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Technical Note - TN 041: 2016

Issued date: 17 October 2016

Effective date: 17 October 2016

Subject: Withdrawal of legacy RailCorp signalling maintenance manuals

WITHDRAWN

This technical note is issued by the Asset Standards Authority (ASA) to notify that the following legacy RailCorp signalling maintenance manuals have been withdrawn:

- TMG E1083 *Lamp Proving Module Maintenance Manual*, version 1.1
- TMG E1340 *The Claw Lock Mechanism Description and Operation*, version 2.2
- TMG E1341 *Claw Lock Mechanism – Safety and Functional Tests – Routine Maintenance*, version 2.3
- TMG E1342 *The Claw Lock Mechanism – Overhaul*, version 3.0
- TMG E1360 *Jeumont Schneider Track Circuits*, version 1.1
- TMG E1400 *Electro-pneumatic Points – Style 'S' Control Valve*, version 1.2
- TMG E1401 *Pneumatic Points Control Valve Style 'A'*, version 1.4
- TMG E1402 *Pneumatic Points Control Valve Style 'N'*, version 1.3
- TMG E1403 *Pneumatic Points Control Valve Style 'T'*, version 1.4
- TMG E1580 *Electric Points Machine – Westinghouse 84M Mechanism*, version 1.1
- TMG E1585 *HLM Point Lock Detectors Maintenance Manual*, version 1.0
- TMG E1590 *Signal Structures – Examination and Maintenance*, version 1.2
- TMG E1630 *Signalling Compressed Air System*, version 1.0
- TMG E1632 *Pulsating Indications*, version 1.0

Note: All enquiries regarding the technical content of the manuals listed in this technical note should be directed to SydneyTrainsstandards@transport.nsw.gov.au

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TMG E1400

ELECTRO-PNEUMATIC POINTS - STYLE 'S' CONTROL VALVE

Version 1.2

Issued 2 October 2012

Engineering Manual

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Document control

Version	Date	Summary of change
		Replaced *SC 07 33 01 00 EQ Electro-pneumatic Points – Style S Control Valve – Version 1.0 1 June 1999*
1.0	21/08/2007	New RailCorp format
1.1	May 2010	Application of TMA 400 format
1.2	2 Oct 2012	Section 1 – add note re new installations using A Type; Section 2, 2.1 – new item re only using valves with a latching spool; Section 2.1 – added note to Valves concerning using Norgren 110V DC units with a rectifier when operating form 120V AC. Section 5 – amend reverse solenoid symbol to show latching spool in Fig 7.

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1 Introduction

The Style S electro-pneumatic control valve, assembled by Westinghouse Signals Australia, is used to control the operation of pneumatic points motors and, where required, facing point locks. New installations will usually require the A type valve to be used. If it is used to replace older types of control valve, circuit alterations will be required.

Principles of operation of the Style S valve are similar to the Style 'C', 'D', and 'E' valves currently in use for EP points at Sydney, Strathfield, Hornsby and Newcastle. There are however significant differences in the construction and method of operation of the valve. These differences are:-

a) The plunger lock control valve is included in the same case as the point control valve.

b) Air supply is maintained to the points cylinder at all times.

c) ISO (International Standards Organisation) standard valves are used without any special manifold(s). Connection between valves is by nylon air line and associated fittings.

d) Main valve position is not detected.

e) Provision is made for emergency power operation by push-button.

f) Emergency manual operation is provided on the main valve (or cut-off, normal and reverse valves) and plunger lock valves.

There are two versions of the Style S valve. The first, produced prior to 1998, used Parker-Hannifin valves and fittings, while valves produced from early 1998 have used Norgren valves and fittings. Operation of both types is identical except for emergency manual operation.

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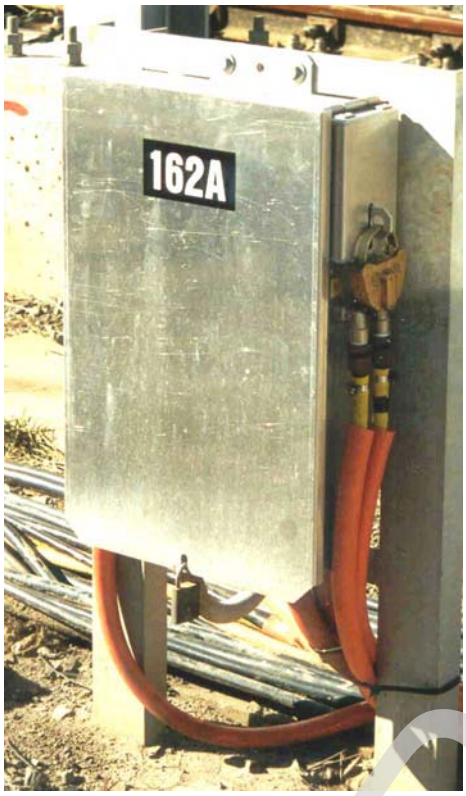

Figure 1 - Style S master unit

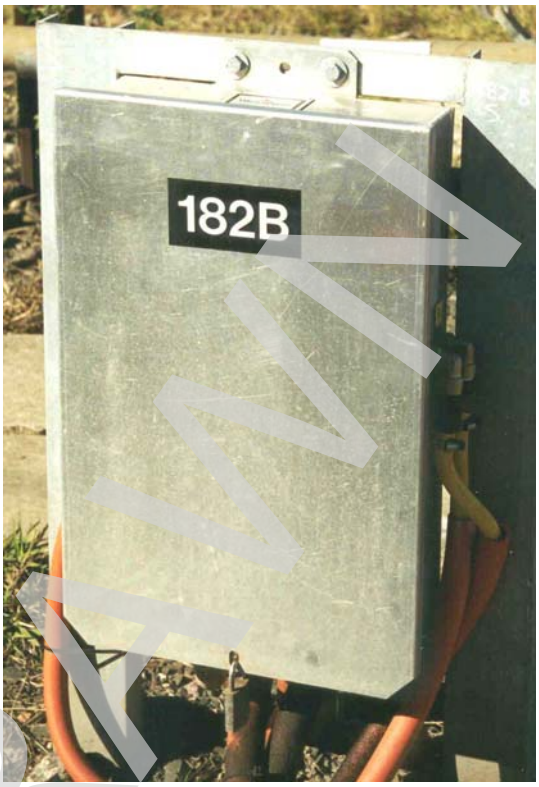

Figure 2 - Style S slave unit

Figure 3 - Style S master valve with EOL switch and push-buttons

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2 Construction

The style S valve can be configured in four ways:

a) A master unit with EOL (emergency operation lock) switch, normal and reverse emergency pushbuttons and plunger lock valve.

b) A master unit with EOL switch, normal and reverse emergency pushbuttons without plunger lock valve (used with claw locks).

c) A slave unit with plunger lock valve.

d) A slave unit without plunger lock valve.

For a single end set of points, a master unit must always be used.

For a crossover or where two or more ends of points are controlled from the one lever, one master unit plus as many slave units as necessary are used.

For emergency power operation, the master unit controls all ends of points with the one lever number.

For emergency manual operation, the valve at each set of points must be operated.

The control valve consists of:

a) A spring return two position solenoid valve controlling air supply to the plunger lock. (where fitted)

b) A two position spool valve, operated by pilot air from normal and reverse solenoid pilot valves, controlling air supply to the points cylinder.

c) Only valves with latching spools are accepted with new units.

d) A solenoid operated cut-off valve controlling air supply to the normal and reverse pilot valves.

e) An auto drain/filter and lubricator assembly.

All components are housed in an aluminium enclosure and coupled with nylon air line. Air in, normal air out, reverse air out and plunger lock air out connections are provided together with outlets for exhaust air and filter drain.

Diagrams of valve operation are shown in Figure 8, Figure 9 and Figure 10and the valve pneumatic circuit is shown in Figure 7. A wiring diagram is given in figure Figure 11.

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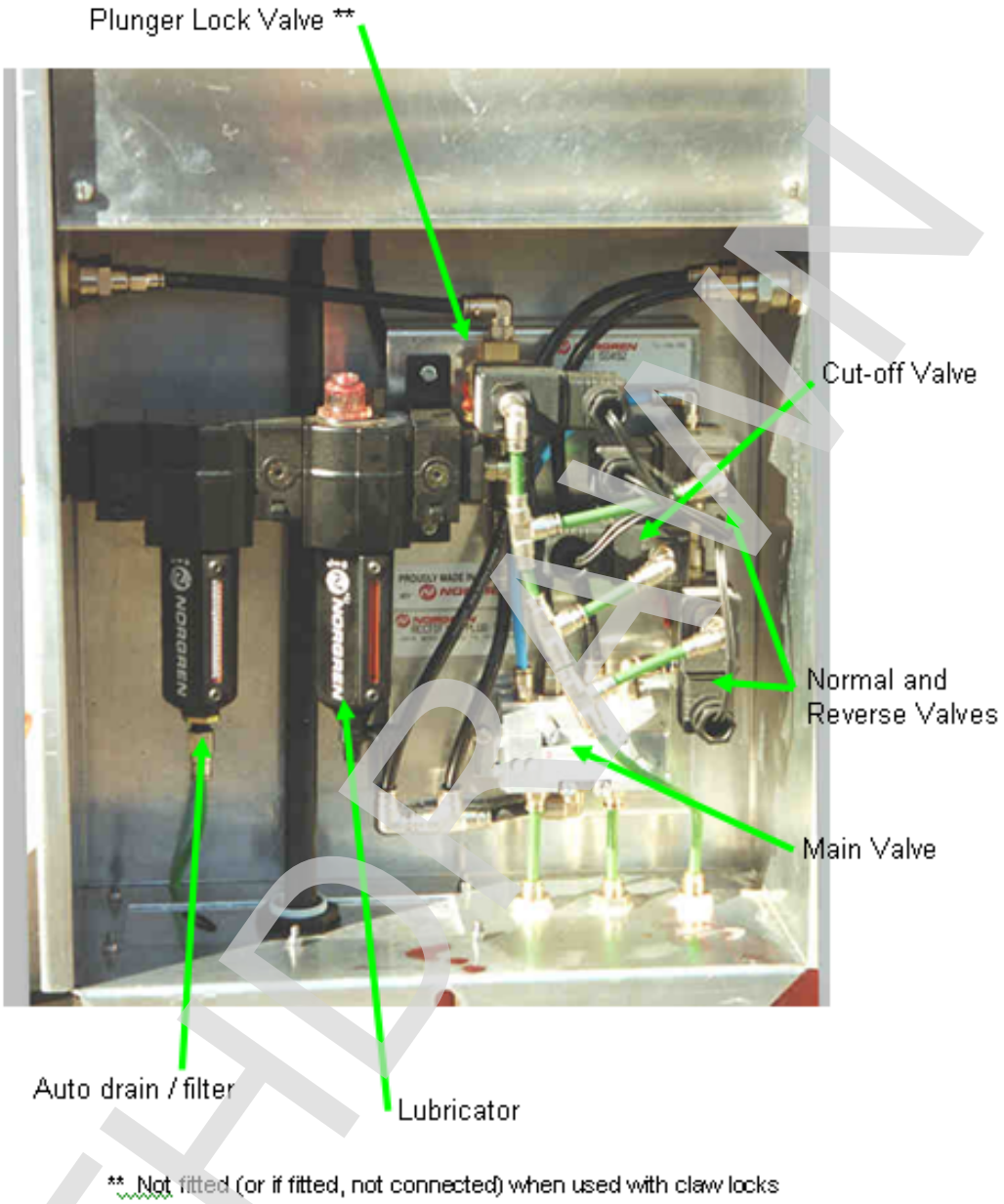

Figure 4 - Style S valve components

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2.1 General specifications

Case material	Aluminium
Case width Height Depth	410 mm 640 mm 160 mm
Main Valve	ISO five way two position air operated spool with ISO solenoid two position pilot normal and reverse valves Nominal voltage 110 V ± 10% 50 Hz 100% duty cycle #. Later units incorporate latched spool valves.
Cut-off valve	ISO three way solenoid Nominal voltage 110 V ± 10% 50 Hz 100% duty cycle #
Plunger Lock Valve	ISO spring return three way air operated spool with ISO solenoid two position pilot. Nominal voltage 110 V ± 10% 50 hz 100% duty cycle #
Minimum Air pressure Maximum Air pressure	280 kPa 840 kPa
Air Line	Nylon 6 mm and 8 mm.
EOL key switch*	Fortress Security Key switch, 4 (four) independent contacts made with key in, no contacts made with key out
Normal / Reverse Pushbuttons*	1 contact made normal (button out) 1 contact made reverse (button in)

Notes:

- Master unit only
- # 110V DC solenoid valves and plugs with built-in AC-DC rectifiers plus MOV (as used in A units) are also suitable.

2.2 Operation

The schematic diagram Figure 7 shows the pneumatic circuit.

Air passes through the filter and lubricator to inlets of the plunger lock valve, the cut-off valve and the main valve.

With the points laying normal and locked, the plunger lock and cut-off valves are de-energised (closed) and the plunger lock cylinder is open to atmosphere.

Air is applied to the normal side of the points cylinder through the main valve.

To operate the points to reverse, power is applied to the plunger lock valve, the reverse valve and to the cut-off valve. The plunger lock valve opens to inlet air and closes the cylinder exhaust. When the plunger lock has cleared the notch and made the plunger lock reverse contacts, power is applied to the cut-off valve. Air is admitted to the reverse valve via the cut-off valve and in turn is admitted to the main valve to drive the spool to the reverse position. The movement of the spool opens the normal side of the points cylinder to atmosphere and applies air to the reverse side of the cylinder. When points movement has been completed and detection made all valves are de-energised. The plunger lock cylinder is opened to atmosphere and the plunger lock returns to the locked (normal) position. Air continues to be applied to the reverse side of the points cylinder.

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In more recent units, the spool is latched into the normal or reverse position to prevent inadvertent movement.

3 Maintenance

Maintenance is carried out at the intervals specified in the baseline Signalling Technical Maintenance Plan or in the Tailored Signalling Technical Maintenance Plan for the particular location.

The filter/auto drain is to be examined and cleaned or replaced as necessary. The oil level in the lubricator is to be replenished and lubricator adjustment and operation checked. The lubricator must deliver at least 1 drop of oil but not more than two drops of oil per operation of the points. The unit is to be checked for air leaks.

If lubrication is not provided, premature valve failure can be expected. Excessive oil will lead to premature air hose failure.

No attempt should be made to carry out any internal repairs to the main, normal, reverse, plunger lock or cut off valves on site. Any defective valve should be replaced and returned to a depot or workshop for repair.

All valves can be removed by unplugging air lines and wiring and removing the screws securing the valve to the case. Air lines and fittings should be replaced if leaking since repair is unlikely to be effective.

WARNING

When insulation testing, isolate all solenoid valve coils by disconnecting the connection plug on each valve.

Master Unit Only

Check the operation of the EOL switch and the normal and reverse push buttons. Ensure that the EOL key cannot be removed with the EOL switch contacts made.

3.1 Lubricants

The lubricator must be filled with lubricating oils suitable for pneumatic systems. Examples are:-

a) Mobil DTE light

b) Shell Tellus 22

c) Castrol Hyspin VG32

d) Ampol Tecoma 32

e) Caltex Rando HD46

f) BP HLP 32

Filling intervals will be determined by the number of turnout operations per day and may vary widely between different turnouts. Turnouts with a very high usage rate may require a special service schedule solely for lubricant replenishment.

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3.2 Fault finding

Warning

Before testing the operation of any valve or replacing any valve within the Style S unit ensure that:

either

The signals protecting all ends of points associated with the Style S unit have been placed at stop

or

The points end controlled by the particular Style S unit has been disconnected from the air supply and clipped and locked.

If the Style S unit is suspected of causing a points failure proceed as shown on the fault finding chart, Figure 5.

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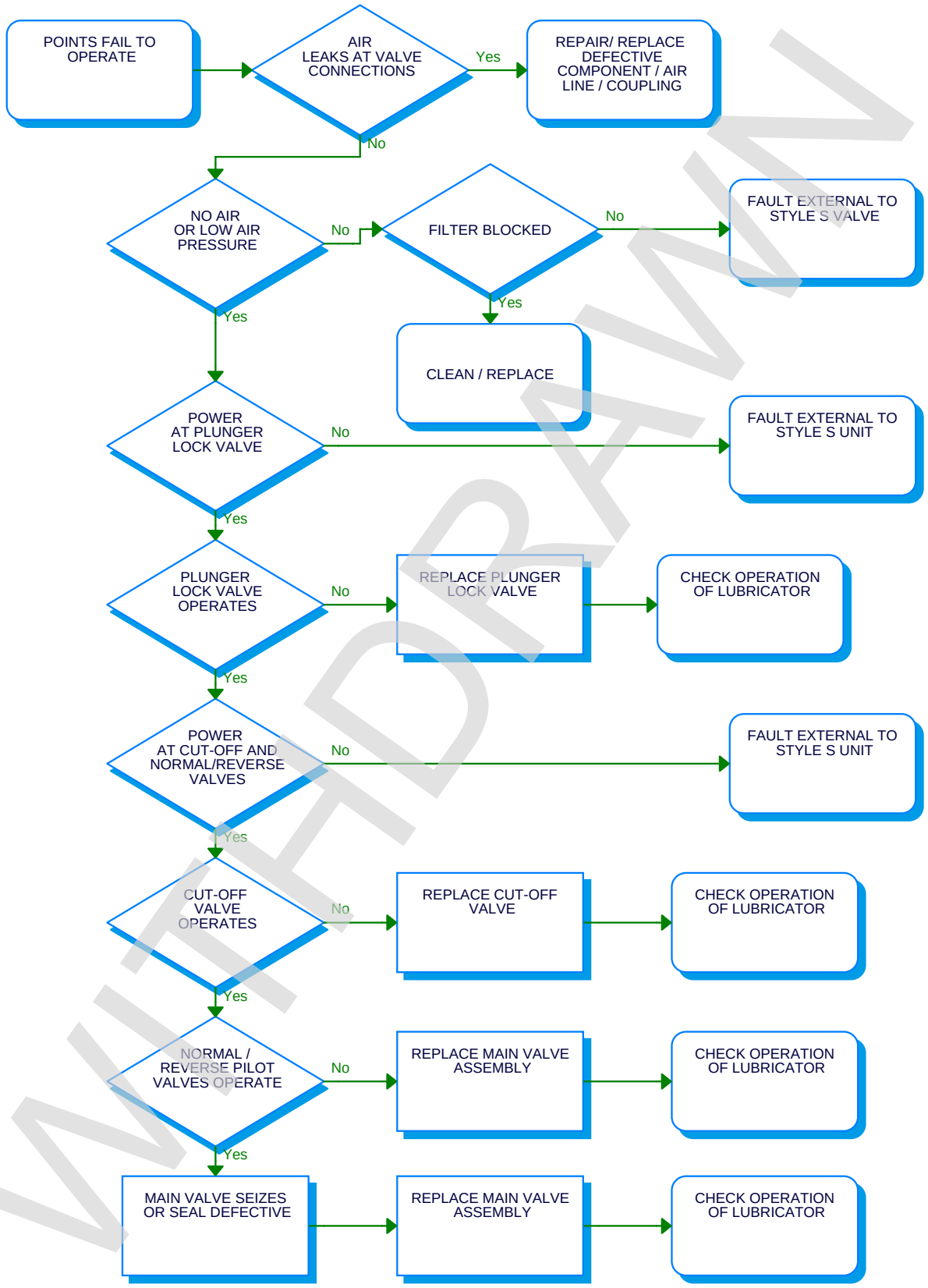

Figure 5 - Fault finding chart

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4 Emergency operation

4.1 Emergency operation - power

WARNING

The one Style S master unit contains the EOL for all ends of points with the lever number corresponding to that EOL.

Operation of the EOL switch and push-buttons in the master unit will throw all ends of points.

The EOL must not be operated until it is certain that there are no trains approaching or on any end of points operated by the master unit

An Emergency Operation Lock, with a similar purpose to the ESML on an electric switch machine, is provided on the Style S valve. There is however a significant difference as the EOL on the Style S valve provides for emergency power operation of the points by key and pushbutton as opposed to manual operation by hand crank or hand lever on the electric switch machine.

The EOL consists of a 'Fortress Security' key switch, key captive in the normal position, located in a locked box (EOL box) in the vicinity of the points. A matching key switch together with a normal and a reverse push-button are located in the Style S Master Unit case.

To operate the EOL;

a) Turn the key and remove it from the switch in the EOL box. This will open circuit the points detection.

b) Take the key to the Style S master unit, insert it into the key switch and turn. (the key is then captive in this switch). This powers the plunger lock valve and the cut-off valve and enables the normal and reverse pushbuttons.

c) Throw the points by pushing the normal or reverse pushbuttons as required.

Note that the facing point lock will be engaged during this procedure but the FPL plunger will not be locked while the EOL key is in the Style S master unit.

4.2 Emergency operation - manual

WARNING

Before any attempt is made to blow the points by manual operation of the valves within the Style S unit, the maintainer must ensure that the signal(s) protecting the points have been placed at, and are maintained at, stop in accordance with the safeworking unit procedures.

In addition, no attempt is to be made to blow the points until the maintainer is satisfied that any train approaching the points has come to a stand.

Manual emergency operation should only be used

a) When electrical power is not available and correction of the fault will take longer than traffic requirements permit.

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b) When a valve is defective and a replacement is not readily available or replacement will take longer than traffic permits.

For Style S units with Parker Hannifin valves

The plunger lock and main valves are provided with pins at the ends of the valve body which will open the plunger lock valve and move the main valve spool to the reverse or normal position. The pins are not readily accessible and cannot be accidentally operated.

To throw the points depress the pin on the end of the plunger lock valve and hold in. After about 3 to 5 seconds depress the pin on either the normal or reverse end of the main valve to throw the points. Release both pins.

Note that the normal pin will be on the *same* end of the main valve as the normal solenoid valve; the reverse pin will be on the *same* end of the main valve as the reverse solenoid valve.

For Style S units with Norgren valves

The Norgren main valve has no manual operation facility.

The plunger lock, cut-off, normal and reverse valves are fitted with a switch on the side of each valve as shown in Figure 6.

To manually blow the points from normal to reverse:

a) Operate the switch on the cut-off valve

b) Operate the switch on the plunger lock valve (where fitted) then operate the switch on the reverse valve.

To blow from reverse to normal, proceed as described except operate the switch on the normal valve instead of the reverse valve.

WARNING

Ensure that all manual switches are returned to the power position before the Style S unit is returned to service

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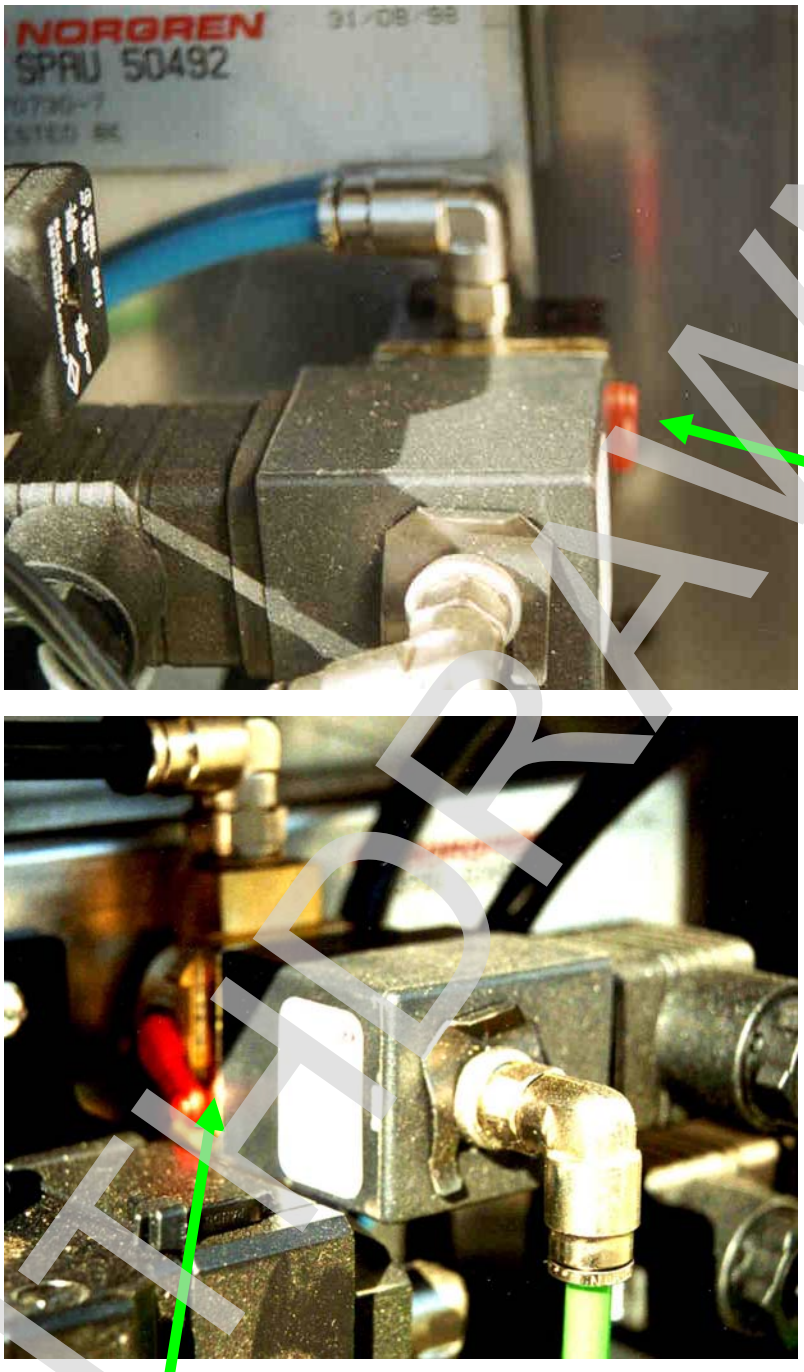

Figure 6 - Norgren valves manual operating switch

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5 Pneumatic and electrical diagrams

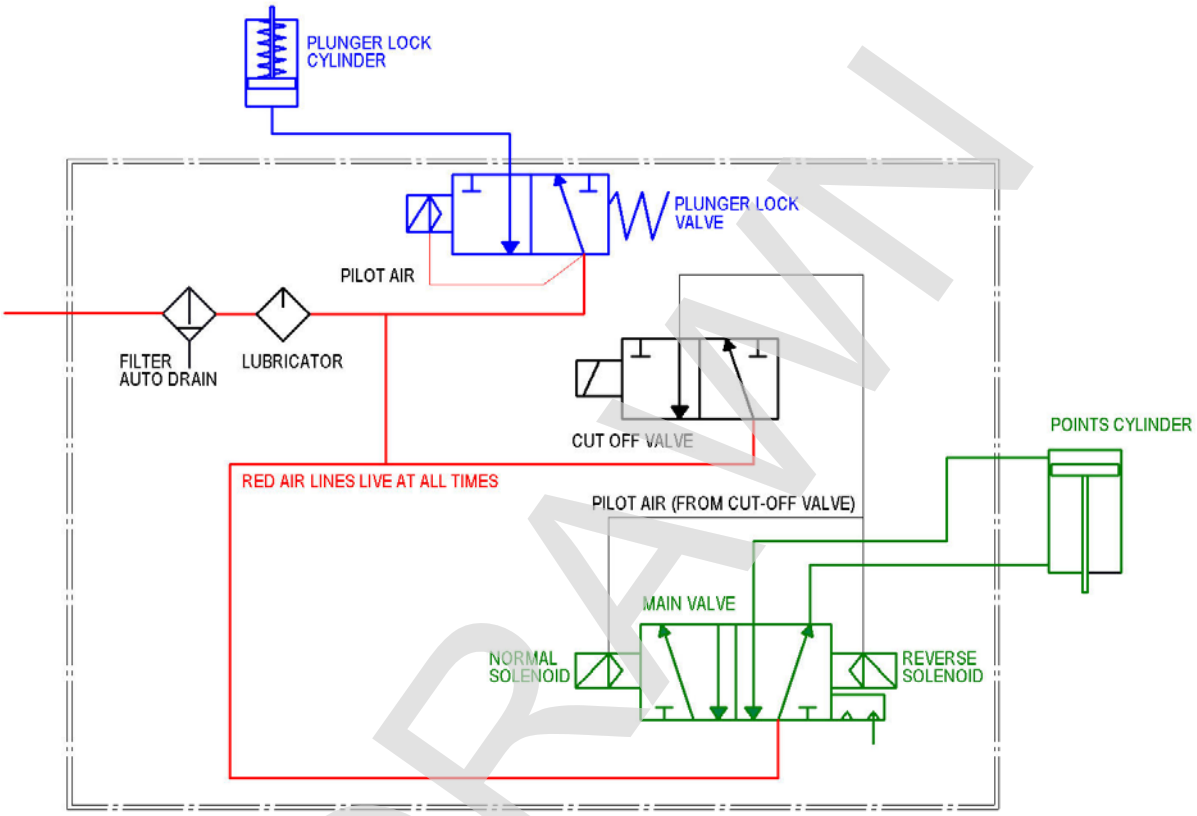

Figure 7 - Style S valve - Pneumatic Circuit
(Valve and points motor in the normal position)

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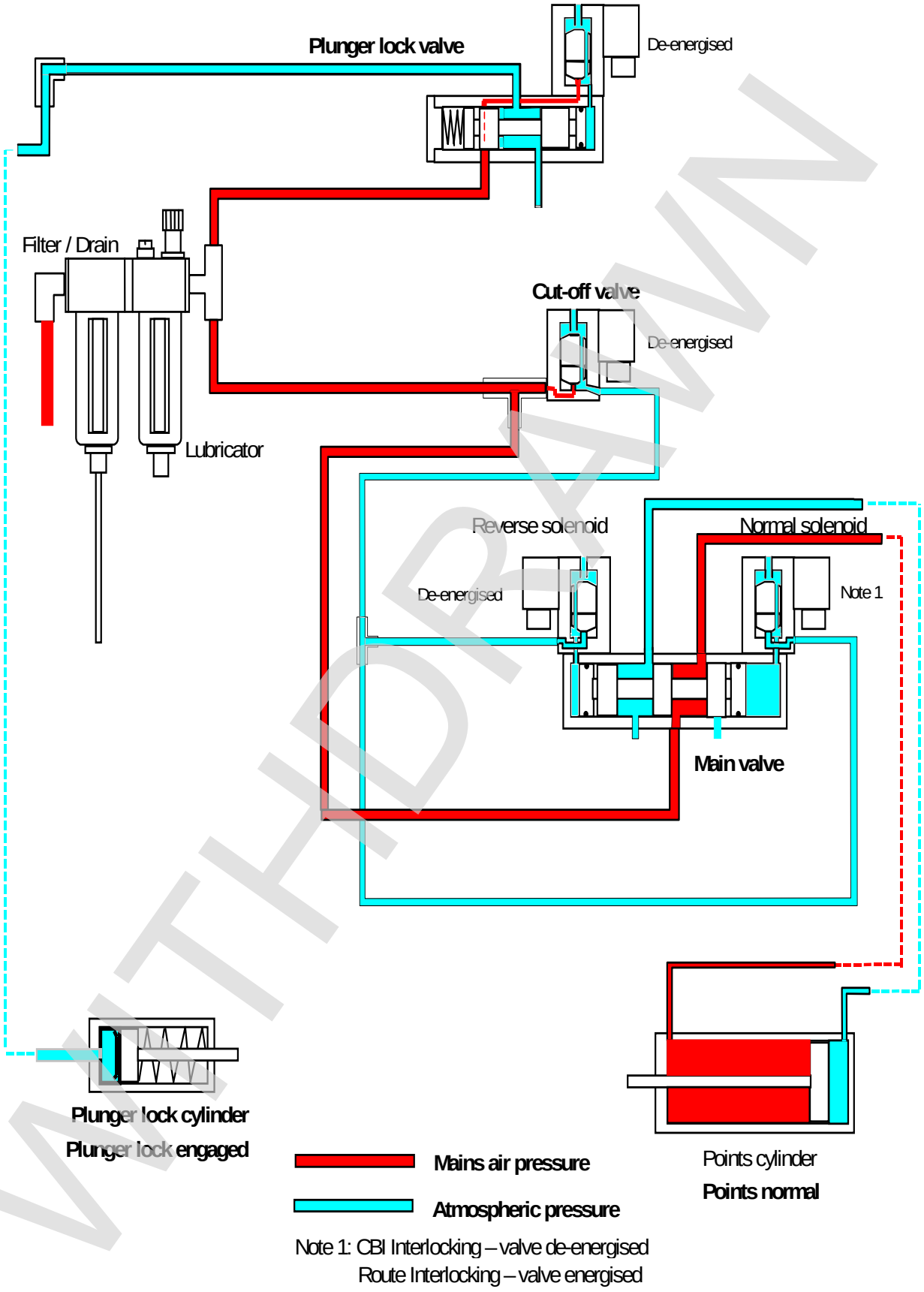

Note 1: CBI Interlocking – valve de-energised
Route Interlocking – valve energised

Figure 8 - Air flow diagram – points normal

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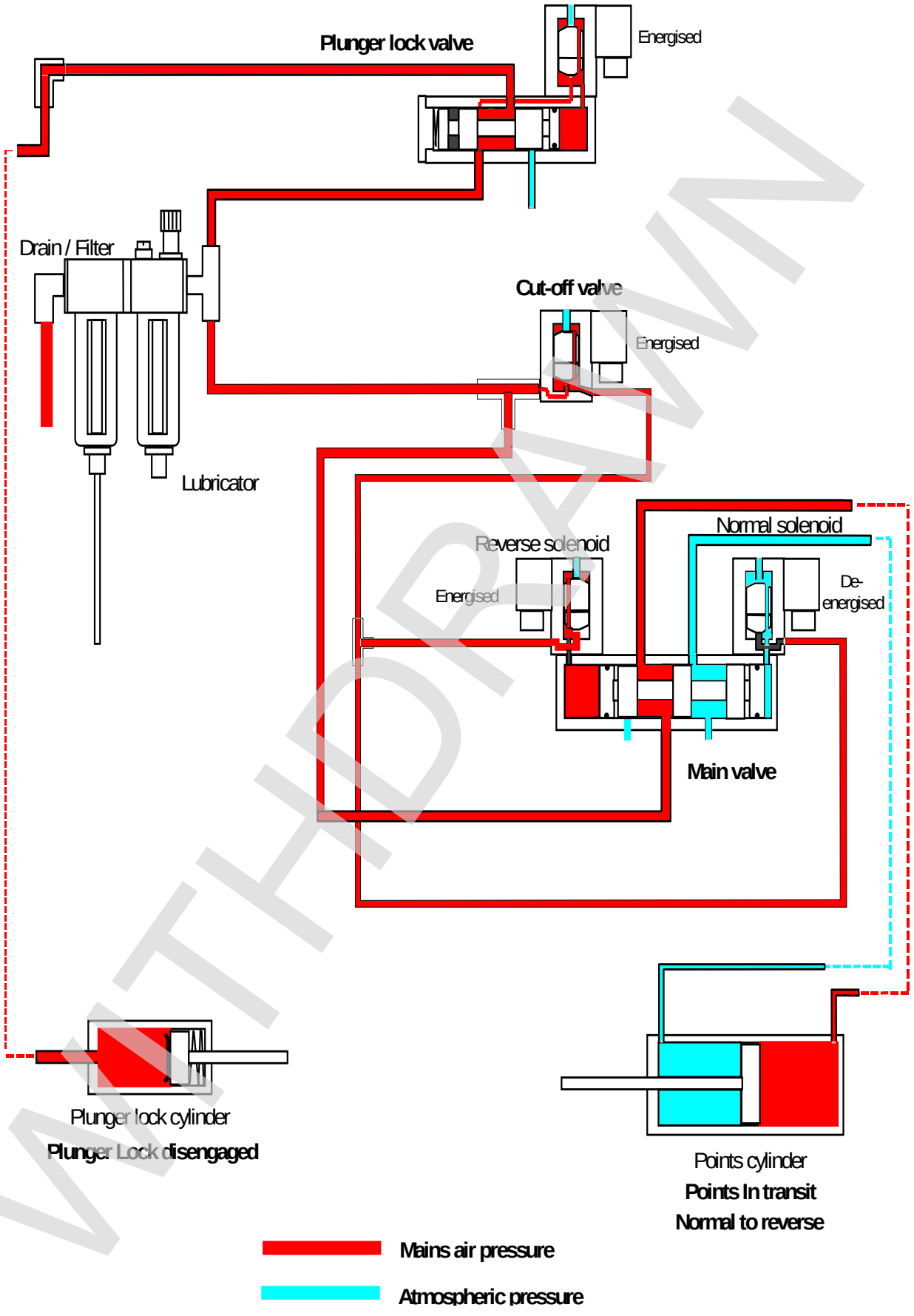

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Figure 9 - Air flow diagram - Points in transit – Normal to Reverse

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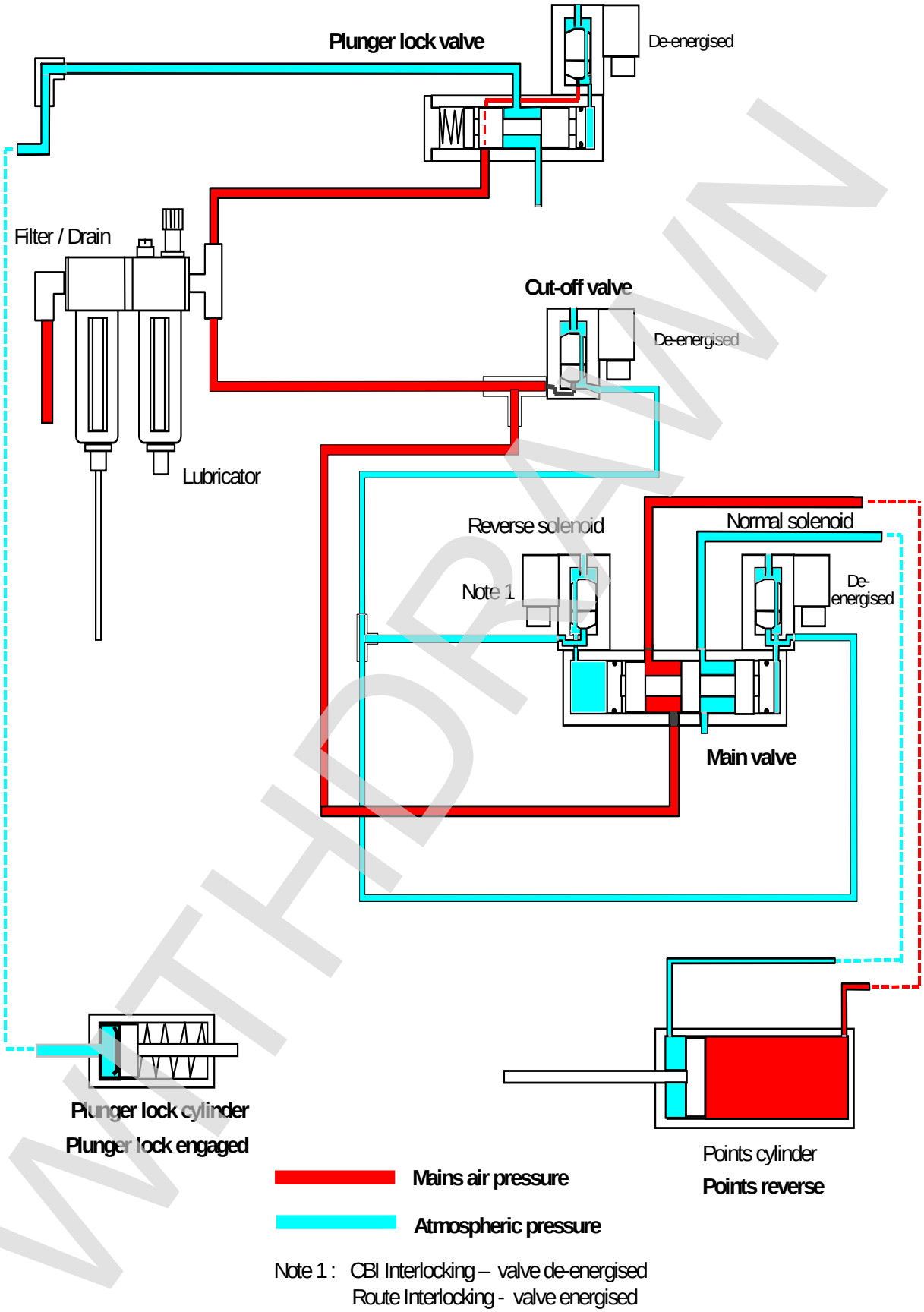

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Figure 10 - Air flow diagram - Points Reverse

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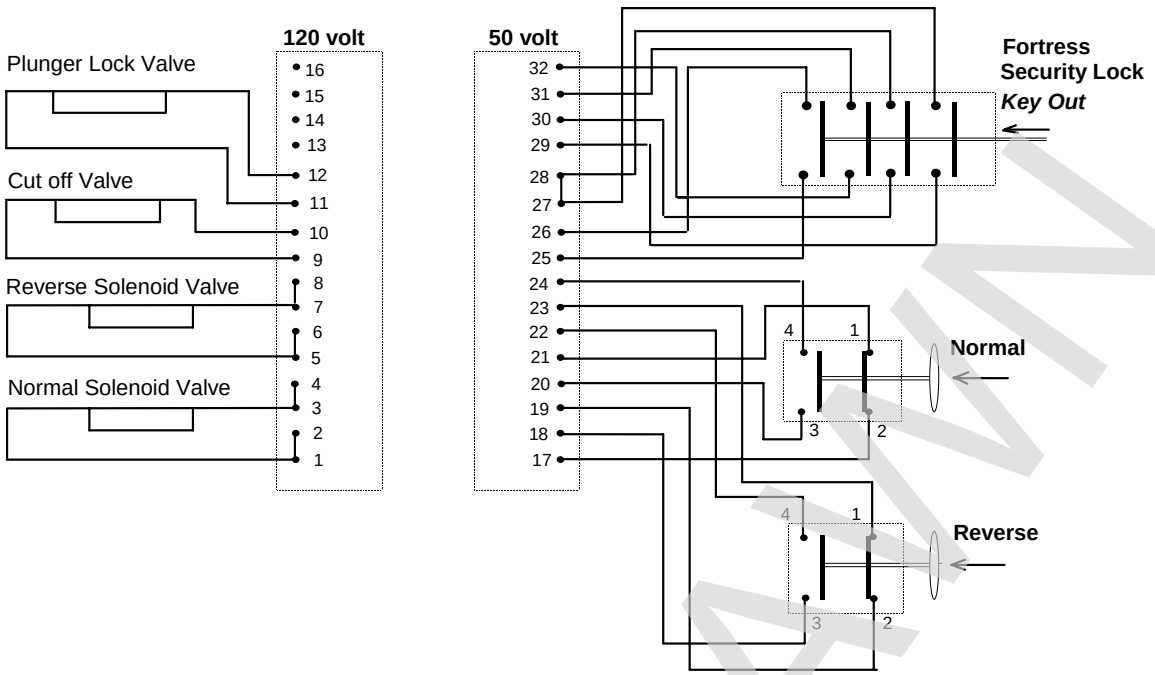
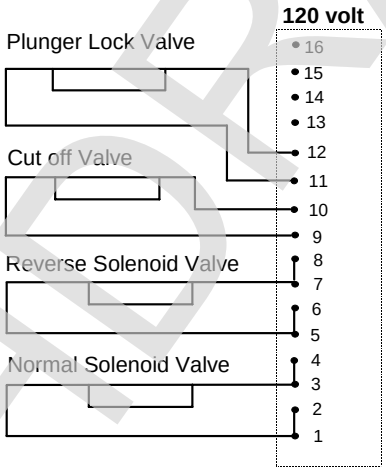


Master Unit



Slave Unit

Figure 11 - Master unit and slave unit electrical circuits

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