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Technical Note - TN 041: 2016

Issued date: 17 October 2016

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Subject: Withdrawal of legacy RailCorp signalling maintenance manuals

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Asset Standards Authority (ASA) to notify that the following legacy RailCorp signalling maintenance manuals have been withdrawn: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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Engineering Manual

TMG E1402

PNEUMATIC POINTS CONTROL VALVE STYLE 'N'

Version 1.3

Issued 2 Oct 2012

Owner: Warwick Allison, Chief Engineer Signals and Control Systems

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Document control

Version	Date	Summary of change
		Replaced *SC 07 33 11 00 EQ Pneumatic Points Control Valve Style 'N' – v1.2* of 7 November 2004.
1.0	21/08/2007	New RailCorp format
1.1	04/11/2008	1 & 7.1 – note about 120V AC operation; 4 - retaining clip; 7.4 - air hoses clear of coils; 8 – details of coil and plunger spare parts
1.2	May 2010	Application of TMA 400 format
1.3	2 Oct 2012	Section 1, 2, 3, 3.1, 4 – add note re later units using a latched spool valve; Section 3.1 – add note about using DC valves with rectifier.

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Figure 1 - Style N Valve Unit

1 Main (spool) valve
2 Normal solenoid valve
3 Reverse solenoid valve
4 Plunger Lock Valve
5 Plunger lock solenoid valve
6 Slide valves
7 Filter/Auto drain
8 Air inlet from mains
9 N and R outlets to motor
10 Outlet to plunger Lock
11 Main / Plunger lock valve exhaust (under case)
12 Cable entry
13 Terminals "A"

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1 Introduction

The Style 'N' (Newcastle) valve unit is essentially a Style 'A' unit with an additional valve included to operate the plunger lock, but without pressure switches and with different terminal arrangements.

Since it is not, at this stage, intended to change the existing arrangements at Newcastle where air is supplied to points motors at all times, pressure switches are not required.

Due to restrictions imposed by the interlocking at Newcastle, the Normal and Reverse pilot valves are 24V DC and the plunger lock valve is 110V DC with a rectifier and MOV suitable for operation from 120V AC.

Later units incorporate a latched spool type valve.

2 Application

The Style 'N' valve is suitable only for use in the Newcastle Interlocking area and must not be used elsewhere.

3 Configuration

The 'N' unit is not provided with an EOL assembly.

The major pneumatic components of the 'N' valve unit are

a) A five port, two-position spool valve, pilot air operated from normal and reverse solenoid valves. This controls air supply to and exhaust from the air motor. The spools incorporate a latching arrangement.

b) 24V DC solenoid pilot valves (Normal and Reverse). These control the movement of the main valve spool.

c) A five port, two position spool valve blanked off to operate as a three port, two position valve and pilot air operated to reverse, spring return to normal. This operates the plunger lock (where fitted).

d) A 120V AC solenoid pilot valve to operate the plunger lock valve

e) An auto drain/filter assembly.

f) Slide on-off valves on the normal, reverse and plunger lock outlets.

All pneumatic components with the exception of the filter/drain and slide valves on the outlets are mounted onto a common base plate. The drain/filter assembly and the slide valves are connected to the other components with polyurethane airline with quick release fittings.

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3.1 General Specifications

Case:	
Material	Marine Grade Aluminium
Width	
600	
Height	400
Depth	
150	
Pneumatics:	
Main valve	ISO #2 5/2 spool valve, Solenoid – Solenoid Pilot, G⅜ sub base with latching spool.
N and R Solenoid (pilot) valves	24V DC – voltage tolerance rating ± 20% A manual (by screwdriver) lifter is provided on the valve.
Plunger lock valve	ISO #2 5/2 spool valve ported to operate as a 3/2 valve – Solenoid / spring pilot G⅜ sub base. #
Plunger lock (pilot) valve solenoid	110V AC – voltage tolerance ± 20%. A manual (by screwdriver) lifter is provided on the valve.
Shut off cocks	10 BSP. Slide type
Internal air line	12 OD Polyurethane
Air inlet (to case)	15 BSP
Air outlets (from case)	15 BSP
Electrical:	
Internal wiring	7/0.4
Terminal blocks	Weidmuller ZTR2.5 types mounted on TS35 rail
Cable glands	40, 32 and 25 mm, Clipsal part nos 269/40, 269/32 and 269/25 or equivalent.

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

4 Pneumatic Operation

Air at mains pressure passes through the filter to the main valve manifold inlet. Galleries within the manifold direct the air to the inlet ports of the main valve, the normal and reverse pilot valves, the plunger lock valve and the plunger lock valve pilot.

The outlet port of each of the normal and reverse pilot valves feeds to one end of the main valve spool chamber. The outlet port of the plunger lock pilot feeds to one (the normal) end of the plunger lock valve.

Each main valve outlet port connects to one end of the points motor via slide on/off valves and external air hose. Note that when in the off position these slide valves will exhaust the air between the slide valve and the points motor.

Retaining clips are to be attached to the slide valves to prevent vibration from closing the valve unintendedly.

The outlet of the plunger lock valve connects to the plunger lock cylinder via a slide on/off valve.

Air flow diagrams for the valve are shown in figures Figure 2 and Figure 3.

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To call the points normal, the plunger lock valve is energised. Pilot air at mains pressure is supplied to the normal end of the plunger lock valve. This moves the valve spool to the reverse end and opens the outlet port to mains pressure.

When the plunger lock is reverse and contacts made, the normal solenoid valve is energised. Pilot air at mains pressure is supplied to the normal end of the main valve spool. The reverse end of the spool is opened to atmosphere. This moves the spool towards the reverse end and opens the normal outlet port to mains pressure and the reverse outlet port to atmosphere.

When the points have completed the movement, the plunger lock solenoid is de-energised. This opens the normal end of the valve to atmosphere. The spring returns the spool to the normal end and the outlet port (and plunger lock cylinder) are opened to atmosphere.

The valve remains in this configuration while the normal call is maintained on the points.

To call the points reverse, the plunger lock valve is energised. Pilot air at mains pressure is supplied to the normal end of the plunger lock valve. This moves the valve spool to the reverse end and opens the outlet port to mains pressure.

When the plunger lock is reverse and contacts made, the normal (NW) valve is de-energised and the reverse (RW) valve is energised. Pilot air at mains pressure is supplied to the reverse end of the main valve spool. The normal end of the spool is opened to atmosphere. This moves the spool towards the normal end and opens the reverse outlet port to mains pressure and the normal outlet port to atmosphere.

When the points have completed the movement, the plunger lock solenoid is de-energised. This opens the normal end of the valve to atmosphere. The spring returns the spool to the normal end and the outlet port (and plunger lock cylinder) are opened to atmosphere.

The valve remains in this configuration while the reverse call is maintained on the points.

The style 'N' valve provides mains air pressure to one, or the other, end of the points motor at all times. This prevents the plunger drifting back against the plunger lock and minimises the possibility of the plunger "dog locking". In addition, it provides a positive control to restrain the switch in the correct position against the stockrail.

Air flow diagrams are shown in Figure 3, Figure 4, Figure 5 and Figure 5 and the pneumatic circuit is shown in Figure 9.

To prevent potential spool movement in the absence of control air, the spools are latched in the normal or reverse position.

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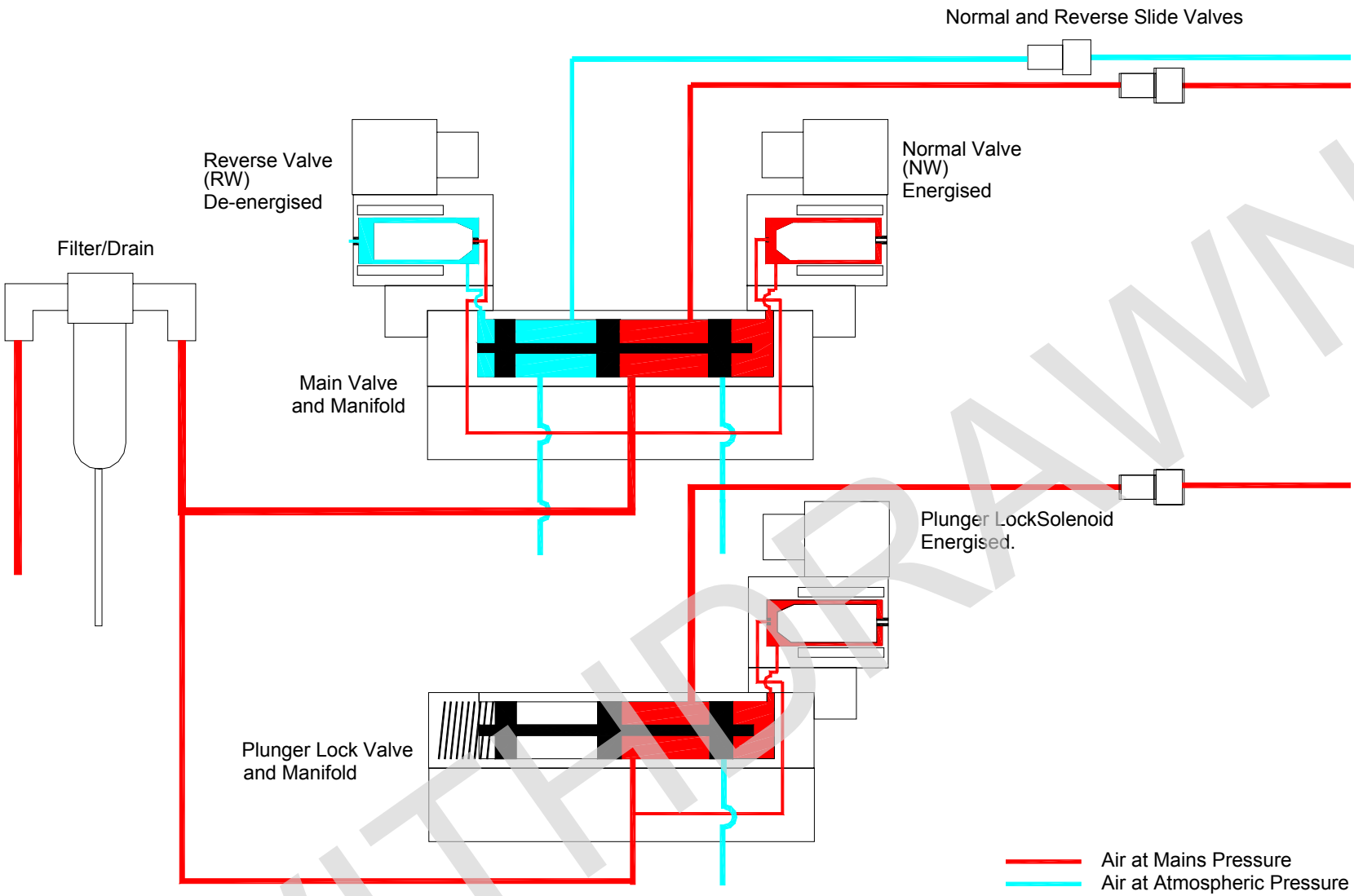

Figure 2 - Points in Transit Reverse to Normal

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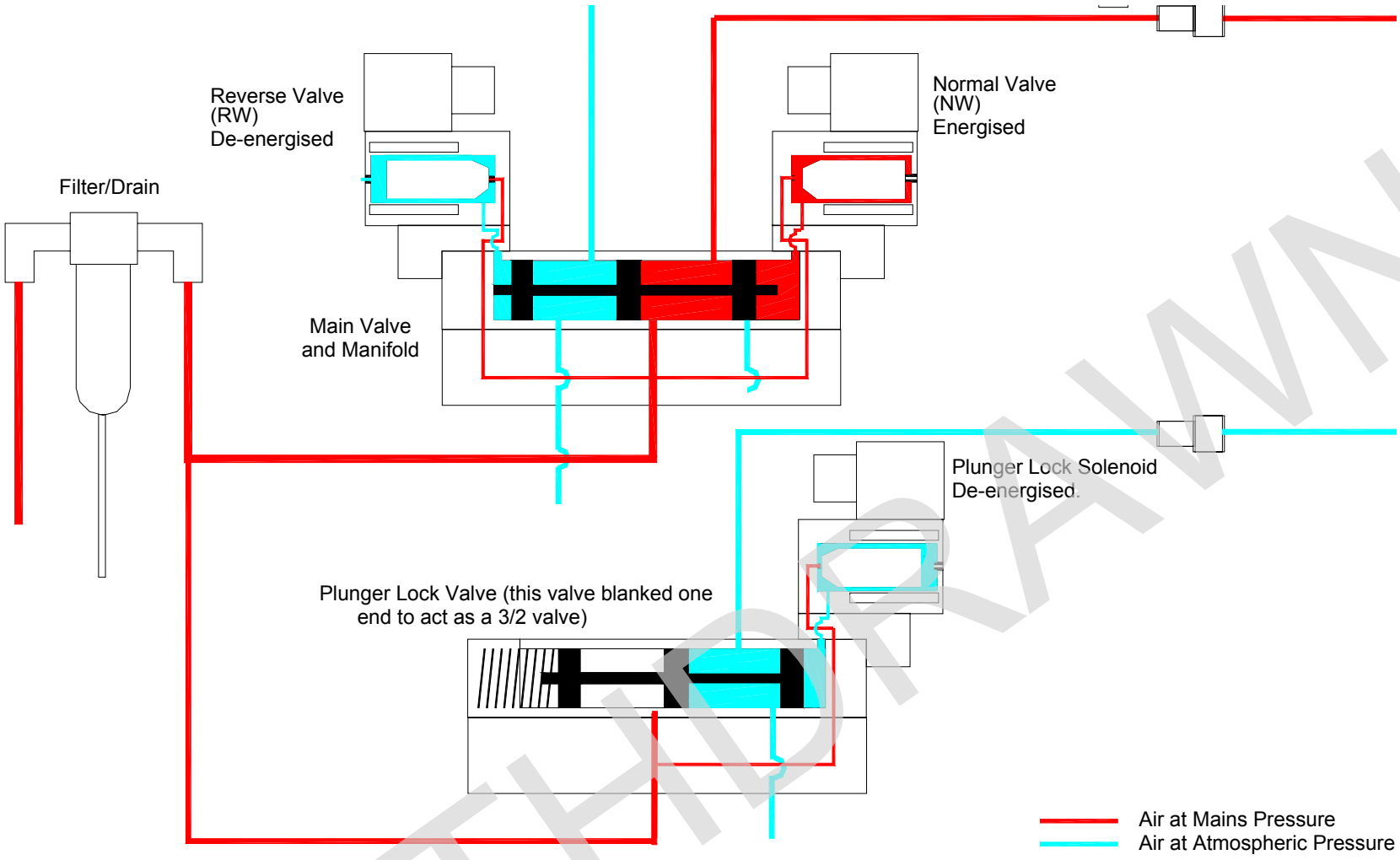

Figure 3 - Points Normal

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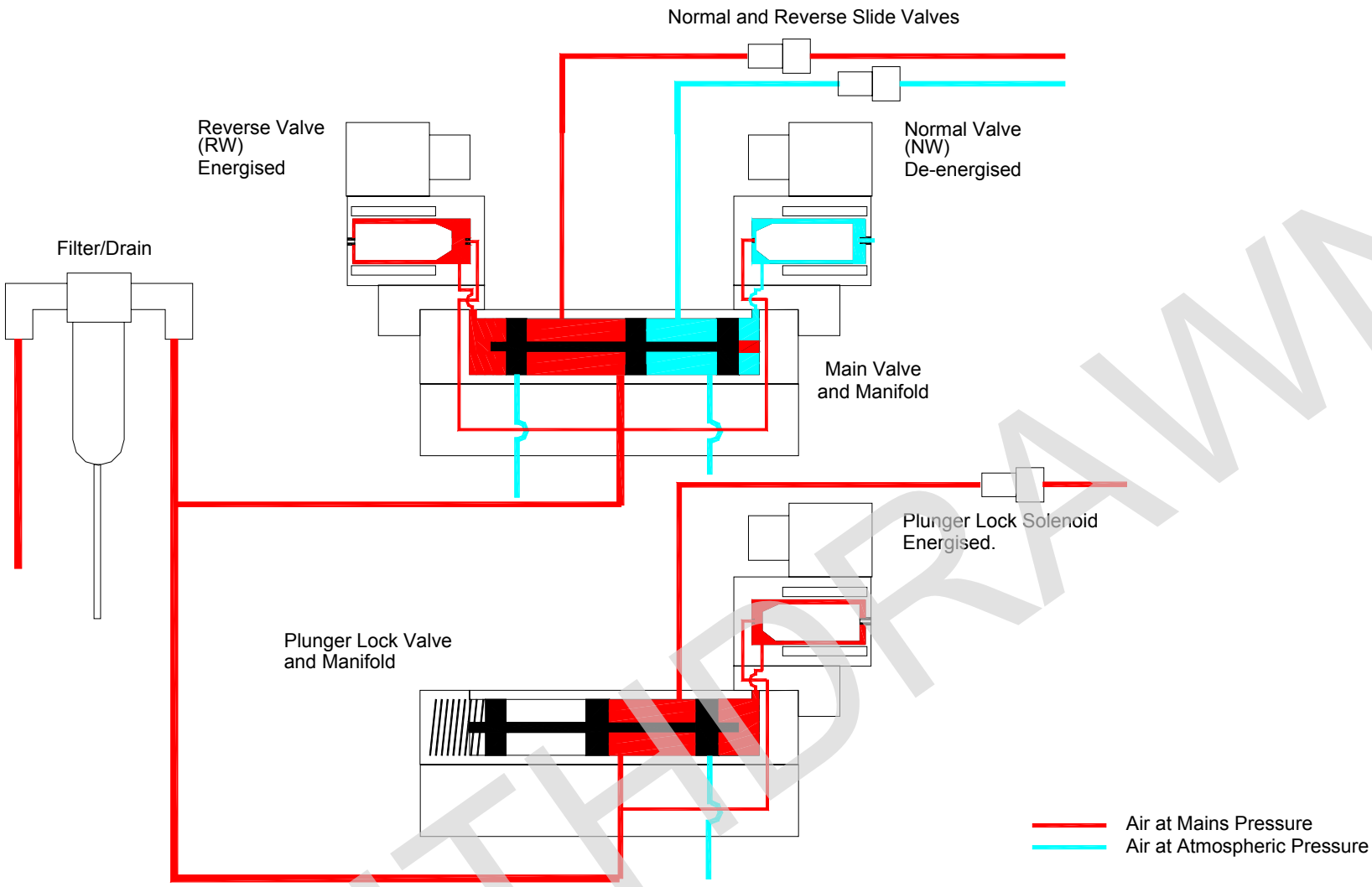

Figure 4 - Points in Transit Normal to Reverse

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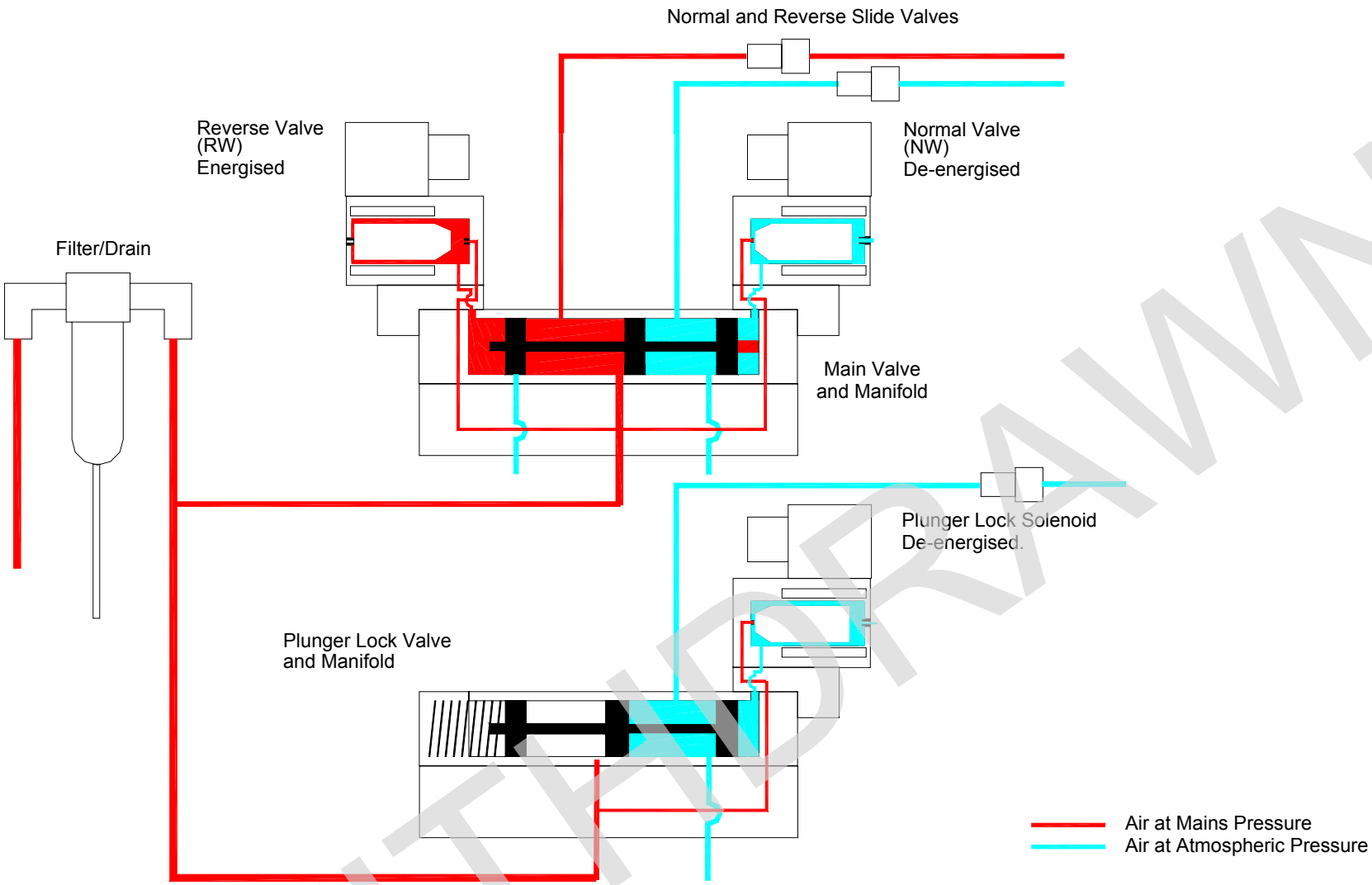

Figure 5 - Points Reverse

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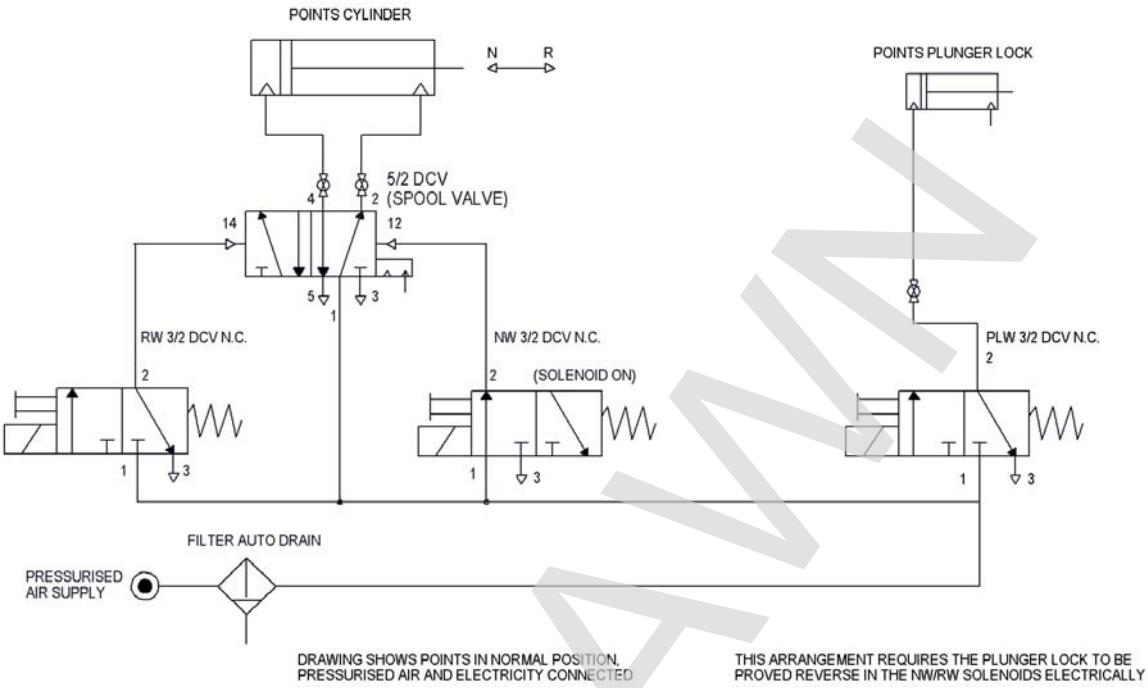

Figure 6 - Pneumatic circuit

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5 Internal Electrical Circuit

The N valve contains only the necessary wiring to operate the normal and reverse solenoid valves and the plunger lock solenoid valve.

Wiring for detectors, plunger lock contacts and indication boxes does not enter the N valve case.

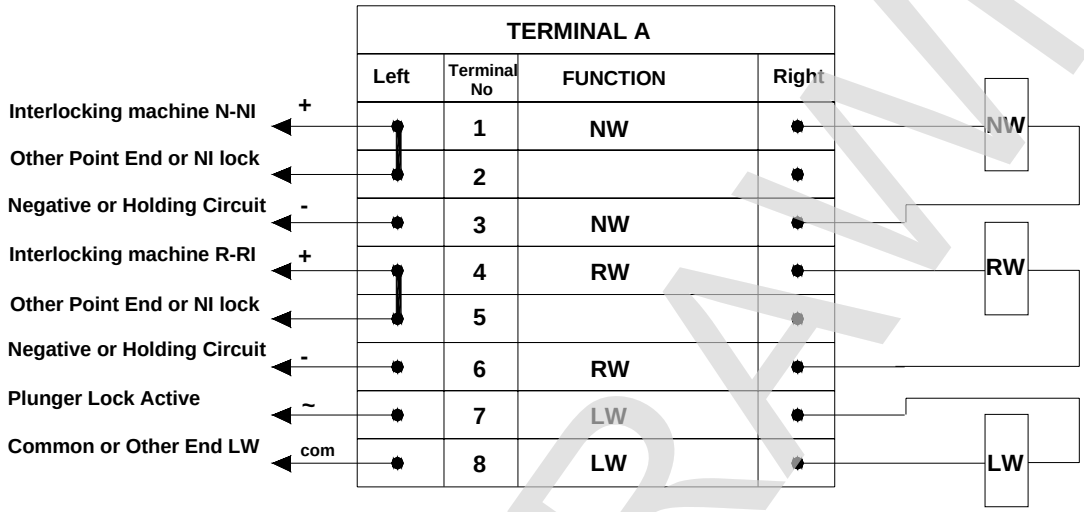

Figure 7

6 Manual Emergency Operation

It is possible to manually operate the Style 'N' valve without electrical power if mains air supply is still available.

The normal and reverse pilot valves and the plunger lock pilot valve are provided with manual lifters which, when turned, have the same effect as energising the solenoid.

If the fault causing loss of electrical power has not been identified and unexpected return of power is possible, open the links on terminals A1, A4 and A7 before using the manual lifters.

The lifters are operated by a flat bladed screwdriver and are located on the base of each valve facing the front of the unit. They are coloured red.

To operate the points from Reverse to Normal

a) Ensure that the reverse pilot valve lifter is in the "PWR" position

b) Turn the lifter on the plunger lock pilot to "MAN"

c) Turn the lifter on the normal pilot valve to "MAN".

d) Turn the lifter on the plunger lock pilot to "PWR"

To operate the points from Normal to Reverse

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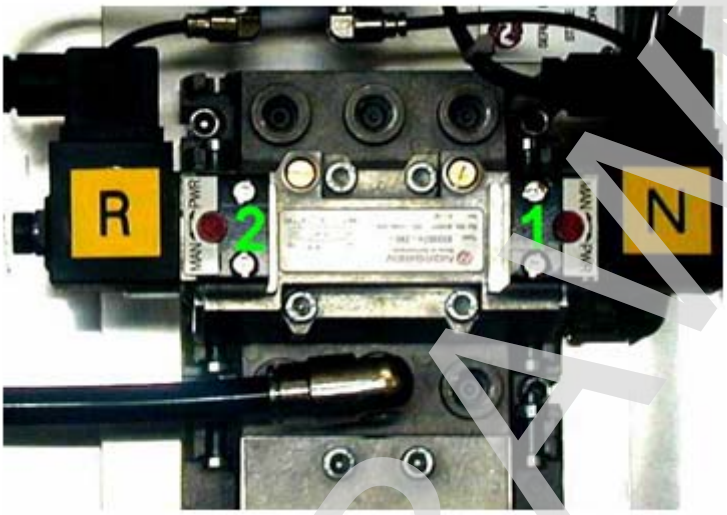
e) Turn the lifter on the normal pilot to "PWR"

f) Turn the lifter on the plunger lock pilot to "MAN"

g) Turn the lifter on the reverse pilot to "MAN"

h) Turn the lifter on the plunger lock pilot to "PWR"



1 Normal valve manual lifter
2 Reverse valve manual lifter

Figure 8 - Manual lifters on solenoid valves

Actions MUST be carried out in the order described. If both pilots are on manual at any time, there will be mains pressure air on both ends of the main valve spool and it will not move.

Before closing the 'A' unit case when leaving, ensure that

Manual lifters on all pilot valves are in the "PWR" position

Links are closed on terminals A1, A4 and A7.

Figure 9 - Plunger Lock Solenoid Valve Lifter

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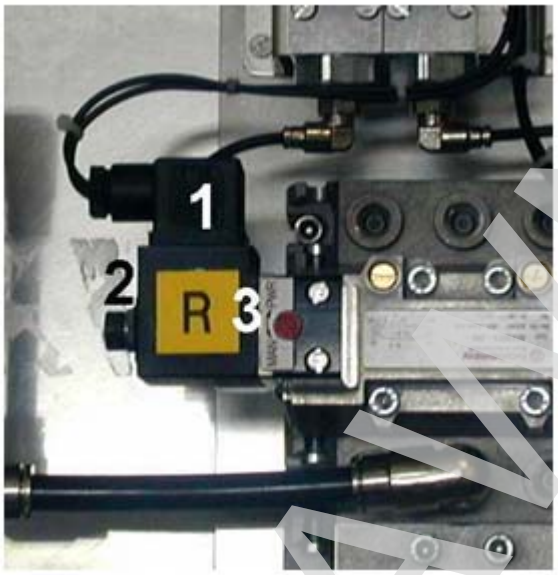
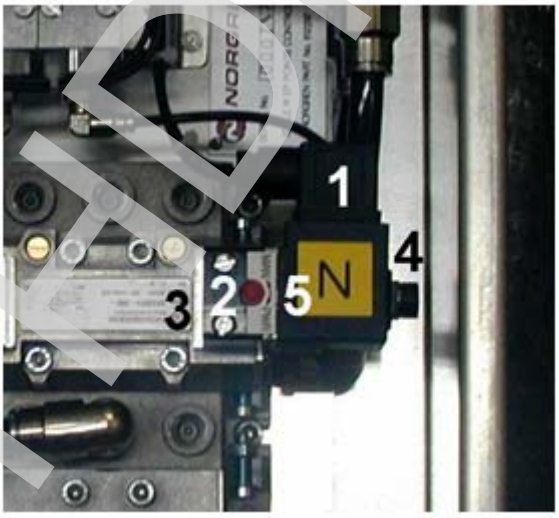


1 Plug
2 Spring Clip
3 Coil assembly

Figure 10 - Manual lifters on solenoid valves



1 Normal valve manual lifter
2 Securing screws
3 Spacer
4 Spring Clip
5 Coil Assembly

Figure 11 - Normal solenoid valve

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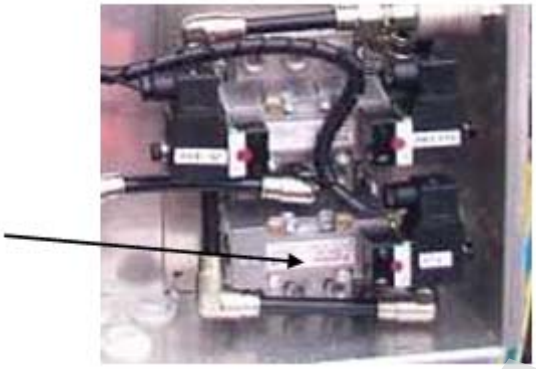

Figure 12 - Plunger Lock Solenoid Valve

7 Maintenance

7.1 Pilot Valve Coil Replacement

This may be carried out with air on only if the valve that is being serviced is non-energised. Ie, the reverse valve can be worked on if there is a normal call maintained on the points and vice versa. The plunger lock pilot can be worked on while a normal or a reverse call is maintained on the points.

Open the links on terminals A1, A4, A7 as appropriate.

CAUTION

Power MUST be removed from the pilot valve before coil replacement is attempted. New coils will be destroyed within 2 seconds if power is applied before the coil is mounted onto the valve.

CAUTION

The normal and reverse pilot valve coils are 24 volt DC and the plunger lock pilot valve is 110 volt DC

Ensure that the correct coils are used

Remove the screw securing the plug (1) to the coil casing and disconnect the plug.

For the Reverse pilot valve: -

a) Remove the clip (2) and slide the coil assembly (3) off the valve.

b) Fit the new coil assembly and refit the clip.

c) Refit the plug and secure with the screw.

d) For the Normal pilot valve and the Plunger Lock pilot valve: -

e) Undo the screws (2) securing the pilot valve to the main valve.

f) Carefully lift the pilot off the main valve. Be sure not to lose or damage the (two) "O" ring seals either side of the spacer (3) between the valves.

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g) Remove the clip (4) and slide the coil assembly (5) off the valve.

h) Fit the new coil assembly and refit the clip.

i) Ensure the mating surfaces and "O" ring grooves between the valves are clean

j) Reseat the pilot valve and spacer on the main valve ensuring that "O" rings are correctly seated in their grooves.

k) Secure with the two screws.

l) Refit the plug and secure with the screw.

When replacement is complete, close the links on A1,A4 and A7 as applicable

7.2 Air Leaks or Main Valve/Plunger Lock Valve Assembly Defect

If there is leakage anywhere in the main valve or plunger lock valve and manifold assembly or if the main or plunger lock valve is suspected of sticking, the complete valve assembly and mounting plate is to be removed from the case and replaced. The main valve, plunger lock valve and manifold group must not be dis-assembled on site.

Changing the valve assembly requires that air be turned off at the manifold.

Since this will result in no air on the points motor, the points must be clipped and locked.

To remove the valve assembly

a) Isolate the unit from the air supply at the manifold

b) If the points are lying normal, close and open the normal slide valve once or twice to purge air from the hoses and valve. (if points are reverse, use the reverse slide valve). DO NOT use the incorrect slide valve – this could cause the points to move away from the locked position. (The plunger lock valve should be de-energised so there should be no air on the plunger lock).

c) Open the links on terminals A1, A4 and A7.

d) Remove the wiring plugs from the normal and reverse solenoid valves and the plunger lock valve. Use temporary labels on the plugs to ensure that they are replaced in the correct position.

e) Remove the delivery line from the filter.

f) Remove the normal and reverse delivery lines and the plunger lock delivery line from the manifold assembly. Note to which outlets on the valve manifold the airlines are connected before removing them from the valve assembly. Ensure that they are connected the same way on the replacement valve assembly.

g) Unscrew the exhaust silencers from outside the case.

h) Remove the valve and manifold assembly from the case.

The complete assembly is to be returned to the depot and arrangements made for overhaul, preferably by the equipment supplier.

To replace the assembly

a) Fit the new valve and manifold assembly to the case

b) Fit the exhaust silencers to the manifold (from outside the case)

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c) Connect the normal and reverse delivery lines and the plunger lock delivery line to the manifold. Ensure connection to the correct port.

d) Connect the delivery line from the filter to the manifold.

e) Refit the plugs to the solenoid valves and secure them with their lock screws.

f) Ensure that all three slide valves are open.

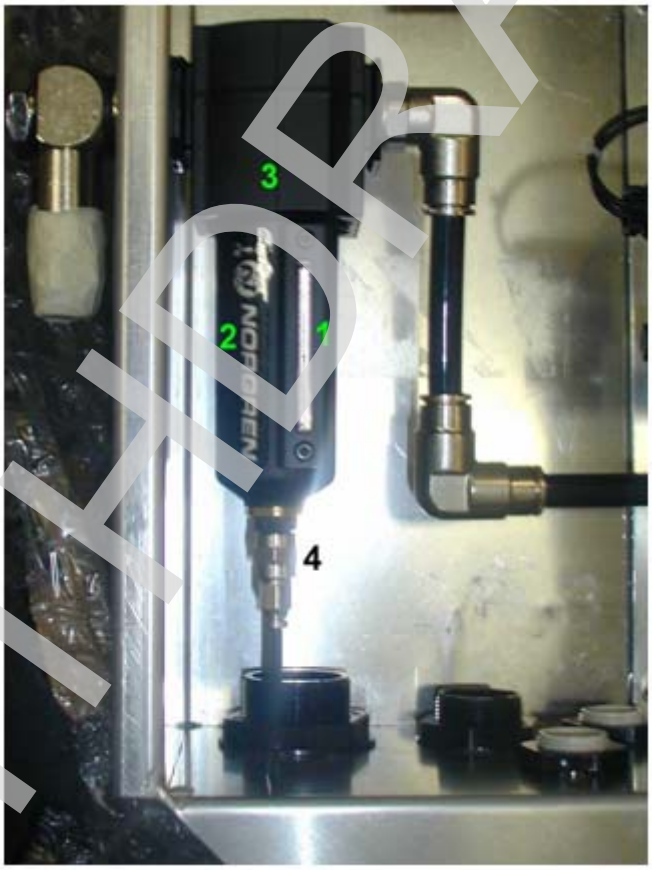
g) Close the links on terminals A1, A4 and A7.

Before turning the air on at the manifold, check that the call on the points is as it was before work commenced. This is essential to check the operation of the unit.

Turn the air back on at the manifold. THE POINTS MOTOR MUST NOT MOVE. Any movement indicates that hoses have been connected to the wrong ports or that plugs have been refitted to the wrong solenoid valve.

Test the operation of the valve unit.

7.3 Filter/Auto Drain



1 Sight glass
2 Bowl
3 Manifold – note that the filter is attached to the manifold, not the bowl
4 Adaptor and tube

Figure 13 - Filter/Auto drain

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If the sight glass (1) in the filter is more than half full of water the auto drain is not working correctly and will require service. The sight glass appearing red up to the water level and clear above indicates water height.

To examine and service the filter/drain: -

a) Isolate the style 'N' unit from the mains air supply by turning off at the manifold.

b) Relieve residual pressure between the mains and air motor by closing and opening the normal or reverse (as applicable) slide valve once or twice. (NOTE: - This will open circuit detection).

c) If the points are lying normal, operate the normal slide valve. If reverse, operate the reverse slide valve. Closing the valve will exhaust air between the valve and motor and opening it again will allow the air trapped between the manifold and the valve to flow to the motor. This will result in a considerable decrease in pressure at the filter.

d) Air pressure through the filter/drain must be at or close to, atmospheric pressure before the drain bowl (2) can be removed.

e) Remove the adaptor and tube (4) from the bottom of the bowl.

f) Rotate and remove the bowl. Upward pressure on the bowl is required while rotating clockwise. Take care not to damage the filter which is attached to the manifold (3).

g) Remove the float in the bottom of the bowl. This should fall out if the bowl is inverted.

h) If it does not fall out, replace the float and bowl.

i) The defective unit can be returned to the depot to determine whether it can be cleaned and returned to service or whether disposal is indicated.

j) If the float does fall out, examine the fitting in the bottom of the bowl and the drain tube for any blockage.

k) Remove the blockage or replace the tube. If the problem is in the fitting, replace the bowl.

l) While the bowl is off, examine the condition of the filter. If this appears to be partially clogged, replace it. (The filter is tapered – note which way the old filter was fitted before removing it.)

CAUTION

Under no circumstances permanently remove the filter.

The main valve is a seal free (lapped) type valve which requires clean air

Removal of the filter will result in premature valve failure

To re-instate: -

a) Ensure that the float is correctly seated on its splines in the bottom of the bowl

b) Replace the bowl. Exert upward pressure while rotating anti-clockwise as far as possible.

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c) Refit the adaptor and tube

d) Open the air supply at the manifold.

e) Ensure that the slide valves are open.

7.4 Airline

Discolouration of the flexible air line material, other than from surface contamination, will indicate deterioration of the material necessitating its replacement.

To replace airline, push back the collar on the airline fitting and pull the airline from the fitting. Ensure the new airline tube end is cut square and cleanly. Remove all loose material and ensure there are no nicks in the tube. Simply push the new airline into the fitting as far as it will go. Note that airline size must be 4mm for pressure switches and 12mm for supply and delivery.

Ensure the air lines are located away from and do not contact the solenoid coils or other components.

7.5 Repair or Replacement of Points Motor / Hoses

As the points motor can be isolated from the air supply at the slide valves within the Style 'N' unit, it is possible to repair or replace the points motor and /or air hoses without isolating the 'N' valve from the air mains.

Before commencing work, the points are to be booked out of order and:

a) The point lever must be placed in the appropriate position and blocked.

b) Point ends, other than the end being worked on, must be clipped and locked. If train movement is necessary over the end of points being worked on, this must also be clipped.

8 Spare Parts

8.1 Pneumatic Components

Component	Manufacturers Part No (NORGREN unless otherwise specified)	Stock Code
Normal / Reverse / Plunger lock Pilot Valves		
Excel 32 CNOMO Operator	V04Y486LQ116A	1903392
Slide valve retaining clip	Moss Q15-Q G19-Q	—
Solenoid coil for lock – 110V DC	QLX3/21/21	2069839
Plug (30mm with 11mm gland) for 110V DC solenoid coils	LPAU156-1045	2069821
Solenoid coil for Normal and Reverse Pilot Valves – 24V DC	V04X286A-Q1323	—
Plug (30mm with 11mm gland) for 24V DC solenoid coils	V04X286A-Q1323	—
Auto Drain / Filter		
Auto Drain / Filter complete	F73G-4GN-AD3	1903491

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Component	Manufacturers Part No (NORGREN unless otherwise specified)	Stock Code
Service Kit	4380-600	1903509
Filter element (40 µm)	4438-03	1883099
Main Valve		
Main valve, plunger lock valve and manifold assembly complete on mounting plate includes pilot valves	812313	TBA
Air Line		
4 mm	PA0704025C	1903517
12 mm	PU0712025	1903525
Air Line Fittings		
⅛ BSP x 4 tube swivel elbow	101470418	1903459
¼ BSP x 4 tube swivel elbow	101470428	1903442
⅜ BSP x12 tube swivel elbow	101471238	1903467
½ BSP x 12 tube swivel elbow	101471248	1903475
⅜ BSP M & F Elbow	150430038	1903483
12 tube x 12 tube elbow	100401200	1903541
½ BSP M & F Elbow Banjo	16A514848	1903558
½ BSP Exhaust Filter	M/1514	1903566
⅛ BSP x 4 tube straight adaptor	101250418	1903574
⅛ BSP x ⅛ BSP sleeve adaptor	160221818	1903582
Slide Valves		
⅜ BSP Slide valve	M/7238	1903590

8.2 Terminals

Component	Manufacturers Part No	Stock Code
Terminal Disconnect ('A')	WEIDMULLER ZTR2.5	TBA

8.3 Storage of Pneumatic Components

Pneumatic components are to be stored in their original packaging and, as far as possible, in a dry, dust free environment. All components should be marked with the date received into store.

Pilot valves which have been in storage for more than 4 years must be tested before use to ensure that elastomeric seals have not deteriorated.

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