Presscon Network - General Information

1. Wiring Specifications & Startup

The following minimum standard of wiring must be attained to guarantee reliable operation of Presscon Network. If any aspect of this specification is not adhered to, intermittent operation of any board component of the system will most likely occur. As a minimum ,a quality Digital multimeter will be required to carry out required electrical checks. Section 2 provides explanatory notes to the point raised in this section.

1. SYSTEM EARTH

a. There is to be a single nominated **SYSTEM EARTH** position- referred to in this text as EARTH. This point shall be a brass earth block. The earth block shall be connected to a good earth in the normal manner (a 4mm^2 cable is recommended). All connections to this earth from Presscon boards should be run **separately** in cable (0.75-1.5mm^2 recommended). **It is not acceptable to daisy chain the earth connection**.

2. DATA CABLE CONNECTION.

Recommended data cable: Twisted, shielded data cable (1 pair). Type MCP-1S. Cable size 2 x 7/0.2. 30v working voltage, 4kV spark tested. Screen-conductors; 1500V RMS 1 minute. Supplier AG Garland (03) 9543 6411. (Phasefale can supply sample on request)

Please note. The data cable connection is most **critical** to reliable system communication. Because communications can still operate, but be intermittent or fail under adverse operating conditions, it should be carefully installed and tested. Minor errors (eg a loss of continuity of B+, B- or drain wire) will not necessarily show up during system programming but have a negative impact on system performance.

a. The data cable, including its shield trace wire (drain wire) are to be connected in a daisy chain fashion, and be continuous through all connections. At ONE end only, the drain should be connected to EARTH.

The shield trace wire connection of the 12V power cable is to be left unterminated at the remote end, and taken to earth at the PSB60 board end. The shield trace wire connection to be fully maintained for the length of the data bus.

b. *THE MOST IMPORTANT TEST YOU WILL DO.....**(Mult-meter required!)***
Test: a test will be conducted as follows BEFORE commissioning system.

- *unplug all 3 position data plugs from circuit boards*
- *disconnect earth wire from drain wire connection from end of data cable*
- *test for isolation of B+ to earth, B- and drain wire*
- *test for isolation of B- to earth, B+ and drain wire*
- *test for isolation of drain wire to earth, B+ and B-*
- *test for continuity of B+ from one end of data cable to the other*
- *test for continuity of B- from one end of data cable to the other*
- *test for continuity of drain wire from one end of data cable to the other*
- *plug 3 way data connectors back to Presscon Network boards*
- *measure 60 Ohm (+/- 10) between B+ and B- no power to boards and 2 terminate jumpers are engaged at end boards)*

IMPORTANT: reconnect earth to drain wire at **one end** of data cable

c. The drain wire is to be taken to the earth at **ONE POINT ONLY**. This connection point is to be from the end board position.

d. The data cable (Bus+, Bus-, and drain wire) must be shielded for its entire length. The maximum exposed cable (B+,B-) is 20mm- therefore a shield is required on connection between relay and sensor card.

e. The drain wire is to be joined at the shield connection point (labelled SHLD on the circuit boards) to ensure shield continuity along the data cable.

f. Exposed drain wire is to be taped or sleeved and covered at the B+, SHLD, B- terminals to each board.

g. The two end boards of the data cable connection are to have termination resistor jumpers engaged. All other boards have resistors **DISENGAGED**.

3. 240VAC POWER SUPPLY TO PRESSCON

a. A surge arrester, Phasefale parts PB60, PL10 or recognised equivalent must be fitted to the 240VAC supply used to power the Presscon system. This unit provides EMI (electo- magnetic) filtering , HF (high frequency) , and surge filtering to clamp excess voltages presented on the 240VAC supply.

b. It is RECOMMENDED that a separate and dedicated control circuit breaker of low capacity (eg 10A) be fitted for the power to the Presscon Network.

4. BOARD EARTHING

a. The PB60 unit/s are to have an earth connection from the **EARTH** terminal to EARTH. A separate earth from boards not generating 12VDC (eg sensor, display and clock boards) is NOT required.

5. POWER SUPPLY TO SYSTEM COMPONENTS

a. PB60 unit/s are used to provide 12VDC power to all system components. Refer to section 3 for more details

6. POWER SUPPLY TO DISPLAY CONTROLLERS

a. The power cable to the display controllers (rack/con, alarm, temp control, defrost etc.) shall be run in a shielded cable. The shield trace wire connection of the power cable to be left UNTERMINATED at the controller end, and TAKEN to EARTH at the power board end. The shield trace wire connection to be fully insulated.

7. REMOTELY MOUNTED PRESSCON NETWORK CARDS

a. If a network card is mounted outside the power board enclosure supplying power to it, then power cables to it shall be shielded. An example of this is where sensor cards are mounted in cabinet fixtures.

8. SENSOR CABLING

Recommended sensor cable: Shielded cable (1or more pair). Type MCP-1S, MCP-2S, MCP-3S, MCP-4S, MCP-6S . Cable size 2 x 7/0.20.[24AWG] 30v working voltage, 4kV spark tested. Screen-conductors; 1500V RMS 1 minute. Supplier AG Garland (03) 9543 6411. (Phasefale can supply sample on request)

a. All sensor cables are to be shielded cables. 3 wires are required for each pressure sensor (+12v, Signal, Ground) and 2 wires for each temperature sensor. Where a single sensor card has more than one temperature sensor, the G (ground terminal) may be a common conductor. For example, for a sensor card with 8 temperature sensors, 9 wires (8 signals plus a single common ground) will suffice. There is no polarity to the temperature sensors. It is NOT acceptable for temperature sensors to share a single common ground where they are connected to different sensor cards.

b. All sensor shield trace wires to connect directly to the system earth.

c. Sensor and all low voltage cabling in the switchboard, shall not run parallel to 240 or 415V cables in duct for more than 200 mm unless that cable is shielded and its drain wire connected to EARTH.

d. Maximum recommended Cable run for Temperature sensors is 300Meters [1000 feet]

9. CONTROL OUTPUTS

a. Control output loads are supplied from terminal "LOAD", whilst the common (active) supply is wired to the "A" or "B" terminal for each output. Use "A" for outputs which should close for failsafe, "B" for outputs which should open for failsafe and program accordingly- see relay board instructions.

b. Where multiple points are required from a single output (eg. a close and an open signal) use auxiliary or pilot relays for this function. ONLY TWO Connections should be made for each relay output; between LOAD & "A", or LOAD & "B".

c. There is a snubber circuit between each output at LOAD and the terminal "Snubber" (located below the "Neutral" terminal). The snubber consists of a 0.47uF/250VAC polyester capacitor in series with a 470 Ohm 1.6 Watt resistor. This snubber when engaged absorbs electrical switching noise.

d. Snubber neutral should be wired to "Unfiltered Control Neutral". Where 240VAC control actives are used the Snubber would be connected to 240VAC Neutral, alternatively where a 24VAC or other control voltage is required, the snubber neutral is wired to the 24VAC or other control voltage Neutral.

e. Outputs 7 and 8 are a special case, they can be used as 240VAC outputs, or as low voltage/voltage free alarm contacts. To use as 240VAC outputs: engage jumper bridges. To use as voltage free or low voltage outputs: disengage jumper bridges. The bridges are located to the left of the terminal 8-LOAD.

f. Outputs are rated: SPST 5A (resistive) 240VAC.

Refere Appendix A for further discussion on Snubber Circuit operation.

10. MODEM SUPPLY (RECOMMENDATIONS ONLY)

a. The power supply to the modem plug pack should be from the filtered 240VAC output of the PB60 and should be interrupted for at least 20 seconds at least once every 24 hours. This can be achieved by either interrupting the 240VAC supply using a timer, or by a Presscon System controller, which has a modem output which is ideal for interrupting the supply to the modem without requiring a pilot relay. Refer to the System controller instructions for details.

11. CHECKLIST

The table at the end of this document should be completed by the switchboard manufacturer.

12. SYSTEM STARTUP

a. Preparation

Complete the wiring Checklist
Disconnect pressure transducer/s
Identify and locate all power supply boards.
Have a multi-meter ready to use as power is applied to the system.

b. Initial power On

As soon as power is applied, check that each power supply board is supplying 12V DC. If an overload condition exists then the PB60 will shut down and no voltage will be measured at the +12V and GND terminals. Switch off the power immediately and look for the reason.

c. Transducer check.

Before connecting transducers, check supply polarity- red is +12V. Reverse polarity to transducers will damage them.

2. Notes to the Wiring Specifications & Startup

When setting up multiple controllers on a single site, the following hints will help in programming, commissioning and later system trouble shooting. Explanations are given for each recommendation.

1. Start with the system overview page(s) as a first step. Early on, ensure that sensor cards, displays etc have enough power from relay cards by following the "power supply considerations" application note available.

Explanation....as soon as you get to the second rack system, it is important that all card numbers are planned and no overlap is allowed. Because the system will not let you have 2 cards with the same number, it is impossible to set up an incorrectly configured system. Also, if it is discovered later on that more power bases are required or extra cards are required, changing card assignments half way through programming gets confusing (especially on site).

2. Sprinkle the system overview page with comments as to what connects to what. Ensure that the "power to" and power from" column are filled in.

Explanation..... cross referencing which cards are related often highlights mistakes in card assignments (eg 2 relay cards are given the same card number)

3. Do not use card 1 for rack controller, 10 for relay, 20 for sensor, 30 for defrost, 40 for temp. controller or 50 for defrost controller cards.

Explanation..... new and replacement boards have these numbers as defaults. If you try to add a new card to a system which already has the number used, more than 1 card will have the same number and you will receive error messages. If the original card is selected first in "NETWORK CARDS" you will be forced to change its number from its setting. Leaving the "base address" free ensures a new card can be connected without having to go through error messages and possible confusion.

4. Put a clearly labelled sticker on each card with its card number assignment and which rack it is assigned to.

Explanation.....this is an obvious way to speed the programming. It may also be a good idea to do this before passing components on to the switchboard manufacturer.

Before powering up the system and setting card numbers

5. . All communications must pass through the data cable- BUS+, BUS-. Make a visual inspection of correct polarity of + and - wires to ALL cards, also check shield connection is joined and only taken to earth at ONE point. For the moment, also check that NO termination jumpers are fitted.

Explanation.....Without proper communications, no network activity is possible. It won't go!

6. Using a multimeter, (no termination jumpers fitted) check resistance is over 20,000 Ohms (20kOhms) across BUS+, BUS-

7. Fit termination jumpers at each end of the data cable in accordance with network cabling considerations (page 10 of reference). Check resistance across BUS+, BUS- is now around 60 ohms.

Explanation.....We are checking that the termination resistors are properly fitted. They are there to absorb echoes on the data cable as signals are transmitted across the cable. They are particularly important as cable length gets longer. Over short distances the shielding is still important.

Power UP

8. Check all cards are receiving power. The LED blinks at about 1 second on/off and display cards will respond to key presses. Check with a multi-meter that supply voltage to cards is between 11.5 and 14 volts DC.

Explanation.....We are checking integrity of the power supply to cards.

9. If possible, it is a good idea to now power down part of the system and "bind" a small part of the system (eg a rack), in the "NETWORK CARDS" menu (see item 11). At this stage DO NOT complete "SENSORS & RELAYS" settings (for reasons given in 10)

Explanation....It is simpler to work with a small group off cards at a time. Leaving cards on the network, but not powered up is OK (they are designed for this).

10. Continue to "bind" small groups until they are all done. Power up the whole system and re-check the binding.

Explanation....this is to check that 2 cards have not been given the same number which is not allowed.

11. For a larger group, turn system off and on before "network cards" is started.

Explanation....binding must be completed in 3-4 minutes otherwise relay cards reset (fail safe condition if no rack communications). However, to aid in binding, 10 minutes after power up is allowed.

12. Once the system is all up and cards are all chatting, proceed to program the controllers in the following sequence:

SYSTEM OPTIONS *your preferred units will come up (C/F/psi/psi)*
COMPRESSORS
OIL FAILURE
HEAD CONTROL .....*then*
SENSORS & RELAYS *not until you have completed the above will the controller know how many inputs outputs are required*

Explanation.... The above sequence is the only way to ensure you do not have to re-enter programming. For example, the head circuit has a default of 4 fans. If you went straight to "sensors & relays", it would only ask for the location of 4 relay outputs. If you then went to "head control" and changed the fans to 6, you would be obliged to again enter "sensors & relays" to then tell it the location of the 2 extra fan relays.

The sequence for other controllers is to complete "system options" then the "main" groups headings and then "sensors & relays" because similar considerations

3. Power Supply Considerations using PB60

Presscon Network cards operate from a 12V DC supply. The PB60 (12V,5000mA = 60Watt) unit generates this supply; one or more of these units should be used to supply power to all cards on the network. (*The Following information relates to installations using PB60 unit/s (1999 onwards). Please refer to PN 327 for earlier installations.)*

Network Cards and Components Power Consumption

Board Type	**Drawing abbrev.**	**Power Required**
Display/keyboard	D/k	160 mA @ 12V DC
Relay Card	Rel	240 mA @ 12V DC
Sensor/8 Card	S/8	25 mA @ 12V DC
Sensor/32 Card	S/32	100 mA @ 12V DC
Clock/modem Card	Clk	60 mA @ 12V DC
Data Logger Card	Log	60 mA @ 12V DC
Pressure Transducer (0-100 & 0-500 psi)	Txd	15 mA @ 12V DC
ancilliary equipment (e.g. liquid level probe)		check manufacturers specifications

Example Power Supply calculation

A system comprises :

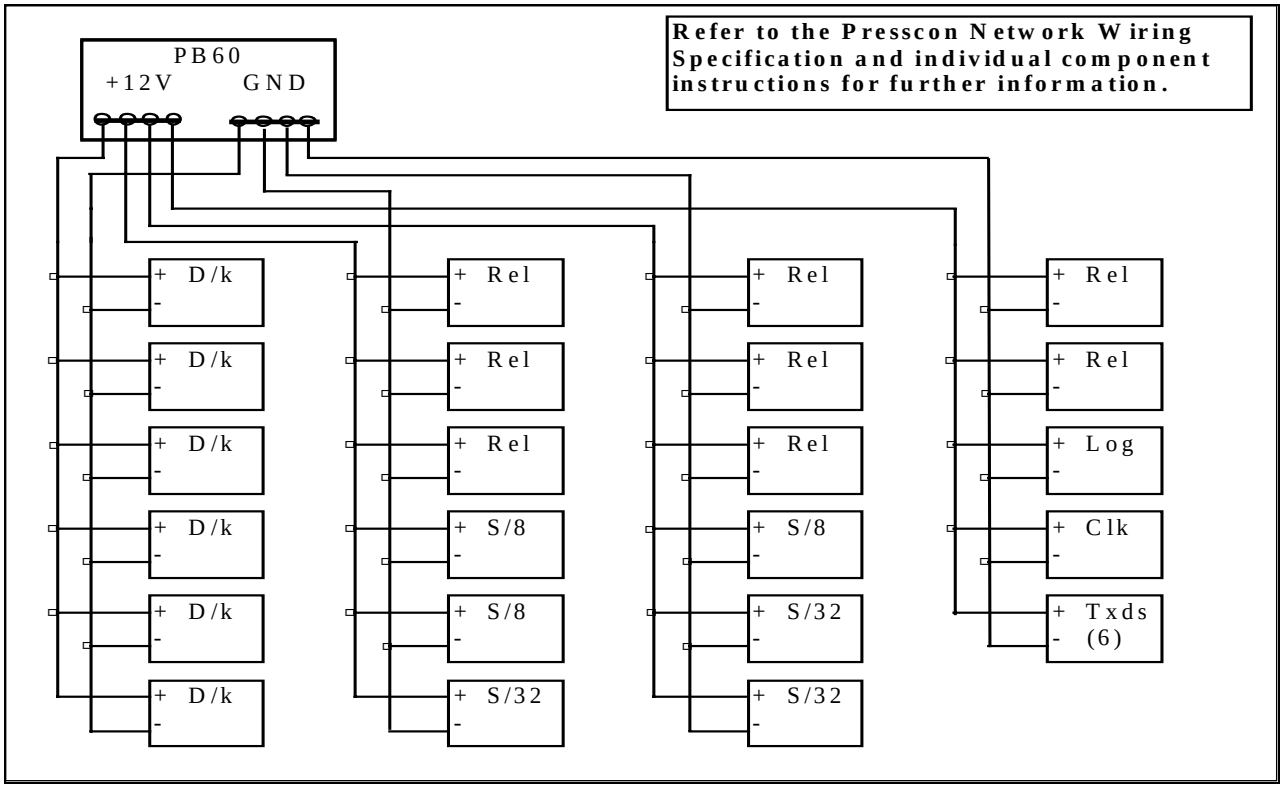
3 Rack controllers, 3 System controllers,
8 Relay cards, 3 Sensor/8 cards,
3 Sensor/32 cards, 6 Pressure transducers,
1 Data logger card, 1 Clock/modem card.

Adding up the consumption of all the components shows that it is within the 5 Amp capability of one PB60 unit.

#	**Type**	**mA**	**Total**
6	displays	160	960
8	relay cards	240	1920
3	sensor/8	25	75
3	sensor/32	100	300
6	pressure transducers	15	90
1	data logger	60	60
1	clock/modem	60	60
	Grand Total		3465

Notes :

- It is recommended that the distribution of the 12V supply to the Network components be kept to cable runs of no more than 1 amp each. Therefore in the above example there are four cable runs from the PB60 to the Network components shown.
- Relay 8 Cards have a 240V supply alternative. It is recommended that where a PB60 is fitted this is NOT used.
- The Snubber neutral connection on the Relay 8 Cards is still required to be connected - refer Presscon Wiring Specification
- The PB60 also includes a 5Amp 240VAC filtered output; this is used for external 240V powered equipment - e.g. Modem plug pack.



4. Wiring checklist - to be completed by Switchboard Manufacturer

Site			
Date			
Commissioning Engineer			
Item to Check	**see sect.**	**OK**	**Attend**
240VAC Supply to all PB60 unit/s	3		
System Earth position is a separate identifiable point	1,2		
Data cable is in daisy chain fashion	1,2		
Data cable test completed	1,2		
Data cable shield trace wire to earth one end only	1,2		
Termination resistors engaged each end of data cable	1,2		
PB60 Power Supply boards have separate ground connection to Earth	1,2,3		
Snubber on each relay board to unfiltered neutral	1,2		
All 240VAC Outputs have supply on A or B and output on LOAD	2		
Low voltage outputs (eg dialler) has snubber jumper disengaged	1,2		
Each PB60 power board load less than 5000 mA	3		
The above items have been checked and verified by ;	Date		

.....	...../...../.....

Phasefale Pty. Ltd. **Rev 2: 21/1/4 added Snubber appendix**
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Appendix A :

Correct Relay Board Wiring for Snubber Circuits

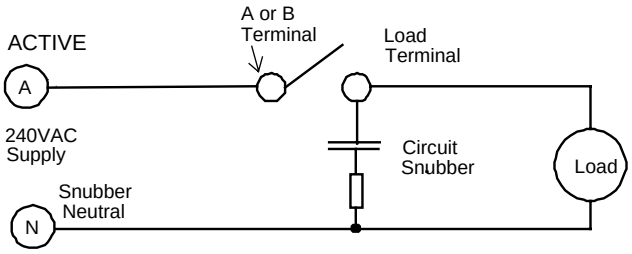
General

The snubber protection system incorporated into Presscon relay boards is critical to the integrity of the systems reliability. Correctly installed, the snubber circuitry eliminates electrical interference caused when Presscon relays switch reactive loads such as fans, solenoids, contactors etc. which generate high "back emf" voltages. Correctly commissioned, the snubber will reduce and absorb the voltage "spike", thereby dramatically reducing electromagnetic radiation transmitted through the air and along the system wiring.

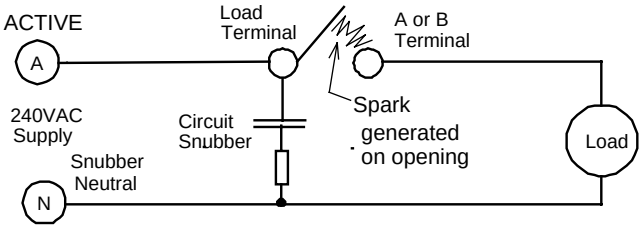
Presscon and other control systems will generally operate ok in an electrically noisy environment, however in some instances severe interference can temporarily affect system operation. Generally Presscon will recover from interference, but in the process memory or other operation may be affected.

How does the Snubber circuit work?

The diagram below shows the snubber in action;



Snubber Circuit correctly wired



Snubber Circuit incorrectly wired

In the correctly wired configuration, when the relay contact opens on the Presscon relay board, the snubber circuit absorbs the voltage spike which the load generates. Therefore there is little or no interference generated. However with the incorrect wiring, the snubber circuit has no affect and a spark* is generated across the relay contacts- generating significant electrical interference. (* the size of the spark will vary greatly depending on the load, and timing in the AC cycle of the switching).

How do I check the wiring is correct?

A simple method to check the snubber wiring is correct is:

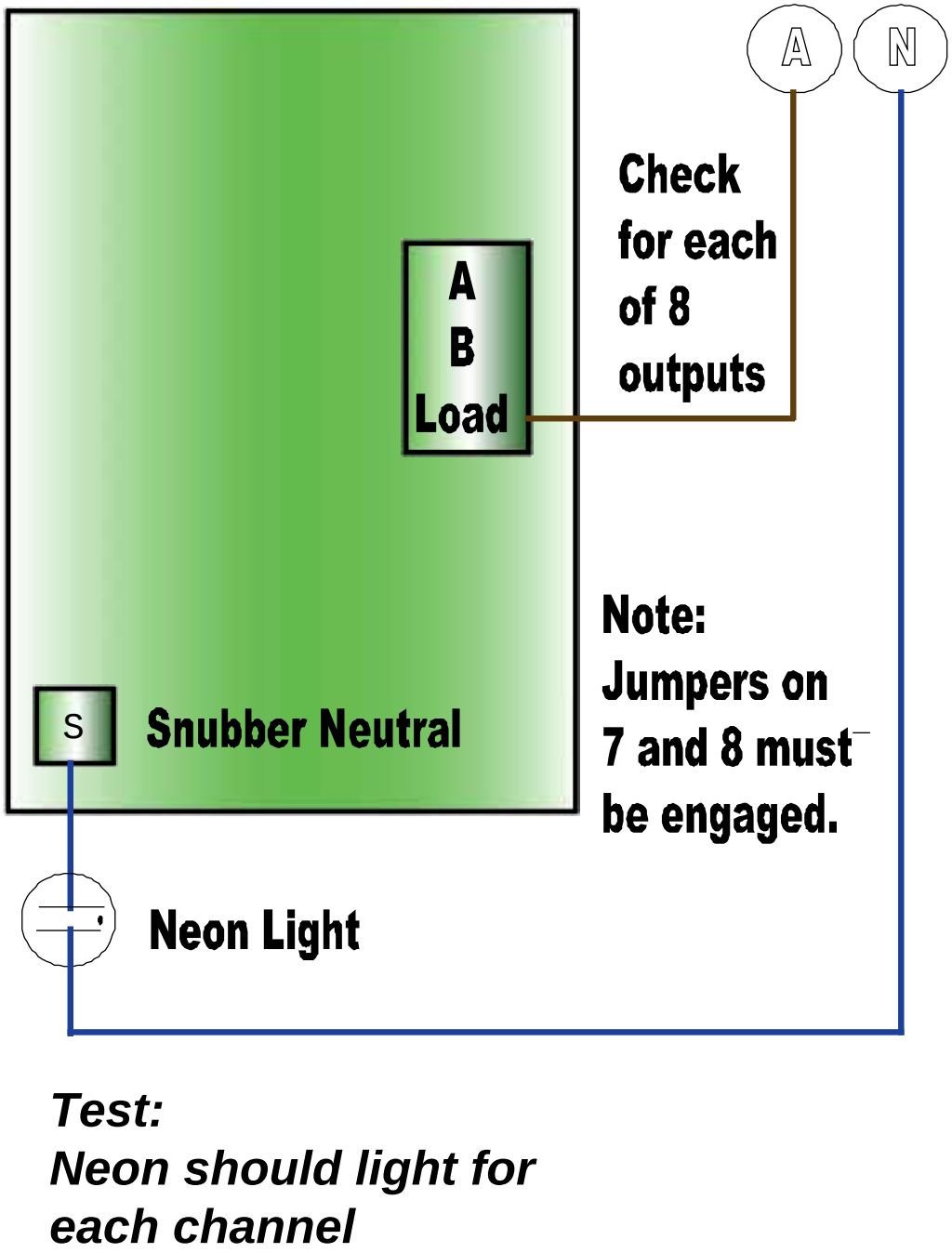
1) Use a Multimeter set to AC Voltage 750VAC Range.
2) Use the override function of the relay board or a controller to turn the load OFF
3) Check using the multimeter that there is 240VAC on the A or the B terminal and 0 Volts on the LOAD terminal. This indicates correct wiring.
4) If there is 240VAC on the LOAD terminal when the output is OFF the wiring is incorrect.

Important

The snubber circuit ALSO requires the connection of the Snubber Neutral. Use the Multimeter to check the voltage between the system Neutral and the Snubber neutral is 0 Volts.

Appendix B :

A simple test to check integrity of snubber circuits on Relay Boards



Test:
Neon should light for each channel