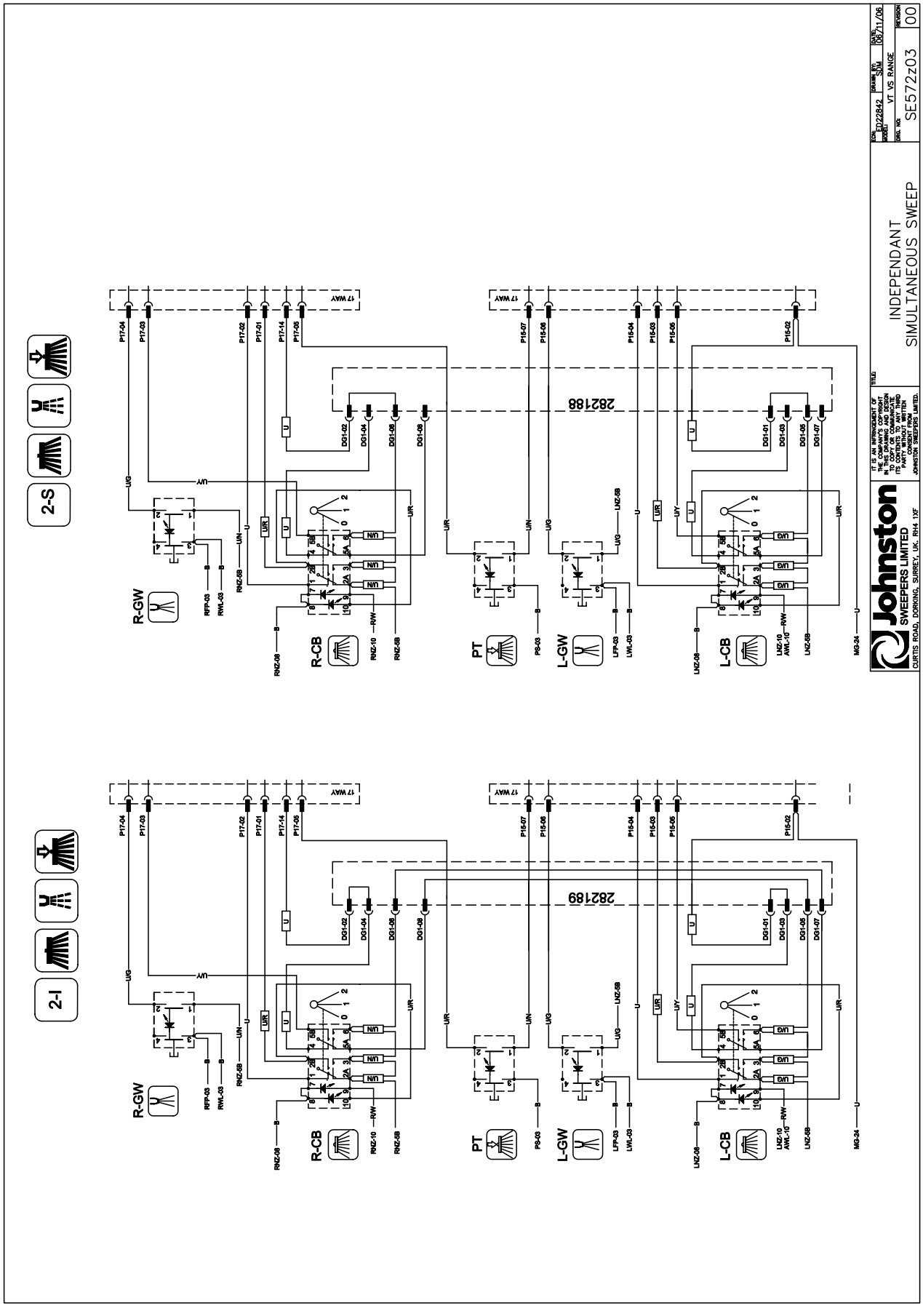
Powaboom Diagram - SE568a01



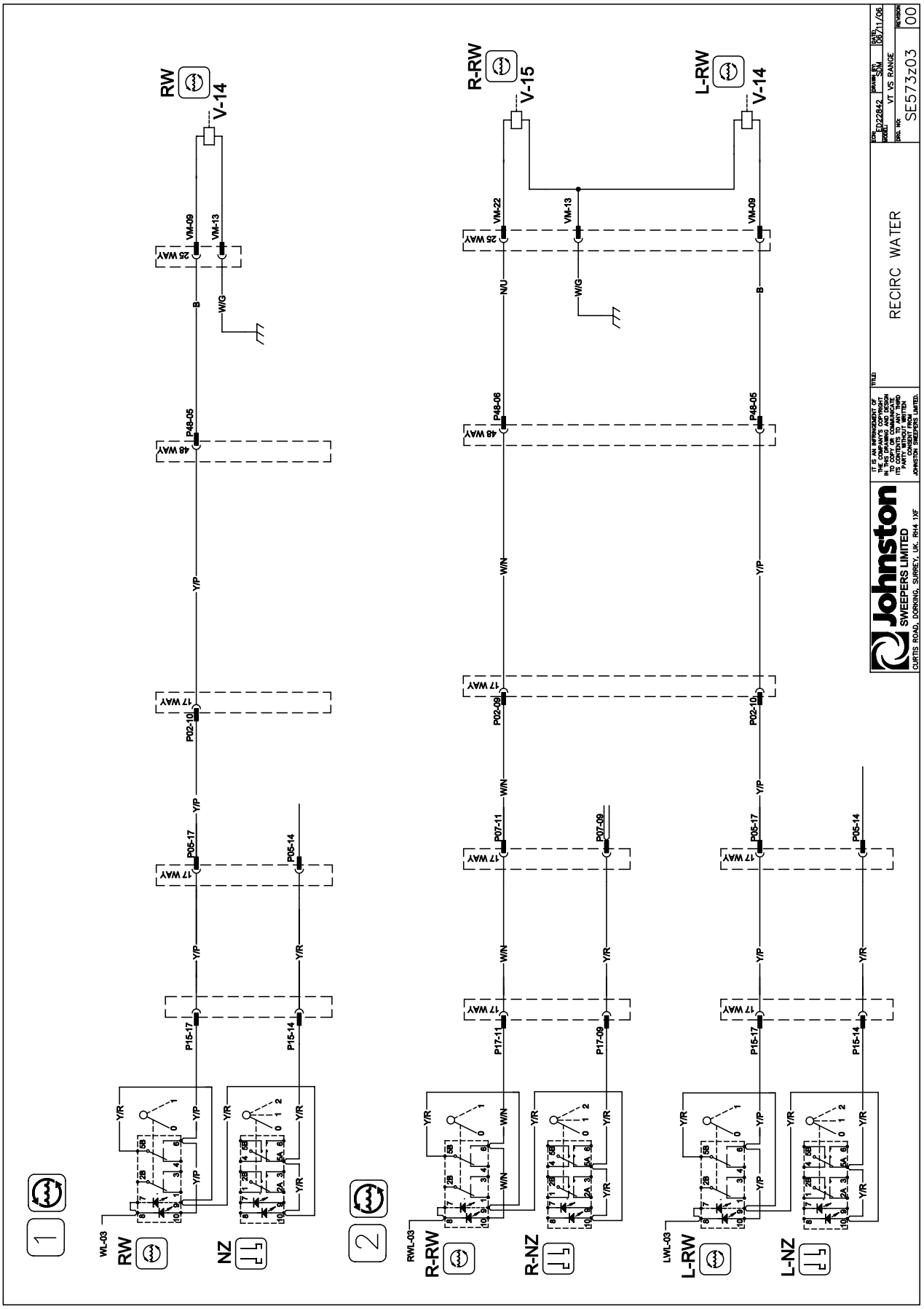
Variabrush / Rotatilt Diagram Type B Switches - SE571z03



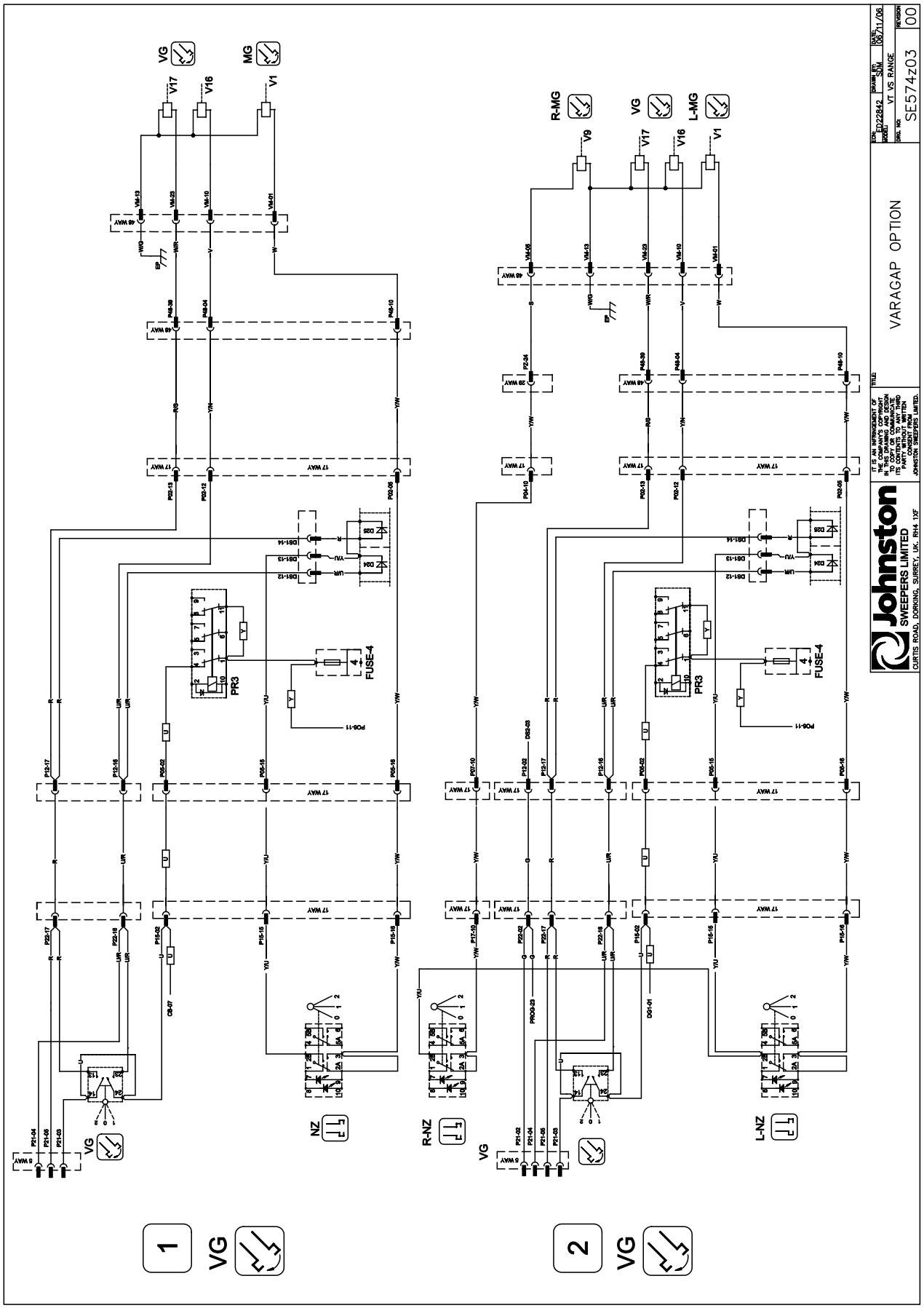
Independant / Simultaneous Sweep Diagram Type B Switches - SE572z03



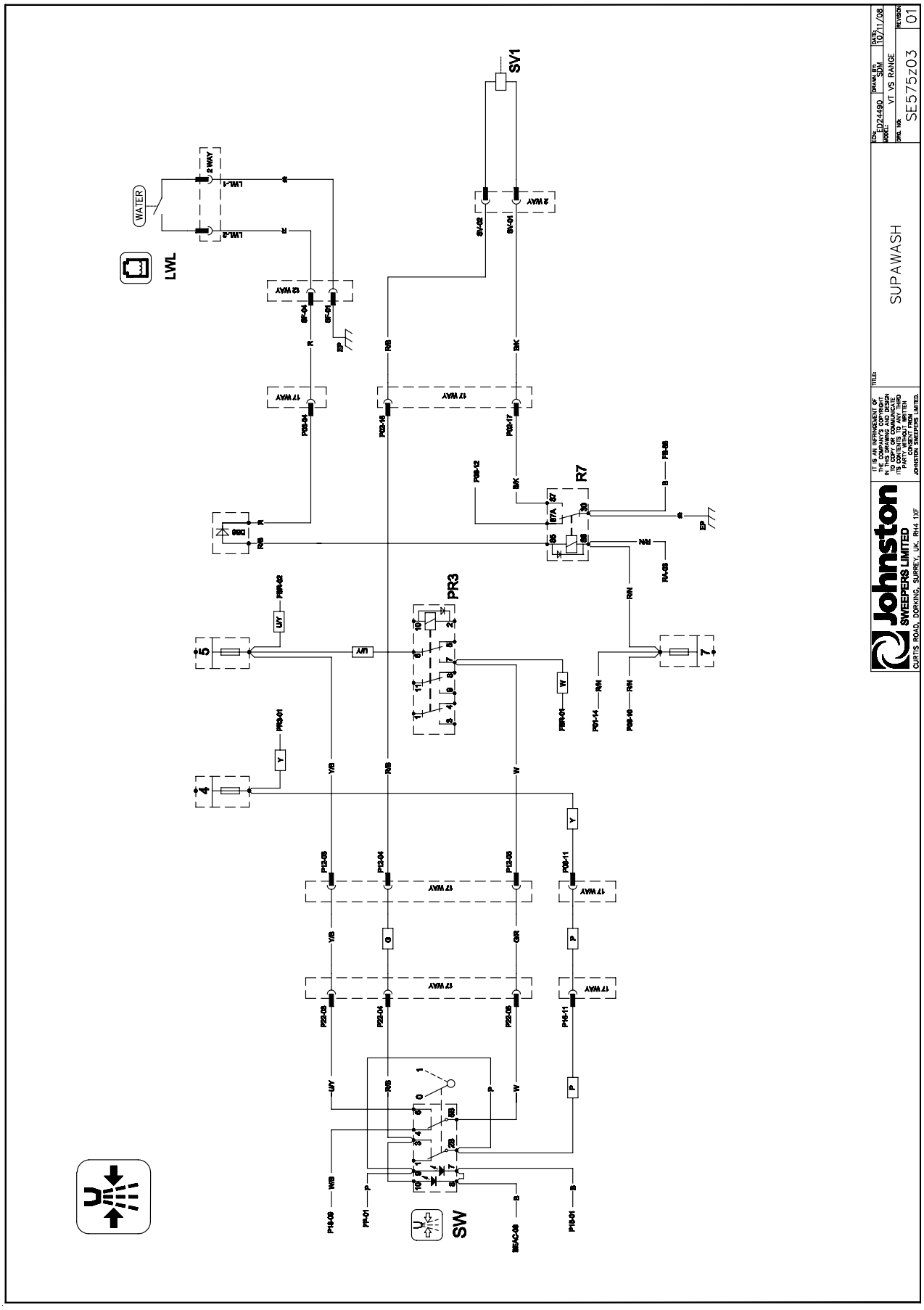
Water Recirculation Diagram Type B Switches - SE573z03



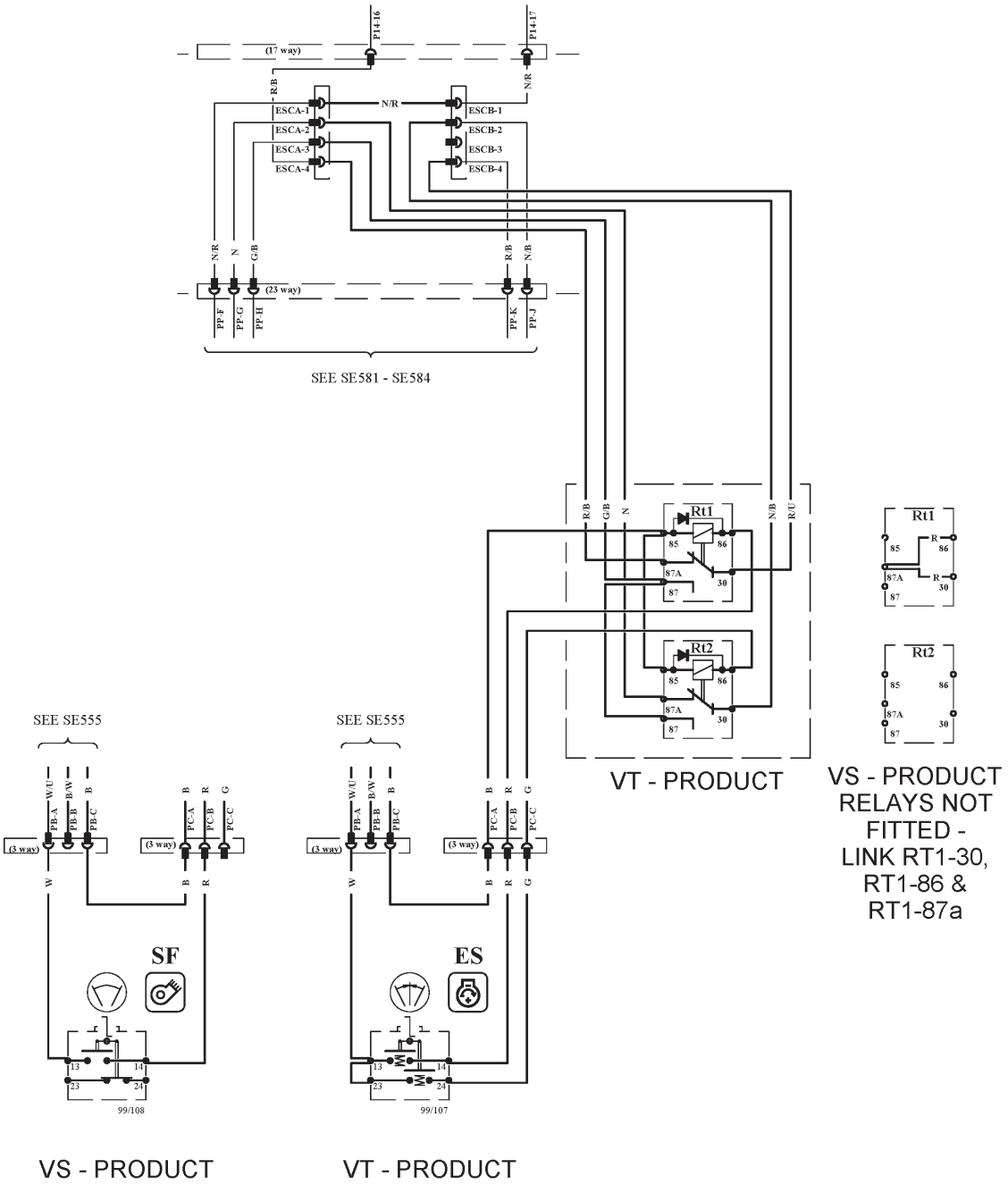
Varagap Option Diagram Type B Switches - SE574z03



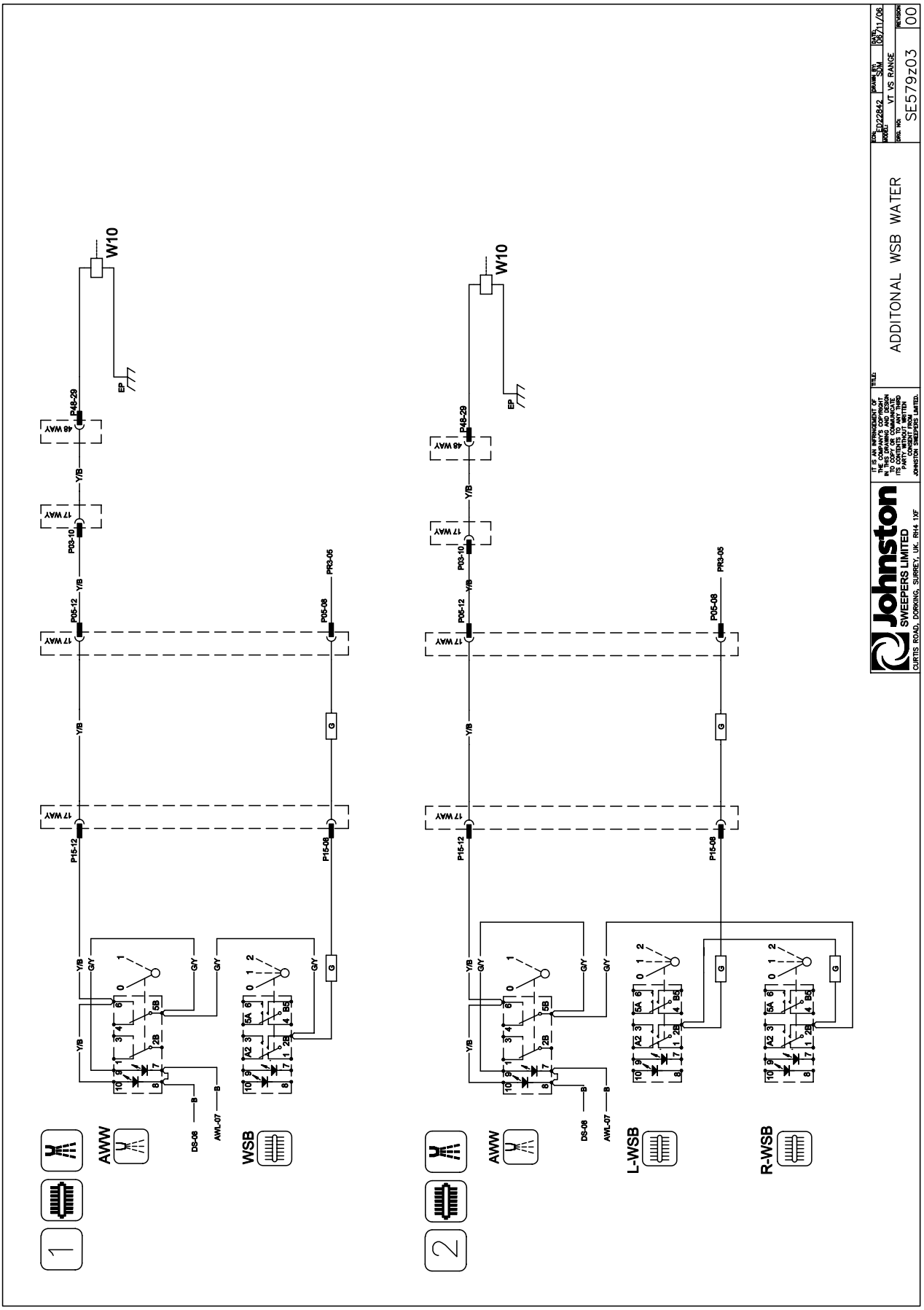
Supawash Option Diagram Type B Switches - SE575z03



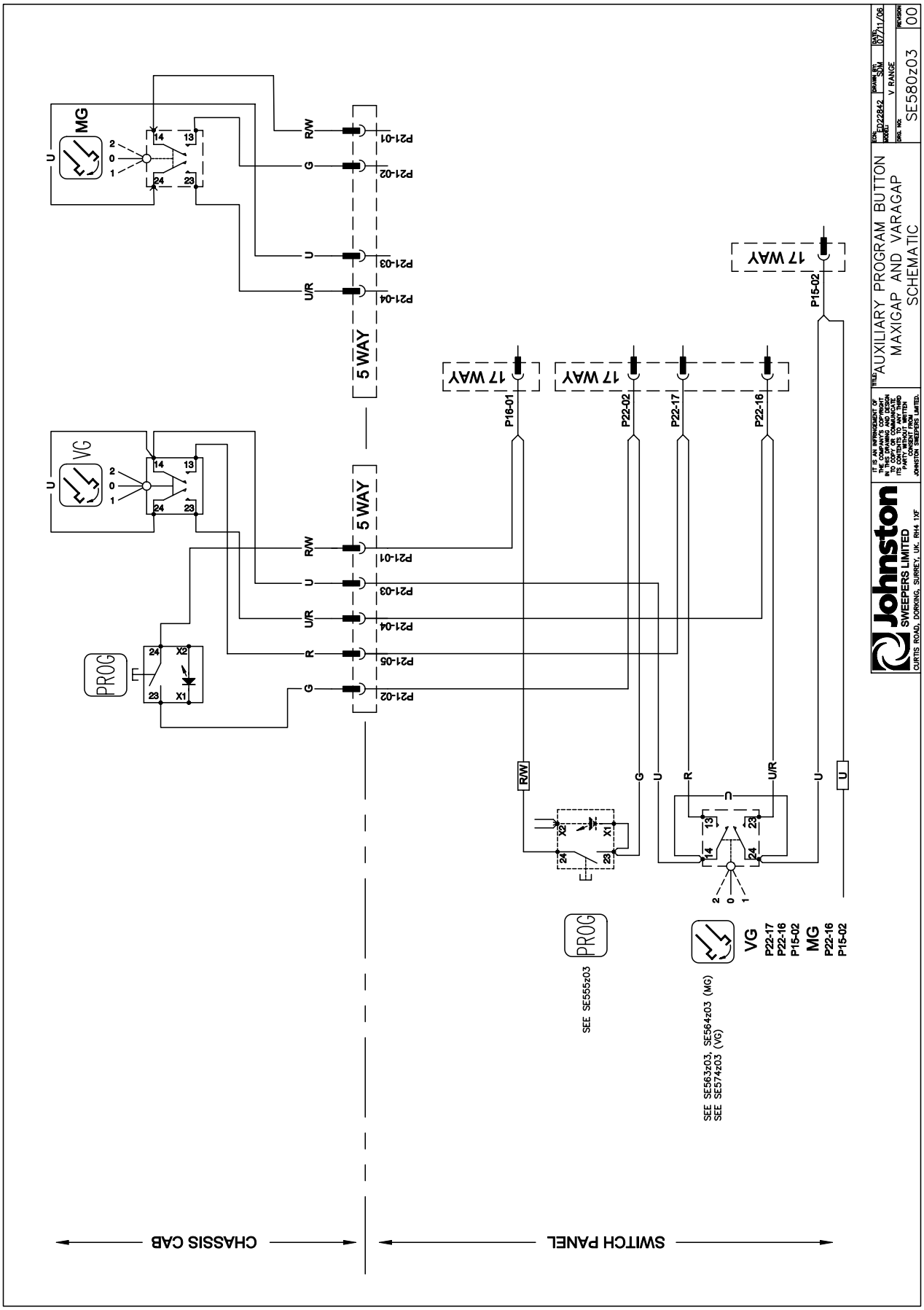
Additional Throttle Diagram - SE578a01



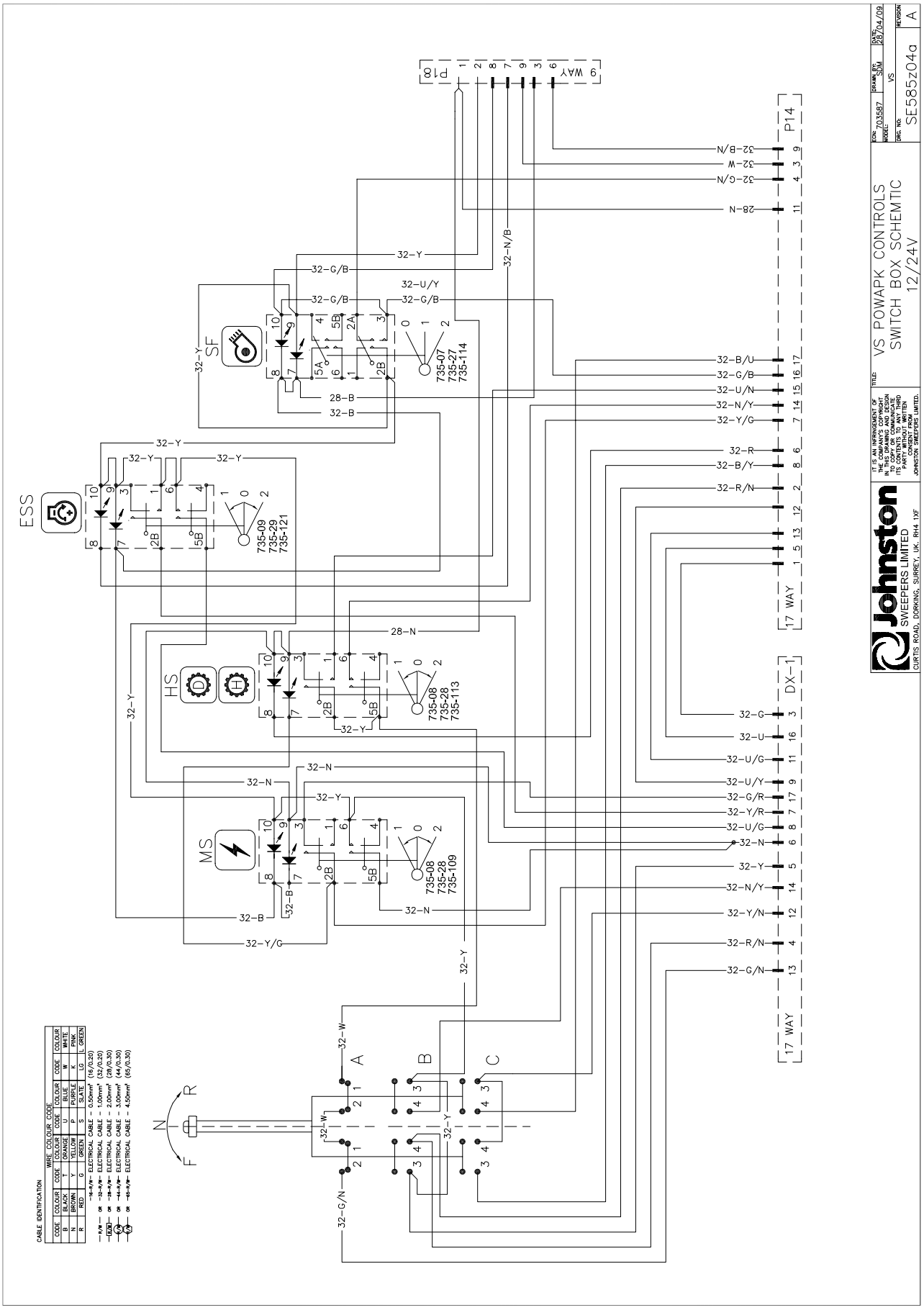
Additional WSB Water Option Diagram Type B Switches - SE579z03



Program / Maxigap / Varagap Diagram Type B Switches - SE580z03



VS Powapak Controls Diagram Type B Switches - SE585z04a



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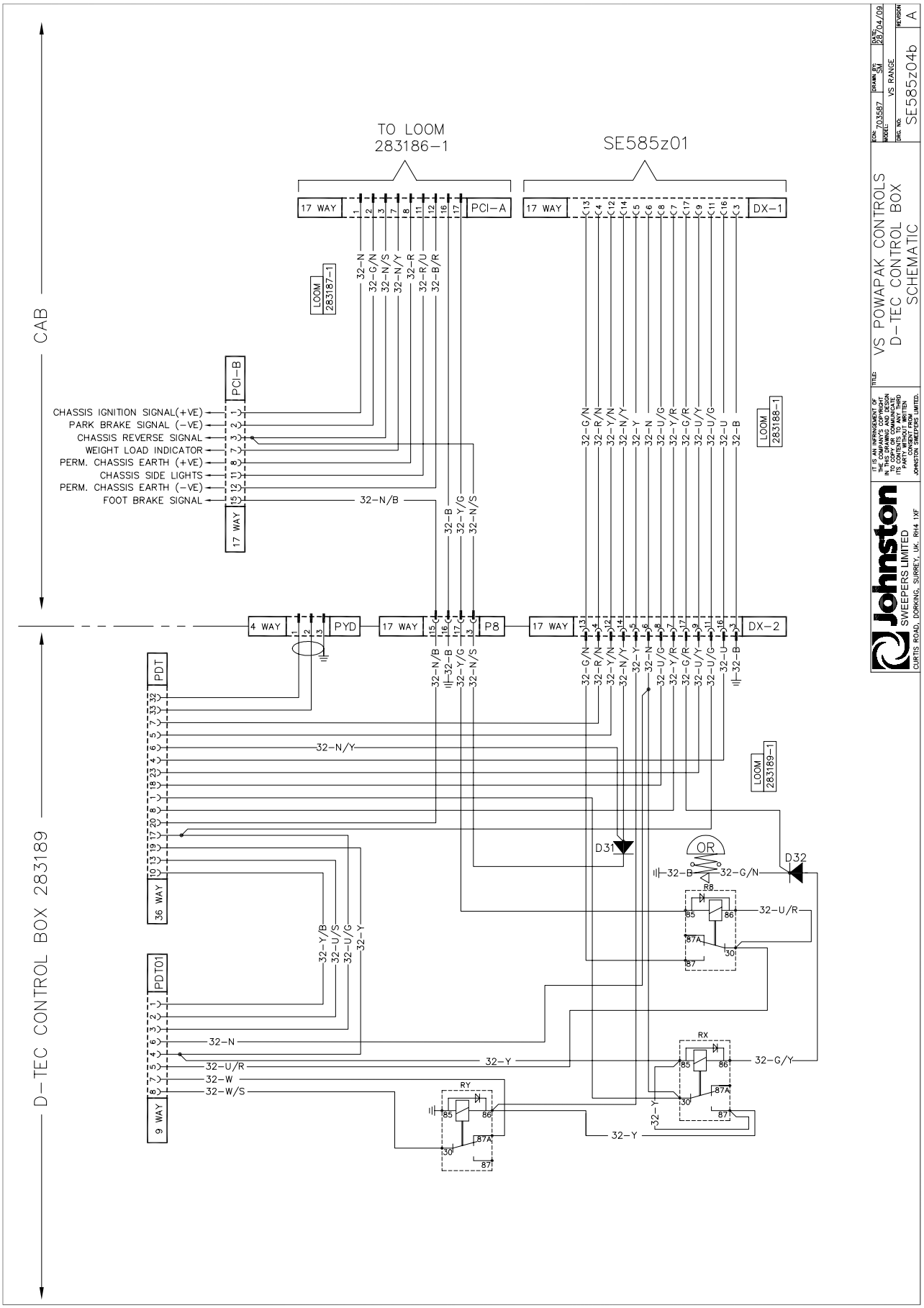
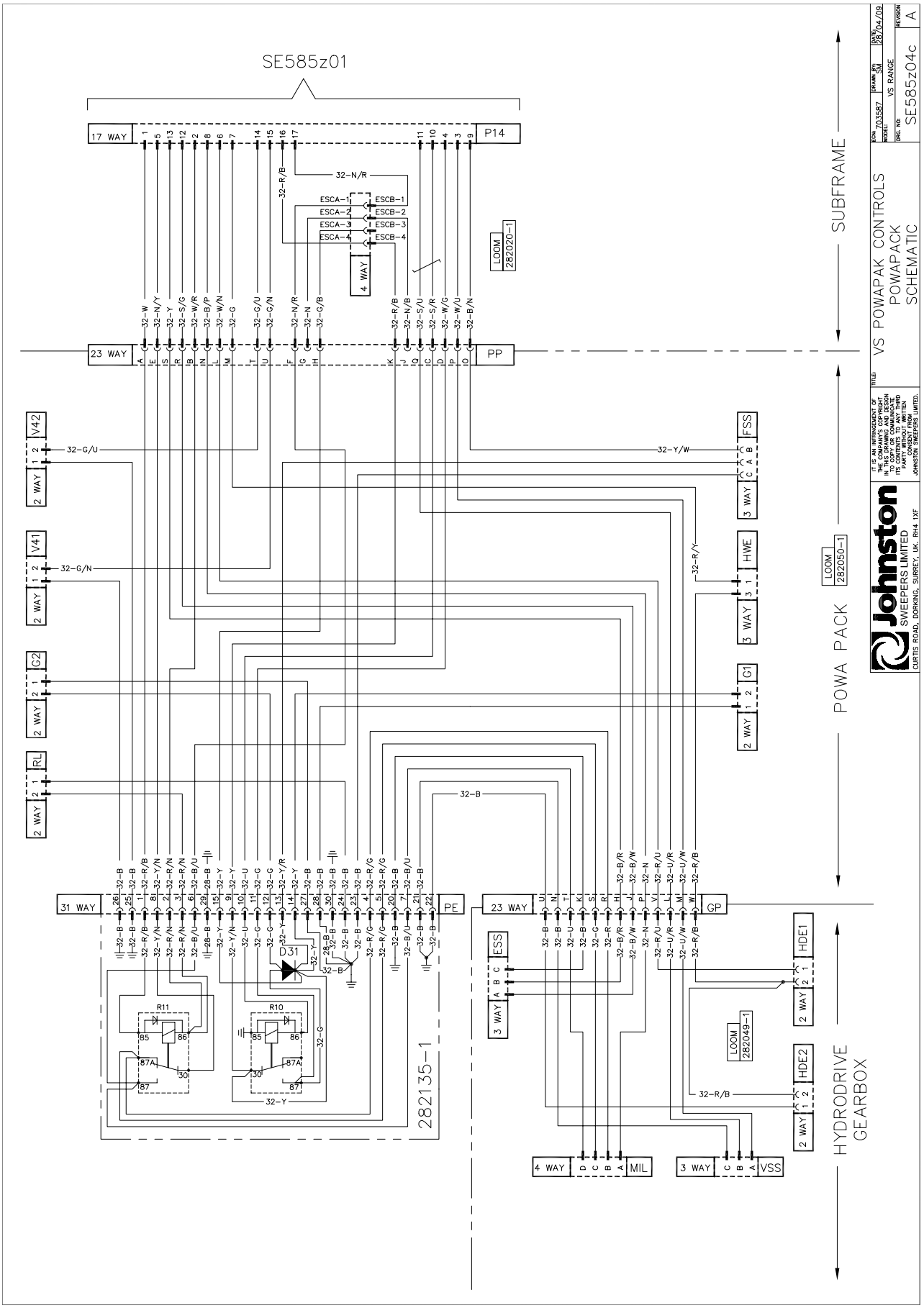
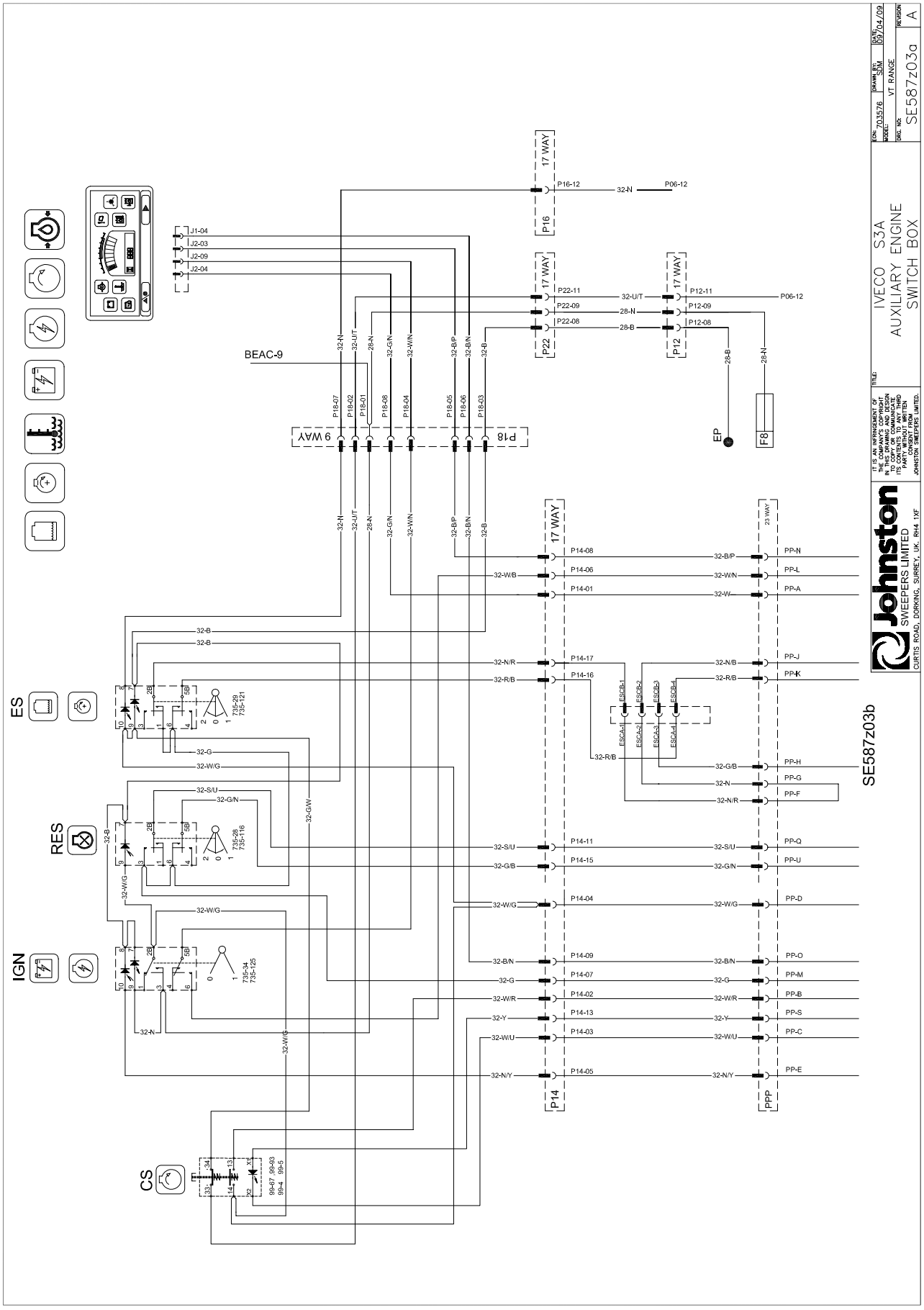


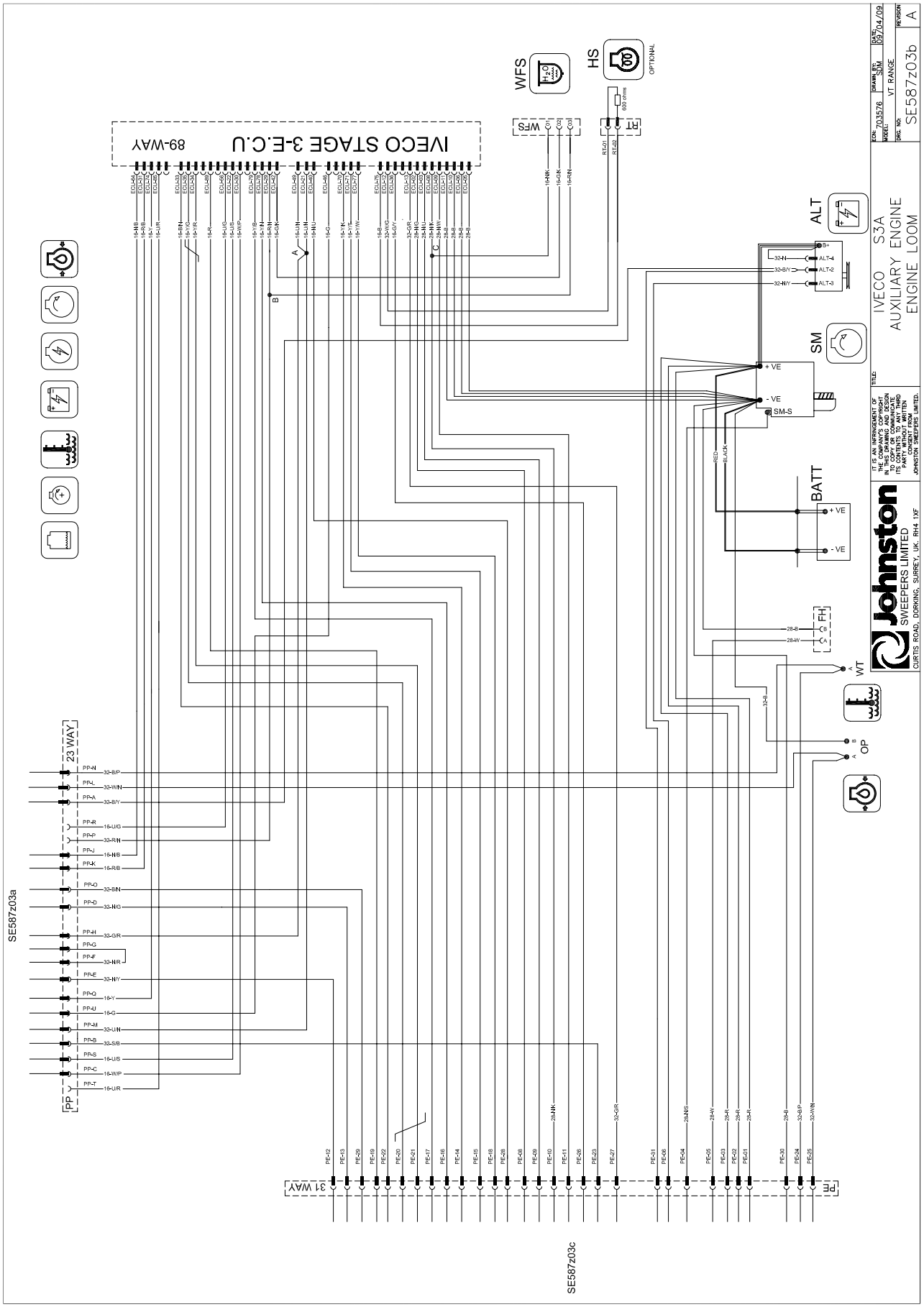
VS Powapak Controls Diagram Type B Switches - SE585z04c



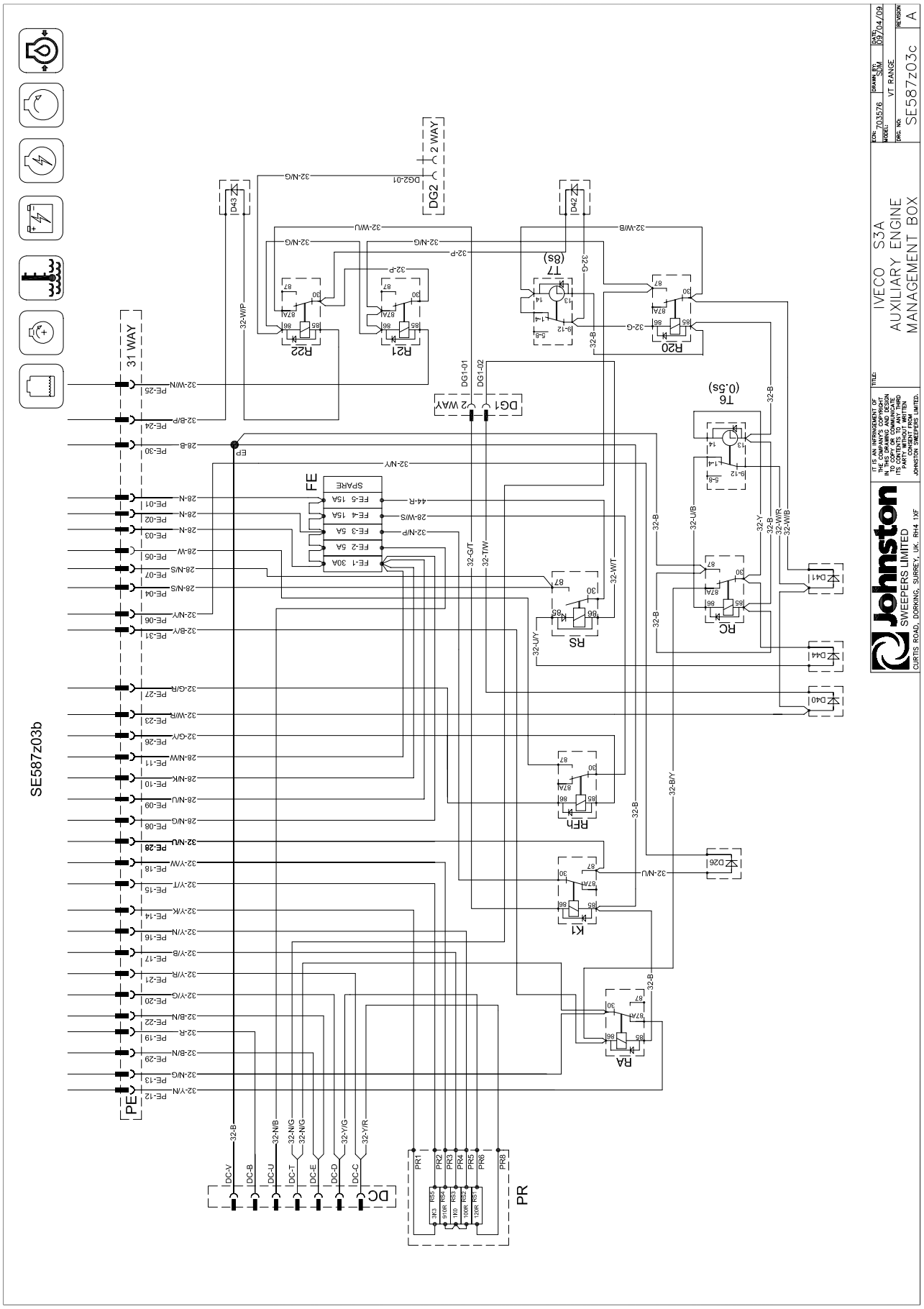
Iveco Stage 3a HP Engine Diagram - SE587z03aA



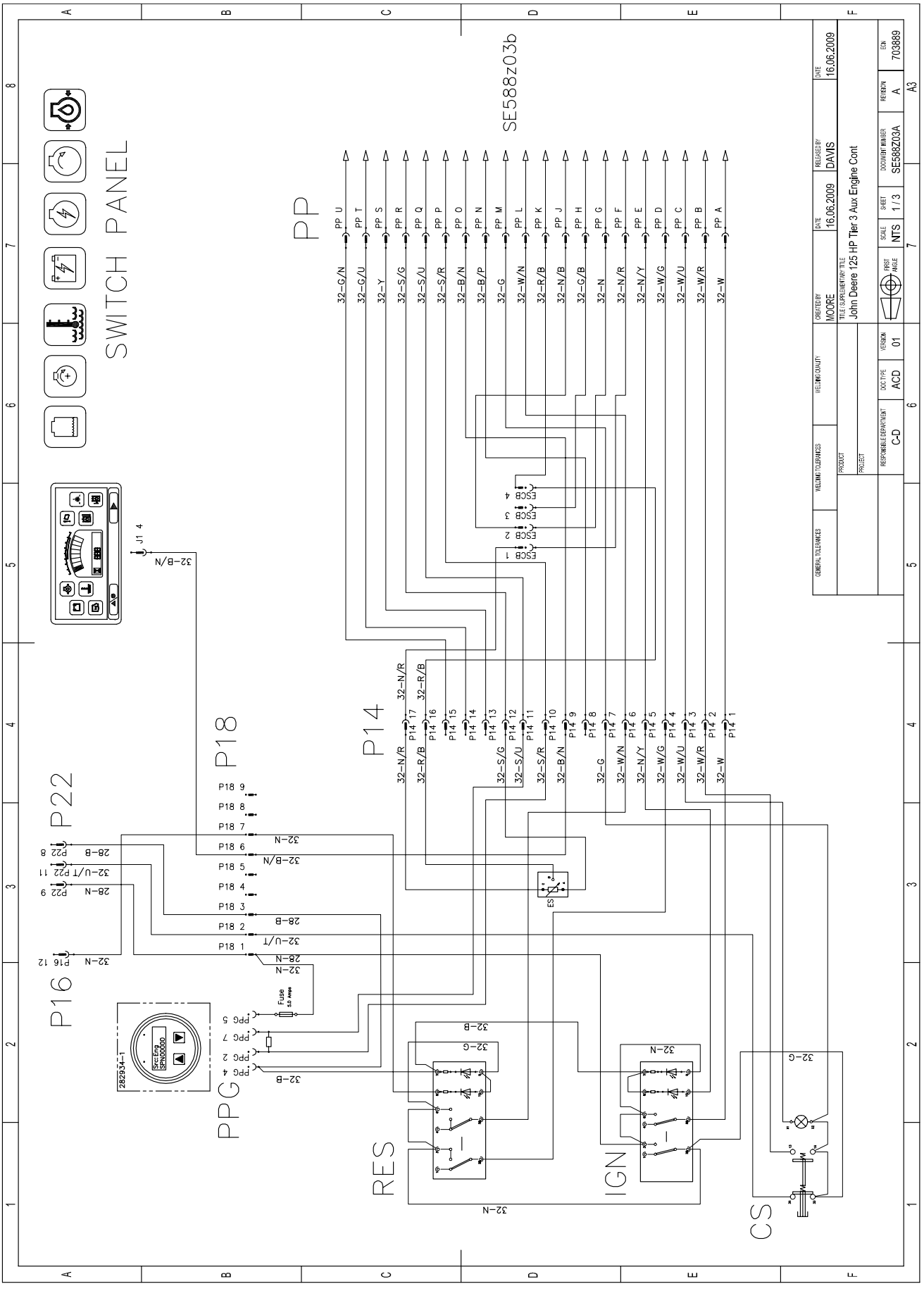
Iveco Stage 3a HP Engine Diagram - SE587z03bA



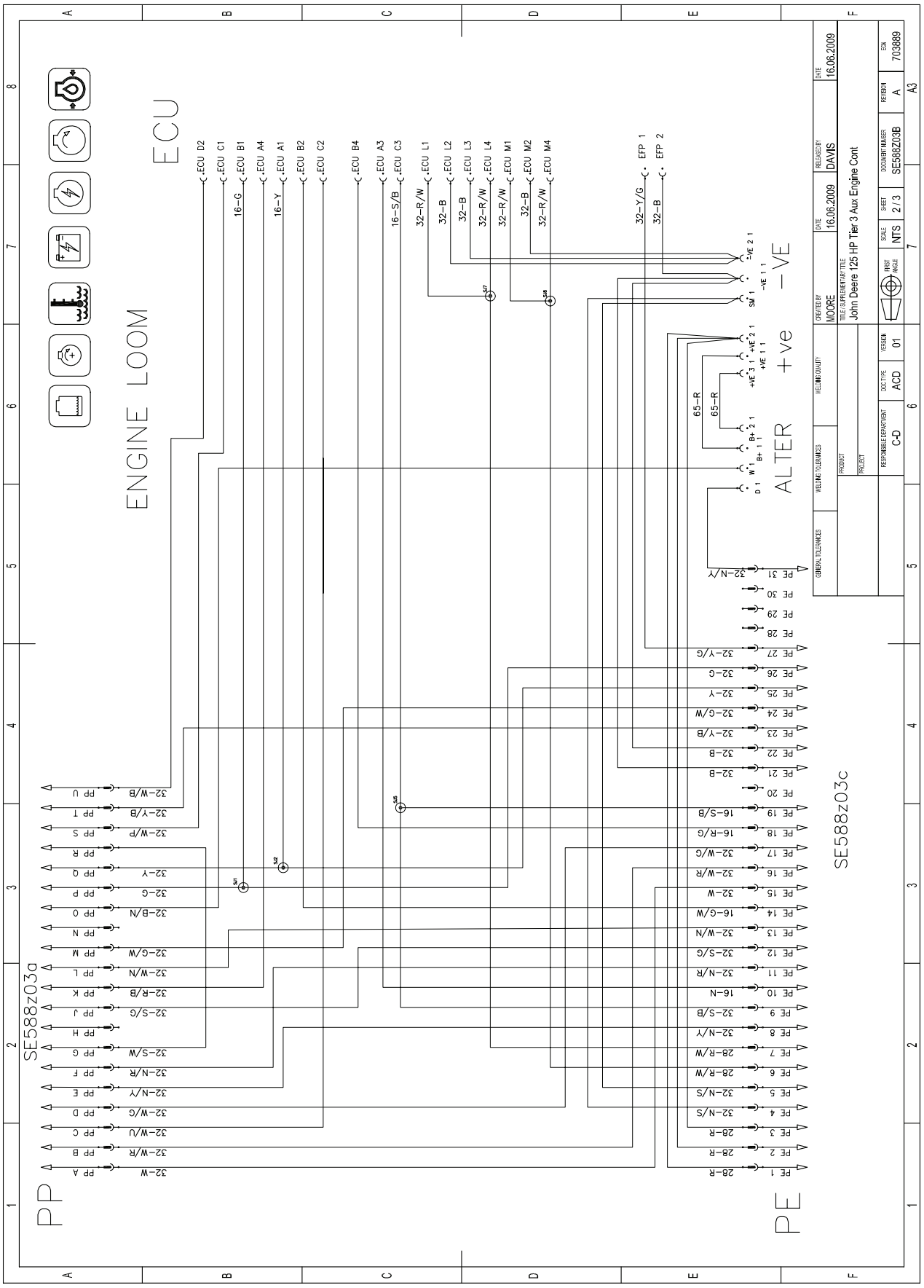
Iveco Stage 3a HP Engine Diagram - SE587z03cA



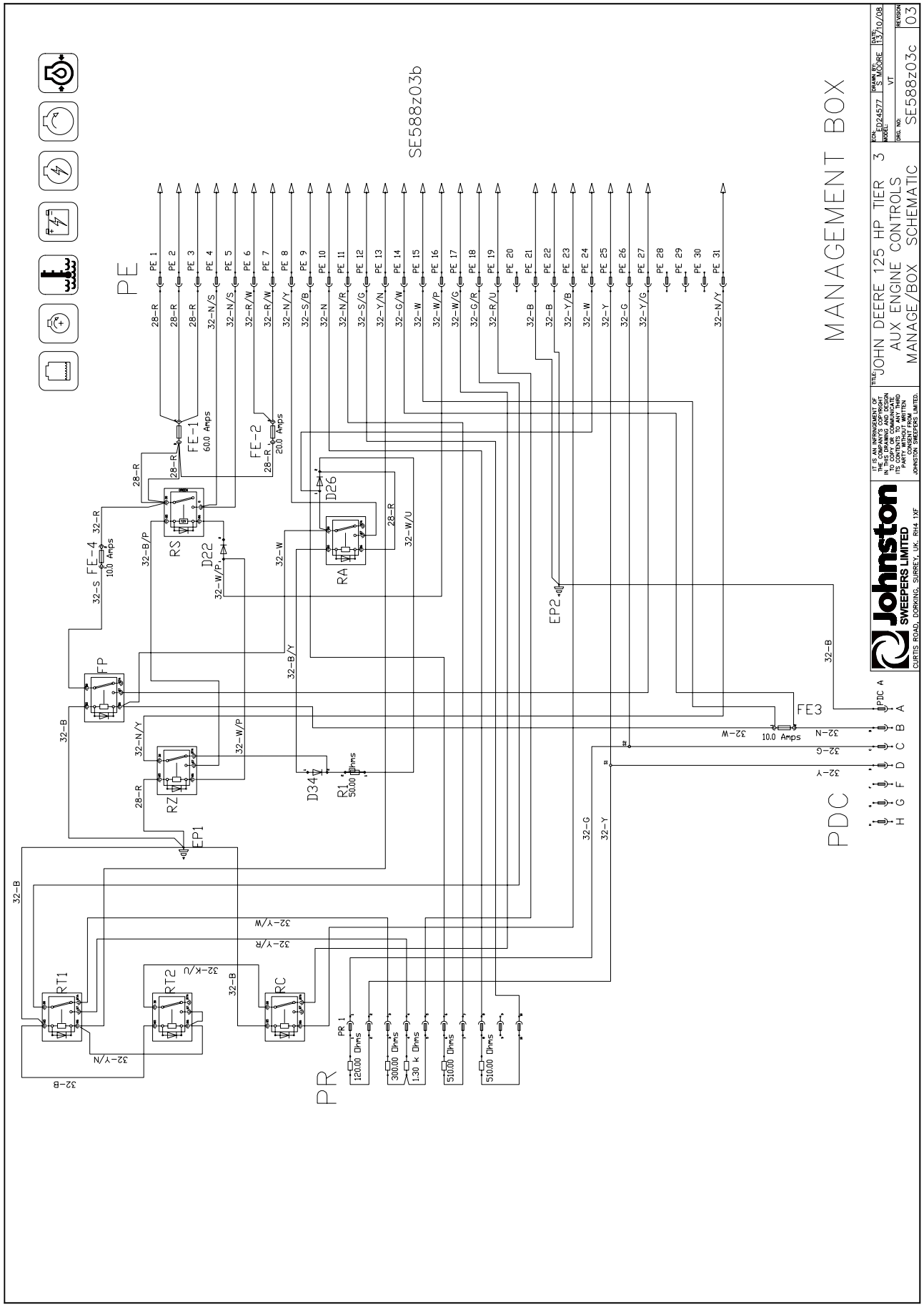
John Deere Tier 3 HP Engine Diagram - SE588z03a



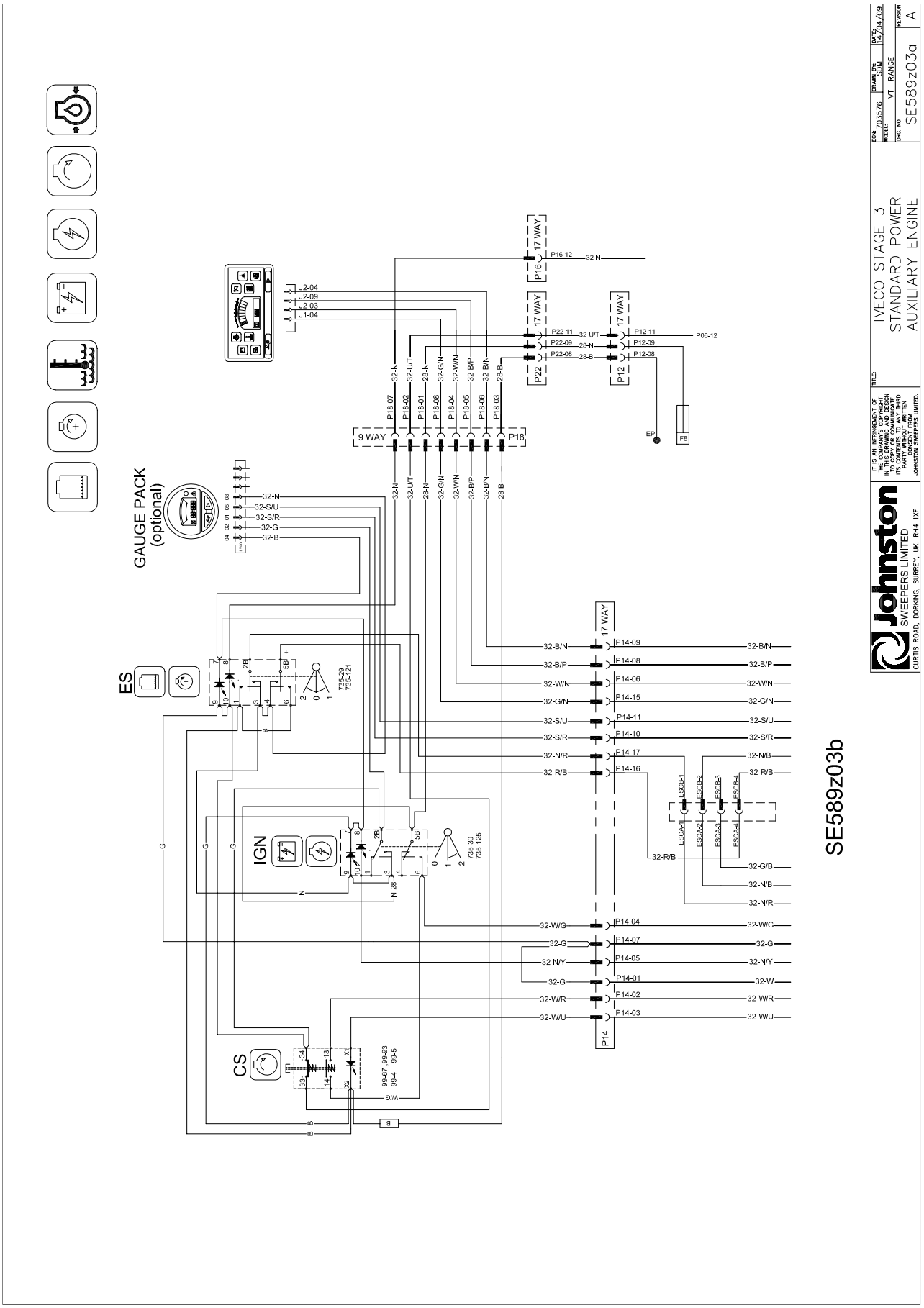
John Deere Tier 3 HP Engine Diagram - SE588z03b



John Deere Tier 3 HP Engine Diagram - SE588z03c



Iveco Stage 3a SP Engine Diagram - SE589z03aA



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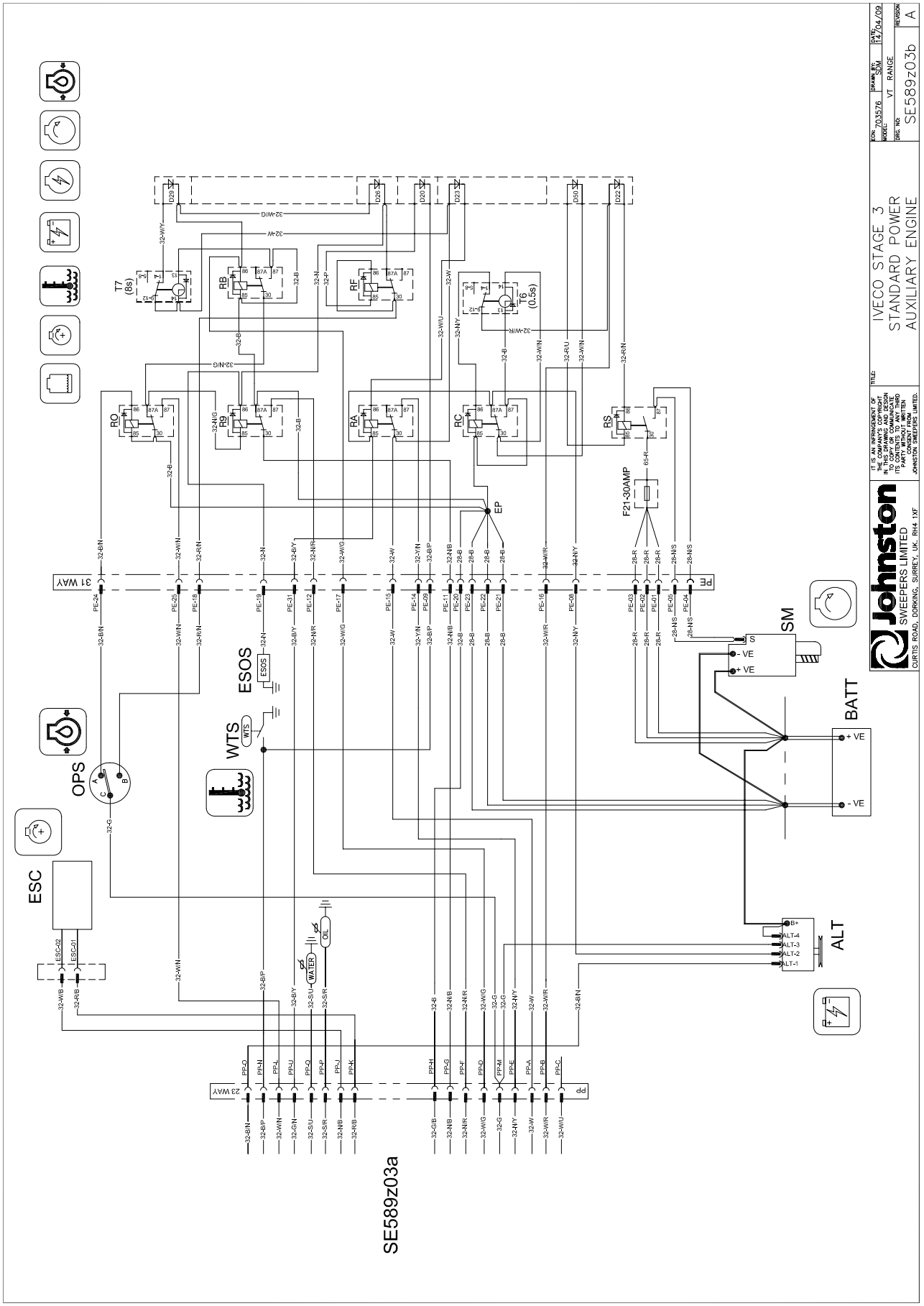
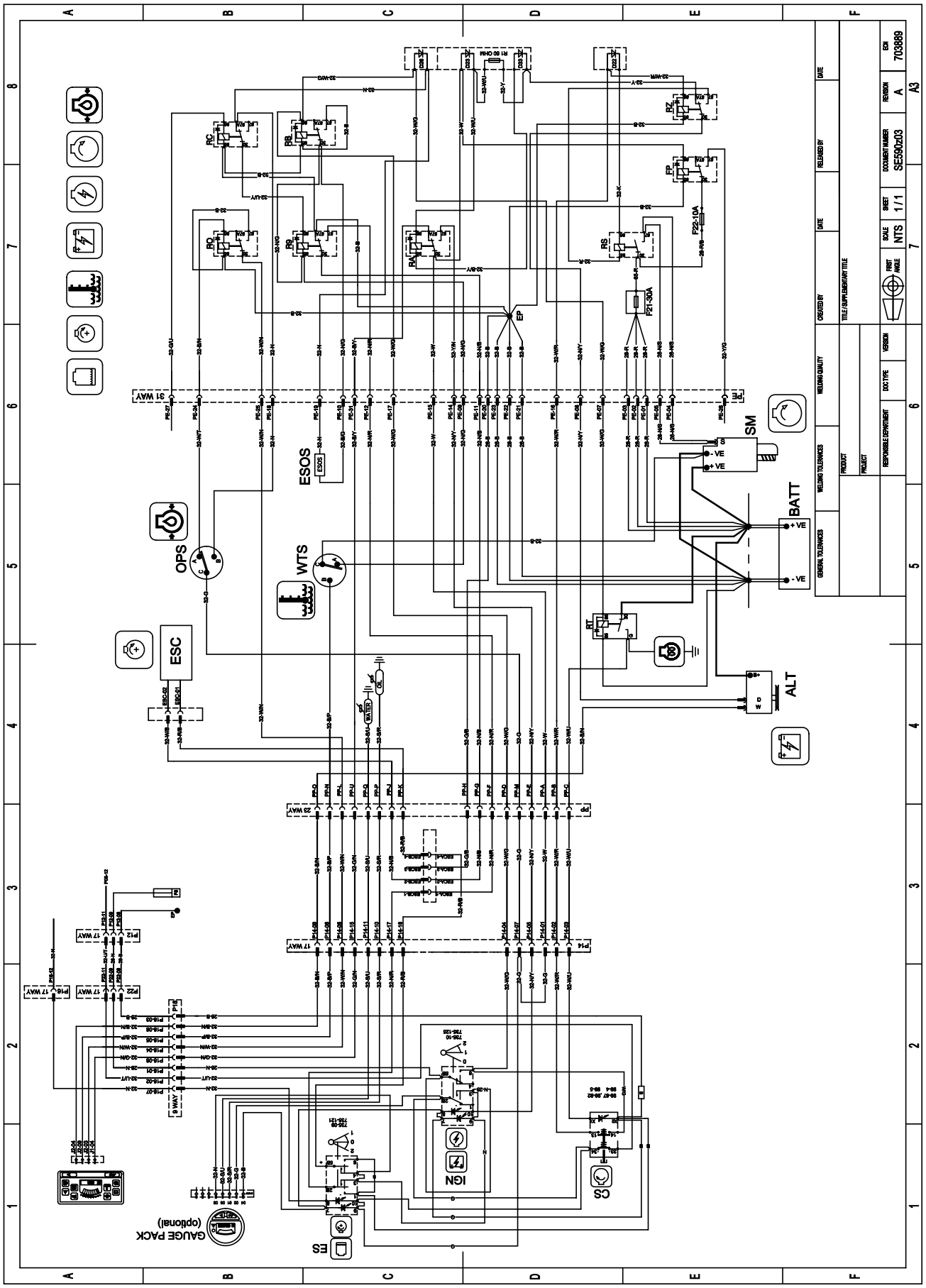
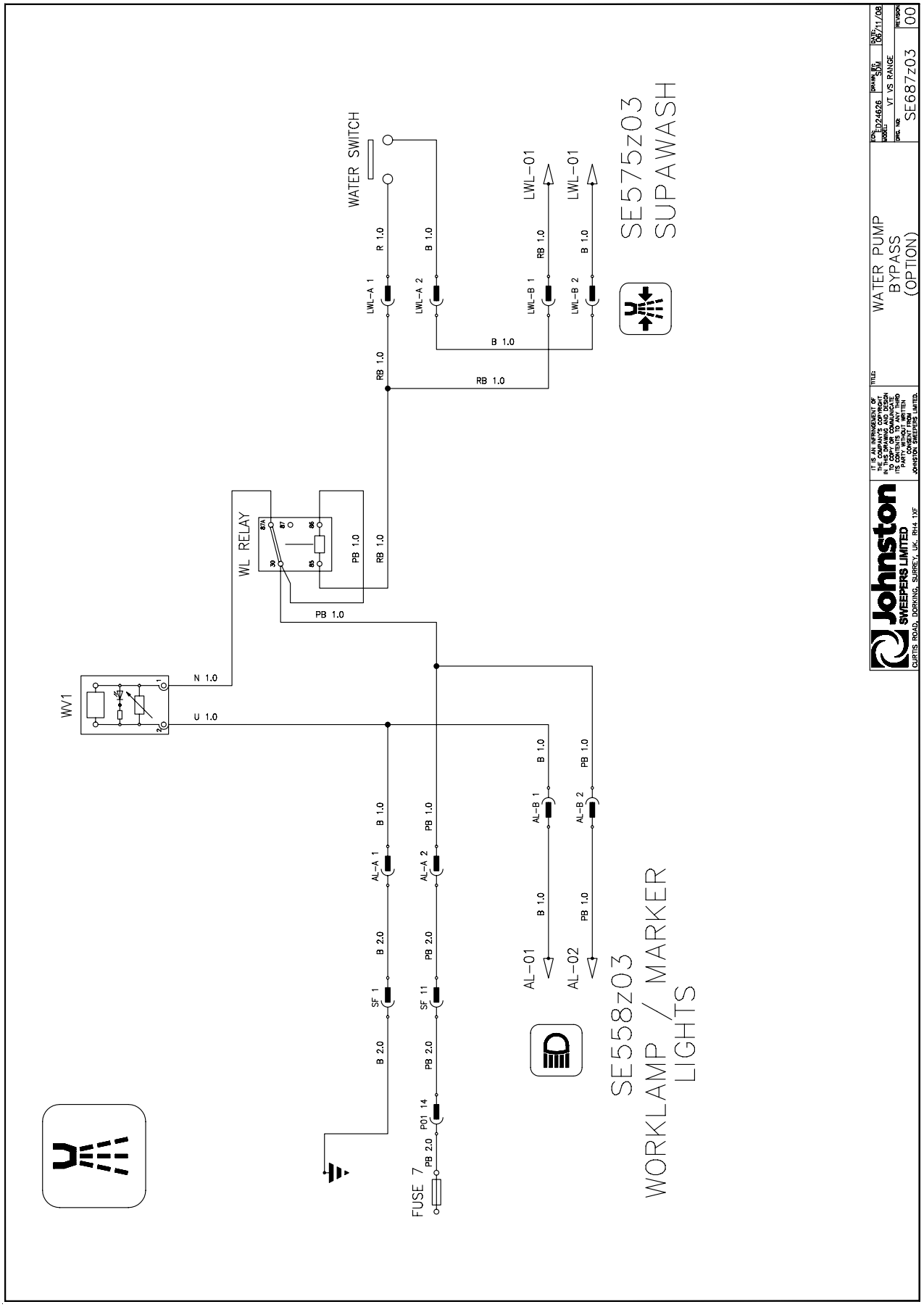


John Deere Tier 3 SP Engine Diagram - SE590z03



Low Pressure Water Pump Bypass - Option - Diagram SE687z03



CHAPTER 10

Water System

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GENERAL DESCRIPTION

Pressure for the water supply is provided by a twin diaphragm pump hydraulically driven from the auxiliary engine. Pressure regulation is by a relief valve situated at the rear of the machine. Filtration is by two filters, one mounted within the water tank and a second in-line type located at the right hand rear of the machine. An isolator valve is built into the in-line filter for ease of element servicing. All sweeping spray jets are controlled by simple solenoid valves, manifold mounted within the systems locker.

Control of the washdown hose and wanderhose water injection is by manual valves at the rear of the machine subframe.

SUPAWASH OPTION

This optional equipment comprises a hydraulically driven high pressure water pump, and a hand lance mounted on the chassis of the machine with a 15 metre hose wound onto a recoiling reel.

Front and nozzle spraybars are optional equipment.

Supawash Unloader Valve - Pressure Setting

1. Ensure that the hydraulic relief valve has been set as outlined in section 8.

2. Fit a hydraulic test gauge to the Supawash manifold (T13).

3. Disconnect the 3/8” bypass pipe at the unloader valve and plug the hose end.

4. Turn on the front spraybar tap.

5. Activate the Supawash and increase the engine speed to 2000 rpm. Check to see if any water is leaking from the bypass port on the unloader, if not loosen the retaining nut on the top of the unloader and unscrew anticlockwise until water dribbles from the bypass port. Gently turn the adjuster clockwise until water stops dribbling, then turn the adjuster 1/2 turn clockwise and lock off the retaining nut. The operational pressure at the manifold should be 100 bar nominal. If the pressure is higher check again for blocked jets.If the pump operates at a pressure in excess of 100 bar there is a problem that will effect the life of the pump and invalidate any warranty.

NB - Do not turn off the front Supawash spraybar or water will be ejected from the bypass valve where the hose has been removed.

6. Stop the engine and reconnect the bypass hose.

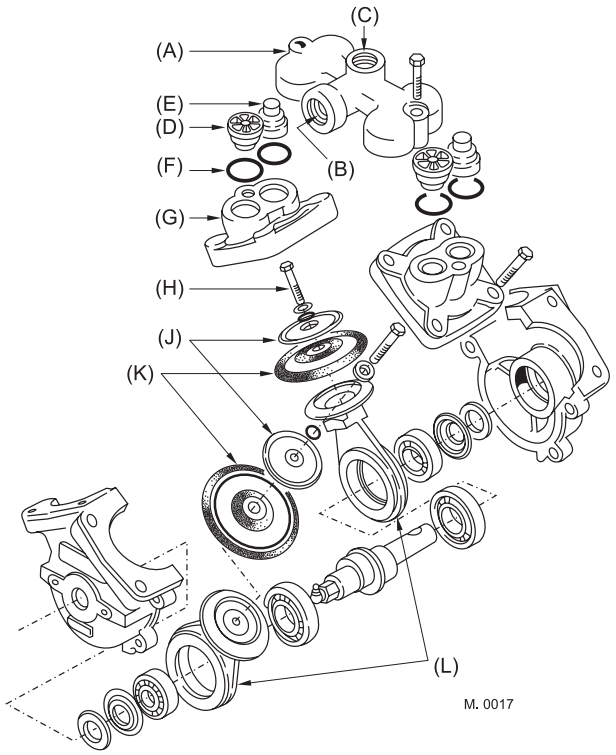
CIRCUIT PRESSURES

Two test points are provided for checking the water pressures.

Test Point No.	Function
WTP	Dust Suppression Sweep System
T13	Supawash System

WATER PUMP

A) Manifold
B) Suction Port
C) Delivery Port
D) Suction Valve
E) Delivery Valve
F) Valve Sealing Rings
G) Pump Chamber
H) Tension Pad Bolts
J) Tension Pads
K) Diaphragms
L) Connecting Rods



The assembly of the twin diaphragm pump is quite simple and straightforward, but attention to the undermentioned points will afford economy by prolonging the life of the pump and, more especially, the expendable components.

1 Diaphragms -
When replacing a diaphragm, turn the crankshaft until the relative connecting rod is at TDC so that when securing the diaphragm and the tension pad by means of the tension pad bolt, the periphery of the diaphragm is free of the crank case.
Ensure that the tension pad is pulled down onto the connecting rod.

2 Pump Chambers -
Before fitting a pump chamber, turn the crankshaft until the relative diaphragm is at the centre of its stroke, i.e. so that the periphery of the diaphragm is just resting on the face of the crankcase. Place the pump chamber in position, place the bolts and nuts in position and tighten ‘finger tight’. Tighten down, but make sure that the pump chamber is pulled down square so that the lower face of the chamber is correctly located against the crankcase.

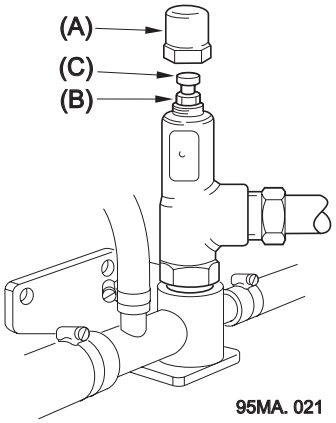
3 Manifolds and Valves -
Fit the valve sealing rings onto the valve seat. Place the delivery valve (stem upwards) over the delivery orifice of the pump chamber and push the sealing ring down so that it is flush with the pump chamber. Fit the suction valves in a similar manner, but with stem downwards. Place the manifold over the valves and see that it sits square. If the manifold does not sit square, then either the valves or the sealing rings are not correctly located. Place the securing bolts in position and pull down squarely.

It is important that these instructions are carried out, especially with regard to the fitting of the manifolds, to ensure a satisfactory seal at the valve sealing rings. Unless these instructions are followed, leakage will be experienced at the joint between the manifold and the pump chambers. On dismantling a pump for examination, if the valve sealing rings have taken on a permanent set to their location (roughly triangular in cross section), they should be replaced.

RELIEF VALVE

This valve is factory set and should not normally be touched, but should it be necessary to make adjustments, the pressure is set as follows.

PRESSURE SETTING
Remove the cover (A) and loosen adjuster locknut (B). Connect a pressure gauge to the test point located in the systems locker. With the auxiliary engine running at low idle speed (750/800), and all water sprays switched off, turn adjuster screw (C) until gauge reads 3.5 bar (50 psi). Tighten locknut and replace cover.



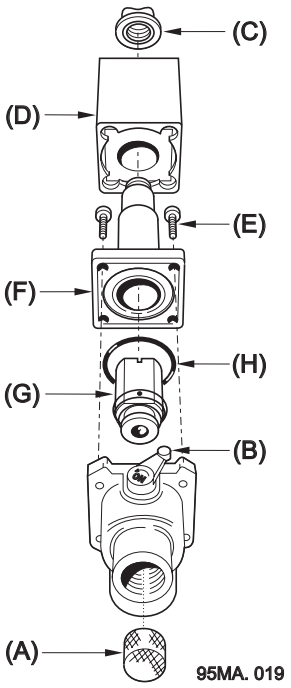
95MA. 021

SOLENOID VALVES

Solenoid valves control the water spray jets and are located in the systems locker. Each valve incorporates a filter (A) in its suction port and a manual lift override lever (B). Turning the lever anticlockwise opens the valve; clockwise closes it. This manual lift facility can be used when draining the water system in winter (see Operator's Guide, Chapter 3) and for actuating the valve should it for any reason fail to operate electrically.

The valve is readily dismantled for inspection or cleaning by unscrewing the retaining cap (C) through the coil (D).

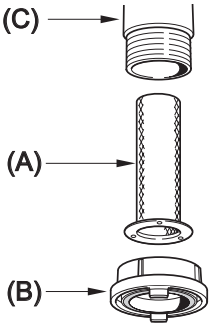
To access the armature, unscrew the four retaining screws (E) and remove the armature cover (F). The armature (G) can be removed. When refitting parts ensure the 'O' ring (H) is in good condition and located correctly.



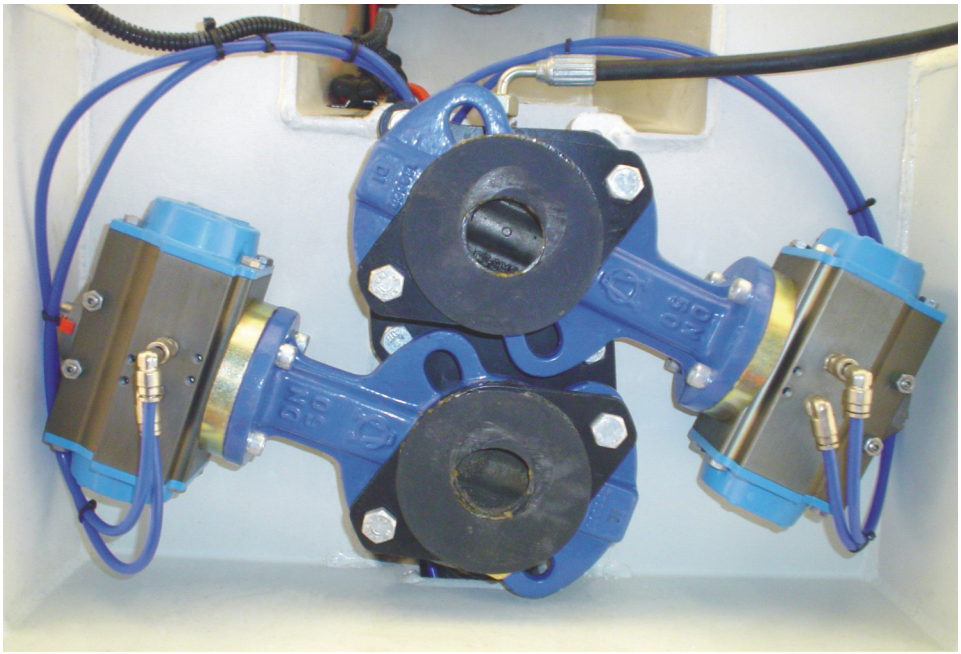
95MA. 019

HYDRANT FILTER

Periodically the hydrant filler filter (A) should be cleaned, or replaced if damaged. To gain access to the filter, unscrew the hydrant coupling (B) and withdraw the filter from its housing (C).



95MA. 020

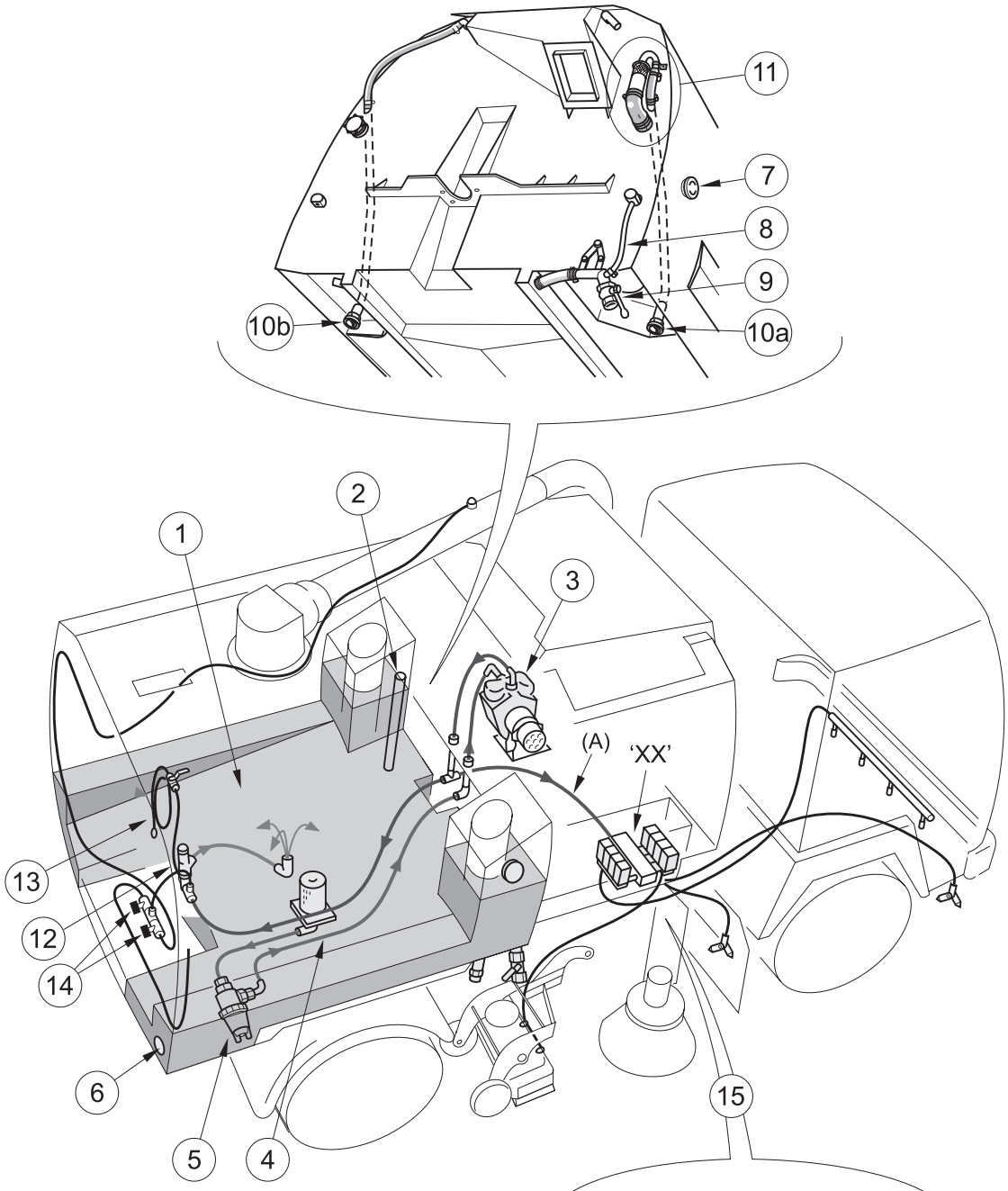


95MA.031

There is no routine maintenance required on these valves.

Isolate the air supply at the Filter regulator unit before removing the valve for maintenance, cleaning or replacement

Piping Diagram



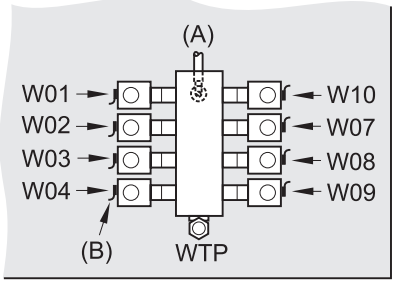


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Illustration Component Key

1	Water tank
2	Tank overflow vent
3	Water pump - output 28 l/m
4	Water tank primary filter
5	Suction filter
6	Tank flushing ports
7	Tank filler port - hosepipe
8	Water level sight glass
9	Tank drain/flushing valve
10a	Hydrant filler port for water tank
10b	Recirc water body filler *
11	'Type A' anti syphon water break
12	Relief valve
13	Washdown hose
14	Wanderhose and Littasnatch valves *
15	Water valve manifold - see table below
	(A) Supply
	(B) Manual override levers
	WTP Water test point

* Options

VS & VT MODULAR SERIES - WATER SYSTEM - WATER VALVE STATION UTILISATION

	M/C TYPE		1	2
VALVE	VT	VS	SINGLE	DUAL
WO1	v	v	Wide sweep brush	Wide sweep brush
WO2	v	v	Gutter	LH gutter
WO3	v	v	Channel brush	LH channel brush
WO4	v	v	Nozzle	LH nozzle
WO7	v	v	*Not fitted*	RH gutter
WO8	v	v	*Not fitted*	RH channel brush
WO9	v	v	*Not fitted*	RH nozzle
W10	v	v	*Not used on basic m/c*	*Not used on basic m/c*

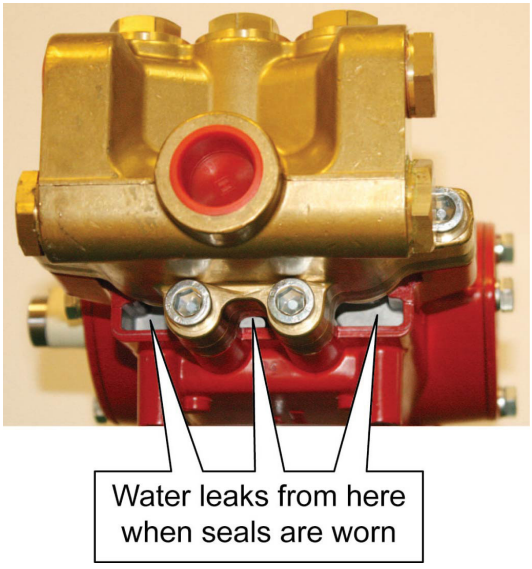
Note:

(1) Where the words 'not used' appear this means that the valve is fitted to the mounting station and is only used for various option.

(2) Where the words 'not fitted' appear this means that the valve is not fitted to the mounting station.

Water Pump Repair

Water pumps by their very nature are subject to erosion and wear from the process of pumping water. The life of the pump will depend on the quality of the water being used. The more particles that are in suspension in the water the sooner the seals and valves in the pump will wear and require replacing and are therefore considered as consumable items.
The main components in the pump that will require servicing are the suction and discharge valves and the seals on the plunger pipes.
A pump working correctly will normally not have any water leaks. If the plunger seals wear water will leak from the underside of the pump as shown below.



A drip ever 5 -10 seconds is an indication that the seals need replacing in the very near future.
A continuous drip from underneath the pump shows the seals are severely worn and require urgent and prompt replacement. Shown by the arrows in the above picture.

If a steady stream of water leaking from the pump is observed the pump should NOT be used. Should the pump be used in this condition water will be drawn back into the crankcase by the motion of the plungers. This water ingress into the crankcase will cause a catastrophic failure of the pump.

When the suction and discharge valves wear the out put of the pump will be reduced and this will be noticed as reduced output from the spray jets.

P22/34-100 Johnston Waterpump 283701-1
Seal and Valve Maintenance Instructions

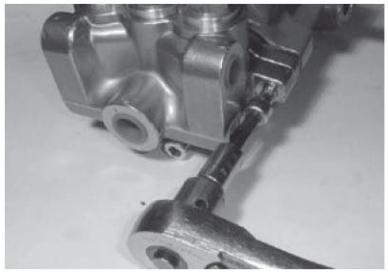
The following shows the overhaul procedure for the valves and plunger seals

1. With a 22mm socket, remove the three discharge valve plugs (43) from the top of the manifold.

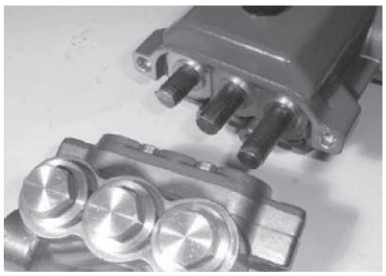
2. With a pair of needle nose pliers remove the spring tension cap (34), spring (35) and plate (36)

3. Use a valve extractor tool (99.061) to remove the valve seats (37)

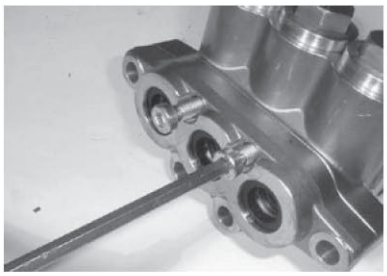
4. Inspect the valve seat (37) and valve seat (36) for signs of wear or cavitation and replace as necessary.



5. Using an 8mm Allen key remove the inner hexagon screws (45)

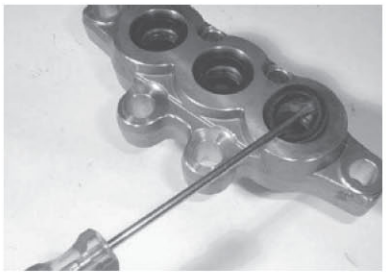
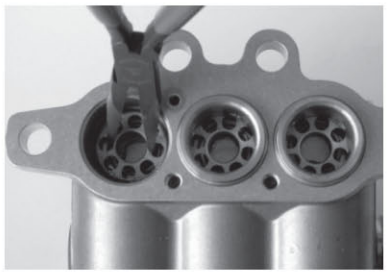
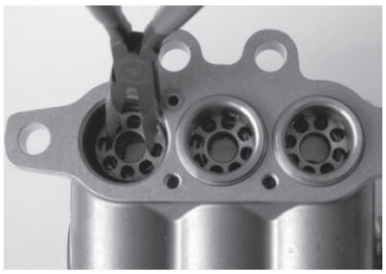


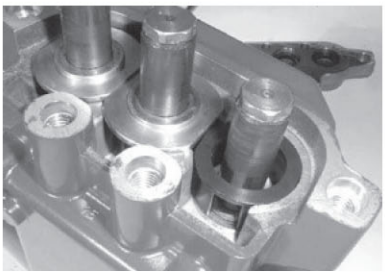
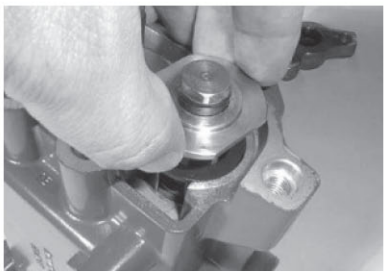
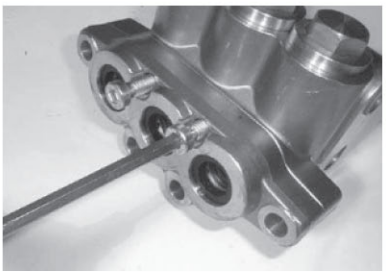
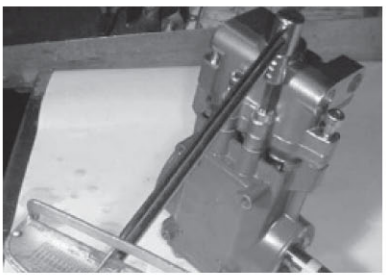
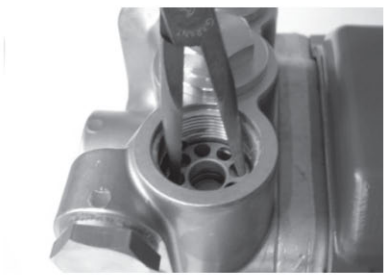
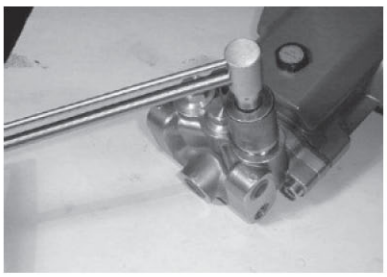
6. With a rubber mallet tap the back of the valve casing (29) and pull the valve casing (29) off the plungers (24a).



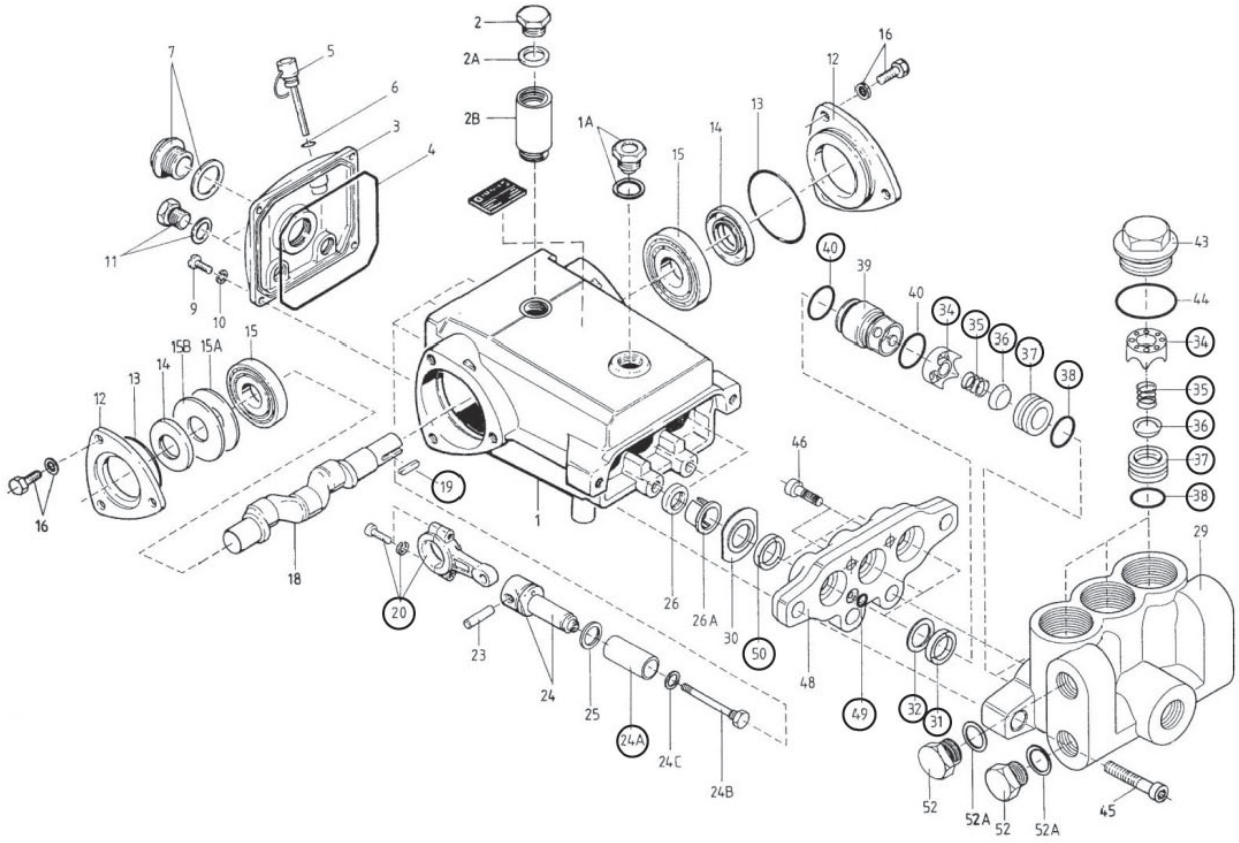
7. Using a 6mm Allen key remove the two inner hexagon screws (46).

8. Separate the intermediate casing (48) from the valve casing (29)

		
9. Remove and inspect the low pressure seal (50) and replace if necessary.	10. Turn over intermediate casting (48) Remove and inspect the high pressure seal (31) and the support ring (32) replace if necessary.	11. Remove the seal case (39) from the valve casing (29) and inspect both O Rings (40) for wear.
		
12. Using needle nose pliers, remove the spring tensioning caps (34), valve spring (35), valve plate (36) from the valve casing (29) Using a valve extractor (99.061) to remove the valve seat (37) from the valve casing (29).	13. Inspect the valve seat (37) and valve seat (36) for signs of wear or cavitation and replace as necessary.	14. Install the inlet valve assembly (34 – 38) back into the valve casing. Ensure the “fingers” of the spring tensioning cap (34) DO NOT obstruct the cross bore in the valve casing (29).
		
15. Install the seal case (39) with O Rings (40) into the valve casing (29)	16. Install the support ring (32) and the high pressure seal (31) into the intermediate plate (48)	17. Lubricate the low pressure seal (50) and install into the intermediate casing (48).

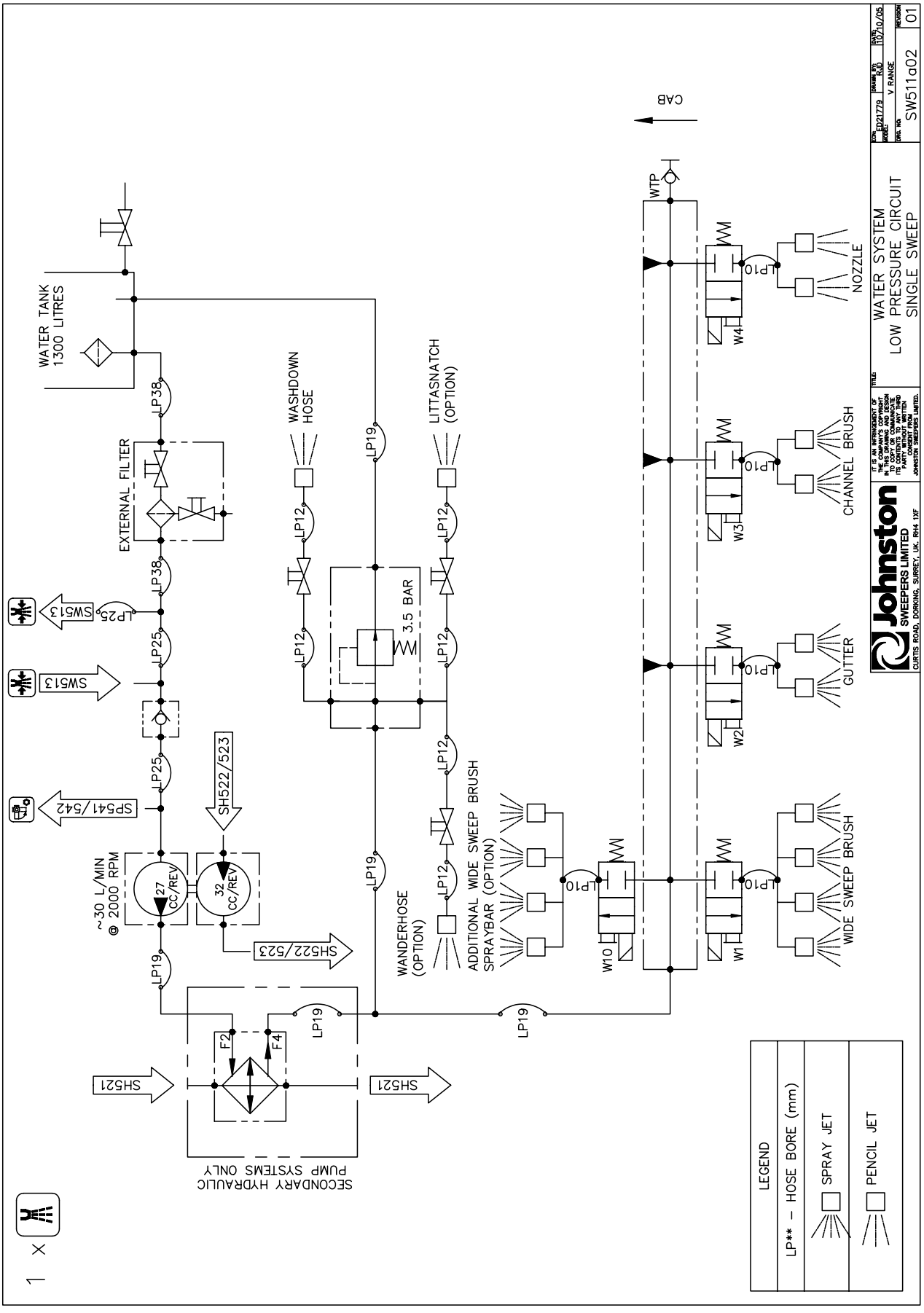
		
18. Replace the three spacer sleeves (26a) over the plunger (24a) with the flanged side toward the valve casing (29)	19. Install the pressure rings (30) over the plungers (24a). Make sure that the small o ring (49) is in place in the intermediate casing (49)	20. Secure the intermediate casing (48) to the valve casing (29) with the inner hexagon screws (46). Torque to 12 NM.
		
21. Place the valve casing (29) over the plungers (24a). Secure with inner hexagon screws (45) Torque evenly to 45 NM	22. Install the high pressure valve assemblies with o rings (34 – 38) Ensuring the fingers of the spring tensioning cap (34) DO NOT obstruct the cross bore in the head (29).	23. Replace the high pressure plugs (43) and torque to 70 NM.

Exploded view of Pump

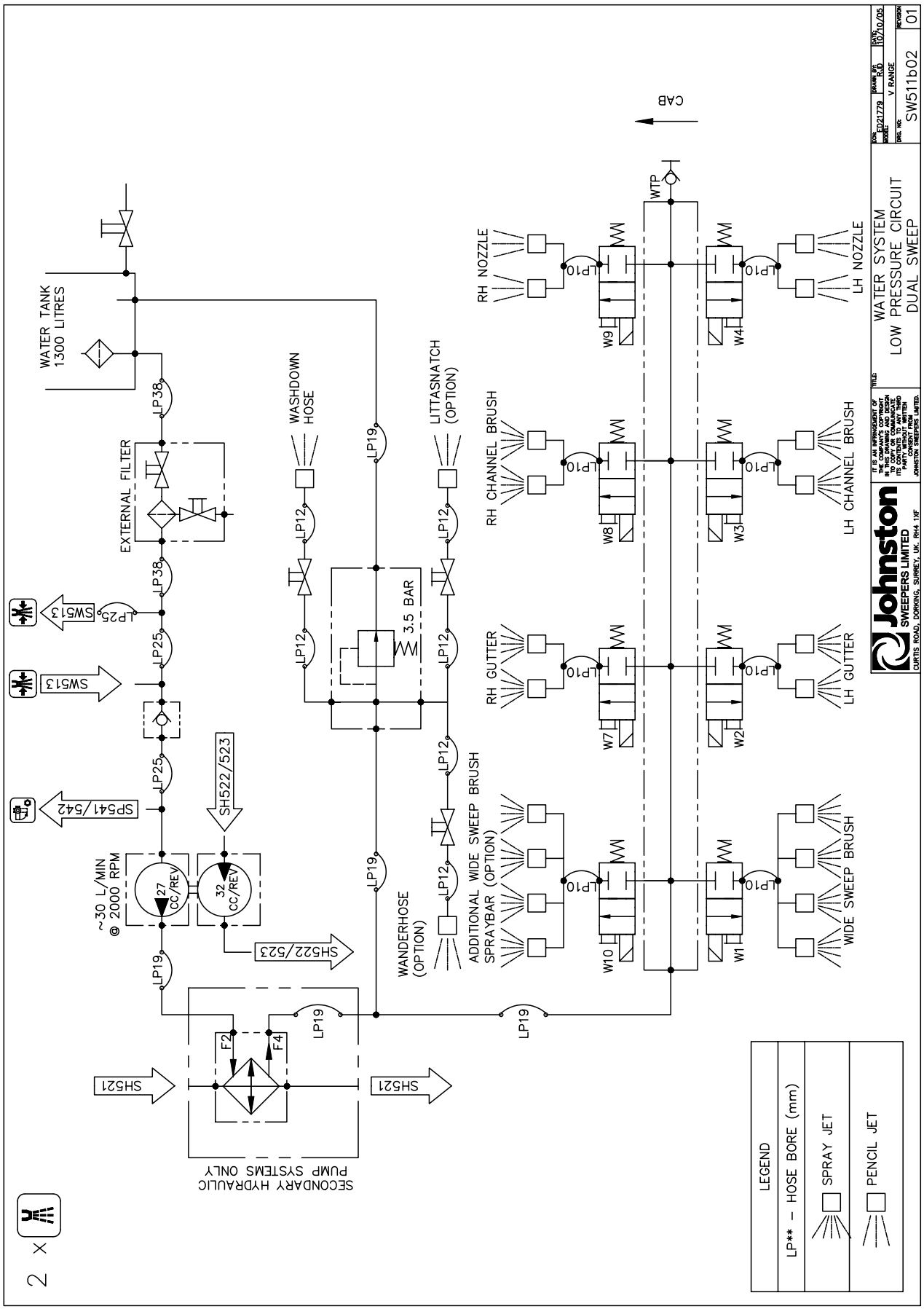


Item Number	Quantity	Part Number	Description
19	1	283701-13	Woodruff Key
20	3	283701-14	Connecting Rod
24A	3	283701-12	Ceramic Liner
31,32,40,49,50	1 Kit	283701-10	Plunger Seal kit - for 3 plungers
34,35,36,37,38	1 Kit	283701-11	Valve Kit - for the 6 valves

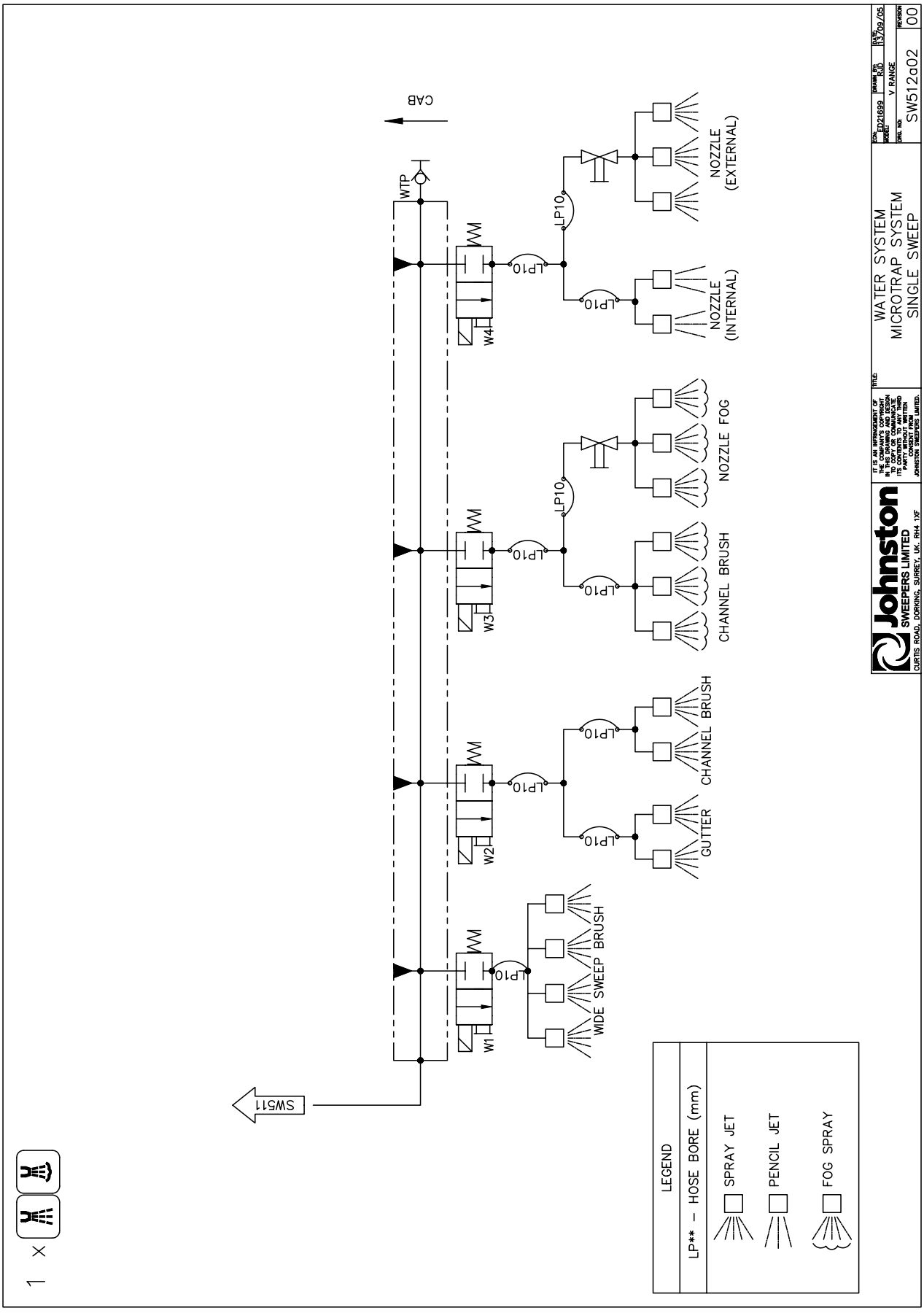
Water System Low Pressure Single Sweep - Diagram SW511a02



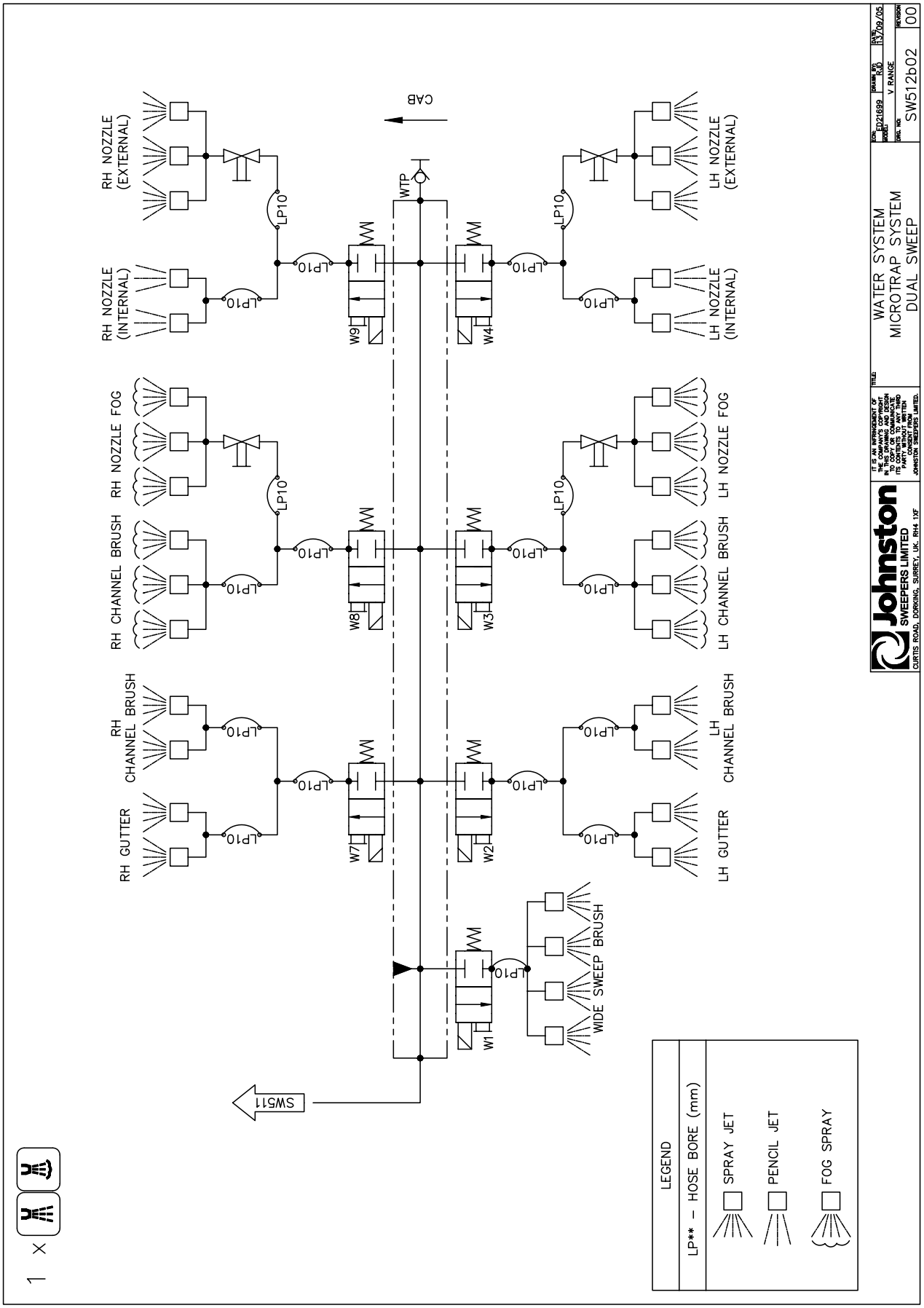
Water System Low Pressure Dual Sweep - Diagram SW511b02



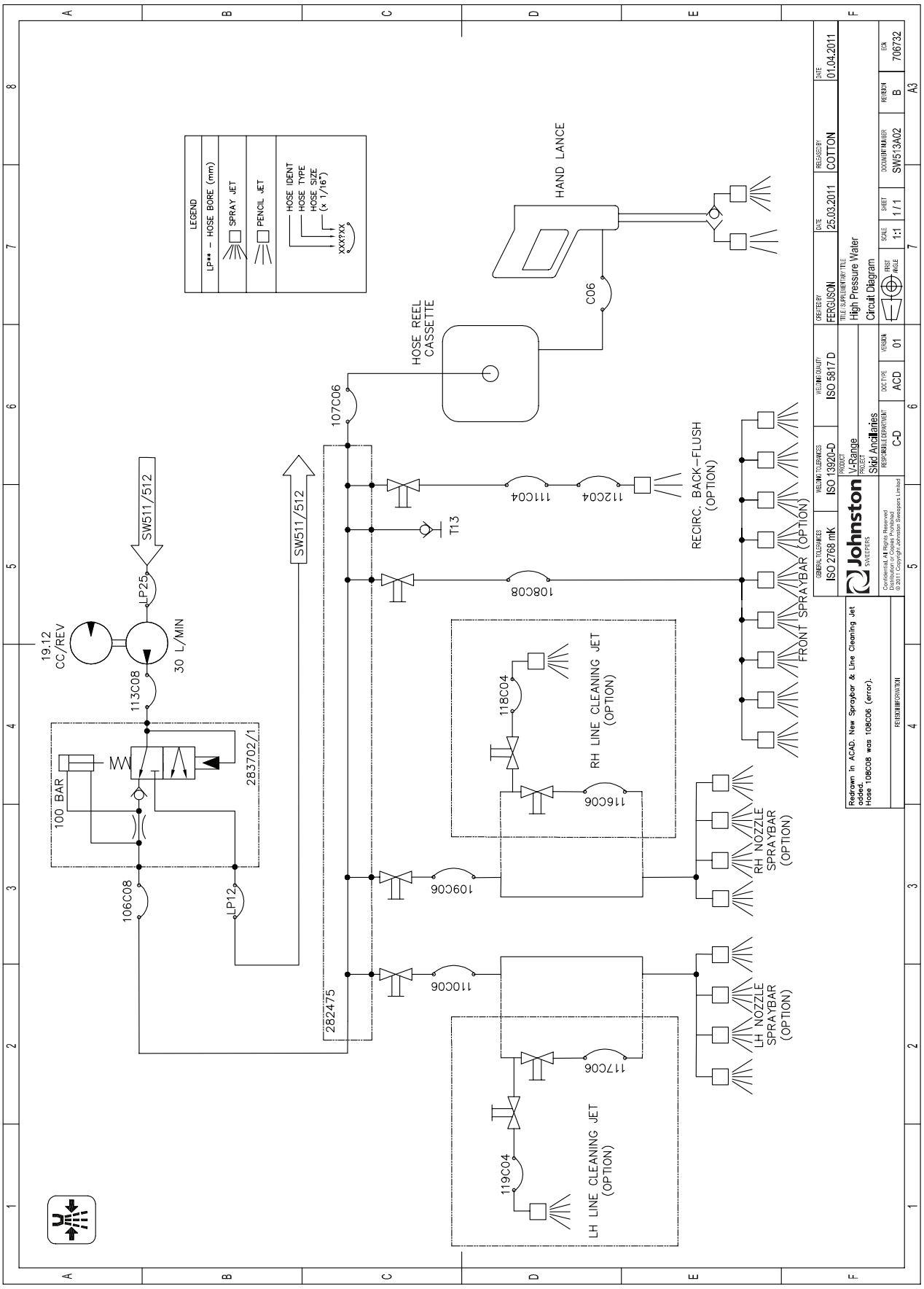
Water System Microtrap Single Sweep - Diagram SW512a02



Water System Microtrap Dual Sweep - Diagram SW512b02



Water System Supawash - Diagram SW513a02



CHAPTER 11

Pneumatic System

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GENERAL DESCRIPTION

The air supply for the pneumatic system is taken from the vehicle braking system via a safety regulating valve that ensures the braking system receives priority in the event of a failure to the sweeper air system. A filter regulator unit with integral shut off/drain facility and low air pressure warning buzzers are located within the systems locker, as are the electrical solenoid control valves for operation of channel brush/ nozzle and wide sweep brush, and intake duct flap. Wide sweep brush balance adjustment is provided by pressure regulators.

Safety Precautions

Before servicing any components on this system, the air supply should be shut off by means of the shut off valve mounted on top of the filter regulator unit. This not only severs the pneumatic supply, it also exhausts the air from the system causing the nozzle and wide sweep brush to lower. Wait approximately 15 seconds to allow air to completely exhaust before carrying out any work. The shut off valve does not drain air from the vehicle braking system.

CIRCUIT PRESSURES

A test point PTP (on piping diagram) is provided in the systems locker to carry out pressure checks, i.e. 8.0 bar (115 PSI).

The pressure in the Powathrust system is preset at 3.5 bar.

The pressure in the Powascrub system (option) is preset at 2 bar.

1 First ensure truck air system is up to pressure and sweepgear is lifted.
2 Fit a 25 bar minimum pressure gauge to test point PTP.

If pressure is incorrect, adjustment is carried out by turning the regulator control on the filter regulator unit.

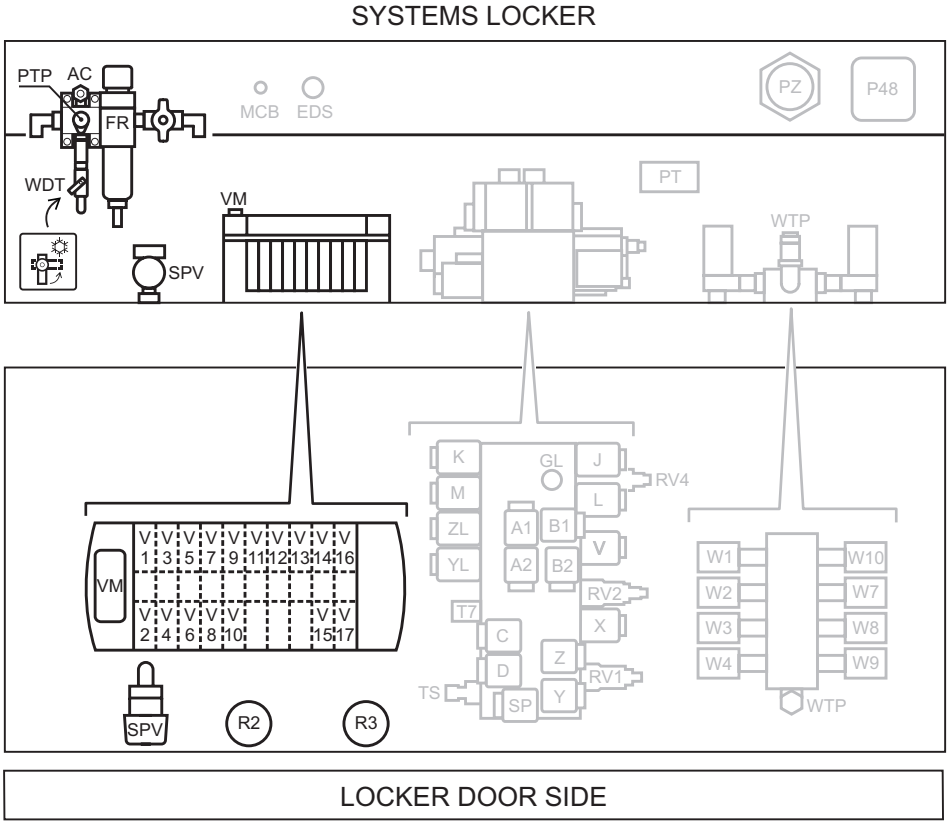
NB : Provided in the systems locker is an air charge point (AC) via an airline push in connector supplied with the sweeper.

PNEUMATIC PIPE COLOURS

A system of colour coding has been introduced to assist pipe identification and fault finding. The following colours have been adopted.

R = Red - used for live feed/supply
U = Blue - used for switched supply via valve or tap
B = Black - used for permanent vent/exhaust line

VALVE IDENTIFICATION/LOCATION



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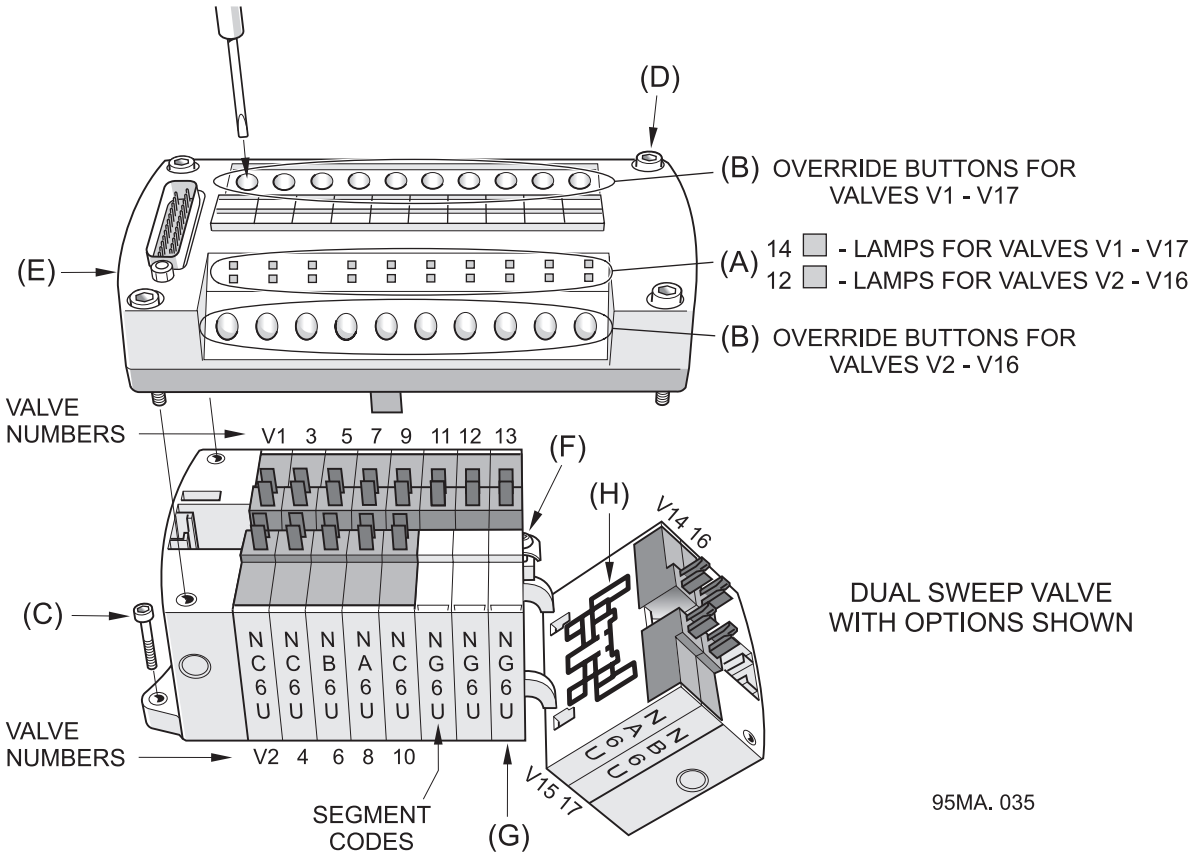
AIR FILTRATION AND REGULATOR (FR)

A filter regulator unit, located in the systems locker on the left hand side of the body, filters the air for the sweeper section of the pneumatic system to prolong the life of the components served by it.

Before carrying out any major work on the unit, other than that described in the Routine Maintenance Section of the Operator's Guide, it will be necessary to remove it from the locker by first draining the vehicle air system, then disconnecting the supply pipes and releasing the fixing bolts.

PNEUMATIC VALVE ISLAND

The pneumatic valve island is a modular unit comprising various valve segments. Each valve segment has an indicator light that illuminates when energised (A) and a manual override button (B) for ports 2 or 4 on each segment



The segments are identified by a code and are not all the same - see following tables.

To replace a valve segment -

1) Remove the 4 fixing screws (C).
2) Remove the 4 socket head screws (D).
3) Remove the valve cover containing the valve operating coils (E).
4) Unscrew (F) each side of the segment to be replaced.
5) Fold open the segment (G) and replace ensuring the rubber gasket (H) is in position.
6) Tighten screws (F).
7) Replace top cover (E).
8) Replace screws (D).

Pneumatic Valve Island modus operandi

Single Configuration

Valve	Segment Code	Function	
		Port 4 / LED 14	Port 2 / LED 12
V1 & V2	NC6U or TC6U	V1 = Maxigap (NC)	V2 = Nozzle lower (NO)
V3 & V4	NC6U or TC6U	V3 = CB lok & Autolok* (NC)	V4 = WSB lower (NO)
V5 & V6	NB6U or TB6U	V5 = CB lower (NO)	Port plugged
V7 & V8	NA6U or TA6U	V7 = Powathrust (NC)	V8 = Powascrub (NC)
V9 & V10	Blank		
V11	NG6U or TG6U	Flap – Full Bore (NC)	Flap – Annulus (NO)
V12	Blank		
V13	Blank		
V14* & V15*	NA6U or TA6U	Water recirculation (NC)	Port plugged
V16* & V17*	NB6U or TN6U	Varagap = Full Bore (NO)	Varagap = Annulus (NO)
* Option			

Dual Configuration

Valve	Segment Code	Function	
		Port 4 / LED 14	Port 2 / LED 12
V1 & V2	NC6U or TC6U	V1 = Maxigap LH (NC)	V2 = Nozzle lower LH (NO)
V3 & V4	NC6U or TC6U	V3 = CB lok & Autolok (NC)	V4 = WSB lower (NO)
V5 & V6	NB6U or TB6U	V5 = CB lower LH (NO)	V6 = CB lower - RH (NO)
V7 & V8	NA6U or TA6U	V7 = Powathrust (NC)	V8 = Powascrub (NC)
V9 & V10	NC6U or TC6U	V9 = Maxigap RH (NC)	V10 = Nozzle lower - RH (NO)
V11	NG6U or TG6U	Flap LH – Full Bore (NC)	Flap LH – Annulus (NO)
V12	NG6U or TG6U	Flap RH – Full Bore (NC)	Flap RH – Annulus (NO)
V13	NG6U or TG6U	WSB balance LH (NC)	WSB balance RH (NO)
V14* & V15*	TA6U or Blank	Water recirculation LH (NC)	Water recirculation RH (NC)
V16* & V17*	TB6U or Blank	Varagap = Full Bore (NO)	Varagap = Annulus (NO)
* Option			Revision 00 dated 10/11/05

Note: 12 volt segments start with T***
24 volt segments start with N***

WIDE SWEEP BRUSH REGULATOR MAINTENANCE

Before any work can be carried out on these units, they must be removed from their locations under the ends of the subframe crossmember+ as follows.

Exhaust the system using filter regulator shut off valve, disconnect pipes from regulator and shuttle valve, unscrew regulator securing nut. The regulator, shuttle and non-return valves can be removed as a complete assembly.

REGULATOR

Remove the regulator by undoing the securing nut (A). Use retaining ring pliers to remove the top plate (6) and retaining ring (7). Pull cap (8) and 'O' ring (9) from body.

Unscrew socket head screw (1), then remove button (2), spring (3), knob (4), tumblers (5), couple (10) and 'O' ring (11).

Remove, as an assembled unit, the adjusting screw (12) with upper and lower piston assemblies (Items 13 through 20). Remove spring (21).

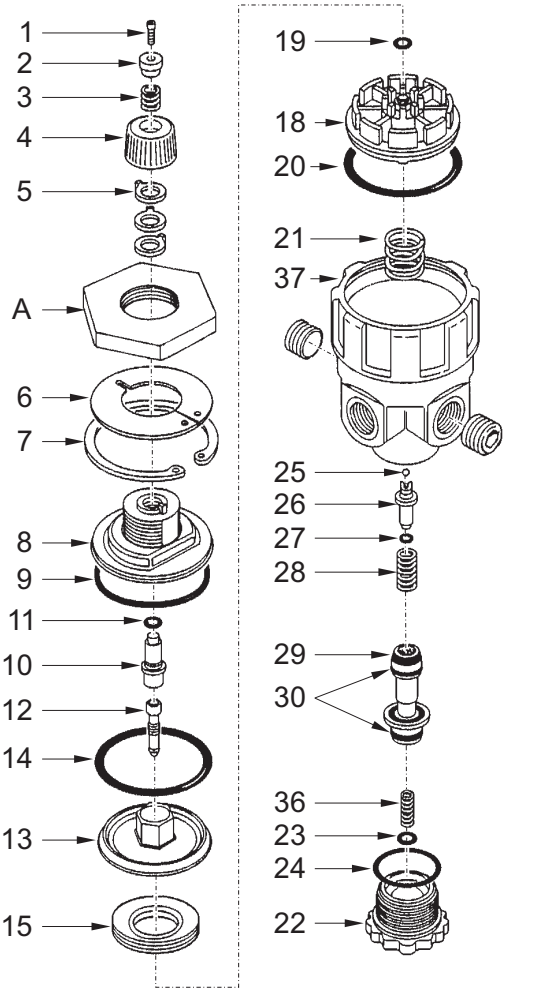
Unscew the adjusting screw (12), then separate upper and lower piston assemblies (Item 13 through 20). The adjusting screw has left hand threads. Make sure 'O' ring (19) remains attached to the lower piston. If not, retrieve it from inside the upper piston (13).

Unscrew bottom plug (22) to gain access to the parts (23 through 36) located in the lower portion of the body.

Clean and inspect each item for damage.

A repair kit, Part No. 253-10, is available comprising Items 9, 11, 12, 14, 19, 20, 23-27, 29, 30 and 36.

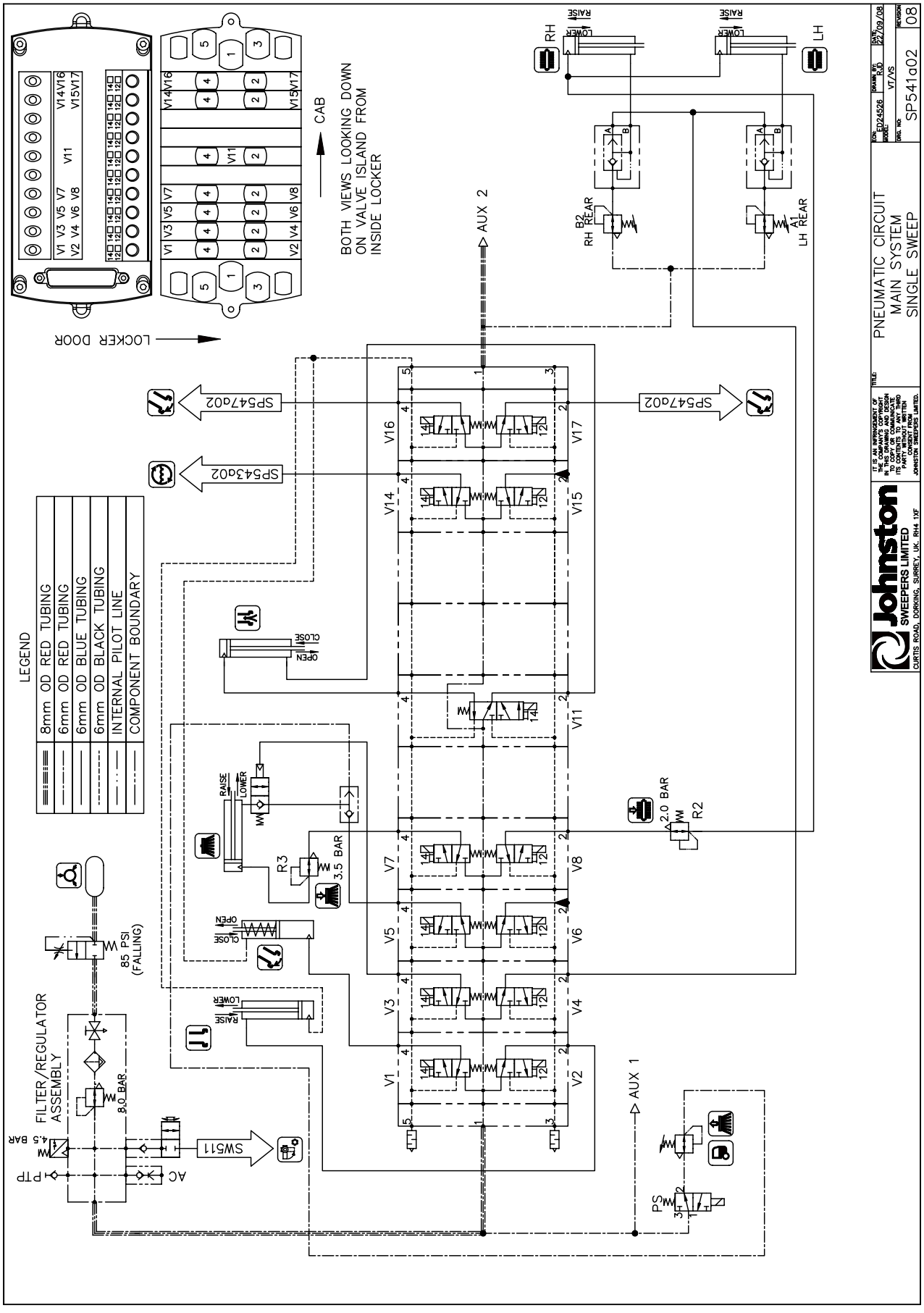
When reassembling, lightly smear the 'O' rings and rubbers with a silicon grease. Reassemble in the reverse procedure.



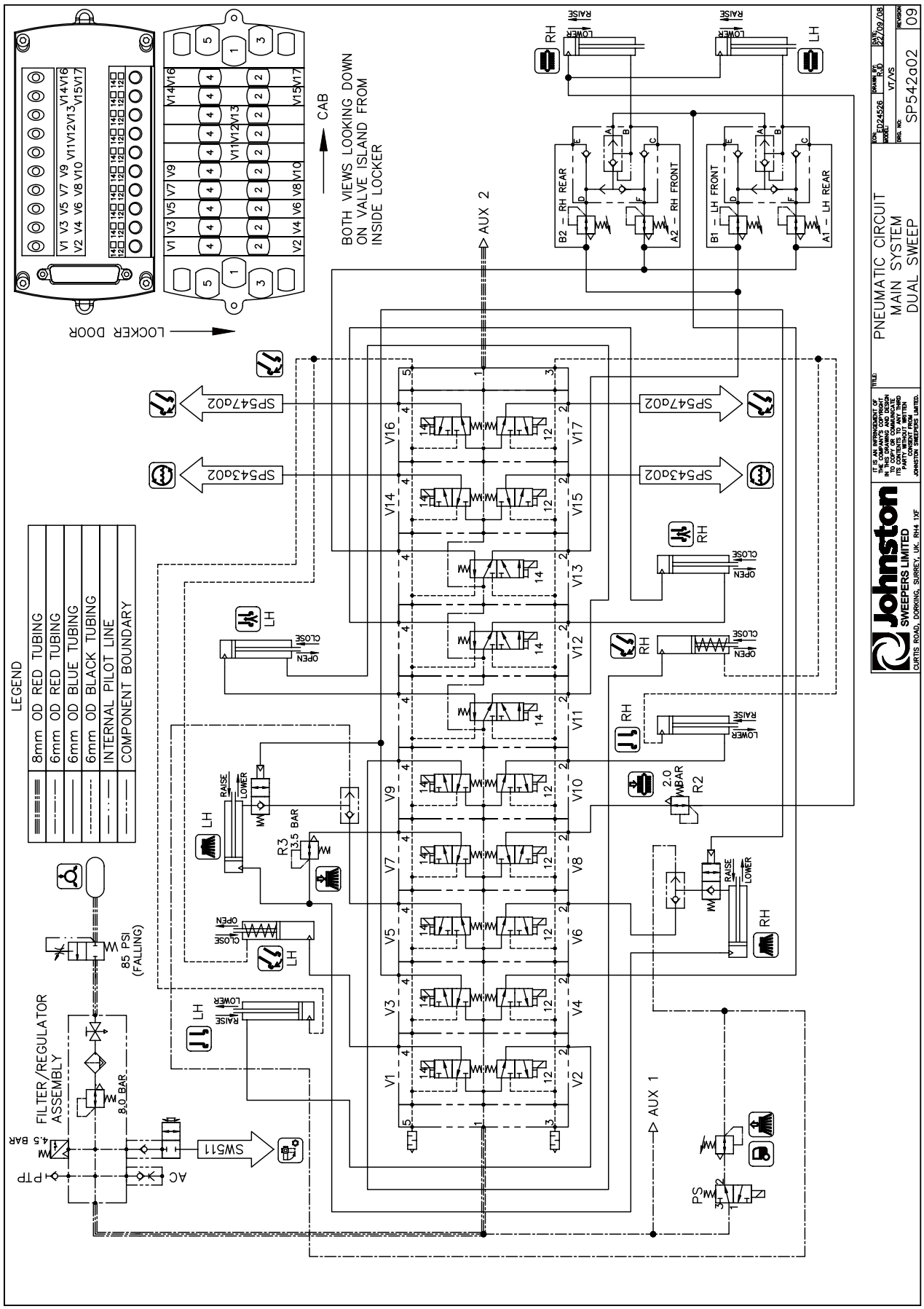
PC. 0014

Make sure retaining ring (7) is fully seated in the groove in the body before testing or refitting onto the machine.

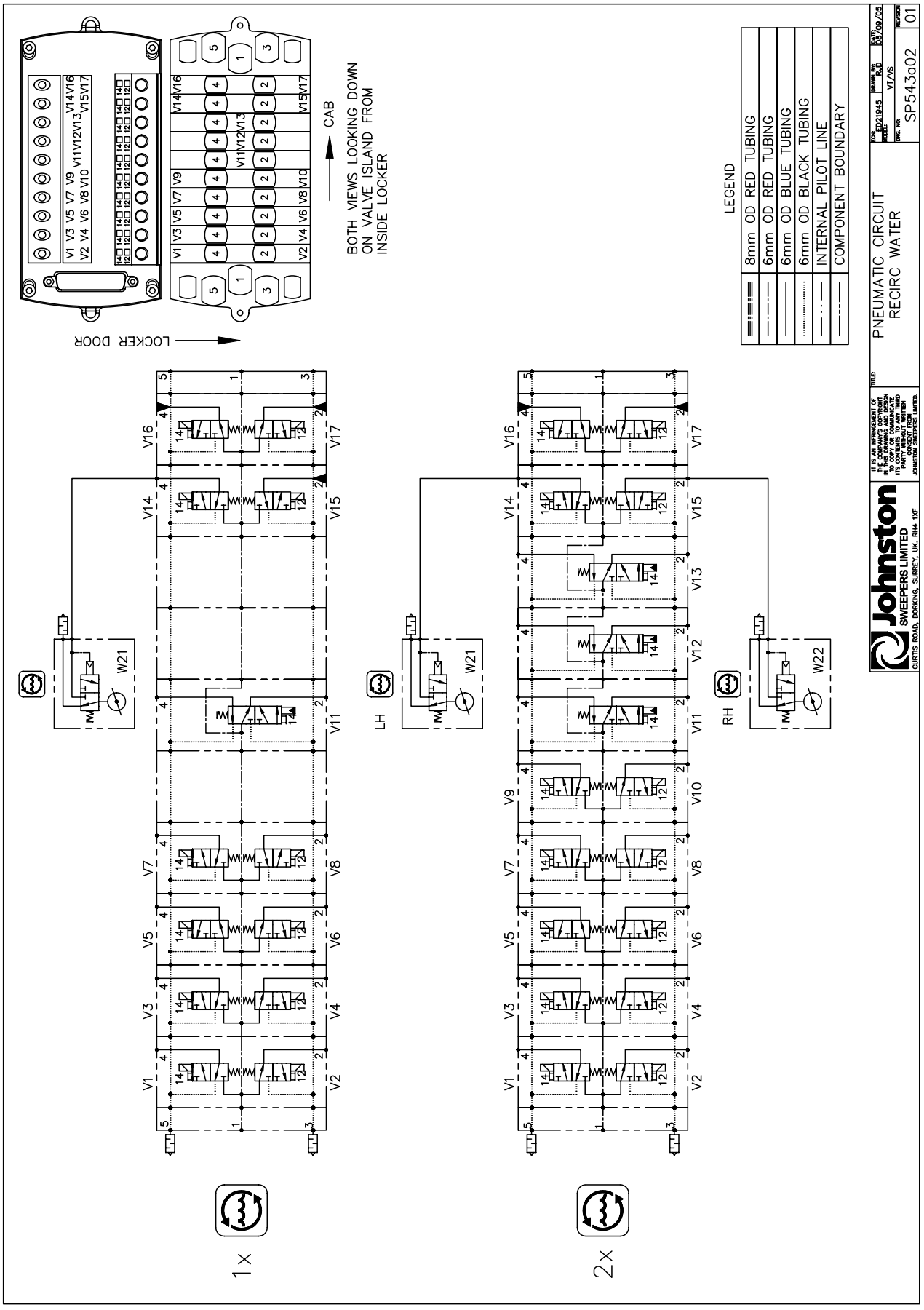
Maxigap Single Sweep - Diagram SP541a02



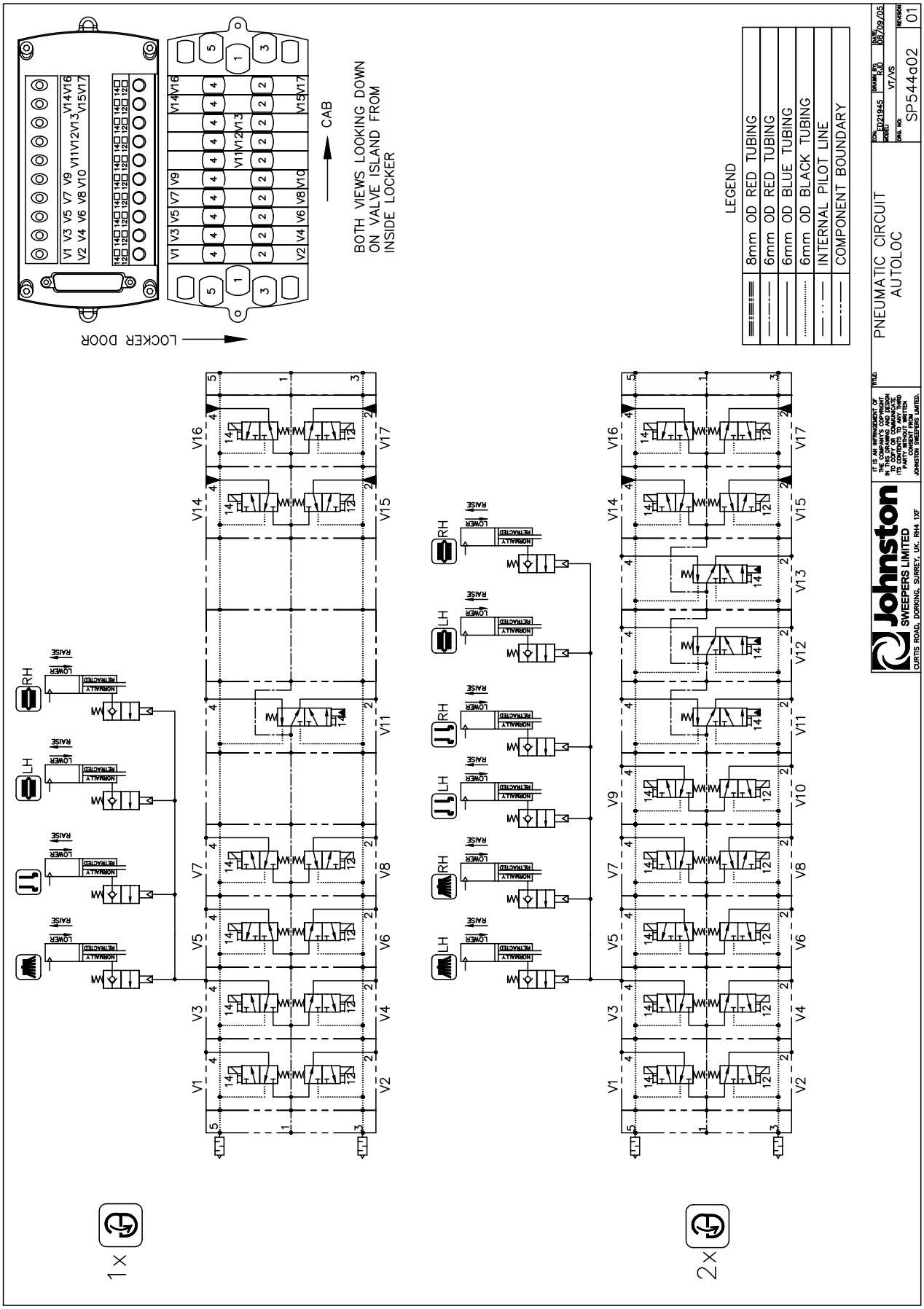
Maxigap Dual Sweep - Diagram SP542a02



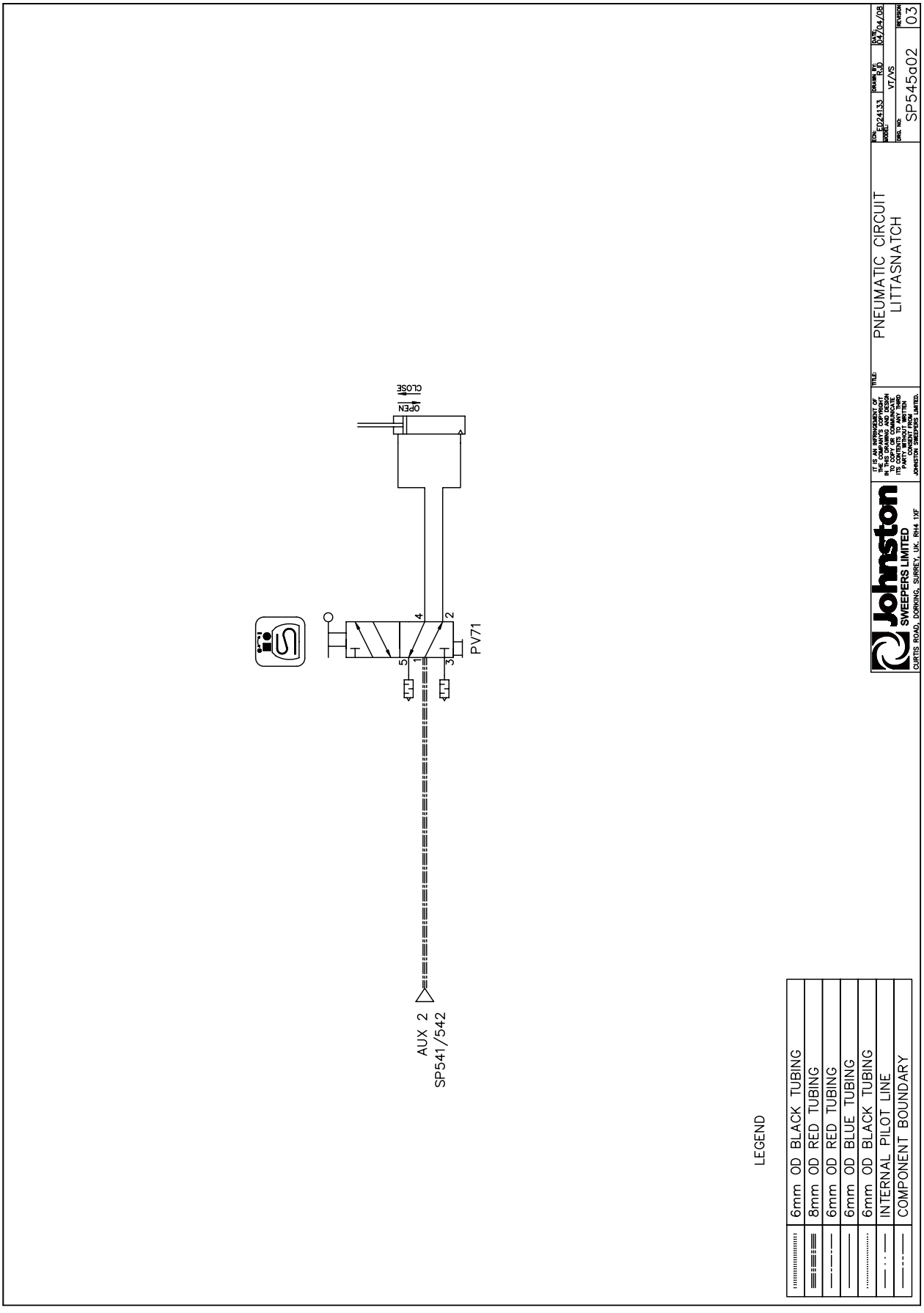
Recirculation Water Option - Diagram SP543a02



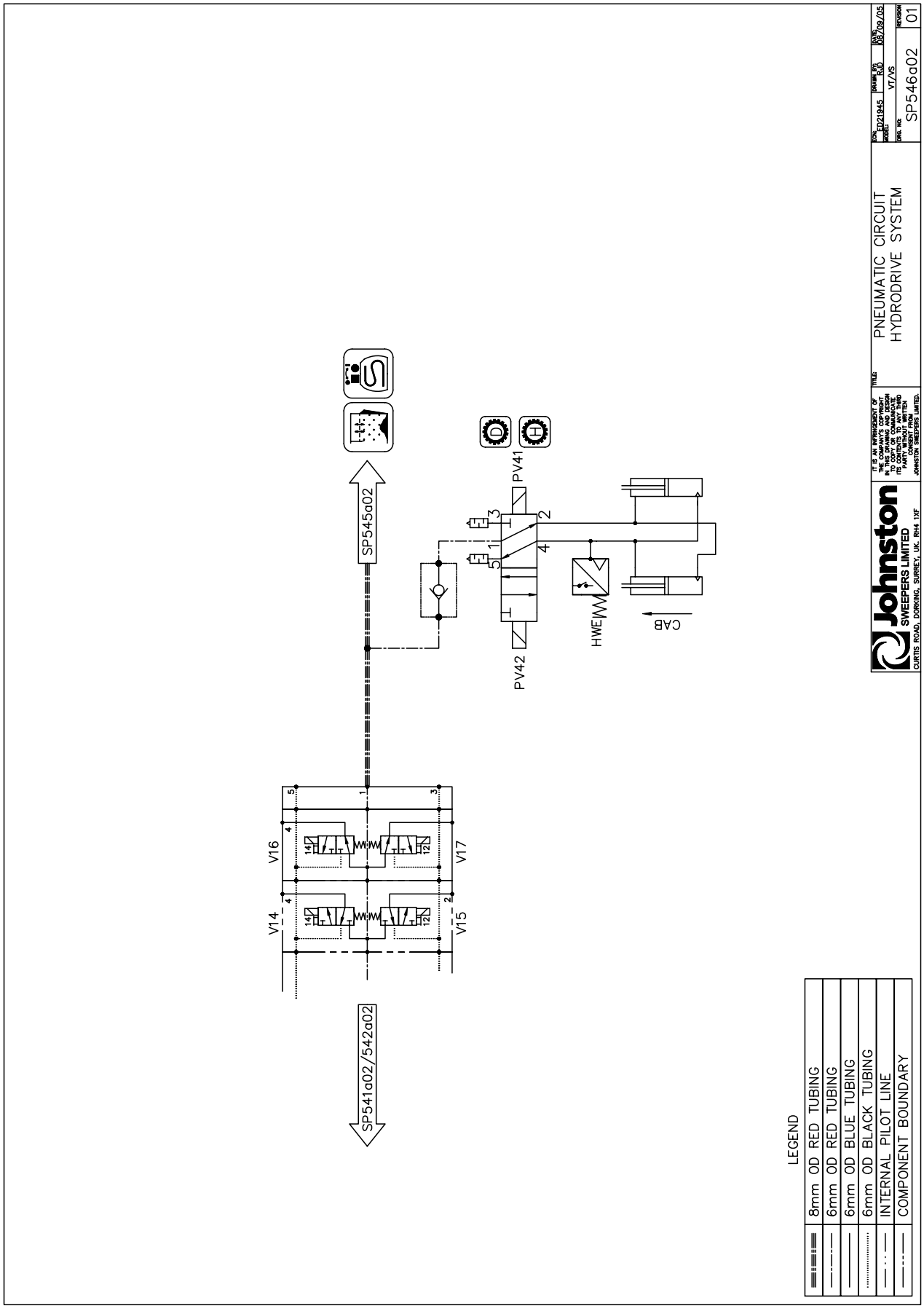
Autolok Option - Diagram SP544a02



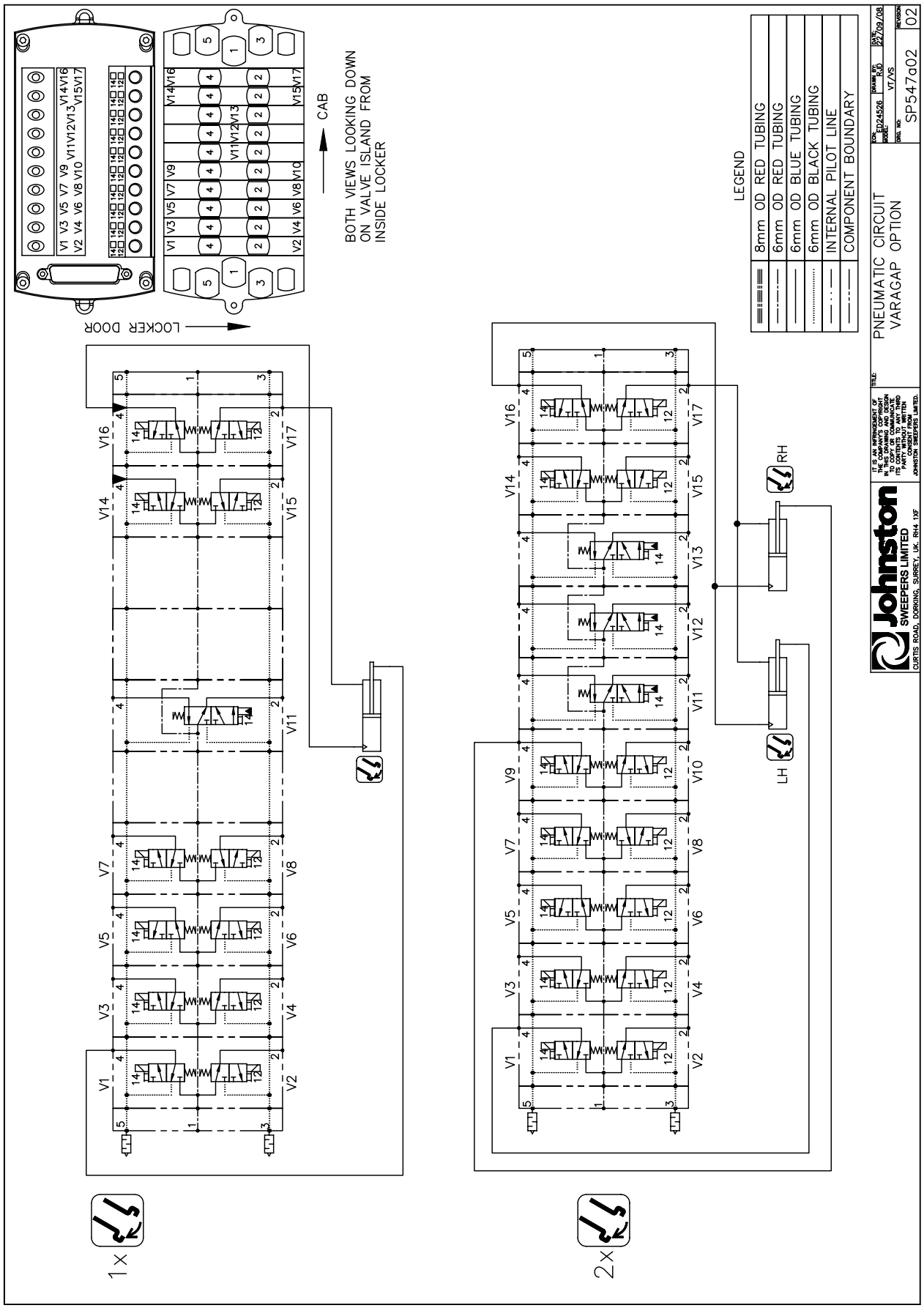
Littasnatch - Diagram SP545a02



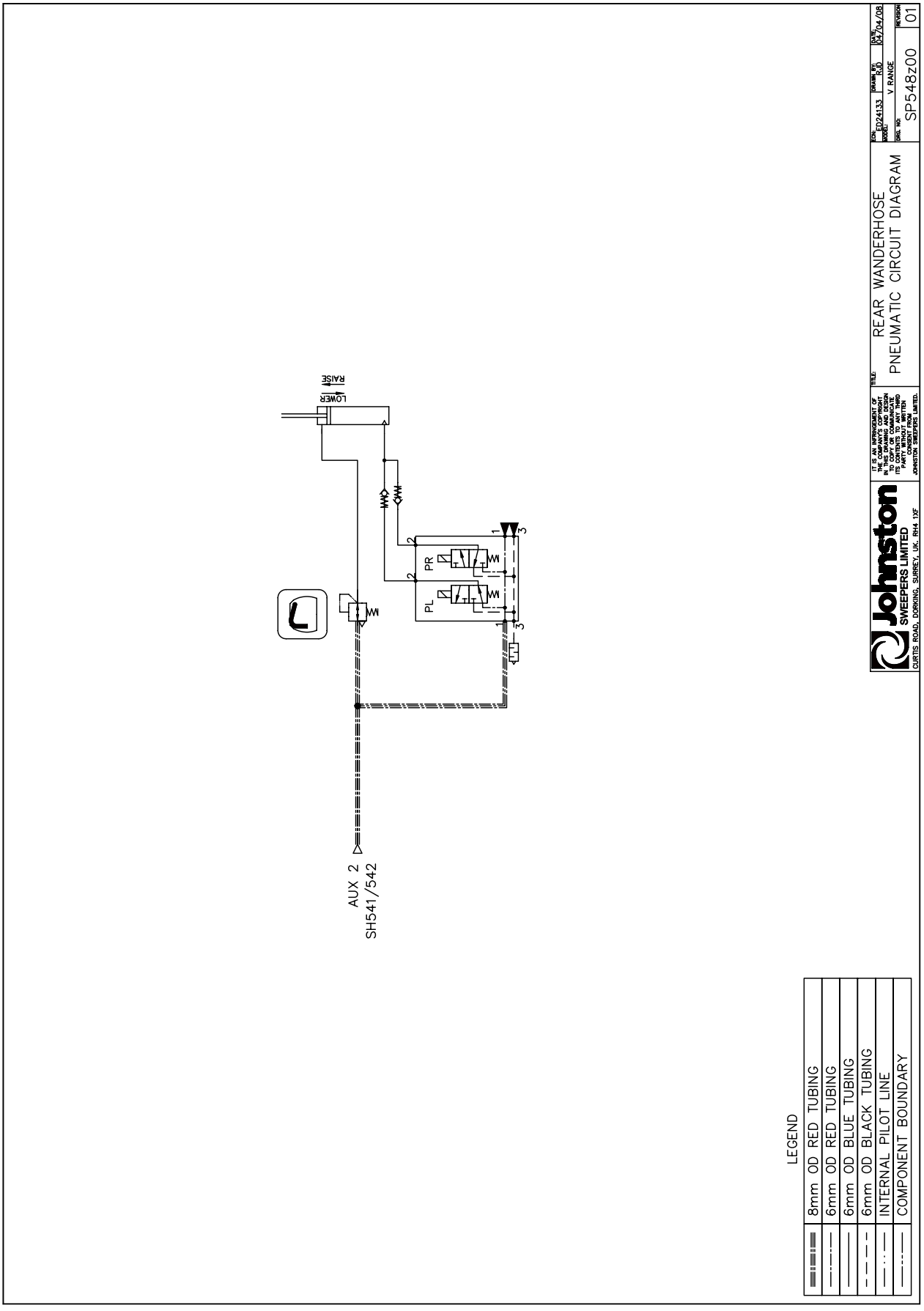
Hydrodrive Gearbox - Diagram SP546a02



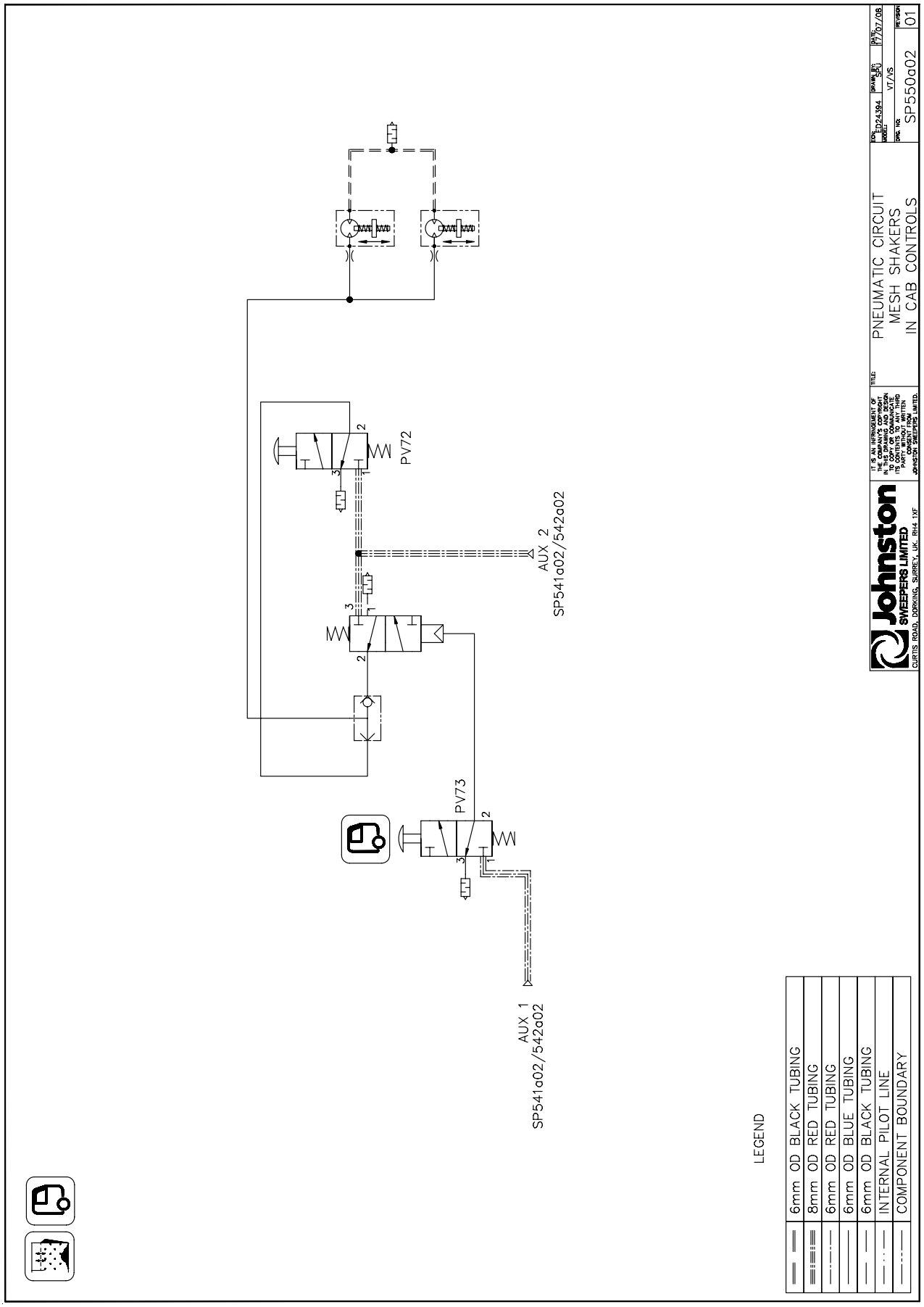
Varagap Option - Diagram SP547a02



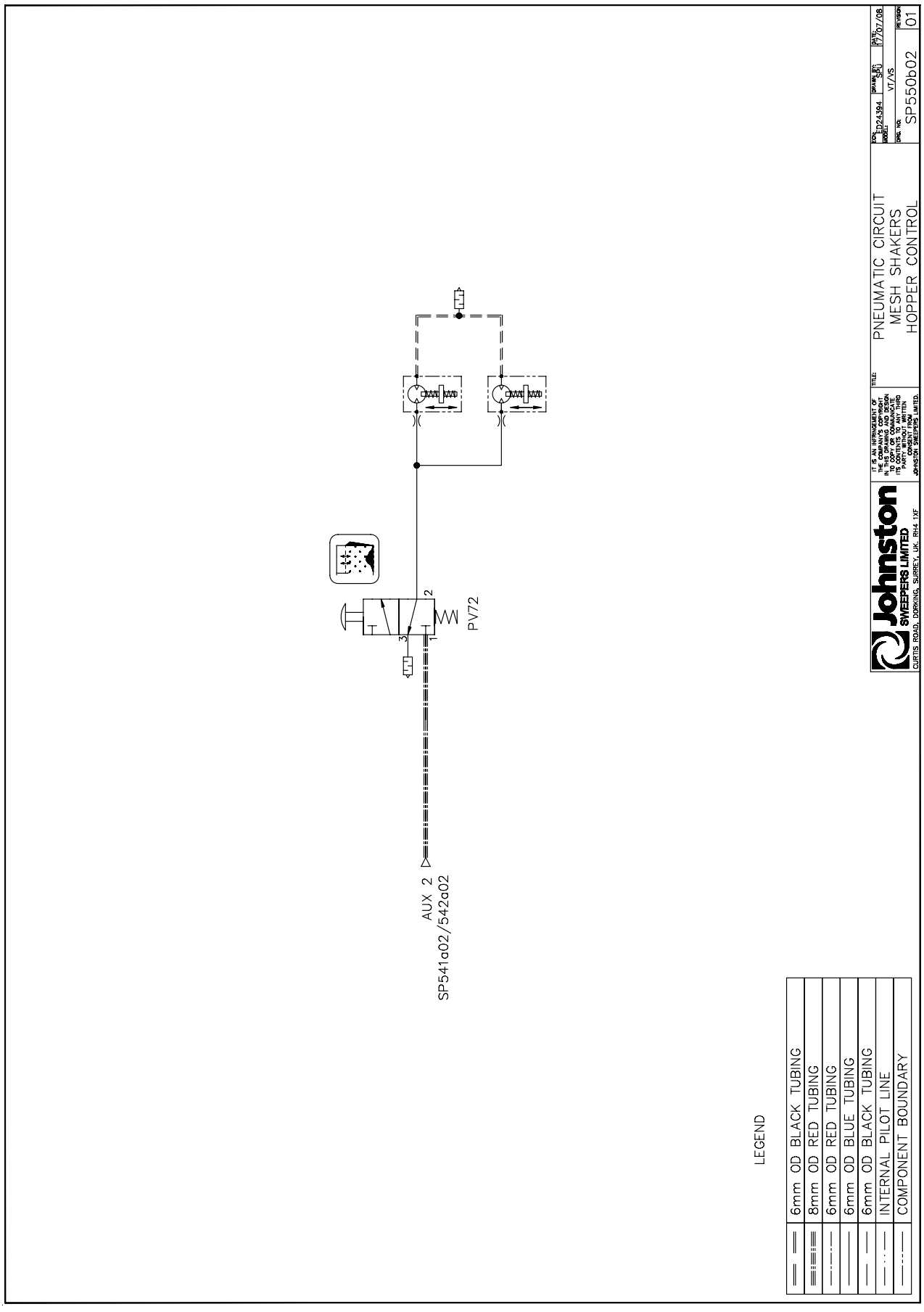
Rear Wander Hose - Diagram SP548z00



Mesh Shaker in Cab - Diagram SP550a02



Mesh Shaker - Diagram SP550b02



CHAPTER 12

Wearing Items

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WEARING PARTS REPLACEMENT INSTRUCTIONS

It is important that the following safety precautions are observed when working on the machines.

Safety Precautions

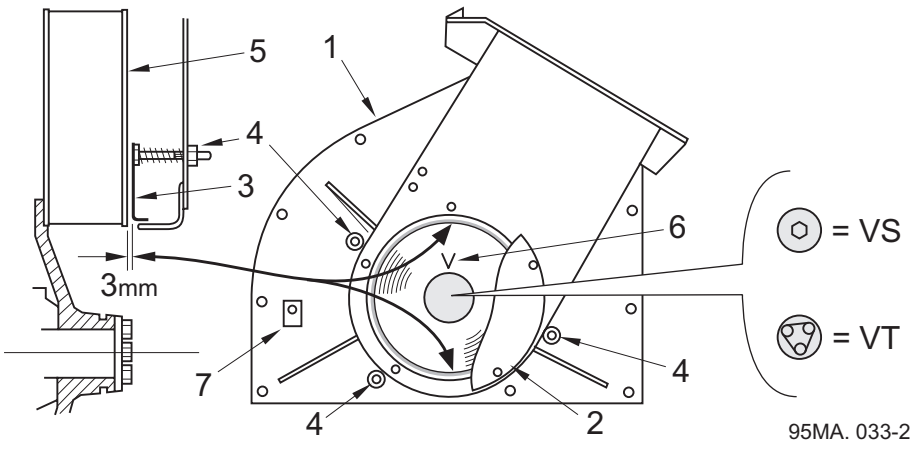
- **Ensure the machine is standing on firm, level ground and there are no obstructions above or to the rear before raising the body.**
- **Ensure the safety prop is engaged at all times when working under the body.**
- **Ensure operators are fully conversant with the controls and operation.**
- **Isolate the air in the systems locker before working on any pneumatically operated or controlled equipment.**
- **Disconnect or isolate the vehicle battery when working on the electrical system.**
- **Do not approach the fan inlet while the fan is running.**
- **Do not grasp any part of the engine or exhaust system without first ascertaining whether it has cooled sufficiently to avoid scalding.**
- **Be aware of the safety instructions relative to the suction fan given in the equipment maintenance notes.**
- **Keep hands, loose clothing, hair etc. well clear of moving parts.**
- **Do not climb on the engine walkways unnecessarily or approach the fan inlet whilst the engine is running.**
- **Do not use ill-fitting tools such as spanners that may slip and cause injury.**
- **Always get a second person to check periodically that all is well when only one person is working on the machine or inside the body.**

⁎ **THESE ITEMS HAVE BEEN SPECIFICALLY DESIGNED FOR LO-NOISE EMISSIONS AND FITTING OF ALTERNATIVE ITEMS COULD CAUSE AN INCREASE IN THE OPERATIONAL NOISE OF THE MACHINE.**

FAN IMPELLER ⁎

INSPECTION -This should be on a regular basis as outlined in the routine maintenance. The impeller should be replaced as soon as the blade thickness is less than 2mm or the blades have visible signs of wear/damage.

REMOVAL
Raise the body and ensure the body prop is engaged in the rack.
Remove the fan case inspection plate. 5 bolts Item 2.
Remove the fan case cover Item 1. 10 bolts.



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REMOVAL
Before removing the fan impeller check for any lateral movement in a similar fashion to checking a wheel bearing. An excess of 2mm play would indicate wear in the gearbox bearing and would require overhaul/ replacement.

Remove the 3 bolts under the securing tab washer in the centre of the fan on the VT, or one M12 setscrew/ capscrew on the VS, The fan should slide off the spline - a bearing puller part number 437-2, can be used if required.

REFITTING
Replacement is reverse procedure, taking note of the following.

Lightly grease the fan drive spline, using Kluberpaste JSL part number 94-24, before refitting the impeller.

VT Range:- If setscrews are fitted replace with Tuflock capscrews 148-1 and torque up the three impeller securing bolts to 80 Nm (59 lbf.ft).
VS Range:- If a setscrew is fitted replace with a Tuflock capscrew 148-100 and torque up to 101Nm (75 lbf.ft)

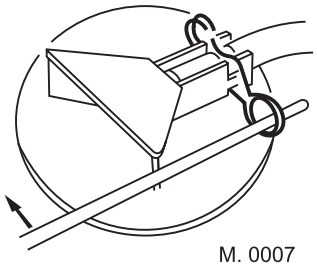
From July 2009 all impellers have a ‘’V’’ mark, item 6, at Top Dead Centre (TDC) applied when they are manufactured. When fitting a replacement impeller it should be rotated so this mark is at the 12 o’clock (TDC) position before the retaining bolts/bolt are tightened to the prescribed torque.

Refit fan case cover item 1, using sealant part number 94-1, to the mating face having first removed the old sealant. Push the fan assembly towards the drive motor and then pull towards you. If there is excessive play the bearings will require replacement. Adjust the three transition adjustment nuts, item 4, to give a gap between the transition ring and impeller of 3-4mm for a full 360 degrees as shown in figure opposite.

Refit the fan case inspection plate item 2, using sealant as for item 1.
An inspection plate, item 7, is provided to measure the fan speed by optical tachometer if required.

INTAKE DUCT FLAP

When the flap plate is in the open position, it is abraded by the material discharging from the intake duct into the body. The flap should be inspected periodically and replaced when worn. To inspect one must first open the rear door and suitably prop open, then depressurise the air system in the systems locker, this will allow the flap to be opened and closed manually from the interior of the body. Enter body and inspect the flap valve plate which is secured to actuating fingers by a pair of spring clips.

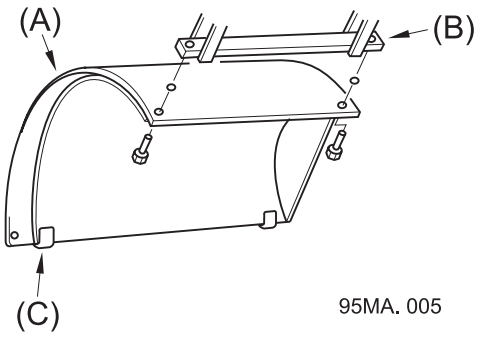

M. 0007

REMOVAL
To remove a flap plate the springs must be withdrawn using a suitable tool or bar. Notice how the springs were fitted from each side of the finger guide and around the groove in the finger assembly. Once the springs are removed the flap plate can be detached from the finger.

REFITTING
Before refitting or fitting a new flap plate, ensure the springs are in good condition and the finger adjustment areas have been cleaned, then locate flap on the finger and replace springs. Ensure the flap plate seats correctly on top of the inlet tube, if not, check for excessive wear on the inlet tube/flap, or adjustment of the flap operating mechanism.

WEAR PLATE

REMOVAL
Enter the body after carrying out precautions as for intake duct flap. The wear plate (A) is secured by two screws and a clamp bar (B). It is a wise precaution to prop the wear plate before attempting to remove these screws. Once the screws are removed, support the wear plate and remove the prop. Allow the wear plate to fall slightly and unhook from the hooks (C) attached to the body outer skin, and remove. Help may be required in removal as this unit weighs approximately 36kg.



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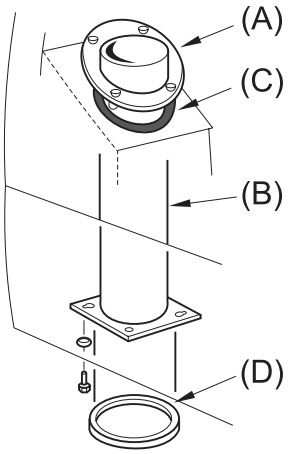
INTAKE DUCT

These parts are also abraded by the material being conveyed from the suction nozzle and must be periodically inspected and replaced when worn or holed. The duct is 250mm diameter.

REMOVAL
Enter body after carrying out the same precautions as for intake flap replacement. Remove the four bolts securing the collar (A) around the intake duct (B). Lift up the flap manually (if fitted) and remove collar. A rubber cord (C) will now be visible which should also be removed with care to prevent damage. Dismount from body. Tip body and support on prop. Remove the four bolts in the square flange carrying the flexible trunking seat seal (D). The intake duct can now be pulled downwards clear of the body.



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REFITTING
Reverse of removal procedure, but if fitting a new duct a new trunking seat seal should be used and secured using a contact adhesive, Part No. 9903. Fit two bolts in diagonal holes, the duct (B) has two holes with keyhole slots. Align slots over the bolt heads and twist. Fit the other two bolts and tighten. The rest is the reverse of the removal instructions. Replace the rubber cord (C) and collar plate (A) inside the body and secure. Finally, fully tighten the four duct top retaining bolts.
NB. Torque for brass M12 bolts 22 Nm (25ftlbf).

FLEXIBLE INTAKE TRUNKING ⁎

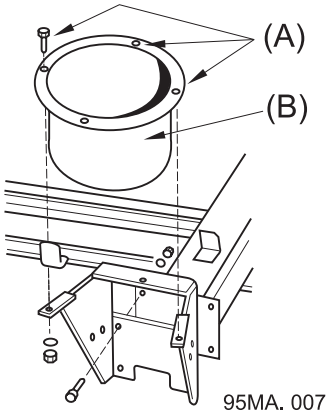
REMOVAL
Lower suction nozzle to the ground, release worm drive clips at either end and remove trunking. The nozzle trunking has an inside diameter of 250mm.

REFITTING

Loosely fit worm drive clips to either end of trunking. Engage trunking onto the nozzle with a 55mm (2”) overlap and tighten clip. Fit other end to the intake seat and secure. Check trunking is not twisted or rucked and does not foul anything when the nozzle is raised or lowered again.

INTAKE SEAT

REMOVAL
Firstly tip body and support on prop. Release trunking from tube as described on previous page. Release and remove the three countersunk screws and nuts (A). Lift seat (B) clear of bracket.



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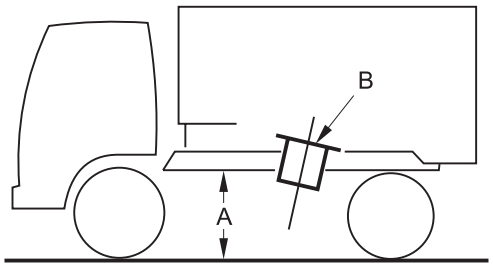
REFITTING
Reverse of removal procedure. As no adjustment for seal compression is provided, it is wise to check seal compression when the body is lowered.

Note : When replacing the intake seat, it is important that the correct length is used. The correct length of intake seat is determined by measuring dimension A, as shown below, from ground to underside of the subframe (i.e. top of chassis).

Dimension A	Inlet Seat Part No. 'B'
900 - 999	94990-1
1000 - 1099	94990-3
1100 - 1199	94990-4



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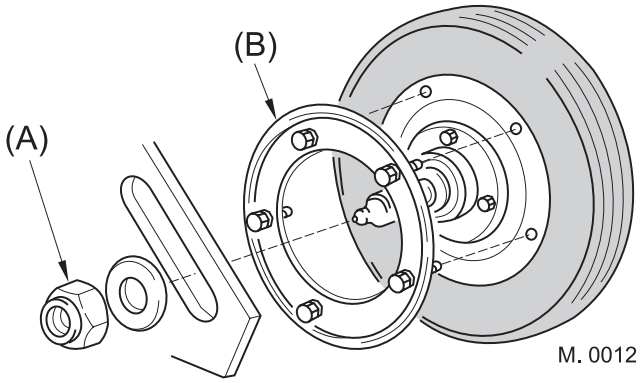
SUCTION NOZZLE WHEEL

REMOVAL
Release nozzle wheel adjustment nut (A) on inner end of wheel spindle. Remove wheel complete.

REFITTING
Reverse of removal procedure.



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TYRE - SUCTION NOZZLE WHEEL

REMOVAL
Remove nozzle wheel as above. Remove five screws securing tyre plate (B) and prise off. Remove tyre from hub.

REFITTING
Reverse of removal procedure.
Note : Ensure correct re-setting of nozzle rubbers in relation to the ground.

NOZZLE WHEEL BEARINGS

REMOVAL
To withdraw bearing remove wheel assembly from carriage and remove the three setscrews from the retaining plate. Refit washer and nut, insert M6c x 50mm setscrews, Part No. 124-113, in the three unused retainer plate holes. Tighten each bolt half a turn at a time to extract the bearing. Remove drift bearing from shaft.

REFITTING
Reverse of removal procedures.

SUCTION NOZZLE RUBBERS

REMOVAL
This can be effected without removing the nozzle assembly from the machine but if personnel are inexperienced it will probably be easier to remove nozzle assembly and turn upside down. Release two screws retaining bump bar at kerb end of nozzle. Release securing nuts retaining the rubbers. Pull away the two short end rubbers, then remove the front and rear side rubbers.

REFITTING
Reverse of removal procedure remembering to fit the radius rubber to the nozzle rear. Do not over tighten the nuts as this will cause distortion of the rubber. Refit bump bar.

CHANNEL BRUSH

Sharp objects

REMOVAL
It is preferable to have brush in working position with auxiliary engine stopped. Release four nuts from coach bolts securing brush stock assembly drive plate. Remove brush.

REFITTING
Reverse of removal procedure. Any loops of steel tines which project above the head of the stock should be hammered flush before offering up brush stock assembly to driving plate.

WIDE SWEEP BRUSH CORE ASSEMBLY

Sharp objects

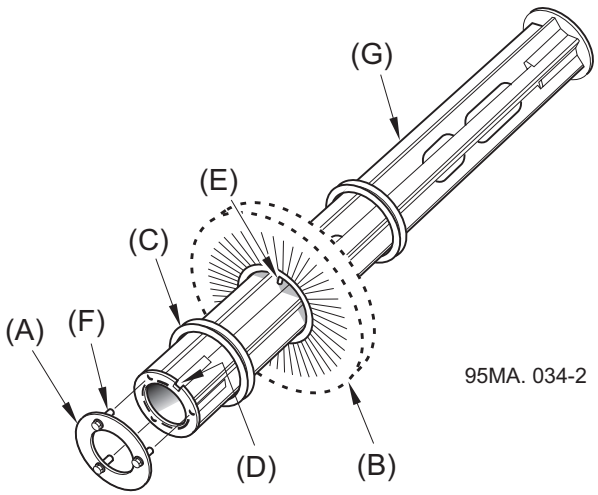
See Chapter 6 in the Operator's Guide.

WIDE SWEEP BRUSH FILLS

There are two types of brush fills:

a) Replacement segments
b) Plastic 'throw away' stock tines.

Replaceable Segments



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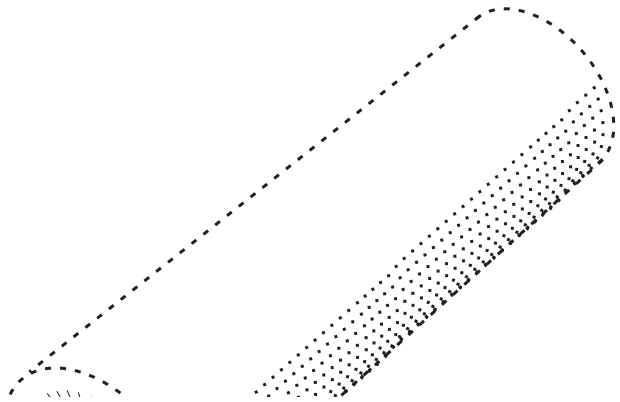
REMOVAL
Release and remove the retaining screws (F) securing the end plate / adaptor (A). Slide off the segments (B) and spacers (C) from the central core. **Note :** On earlier machines the driving pin (E) on the inner diameter of the segments must be aligned with a slot (D) on the core (G) where the two parts join.

REFITTING
First slide on a segment then alternately a spacer and a segment. Sufficient spacers and segments must be fitted to allow the end plate to nearly abut with the core and also clamp them tightly. The peg (E) on the segment (B) to be alternatively located round the core clockface at 12, 2, 4 o'clock and so on until the core is filled, failure to observe this could cause the brush to bounce. The last segment must have the pin (E) on the segment (B) located in the cutout (D) to ensure the peg does not interfer when the parts are bolted together.

Note : Lightly smear the retaining screws (F) with grease with grease.

This assembly is designed to accommodate 406mm diameter segments.

Plastic Throw Away Stock



The stock (H) is removed and can be recycled as plastic waste.

CHAPTER 13

Remove and Refit Procedures

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This section describes the removal and refitting of some of the major components on the machine. These are not routine jobs and should normally only need to be undertaken when overhauling or exchanging these units.

Safety Precautions

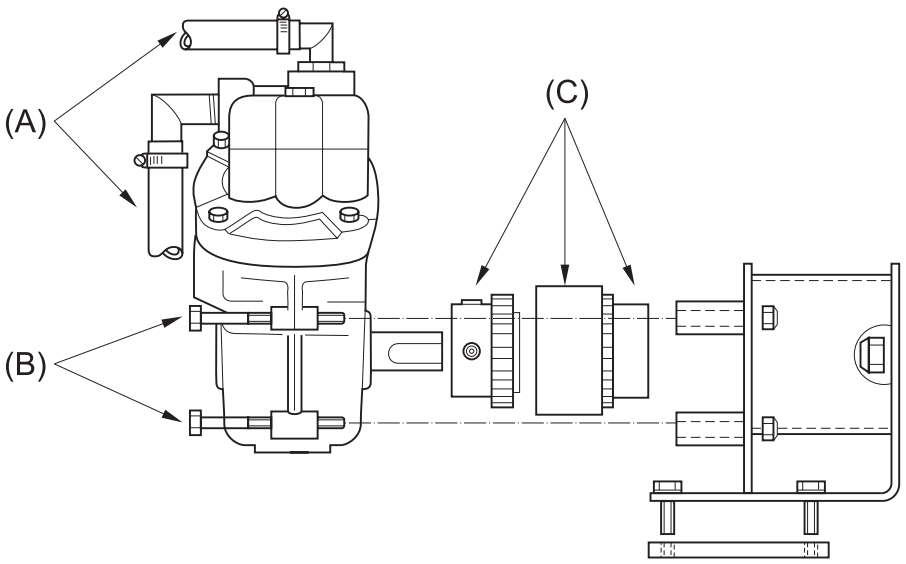
The hinged prop stowed beneath the body SHOULD BE USED AT ALL TIMES to prop the body when carrying out any inspection, servicing or maintenance work beneath the body.

Disconnect the battery negative lead before undertaking any of the following operations on the auxiliary pack.

1. WATER PUMP - DUST SUPPRESSION - Removal and refitting

1 Isolate the water supply at the filter unit.
2 Disconnect the feed and pressure water pipes (A) to the pump.
3 Remove the 4 bolts (B) holding the water pump to the drive motor.
4 Withdraw the pump assembly from the drive coupling (C).
5 Refitting is the reverse procedure, ensure that the pump drive gear does not bottom in the drive coupling.

NB It is possible to replace the pump diaphragms and valves with the pump in situ.



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2. WIDE SWEEP BRUSH MOTOR - Removal and Refitting

1 Remove the brush stock as described in Chapter 6.
2 Unscrew the four end plate securing setscrews and remove plate complete with motor assembly and drive shaft or drive dog.

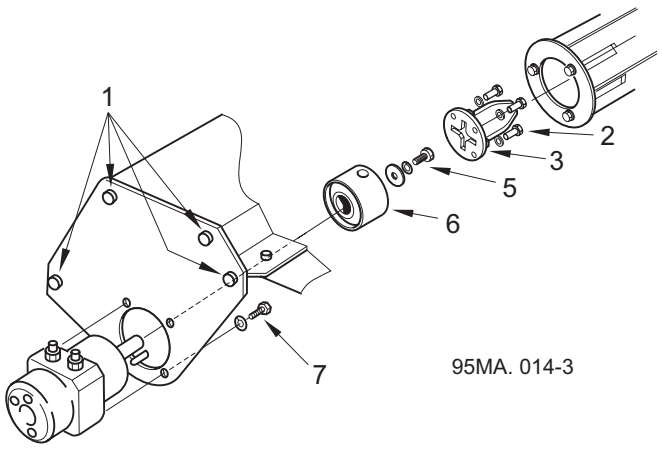
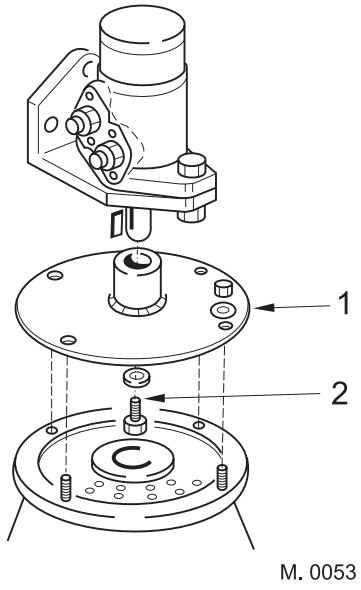


FIGURE 4 - WIDE SWEEP BRUSH MOTOR

1 End plate securing screws.
2 Drive shaft retaining screws.
3 Drive shaft/drive dog.
4 -
5 Drive adaptor retaining screw.
6 Drive adaptor
7 Motor securing screws

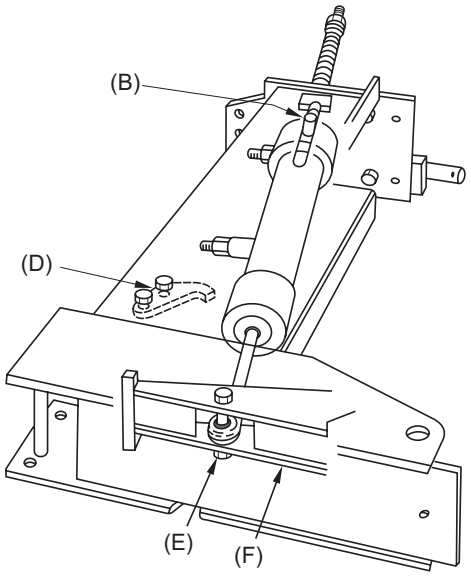
3. CHANNEL BRUSH MOTOR - Removal and refitting



1. Unscrew the four nuts (A) from the coach bolts securing the channel brush to the drive adaptor plate and remove brush.
2. Unscrew the retention screw (B) from the centre of the drive adaptor plate and remove plate.
3. Disconnect the two hydraulic hoses from the motor.
4. Unscrew the two bolts securing the motor to mounting bracket and lift off motor.
5. Refitting is the reverse of removal.

4. CHANNEL BRUSH CYLINDER - Removal and refitting

1. Disconnect the two hydraulic hoses from rear of the cylinder.
2. Remove cylinder pin (B).
3. Remove stop from pivot frame (D).
4. Remove cylinder eye pivot (E) from pivot head lever (F). Lift out cylinder.
5. Refitting is the reverse of removal, grease items (B) and (E) prior to refitting.



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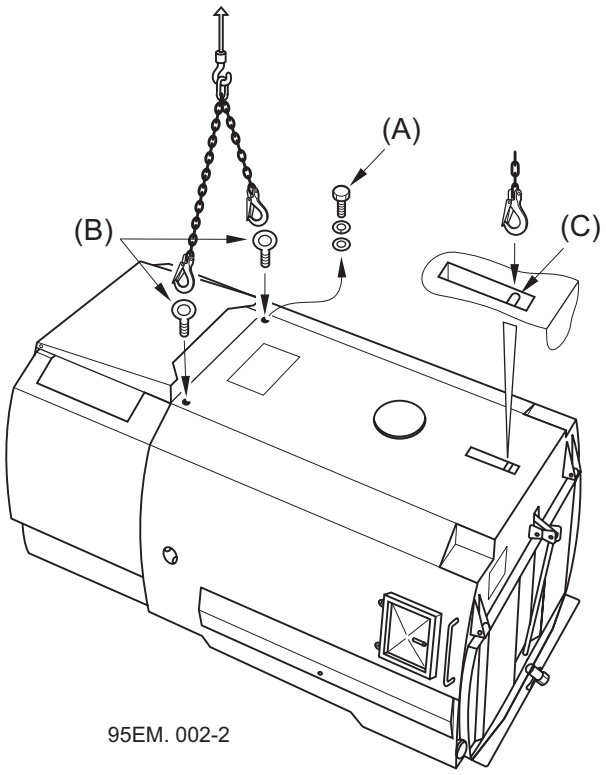
5. LIFTING OR REMOVAL OF THE BODY

If it is necessary to raise the body, two holes are provided in the front of the body.

- Remove blanking bolts (A).
- Insert eye bolt item (B) part no. 442-1 into the M16 socket.

If the body has to be removed use the two lifting eyes and point (C) with a suitable chain or web strap.



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10. HYDROSTATIC GEARBOX AND PUMPS

The individual pumps may be removed in situ if required. However, the following criteria applies.

On the end of the transmission pump (identified by an oil filter mounted on the side of the pump) is mounted the sweep gear drive pump.

The fan drive pump is mounted on the opposite side of the gearbox to the transmission pump (i.e. front to rear). On the end of the fan drive pump is mounted an option pump to drive supawash or other accessories.

The transmission drive motor(s) are always mounted on the opposite side of the gearbox to the transmission pump.

If the removal of any pump is required, it is first necessary to minimise oil loss by loosening the cap on the hydraulic return filter.

Care should be taken as the oil may be under pressure if the vehicle has just stopped, and the cap loosened slowly.

All hoses should be plugged after the removal of any pump to prevent dirt ingress and oil loss from the hoses.

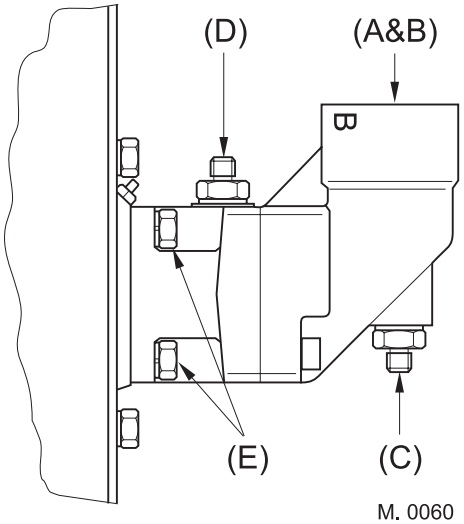
HYDRODRIVE GEARBOX

The hydrodrive gearbox and pump assemblies can be removed as a complete unit by using a lifting jig, Part No 93828-1.

If the gearbox is to be removed, the truck will be immobile. The ignition keys should be removed to prevent inadvertent starting and consequential damage to the drive line and components.

11. FAN DRIVE MOTOR - Removal and refitting

1 Remove fan case cover and impeller as described earlier.
2 Loosen cap on hydraulic return filter.
3 Disconnect hydraulic hoses from ports A, B, C and D.
4 Remove 4 setscrews (E) holding motor on to the mount.
5 Withdraw motor.
6 Refitting is the reverse procedure to removal. Lubricate motor drive shaft with Molykote DX (Part No 30-100) before refitting.
7 Motor securing capscrew should be tightened to torque of 101 Nm.
8 Retighten cap on hydraulic return filter.



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20. RADIATOR - Removal and Refitting

1 Remove lower hose from water pump and direct flow of coolant into a suitable container.
2 Remove top hose from radiator.
3 Unscrew the five button headed socket screws and remove walkway in front of radiator.
4 Unscrew the four mounting screws and withdraw radiator from shroud.
5 Refitting is reverse of removal, but fit lower two mounting screws first to allow radiator to pivot making the lower hose fitment easier. Refill cooling system with specified anti-freeze mixture.

21. HYDRAULIC PUMP - Removal and Refitting

1 Remove both low and high pressure pipes from pump.
2 Remove the setscrews from the pump flange to timing case and remove pump.
NB : Iveco engine has a pump drive adaptor.
3 Refitting is the reverse of removal. Apply a little grease, not sealant, to mating surfaces and fit a new gasket. Torque gear securing nut to 27 lbf/ft (50 Nm)(Perkins).

22. FAN IMPELLER - Removal

Before removing the fan impeller check for any lateral movement in a similar fashion to checking a wheel bearing. Any excessive play would indicate wear in the bearing/gearbox assembly and would require an overhaul.

1 Unscrew the ten fan case cover securing setscrews and remove cover (see chapter 2).
2 Unscrew the three impeller securing setscrews having first straightened the tab washer.
3 Withdraw the impeller from the splined shaft, Puller, Part No. 437-2, is available for this purpose (if required). Lift fan from case.

23. FAN CASE - Removal

1 Carry out procedure 22.
2 Remove the screws (B) holding the mask plate onto the gearbox and remove the mask.
3 Disconnect the silencer assembly at the flexible joint on the exhaust manifold.
4 Unscrew the four setscrews (two per side) holding the fan case to the front and rear valances.
5 Unscrew the two button head socket screws, one at each end of walkway togethr with the two setscrews 5a.
6 Unscrew the two lower setscrews (5a) securing the fuel tank to front and rear valances. Loosen the two upper setscrews each side (5b) in the elongated holes allowing the tank to slide outwards. Lift out fan case.

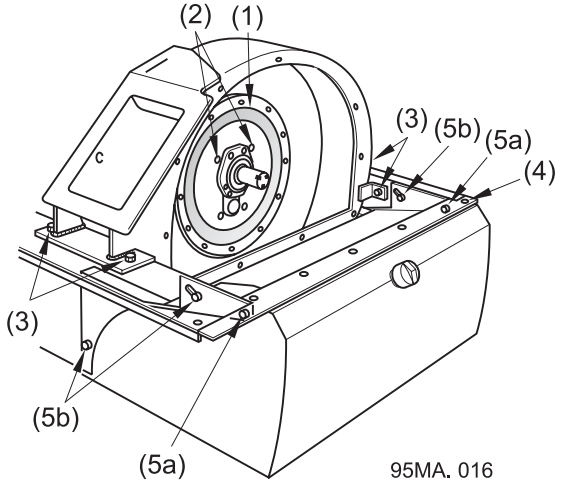

FIGURE 1 - FAN CASE
(Procedures 22 and 23)

(1) Rubber diaphragm.
(2) Mask and special securing screws.
(3) Fan case securing screws.
(4) Button headed screws.
(5) Fuel tank securing screws.
(a) remove
(b) loosen

24. GEARBOX - Removal

1 Carry out procedures 22 and 23.
2 Drain fluid drive coupling as described in Chapter 7.
3 Remove the six setscrews securing the gearbox to the bell housing and the four bolts holding the two cover plates to the flywheel housing.
4 Withdraw the gearbox, supporting its weight so as not to damage the input shaft fluid drive coupling.
5 On some installations there may be an adaptor ring between gearbox and flywheel housing.

25. FLUID DRIVE COUPLING - Removal

1 Carry out procedures 22, 23 and 24.
2 Remove the twenty socket head screws securing the coupling to the flywheel.
3 Insert M8 setscrews in the two blind extractor holes and tighten each half a turn at a time to ease the coupling from the flywheel.

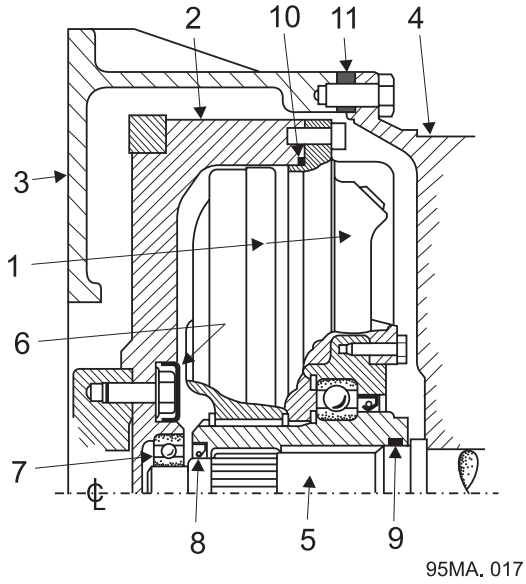

FIGURE 2 - FLUID DRIVE COUPLING AND FLYWHEEL
(Procedures 7 to 10)

1 Fluid coupling.
2 Flywheel.
3 Bell housing.
4 Gearbox.
5 Gearbox input shaft.
6 Rubber cover if fitted. Part No. 221-3.
7 Gearbox support bearing.
8 Oil seal, Part No. 77-39.
9 'O' ring, Part No. 656-2.
10 'O' ring, Part No. 656-1.
11 Adaptor ring.

26. FLYWHEEL - Removal

1 Carry out procedures 22, 23, 24 and 25.
2 On Perkins engines only - pierce and prise out rubber covers from retaining bolts.
3 Remove setscrews and withdraw the flywheel.

27. FLYWHEEL - Refitting

1 On Iveco and John Deere units apply Loctite 510 between the crankshaft palm and the flywheel around the mounting holes. Also apply Loctite 275 onto the fixing bolts.
2 Refit flywheel and torque retaining setscrews to 138 Nm on Iveco and John Deere units and 108 Nm on Perkins units.
3 On Perkins engines only - fit new retaining screw covers flush with flywheel, having ensured the screw heads and flywheel undercuts are clean and oil free. Leave 10-15 minutes then check covers have not pushed out, tap in if they have.
4 Replace the support bearing in the centre of the flywheel.

28. FLUID DRIVE COUPLING - Refitting

1 Before fitting coupling, renew oil seal and 'O' rings (Items 8, 9 and 10, Figure 2).
2 Generously grease both 'O' rings and internal splines with Kluber Paste 46MR401, JSL Part No. 94-24.
3 Offer fluid drive to the flywheel ensuring bolt holes are in line. Push assembly together by hand, making sure not to trap and damage the large 'O' ring.
4 Refit the ring of M8 cap screws and tighten to a torque of 26 Nm (19 lbf.ft) on Perkins and Iveco engines.

NB : On the John Deere engines the cap screws are M6 and torqued up to 19 Nm (14 lbf.ft)

29. GEARBOX - Refitting

1 Lightly grease splines on the input shaft with Kluber Paste, JSL Part No. 94-24.
2 Some engine installations have an adaptor ring between the flywheel housing and the gearbox. (See Fig. 2, Item 11)
3 Ease the gearbox onto the engine bell housing whilst rotating the output shaft. Use the securing setscrews to finally pull the gearbox up to the housing.
4 Ensure the output shaft rotates freely after assembly.
5 Refit the two side cover plates.
6 At this point it is advisable to refill the fluid coupling and gearbox (if it has been drained) as described in Chapter 7 of this manual.

30. FAN CASE - Refitting

Refitting is the reverse of removal described in Chapter 12, but when refitting the mask to the gearbox, ensure it abuts or is very close to the rubber diaphragm attached to the fan case. Apply stud lock to the mask retaining screws before fitting.

31. FAN IMPELLER - Refitting

See Chapter 12.

32. FAN CASE COVER - Refitting

See Chapter 12.

CHAPTER 14

Fault Diagnosis

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HYDRAULIC SYSTEMS

FAULT SYMPTOM	POSSIBLE CAUSE
Hydraulic oil frothing	1. Air getting into system. Check LP pipe to pump. 2. Defective pump shaft seal. 3. Wide sweep brush lift cylinder seals defective. 4. Return pipe separated from underside of return filter inside hydraulic tank.
Sluggish hydraulics	1. Cartridge valve not travelling full extent - measure oil flow. 2. Blocked filters. 3. Air in oil

PNEUMATIC SYSTEMS

FAULT SYMPTOM	POSSIBLE CAUSE
Low pressure warning buzzer on continuously	1. Air pressure switch faulty. 2. Insufficient pressure in Johnston system.
Constant air leak from solenoid block	1. Cylinder seals leaking internally. 2. Air solenoid faulty.

WATER SYSTEMS

FAULT SYMPTOM	POSSIBLE CAUSE
Jet continuously leaking	1. Grit under armature seating. 2. Armature stuck open. 3. Manual override on.
No water to wash down hose or jets	1. Water pump filter blocked. 2. Water tank filter blocked. 3 Water pump belt loose or broken. 4. Drain tap on filter open. 5. Filter isolation valve closed. 6. Filter assembled incorrectly 7. Pump valves fitted incorrectly after overhaul.
Lack of pressure	1. Grit under relief valve seating. 2. Relief valve spring broken. 3. Relief valve stuck open. 4. Relief valve worn.

ELECTRICAL SYSTEM

FAULT SYMPTOM		POSSIBLE CAUSE
Beacon not working	1.	Check vehicle ignition is on
	2.	Check beacon bulb/motor
	3.	Check feed to beacon
	4.	Check earth wire
	5.	Check fuse No. 1 for front. Fuse 2 for rear
	6.	Check switches
Work lights not working	1.	Check vehicle ignition is on, master switch V is illuminated
	2.	Check bulb
	3.	Check feed to light
	4.	Check earth wire
	5.	Check fuse No. 1
	6.	Check switch
Flap (duals) fail to operate	1.	Check feed to solenoid/Plug LED's V11 or V12
	2.	Check solenoid
	3.	Check earth wires
	4.	Check fuse No. 4
	5.	Check switch
Nozzle pneumatic solenoids fail to operate	1.	Check feed to solenoid/Plug LED V2 or V10
	2.	Check solenoid
	3.	Check earth wires
	4.	Check fuse No. 4
	5.	Check switch
Channel Brush fails to lower	1.	Check feed to solenoid/Plug LED V4 or V10
	2.	Check solenoid
	3.	Check earth wires
	4.	Check fuse No. 4
	5.	Check switch
Channel Brush fails to rotate	1.	Check feed to solenoids/Plug LED (see Modus Operandi)
	2.	Check solenoid
	3.	Check earth wire
	4.	Check fuse No. 4
	5.	Check switch
Channel Brush water fails to operate	1.	Check feed to solenoid/Plug LED's W03/W08
	2.	Check solenoid for operation/obstruction
	3.	Check earth wire
	4.	Check fuse No. 4
	5.	Check Wide Sweep Brush hydraulic
Wide Sweep Brush fails to lower	1.	Check feed to solenoids/Plug LED's V4
	2.	Check solenoid
	3.	Check earth wire
	4.	Check fuse No. 5
	5.	Check switch
Wide Sweep Brush fails to rotate	1.	Check feed to solenoid/Plug LED (see Modus Operandi)
	2.	Check coil for operation
	3.	Check earth wire
	4.	Check fuse No. 5
	5.	Check switch
Wide Sweep Brush water solenoid fails to operate	1.	Check feed to solenoid/Plug LED W01
	2.	Check solenoid for operation/obstruction
	3.	Check earth wire
	4.	Check fuse No. 5
	5.	Check switch

SUCTION SYSTEM

FAULT SYMPTOM		POSSIBLE CAUSE
No pickup performance	1.	Hopper full, causing airflow to be throttled: - Discharge load.
	2.	Nozzle or nozzle trunking blocked or restricted by debris. Check the nozzle water jets are not blocked, are working correctly and lubricating the intake duct.
	3.	Intake flap not open (dual m/c's). Blanking plate not removed after using the wanderhose (single m/c).
Poor pickup performance	1.	Maxigap nozzle not set to the optimum opening., i.e. too close to ground
	2.	Nozzle trunking partially restricted by debris. Check nozzle water jets are working correctly and so lubricating the duct.
	3.	Channel brush incorrectly set, not directing debris in line with nozzle.
	4.	Intake flap not fully opened (dual m/c's).
	5.	Rear body meshes blocked or restricted.
	6.	Fan case transition ring not correctly set.
	7.	Fan flap incorrectly set or is incapable of attaining correct opening due to damaged relay mechanism.
	8.	Low oil level in fluid flywheel.
	9.	Air silencer pack in roof of cowl blocked with debris and/or sound absorbent material separating from its substrate causing a restriction.
	10.	Fan case inlet make and break seal fitted to flanged duct on body front face either degraded and not sealing or missing. **Note:** The fan case outlet seal, unlike the inlet seal, has no effect on air performance and only provides the function of a dust seal.
	11.	Engine is not running at correct operational speeds. Check fuel filter or air filter blocked/ causing a restriction.

AUXILIARY ENGINE

FAULT SYMPTOM	POSSIBLE CAUSE
Auxiliary engine fails to turn over	1. Check truck ignition is on 2. Check battery and connections 3. Check ignition switch 4. Check starter motor
Auxiliary engine starts but will not accelerate	1. Check throttle cable is not broken/jammed 2. Check feed to actuator 3. Check fuse No. 8 4. Check switch
Auxiliary engine turns over but will not start	1. Check fuel tank 2. Check electric feed to engine injector shut off fuse 8 3. Check injector shut off valve 4. Check fuel lines for loose connections 5. Check oil pressure sender and connections 6. Check water temperature sender 7. Bleed fuel system
Auxiliary engine runs but stops after 8 seconds	1. Check engine oil pressure is above 0.5 bar 2. Oil pressure switch faulty (Not Iveco engine)

AUXILIARY ENGINE ELECTRICS AND SHUT DOWN SYSTEM

FAULT SYMPTOMS	POSSIBLE CAUSE
Oil pressure warning light not illuminated when ignition on engine stopped (Not Iveco E3)	1. Check fuse No. 9 2. Check feed to oil pressure switch 3. Check earth wire 4. Check bulb.
Water temperature warning light illuminated (Not Iveco E3)	1. Unit overheated 2. Low coolant level 3. Blocked radiator 4. Check temp. sender if engine fails to shut down
ESOS electric failure (Not Iveco E3)	1. Check fuse No. 8 2. Check oil pressure switch 3. Check water temperature switch 4. Check feeds to ESOS 5. Check ESOS valve

WIDE SWEEP BRUSH

FAULT SYMPTOM	POSSIBLE CAUSE
Not rotating	1. Worn drive adaptor and plate 2. Bearings seized 3. Motor seized 4. Foreign matter jammed in brush. 5. Check electrical feed to solenoid/Plug LED (see Modus Operandi) 6. Check hydraulic system for pressures for diagnosis of problem
Rotating slowly	1. Motor worn 2. Hydraulic pump worn 3. Brush end bearing seized
Bouncing	1. Regulator adjustment incorrect 2. Brush stock bent 3. Linkage pins/brackets worn/damaged 4. Air damping system not working
Not dropping	1. Check feed to solenoid/Plug LED V4 2. Solenoid faulty 3. Switch on control box faulty 4. Linkage/pivots/cylinders seized
Lifts intermittently	1. Faulty or loose electrical connections while in working mode
Air leaking from Wide Sweep Brush	1. Shuttle valve or regulator defective 2. Lift ram seals worn
Brush not slewing - dual sweep machines	1. Check slew cylinder for damage/corrosion 2. Solenoids B1 B2 not operating

CHANNEL BRUSH

FAULT SYMPTOM	POSSIBLE CAUSE
Brush slows down after	1. Hydraulic pump worn 2. Channel brush worn 3. Check hydraulic pressure for fault diagnosis
Works intermittently	1. Check switch in Control Panel and looms for loose connections
Brush fails to lift	1. Check for electrical power at solenoid/Plug LED V5 or V6 if a dual. 2. Check pneumatic solenoid for correct operation 3. Seals in cylinder leaking

MAXIGAP NOZZLE

FAULT SYMPTOM	POSSIBLE CAUSE
Maxigap will not tilt	1. Check feed to pneumatic solenoid/Plug LED V1 or V9 if a dual. 2. Pneumatic solenoid valve faulty. 3. Cylinder pivot/linkage seized.

BODY TIP

FAULT SYMPTOM	POSSIBLE CAUSE
Rear door will not open	1. Check handbrake is on 2. Check master switch V is illuminated 3. Check green safety run button is pressed on pedant unit 4. Check pendant unit has not become unplugged
Body will not tip	1. Ensure handbrake is on 2. Ensure master switch V is on (illuminated) 3. Check feed to solenoids/Plug LED 4. Check green safety run button is pressed on pedant unit 5. Check pendant unit has not become unplugged

HYDRODRIVE GEARBOX SYSTEM

FAULT SYMPTOM	POSSIBLE CAUSE
No forward/reverse drive	1. Is truck chassis in 1:1 gear. 2. On dual sweep m/c has drive for power steering changeover been correctly selected 3. Is master switch V1 illuminated 4. Has engine rpm increased from tickover to 1,100 5. Check boost pressure on transmission pump is 24 bar. 6. If fan/sweep gear operates check feed at Mills plug on transmission pump. The voltage at pins A and B should be 0-2.5 volts dependant upon pedal position. If okay, refit plug ensuring it is screwed fully home. If no voltage, call for service assistance.

CHAPTER 15

Service Tools

Table of Contents

The following tools are available through our Spares Network

	TOOL NO	ITEM	FUNCTION
>	283266-1	ESU Unpacking Control Unit	Rear door control (single plug) to enable ESU's to be unpacked
	437-2	Bearing Puller	Removal of fan impeller bearings etc
	437-3	Pressure Gauge Set	Measure hydraulic, pneumatic and water pressures
	437-4	Optical Tachometer	Measure fan rpm
	437-7	0-55 Litres/Min Flow Gauge	Hydraulic flows
	437-8	Impulse Adaptor	Connects to 437-4 to measure engine speeds from fuel injection pipes
	437-9	D-TEC Programme (PPU)	For calibration on D-TEC Units
	437-11	Check valve insertion tool	To fit check valve 421-278
	437-311	Nylon Tube Cutter	Ø5 - Ø6mm
	TN 7964	Torque Wrench Extension Spanner	Fits special bolts 62077-1 on WS Brush Compensator Shaft
	93828-1	Hydrodrive Gearbox-Lift Jig	Removal of hydrodrive gearbox and pump assemblies by a cradle to fit a trolley lift jack.
	422-1	Body Eye Bolt	Raising/lifting of body
	201208-1	Workshop Body Prop	Used when replacing a damaged body prop
	283306-1	Pocket	Used when replacing a damaged body prop

D-Tec

MICROPROCESSOR CONTROLLER

Set-Up and Commissioning Procedure
For
Truck Mounted Units

D-Tec Version 04 Onwards Software
employing Sauer Sundstrand Hydrostatic Transmission Components

1 - INTRODUCTION

The purpose of this Chapter is to provide specific data and instruction for setting-up and commissioning the ***D-Tec*** microprocessor controller on a Johnston truck chassis based sweeper with the Johnston HydroDrive hydrostatic transmission employing Sauer Sundstrand equipment. The data is also specific to the ***D-Tec*** software version 04 onwards. The ***D-Tec*** controller is factory pre-programmed with a set of parameters which are optimised to allow a first-time start-up. A list of these parameters and their values are shown on the 'log sheet' on the next page of this chapter.

Unfortunately, due to mechanical and electrical control tolerances within the hydrostatic pump, the foot pedal control, it is necessary to ascertain and adjust six specific physical parameter adjustments which have an effect on the way the controller performs. These six parameters are:-

A2 - Pulses per rev (number of pulses from the speed sensor per engine revolution)
A4 - Calibrate the throttle (programme injector pump movement)
B5 - Min. pedal posn (foot pedal position relaxed)
C5 - Max. pedal posn (foot pedal position deflected)
C2 - Minimum current (minimum current applied to the transmission system)
B7 - Maximum current work forward (maximum current applied to the transmission system)
B8 - Maximum current work reverse

The log sheet example which is included in the booklet shows two numerically valued columns, one with all the factory set pre-programmed default parameter values for the VS Range. In the second column it provides spaces for recording the actual set values which will be determined by following the instructions in setting-up the five variable parameters described above. Log sheets should be retained for each machine with its service records.

Please note that all parameters shown in **bold script** on the log sheet should be maintained and not varied from. It is prudent to check that these bold values have been correctly programmed as variations have occurred on occasion.

Currently two D-Tec models are used, i.e. Z910 and Z918. See Section 3 of this chapter for identification of model.

NB : On chassis with electronic fuel injection, the engine management system will have been employed and therefore some parameters will have been reset to allow it to function within our specifications.
A copy of this setting information can be obtained from our Service Department on quotation of the machine serial number - EQ .....

JOHNSTON D-Tec Microprocessor Controller

LOG SHEET - Programmer Parameter Setting For Z910

MACHINE TYPE:

D-Tec Serial No: Actuator Serial No: Calibrated by:	Date: Datalogger calibration No: EQ No:	Special features:

PROGRAMMER SWITCH			FACTORY PRE-PROGRAMMED VALUES		ACTUAL ADJUSTED VALUES			
POS	FUNCTION							
	IGNITION ONLY	ENGINE RUN	IGN	ENG	IGNITION ONLY		ENGINE RUN	
A1	**Model Number**	***Tacho.** (RPM)	**910**	*	**910**		*	
A2	**Pulses per rev.**	***Target speed.**	06	*			*	
A3	***Actuator %**	***Injector pump %**	**00**		**Min.**	**Max.**	**Min.**	**Max.**
A4	**Calibrate push up**	***Valve Cur mA**					*	
A5	***Pedal position**		***00**		**Min.**		**Max.**	
A6	***Hand Thrt position** (if fitted)		***00**		**Min.**		**Max.**	
A7	(not implemented)		00		00			
A8	(not implemented)		00		00			
A9	(not implemented)		00		00			
A10	(not implemented)		00		00			
A11	(not implemented)		00		00			
A12	(not implemented)		00		00			
A13	(not implemented)		00		00			
A14	(not implemented)		00		00			
A15	(not implemented)		00		00			
A16	(not implemented)		00		00			
B1	***Gain***		**10**		**10**			
B2	**Zeta**		**265**		**265**			
B3	**Window +/-** (RPM)		**05**		**05**			
B4	(not implemented)		00		00			
B5	**Pedal Min.** (see A5+23)		25					
B6	**Hand Thrt. Min** (if fitted see A6+23)		25					
B7	**Max. Cur. FW mA** (120 max)		100					
B8	**Max. Cur. RW mA** (120 max)		100					
B9	**Max. Cruise**		**50**		**50**			
B10	**Max. Work** (RPM)		**1700**		**1700**			
B11	**Min. Work** (RPM)		**1100**		**1100**			
B12	Speed up/ dn Rate		242		242			
B13	**Ramp up FW**		**25**		**25**			
B14	**Ramp up RW**		**25**		**25**			
B15	**Ramp down FW**		**05**		**05**			
B16	**Ramp down RW**		**05**		**05**			
C1	(not implemented)		00		00			
C2	**Min. Cur. MA**		**3**		**3**			
C3	***Switch inputs +**		N/A		*			
C4	***Switch inputs -**		N/A		*			
C5	**Pedal Max.** (see A5-5)		210					
C6	**Hand Thrt Max.**(if fitted see A6-5)		210					
C7	**Thrt before Lug%**		**75**		**75**			
C8	(not implemented)		00		00			
C9	(not implemented)		00		00			
C10	**Lug Start W**		**100**		**100**			
C11	**Lug End W**		**500**		**500**			
C12	**Lug Ramp up T & W**		**50**		**50**			
C13	**Lug Ramp dn T & W**		**50**		**50**			
C14	(not implemented)		00		00			
C15	***Software version**		***T04**		***T04**			
C16	***Hours work**	***Hours total**	00		*	*		

*** = Read Only Function**

	Not used on Software T04

SOFTWARE VERSION T04 Rev 02

PJP/08/03/01

Issue 04

JOHNSTON D-Tec Microprocessor Controller

LOG SHEET - Programmer Parameter Setting For Z918

MACHINE TYPE:

D-Tec Serial No: P-Pak Serial No: Calibrated by:	Date: Datalogger calibration No: EQ No:	Special features:

PROGRAMMER SWITCH			FACTORY PRE-PROGRAMMED VALUES		ACTUAL ADJUSTED VALUES			
POS	FUNCTION							
	IGNITION ONLY	ENGINE RUN	IGN	ENG	IGNITION ONLY		ENGINE RUN	
A1	**Model Number**	***Tacho.** (RPM)	**918**	*	**918**		*	
A2	**Pulses per rev.**	***Target speed.**	06	*			*	
A3	***Injector pump %**			*00	Min.	Max.	Min.	Max.
A4	***Valve Cur mA**						*	
A5	***Pedal position**			*00	Min.		Max.	
A6	***Hand Thrt position** (if fitted)			*00	Min.		Max.	
A7	(not implemented)			00		00		
A8	(not implemented)			00		00		
A9	(not implemented)			00		00		
A10	(not implemented)			00		00		
A11	(not implemented)			00		00		
A12	(not implemented)			00		00		
A13	(not implemented)			00		00		
A14	(not implemented)			00		00		
A15	(not implemented)			00		00		
A16	(not implemented)			00		00		
B1	***Gain***			**10**		**10**		
B2	**Zeta**			**265**		**265**		
B3	**Window +/-** (RPM)			**05**		**05**		
B4	(not implemented)			00		00		
B5	**Pedal Min.** (see A5+23)			25				
B6	**Hand Thrt. Min** (if fitted see A6+23)			25				
B7	**Max. Cur. FW mA** (120 max)			100				
B8	**Max. Cur. RW mA** (120 max)			100				
B9	**Max. Cruise**			**50**		**50**		
B10	**Max. Work** (RPM)			**800**		**800**		
B11	**Min. Work** (RPM)			**800**		**800**		
B12	Speed up/ dn Rate			242		242		
B13	**Ramp up FW**			**25**		**25**		
B14	**Ramp up RW**			**25**		**25**		
B15	**Ramp down FW**			**05**		**05**		
B16	**Ramp down RW**			**05**		**05**		
C1	(not implemented)			00		00		
C2	**Min. Cur. MA**			**3**		**3**		
C3	***Switch inputs +**			N/A	*			
C4	***Switch inputs -**			N/A	*			
C5	**Pedal Max.** (see A5-5)			210				
C6	**Hand Thrt Max.**(if fitted see A6-5)			210				
C7	**Thrt before Lug%**			**75**		**75**		
C8	(not implemented)			00		00		
C9	(not implemented)			00		00		
C10	**Lug Start W**			**100**		**100**		
C11	**Lug End W**			**500**		**500**		
C12	**Lug Ramp up T & W**			**50**		**50**		
C13	**Lug Ramp dn T & W**			**50**		**50**		
C14	(not implemented)			00		00		
C15	***Software version**			***M03**		***M03**		
C16	***Hours work**	***Hours total**		00	*		*	

*** = Read Only Function**

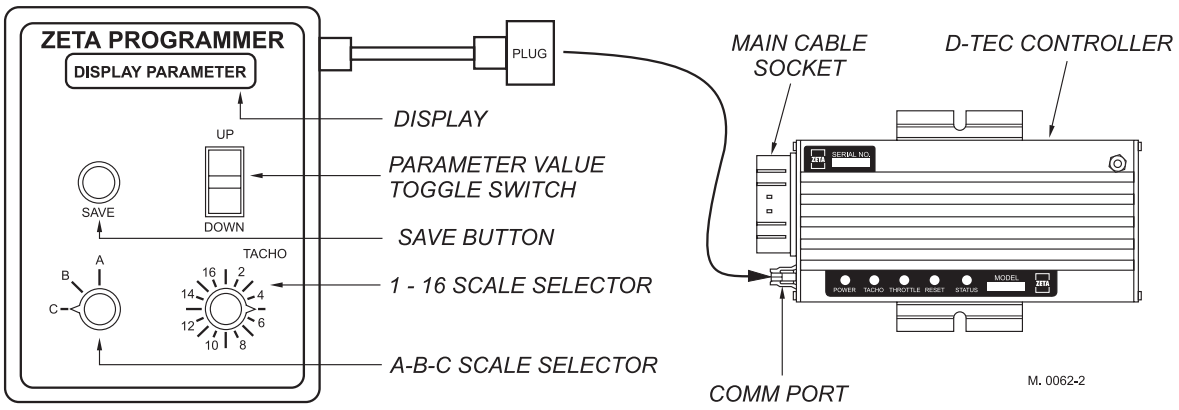
	Not used on Software M03

SOFTWARE VERSION M03 Rev 02

TP/01/02/01 Issue 02

2 - USING THE PORTABLE PROGRAMMING UNIT (PPU)

The Johnston ***D-Tec*** portable programming unit (PPU) can also be used to set-up and tune the controller whilst the engine is running. To set-up the controller for adjustments, the following procedure should be adopted;



***D-Tec* programmer control interface**

(1) Insert the programmer unit connector lead into the communication (COMM) port which is found under the main cable socket. The port also provides power to the PPU.

(2) The programming unit should briefly display the '**Zeta** Banner' after the vehicle's ignition has been switched on and then show one of the parameters by name and value.

(3) Using the three position rotary switch, set the parameter range to either **A, B** or **C** as desired.

(4) Using the 16 position rotary switch, select a parameter **1** to **16** for alteration as desired, values prefixed with * cannot be adjusted and are 'read-only' features.

(5) Only adjust the value of the parameters, not in bold type, with the up/down toggle switch.

(6) Repeat steps (3), (4) and (5) for any other parameters that require alteration. Parameters may be altered in any sequence.

(7) When the performance of the system is satisfactory press the red SAVE button to 'log-in' the set parameters.

IMPORTANT - DO NOT REMOVE THE 'COMM' PLUG OR SWITCH OFF THE IGNITION POWER UNTIL THE "PROGRAMMING" BANNER DISAPPEARS

(8) When the message PROGRAMMING disappears and the unit displays the currently selected parameter, it may be disconnected from the controller.

(9) The **SAVE** button may be pressed any number of times during a programming session, but MUST always be pressed after the final parameter is changed. Failure to press the **SAVE** button will cause the controller to revert to the previously saved setting when powering down.

(10) In order to record and establish a basis for further adjustments, the parameter settings should be recorded on the log sheet for a particular vehicle, typically as shown on the previous page.

3 - PHYSICAL SET-UP PARAMETER ADJUSTMENT

The following notes pertain to the six physical adjustments required and the order sequence should be followed.

Firstly, select switch position **C15** and check the display reading is **T02** or above on D-Tec Z910, or **M03** and above on Z918. If not, check that the reading on switch position **A1** (with ignition only on) is **Model Number 910 or 918**. Check which model is required for your particular chassis by looking at the existing unit fitted.

A2 - Pulses per rev

The engine speed sensor has bee nre-positioned to read the pulses provided by the input shaft to the hydrostatic gearbox.

This means that for all VS Range of vehicles irrespective of chassis typethe number of pulses will not vary. However, the operating functions do differ to previous models, the controller will no longer recognise that the engine is running until the hydrostatic gear box is selected together with the appropriate gear.

Remember to save the adjustments by pressing **SAVE** and to record the values on the log sheet.

B5 / C5 - MIN. PEDAL POSN / MAX. PEDAL POSN

These two parameters input to the ***D-Tec*** the physical characteristics of the foot pedal's in-built potentiometer in two conditions, one with the pedal fully relaxed and one with it fully depressed. As this component is a mechanical device it must be realised that variances in the potentiometer resistance (ohms) can be expected.

The set-up for **B5** is as follows;-

> With the foot pedal fully relaxed and in its un-deflected state, look at the reading for **'pedal position' A5,** then set the indicated value **+5 higher**, i.e. if the **'pedal position'** reading is 24 at minimum position, then set **pedal min,** switch position **B5,** to 29. This ensures there is a small safety band and that the pedal has to be deflected a small amount before anything happens.

The set-up for **C5** is as follows;-

> With the foot pedal fully deflected, look at the reading for **'pedal position' A5**, then set the parameter to **-5 lower**, i.e. if the **'pedal position'** reads 195 when fully deflected, then set pedal max, switch position **C5,** to 190.

Remember to save the adjustments by pressing **SAVE** and to record the values on the log sheet.

C2 - MINIMUM CURRENT

This parameter sets the minimum current output threshold to the transmission pump's proportional control. Ideally the current should be set as high as possible to a stage where once the foot pedal is deflected past its 'safety-band' setting, movement of the swash plate occurs. **Note**: **C2, B7** and **B8** cannot be set until the ***HydroDrive*** hydraulic system has been primed and the system working mechanically with the wheels turning hydrostatically. They should be left at the default settings.

The procedure for setting **C2** is as follows;-

With the engine running and all systems active (Hydrodrive in operation), set the machine into Forward Work Mode and with the PPU unit adjust the **C2** parameter in steps until a 'clutch-bite' condition occurs, i.e. a condition when the wheels start to turn and the machine just wants to move. Now repeat the test in reverse and note the reading. The lower of the two readings should then be **reduced by 5** to establish the correct setting for **C2**. Conduct the procedure several times to ensure an average condition for **C2** is established. The procedure should also be reconducted on level ground and after a period of running or warm-up.

Remember to save the adjustment by pressing **SAVE** and to record the value on the log sheet.
Please note that the pre-programmed default value is **3,** but from experience this has been found to vary on occasions.

B7- MAXIMUM CURRENT WORK FORWARD

Select the parameter **B7** and increase the reading to 120. Press save and record the setting on the Log Sheet.

B8 - MAXIMUM CURRENT WORK REVERSE

Select **B8** and input the figure in **B7** above.

4. TROUBLESHOOTING

There are various diagnostic functions that can be carried out to ensure the D-Tec and its connections are functioning correctly.
Firstly, check the indication on the LED's as detailed in Chapter 20 and that **C15** on the PPU reads software **T02** on D-Tec Z910 or **M03** or above on Z918.

There are diagnostic facilities on the Programmer (PPU) which enables you to view the input signals being received from various input sources.

Using the PPU select position **C3**, with the unit plugged in, ignition switched on and hydrodrive selected, the following readings should be seen.

Switch Input	Value on **C3**
Neutral (hydrodrive gear selector)	32 (work mode engaged)
Forward selected	2
Reverse selected	1
Foot brake signal	64

Please note that these figures can be built up in any combination.

i.e. Work Mode and Forward Drive
32 + 2 = 34
If foot brake is then pressed reading = 34 + 64 = 98

Additional input signals are:

Accelerator - Select position **A5**, with ignition turned on the reading will increase from the min position (about 25) to the max position (about 190) as the pedal is pressed - this confirms that the pedal and wiring are all satisfactory.

Engine Speed Sensor - Select position **A1**, with the engine running and hydrodrive selected, (ensure chassis gearbox 1:1) the engine rpm should be displayed. This confirms that the speed sensor is in order. This information confirms continuity of signals and wiring to the D-Tec controller.

D-Tec Output - Using the PPU select switch position **A4**, engine running, select Forward, with handbrake applied note the reading on **A4** (probably about 4mA). As the accelerator pedal is pressed the pump will try to drive and the current going to the EDC on the pump can be measured, it should achieve the reading shown in **B7**.
This confirms that a current is going to the transmission pump to drive the machine.

HydroDrive Transmission System

Set-Up and Commissioning Procedure For Truck Mounted Units

D-Tec Version 04 Onwards Software

Employing Sauer Sundstrand Hydrostatic Transmission Components

1 - INTRODUCTION

The purpose of this booklet is to provide guidance and set-up data for commissioning the hydrostatic transmission components associated with the Johnston ***HydroDrive*** system. The data is specific to truck chassis based sweepers when employing Sauer Sundstrand transmission equipment and the Johnston ***D-Tec*** control system.

It is presumed that in commissioning, the selection of the chassis and its characteristics along with the ***HydroDrive*** system would have already been predetermined and installed to the relative guidelines. This Chapter only gives details on the set-up and adjustments required to the hydrostatic pump and motor together with associated components.

2 - INITIAL SET-UP PROCEDURES

When starting the chassis engine and engaging the Hydrostatic gearbox for the first time from a 'dry-start' for commissioning and set-up, the following procedures must be adhered to;-

1. Jack-up the rear wheels and secure on axle stands and fully chock both front wheels.

   Suitably guard/fence off the machine to ensure no personnel can inadvertently walk into the revolving rear wheels.

2. Fill hydraulic reservoir to the middle of the sight glass with Shell Tellus T46 oil or equivalent.
   Note: Hopper resting on prop.
3. Remove the top cap of the boost canister and fill with filtered oil. The oil will drain into the pumps, at the same time displacing air, so the canister will require topping-up several times. It may take some time before the oil in the canister maintains its correct level (i.e. covering the filter) at which time the top can be replaced and tightened.
4. Attach a suitable 0-25 bar gauge via an extension tube to the test point **T4**, refer to section 23 of the Technical Manual for test point location.
5. On the clutch system a mechanical switch has been fitted that is made when the clutch is pressed.
6. With chassis gearbox in neutral, start chassis engine to ensure air pressure is present (7.5 bar) 108 PSI.

Note: On new machines, or after repairs check, to select ***HydroDrive*** gearbox press the appropriate switch **W** and the warning lights **H** and **D** should illuminate. If the warning lights do not come on, simply select 1st gear, release the clutch to its bite point and the ***HydroDrive*** gearbox will engage and the emblem illuminate. **DO NOT** fully release the clutch.

7. Having engaged ***HydroDrive*** keep the clutch depressed. Select 1st gear on the chassis lift the clutch for no more than 20 seconds. Wait a short while then repeat. Keep repeating this process until the gauge connected to **T4** starts to show a pressure. Depending on the ratio of the chassis gearbox the pressure may vary. In order to achieve a higher pressure, one may need to progressively increase the speed by changing gear i.e. 2nd - 3rd etc. until 24 bar is achieved. Top up hydraulic tank if necessary.

If the clutch is released while the *HydroDrive* is engaged and any gear selected on the chassis gearbox, the front prop shaft will be turning

8. To operate the transmission motor that drives the rear wheels, select the correct gear that gives 1:1 ratio.
Release the handbrake, activate the master switch next to the drive selector. This will increase the chassis engine rpm to the lower speed limit of 1100 rpm.
Ensure all other switches are in their off position - select forward using the drive select switch. Progressively press the pedal until the rear wheels start to rotate.
Allow the wheels to rotate slowly for a short while then return the drive select to neutral and allow the wheels to stop. Select reverse and again allow the wheels to rotate slowly, for a short while. During this process keep an eye on the oil level - top up as required.
9. Alternating between forward and reverse, repeat this process six times.

Note: At all times the pressure on the gauge for **T4** should be maintained at approximately 24 bar.
The 1:1 ratio can be verified by checking switch position A1 on the ***D-Tec*** with the truck engine rev counter.

3 - PUMP SET-UP - RELIEF VALVE SETTINGS

Pressure setting -
Maximum forward - 420 bar - test point **T3**
Maximum reverse - 350 bar - test point **T1** anti skid block.

Attach suitable 0-500 bar gauges via an extension tube to the test points **T1** and **T3**, refer to section 23 of the Technical Manual for test point locations.

Pump Set Up continued:

1. With the vehicle jacked-up and secured on axle stands and both front wheels fully chocked - engage the ***HydroDrive*** and select the 1:1 ratio.
2. Release the clutch and increase the engine rpm to the maximum 1700. Keep handbrake applied, select forward using the drive select control, depress the accelerator pedal and read the pressure from test point **T3,**
3. Then select reverse and read the pressure from test point **T1**.

   Note: The forward and reverse relief valves are located adjacent to the filter on the transmission pump. The top valve is for reverse (350 bar) and the lower for forward (420 bar). Adjustments are made by turning the valves clockwise to increase the pressure and counterclockwise to reduce it. See Figure **?** of the Technical Manual. Now ensure **C2, B7** and **B8** have been set before proceeding.

4 - PUMP - CONTROL SYSTEM CHECKS

The pump is equipped with an electronically controlled proportional control valve which acts to convert an electrical current (mA) input into a hydraulic servo control pressure. In order to check that this function is operating correctly, a pressure signal of 8-18 bar should be recorded at test point **T2** with accelerator pedal fully relaxed or fully deflected.

5 - ANTI SKID MODULE SET-UP

1. Fit a 400 bar minimum pressure gauge on test point **T1** adjacent to the valve on the anti skid block

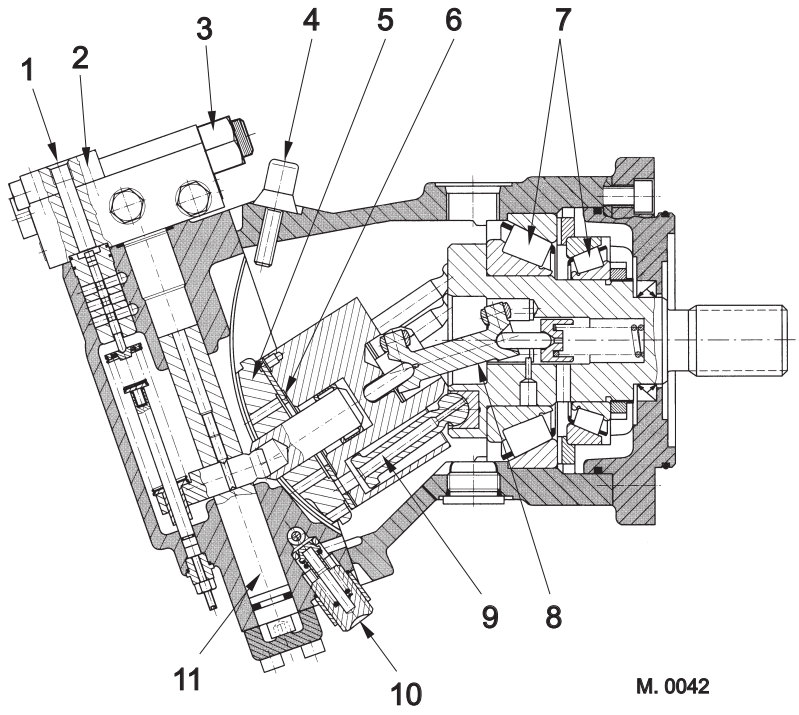
2. Disconnect and remove the electrical connection from the valve (RL) and energise the valve from a remote battery/supply.

3. With ***HydroDrive*** engaged, select reverse using the joy stick, (the chassis gearbox in 1:1 drive on a manual gearbox or **D** on an automatic gearbox) and the parking brake applied, depress the go pedal to its maximum position and read the pressure on the gauge. Adjust the relief valve **CT2** on the antiskid module required to achieve a nominal 200 bar setting.

6 - MOTOR SET-UP - PRESSURE CONTROL ADJUSTMENT

The motor is equipped with two in-built pre-set control features: (1) to instigate a decrease in the motor displacement resulting from a signal from the main control valve in the pump, this control is called the threshold control. (2) a pressure compensator valve that increases motor displacement when higher circuit pressures occur, this control is called the pressure compensator override (PCOR). Both these controls are pressure sensitive and factory set and on this basis should not be adjusted. However, to ensure conformity we like to check the displacement actuation pressure. This is achieved by connecting suitable pressure gauges (40 bar) to test point **T4B** with hydrodrive engaged, handbrake released, select forward drive and using the hand held PPU on position **C2**, slowly increase its value until a road speed of between 8-10 km/h is reached, at the same time observing the reading on pressure gauge, it should be 24 bar, until 8-10 km/h is reached. At this point the pressure should start to reduce.
The object of this test is to ensure the pump boost pressure (24 bar) is maintained until the speed criteria is achieved when motor displacement starts to change.

Section of Sauer Variable Deplacement Motor



1 Control Pressure Port
2 Hydraulic Proportional Control
3 Pressure Compensator Override
4 Minimum Displacement Limiter
5 Valve Segment
6 Bearing Plate
7 Tapered Roller Bearings
8 Synchronizing Shaft
9 Piston
10 Change Pressure Relief Valve
11 Servo Piston Cylinder

7 - COMPLETION OF SETUP

Remove guarding. Lower the vehicle off the axle stands and road test the vehicle in hydrostatic drive to confirm 40 kph can be achieved along the flat and that the vehicle can climb hills in Forward and Reverse. Please note max speed in reverse along the flat is restricted to 10 kph approx.

CHAPTER 16

Warranty

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1 WARRANTY TERMS AND CONDITIONS

Johnston Sweepers Limited (JSL) undertakes to repair or replace, free of charge, any part manufactured by it which is proved to be defective through inadequate workmanship or materials during the first two thousand hours of operation, or within a period of twelve months (whichever is the sooner) from the date of delivery from JSL unless the warranty is registered to the buyer (the Customer) through our website at http://www.johnstonsweepers.com/warranty_registration.asp. This warranty is not transferable. Any original equipment part replaced at JSL cost carries the remaining period of warranty for any defective material or workmanship. Qualifying parts fitted outside the JSL machine warranty period carry a twelve months parts only warranty for defective material or workmanship.

Warranty is given subject to the following conditions:

a) The machine shelf life of 6 months has not been exceeded. “Shelf Life” means time stored in good condition by the distributor from the date on which the product was despatched by JSL. For spare parts the shelf life is 1 year.
b) A suitable working area is provided for the work required.
c) Adequate written notice of the defect is submitted to JSL within 30 days of the discovery of the defect. This must include a written detailed report describing the problem, the circumstances applying at the time and any additional relevant information. The report must contain sufficient information to allow JSL to understand the problem and action taken. Claims relating to damage incurred during delivery to the Customer must be notified within 24 hours of receipt of the equipment.
d) Defective parts are held by the Customer until disposal has been authorised by JSL. If JSL requests the return of the parts then JSL will pay reasonable carriage charges.
e) The defect has not been caused by carelessness, vandalism, accident, incorrect maintenance, improper operation, abnormal working conditions, tampering with sealed settings, failure to follow JSL’s instructions, inadequate lubrication or fair wear and tear.
f) For parts not manufactured by JSL, no attempt shall have been made to dismantle or repair the parts without the written approval of the relevant manufacturer, JSL, or an authorised agent of either.

Replacement parts for warranty claims shall be purchased and a claim submitted to recover costs. Parts replaced under warranty will be credited along with carriage charges for that item. JSL will not pay any Customer profit element on parts replaced under warranty.

JSL will not be liable for replacement of any parts designated as consumable items (see separate list, available on request), for fuel, hydraulic fluid, antifreeze or lubricants used in maintenance or warranty work, downtime or for any consequential loss or charges, including transportation or recovery charges.

As JSL are not authorised repairers of engines or proprietary chassis’ JSL are unable to accept any claims relating to them. JSL will therefore pass on to the customer the benefit of any warranty provided by the manufacturers in respect of them and as such any repairs or claims should be submitted to the manufacturer or its locally appointed agent. Any claim received by JSL for such repairs will be forwarded to the relevant manufacturer for their acceptance before it is credited.

This warranty applies only to the original equipment supplied by JSL and genuine Johnston spare parts. It shall not apply to unauthorised alternative parts or materials or any consequential damage or failure resulting from the use of fitting of such parts or materials.

Provided that the claim is justified and that the correct procedure has been followed, claims will be paid within 30 days of receipt. Offset of claims against sums due to Johnston is hereby specifically prohibited.

ENGINES

The standard warranty from the engine's supplier is passed on in full without reduction as specified in the engine manufacturers standard Terms and Conditions.

FUELS

In line with the engine manufacturers specifications all fuel used must be in line with EN590:1993 and can incorporate a maximum of 5% Bio-diesel.

2 CONSUMABLES LIST

Body Inlet Ducts, Flaps and Meshes
Brush Linkages, Bushes and Pivots
All Sweeping Brushes
Drive Couplings, Bearings and Belts
Curtains and Mudflaps
Filters and Elements
Impellers and Casings
Supawash Hoses, Jets, Lances and Fittings
Lift Cables
Light Bulbs and Fuses
Nozzles, Nozzle Wheels and/or Skids, Guards, Rubbers and Retaining Strips,
Nozzle and Wanderhose Trunkings
Seals and Rubbers
Tyres and Friction Materials
Wanderhose Turrets, Ducts, and Bearings
Water Jets
Water Pump Pistons, Diaphragms, Seals and Rotors
Wearing Plates, Strips and Baffles
Windows, Mirrors and Inspection Glasses
Any other items normally regarded as consumables

3 EXTENDED WARRANTY OPTIONS

JSL offer 2 extended warranty options, Silver or Gold to cover the whole machine (excluding proprietry chassis) for upto 3 years, or 6000 hours, whichever the sooner..

- The Silver Warranty provides full cover for year 2, upto 4000 Hours
- The Gold Warranty provides full cover for years 2 and 3, upto 6000 Hours

All other terms and conditions are as described above.

YOUR COMMITMENT

In order to register your warranty please complete and return the form below.

I have read the Warranty Terms and Conditions as shown above and understand that the equipment must be operated and maintained in accordance with requirements of this warranty to retain entitlement to its benefit. Any failure to comply with conditions shown above renders this warranty null and void and the standard 12 month warranty then applies.

(tick ☐ as appropriate)

This form registers the Standard ☐ Silver ☐ Gold ☐ warranty for the following vehicle.

To register the date into service, please complete and return.

Model _____ Delivery Date _____

EQ No _____ Registration No _____

Signed by or on behalf of the Purchaser _____

Name _____

Position _____

Date _____

The vehicle is located at _____

The vehicle is serviced / maintained at the following depot _____

Depot Manager details

Name _____

Telephone _____

Fax _____

Please forward the completed form to the Warranty Department at the following address:

JOHNSTON SWEEPERS LIMITED
CURTIS ROAD
DORKING
SURREY
RH4 1XF

TEL: +44 (0)1306 884722
FAX: +44 (0)1306 740369
e-mail: warranty@johnstonsweepers.com

Rev. 11 doc
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CHAPTER 17

Health and Safety

Introduction

The information presented in this chapter does not infer that there are hazards associated with the Johnston sweepers. It is given as a guide to general precautions that should be exercised in the course of their maintenance work.

Whilst every effort has been made to ensure completeness of this document, owners and operators of Johnston sweepers are reminded of their responsibilities to comply with all relevant legislation including Risk/COSHH Assessments and Approved Codes of Practice.

HEALTH AND SAFETY PRECAUTIONS

The information presented in this section does not infer there are any particular hazards associated with these machines. It is given as a guide to the general precautions that should be taken in any workshop environment when working on machines of this nature in the course of their maintenance.

Safety symbol:
The universal symbol is used throughout this manual to indicate information which is essential for health and safety of all operating personnel.

Refer to all state, district/company, or council Health and Safety Regulations and follow the procedures laid down.

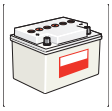
The repair and maintenance of machinery such as this can involve physical hazards or other risks to health. This section lists some of these hazards and the precautions necessary to avoid them.

The list is only general but all other operations, procedures and the handling of materials should be carried out in accordance with the requirement of health and safety laws, which is the responsibility of the Owner/Operator/Maintainer.

Sharp objects warning:
There can be a risk of injury from sharp objects such as discarded hypodermic needles becoming lodged in the sweeping system. The use of 'needle stick gloves' is recommended when changing brushes, using the wanderhose/Littasnatch and when cleaning out the machine.

Anti Freeze:
Anti-freeze may be absorbed though the skin in toxic or harmful quantities.
If swallowed, seek medical attention immediately.
Some types, i.e., isopropanol, ethylene glycol and methanol are flammable.

Batteries:
Gases released during charging are explosive. Never use naked flames or allow sparks near charging or recently charged batteries.



Disconnection:
Disconnect the negative battery lead from battery first. The positive cable must always be disconnected last.

Reconnection:
Always reconnect the positive battery cable first.

Jump-starting and use of auxiliary (booster) batteries:
Do not jump-start maintenance free batteries if in a deeply discharged state as internal short circuits may occur.

If a maintenance free battery is found to be in a deeply discharged state, it is essential to remove the battery and recharge off the vehicle. Jump-starting will not enable the vehicles own charging system to initiate the charging process.

Jump starting procedure:
Always follow this procedure when connecting a booster battery.

Take care not to cause sparking which could ignite hydrogen gas being given off by the batteries.

1. Apply the park brake, turn off ignition, lights and other electrical loads.
2. If the slave battery is mounted on another vehicle, ensure that the vehicles are not touching.
3. Ensure that the donor battery voltage is compatible with the vehicle battery.
4. Ensure that adequate ventilation is available to the vehicle and slave batteries.
5. Connect positive terminal of the donor battery group to positive terminal of the discharged battery group.
6. Connect negative terminal or slave battery group to chassis earth of the discharged battery group.
7. Attempt to start the casualty vehicle.
8. Once the vehicle has started, remove the negative lead from the chassis and then the slave battery.
9. Remove positive lead from discharged chassis and then the donor chassis.

If the vehicle will not start with a booster battery, contact your local Johnston Service Network.

Chemical materials:
Chemical materials such as solvents, sealers, adhesive, paints, resin foams, battery acids, anti-freezes, brake fluids, oils and grease should always be used with caution and stored and handled with care.

Chemical materials may be toxic, harmful, corrosive, irritant or highly flammable and give rise to hazardous fumes and dust.

Always consult the appropriate safety standards for handling such materials.

Typical biohazard symbol

Typical radioactive material symbol

Typical poison symbol

Always use appropriate protective clothing

REMINDERS
Chemical materials

DO	remove chemical materials from the skin and clothing as soon as practical after soiling. Change heavily soiled clothing and have it cleaned.
DO	carefully read and observe hazard and precaution warnings given on hazardous material containers and in any accompanying leaflets, posters or other instructions. Hazardous material health and safety data can be obtained from manufacturers.
DO	organise work practices and use protective clothing to avoid soiling of the skin and eyes; breathing vapours, aerosols, dust, and fumes; inadequate container labelling; fire and explosive hazards.
DO	wash before job breaks, before eating, smoking, drinking or using toilet facilities when handling chemical materials.
DO	keep work areas clean, uncluttered and free of spills.
DO NOT	mix chemical materials except in accordance with the manufacturer's instructions. Some chemicals can form other toxic or harmful substances; give off toxic or harmful fumes; be explosive when mixed together.
DO NOT	spray chemical materials, particularly those based on solvents, in confined spaces; for example, when people are inside a vehicle.
DO NOT	apply heat or flame to chemical materials, except under the manufacturer's instructions. Some are highly flammable and some may release toxic or harmful fumes.
DO NOT	leave containers open. Fumes given off can build up to toxic, harmful or explosive concentrations. Some fumes are heavier than air and will accumulate in confined areas, pits, etc.
DO NOT	transfer chemical materials to unlabelled containers.
DO NOT	clean hands or clothing with chemical materials. Chemicals, particularly solvents and fuels will dry the skin and may cause irritation with dermatitis. Some can be absorbed through the skin in toxic or harmful quantities.

Dusts:
Powder, dusts or clouds may be irritant, harmful or toxic. Avoid breathing dusts from powdery chemical materials or those arising from dry abrasion operations.
Wear respiratory protection in accordance with the requirement of the Health and Safety Acts.

Electric shocks:
When working on electrical systems, remove watches, bracelets and rings as these can conduct electricity and cause shorts and/or burns.

Electric shocks can result from the use of faulty electrical equipment or from the misuse of equipment even in good condition.

Ensure that electrical equipment is maintained in good condition and frequently inspected and tested.

Ensure that flexes, cables, plugs and sockets are not frayed, kinked, cut, cracked or otherwise damaged.

Ensure that electrical equipment is protected by the correct rated fuse and if used outside an earth-leakage circuit breaker is used.

Never misuse electrical equipment and never use equipment that is in any way faulty. The results could be fatal.

Use reduced voltage equipment (110 or 24 volt) for inspection and working lights where possible.

Ensure that the cables of mobile electrical equipment cannot be trapped and damaged such as in a vehicle hoist, trolley jacks, etc.

Use air operated mobile equipment where possible in preference to electrical equipment.

Exhaust fumes:
These contain asphyxiating, harmful and toxic chemicals and particles such as carbon oxides, nitrogen oxides, aldehydes, leads and aromatic hydrocarbons.
Engines should only be run under conditions of adequate extraction or general ventilation and not in confined spaces.
NB : Catalyst exhausts/silencers can run at extremely high temperatures.

Fire and welding:
Observe strict fire safety when storing and handling flammable materials or solvents, particularly near electrical equipment or welding processes.
Disconnect battery, microprocessors, etc. before commencing welding. Failure to observe this could cause failure of components.
Ensure before using electrical or welding equipment that there is no fire hazard present.
Have a suitable fire extinguisher available when using welding or heating equipment.
Special precautions must be taken before any welding or cutting takes place on vessels which have contained combustible materials, e.g. fuel tanks.
The sound insulation foam used on the equipment must be removed if any welding is to be carried out in that area of the machine.

First aid:
It is desirable for someone in the workshop to be trained in the first aid procedures.
Splashes or particles in the eye should be flushed with clean water for at least ten minutes and medical attention sought.
Soiled skin should be washed with soap and water.
Inhalation affected individuals should be removed to fresh air immediately.
If hazardous material has been swallowed or if the effects of exposure to hazardous materials persist, consult a doctor with information (label) on material used.
Do not induce vomiting (unless indicated by the manufacturer).

High-pressure air and lubrication equipment:
Always keep high-pressure equipment in good condition and regularly maintained, particularly at joints and unions.

Never direct a high (or low) pressure nozzle at the skin as the fluid may penetrate to the underlying tissue, etc, and cause serious and potentially fatal injury.

Oils and greases:
Prolonged and repeated contact with mineral oil may result in the removal of natural fats from the skin, leading to dryness, irritation and dermatitis.
Gross and prolonged contact, especially with used engine oil, which contains potentially harmful contaminants, may cause skin cancer.

Where there is a risk of eye contact, e.g., by splashing, eye protection should be worn, for example, chemical goggles or face shields; in addition, an eyewash facility should be provided.

Adequate means of skin protection and washing facilities should be provided.

Repeated or prolonged skin contact should be avoided by wearing protective clothing, including impervious gloves where practical. Particular care should be taken with used oils and greases containing lead.

First Aid treatment should be obtained immediately for open cuts and wounds.

Apply barrier cream before each work period to help when removing oil from the skin.

Use proprietary hand cleaners only if they can be removed from the skin using water.

Overalls must be cleaned regularly. Discard clothing that cannot be cleaned and footwear that has become impregnated.

In the event of a skin condition occurring consult a doctor and tell him/her that your work involves using oil.

Solvents:
Solvents such as acetone, white spirit, toluene, xylene and trichloroethane are flammable.

Avoid splashes to the skin, eyes and clothing. Wear protective gloves, goggles and clothing.

When using solvents ensure good ventilation; avoid breathing fumes, vapours, spray-mists and keep containers tightly sealed. Do not use in confined spaces. When spraying materials containing solvents, for example paints, adhesives or coatings, use extraction ventilation or personal respiratory protection in the absence of adequate general ventilation.

Do not apply heat or flame except under specific and detailed manufacturer's instructions.

Suspended loads:
Never work under an unsupported, suspended or raised load. For example, jacked up vehicle, raised tipper body, suspended engine, etc.

Always ensure that lifting equipment e.g., jacks, hoists, axle stands, slings, etc are adequate and suitable for the job, in good condition and regularly maintained.

NEVER improvise lifting tackle. **ALWAYS** ensure body props and/or axle stands are used when working under bodies or chassis.

Workshop tools and equipment:
Only use tools and equipment for their intended purposes.

Never overload equipment such as hoists, jacks, axles stands or lifting slings. Damage caused by overloading is not always immediately apparent and may result in a fatal failure the next time the equipment is used.

Never use damaged or defective tools or equipment.

Always wear suitable eye protection when using grinding, chiselling or air guns.

Always wear a suitable breathing mask when using sand blasting equipment, working with asbestos based materials (such as brake linings) or using spraying equipment.

ALWAYS use approved safety platforms/gantries when working above ground level.