Maintenance Manual

R655 Mk IV Regenerative Air

Single Engine Suction Sweeper

From Manufacture Sequence No. 9021

Part No 7061600

Revision Level A

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1 Information

FOREWORD

The Johnston R655 Air Regen Sweeper represents the highest grade of craftsmanship and reliability that makes Johnston probably the world leader in sweeping technology.

This machine is designed for the removal of spoil on traffic or pedestrian areas, and litter collection using the Wanderhose [EN 13019 refers], and should only be driven by trained operatives.

This machine should not be used for sweeping hot or burning substances. In the unlikely event of a fire, normal powder or foam fire fighting equipment can be used on this product.

An operator should receive training in the follow elements:

1 Safety Observations/Notices
2 Transit driving
3 Correct use of body prop
4 In cab controls
5 External controls
6 Sweeping techniques
7 Load discharge
8 Gutter broom (gutter broom) setting changing
9 Nozzle (pick-up head) setting
10 Daily and weekly maintenance items
11 Driving/operation assessment
12 End of day cleaning of body and machine

Johnston Sweepers Limited can provide operator training upon request.

We would point out that it is the employers responsibility to carry out his own Risk Assessment on the equipment in his particular working environment and work application.

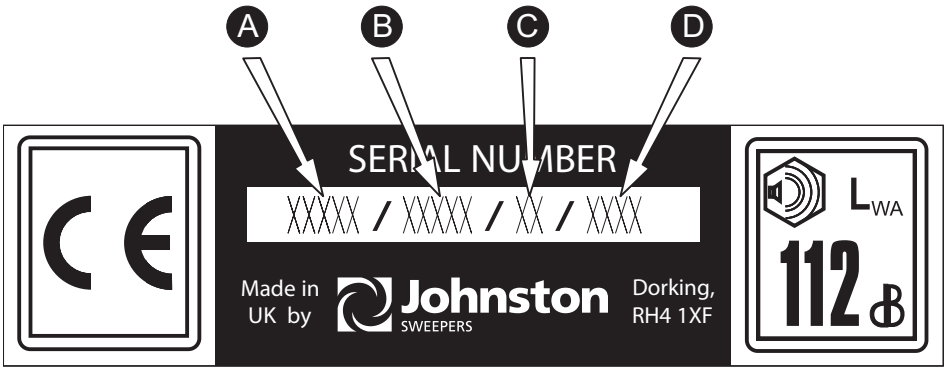
This handbook should be carefully studied. In it you will find instructions for the operation and maintenance of your JOHNSTON SWEEPER.

It is vitally important that the operator and maintenance staff have a copy of this book. The life of the machine will depend upon following these instructions in respect of regular maintenance and correct operating methods.

It is important that only GENUINE JOHNSTON SPARE PARTS are used when servicing and maintaining the sweeper. This is especially important for consumables, filters etc, as the use of non-genuine parts may cause premature failure and invalidation of warranty.

When carrying out maintenance or part replacement, additional explanatory illustrations can be found in the Parts Manual, which shows and lists hardware, and availability of spares with the orientation and positions of the various components.

REPLACEMENT PARTS



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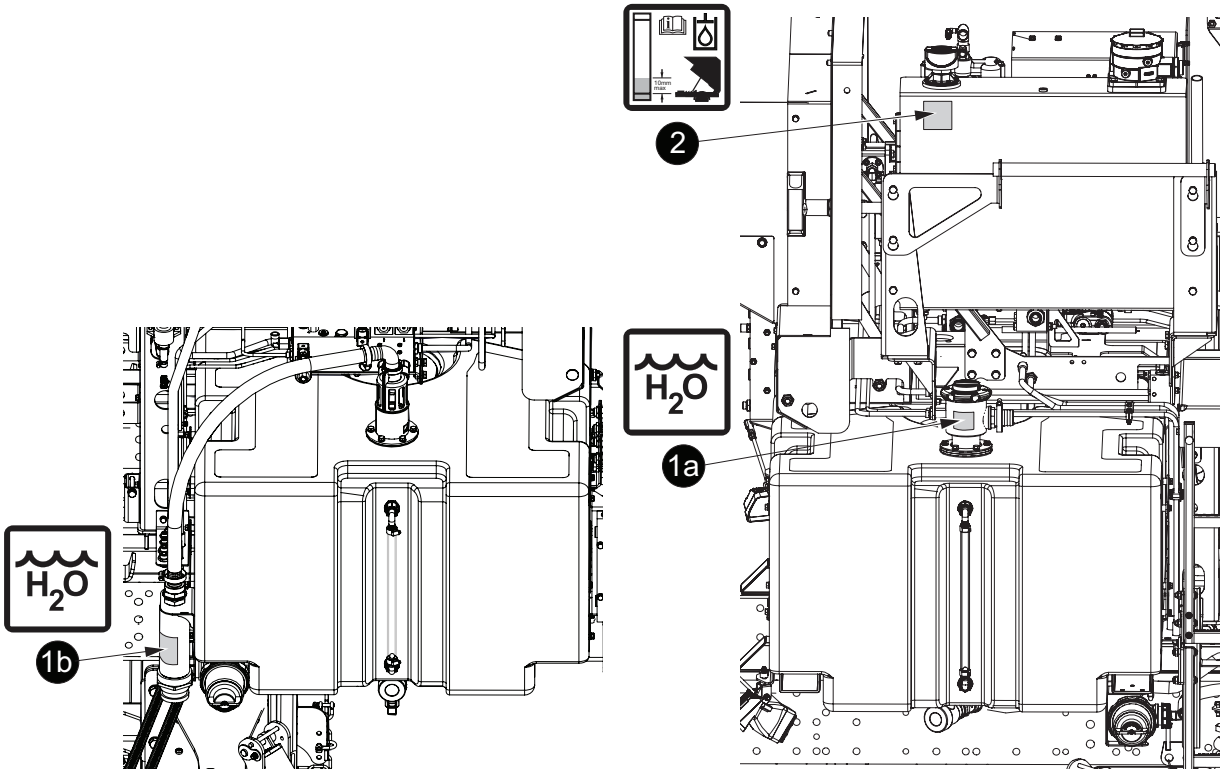
When making enquiries or ordering spare parts the Johnston Serial number should be quoted. The number will be found stamped on a plate similar to that shown below and attached to the rearmost cross-member of the subframe, below the rear door.

Serial number comprises of:

(A)	Model number	RT655 (example)
(B)	EQ number	XXXXXX
(C)	Year of manufacture	XX
(D)	Manufacture sequence number	XXXX

It is important that only GENUINE JOHNSTON SPARE PARTS are used when servicing and maintaining the sweeper. This is especially important for consumables, filters etc. as the use of non-genuine parts may cause premature failure and invalidation of warranty.

For the latest parts information please refer to our on-line interactive catalogues which are available through our E-Shop. To open an account, please follow the instructions on the Johnston Sweepers website: www.johnstonsweepers.com



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INTERNATIONAL SYMBOLS

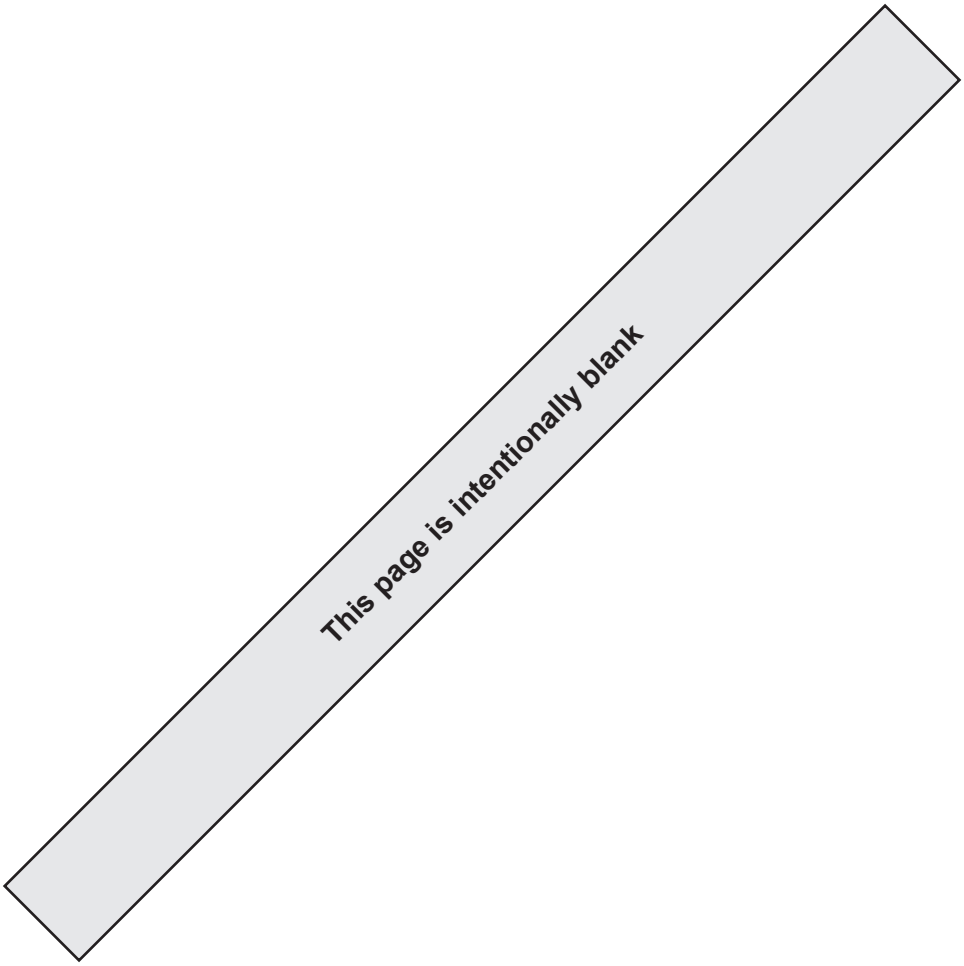
Conforming to ISO 3767

Graphical symbols are used to indicate the water and hydraulic oil tank filler ports.

Their location and descriptions are shown below.

Label	Description	
(1)	Water tank filler ports	**(1a)** = Hose Pipe **(1b)** = Hydrant
(2)	Hydraulic oil tank filler	

2 Safety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FOR YOUR SAFETY

Basic safety precautions are described in Section 3.

Important operating and safety information is marked with the following **SIGNAL** words:
NOTICE, CAUTION, WARNING and **DANGER.**

SIGNAL WORDS AND SYMBOLS ARE SHOWN AS FOLLOWS:-

SIGNAL WORD
Type and source of hazard.
Measures to be taken to protect against the hazard.

The **NOTICE** signal word does not have the triangle safety alert symbol.

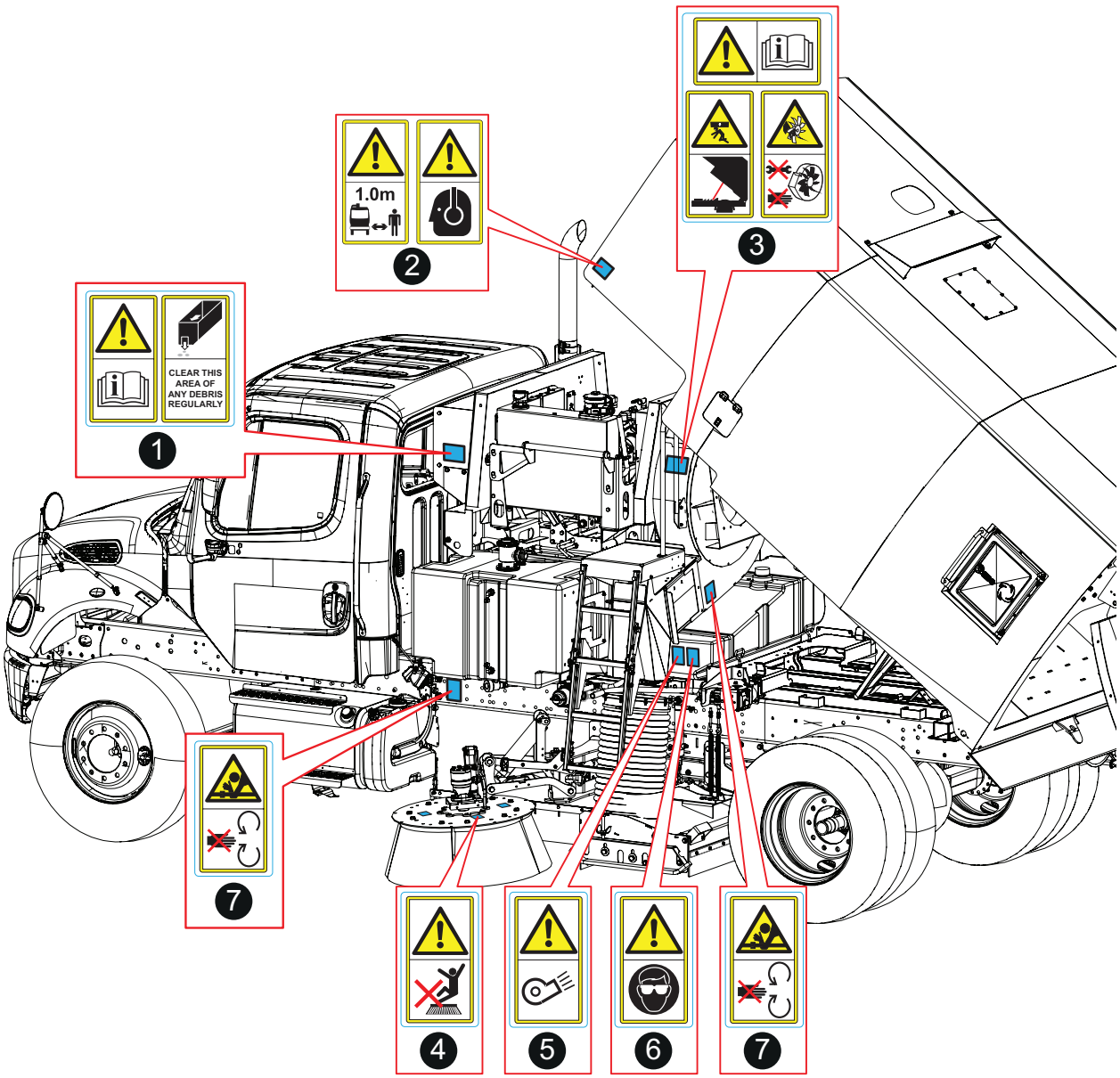
Meanings of signal words used with safety warnings (ISO 3864)

NOTICE: Indicates a hazardous situation with a risk of damage to equipment (ANSI Z535.6).

CAUTION: Indicates a hazardous situation with a low level of risk. Indicates a potentially hazardous situation which if not avoided may result in minor or moderate injury.

WARNING: Indicates a hazardous situation with a medium level of risk. Indicates an imminently hazardous situation which if not avoided could result in serious injury or death.

DANGER: Indicates an imminently hazardous situation with a high level of risk which if not avoided, will result in serious injury or death.


1.0m
CLEAR THIS AREA OF ANY DEBRIS REGULARLY
1
2
3
4
5
6
7
7

MACHINE WARNING LABELS

Label	Description
(1)	**CAUTION** Read Operator's Guide. Clear area of debris regularly
(2)	**CAUTION** Wear ear defenders when working in this area. Keep 1.0 clear of vehicle.
(3)	**WARNING** Read Operator's Guide. Crushing of whole body - force applied from above Body prop correctly engaged. Severing of fingers or hand - Impeller blade. Never reach in or drop tools into the fan case
(4)	**WARNING** Keep clear of brushes
(5)	**DANGER** Beware/keep clear of fan blast
(6)	**DANGER** Wear safety goggles when working in this area.
(7)	**DANGER** Arm entanglement. Never touch rotating shaft.

NOTICE:
Ensure that all safety labels are always kept clean and visible.
Replace any missing or illegible safety labels.
Ensure any safety labels are affixed to replacement parts as required.

3 Scheduled Maintenance

SECURITY OF EQUIPMENT

As part of the maintenance programme it is recommended to check the security of various components (see 'B' Service in Operators Guide).

FA-0051 Tightening Torque

Zinc Plated or Dacromet Bolts/setscrews & Nuts (Friction coefficient 0.12 assembled dry) or
Stainless Steel (Friction coefficient 0.1 assembled lubricated with Molycote grease)
Generally bolts and nuts of the same grade material are used together.

Bolts with metric coarse thread

Thread	Property Class			
	4.8/5.6 Steel	8.8 Steel	10.9 Steel	12.9 Steel
	-	A1- 50 S/S	A2-70 S/S	A4- 80 S/S
M 2	0.13 Nm	0.35 Nm	0.5 Nm	0.6 Nm
	-	0.1 Nm	0.23 Nm	0.3 Nm
M 3	0.60 Nm	1.3 Nm	1.8 Nm	2.1 Nm
	-	0.4 Nm	0.8 Nm	1.1 Nm
M 4	1.4 Nm	3.0 Nm	4.5 Nm	5.0 Nm
	-	0.86 Nm	1.85 Nm	4.0 Nm
M 5	2.8 Nm	6 Nm	8.5 Nm	10 Nm
	-	1.6 Nm	3.6 Nm	4.8 Nm
M 6	4.3 Nm	10 Nm	16 Nm	20 Nm
	-	2.9 Nm	6.3 Nm	8.5 Nm
M 8	11.5 Nm	25 Nm	35 Nm	40 Nm
	-	7.1 Nm	15 Nm	20 Nm
M 10	23 Nm	48 Nm	70 Nm	80 Nm
	-	14 Nm	30 Nm	40 Nm
M 12	40 Nm	84 Nm	120 Nm	140 Nm
	-	24 Nm	50 Nm	70 Nm
M 14	60 Nm	135 Nm	195 Nm	230 Nm
	-	38 Nm	82 Nm	110 Nm
M 16	95 Nm	205 Nm	300 Nm	355 Nm
	-	58 Nm	125 Nm	165 Nm
M 18	130 Nm	290 Nm	420 Nm	485 Nm
	-	82 Nm	175 Nm	235 Nm
M 20	185 Nm	410 Nm	580 Nm	680 Nm
	-	115 Nm	245 Nm	375 Nm
M 22	250 Nm	560 Nm	800 Nm	940 Nm
	-	157 Nm	337 Nm	450 Nm
M 24	320 Nm	710 Nm	1000 Nm	1180 Nm
	-	-	-	-
M 27		1050 Nm	1480 Nm	1750 Nm
	-	-	-	-
M 30		1420 Nm	2030 Nm	2380 Nm
	-	-	-	-

Bolts with metric fine thread

Thread	Property Class		
	8.8 Steel	10.9 Steel	12.9 Steel
M 8 x 1	25 Nm	35 Nm	45 Nm
M 10 x 1,25	50 Nm	75 Nm	85 Nm
M 12 x 1,25	90 Nm	135 Nm	155 Nm
M 12 x 1,5	90 Nm	125 Nm	150 Nm
M 14 x 1,5	140 Nm	205 Nm	245 Nm
M 16 x 1,5	215 Nm	320 Nm	370 Nm
M 18 x 1,5	325 Nm	460 Nm	545 Nm
M 20 x 1,5	450 Nm	645 Nm	755 Nm
M 22 x 1,5	610 Nm	870 Nm	1020 Nm
M 24 x 2	765 Nm	1095 Nm	1280 Nm
M 27 x 2	1150 Nm	1600 Nm	1950 Nm
M 30 x 2	1600 Nm	2250 Nm	2700 Nm

These torques apply unless specified on the drawing.

For steel bolts used in conjunction with aluminium parts the follwing rule applies:

Use the next lower value from the column for property class 10.9.

This directive is valid for all thread diameters and grades.

(e.g. M10 grade 10.9 bolt clamping aluninium parts should be torque to 35 Nm not 70 Nm)

Version 00 25/10/2010

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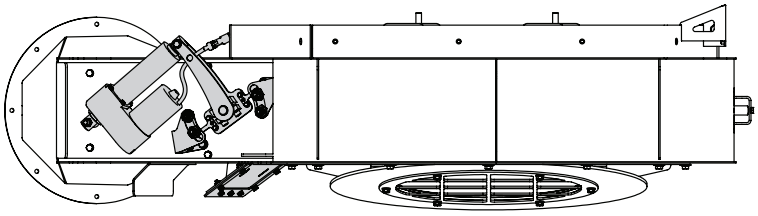
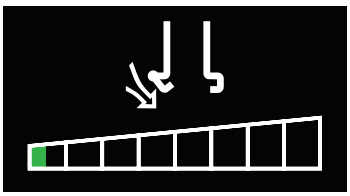
VEG GATE SET UP

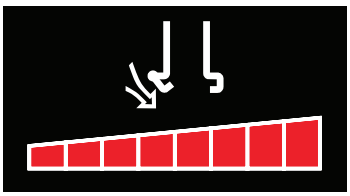
If the VEG gate actuator / fan case or VEG gate door are replaced, it is essential to ensure that they are set up correctly to give the correct machine performance. The actuator is positioned on top of the fan case.



The actuator controlling the VEG gate has an in built potentiometer and is preset to correctly detect the VEG gate position.



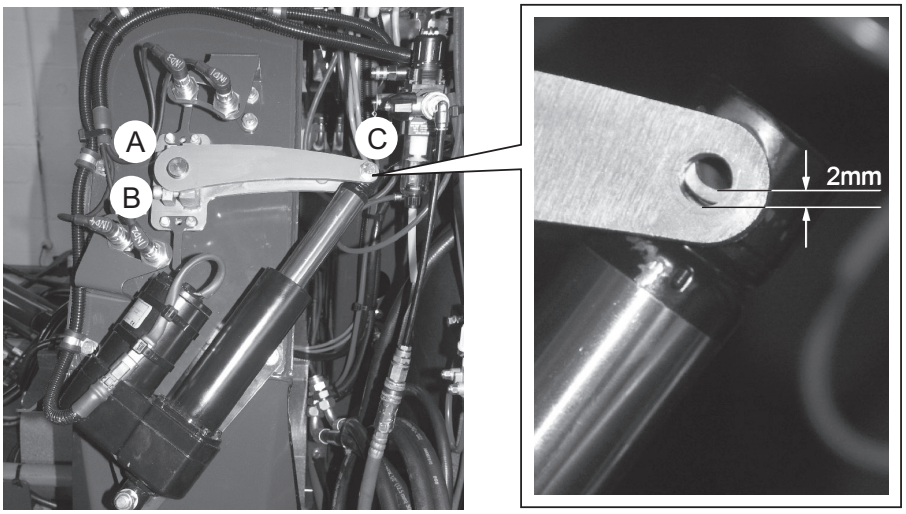
Actuator fully retracted - Full Vacuum



Actuator fully extended - Full Regen

NOTICE: Do not rotate the actuator by hand if removed from the machine, or allow to rotate at the end of its stroke. This will disrupt the resistance values and give incorrect readings.

Mechanical Adjustment for VEG Gate Actuator



- Disconnect and remove bolt (**C**).
- Hold the actuator spindle and activate the actuator to its maximum stroke. Ensure no rotation at the end of stroke.
- Adjust bolts (**A**) and (**B**) to give a parallel gap between the clamping blocks of the lever arm and secure to the pivot shaft.
- Hold the lever arm in its raised position ensuring the flap is fully closed.
- Align the hole in the lever arm together with the hole in the spindle of the actuator.
- Adjust the bolts (**A**) and (**B**) so that the hole in the lever arm is lower than the hole in the spindle of the actuator by approximately 2mm. This will ensure the flap is secure in it's closed position.
- Loosen (**A**) and tighten (**B**) the lever arm will lower.
  Loosen (**B**) and tighten (**A**) the lever arm will raise.

HYDRAULICS

CAUTION: Before changing the filter ensure the oil is cold.
Before removing the return filter. Ensure no pressure is present by allowing the system to rest for a short time after turning off the equipment.

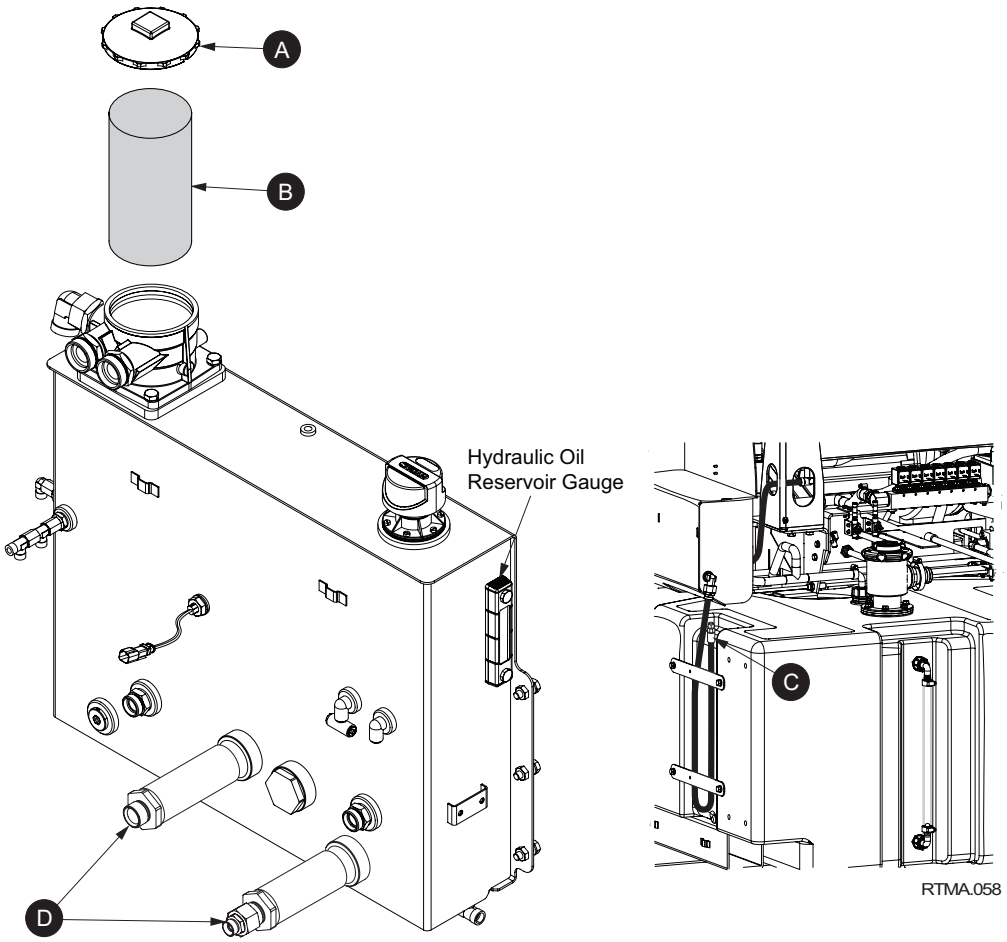
Hydraulic Oil Reservoir

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 on the JVM whilst the suction fan is operating, then the filter is contaminated and requires changing at an earlier interval.

Renewing the Return Filter

Unscrew cover **(A)** and lift out the cartridge element **(B)**. Fit new cartridge and screw on the cover



Renewing the Suction Filters

Note: Drain Oil Before Removing Suction Filters.

The oil can be drained by removing the drain plug **(C)** located under the systems locker or by using a propriety vacuum pump or oil extractor/syringe.

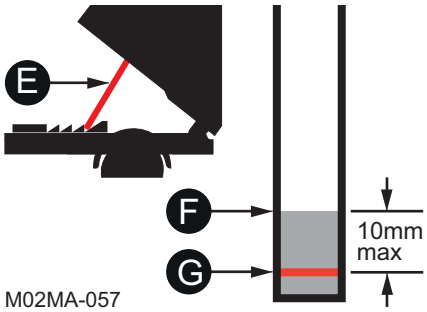
The filters **(D)** should be changed whilst the system is empty.

System Refilling

The system capacity dry is 75 litres.

Raise the body and engage the body prop **(E)** in its highest position. The level **(F)** should be 10mm above the lower red line **(G)** on the gauge.

It is important that the correct level is maintained as under filling can adversely affect the heat dissipation rate of the oil, whilst over filling can cause oil to overflow when the body is lowered.



Hydraulic Cylinder Maintenance

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

PNEUMATICS

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

Filter Regulator Unit

Comprises of a combined air filter/pressure regulator (A) and a lubrication unit (B). It is mounted in the engine Powapak on the right hand side of the machine.

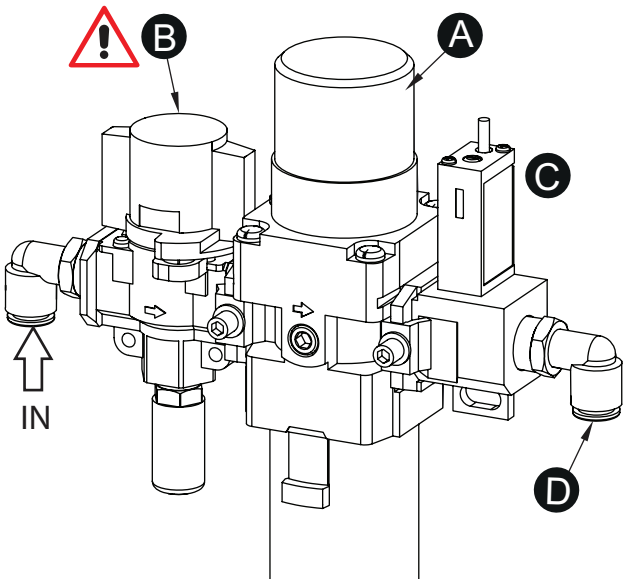
The Air Filter Regulator Unit incorporates the following features;-

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

(**B**) Isolation/drain valve, automatically dumps accumulated water when the machine is shut down or when the air supply is isolated by the shut off valve

(**C**) Pressure switch is fitted to illuminate the low air pressure warning lamp on the control panel.

(**D**) Service connection enabling the system to be charged using a workshop air supply.



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.

BODY/COWL

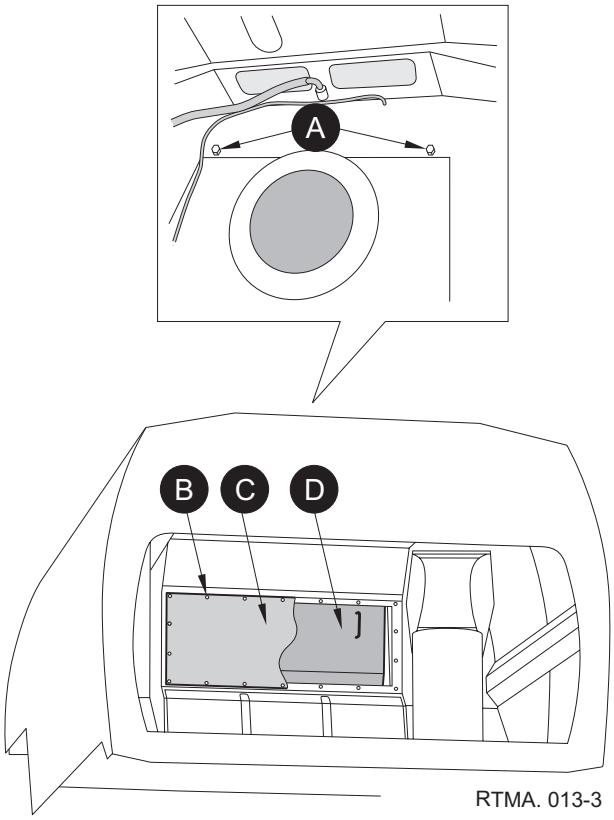
SEPAVAC

Raise the body and remove the 2 bolts (**A**) in the body front. Remove the screws (**B**) retaining the cover (**C**) over the SepaVac.

With the panel removed the SepaVac door (**D**) can be lifted out for inspection, providing bolts (**A**) have been removed.

Check that all parts are in good repair and replace if worn, and that the chamber is clean of debris.

Refit procedure is the reverse of the above.
Apply sealant to the cover (**C**) when refitting.



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CLEANING THE VEHICLE

WARNING:
The use of safety goggles is recommended in case of deflected spray/debris.

NEVER direct a high pressure nozzle at the skin as the fluid may penetrate the underlying tissue etc. and cause serious injury.

NOTICE:
Care MUST be taken not to damage sign written areas when cleaning.
See special notes for cleaning vehicles with vinyl livery below.

ALWAYS keep pressure equipment in good condition and regularly maintained, particularly at joints and unions.

Special notes for cleaning vehicles with vinyl livery or reflective markings

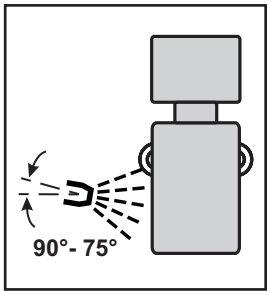
The Supawash handlance or similar can be used for cleaning areas of the vehicle with vinyl or reflective markings subject to the following precautions being taken

The spray pattern should be a wide fan pattern

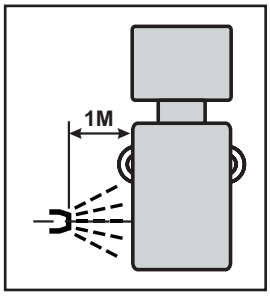
The nozzle pressure should be 80 bar (1000PSI) max

The water temperature should not exceed 60 ºC

Do not use acid or solvent cleaning solutions



The spray angle should be maintained between 90 and 75 degrees to the panel

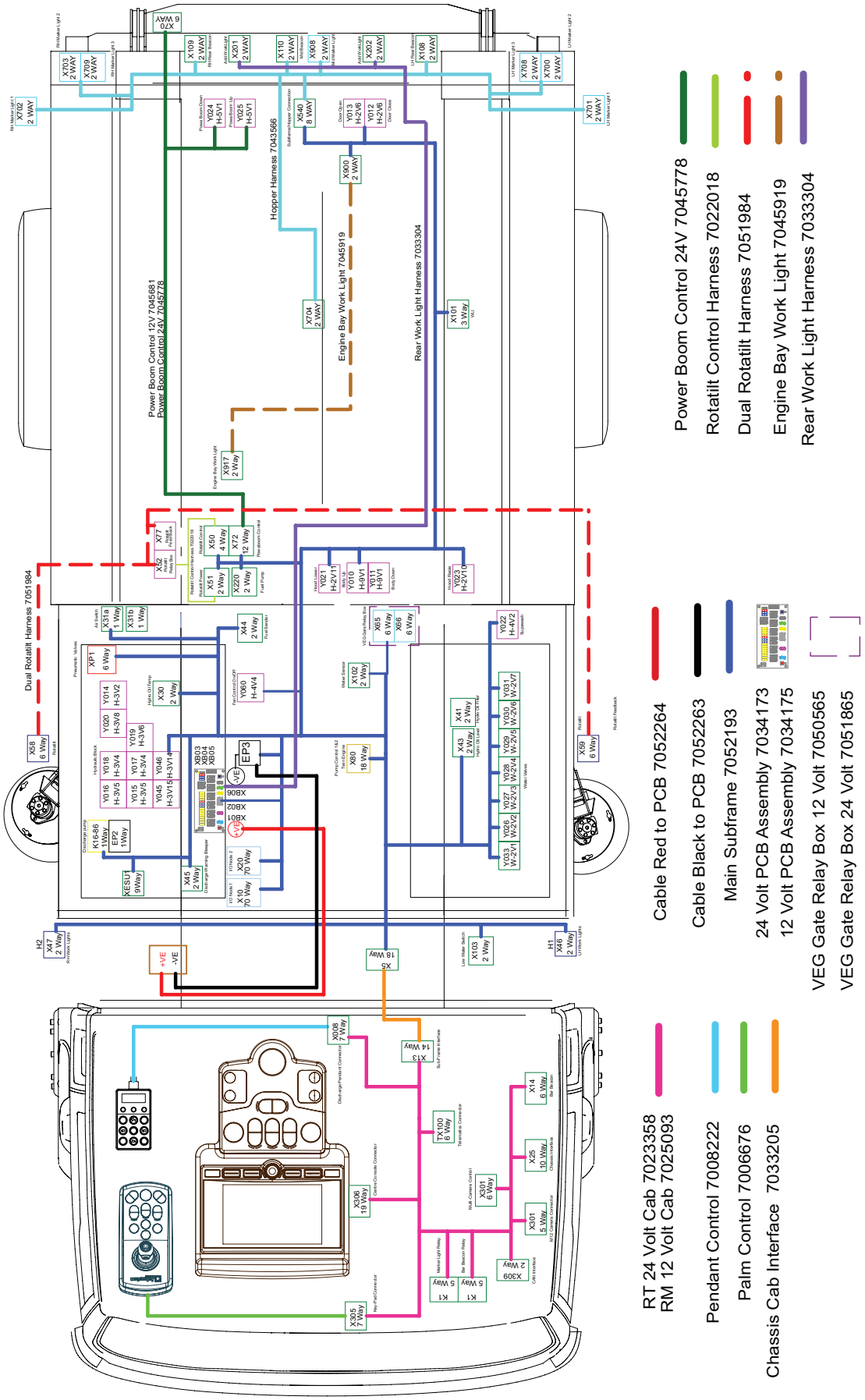


The nozzle distance should be greater than 1 metre minimum from the panel

Alternative Methods

Clean with a sponge or soft cloth using cold or warm water with a soap or detergent, followed by a cold water rinse

HARNESS LOCATIONS



4 Hydraulic System

HYDRAULIC SYSTEM - INTRODUCTION

CAUTION: Do not remove any hydraulic components without first ensuring that any residual pressure has decayed. If in doubt ask.

NOTICE: Only competent trained personnel should work on this equipment.

General Description

The hydraulic system can be divided into two circuits, for use with or without the PTO. The system that uses the engine is used for sweeping; the system for use without the engine is used for discharging the load, or lifting the body in case of PTO failure.

Options are available which easily integrate into the hydraulic system, such as Supawash, and Rear Mounted Hydraulic Wanderhose.

CIRCUIT PRESSURES

Test points

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

Identification	Function
H-8Z2	Main system relief – 200 Bar/Hopper Lower 80 Bar
H-3Z3	Gutterbroom pressure reducing valve 30 bar
H-3Z4	Gutterbroom pressure reducing valve 30 bar
H-3Z2	Sweep manifold Test Point
H-4Z2	Supawash Pump – 220 Bar
H-5Z2	Rear Wanderhose/Powaboom – 50 Bar

Sweeping System

Body Raise

Connect a suitable 250 bar gauge to test point H-8Z2 on the body raise/ lower block on the LH side of the machine.
Lift the body and engage body prop on the first subframe position
Start the engine and run at low idle
Using the control pendant open the rear door, then close the rear door.
Check the pressure when locking, and adjust relief valve H-8V3 on the discharge block to 200bar.
Do not run the pressure test for more than 20 seconds.

Body Lower

Connect a suitable 250 bar gauge to test point H-8Z2 on the body raise/ lower block on the LH side of the machine.
Lift the body and engage body prop on the first subframe position
Start the engine and run at low idle
Using the control pendant, power the body down against body prop
Check the pressure and adjust relief valve H-9V2 on the discharge block to 80bar.
Do not run the pressure test for more than 20 seconds.

Sweeping System

Gutterbroom:

NOTE: If Gutterbroom Extension Override (GEO) is not fitted, manual override of hydraulic valve H-3V4 B (Y-018) (RH) and H-3V5 B (Y-016) (LH) is necessary.
Each Gutterbroom has a pressure reducing valve on the annulus side of the cylinder.

Connect a suitable 50 bar gauge to test point H-3Z3 and then H-3Z4
Start the engine and run at low idle
Switch on the RH Gutterbroom. Then extend out the RH Gutterbroom to maximum. Continue to power it out.
Check the pressure and adjust relief valve H-3V12 (RH) to 30 bar.
To check LH Gutterbroom, stow RH, remove test point, place it on LH side (H-3Z4) and repeat test.
Do not run the pressure test for more than 20 seconds.

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

Sweeping System

Supawash / Front Brush Option Pressure:

First remove the hose from port MA on the Supawash block located on the LHS of the Subframe in front of the centre cross-member. Plug port MA and plug the end of the hose.

Select option 3 from menu 4.12 and follow the on screen prompts:

Connect a suitable 250 bar gauge to test point H-12Z2 on the Supawash block. Once connected, acknowledge this by pressing the rotary encoder on the display.

Start the engine and run at the appropriate speed and acknowledge by pressing the rotary encoder on the display.

Check pressure and adjust if required relief valve H-12V2 on the Supawash block to 220bar.
Acknowledge the pressure is set by pressing the rotary encoder on the display.

Reconnect the hydraulic hose.

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

Powaboom / Rear Wanderhose Option Pressure

Select option 4 from menu 4.12 and follow the on screen prompts:

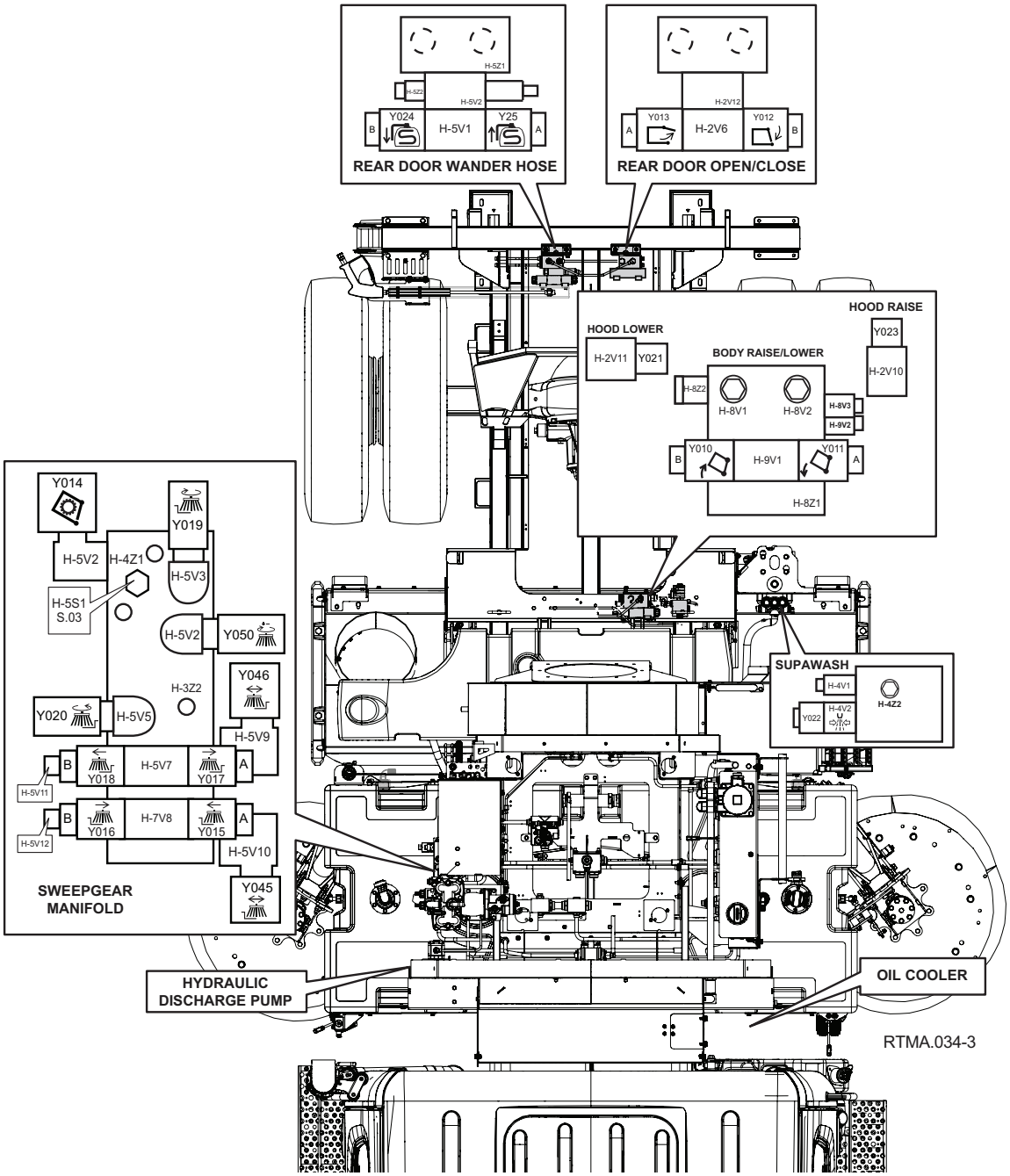
Connect a suitable 250 bar gauge to test point H-14Z2 on the Powaboom block located on the RHS of the Subframe rear cross-member. Once connected, acknowledge this by pressing the rotary encoder on the display.

Start the engine and run at the appropriate speed and acknowledge by pressing the rotary encoder on the display.

Check Hydraulic Pressure Powaboom

Check and adjust if required relief valve H-14V2 (See Hydraulic Circuit Sheet 10 C-3)
Acknowledge the pressure is set by pressing the rotary encoder on the display.

Reconnect the hydraulic hose.

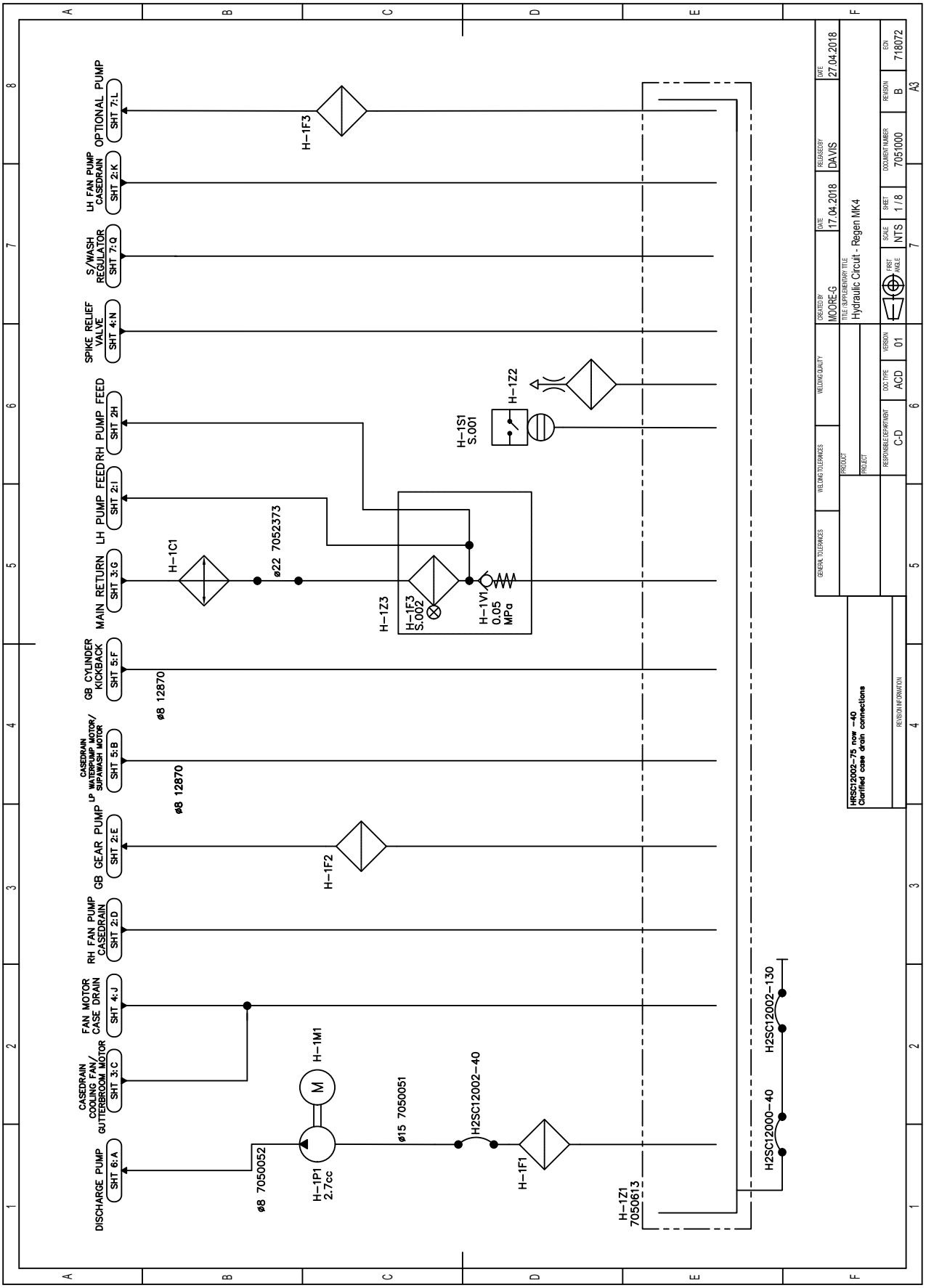

REAR DOOR WANDER HOSE
REAR DOOR OPEN/CLOSE
HOOD RAISE
HOOD LOWER
BODY RAISE/LOWER
SUPAWASH
SWEEPGEAR MANIFOLD
HYDRAULIC DISCHARGE PUMP
OIL COOLER
RTMA.034-3

VALVE IDENTIFICATION

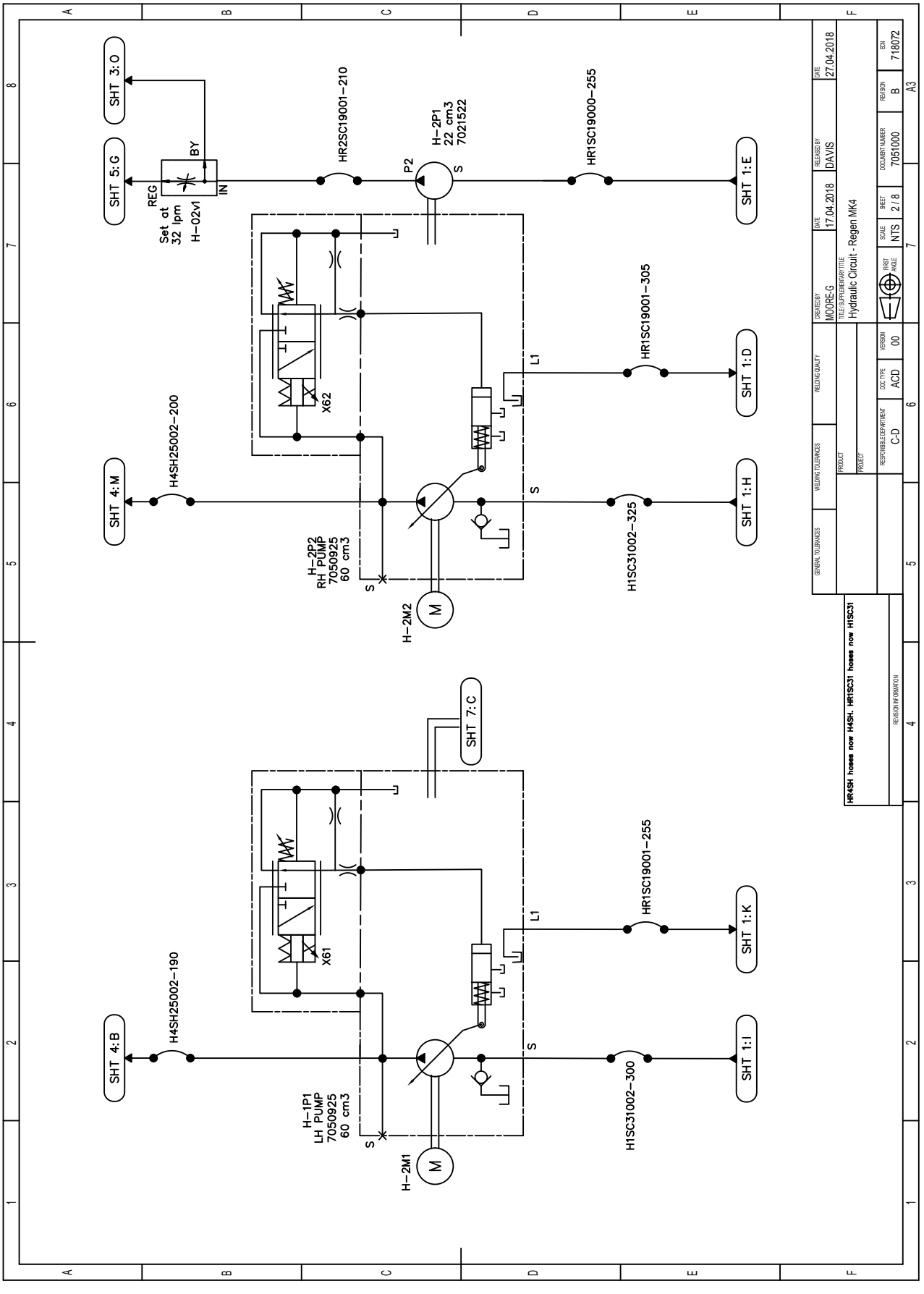
Hydraulic Valve Sweepgear Block

VALVE	ID	FUNCTION
H-3V2	Y014	LOAD DISCHARGE ACTIVE
H-3V6	Y019	L/H GUTTER BROOM MOTOR
H-3V5-A	Y015	L/H GUTTER BROOM OUT
H-3V5-B	Y016	L/H GUTTER BROOM IN
H-3V15	Y045	L/H GUTTER BROOM LOCK
H-3V8	Y020	R/H GUTTER BROOM MOTOR
H-3V4-A	Y017	R/H GUTTER BROOM OUT
H-3V4-B	Y018	R/H GUTTER BROOM IN
H-3V14	Y046	R/H GUTTER BROOM LOCK
-	Y050	GUTTER BROOM SPEED CONTROL

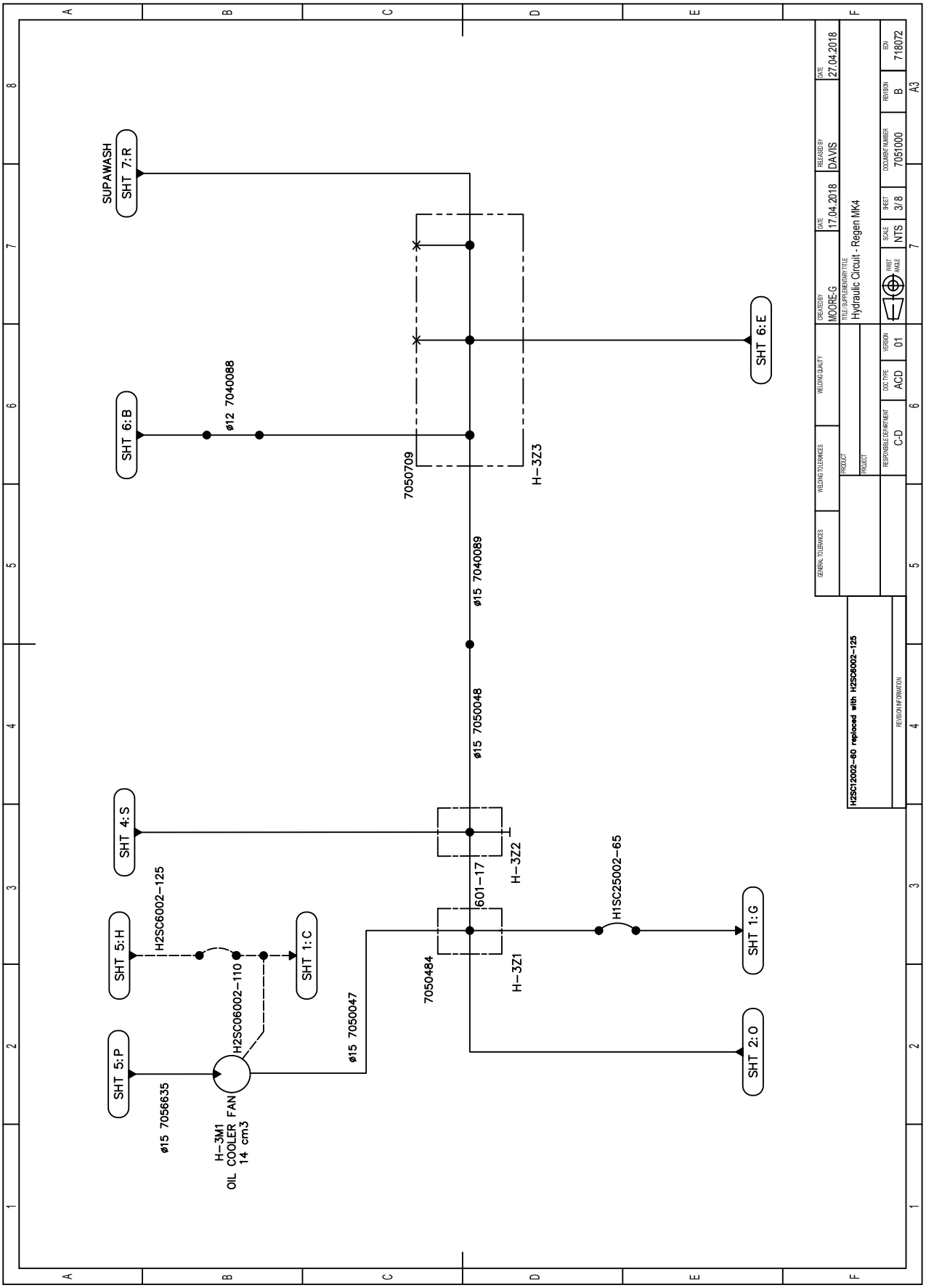
Hydraulic System - Sheet 01/08 Rev B



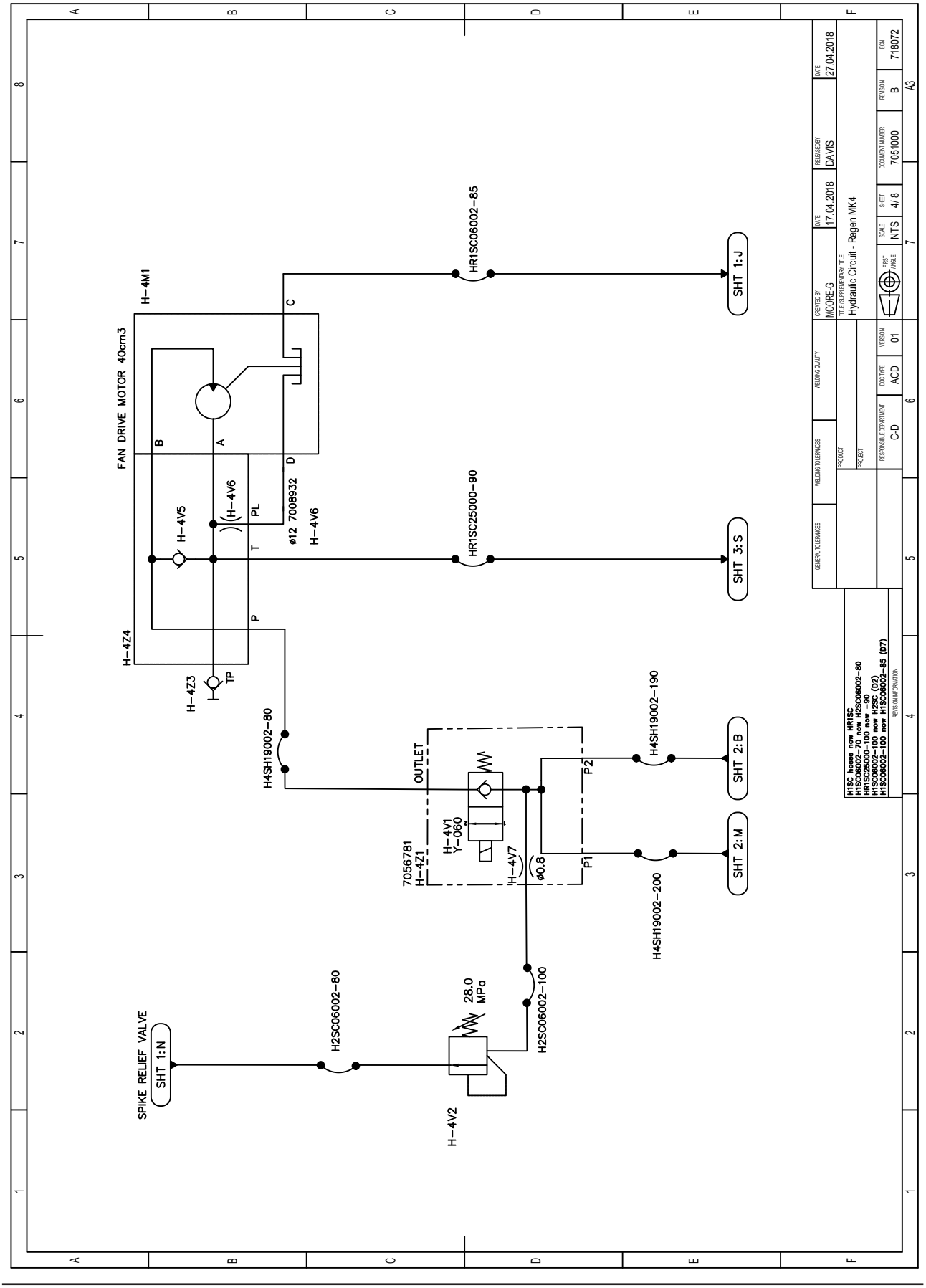
Hydraulic System - Sheet 02/08 Rev B



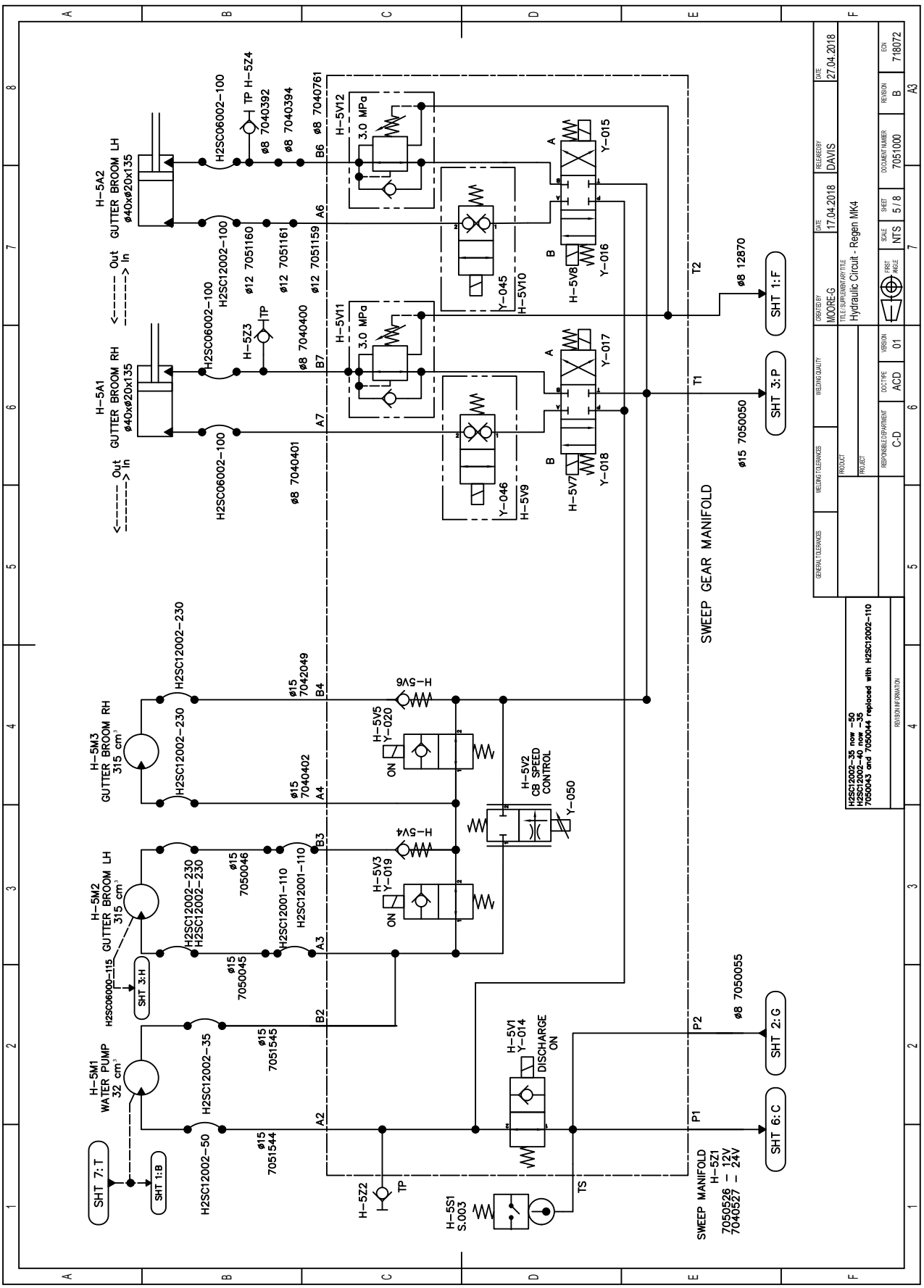
Hydraulic System - Sheet 03/08 Rev B



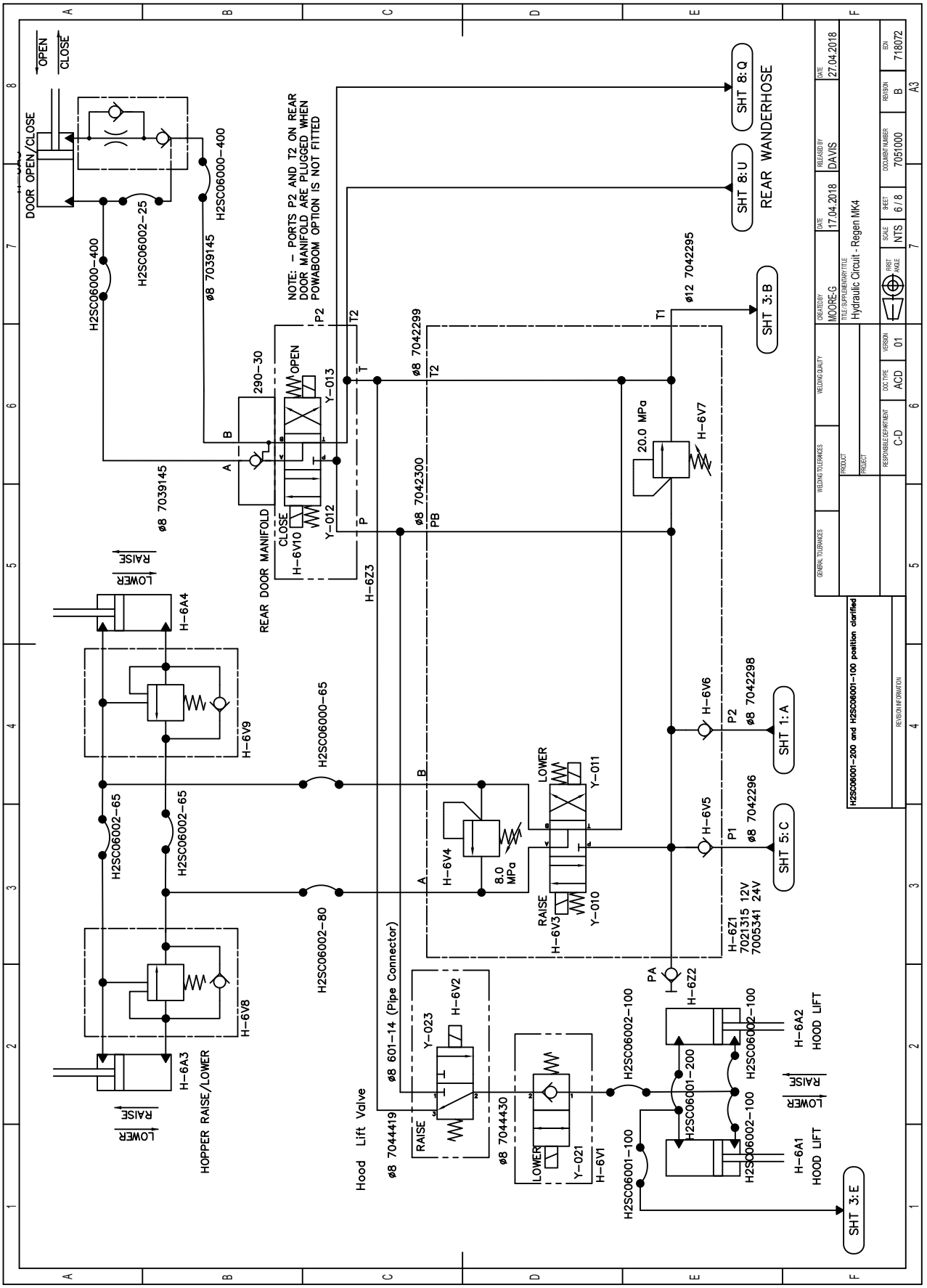
Hydraulic System - Sheet 04/08 Rev B



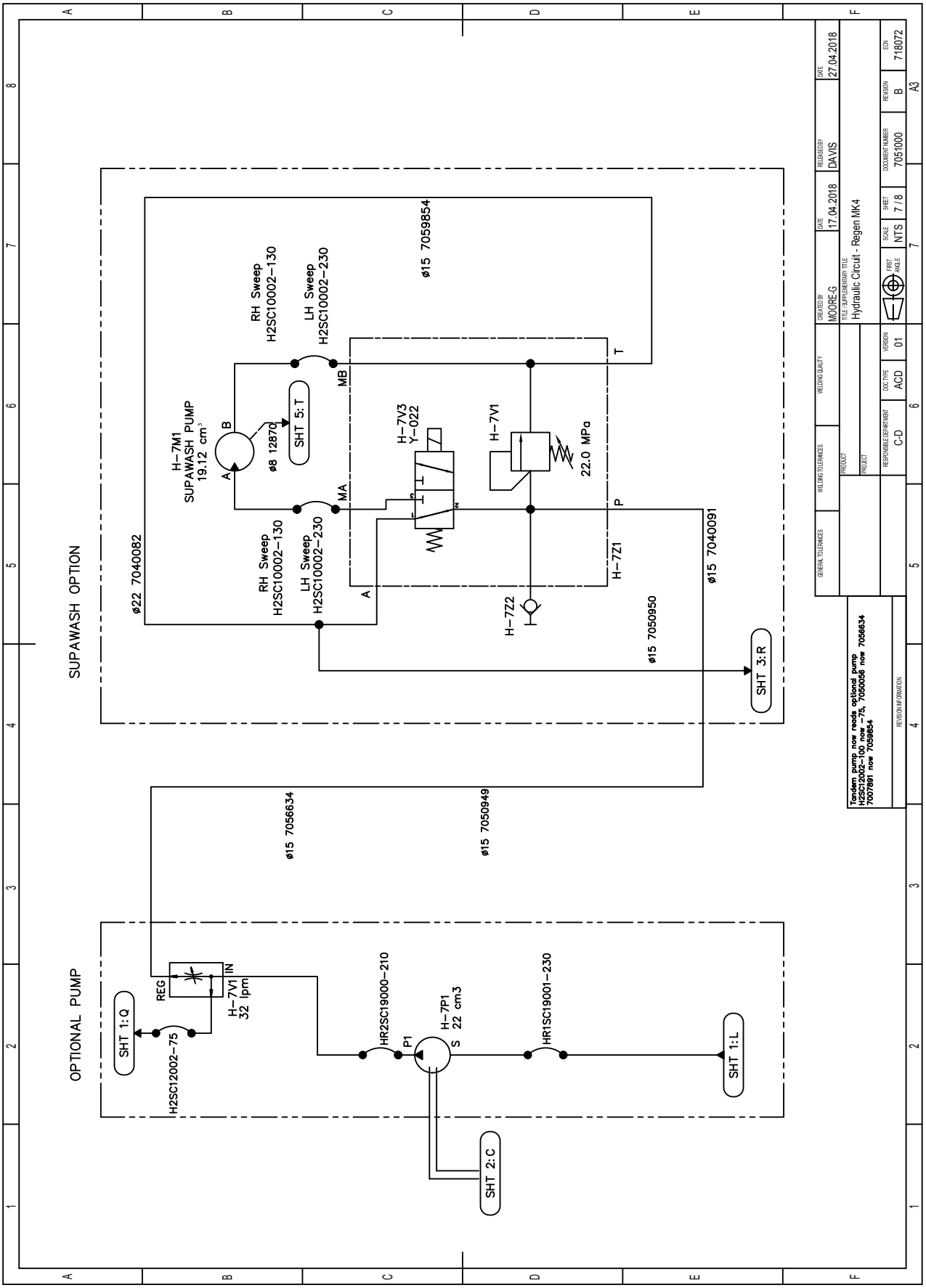
Hydraulic System - Sheet 05/08 Rev B



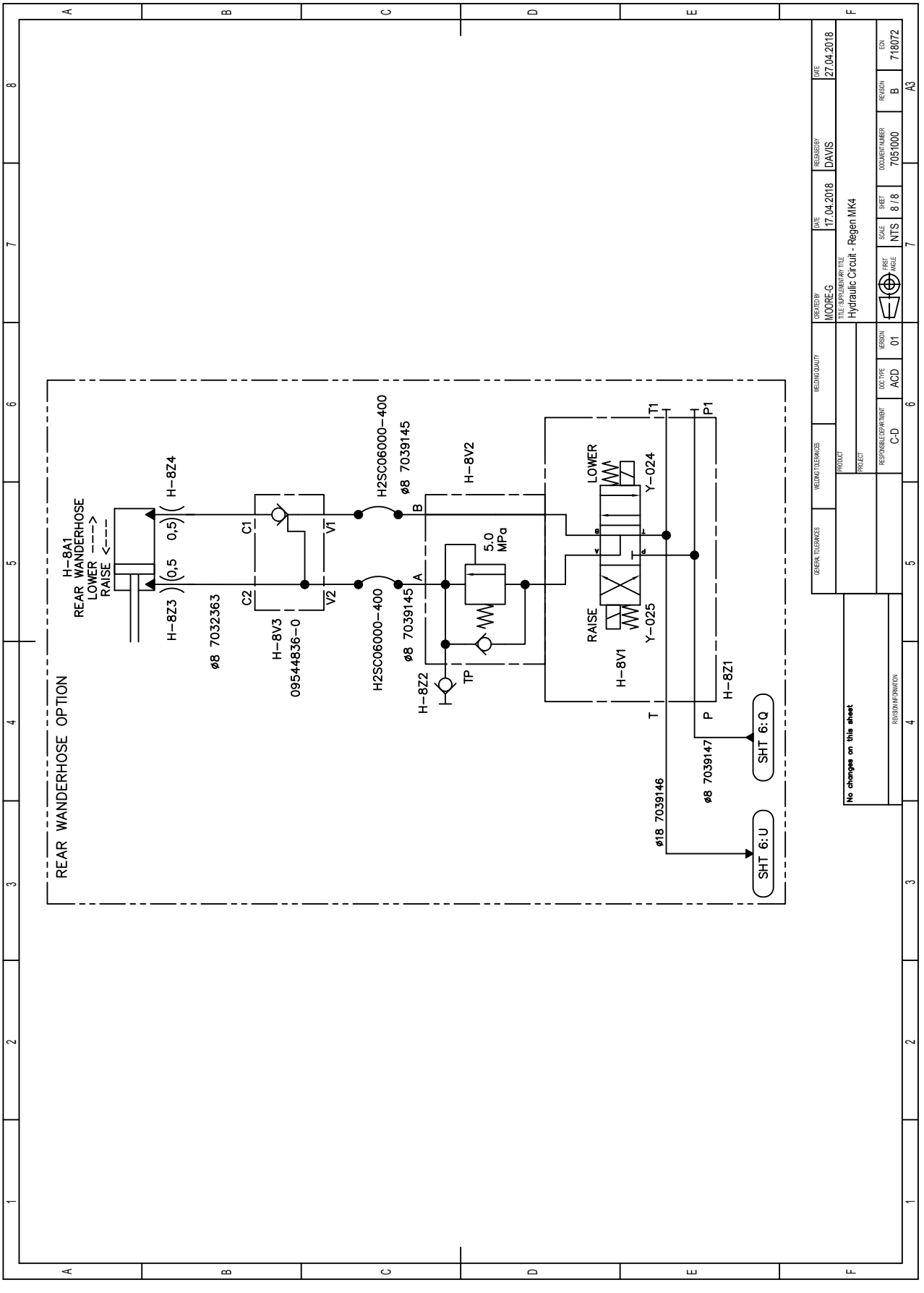
Hydraulic System - Sheet 06/08 Rev B



Hydraulic System - Sheet 07/08 Rev B



Hydraulic System - Sheet 08/08 Rev B



5 Electrical System

INTRODUCTION

General Description

The system is integrated with that of the chassis in that it shares its battery and power source. The system activates all operational functions of the machine.

System Description

The electrical system circuit diagrams are sub divided into modular sub circuits all of which use the same identification number ending with a revision alpha code, i.e. **A, B, C** etc. All circuit diagrams are up-issued simultaneously irrespective to change, so they will all display the identical alpha code.

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.

ELECTRICAL SYSTEM

General Description

The electrical system circuit diagrams are sub divided into modularised sub circuits all of which use the same identification number ending with a revision alpha code, i.e. A, B, C etc. All circuit diagrams are up-issued simultaneously irrespective to change, so they will all display the identical alpha code.

System Description

The system comprises of CAN controlled push button operator keypads, I/O nodes with inputs,digital outputs and PWM based outputs, and the main visual controller, the JVM.

A PCB in the system locker has integrated relays for high current draw functions such as beacons and work lights, with additional relay boxes for the VEG and Rotatilt linear actuators.

There is CAN communication to the chassis to receive information such as engine speed, fuel rate etc.

All solenoid valves connectors are by purpose weatherproof incorporating status tell-tale LEDs. The wiring is fully protected within conduit, colour coded and fuse protected.

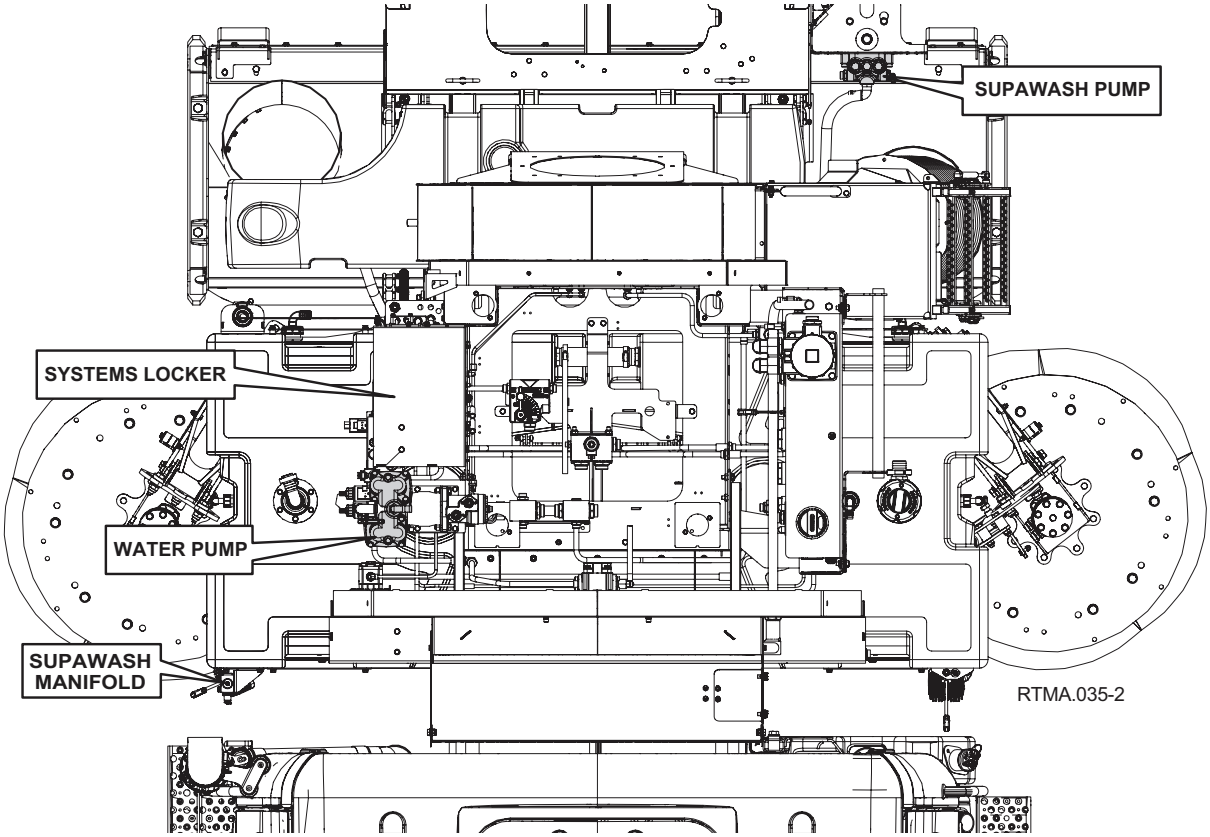
To assist fault finding and troubleshooting, the solenoids have an LED in the electrical connection plug which illuminate when power is achieved.

The main feed from the battery to the electrical system is protected by a maxi power fuse 60 amp mounted to the battery terminal.

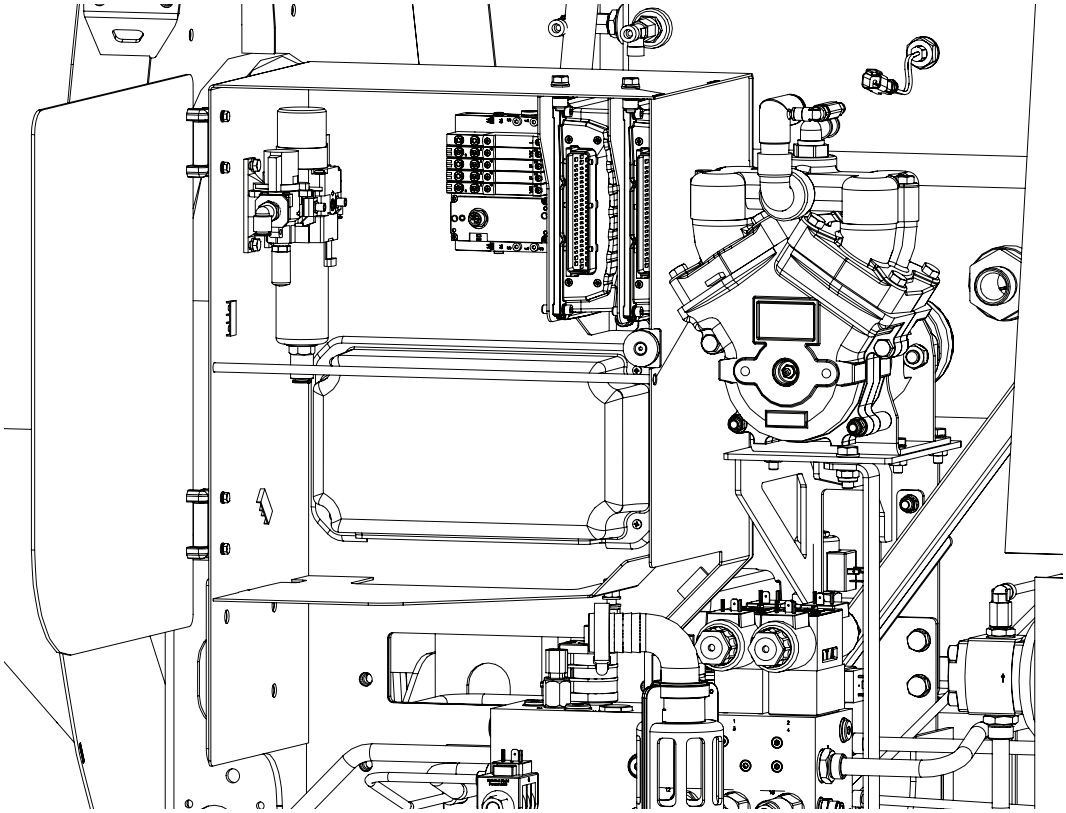
NOTE: A wiring schematic pdf, with hyper-links to aid fault finding, is included on the Technical Manual CD supplied with this machine.

COMPONENT IDENTIFICATION

Miscellaneous Components



Systems Locker



JVM (JOHNSTON VISUAL MODULE)

Engine/Chassis Control

CANbus J1939

CAN stands for Controller Area Network. It represents dedicated wiring that connects the control units of a vehicle (ECU). For the V Range sweepers the J1939 CANbus connects the PTO ECU to the in cab Centre Console allowing control of engine RPM and other engine data to be exchanged.

The system permits the vehicle's various on-board electronic systems to instantaneously exchange huge amounts of data.

It represents a two-way communication system that is widely used in vehicles, mainly due to the reduction in the number of conductors and the amount of interference.

System CAN - CANOPEN

CANopen is also a CAN based higher layer protocol as is J1939.

It provides a standardized network which can be fully customised with "off the shelf" controllers for high speed communication with limited wiring required.

It is already used in numerous applications including machine control, maritime and power generation as well as off-road vehicles.

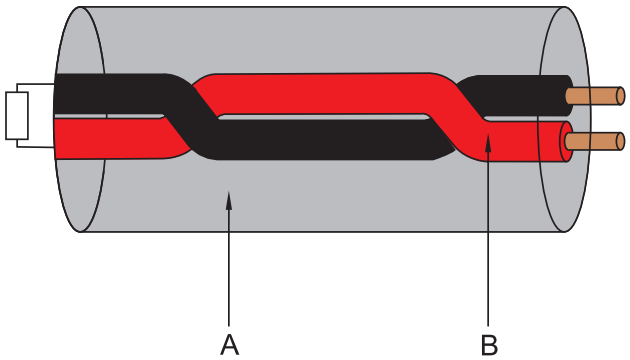
CANopen used on the roadsweeper application allows for a finite and customized control of the sweeper, as well as providing clear visual display of operation and data capture to monitor sweeper use and performance.

CAN Line Setup

The cable used for the 'CAN' line fitted on the vehicle is a twisted pair of cables (**B**).

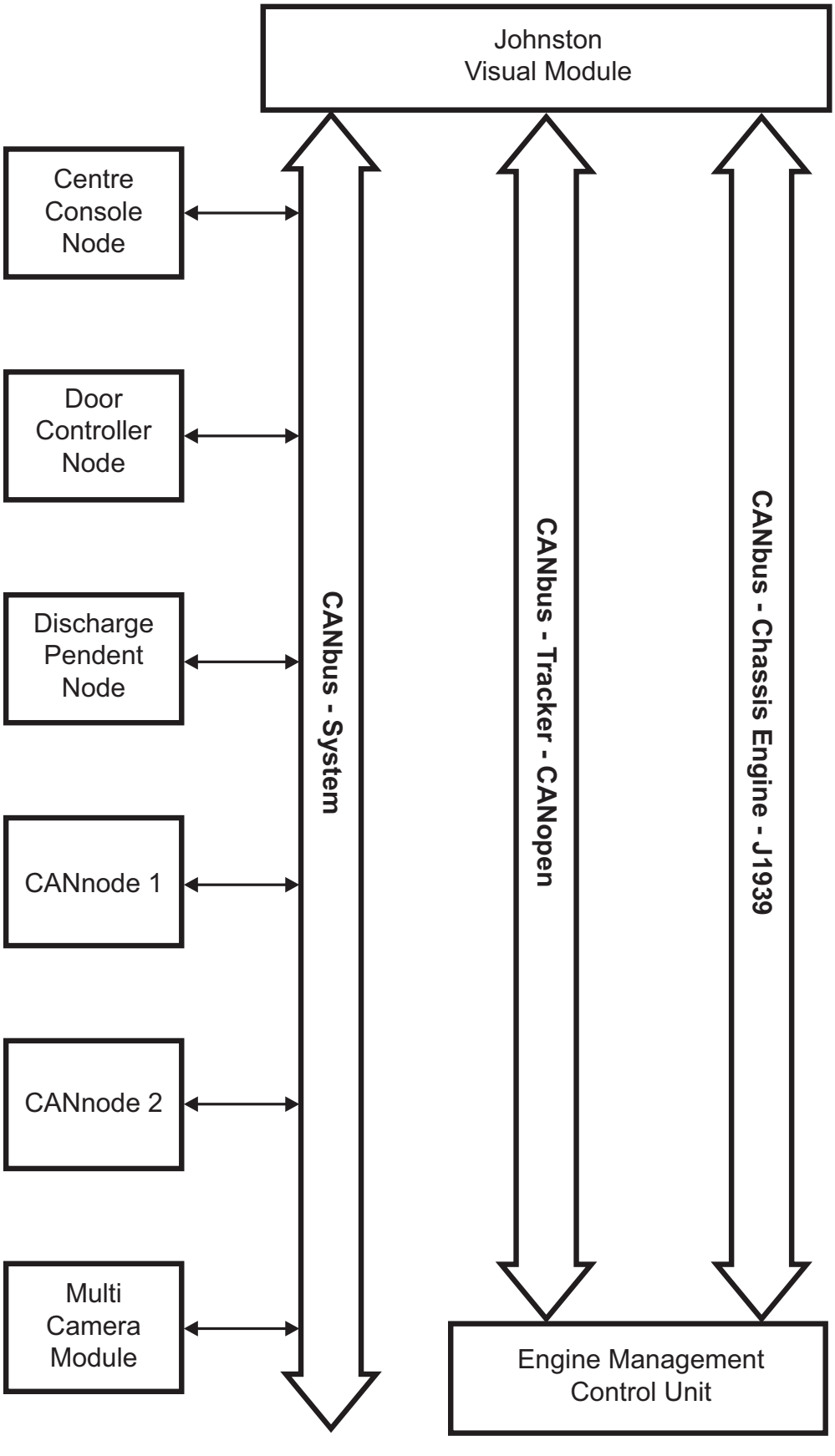
It has these characteristics in order to eliminate any electrical disturbance on the signals.

The sheathing (**A**) is grey in colour.



M02OG-107

VDB COMMUNICATION LINE SCHEMATIC



M02OG118b

HOW TO UPDATE CONTROL SYSTEM SOFTWARE

Step One: Prepare USB Flash Drive

1.1. Obtain the “RegenMK4-SWPACK-A.zip” from Johnston Customer Service at: http://www.johnstonsweepers.co.uk/after-sales/software_updates.php

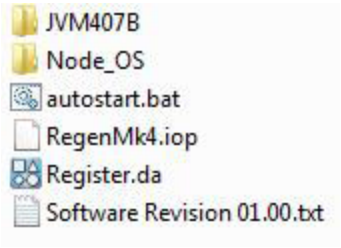
The last digit of the file name will indicate the Software Pack Revision level.
For example: RegenMK4-SWPACK-A.zip = **Revision level A**.

1.2. Unzip the file: “RegenMK4-SWPACK-A”

1.3. Erase ALL data contained on the USB Flash drive (Part No: 7022225) see below.

1.4. Add the contents of the folder “TMS_SoftwareServicePackage_*partnumber_x*.zip” to the USB flash drive.

1.5. Check to ensure that the USB flash drive file structure is identical to the image shown below.

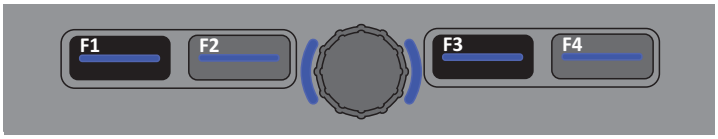


Step Two: Software Download

2.1. Ensure the ignition is off.

2.2. Carefully open the rubber cover on the front of the JVM to expose the USB port.

2.3. Insert the USB flash drive into USB port.



2.4. Press and hold buttons F1 & F3 on the display;

2.5. Switch on the ignition.

2.6. Release buttons F1 & F3 when the following text appears;
"start operating system in STOP mode"

2.7. Software will now download from the USB flash drive automatically.
Note: Software download can take up to 10 minutes depending on the size of the update.

NOTICE: Never switch off the ignition during the download process.

2.8. Once the software download is complete the following message will appear;
"Press any key or touch screen to continue"

Press any of the JVM buttons to continue.

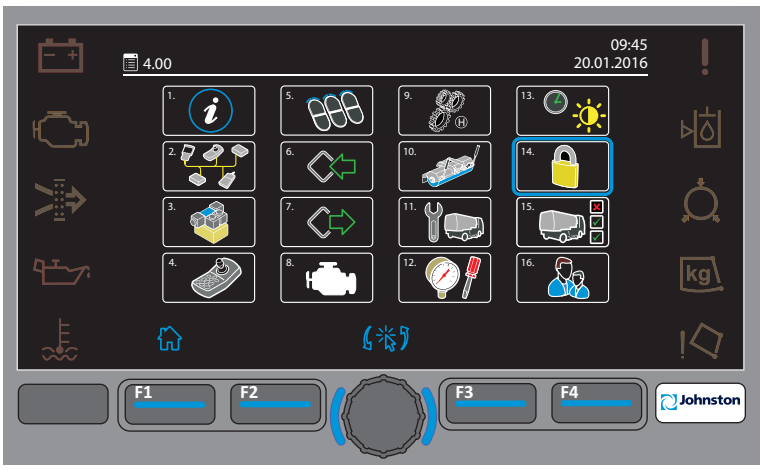
2.9. The JVM will now reboot. Once rebooted, turn off ignition of machine to complete update.

NOTICE: First shutdown of machine after software update may take 10 min. Never isolate the vehicle or disconnect the harness while this takes place.

2.10. Continue to step three.

Step Three: Passcode Entry

3.1. Press button F3 to access the Main Menu 4.0.



Menu 4.0 Main Menu

3.2. Select Menu 4.14 - Security

Menu 4.14 System Security

3.3. Enter the “Service” passcode: 88335.

3.4. Press the ‘enter’ key (F4) to complete the passcode entry.

3.5. Press F1 to Exit the menu .

Step Four: Operating System (OS) Update

4.1. Go to Menu 4.11 - Service, and select option 3, OS Downloads.

Menu 4.11 Service

4.2. Move the blue halo and select the Centre Console cab Node.

Menu 4.11.2.1 Select Centre Console Node.

Step Four: Operating System (OS) Update (continued)

4.3. Compare the “Current OS” version with the “New OS” version numbers. If the OS version numbers are different, then the Node OS must be updated.

Menu 4.11.2.1.2 Centre Console OS Download

4.4. To download the “New OS”, press the centre button on the JVM to start the OS update. The blue bar will indicate the progress of the download.

NOTICE: Do not switch off the ignition, or isolate the vehicle during the download process

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4.5. Once the green tick appears, the OS download is complete.

4.7. Repeat the process for the Door Controller IO Node, System Locker IO Node, Powapak IO Node, Hopper IO Node and the High Current Nodes.

4.8. Once all OS Updates are complete, exit from the Menus and switch off the ignition.

4.9. Wait one minute and then switch on the ignition.

4.10. Remove USB stick from the JVM display.

Clear Emergency Codes

If during operation any emergency codes (EMCY) codes are raised these can be checked using the 4.2 menu or by pressing the soft key F2 and selecting the area and node where the error occurred.

The codes are cleared by automatically by turning off the ignition and allowing the JVM to shut down.

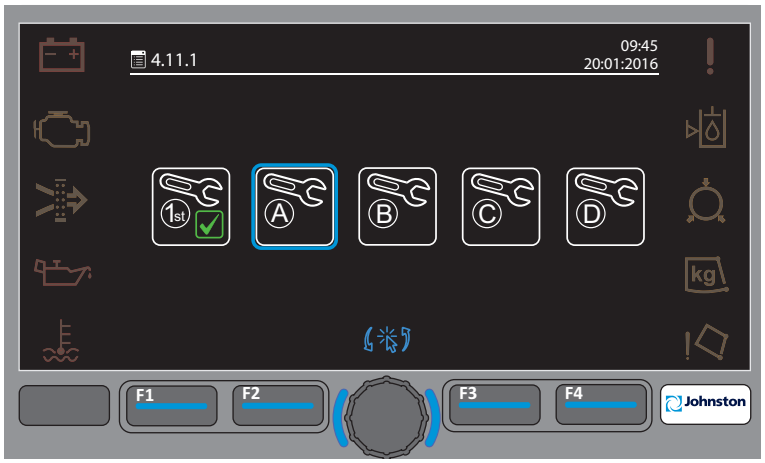
NOTICE: When a fault is repeated 4 consecutive times during one ignition cycle the affected Node will automatically shut down the output. The output will automatically be re-activated after the ignition has been turned off and back on.

Resetting the Service Acknowledgment indicator

Once a service has been completed it must be acknowledged on the JVM display by resetting the service indicator as follows:

1. Switch on the ignition.
2. Select the Main Menu (F3) on the JVM display.
3. Rotate the Encoder to highlight sub menu 4.11 (Service) and press to select.

4. Rotate the Encoder to highlight sub menu 4.11.1 (Service Acknowledgment) and press to select.



5. The JVM will automatically select which service requires acknowledgment and highlights the corresponding icon with the blue halo.
6. To acknowledge that the service has been completed, press and hold the F3 button + the F4 button for five seconds.
7. A green tick will appear to confirm the service is complete.
8. Exit from the menus and switch off the ignition.

DATA CAPTURE DOWNLOAD

The V Range has a standard feature of 'Data Capture'. Data capture allows the vehicle operator or fleet manager to view or download data logged information directly onto a Johnston USB stick and download onto any PC.

Customer benefits of data capture are;

Allows fleet managers/operators of machines to monitor how individual machines are operated and identifies which machines are operating efficiently through engine RPM, fuel economy and other data values.

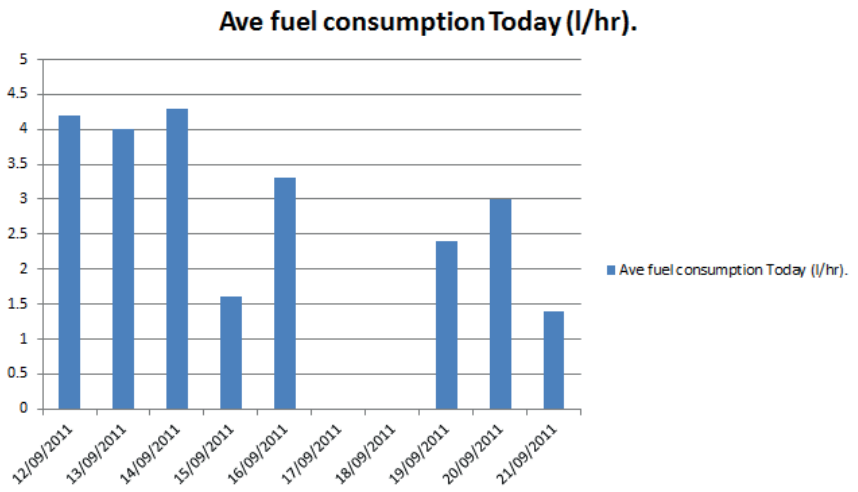
The data capture features are:

Total PTO hours
PTO hours today
Total hood hours
Hood hours (daily)
Total distance swept
Distance swept (daily)
Average work mode RPM (daily)
Average work mode speed
Average work mode (daily)
Average fuel consumption
Average fuel consumption (daily)
Total chassis engine hours
Chassis engine hours (daily)
Gutter broom hours (daily)
Fan hours (daily)
Average fan speed (daily)
Pause hours (daily)
Supawash hours (daily)
Average VEG position (daily)
Boost hours (daily)

It allows fleet managers/operators to easily manage servicing. The data capture file records the "Engine Hours At Last Service" and "Engine Hours Until Next Service" allowing quick identification of required servicing by analysis of the data capture files.

Data capture files can provide a full history of machine operations from servicing requirements to distance travelled on a daily basis.

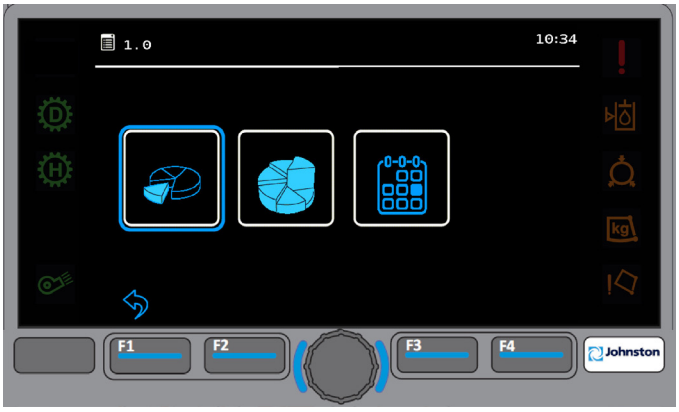
Data capture files can be exported to an Excel document and visual results displayed in the format of a graph etc.



M02OG121

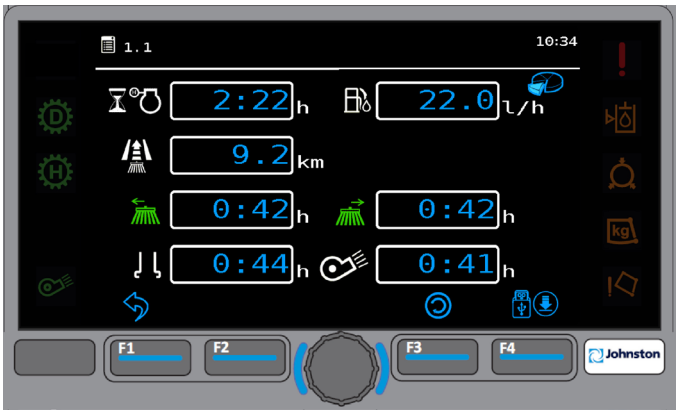
Logged data values can be viewed from the JVM (Johnston Visual Module) display. Press F1 (Hour Glass icon) from the base screen. See following illustrations for more details;

F1 - Vehicle Logging

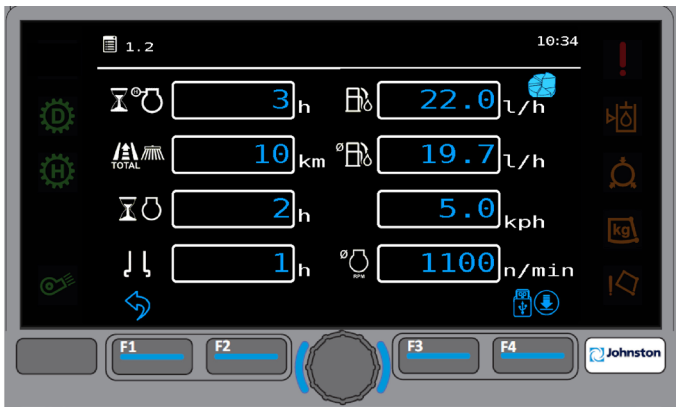


1.1 - Trip Hours
The icon top right shows the current screen

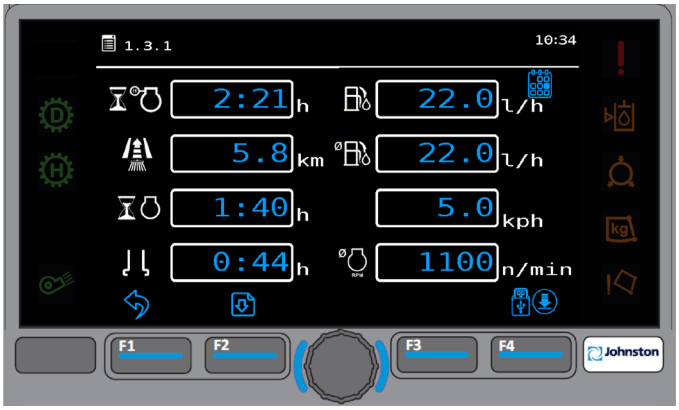
F3 - Reset - Will reset the part totals back to zero.



1.2 Total Hours

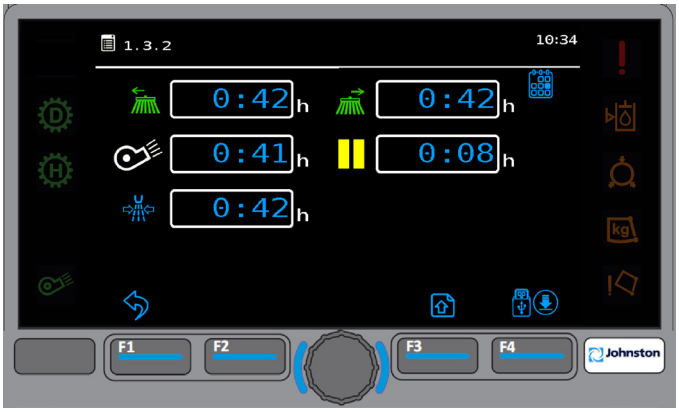


1.3.1 Daily Totals
Page 1

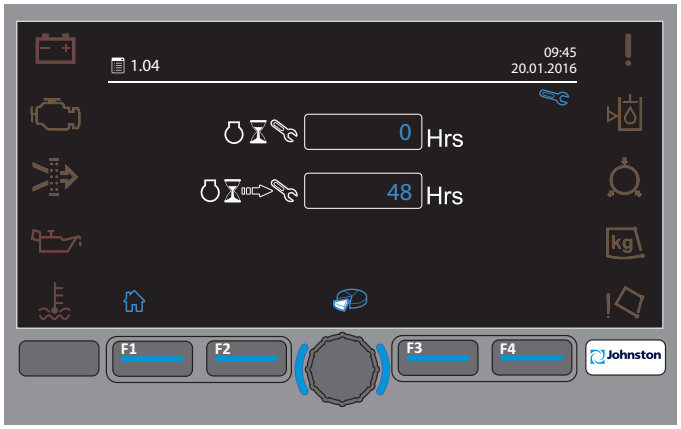


Vehicle Logging (continued)

1.3.2 Daily Totals
Page 2



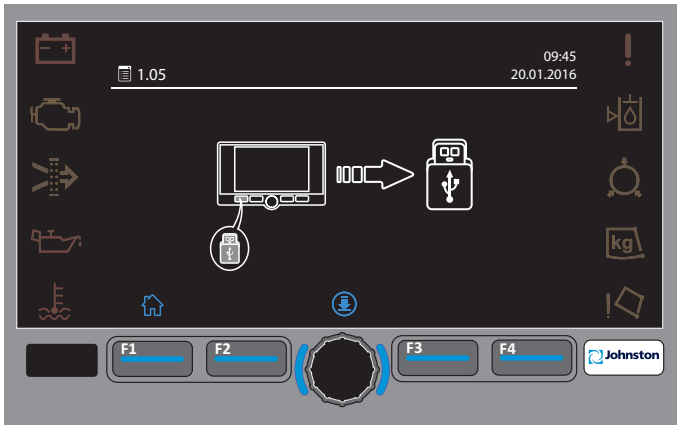
1.4 Service Hours



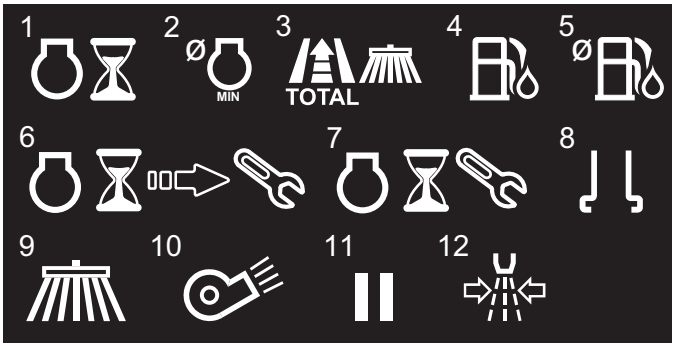
1.5 USB Download (Data Capture)

Insert an Johnston approved USB stick into the USB port (located on front of the JVM - bottom left hand side).

Press centre button on JVM to download.



Key to Logging Screen Icons



1. Engine Hours
2. Average Engine - RPM
3. Total Distance - Swept
4. Fuel Consumption
5. Average Fuel Consumption
6. Engine Hours - To Next Service
7. Engine Hours - Since Next Service
8. Hood
9. Gutter brooms
10. Fan
11. Pause
12. Supawash

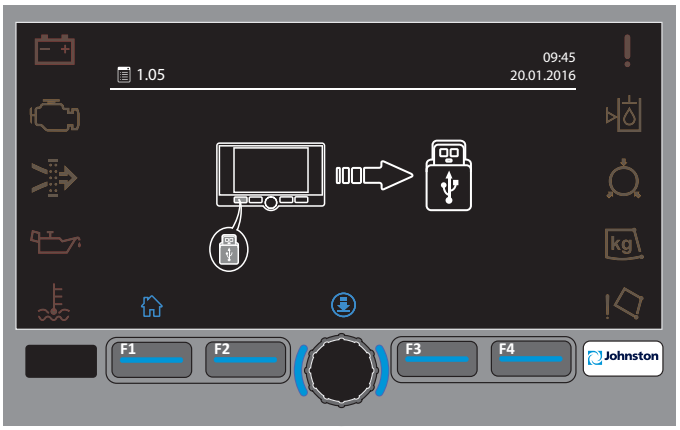
Logging data is displayed in menus 1.1, 1.2, 1.3 and recorded to a “Data Capture” file on the JVM.

Information is recorded “per day” i.e; for each day a new row of logging data is saved to the “Data Capture” file.

The “Data Capture” file can be downloaded from the JVM to a Johnston approved USB memory stick.

The “Data Capture” file format is CSV (Comma Separated values), this is a common format which may be viewed on any PC.

1. Go to the logging screens; press hour glass icon.



2. Press F4 in any of the sub-menus; 1.1, 1.2, 1.3, (download icon). Menu 1.5 will be displayed.

3. Insert the USB Memory stick.

4. Press the middle button on the display. The file download will start. Once complete a green tick will appear.

5. Remove the USB stick from the display.

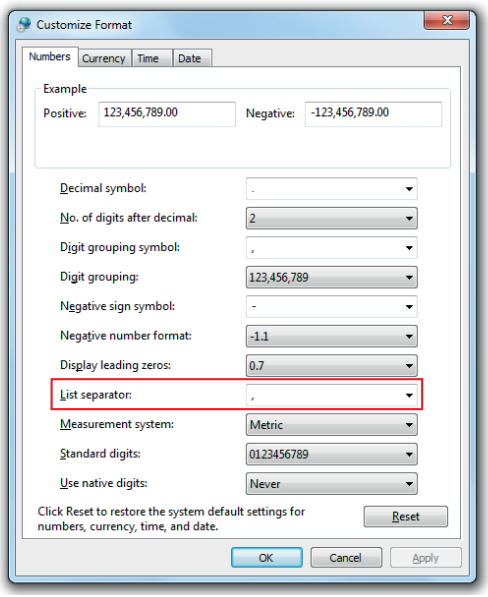
The “Data Capture” file downloaded to the USB stick is named in the format: *serialnumber_* DataCapture.csv.

The “Data Capture” file may be viewed on any PC, using EXCEL if possible.

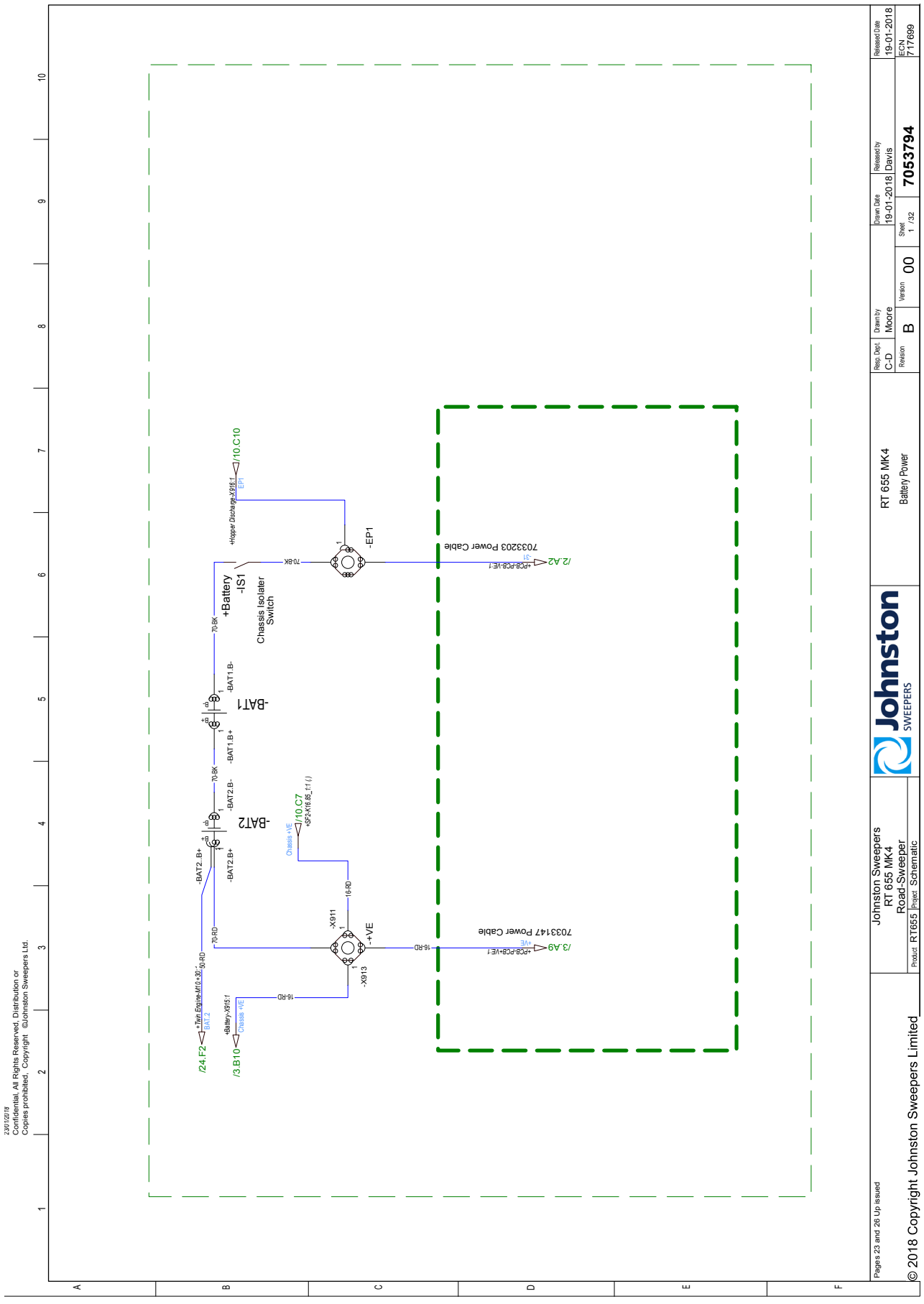
PC Regional Settings

Ensure that the regional settings of the PC are set. “System Separator = ,”

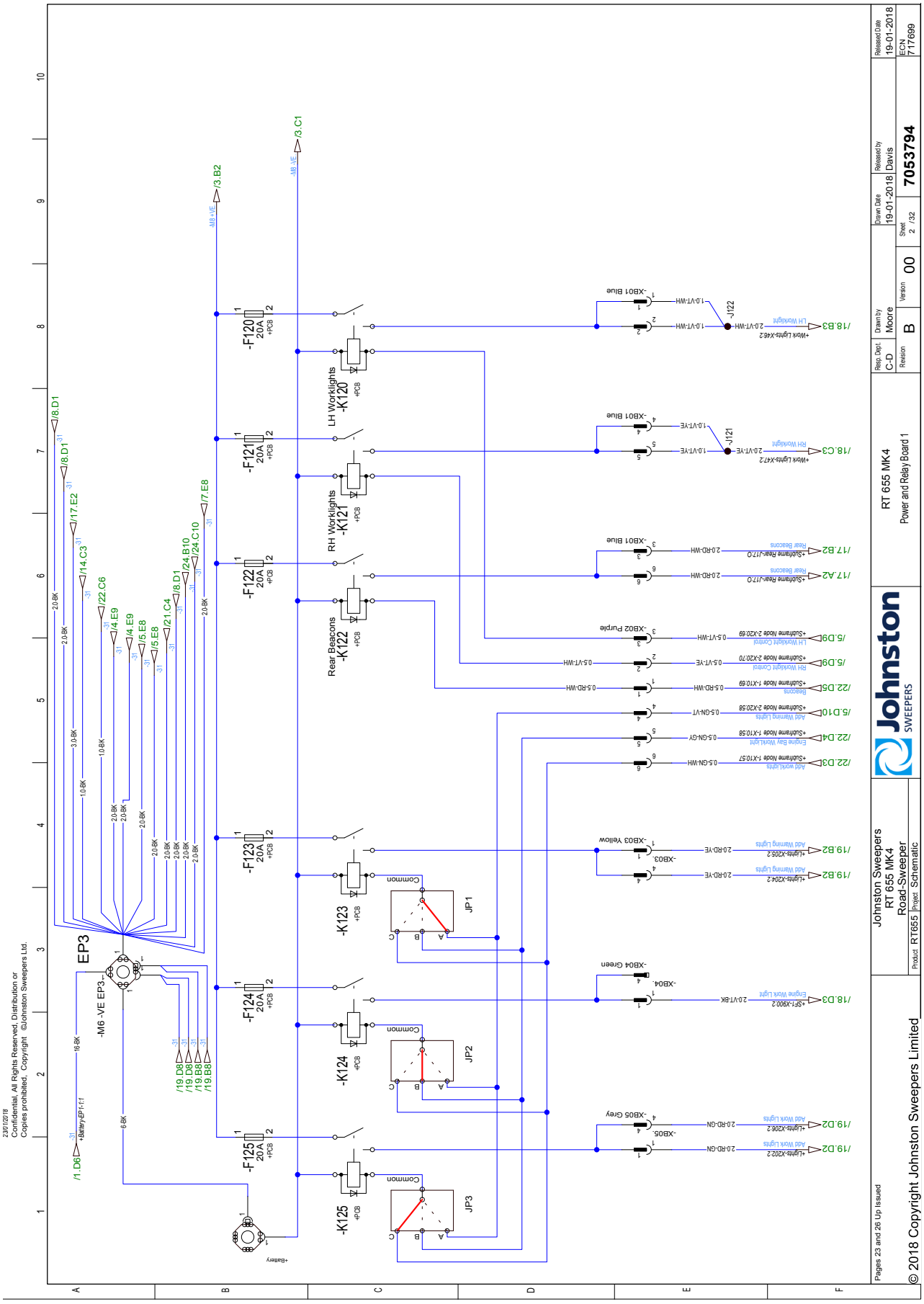
To check the regional settings of the PC go to Control Panel > Region & Language> additional settings, “List Separator: , “



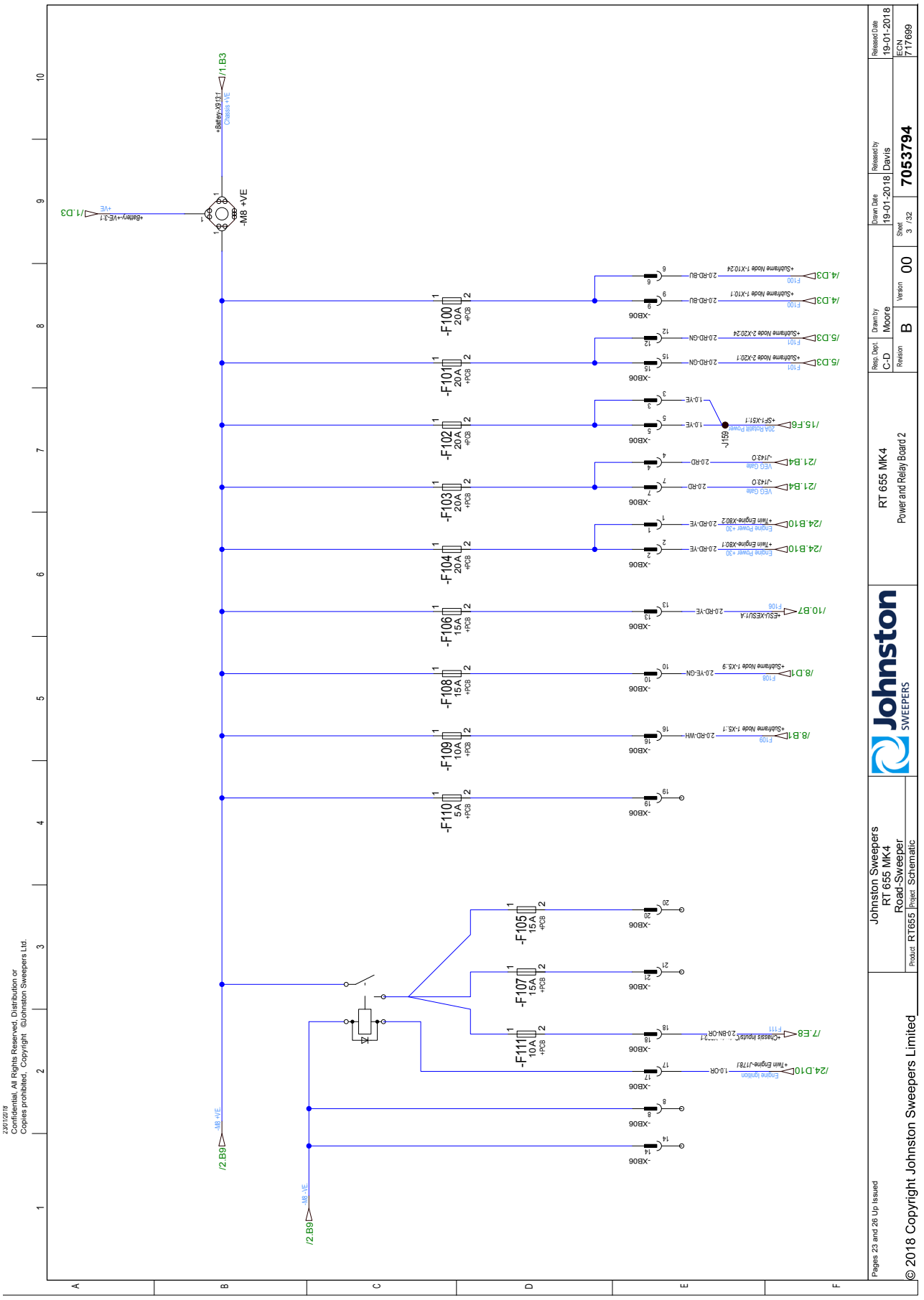
Battery Power Diagram - Sheet 1/32 Rev B



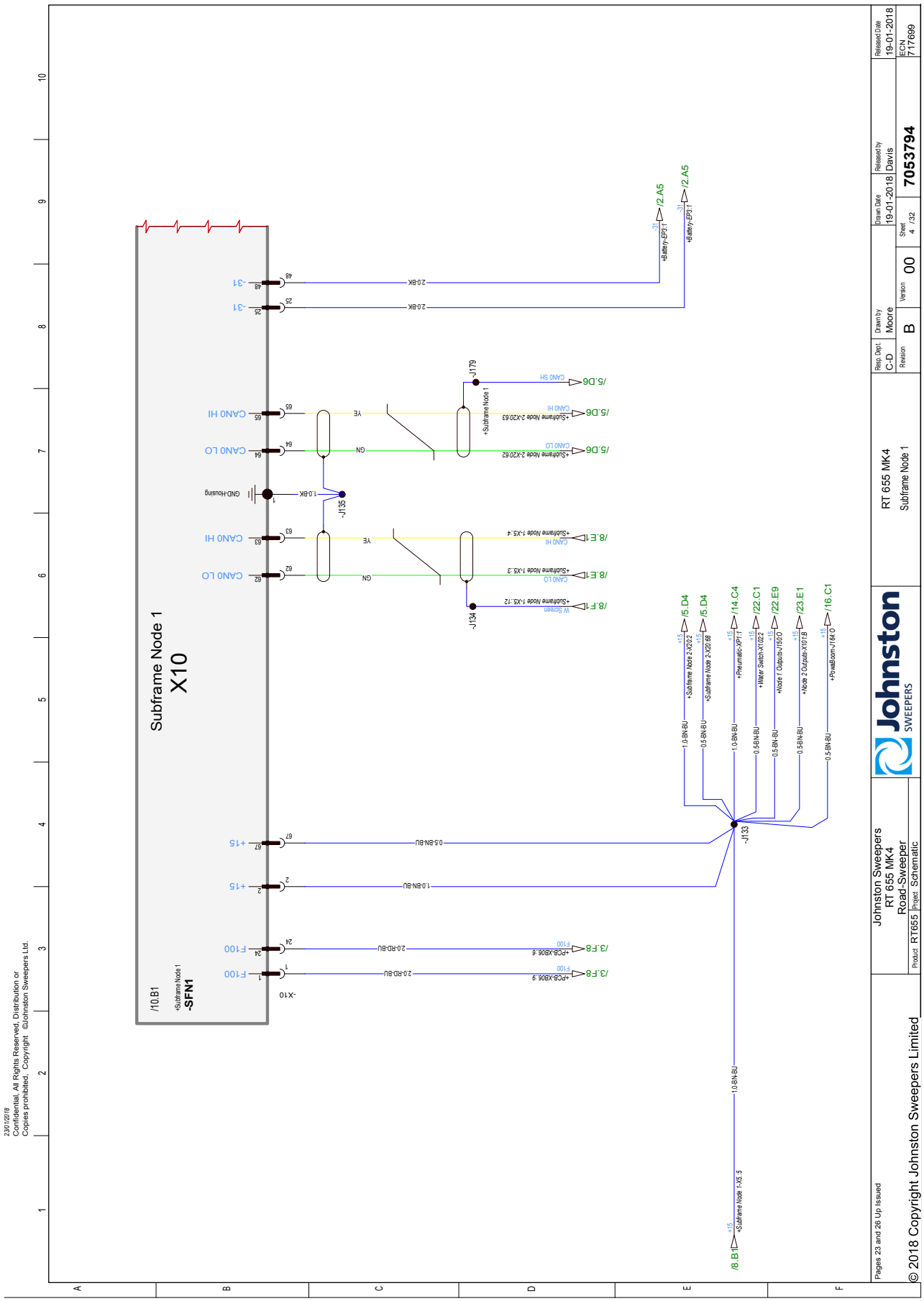
Power and Relay Board 1 Diagram - Sheet 1/32 Rev B



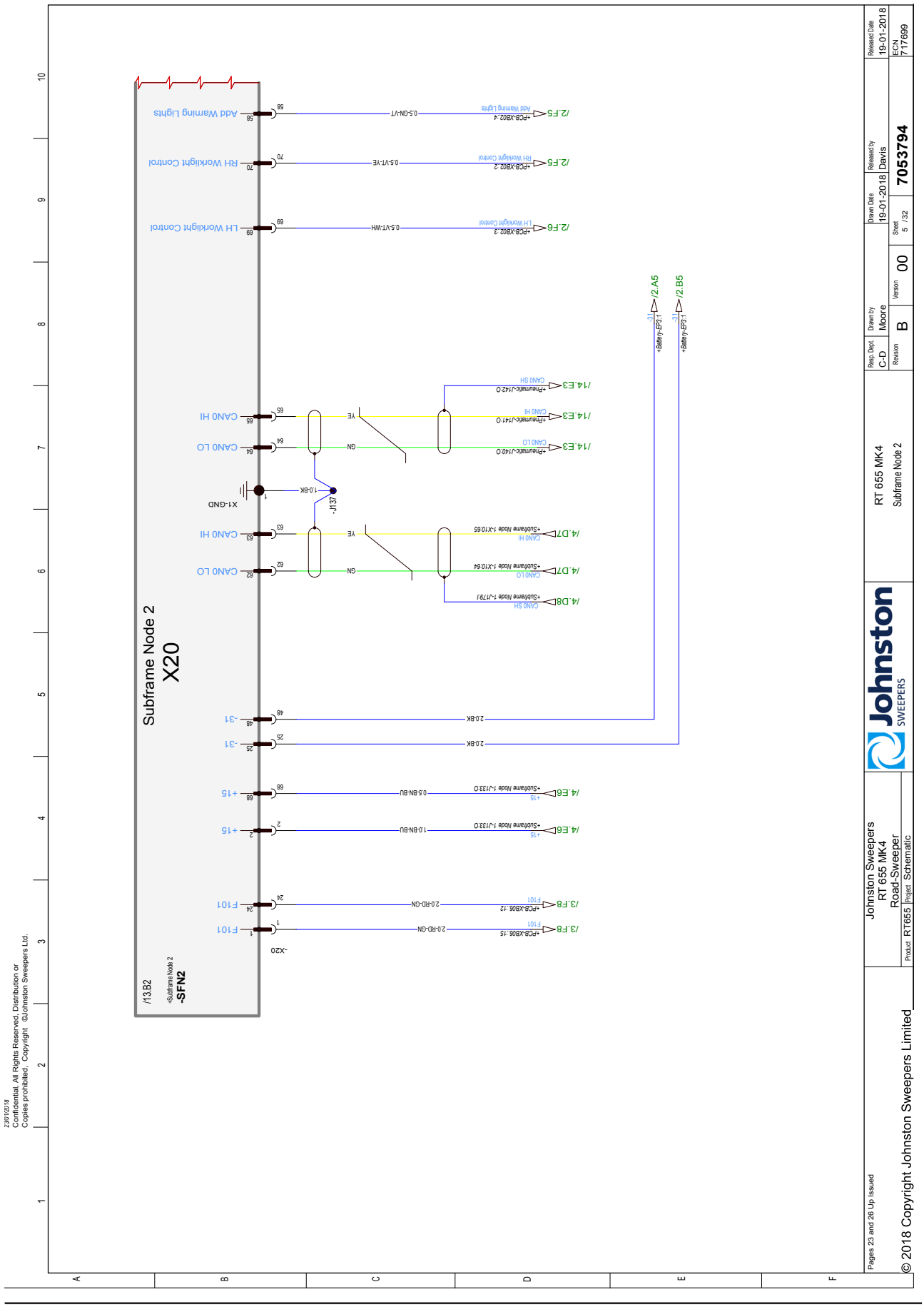
Power and Relay Board 2 Diagram - Sheet 3/32 Rev B



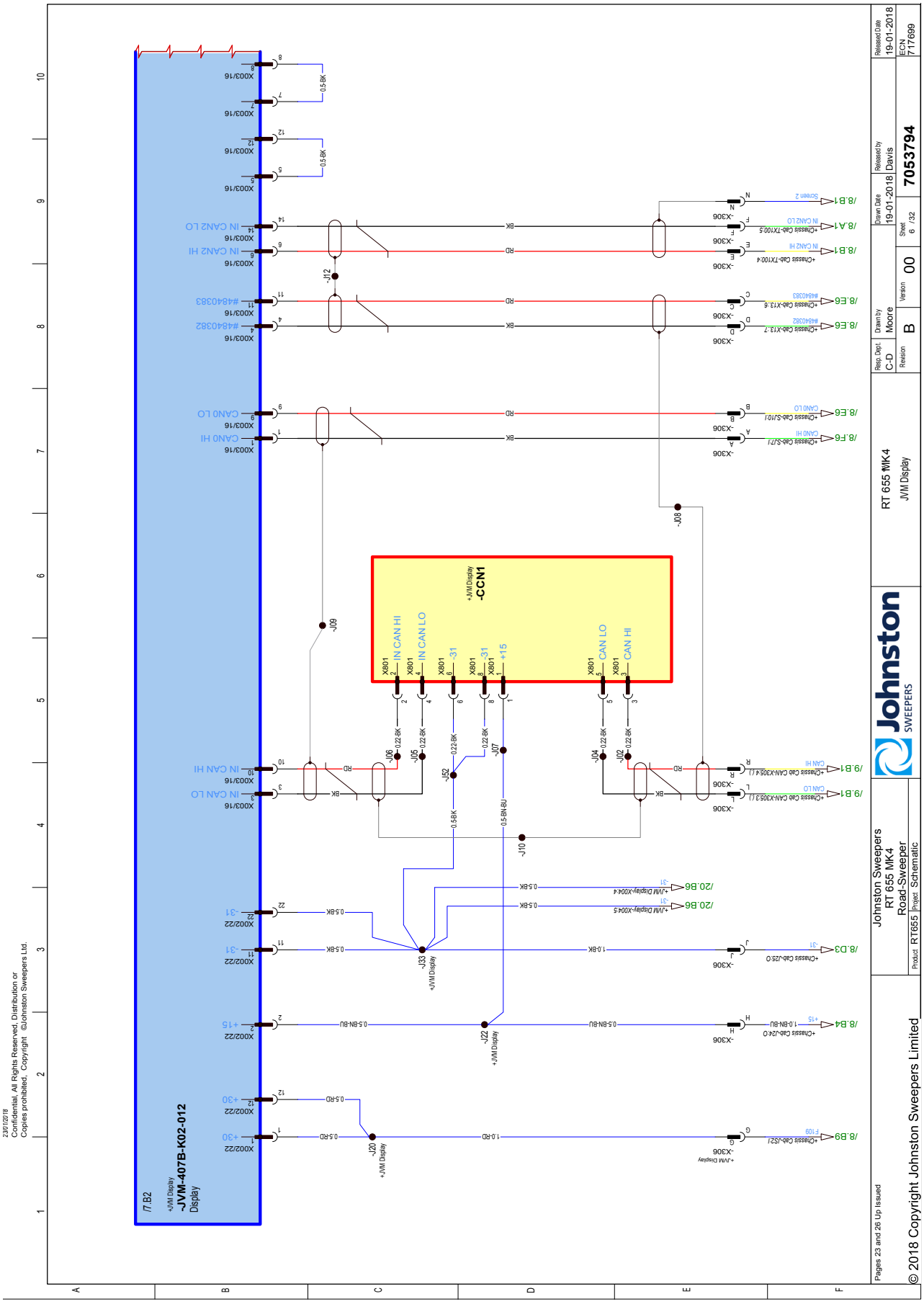
Subframe Node 1 Diagram - Sheet 4/32 Rev B



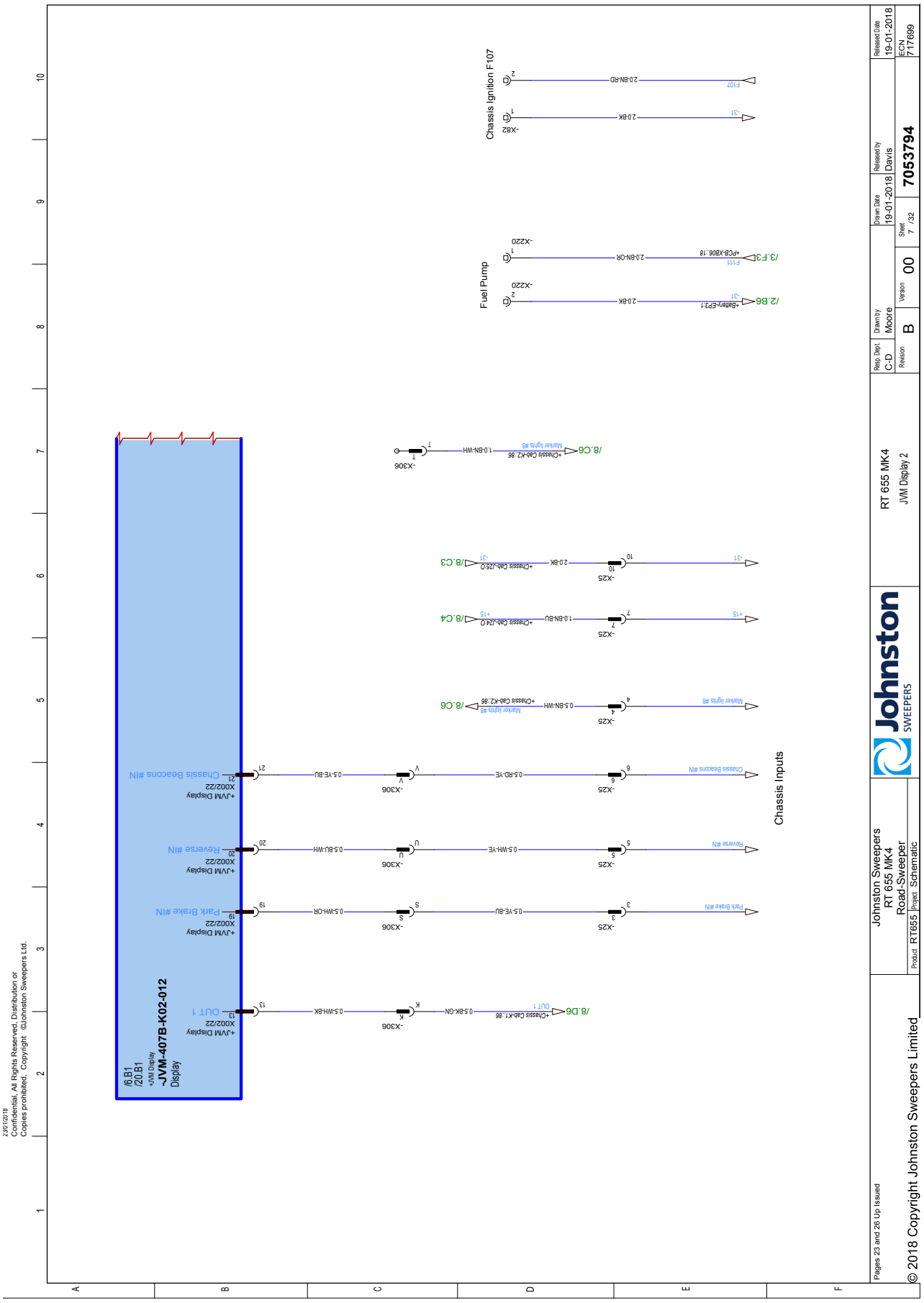
Subframe Node 2 Diagram - Sheet 5/32 Rev B



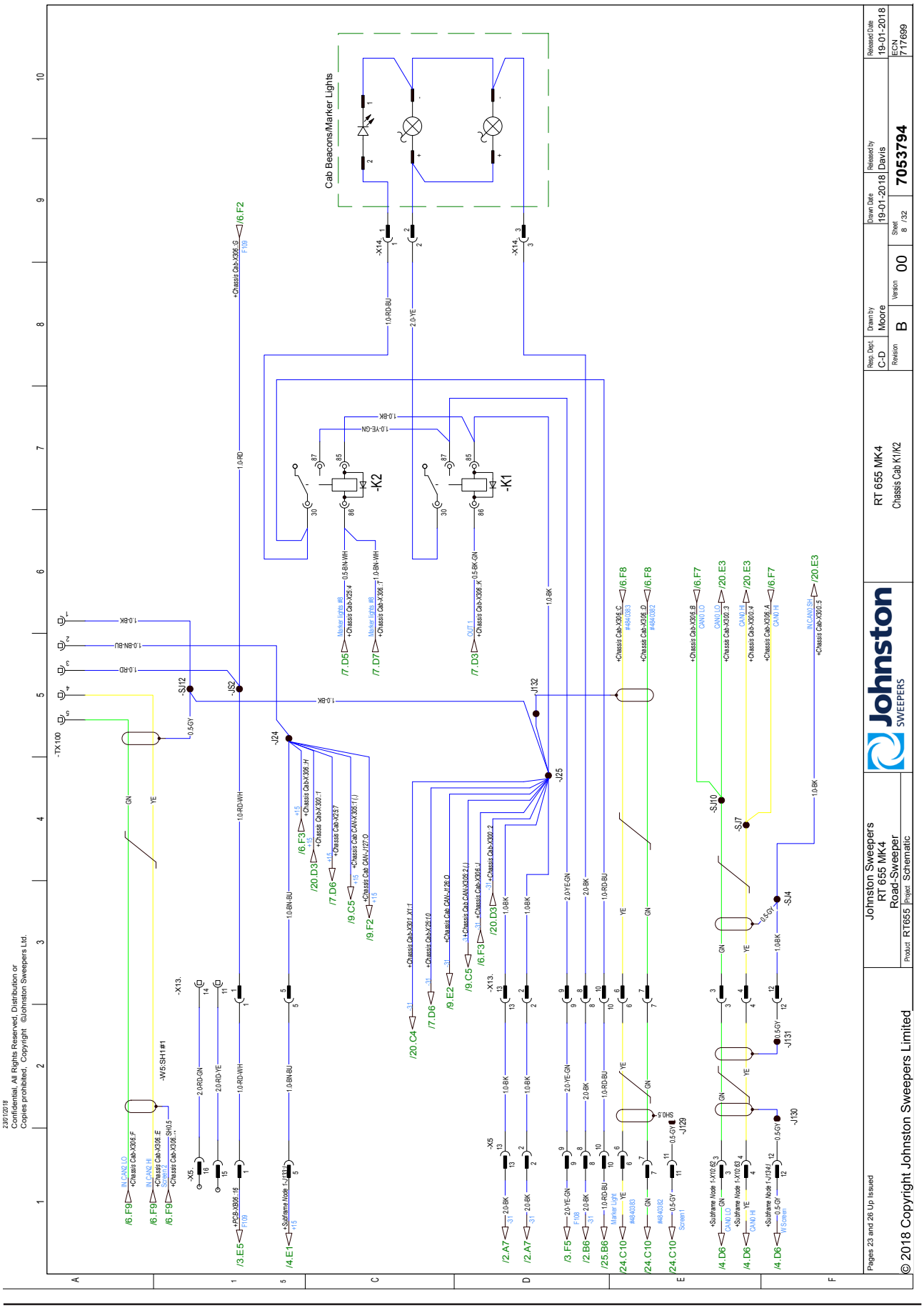
JVM Display Diagram - Sheet 6/32 Rev B



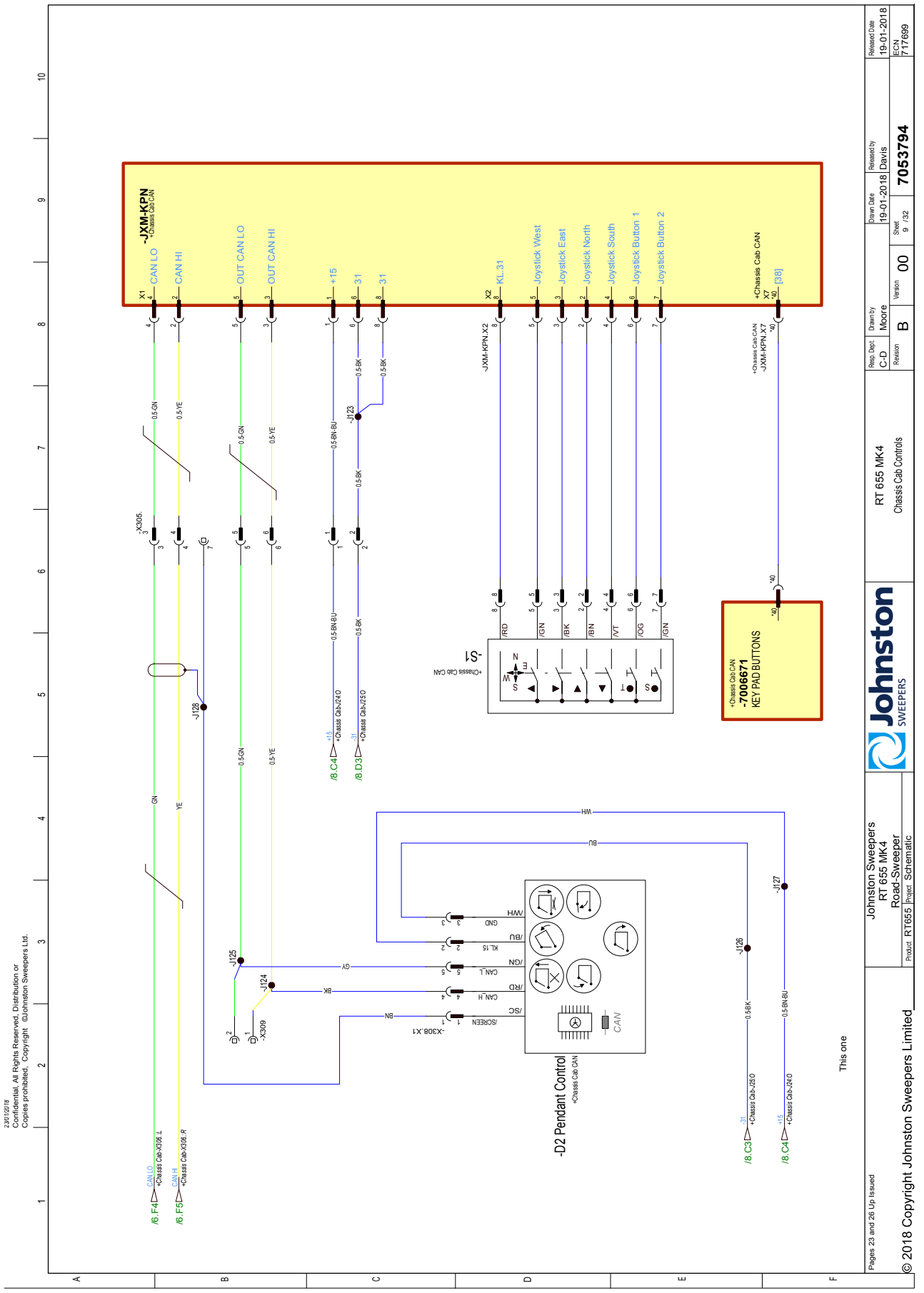
JVM Display 2 Diagram - Sheet 7/32 Rev B



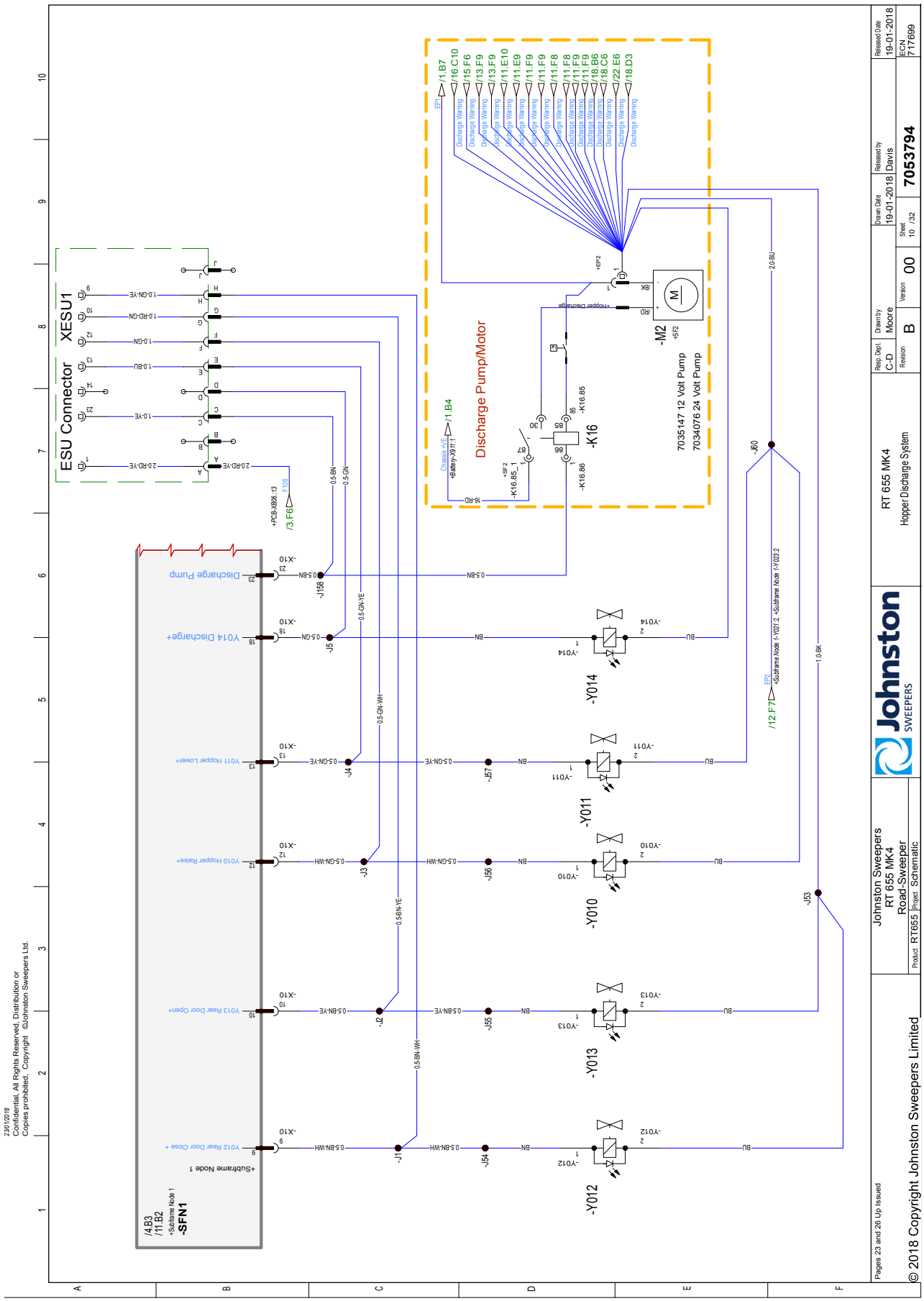
Chassis Cab K1/K2 Diagram - Sheet 8/32 Rev B



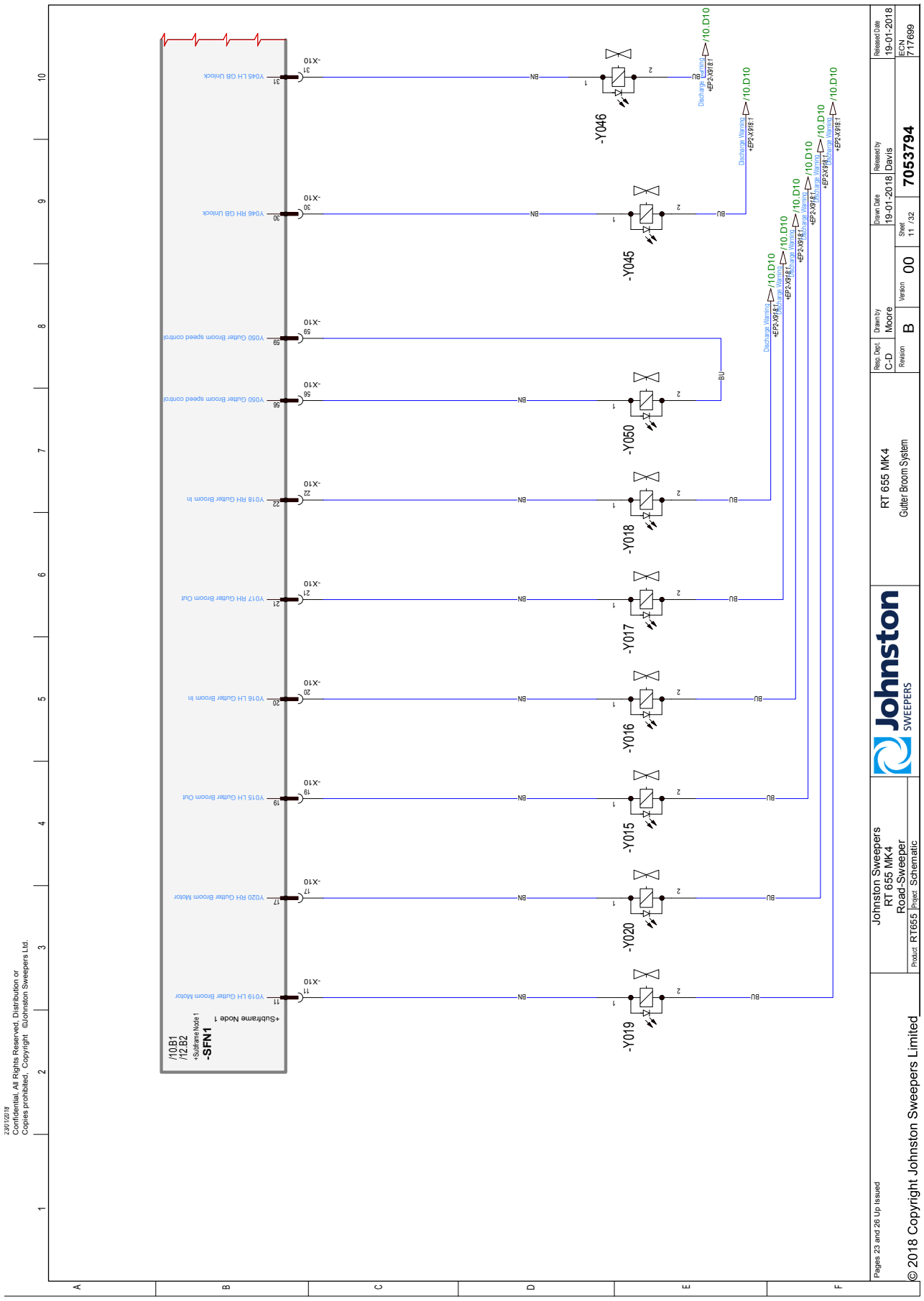
Chassis Cab Controls Diagram - Sheet 9/32 Rev B



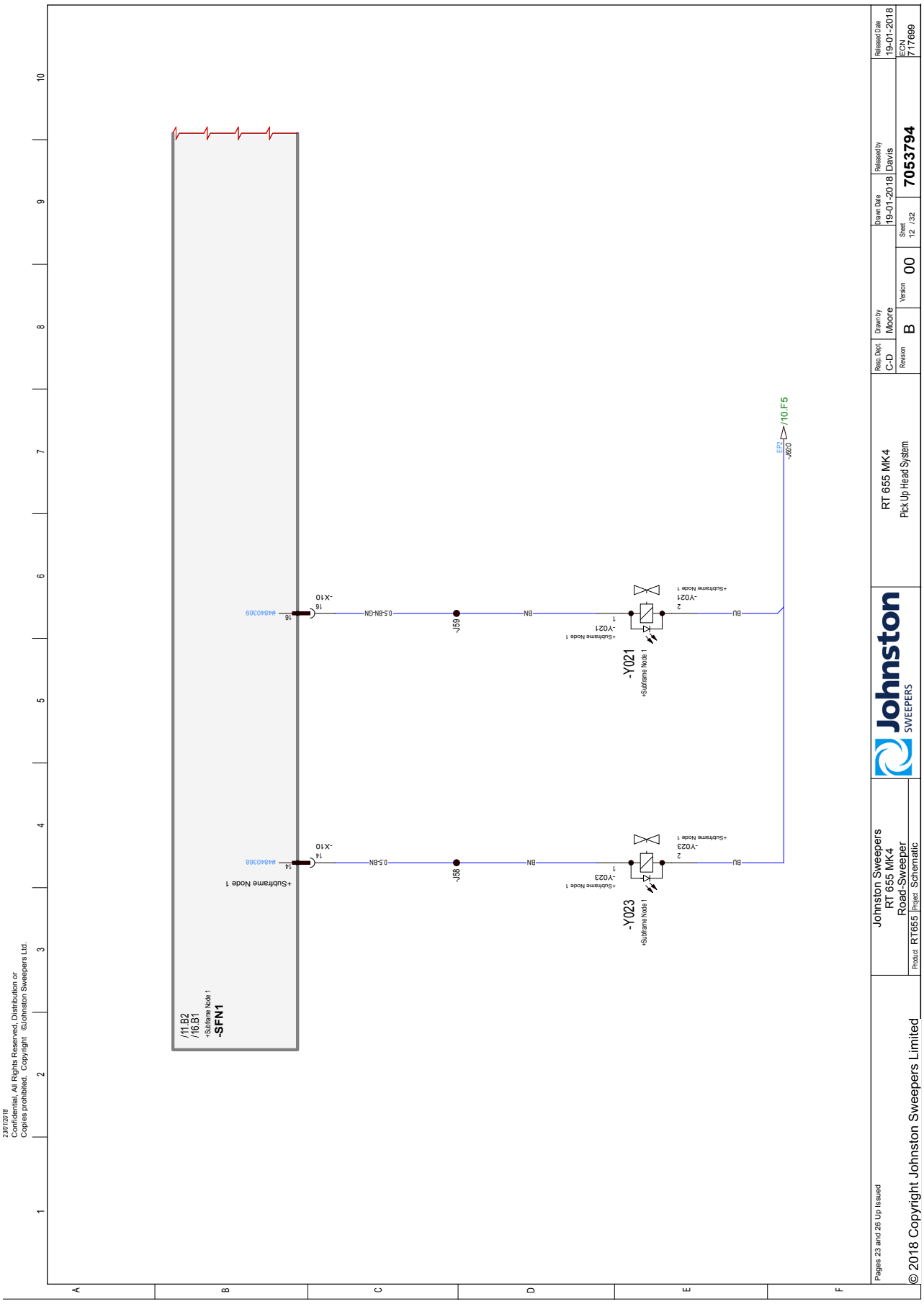
Hopper Discharge System Diagram - Sheet 10/32 Rev B



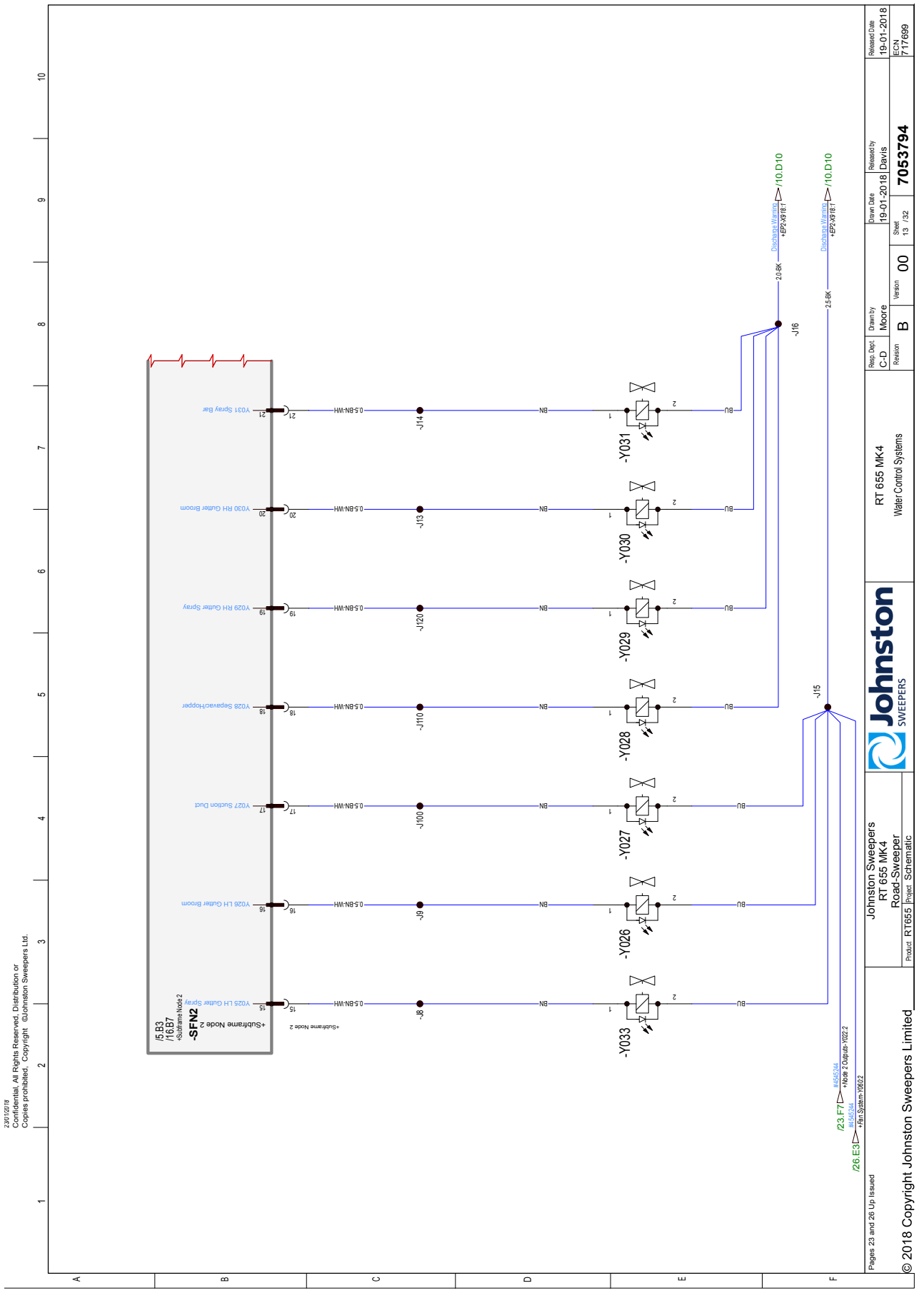
Gutter Broom System Diagram - Sheet 11/32 Rev B



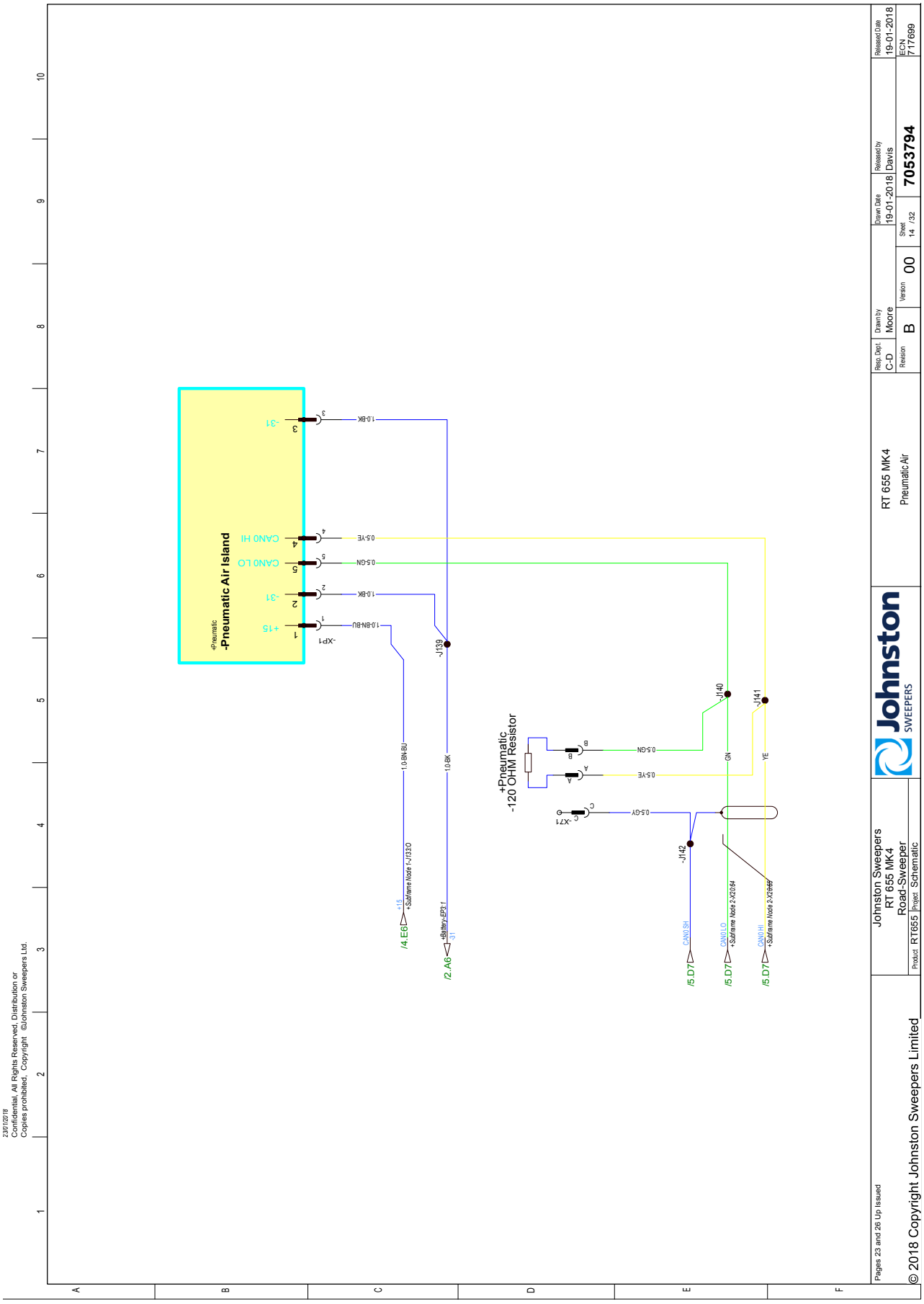
Pick Up Head System Diagram - Sheet 12/32 Rev B



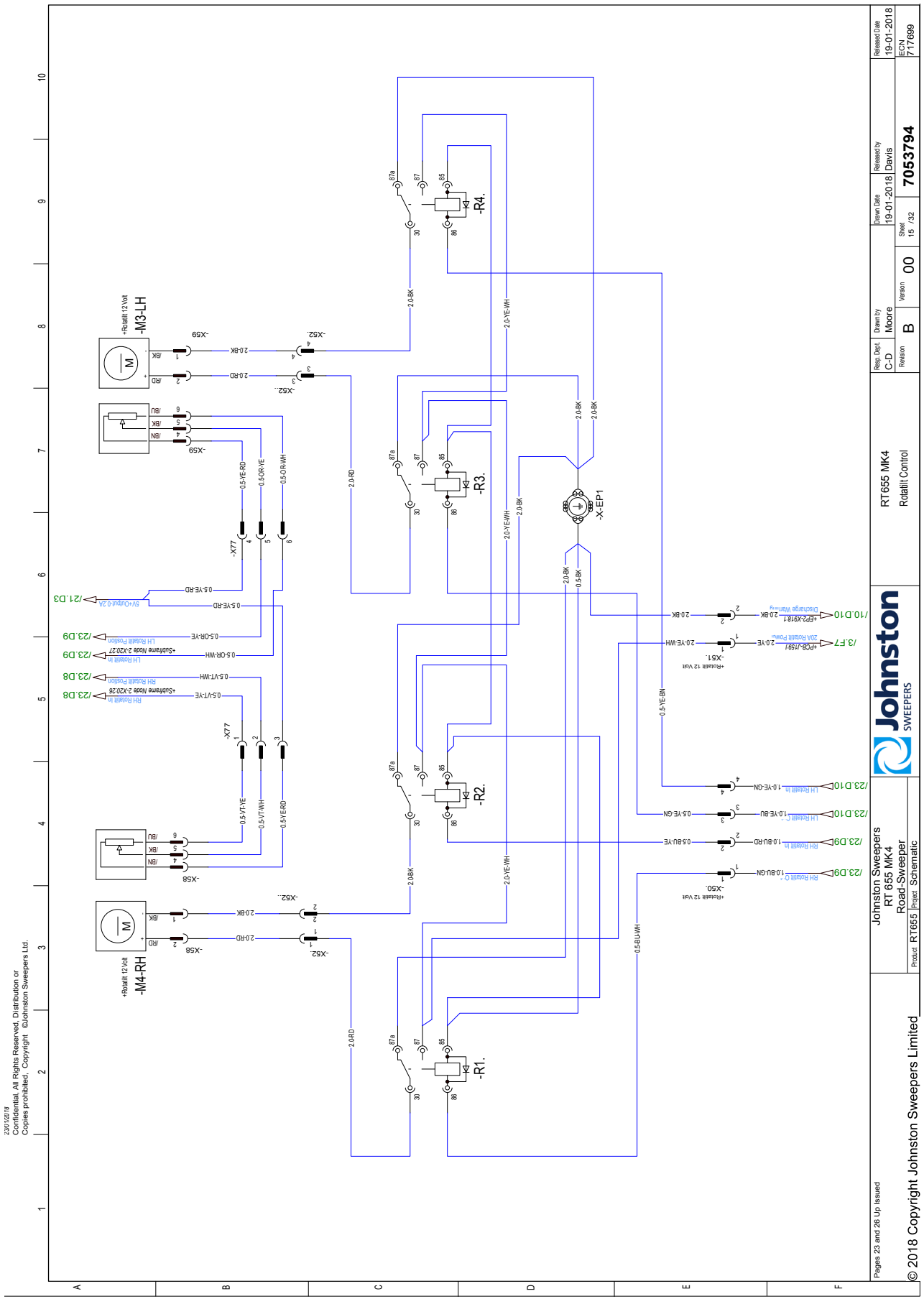
Water Control Systems Diagram - Sheet 13/32 Rev B



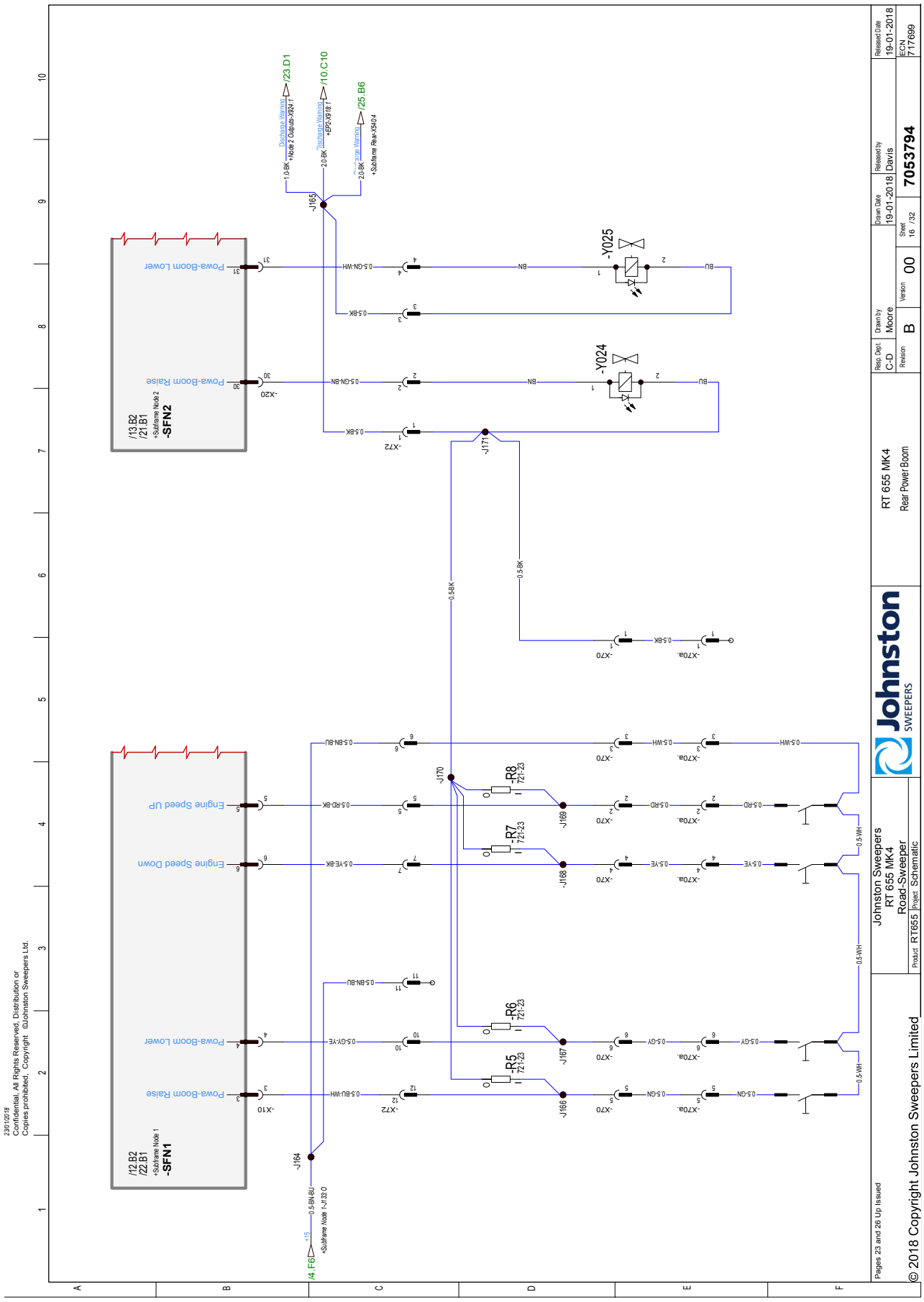
Pneumatic Air Diagram - Sheet 14/32 Rev B



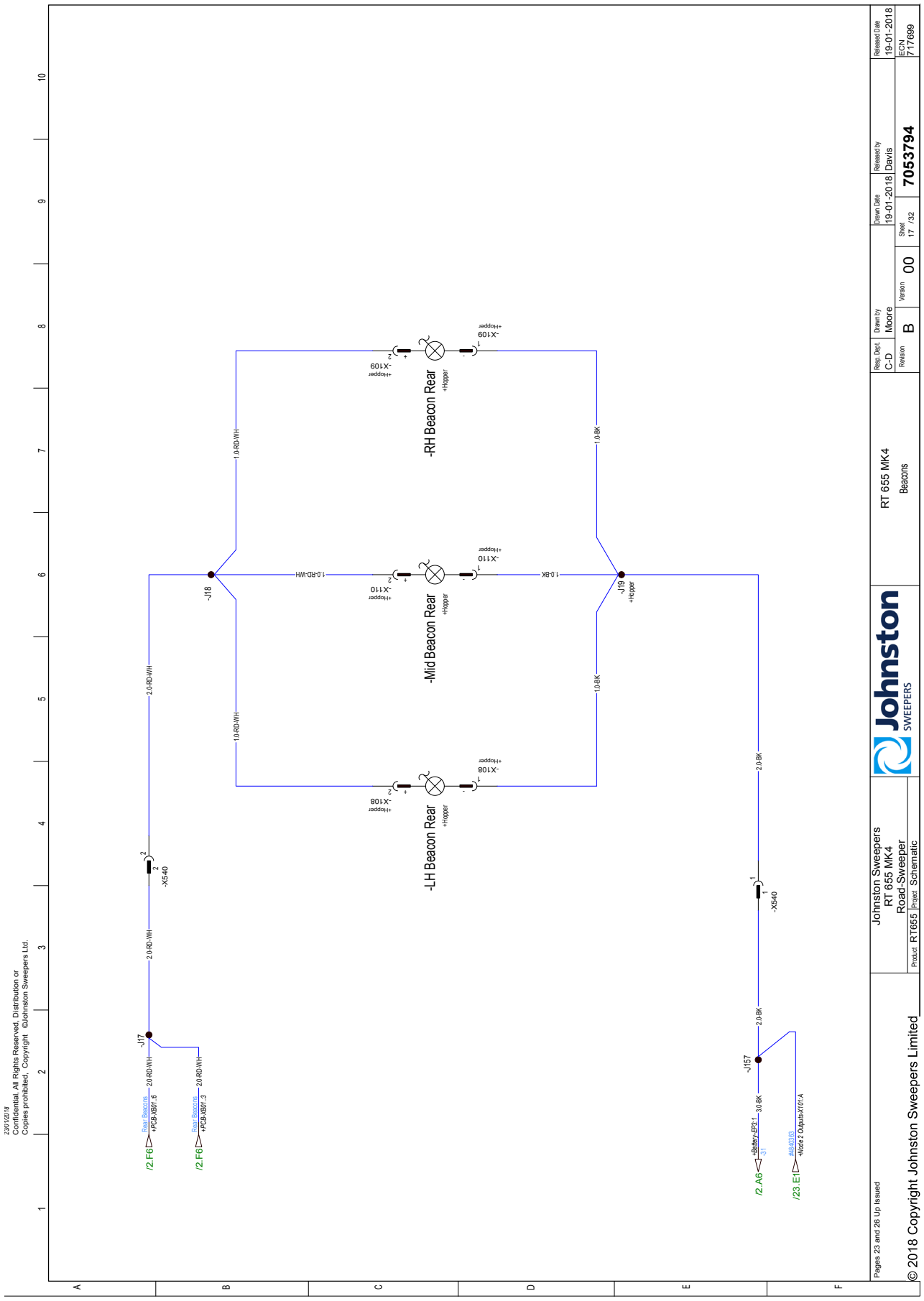
Rotatilt Control Diagram - Sheet 15/32 Rev B



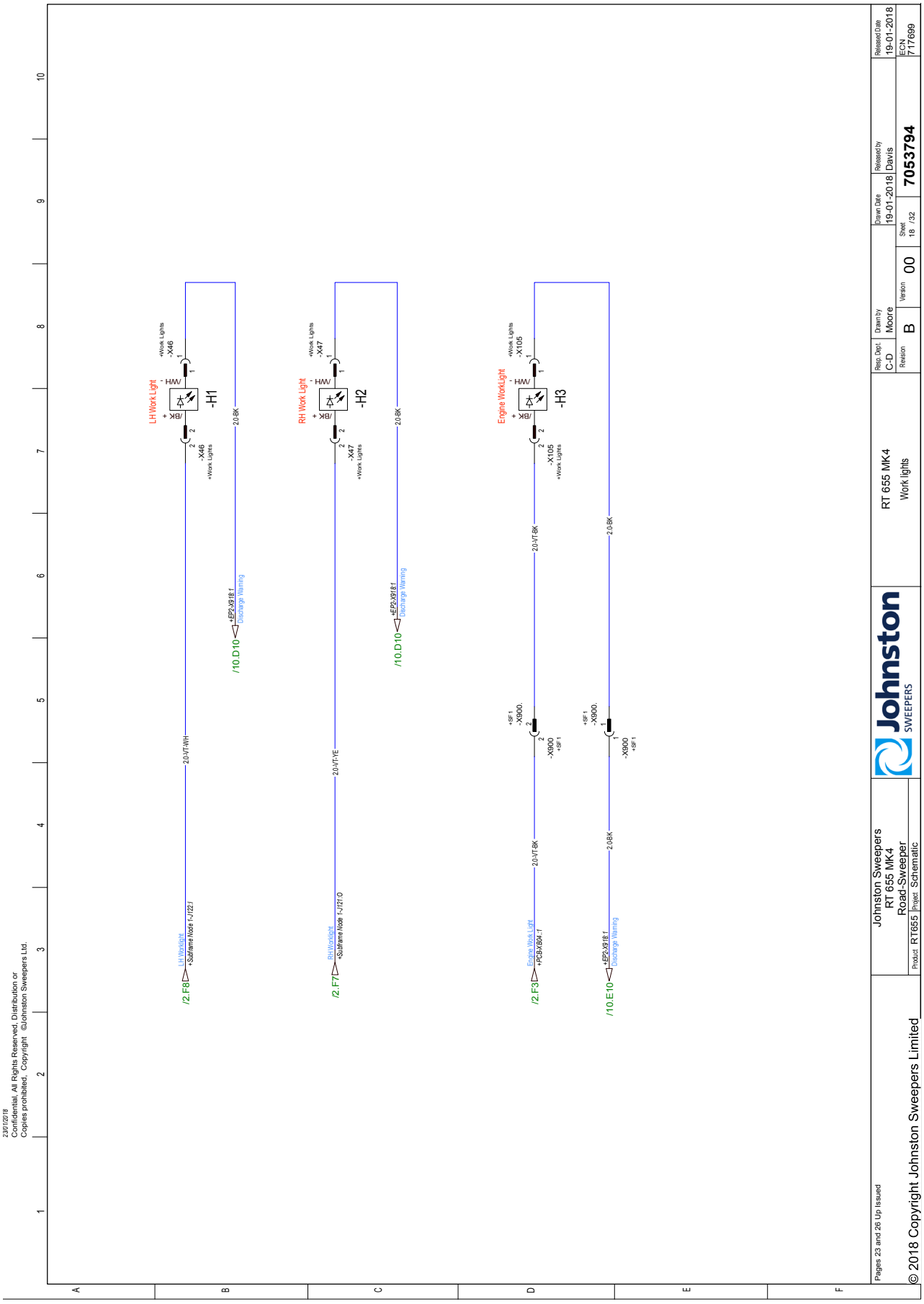
Rear Power Boom Diagram - Sheet 16/32 Rev B



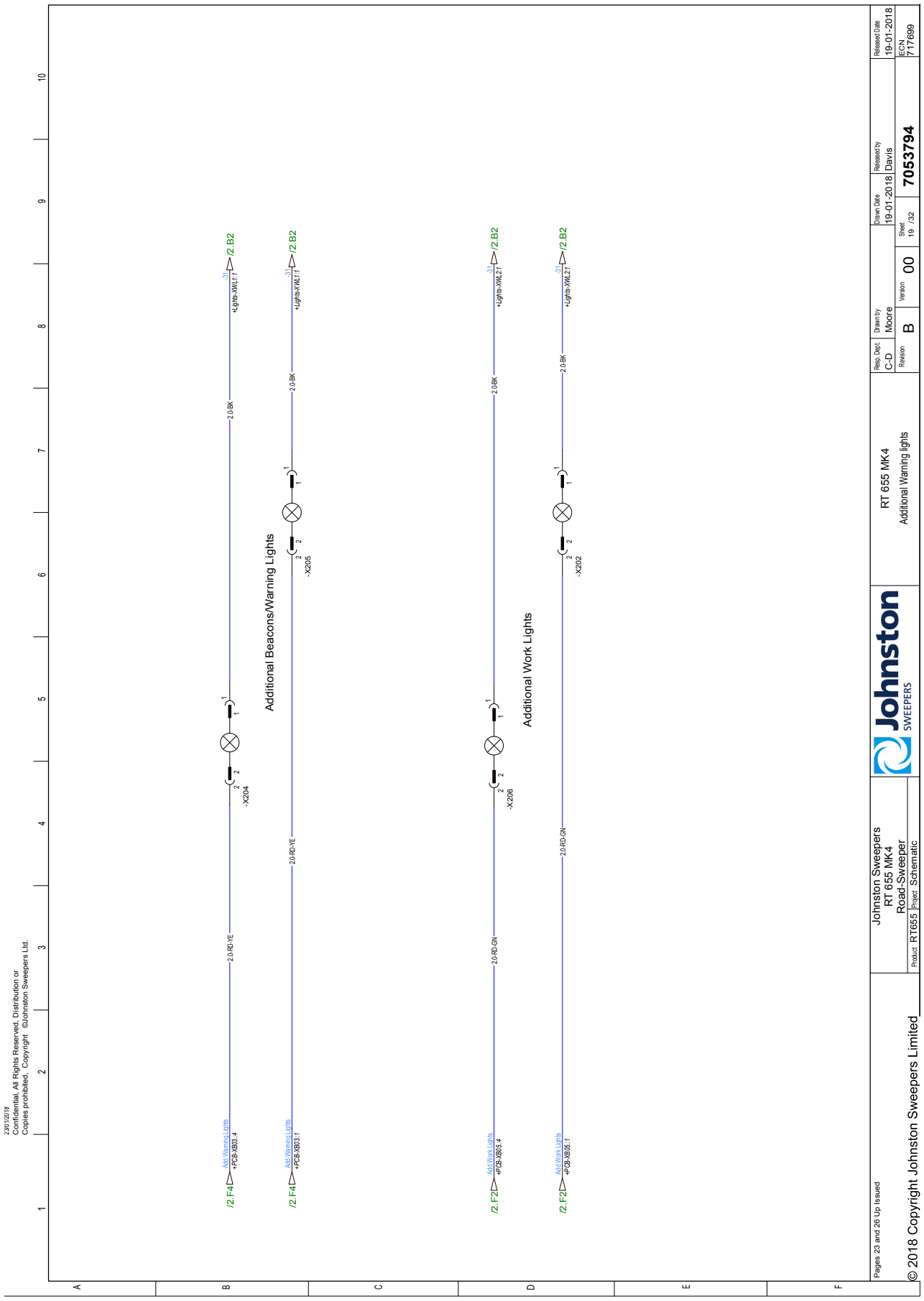
Beacons Diagram - Sheet 17/32 Rev B



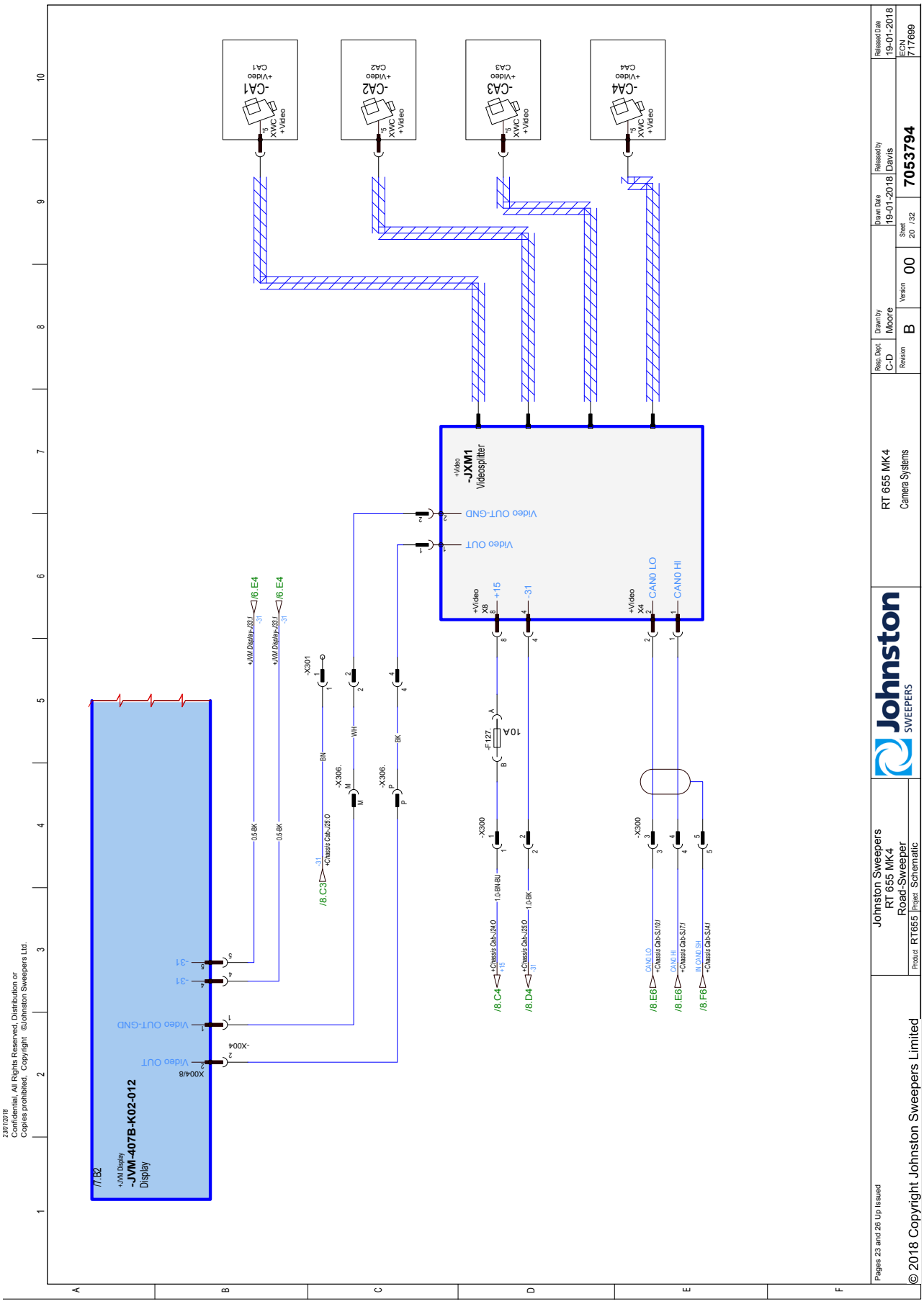
Work Lights Diagram - Sheet 18/32 Rev B



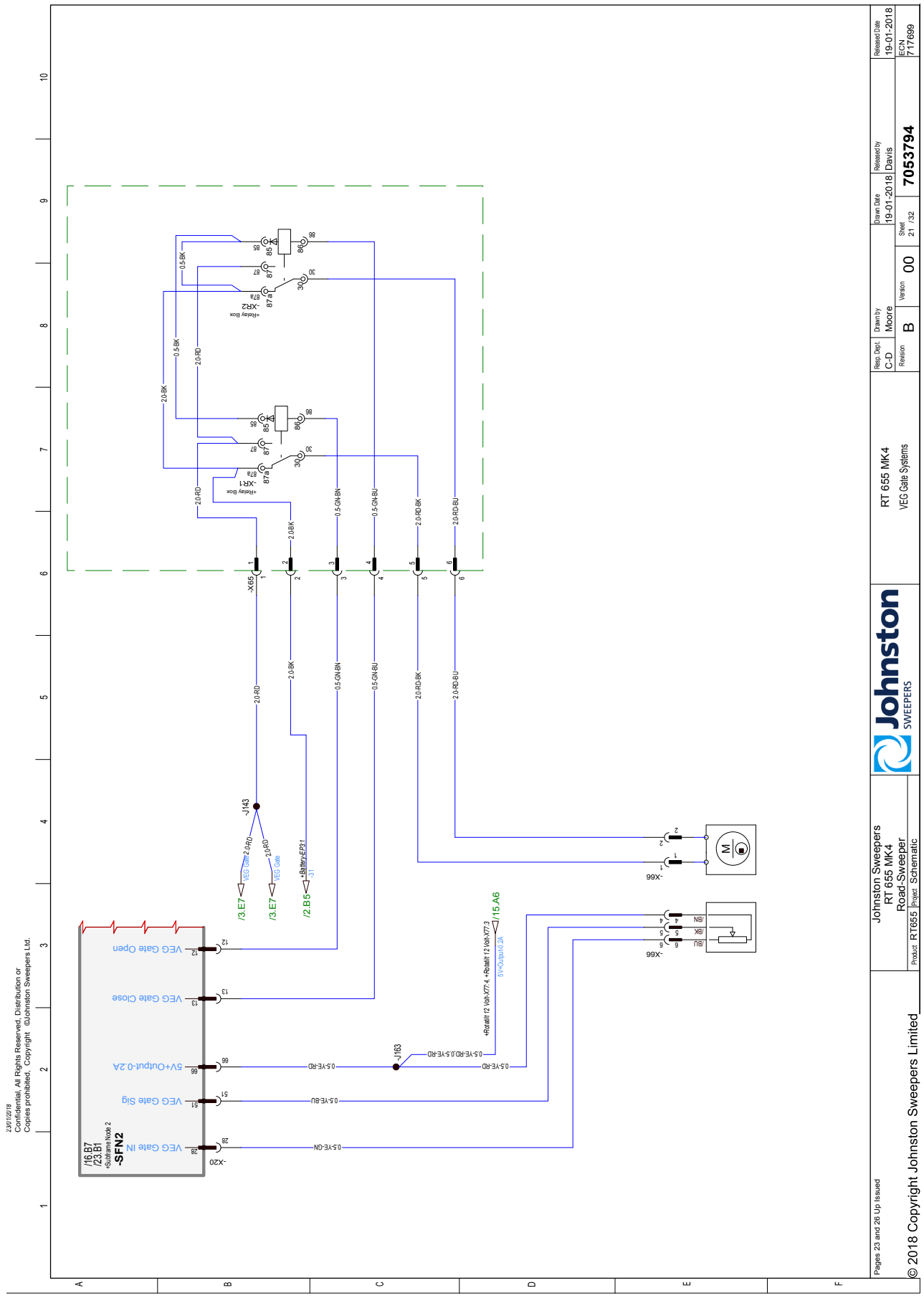
Additional Warning Lights Diagram - Sheet 19/32 Rev B



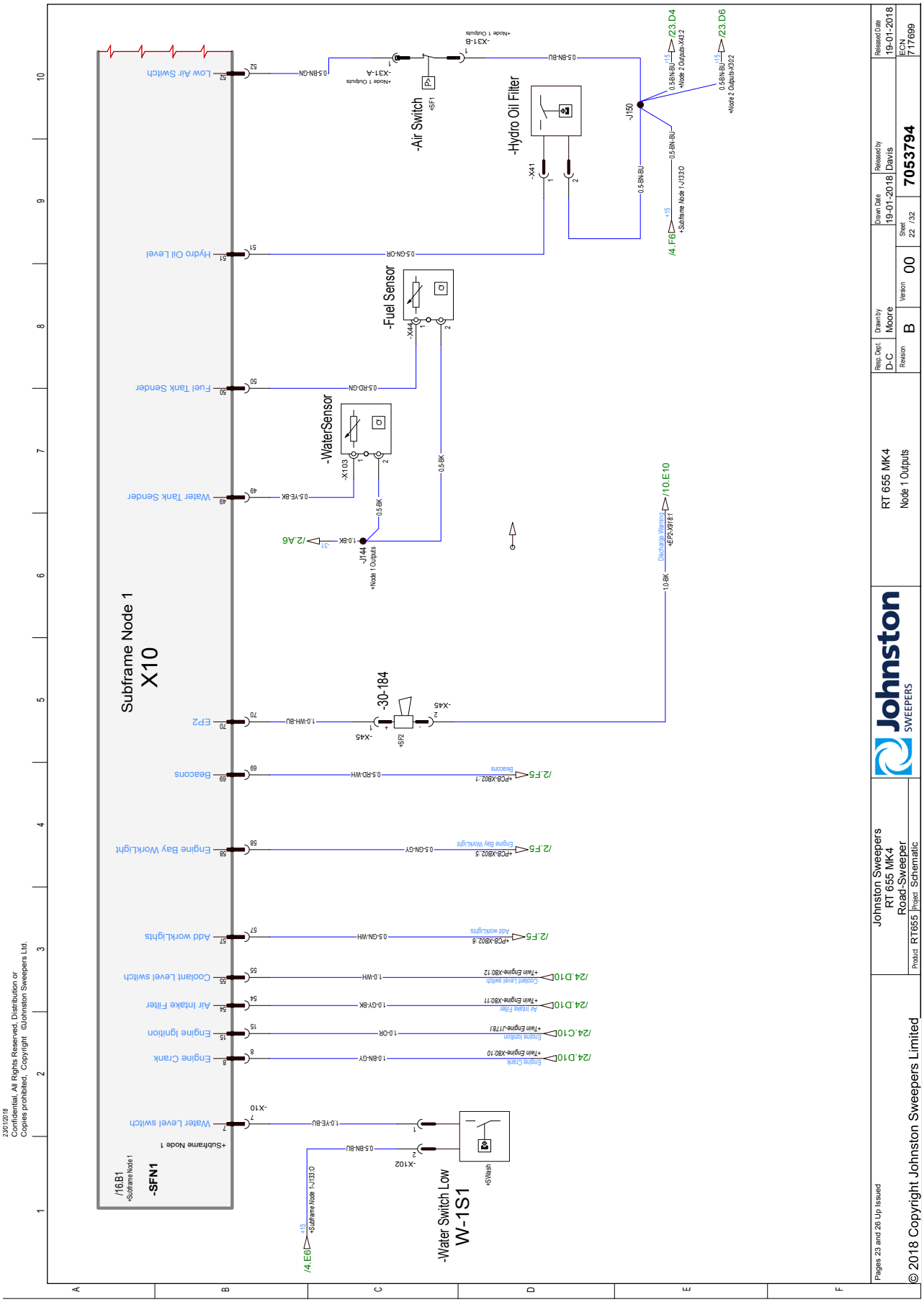
Camera Systems Diagram - Sheet 20/32 Rev B



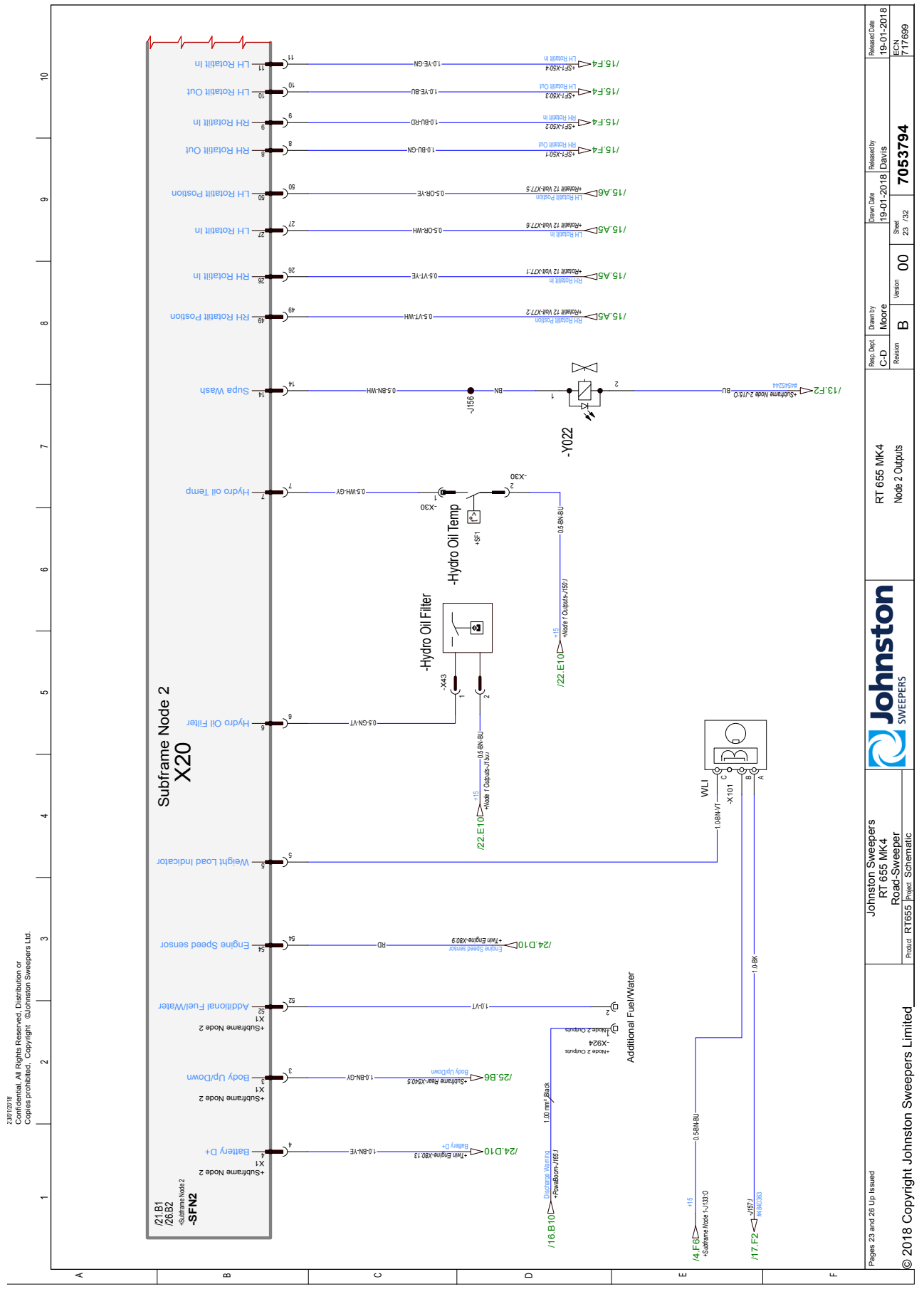
JVM Display 2 Diagram - Sheet 21/32 Rev B



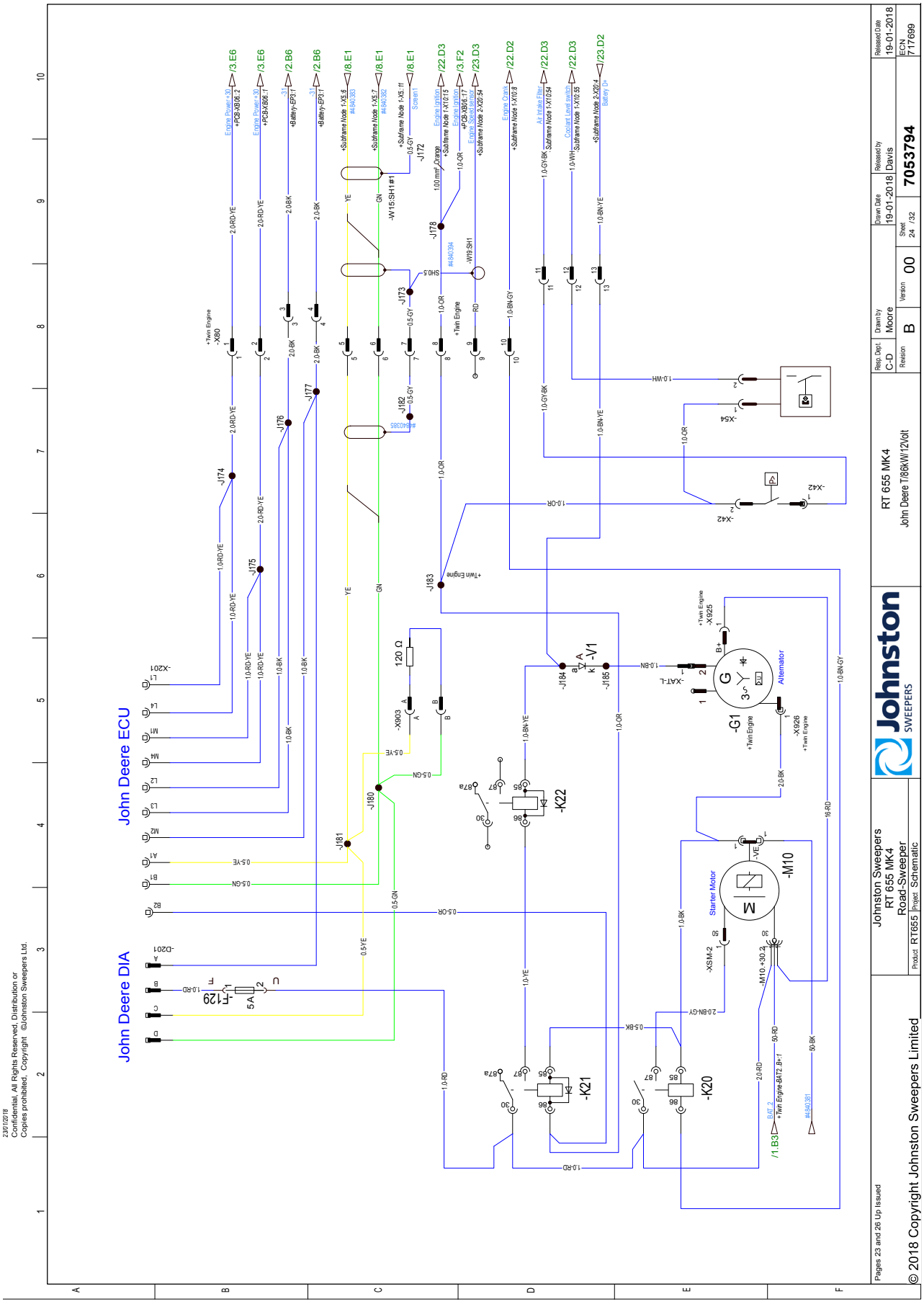
Node 1 Outputs Diagram - Sheet 22/32 Rev B



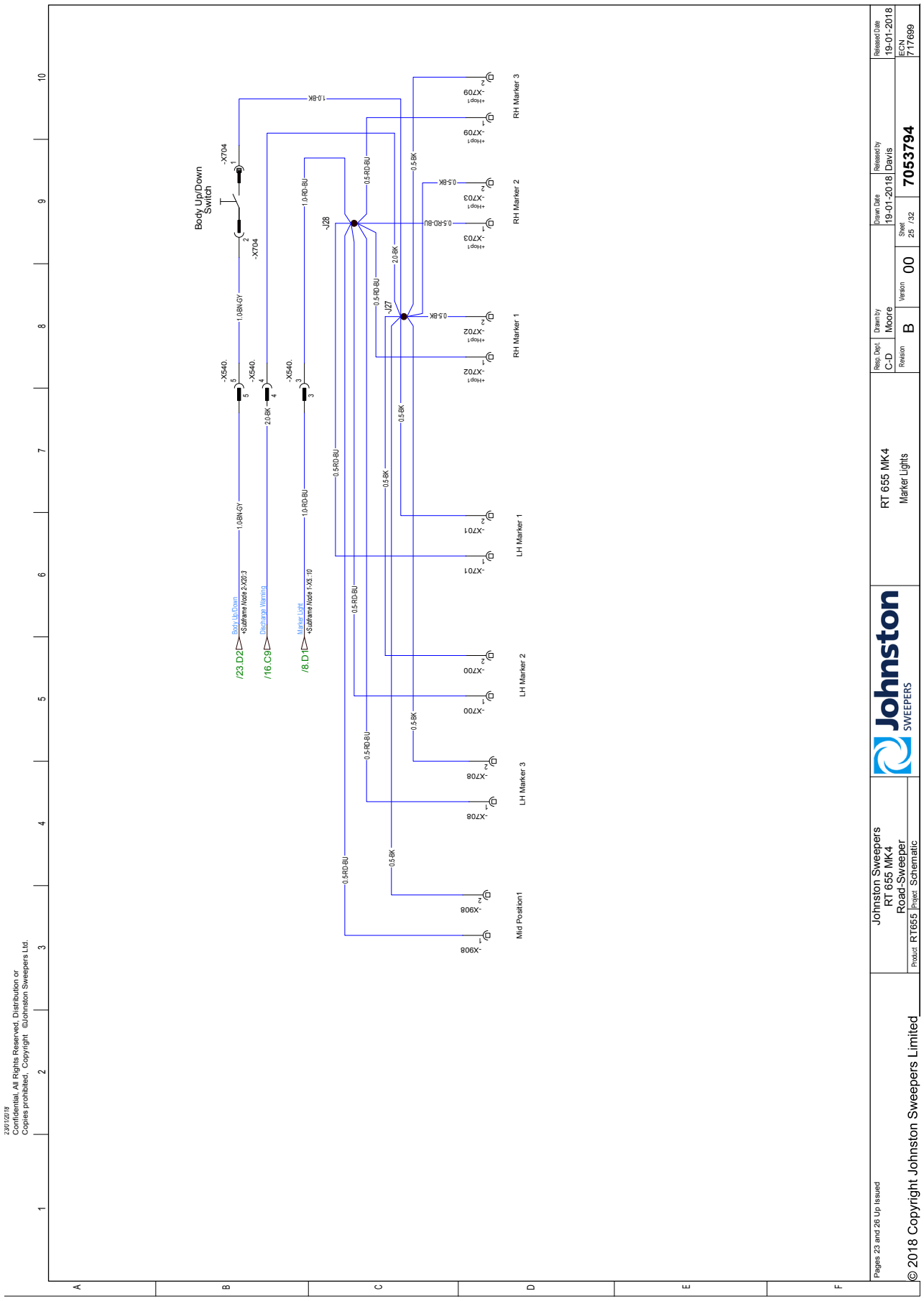
Node 2 Outputs Diagram - Sheet 23/32 Rev B



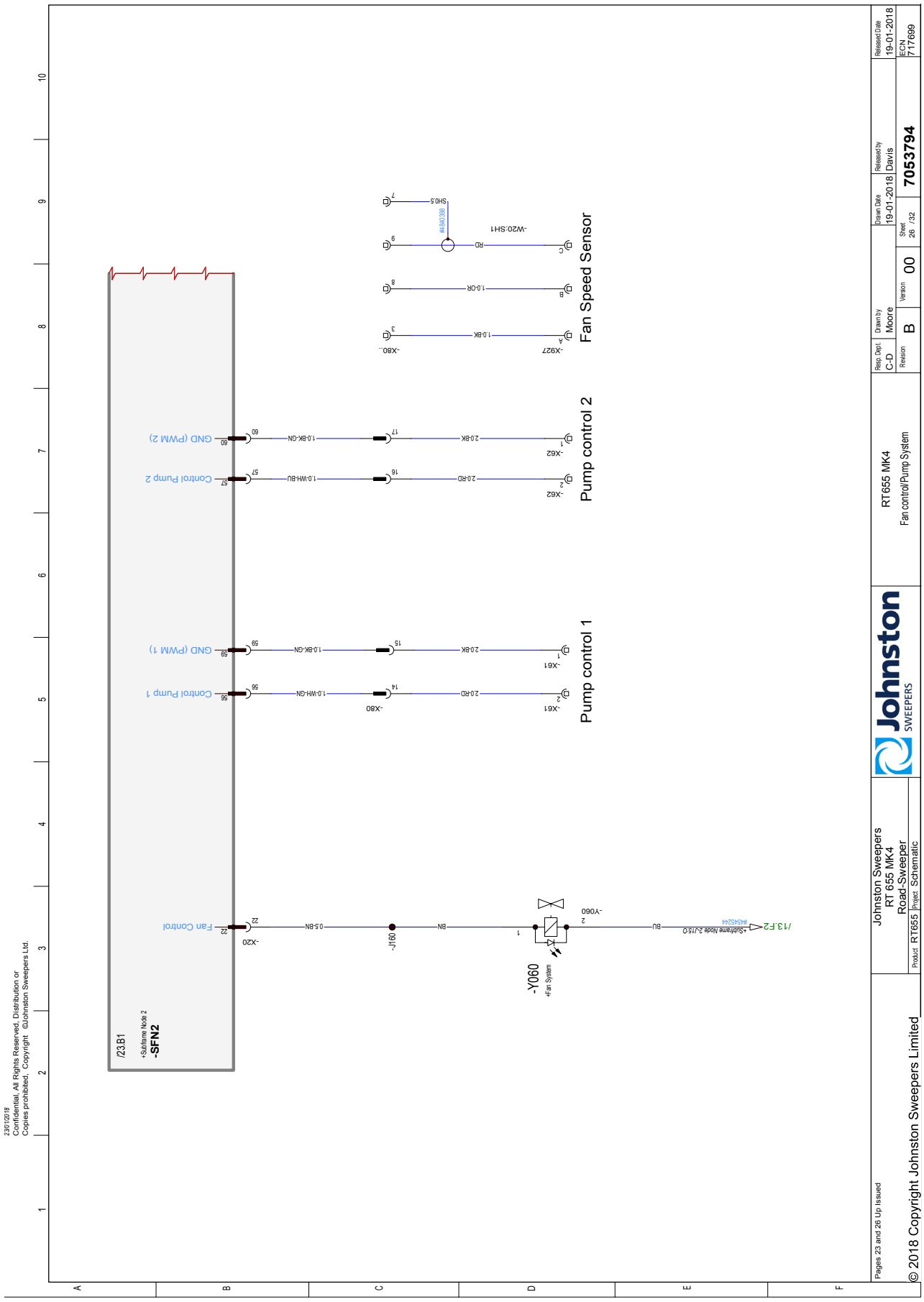
John Deere T/86kW/12Volt Diagram - Sheet 24/32 Rev B



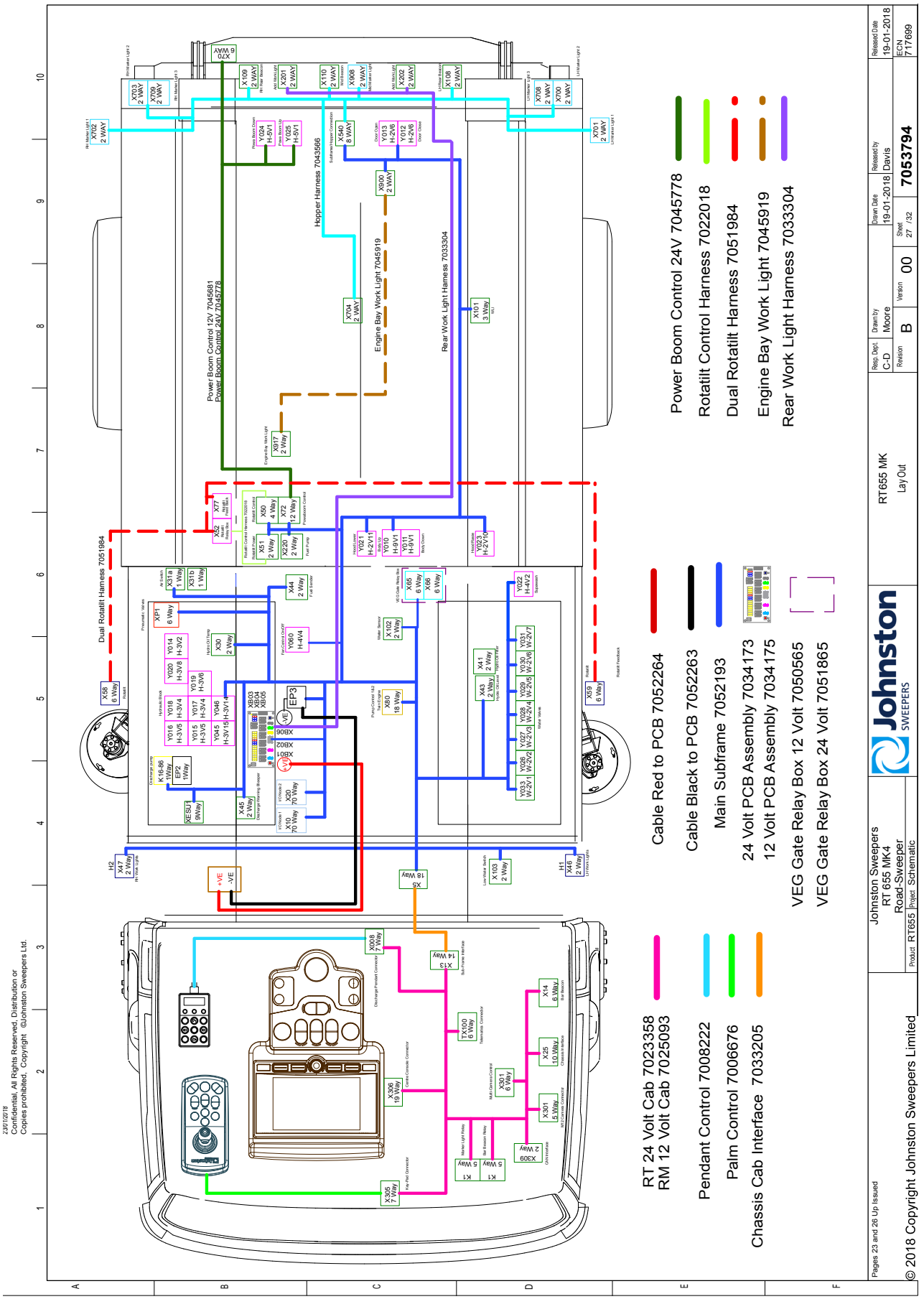
Marker Lights Diagram - Sheet 25/32 Rev B



Fan control/Pump System Diagram - Sheet 26/32 Rev B



Lay Out Diagram - Sheet 27/32 Rev B



Fuse Number	Location	Sheet Location
Subframe Node 1 - F100- 20 Amp	Subframe Node 1	Sheet 3-C 8
Subframe Node 2 - F101- 20 Amp	Subframe Node 2	Sheet 3-C 8
Rotatilt LH/RH- F102 - 20 Amp	Subframe 1	Sheet 3-C 7
VEG Gate - F103 - 20 Amp	Subframe 1	Sheet 3-C 7
Aux Engine - F104 - 20 Amp	Aux Engine	Sheet 3-C 6
Chassis Fused Ignition- F105 - 15 Amp	Chassis	Sheet 3-D 3
Additional Node- F106 - 15 Amp	Option	Sheet 3-C 6
Spare Chassis Ignition Switched- F107 - 15 Amp	Option	Sheet 3-D 3
Front Beacon F108 - 15 Amp	Cab	Sheet 3-C 5
Cab Control - F109 - 10 Amp	Cab	Sheet 3-C 5
Spare- F110 - 5 Amp	Cab	Sheet 3-C 4
Spare Chassis Ignition Switched- F111 - 10 Amp	Cab	Sheet 3-D 3
Worklights LH - F120 - 20 Amp	Subframe 2	Sheet 2-B 8
Worklights RH - F121 - 20 Amp	Subframe 2	Sheet 2-B 7
Rear Beacons - F122 - 20 Amp	Subframe 3	Sheet 2-B 6
Rear/Front Additional Beacons - F123 - 20 Amp	Subframe 3	Sheet 2-B 4
Cowl/Engine Worklight - F124 - 20 Amp	Subframe 3	Sheet 2-B 3
Additional Worklight- F125 - 20 Amp	Subframe 3	Sheet 2-B 2

Pages 23 and 26 Up Issued

Johnston Sweepers
RT 655 Mk4
Road-Sweeper
Product RT655 Project Schematic

RT655 MK4
Fuse List

Resp. Dept.	Drawn by	Drawn Date	Released by	Released Date
C-D	Moore	19-01-2018	Davis	19-01-2018

Revision	Version	Sheet		ECN
B	00	28 /32	7053794	717699

Fuse List - Sheet 28/32 Rev B

Fuse Number	Location	Sheet Location
JXM-MUX F127 - 10 Amp	Camera System	Sheet 20-D 5
Twin Engine F129 - 5 Amp	John Deere	Sheet 24-B 3

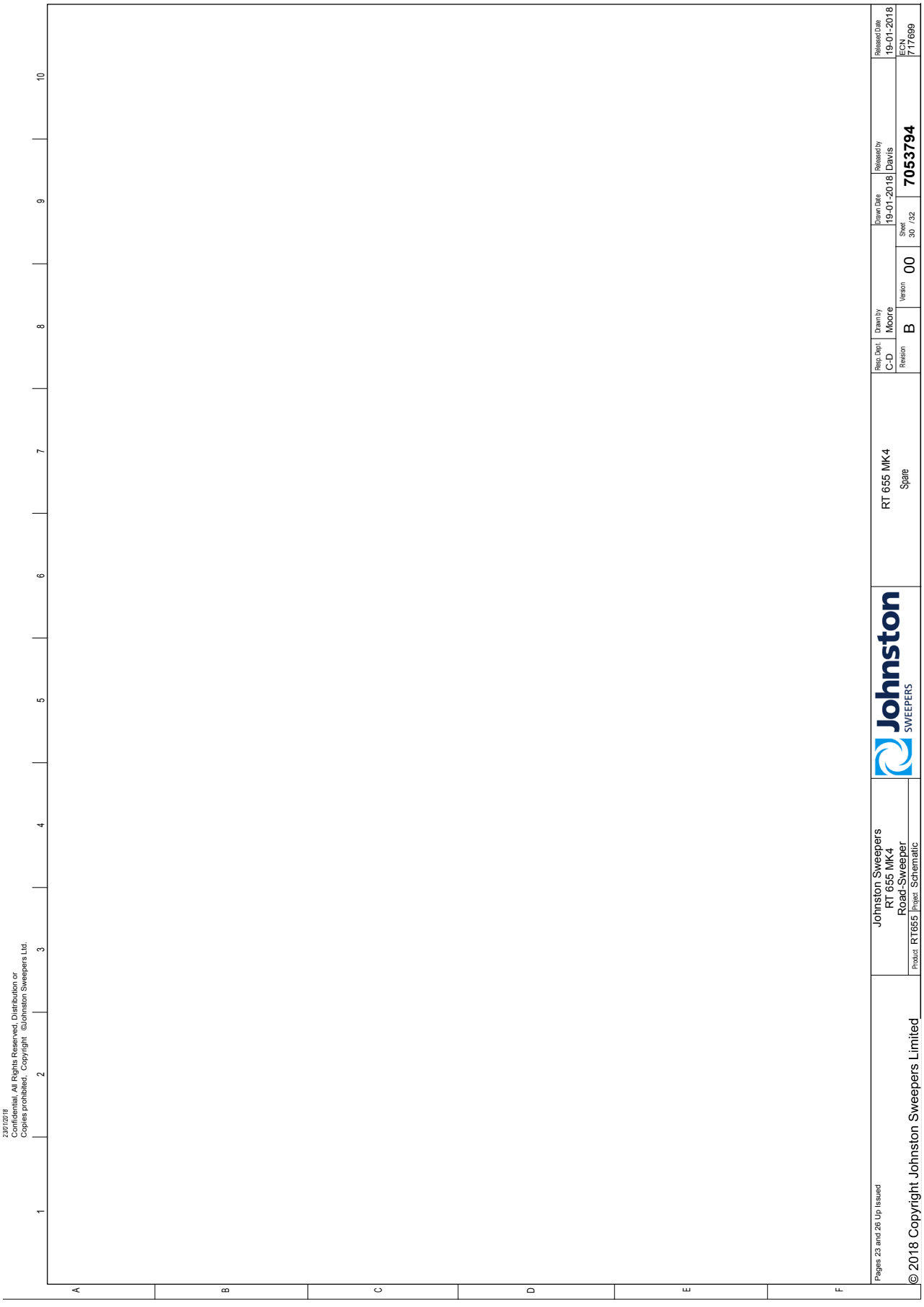
Johnston Sweepers
RT 655 MK4
Road-Sweeper
Product RT655 Project Schematic

RT 655 MK4
Fuse List

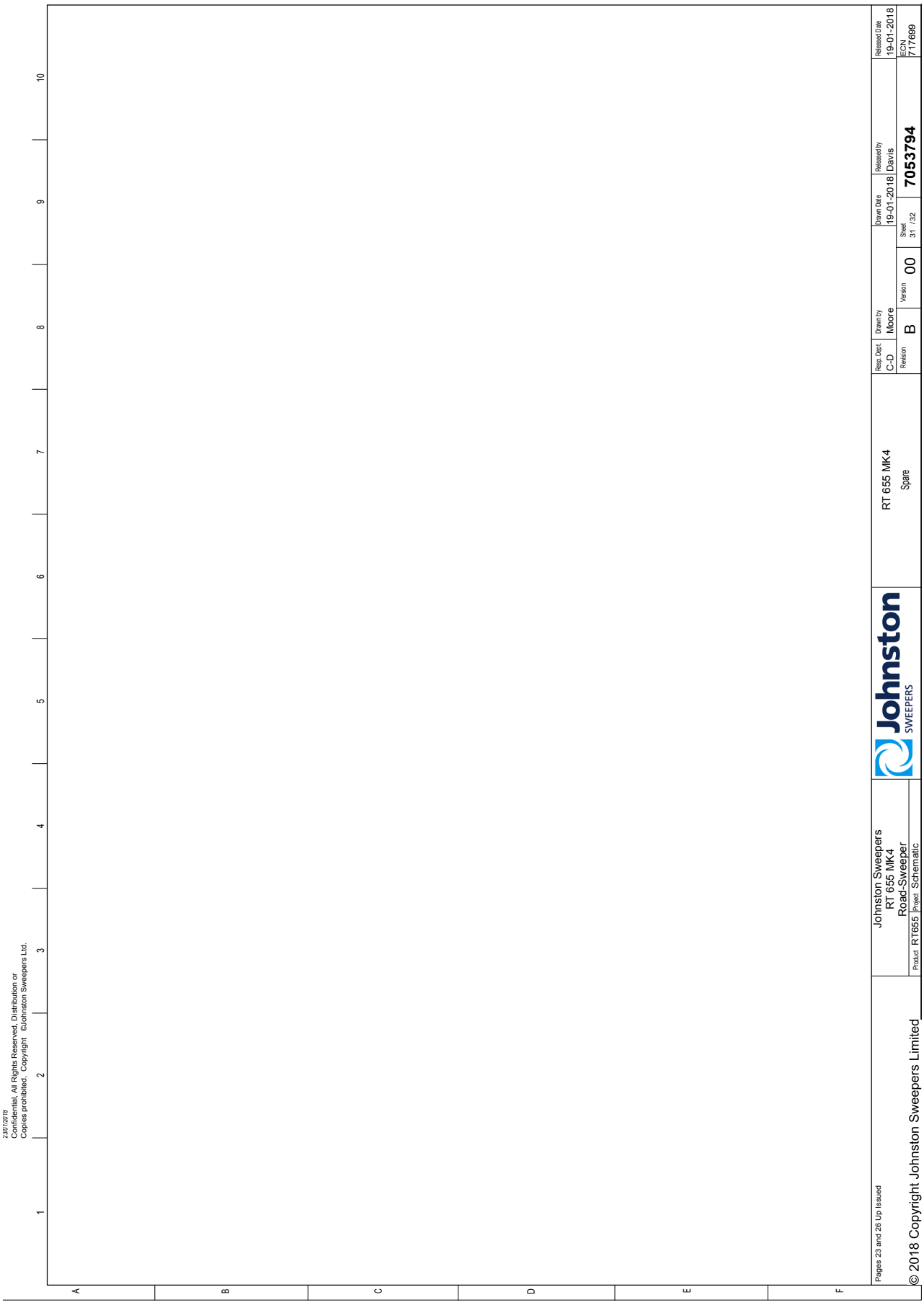
Resp. Dept.	Drawn by	Drawn Date	Released by	Released Date
C-D	Moore	19-01-2018	Davis	19-01-2018

Revision	Version	Sheet		ECN
B	00	29 /32	7053794	717699

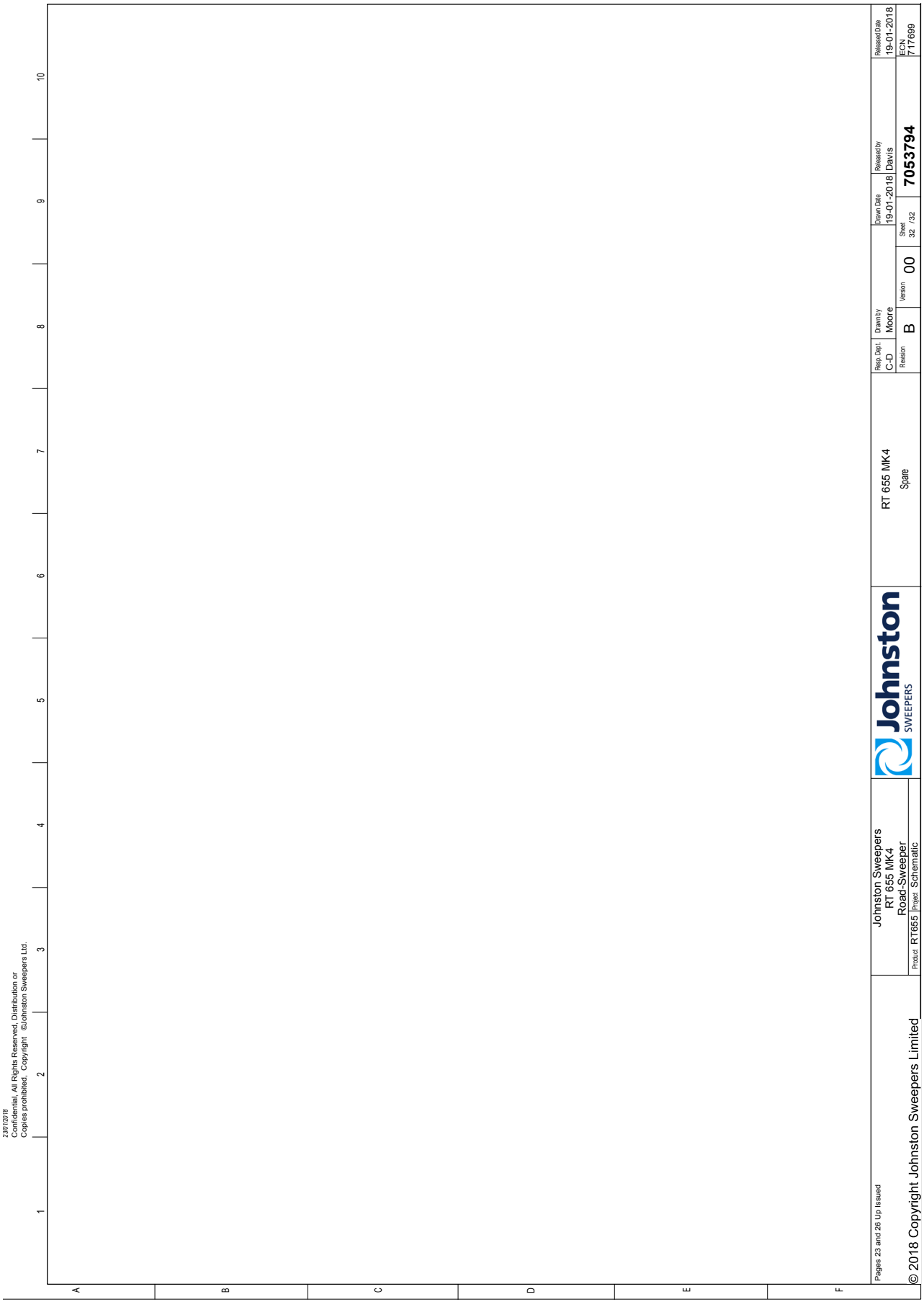
Spare - Sheet 30/32 Rev B



Spare - Sheet 31/32 Rev B



Spare - Sheet 32/32 Rev B



6 Water System

WATER SYSTEM - INTRODUCTION

General Description

The water systems can be categorised into two systems.

Low pressure:- For dust suppression and lubrication of consumable components.

High pressure:- (Supawash) For surface cleaning.

Low pressure Water

Pressure for the water supply is provided by a twin diaphragm pump hydraulically driven from the PTO. Pressure regulation is by a regulator situated in the Powapak. Filtration is by one in-line type located on the kerb side between the water and fuel tank. 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 on the left hand side of the Powapak.

Control of the washdown hose is by manual valves at the rear of the machine subframe.

Supawash

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 spraybar is optional equipment.

Supawash Unloader Valve - Pressure Setting

1. Ensure that the hydraulic relief valve has been set as outlined in section 2.
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. 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 ½ 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.

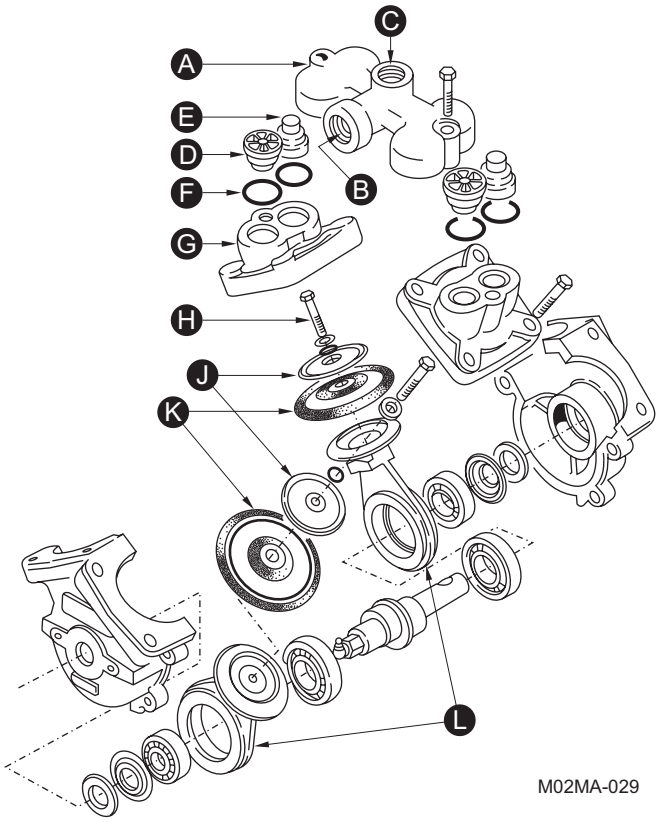
Circuit Pressures

Two test points are provided for checking the water pressures.

Test Point No.	Function
W-2Z3	Dust Suppression Sweep System
W-3Z2	Supawash System

COMPONENT MAINTENANCE AND SETTINGS

Water Pump



Key

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

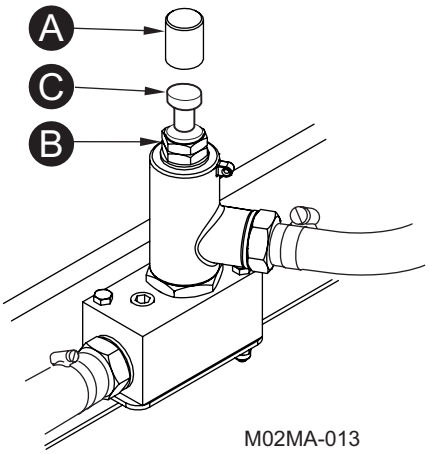
The assembly of the twin diaphragm pump is quite simple and straightforward, but attention to the under mentioned points will afford economy by prolonging the life of the pump and, more especially, the expendable components.

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.

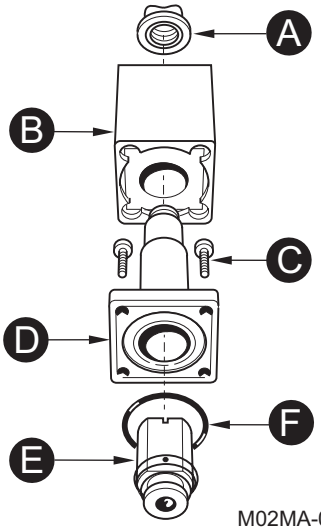
2 Pump Chambers -
Before fitting a pump chamber, turn the crankshaft until the relative diaphragm is at the centre of its stroke, i.e. so that the periphery of the diaphragm is just resting on the face of the crankcase. Place the pump chamber in position, place the bolts and nuts in position and tighten ‘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.

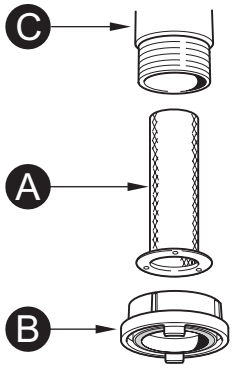
It is important that these instructions are carried out, especially with regard to the fitting of the manifolds, to ensure a satisfactory seal at the valve sealing rings. Unless these instructions are followed, leakage will be experienced at the joint between the manifold and the pump chambers. On dismantling 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.



M02MA-013



M02MA-018



M02MA-030

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 PTO running and all water sprays switched off, turn adjuster screw (**C**) until gauge reads 3.5 bar (50 psi). Tighten locknut and replace cover.

SOLENOID VALVES

Solenoid valves control the water spray jets and are located in the systems locker.

The valve is easily dismantled for inspection or cleaning by unscrewing the retaining cap (**A**) through the coil (**B**).

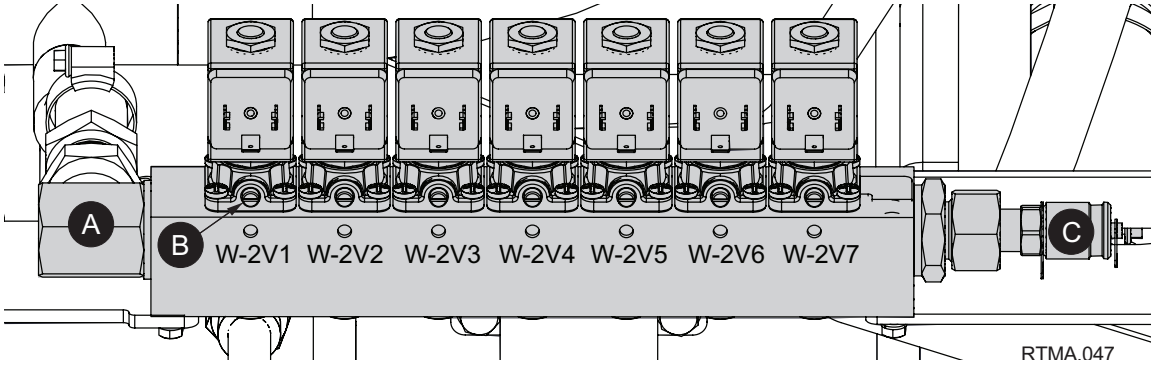
To access the armature, unscrew the four retaining screws (**C**) and remove the armature cover (**D**). The armature (**E**) can be removed. When refitting parts ensure the 'O' ring (**F**) is in good condition and located correctly.

HYDRANT FILTER

Periodically the hydrant 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**).

WATER VALVE MANIFOLD UTILISATION

A Water supply
B Manual override levers
C Water test point

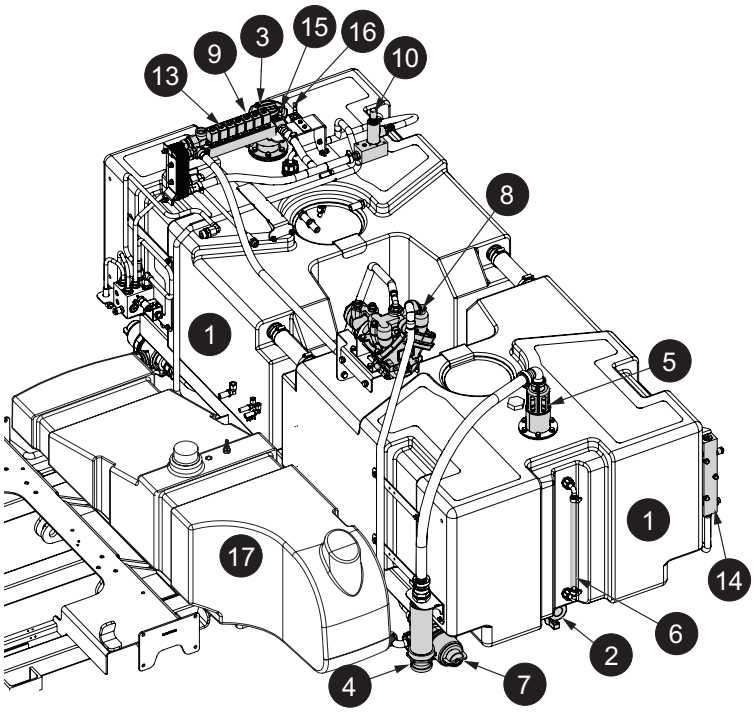


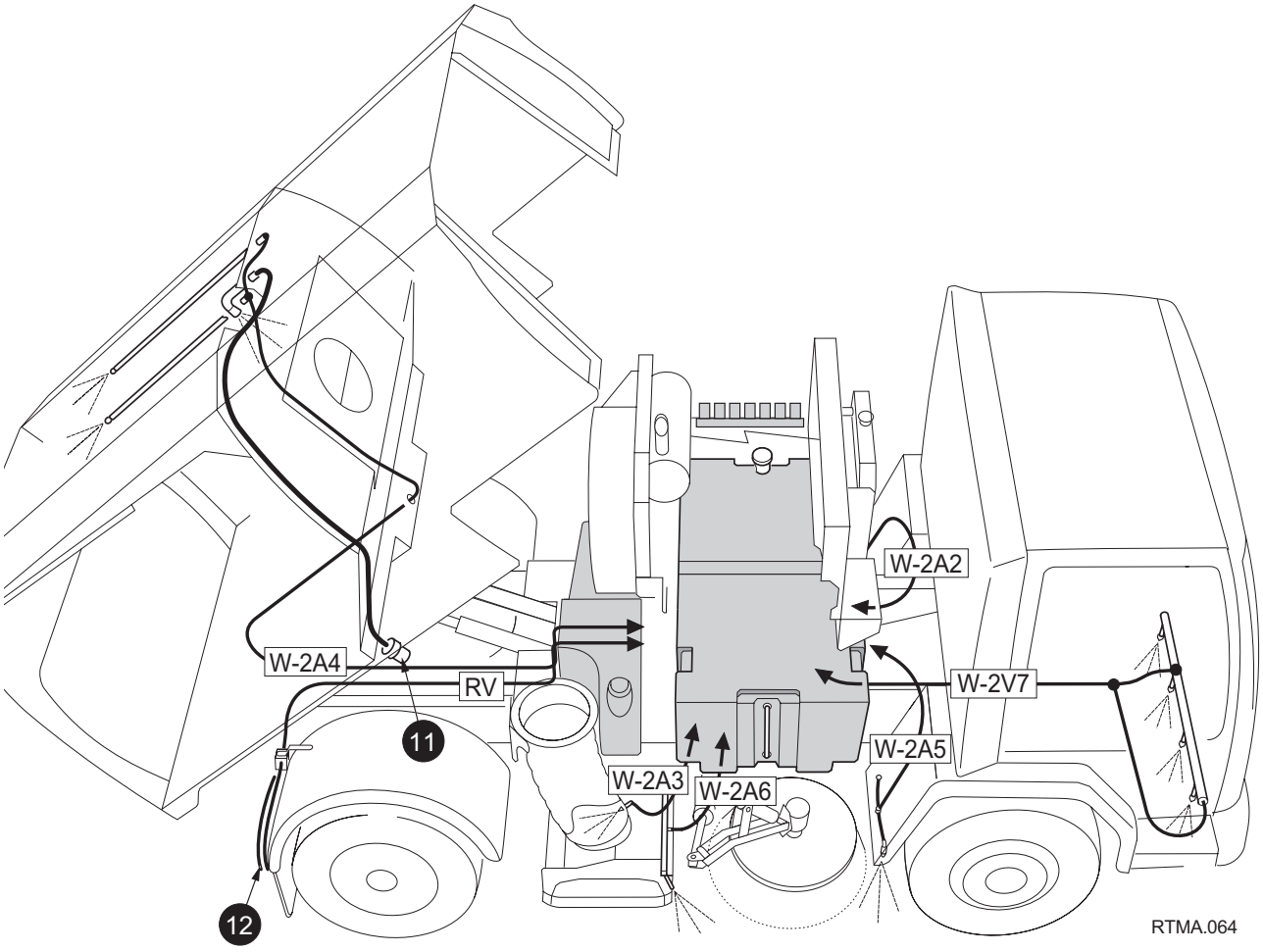
VALVE	ELECTRICAL ID	FUNCTION
W-2V1	Y033	LH Gutter spray
W-2V2	Y026	LH Gutter broom
W-2V3	Y027	Suction duct
W-2V4	Y028	Sepavac/hopper
W-2V5	Y029	RH Gutter spray
W-2V6	Y030	RH Gutter broom
W-2V7	Y031	Spray bar

PIPING DIAGRAM / COMPONENT LOCATION

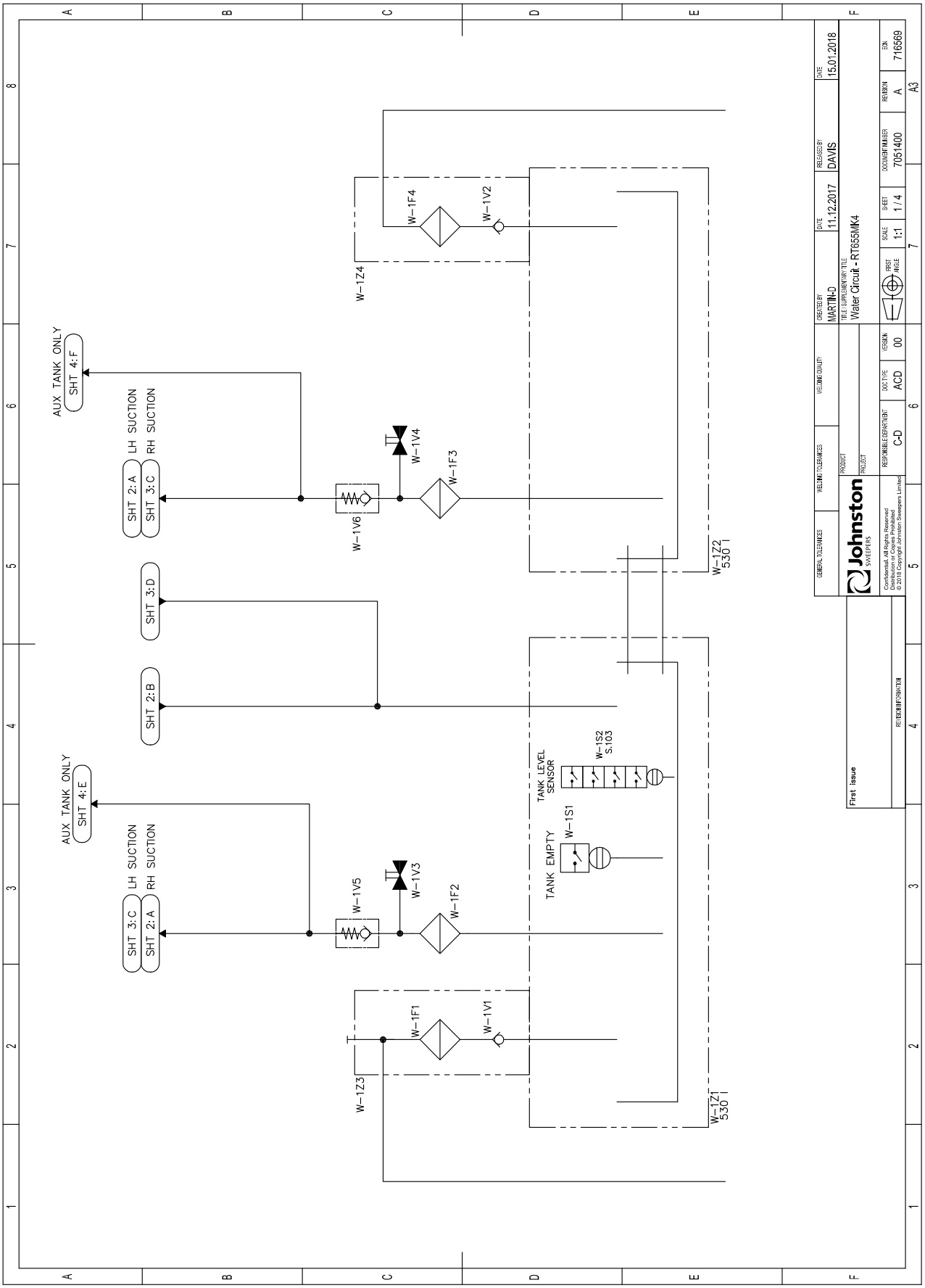
Component Key

1 Water tanks
2 Drain plugs
3 Tank filler port - hosepipe
4 Tank filler port - hydrant
5 'Type A' anti syphon water break
6 Water level sight glass - both tanks
7 Suction filter
8 Water pump - output 35 l/m
9 Tank overflow hose
10 Relief valve (RV)
11 'Sepavac' water flush hydrant connection
12 Washdown hose -shown this side for clarity
13 Water valve manifold (see table on page 89)
14 Supawash manifold
15 Pressadrain
16 Supawash Pressadrain
17 Aux water tank (RM)

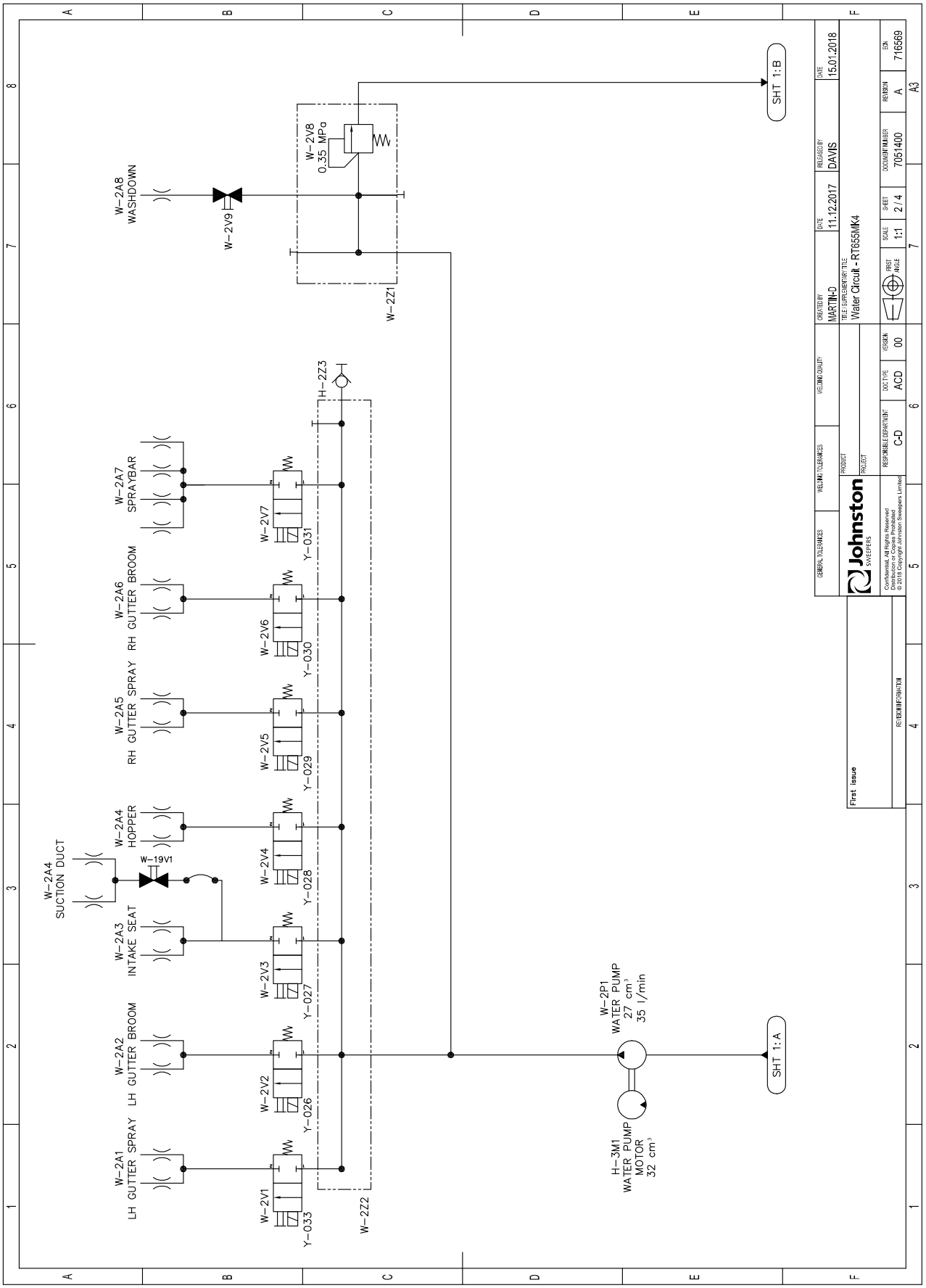




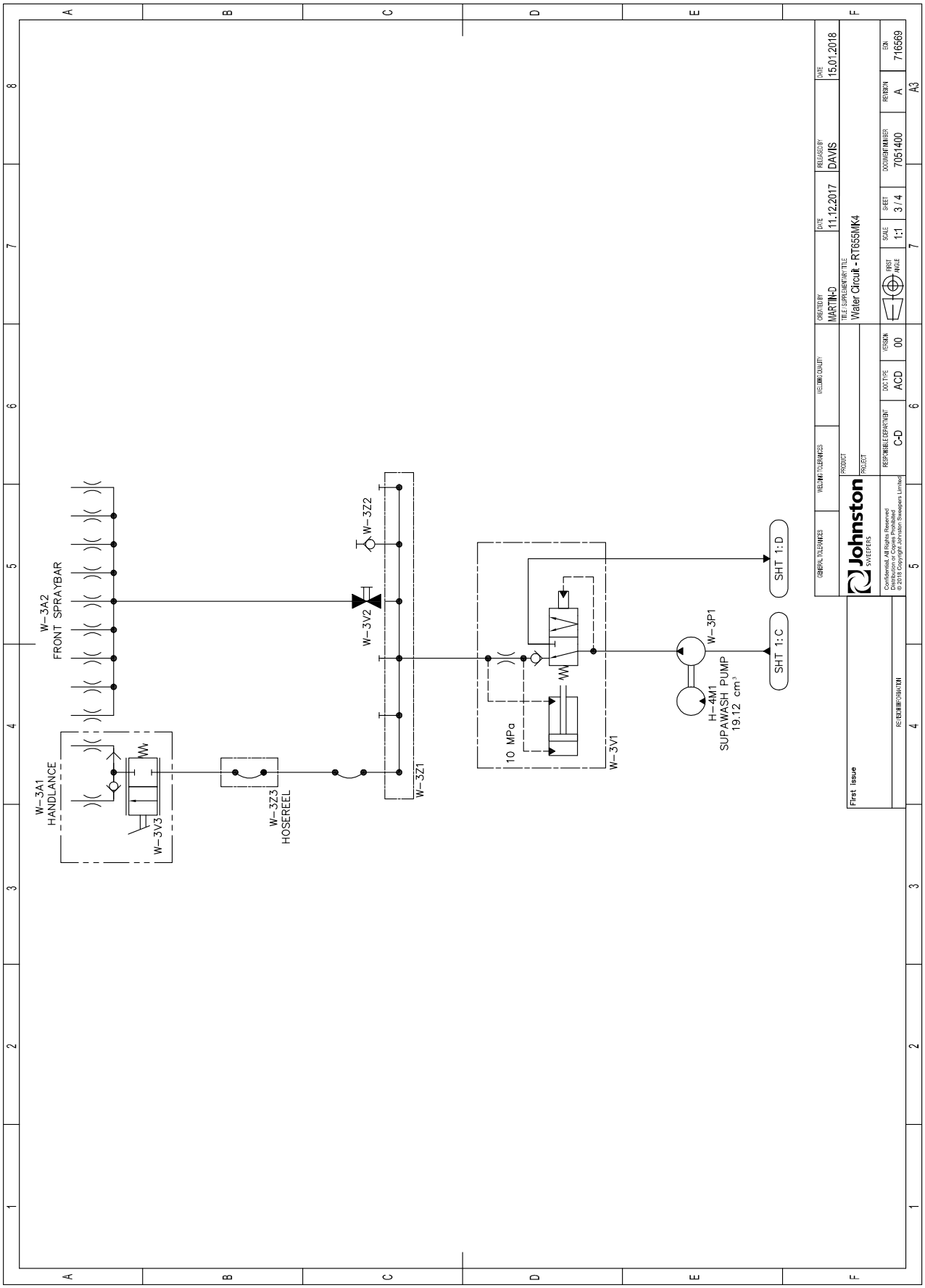
Water System - Sheet 01/04 Rev A



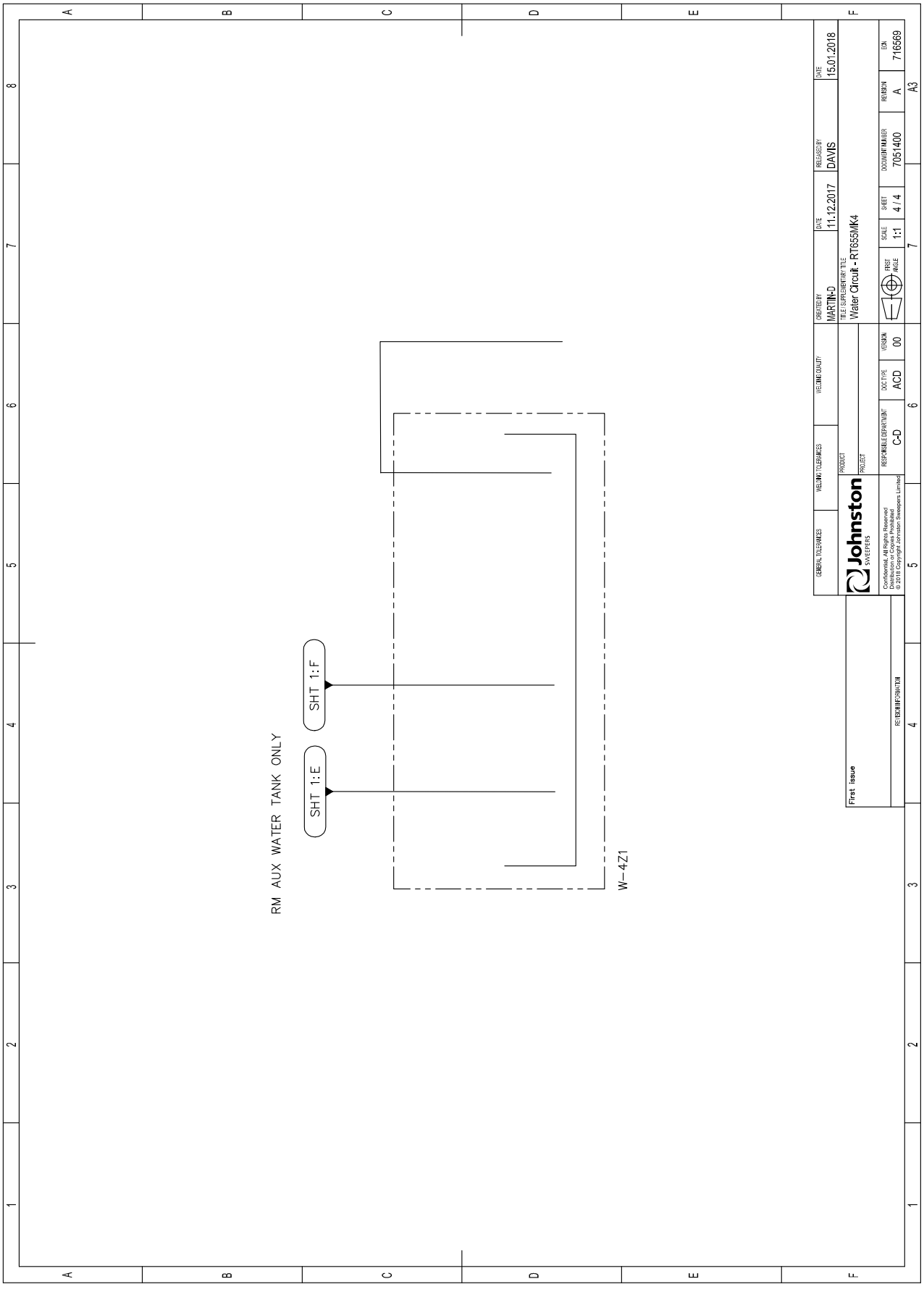
Water System - Sheet 02/04 Rev A



Water System - Sheet 03/04 Rev A



Water System - Sheet 04/04 Rev A



7 Pneumatic System

PNEUMATIC SYSTEM - INTRODUCTION

General Description

The air supply for the pneumatic system is taken from the vehicle pneumatic 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 sweeping equipment.

CAUTION: 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. 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.

NOTICE: Only competent trained personnel should work on this equipment.

Circuit Pressures

The system pressure is pre-set at 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 If pressure is incorrect, adjustment is carried out by turning the regulator control on the filter regulator unit.

Note:
Provided in the systems locker is an air charge point 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 - Permanent/supply

U = Blue - Switched supply via valve or tap

B = Black - Permanent vent/exhaust line

COMPONENT REMOVAL

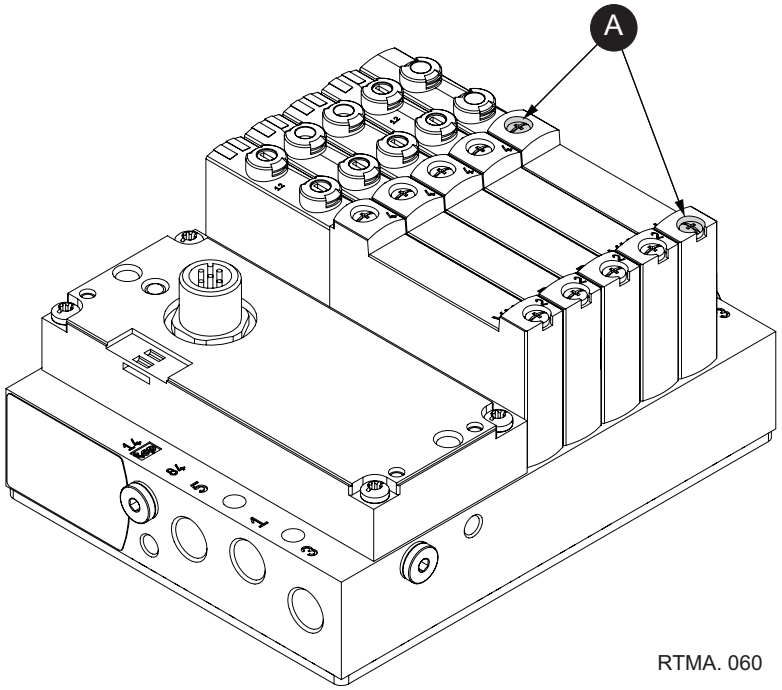
Air Filtration and Regulator (FR)

A filter regulator unit, located on the right 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 drain 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 either 4 or 5 (12V or 24V) valves. Each valve has an indicator light that illuminates when energised.



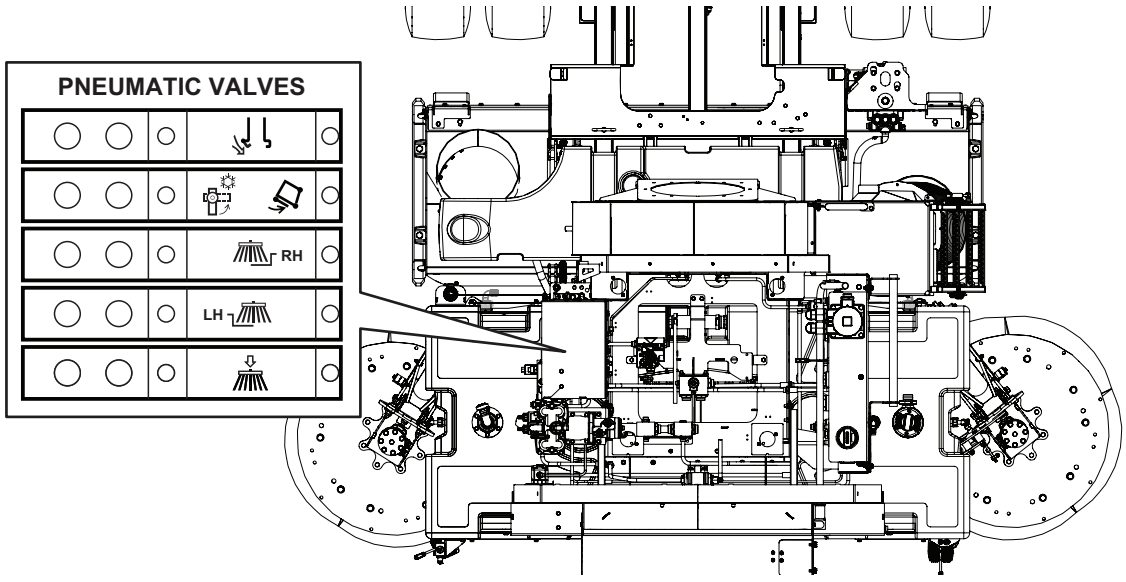
RTMA. 060

The valves are identified by a code.

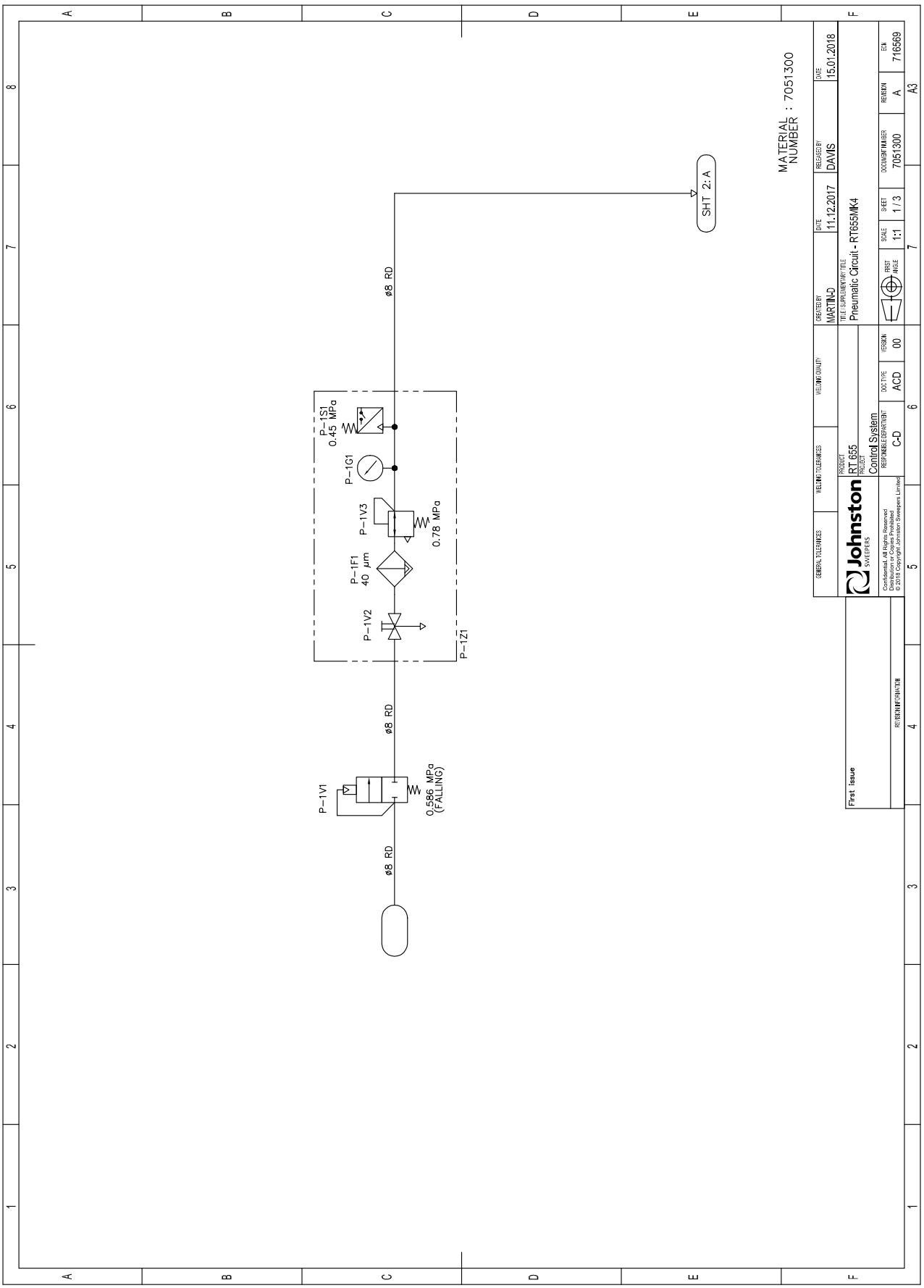
To replace a valve -

1. Remove solenoid and two screws (A) from problem valve
2. Fit new valve, ensuring any gaskets are in position
3. Test system electronically before a thorough test

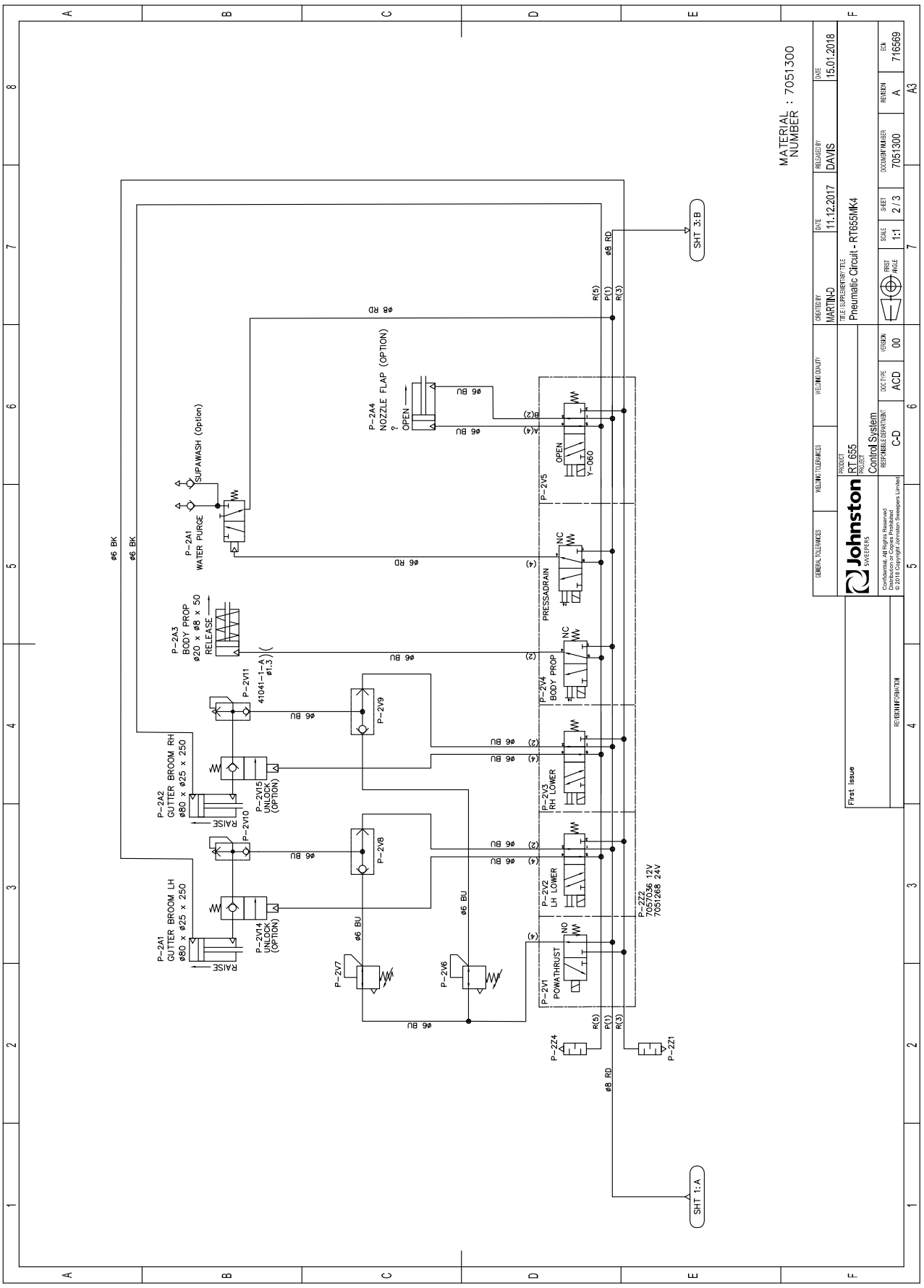
Valve Identification/Location



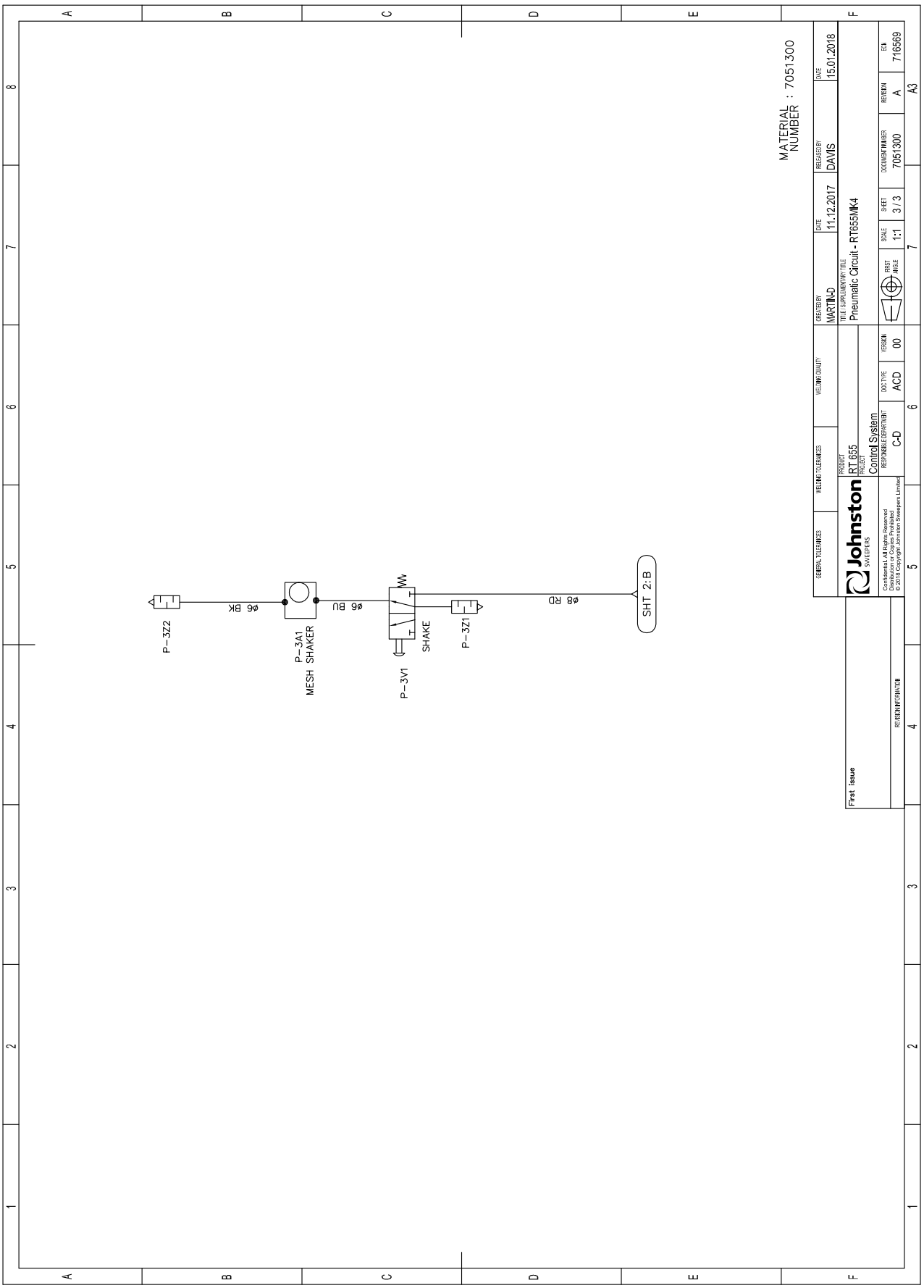
Pneumatic System - Sheet 01/03 Rev A



Pneumatic System - Sheet 02/03 Rev A



Pneumatic System - Sheet 03/03 Rev A



8 Wearing Items

REPLACEMENT INSTRUCTIONS

WARNING:

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.

CAUTION:

When replacing a fan impeller, always fit new securing screws. Never re-use existing hardware.

Never use a second-hand or a non-Johnston fan.

The fan impeller is supplied complete with the hub.

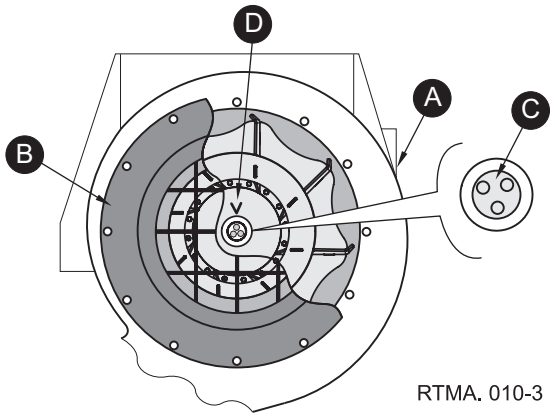
Do not remove the hub or replace it, as the balancing will be adversely affected.

Strictly adhere to the regular checking routines as outlined in the Johnston Operator's Guide.

FAN IMPELLER

CAUTION:
The fans fitted to our sweepers are dynamic components, with considerable inertia. They are arguably the greatest safety hazard on the sweeper, therefore they should be treated with respect at all stages of handling and use.

Inspection
Remove the inspection cover (**A**) to allow access to the impeller. This should be inspected 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 fancase cover (**B**).

Before removing the fan impeller check for any lateral movement in a similar fashion to checking a wheel bearing.

Remove the 3 bolts (**C**) securing the centre of the fan. The fan should slide off the spline - a bearing puller can be used if required.

Refitting
Refitting is the reverse procedure to removal.

Lightly grease the fan drive spline, using Kluer paste (JSL part number 94-24), before refitting the impeller using a new Tuflok Cap screws. Torque the 3 screws to 80 Nm (59 lbf. ft.).

All impellers have a ''V'' mark (**D**) 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 are tightened to the prescribed torque.

IMPORTANT
- When replacing a fan impeller, always fit new securing screws. Never re-use existing hardware.
- Never use a second-hand or a non-Johnston fan.
- The fan impeller is supplied complete with the hub.
  Do not remove the hub or replace it, as the balancing will be adversely affected.
- Strictly adhere to the regular checking routines as outlined in the Johnston Operator's Guide.

Refit fan case inlet duct (**B**) using sealant (part number 94-1), to the mating face, having first removed the old sealant.

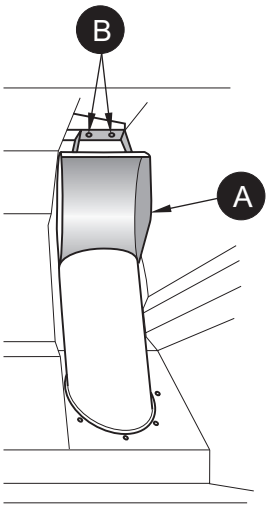
Replacement is reverse procedure, taking note of the following.

Lightly grease the fan drive spline, using Kluber paste before refitting the impeller.

If setscrews are fitted replace with Tuflock Capscrews and torque up the three impeller securing bolts to 80 Nm.

WEAR PLATE

The wear plate is subject to aggressive abrasion and should be replaced when erosion makes it inappropriate to the task of protecting the body.



RTMA.009-2

Removal

Enter the body lowered and the rear door opened, enter the body. The wear plate is secured to the body by 2 screws (**B**). It is advisable to provide a suitable support or prop the wear plate before removing these screws to avoid the heavy wear plate dropping. Remove the wear plate (**A**).

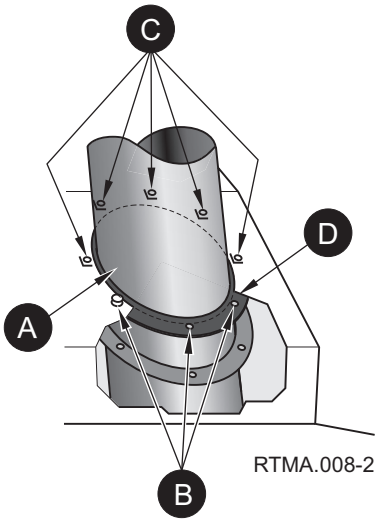
Refitting

Refitting is the reverse procedure to removal.

Note: Provision is made to allow positioning the wear plate to give optimum material loading. This is achieved by rotating the wear plate on the securing screw slots; a slight bias to the centre of the hopper is advised.

INTAKE DUCT

The intake duct (**A**) is subject to aggressive abrasion. Inspect on a regular basis and replace when worn, before the duct is perforated.



RTMA.008-2

Removal

With the body lowered and the rear door opened, enter the body. Release the 3 screws (**B**) around the base of the intake duct.

Note: A further 5 screws cannot be accessed from within the body, and the intake duct will still be secured with 3 screws removed.

Exit the body. Raise the body and ensure the prop is engaged.

Access and remove the 5 remaining screws (**C**) from the underside of the body and remove the intake duct.

Refitting

Refitting is the reverse procedure to removal. Ensure seal (**D**) is in good condition, replace if necessary.

FLEXIBLE INTAKE AND BLASTER TRUNKINGS

The flexible trunkings are subject to erosion and should be regularly inspected for wear, damage and perforation.

Removal

Lower the pick-up hood.

Intake trunking - Release worm drive clip at top and quick release band at the bottom and remove the trunking.

Blaster trunking - Release the worm drive clips top and bottom and remove the trunking.

Refitting

Refitting the trunkings is the reverse procedure to removal. Ensure the trunkings are not twisted or rucked and do not foul on adjacent components when the pick-up hood is raised.

INTAKE SEAT

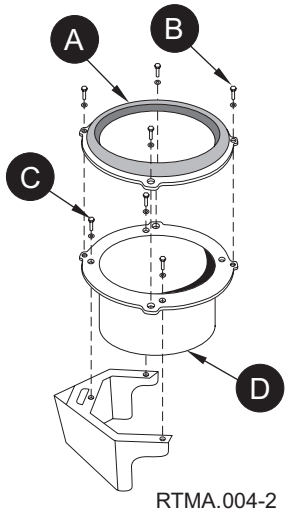
Removal

Raise the body and ensure the prop is engaged.

Release the trunking from the intake seat as described above.

Remove the intake seal and retainer (A) by unfastening the 4 screws (B) securing the retainer to the intake seat.

Remove the 3 countersunk screws (C) securing the intake seat to the support bracket and remove the intake seat (D).



RTMA.004-2

Refitting

Refitting is the reverse procedure to removal.

9 Remove and Refit Procedures

REMOVAL AND REFITTING INSTRUCTIONS

WARNING:

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**.**

NOTICE: 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.

Water Pump - Dust Suppression

Removal and Refitting

1 Isolate the water supply at the filter unit.

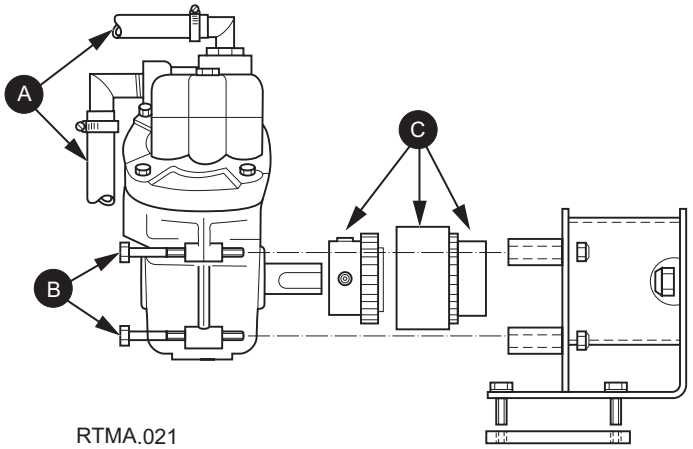
2 Disconnect the feed and pressure water pipes **(A)** to the pump.

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.

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

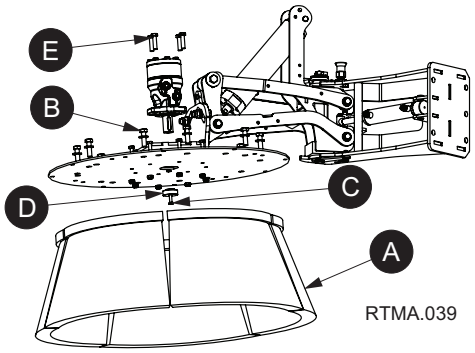


RTMA.021

2 Gutter Broom

Motor Removal and Refitting

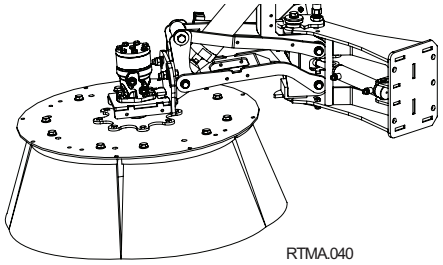
1 Remove the brush segments (**A**).
2 Remove brush mounting plate 8 x M10 bolts (**B**).
3 Undo the centre retaining nut on motor shaft (**C**).
4 Pull off the drive plate (**D**).
5 Disconnect the motor hoses.
6 Remove 4 x M10 bolts and remove motor (**E**).
7 Refit procedure is the reverse of the above.



RTMA.039

Upper and Lower Arms Removal

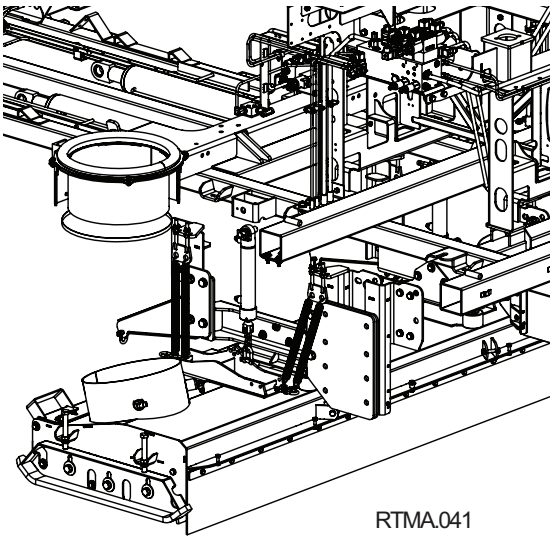
1 Release the pivot bolts on the arms at the brush motor head and pivot brackets. Note the position/ location of the bearings and spacers.
2 The arm pivot bracket can be removed by unscrewing the top and bottom lug bolt and carefully drifting the pin out.


RTMA.040

3 Pick-Up Hood

Removal and Refitting

1 Remove front and rear safety chains from hooks.
2 Undo clips from nozzle trunkings.
3 Remove water pipes from pick-up hood.
4 Lower hood.
5 Remove nozzle trunkings.
6 Insert a pribar under the skid to raise hood so lift ram shackle can be removed - repeat on the other side.
7 Slide the hood out from underneath the machine - Note hood weighs 280 kg. (620 lbs).
8 Turn hood over with suitable lifting equipment to gain access to the rubber curtains.
9 Refitting is a verse of the above procedure.

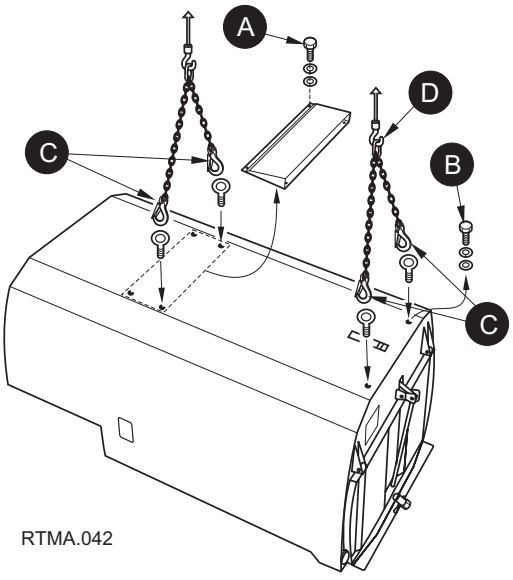

RTMA.041

4 Lifting or Removal of the Body

If it is necessary to raise/remove the body four holes are provided, two at the front and two at the rear.

1 It is necessary to remove the retaining bolts (**A**) and remove the fan out cover.
2 Remove the two blanking bolts (**B**) at the body rear.
3 Insert the eye bolt item (**C**) part no. 422-1 into the M16 socket.
4 The body can be raised by the using the 4 eye bolts with suitable chains or web lifting straps (**D**).

NB. The lifting eyes are not designed for lifting the skid unit, If this is required the appropriate discard beams should be used.



RTMA.042

5 Radiator/Oil Cooler

Removal

1 Drain hydraulic fluid

2 Remove hoses and pipes connected to radiator

2 Unscrew 4 mounting bolts

6 Hydraulic Pump - Gear Pumps

Removal

2 Drain hydraulic fluid

2 Remove low and high pressure hoses from pump

2 Remove from rear of variable displacement pump

7 Hydraulic Pump - Variable displacement pump

Removal

2 Drain hydraulic fluid

2 Remove both suction and pressure hoses

2 Remove propshaft connections from pump

2 Remove fixings from mounting brackets

8 Fan Impeller

Removal

1 Raise the body and ensure the prop is engaged.

2 Remove the fan case inlet duct (12 screws).

Note: Before removing the impeller, check for any axial movement in a similar manner to checking an automotive wheel bearing. An excess of 2 mm play would indicate wear in the gearbox bearing and would require overhaul or replacement.

Remove the 3 bolts securing the fan impeller hub to the motor in the centre of the fan. The fan should then slide off the splined shaft. A bearing puller (part number 437-2) can be used if required.

9 Fan Case

Removal

1 Carry out procedure for fan impeller removal.

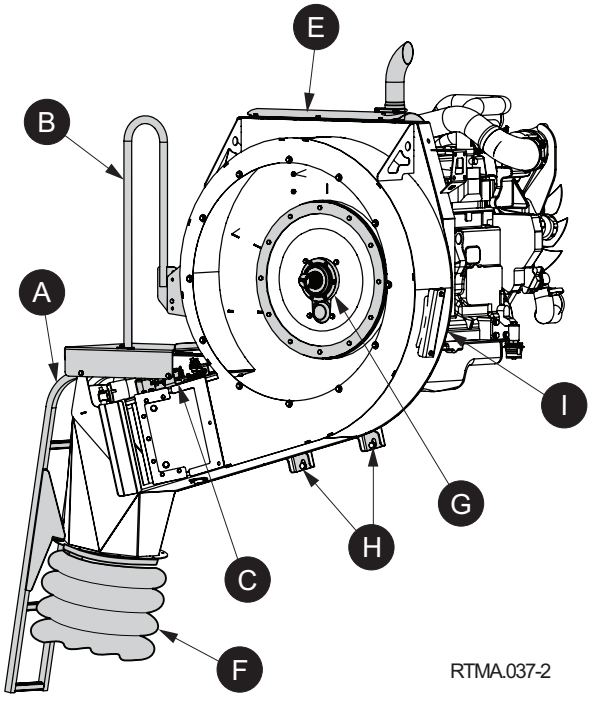
2 Remove the access ladder (**A**), walkway and grab handle (**B**).

3 Disconnect electrical connections to VEG actuator (**C**).

4 Disconnect the blaster trunking (**F**).

5 Remove the screws (**G**) holding the mask plate onto the gearbox.

6 Remove the 2 lower fan case mounting screws (**H**) - and the 2 upper mounting screws (**I**). Remove the fan case, an in-built lifting eye is provided.



10 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 (**G**) before fitting.

11 Fan Impeller

Refitting

See Chapter 6.

12 Fan Case Cover

Refitting

See Chapter 6. Apply flexible sealant on the mating surface to the fan case.

13 Fuel Tank/Aux Water Tank

Removal

1 The RH intake seat and bracket need to be removed.

2 Drain the fuel tank and cap off the pipes and disconnect the sender plug.

3 Ensure all hydraulic hoses and electrical looms are clear of the tank.

4 Loosen the webbing clamps and remove the tank.

The reverse of the above procedure.

NB: a) Ensure the foam strip that the tank sits on is in good condition.

b) Refit webbing clamps loosely. Push tank up to the rear of the engine pack and tighten webbing adjuster so tank is held securely.

14 Water Tank

Removal

1 Drain the water out of the tank.

2 Loosen and remove the various water pipe connections to the tank to be removed.

3 Disconnect the float switch loom connectors if fitted.

4 Remove the upper and lower connectors/hoses between the two tanks at the front of the machine.

5 Remove the work lamps (if fitted).

6a To remove LH tank undo the mounting plate with the valve block and oil cooler if Supawash is fitted.

6b To remove RH tank disconnect the output hose from the water filter. Unbolt the safety protection valve and the water manifold from the rear of the tank.

7 Undo the centre clamping bolt on the tank to be removed and lift the outer edge of the tank to clear the mounting frame.

Refitting is the reverse of the above procedure.

NB: Ensure the foam strip on the mounting frame is in good condition and carefully tighten the centre retaining bolt so the tank is held securely without deforming the plastic tank.

15 Body Lift Cylinder

Removal

1 Raise the body onto the first notch on the body prop.

2 Isolate the truck ignition.

3 Remove the 3 hydraulic hoses from the cylinder to be removed.

4 Support the cylinder and remove the end pins.

5 Lower the cylinder down from the chassis.

The refit procedure is the reverse of the above.

NB: Lubricate the cylinder mounting pins with grease when refitting.

10 Fault Diagnosis

POWER SYSTEMS

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. 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.
Air leak from solenoid block	1. Air pressure switch faulty. 2. Insufficient pressure in Johnston system.

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. Drain tap on filter open. 4. Check hydraulic motor is turning. 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.

Audible Warning

Fault Symptom	Possible Cause
Audible warning on continuously	1. Air pressure switch faulty. 2. Insufficient pressure in Johnston system. 3. Low Hydraulic oil level. 4. Body raised.

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 switches.
Work lights not working	1. Check vehicle ignition is on, ignition switch V is on. 2. Check bulb. 3. Check feed to light. 4. Check earth wire. 5. Check switch is illuminated.
Pick-up hood fails to lower	1. Check feed to solenoid/Plug 2. Check solenoid. 3. Check earth wires. 4. Check switch.
Channel brush fails to lower	1. Check feed to solenoid/Plug 2. Check solenoid. 3. Check earth wires. 4. Check switch.
Channel brush fails to rotate	1. Check feed to solenoids/Plug 2. Check solenoid. 3. Check earth wire. 4. Check switch.
Channel brush water fails to operate	1. Check feed to solenoid/Plug 2. Check solenoid for operation/obstruction. 3. Check earth wire.
Pick-up hood water solenoid fails to operate	1. Check feed to solenoid 2. Check solenoid for operation/obstruction. 3. Check earth wire. 4. Check switch.

SUCTION SYSTEMS

Fault Symptom		Possible Cause
No pickup performance	1.	Hopper full, causing airflow to be throttled - discharge load.
	2.	Pick-up hood trunking blocked or restricted by debris.
	3.	Check the pick-up hood water jets are not blocked, are working correctly and lubricating the intake duct.
Poor pickup performance	1.	Pick-up hood trunking partially restricted by debris. Check nozzle water jets are working correctly and so lubricating the duct.
	2.	Channel brush incorrectly set, not directing debris in line with nozzle.
	3.	Rear body meshes or SepaVac blocked or restricted.
	4.	VEG gate incorrectly set.
	5.	Fan is not running at correct operational speeds.

SWEEP GEAR

Pick-up Hood

Fault Symptom	Possible Cause
Bouncing	1. Spring regulation adjustment incorrect. 2. Brush stock bent. 3. Linkage pins/brackets worn/damaged.
Not dropping	1. Check feed to solenoid/Plug 2. Solenoid faulty. 3. Switch on control box faulty. 4. Linkage/pivots/cylinders seized.

Channel Brush

Fault Symptom	Possible Cause
Rotating slowly	1. Motor worn. 2. Hydraulic pump worn. 3. Check hydraulic pressure to aid fault diagnosis.
Brush fails to lift	1. Check for electrical power at solenoid/Plug 2. Check pneumatic solenoid for correct operation. 3. Seals in cylinder leaking.

DISCHARGE

Body Tip

Fault Symptom	Possible Cause
Rear door will not open	1. Check handbrake is on 2. Check green safety run button is pressed on pedant unit 3. Check pendant unit has not become unplugged
Body will not tip	1. Ensure handbrake is on 2. Check feed to solenoids/Plug LED 3. Check green safety run button is pressed on pedant unit 4. Check pendant unit has not become unplugged

11 Service Tools

The following tools are available through our Spares Network

Tool No	Item	Function
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
437-11	Check valve insertion tool	To fit check valve 421-278
437-311	Nylon Tube Cutter	Ø4 - Ø16mm
422-1	Body Eye Bolt	Raising/lifting of body
7028665	ESU Unpacking Control Unit 12v (501, 651 & 801)	Rear door control enables ESU's to be unpacked
7021548	ESU Unpacking Control Unit 24v (501, 651 & 801)	Rear door control enables ESU's to be unpacked
7052219	ESU Unpacking Regen adaptor harness	Enable 7028665/7021548 to be used on R655 MkIV