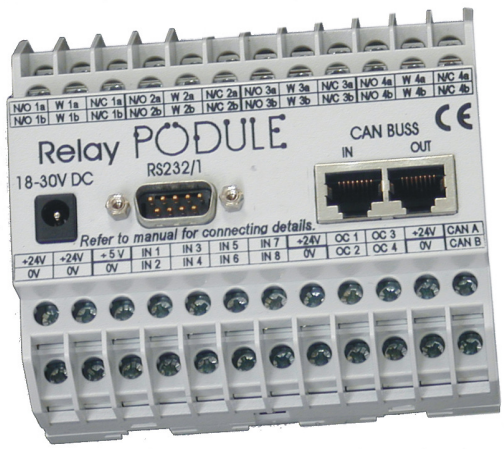
Relay Podule

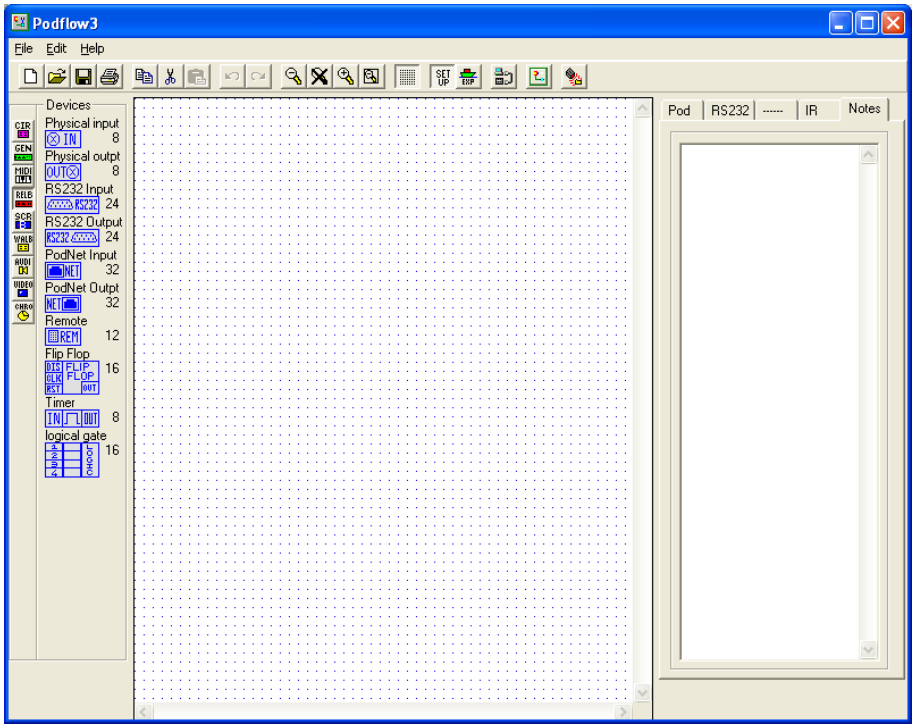
Description

The Podule system evolved because of the need to control audio/video installations. Many of these installations required simple add on facilities such as switch detector, serial command generators, blind and screen controllers. Each of these required IKON AVS to design and produce a one off interface. To avoid this wasted effort the Podule range of interface units was born. Each Podule contains a collection of inputs and output, which can be configured by a user to implement various control functions.



PodFlow 3 Software

Main PodFlow screen with Relay Podule selected.



Refer to the PodFlow programmer's reference manual for full PodFlow 3 programming information.

Device Reference

Physical Input

Number of devices per POD:- 8
Input Trigger Level:- Digital or Analog
Output Type:- Digital 1 or 0
Input connections:- Screw terminal
Connections per output:- >1
The maximum input voltage must not go below 0V or exceed +5V DC (See Appendix A).

Input Configuration

Inputs

All inputs 1 to 4 are digital only whilst inputs 5 to 8 can be Digital or Analog. Select the input from the Terminal list and Name as required.

Selecting threshold or window will put the inputs into Analog mode.

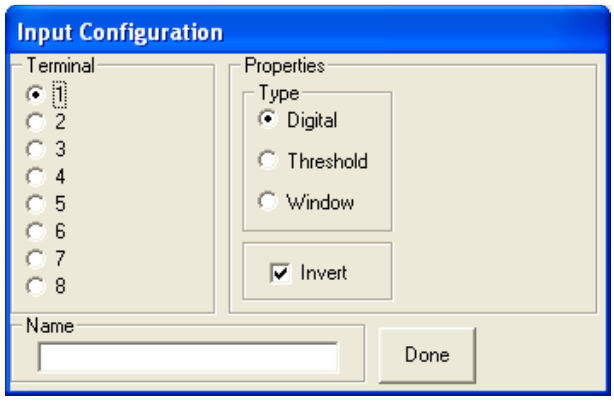
In DIGITAL mode logic thresholds are:-

Logic 1 > 2.0v
Logic 0 < 0.7V

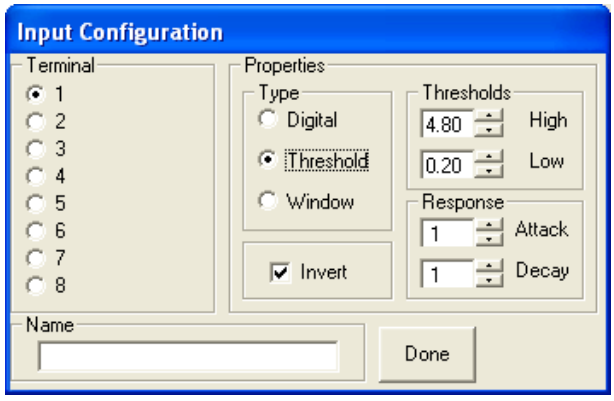
In THRESHOLD mode the output status will change when the DC input level exceeds the high threshold and only return low when it drops below the Low threshold.

In WINDOW mode the output is only high when between the high and low thresholds.

You can set the input to be active High or Low under the POD tab in the main window. Default is pull up.



Digital Input



Analog Input

Name

Each device can be given a “Name”, this is displayed below the device in the diagram.

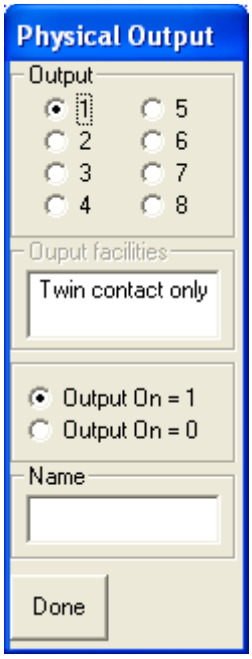
Invert

Inverts the state of the output. By default it is ON requiring the input to be grounded for activation.

Physical Output

Number of devices per POD:-	4 x Relays DPDT + 4 x Open Collector
Input Trigger Level:-	Digital
Connections per input -	>1
Connections per output:-	>1 (See Appendix C for Current ratings)

These can control external relays, Indicators or opto-isolators. After dragging the device onto your worksheet double click on the device to open a configuration window like the one below.

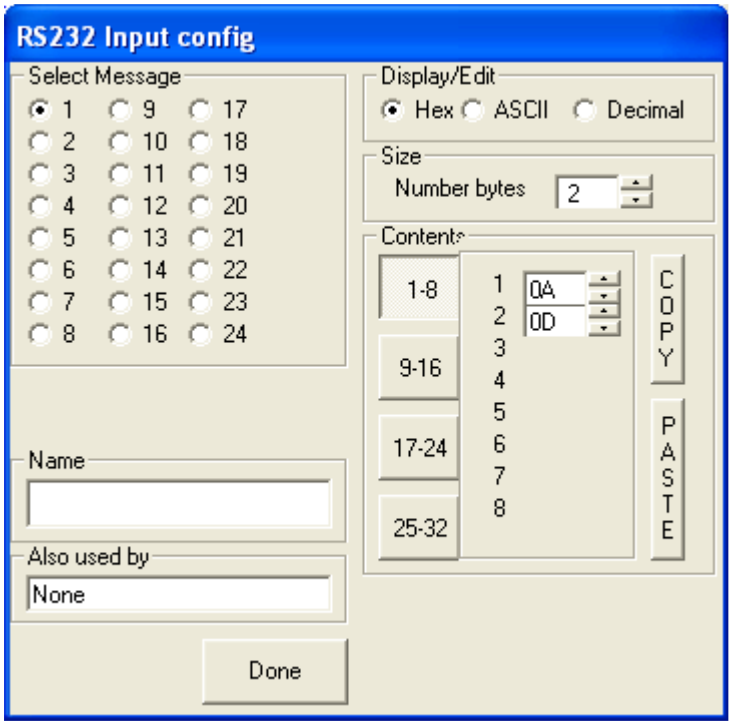


Outputs 1 to 4 control the internal double pole double change over relays, rated at 240V AC 8A. These are labelled on the POD as NO1a/b, W1a/band NC1a/b for output 1 and NO2 etc. for output 2.

Outputs 5 to 8 are provided with open collectors rated at 30@100mA DC and labelled OC1, OC2 etc.

RS232 Input

Number of devices per POD:-	24 (up to 32 bytes each)
Input Trigger Level:-	RS232 Via port1
Output Type:-	Edge triggered 0 to 1
Connections per input:-	1 (Port 1)
Connections per output:-	>1



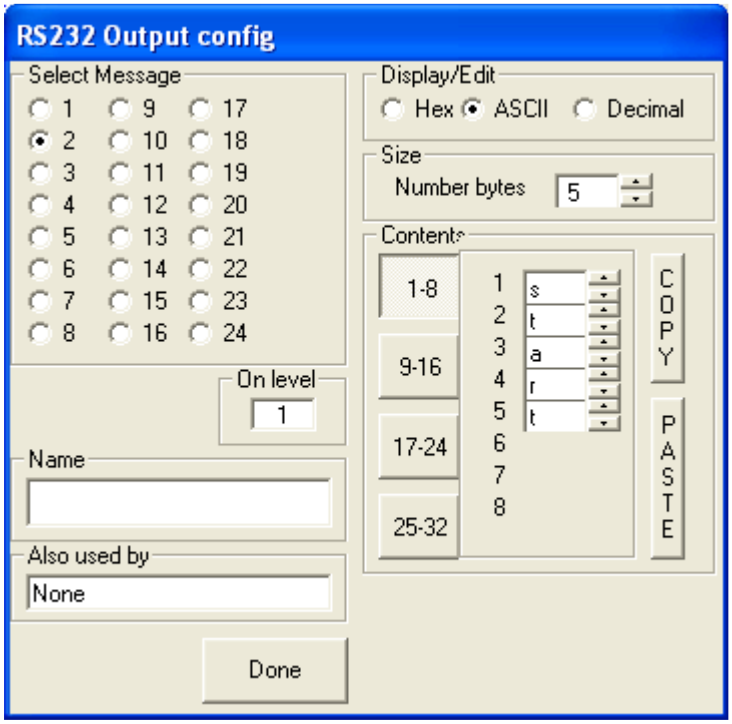
When the RS232 input Device symbol is double clicked it displays a 'Select Message' window allowing the assignment of the message it is to respond to.

When a message is selected a side window opens, this is a repeat of the RS232 Tab and allows the setting up, or verification of the message length and content. A warning is also given if the message is already assigned within the Podule.

RS232 Output

Number of devices per POD:-	24 (up to 32 bytes each)
Input Trigger Level:-	Edge 0 to 1
Output Type:-	RS232
Connections per input:-	>1
Connections per output:-	1, RS232 port 1

Accessed from the 'D' connector the RS232 output is configured under the RS232 tab. Each required message output will need a new RS232 Output device and these require configuring as to which message they are to transmit. The device supports multiple inputs.



Double click on the RS232 Output Device to access the configuration screen.

Configuration is as per the inputs with the message transmitted when active. The On Level window configures transmission on a Low to High transition (1) or Hi to Low transition (0).

Multiple inputs can be connected to the device as it responds only to a level change and not a fixed level.

The above example has been set to transmit message 5 which is an ASCII code s,t,a,r,t, when the RS232 output receives a Logic Level 1 on its input.

PodNet Signals

The PodNet currently supports up to 255 simultaneous messages with these a combination of Digital and Analog. You should only have a single Podule originating the message but all Podules can receive it. On any Podule, if the status of a message is changed the Podule transmits this change immediately, or if the network is busy in the next available time slot, this is generally within 5mS.

All Podules automatically retransmit their locally originated PodNet messages at an interval of approximately 35 seconds to ensure complete synchronisation between units.

PodNet input

Number of devices per POD:-	32
Input Trigger Level:-	PodNet Data
Output Type:-	Digital
Connections per input:-	1 (PodNet data)
Connections per output:-	>1

PodNet Message

Enter the message number to be used either by typing in the message number or using the buttons.

For convenience you can give the PodNet input a suitable name.

PodNet Output

Number of devices per POD -	32
Input Trigger:-	Digital
Output Type:-	Digital
Connections per input:-	1
Connections per output:-	1 (PodNet OUT)

PodNet Message

Enter the message number to be used either by typing in the message number or using the buttons.
For convenience you can give the PodNet input a suitable name.

Podules will not ‘see’ on their input a transmitted message that uses the same message number as a PodNet output used on the same Podule. This is to eliminate the possibility of creating an infinite feedback loop.

*Note; PodNet outputs can take up to 30 seconds to settle after switch on.

Flip Flop

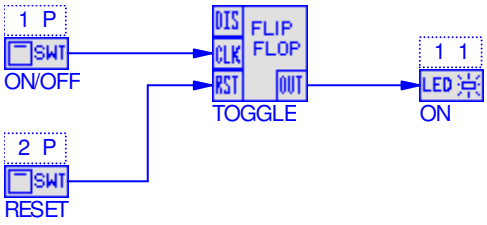
Number of devices per POD:-	16
Input Trigger Level:-	DIS = Level CLK & RST = Edge 0 to 1
Output Type:-	Digital
Connections per input:-	>1
Connections per output:-	>1

Whilst similar to a normal ‘D’ type in many respects the Podule version has a number of specialised attributes.

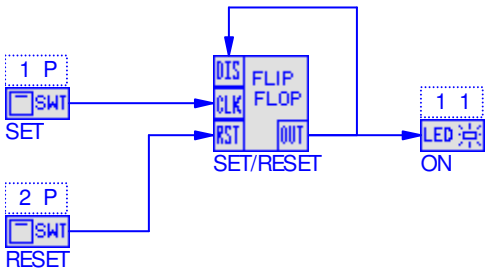
CLK The clock input, it will ignore static states and is only triggered by a Lo to Hi transition allowing multiple sources to be linked to it. On each transition the output will change state. This is unless DIS is tied to a Hi signal – see below.

RST The reset pin triggered by a Lo to Hi transition allowing multiple sources to be linked to it. When triggered it will force the output Lo.

DIS When High this disables the CLK input. This input is both transition and level sensitive and if connected to the Flip-Flop’s output will change the operation to a Set and Reset type using CLK as set and RST as reset.



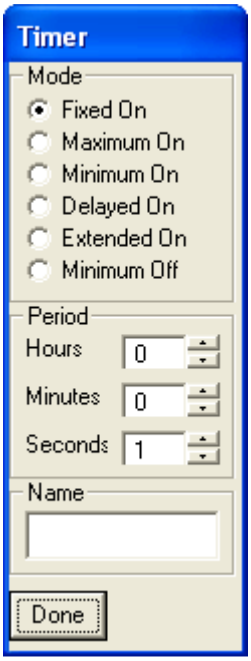
Flip-Flop connected for toggle action with reset.



Flip-Flop connected for Set - Reset operation.

Timer Device

Number of devices per POD:-	8
Input Trigger Level:-	Edge 0 to 1or 1 to 0 (see below)
Output Type:-	Digital
Connections per input:-	1
Connections per output:-	>1



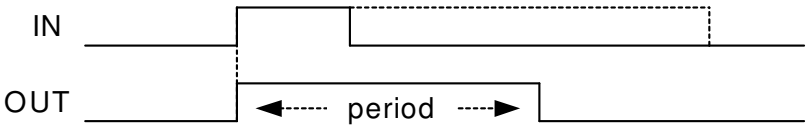
The device will only accept a single input for triggering and can be used in multiple timing modes. The time period can be set from 1 second to 18 hours.

The time period set along with the type of timer selected is displayed above the device.

Any name is shown below the device.

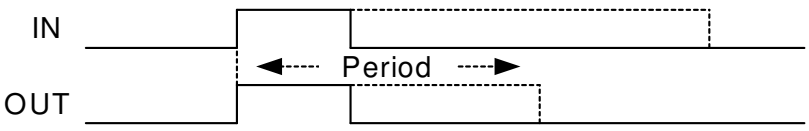
Fixed On

The output will follow the input state. It will remain High for the on timer period, independent of any other input changes.



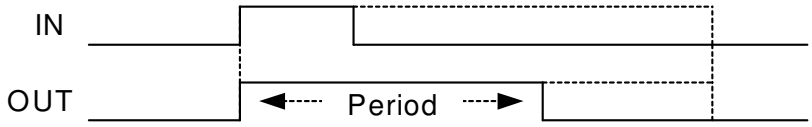
Maximum on

The output will follow the input state up to a maximum time set by the on timer.



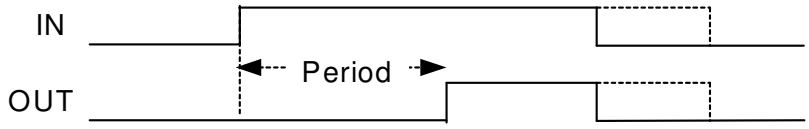
Minimum On

On for a set time even if the trigger is removed. The output remains high whilst the input remains high, even if the time period has expired.



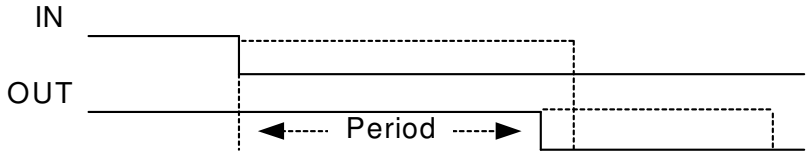
Delayed On

Output remains low for the set period after a Lo to Hi transition and then goes high whilst the input remains Hi.



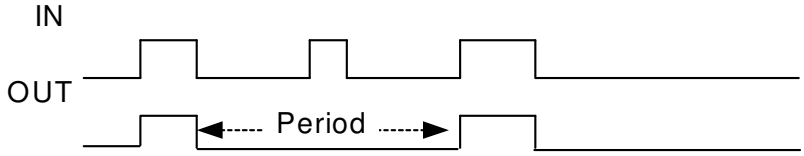
Extended On

Output remains High for the set period after a Hi to low trigger.



Min Off

Output will remain low for the set period, even if the input is re-triggered.



Period

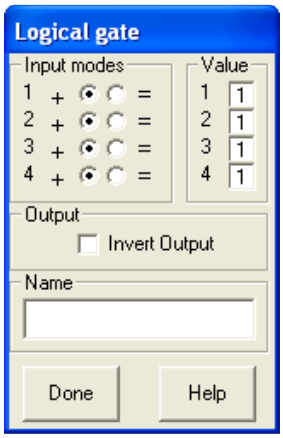
Adjustable time in Seconds, Minutes or Hours
1 to 59 Seconds
1 to 59 Minutes
1 to 17 Hours

If no time is set it defaults to 1 second.

Logical Gate Device

Number of devices per POD:-	16
Input Trigger Level:-	Level
Output Type:-	Digital
Connections per input:-	1
Connections per output:-	>1

Double click on the Logic Gate to configure as:-

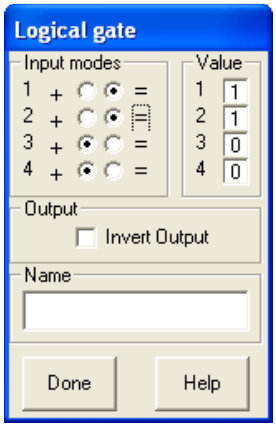


Each input can be set as an AND gate or an OR gate.

If, as shown, the + button is selected it is part of the OR gate.

As part of the OR gate the input will be active if the signal is equal to the number on the right. The example as shown, if any of the four inputs are Hi (1) for the gate output will be high.

The Invert Output box will change the status of the output from Hi to Lo when all inputs are Hi.



Inputs 3 & 4 are still part of the OR gate but looking for a low (0) to be valid - if unconnected effectively not used.

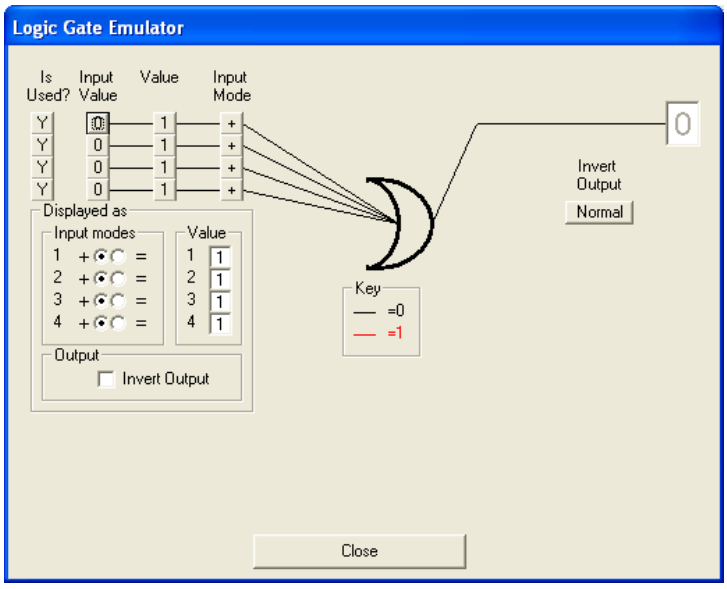
Inputs 1 & 2 have the = button selected and are part of the AND gate.

As part of the AND gate if either input goes high the output will be high.

The Invert Output box will change the status of the output from Hi to Lo when either input 1 or 2 are Hi.

Logical Gate Emulator

Under ‘Help’ an emulator allows a simulation of operation.



Is Used?

Select if the gate input is to be used or not.

Input Value

Set the logic level at the input, either 1 or 0.

Value

Set the level the input is to respond to.

Input Mode

This toggles between + for an ‘OR’ input and = for an ‘AND’ input. Changing these will alter the logic diagram to suit the required logic.

Invert Output

Lets you invert the output if required.

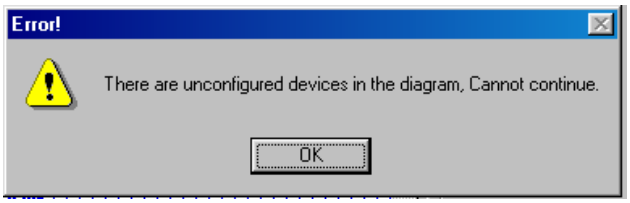
Displayed As

This group of radio buttons change to reflect the emulation settings and directly correlate to how the device itself needs to be set to achieve the emulated logic.

Programming the Pod

Use a serial lead as described in Appendix D to program any of the Podules.

When you click on this icon  you may get a message



This is because some of the devices have not been set up properly.
You may have an input device on you project that has no terminal selected.

Once all the devices have been corrected and you then press 
A window will appear as it searches for pods, Fig 1, if none are found you will get a window like Fig 2, check cable connection and power to the Pod.
Once communications has been established a window like Fig 3 will appear. This shows that there is a Relay Pod connected to com port 1. Click the radio button next to the Pod you wish to program.

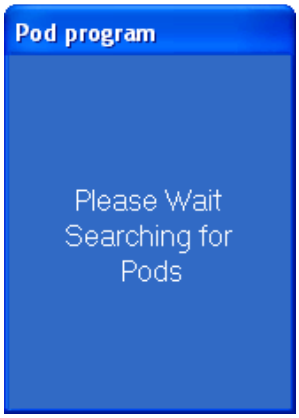


Fig 1

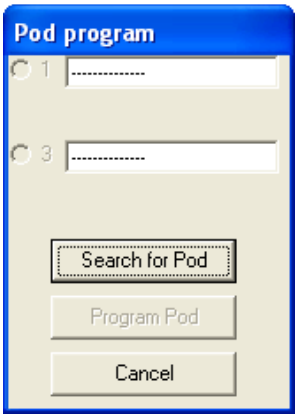


Fig 2

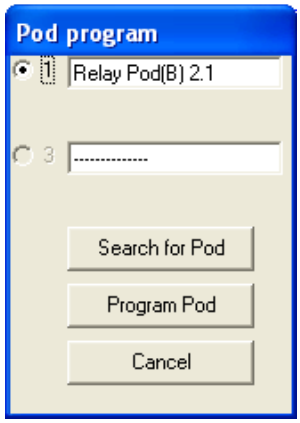


Fig 3

Note:- Fig 3, also shows the revision of the firmware within the POD, New versions, along with PodBootstrap to load them are available on our web site at www.ikonavs.com .

Whilst the main PodFlow data is being sent the progress display as per Fig 4 is displayed with this changing to Fig 5 when the programming is complete. At this point you can program an additional Podule with the same program or exit.

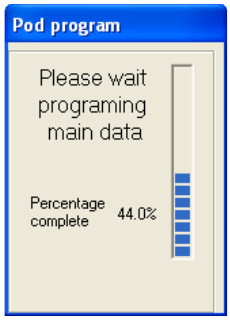


Fig 4

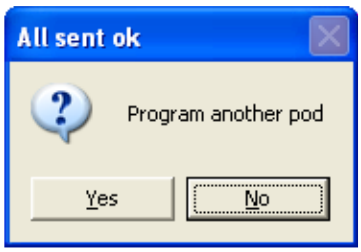


Fig 5

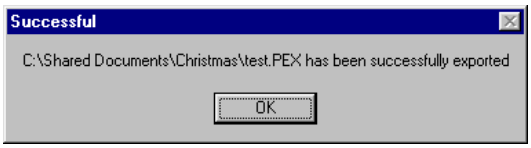
Pod Export

Pod Export allows a configured file to be exported for download to a Podule without having to install PodFlow on the PC being used. This is intended for system designers to allow customers to update configurations without access to the main PodFlow diagram.

To create an export file select 

. A 'Save As' box will open allowing the user to specify where the file is to be saved and also to specify a name. The suffix .PEX will be added.

Click on 'Save' to export. When exported the following conformation will be given. Click on 'OK' to continue.



Pod Download

To utilise a .PEX file it is necessary to install 'Pod Download' on the PC to be used. This is available on the Ikon CD and also from the website at www.ikonavs.com. Once installed it is only necessary to double click on the .PEX file to be downloaded to automatically start the configuration.

Once started the program searches for a compatible Podule on the serial ports in an identical manner to the normal programming method.

A window will appear as it searches for pods, Fig 1, if none are found you will get a window like Fig 2, check cable connection and power to the Pod. Once communications has been established a window like Fig 3 will appear. This shows that there is a Relay Pod connected to com port 1. Click the radio button next to the Pod you wish to program.

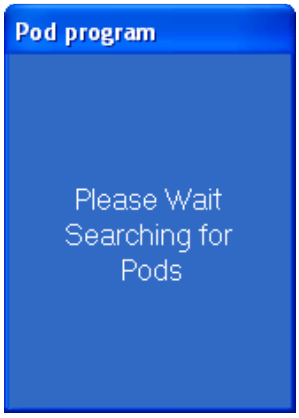


Fig 1

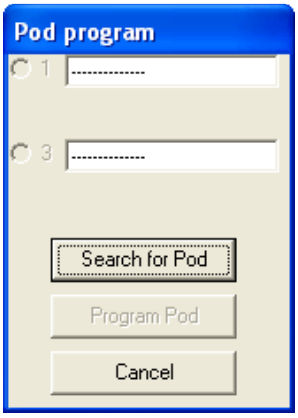
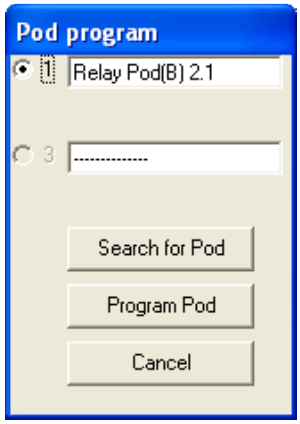


Fig 2



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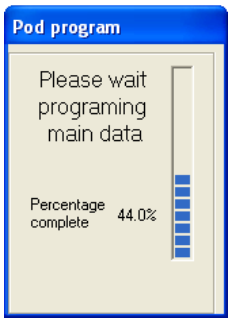


Fig 4

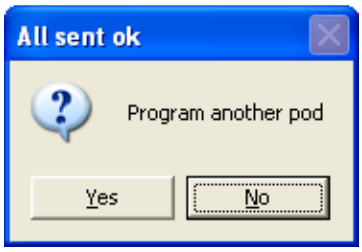
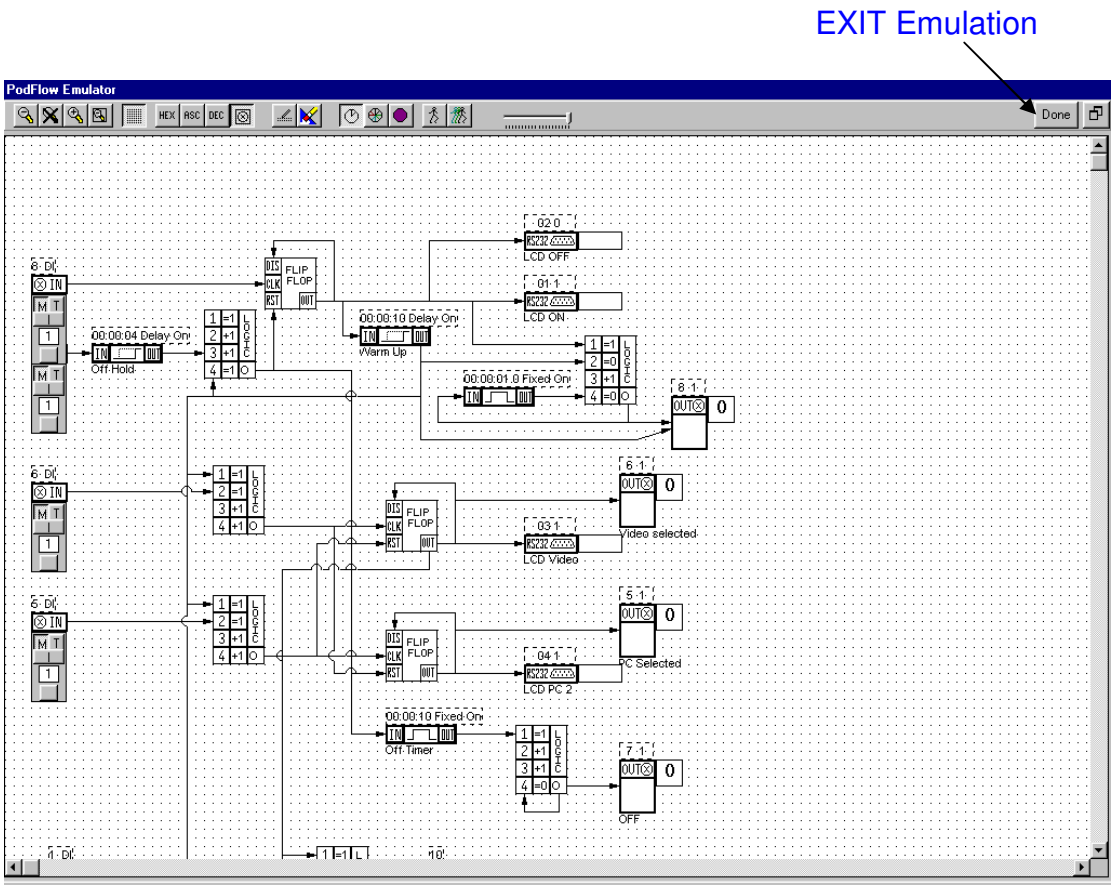


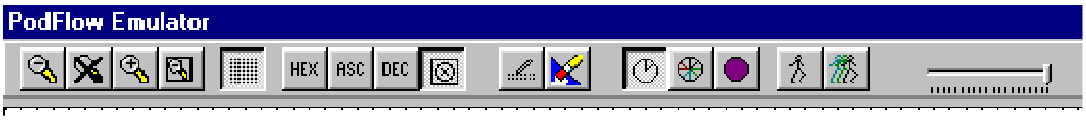
Fig 5

Emulation

The Emulation mode allows you to test your PodFlow configuration prior to loading into a Podule. Click on the Emulate icon on the toolbar to open the emulation.



Emulation Toolbar



Zoom & Grid | RS232 | Log | Timer Speed | Run | Emulation Speed

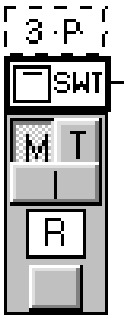
These operate as per the main PodFlow program.

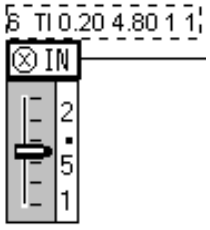
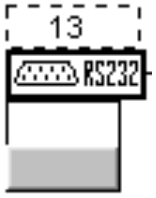
RS232	
	Select the format for RS232 messages.
	Shows devices as device image.

LOG  	RS 232 output events are logged during the emulation. Use to view and hide the log. Clear the log.
Timer Speed   	Use to speed up timer operation during emulation. Run timers in real time, (default setting). Run timers at x10. Run timers at x60, i.e. 1 min in 1 second.
RUN  	Start the emulation. Start the emulation running. Step through each operation manually.
Emulation Speed 	Allows the emulation to be slowed down. As shown emulation is at 100% speed. Slide to left to slow to 5% minimum.

Input Emulation

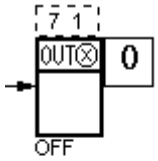
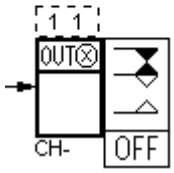
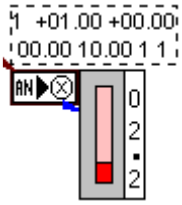
Each input has a set of controls to set the input state. These change between different types of inputs.

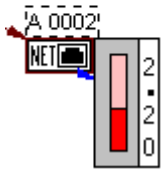
Digital Input & Digital PodNet Input 	When set for **M**omentary operation the **I**nvert button is available. The devices output is only high when the lower button is operated. If **I**nvert has been changed then the output is high until the lower button is operated. When set for **T**oddle the **I**nvert button is hidden and each operation of the lower button toddles the output status.

Analog Input & Analog Input 	If the Podule input is set for Analog, the push buttons are changed for a slider to emulate an input voltage between 0V and +5V. The numbers to the right of the slider show the current voltage, in this case 2.51V.
RS232 Input 	RS232 inputs are emulated by operation of the button below the symbol. When operated PULSE is displayed in the window above the button and the devices output pulses high.

Emulation Outputs

Each type of output device has it's own method of displaying the current status.

OC and Relay Outputs  	OC (Open Collector) outputs display their current status as a flag showing 0 for off and 1 for on. Outputs 1 also 2 also operate relays. For these outputs the status of the relay contacts is shown.
RS232 Outputs 	When an RS232 output is activated the message will be displayed to the right of the symbol. It is also logged.
Analog Outputs 	The Analog output emulation is displayed as a bargraph. The Red graph depicts the relative Analog level whilst the numbers reflect the actual level having accounted for any offsets and multipliers.

PodNet Outputs	
	Digital PodNet messages are shown with a ‘0’ or ‘1’ flag dependent upon their status.
	Analog PodNet messages are displayed as a bargraph and numeric value between 0V and 5.00V

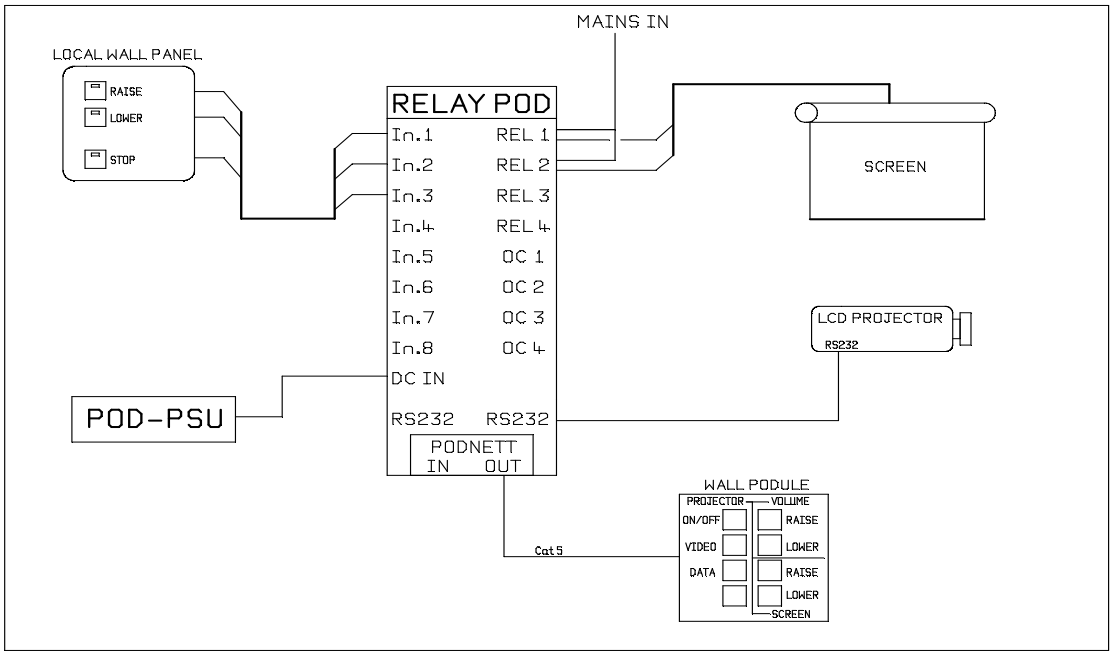
Running the Emulation

1. Zoom, maximise, turn on/off the grid etc. as per personal preference.
2. Set all inputs to the start condition, by default this is Momentary & Inverted.
3. Select RUN  .
4. Manipulate inputs as appropriate.
5. Change the emulation speed, timer speed etc if required.

Applications

Due to the highly configurable nature of Podules their possible applications are virtually infinite. Some possible applications are:-

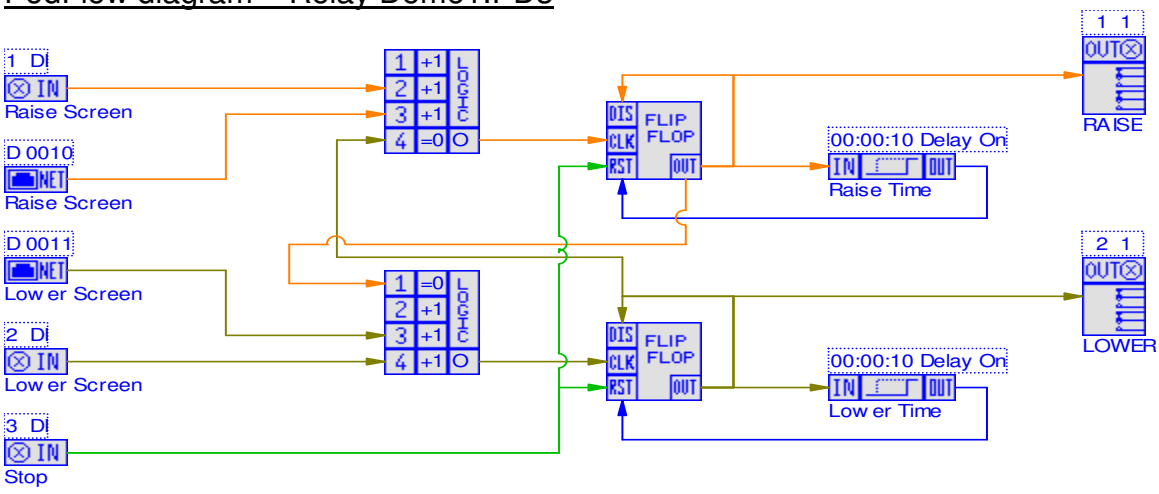
Control of Electric Screen & Projector



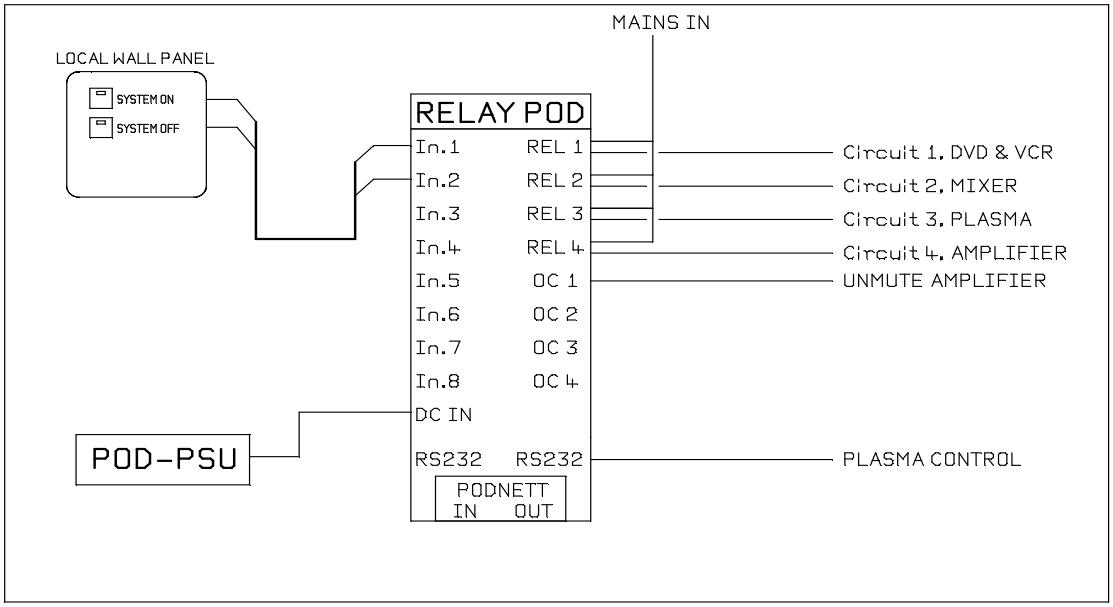
In the above example a **Relay Podule** is used to provide 240V power control over an electric screen as well as provide the RS232 control for the projector. The main system control is from a **Wall Podule** connected via the PodNet. This panel allows direct control of the screen as well as control over the projector. Typically the system would be programmed for automatic operation of the screen when the projector is turned on and off.

The local control panel is used for occasions when the projector is not required.

PodFlow diagram – Relay Demo1.PD3



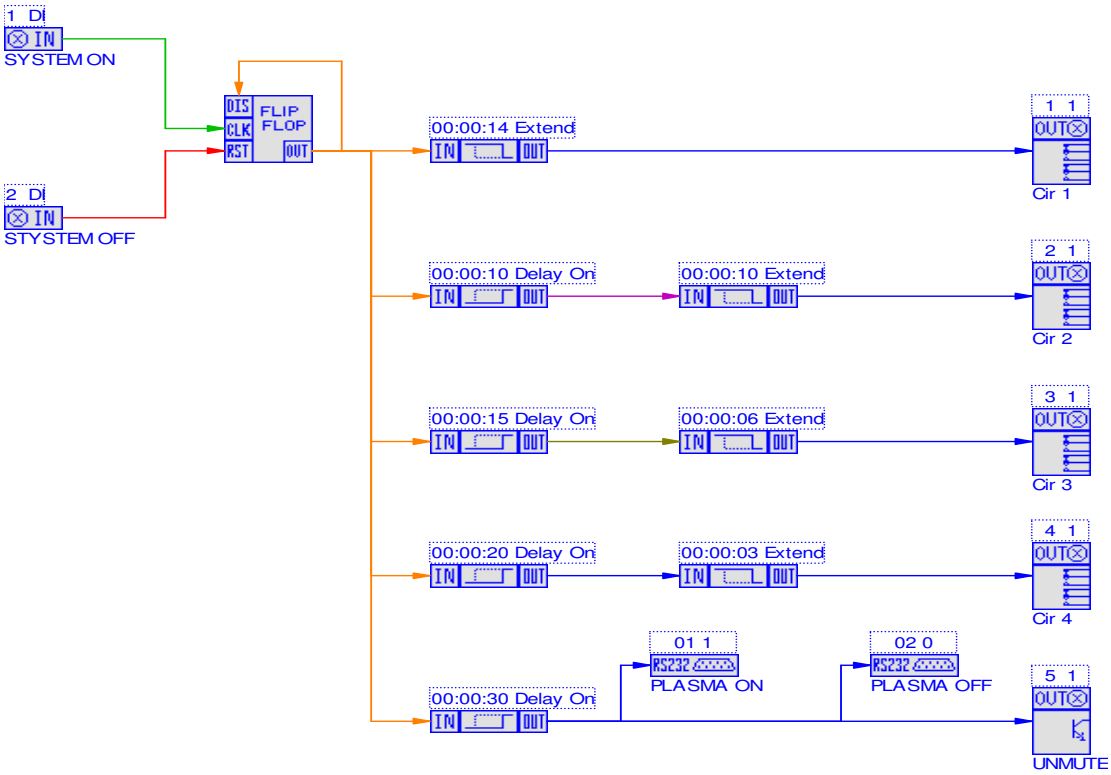
Power Sequencing



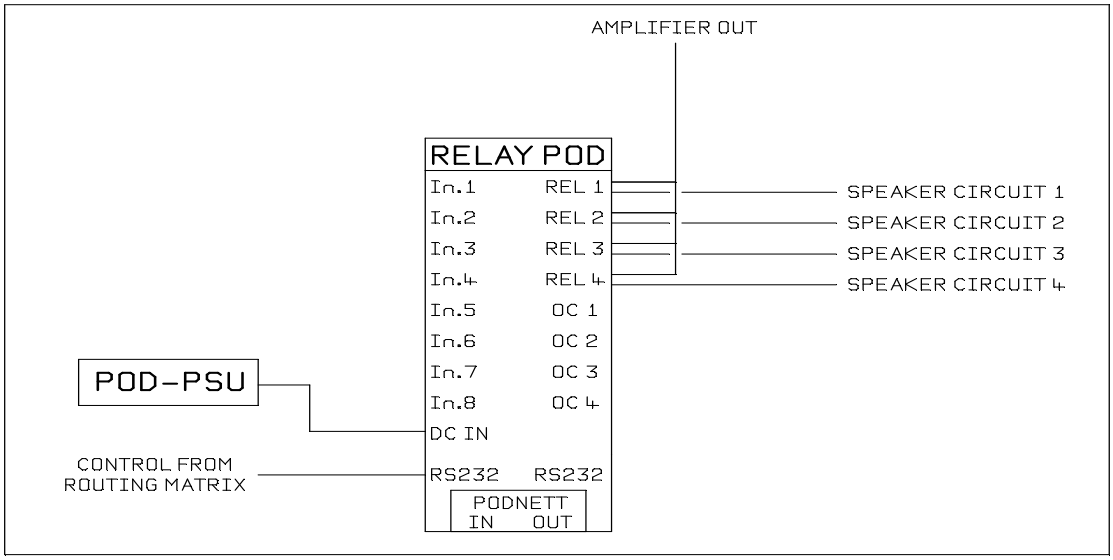
This application used the Relay Podule for On and Off power sequencing. Typically, once the 'System ON' push is operated the four mains circuits are operated in sequence to minimise inrush current. Once a further time delay to allow equipment to settle has elapsed the amplifier mute is removed and if required the Plasma Screen turned on.

On operation of 'System OFF' the reverse procedure is triggered.

PodFlow Diagram – Relay DEMO2.PD3

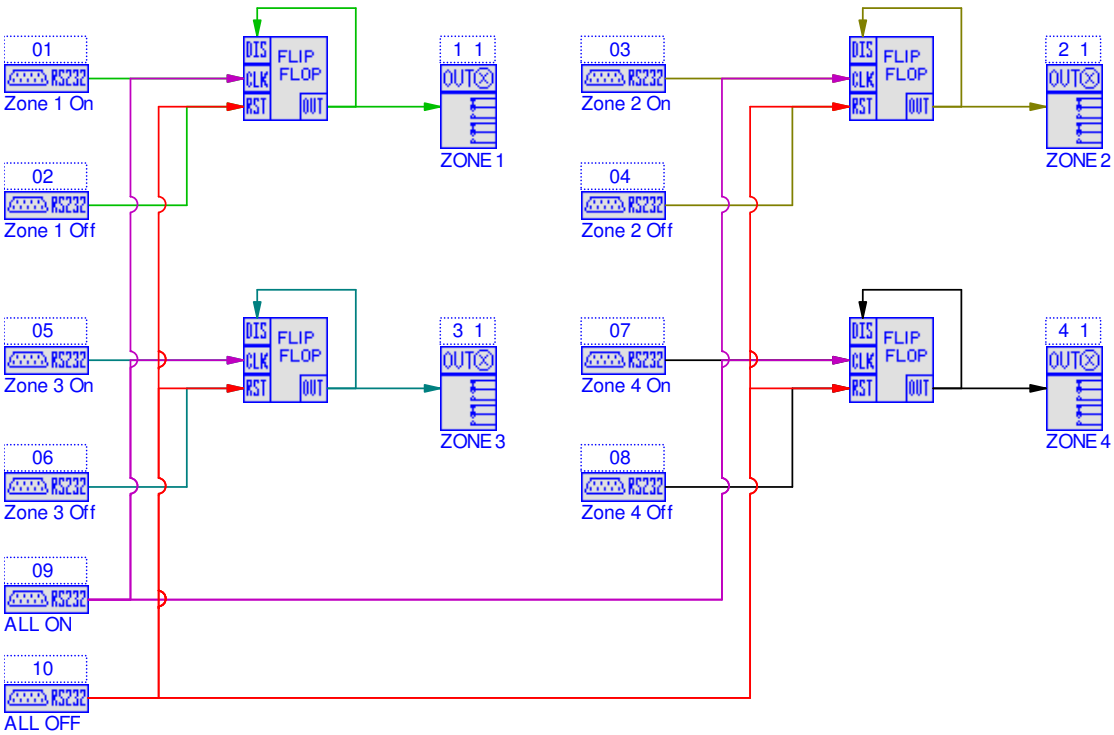


Loudspeaker Zoning



In a number of 100V line PA installations it is often necessary to route a paging message to one zone only or a combination of zones. In this application the remote control is via RS232 with this used to switch on and off zones via the **Relay Podules** internal relays.

PodFlow Diagram – Relay DEMO2.PD3



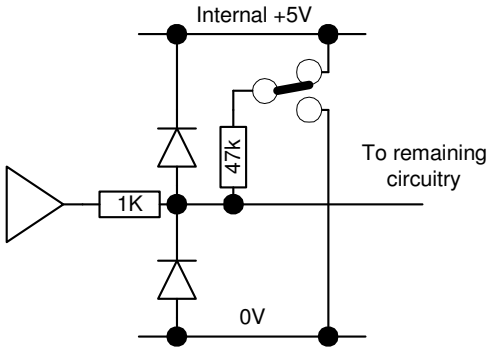
Appendix A

Input Configuration

Inputs

To protect the inputs from excessive voltages each input has 1k ohm input resistor and diode clamps to 0V and +5V. This clamp allows input levels to be between a max +/-10V. For digital inputs

1. Logic high is any voltage greater than +2.0V
2. Logic low is any voltage less than +0.7V



Analog inputs of between 0V and +5V, voltages outside this are effectively clamped to either 0 or +5V.

Each input is provided with a 47k ohm resistor; this can be configured as either a pull up (to +5V) or as a pull down (0V). (Default pull up)

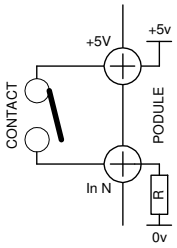
Debounce

Each input has a built in debounce of min 50ms to a max of 150ms depending on how complex the Podule project.

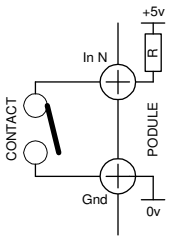
Input connection details

Typical connection details for digital inputs are

Active High

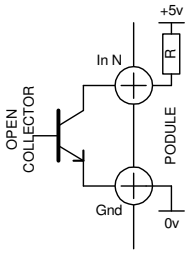


Active Low



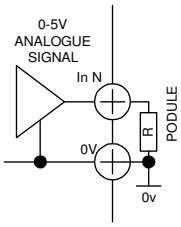
Pull up active

Open Collector

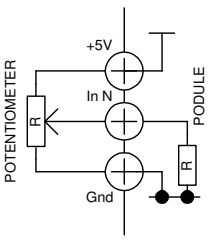


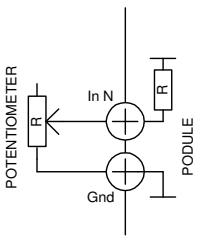
Pull up active

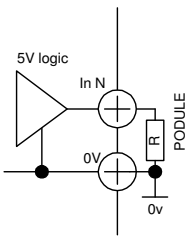
Analog Signal



Typical connection details for threshold/Analog inputs are







Pull up Active

Appendix B

Installing Podules

Mechanical installation and connecting of the Podule should be carried out before any power is applied. Podules should not be used in areas of extreme heat or moisture.

Din Rail Mounted Models

Podules are designed for mounting onto standard 35mm ‘top hat section’ din rails. The rail can be within a rack or control cubical or fitted to any suitable surface.

Refer to appendix D for connecting details. The use of bootlace ferrules on cables and finger trunking or similar for cable management is highly recommended.

Voltages over 50V

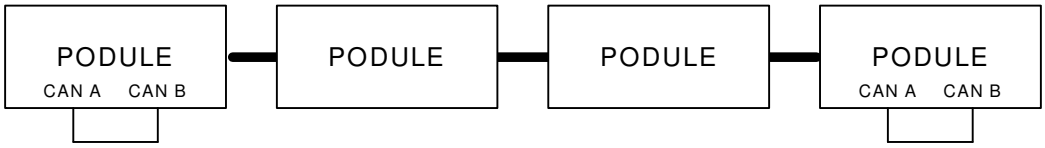
If using voltages over 50V on the relay terminals, it is recommended that the Relay Podule is housed in a secondary enclosure to protect the terminals for accidental contact. Suitable enclosures are availabel from Ikon AVS and its distributors or from most good electrical wholesalers.

Please refer to appendix E for important information when using voltages over 110V.

Powering Multiple Pods

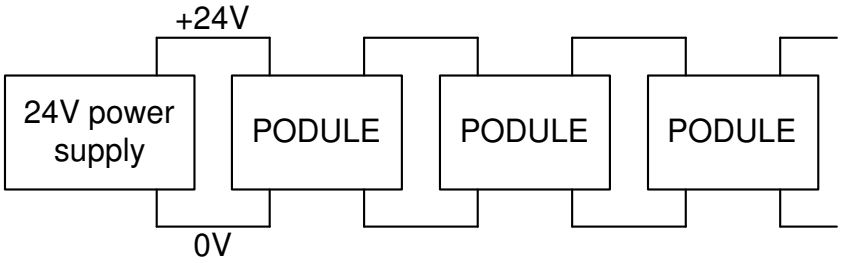
PodNet Buss

The PodNet bus uses RJ45 connectors and cat 5 cables. Each Podule is provided with two RJ45 connectors so that a simple daisy chain up to the maximum of 32 Podules can be created. The Podules at the extreme ends of the network must have their CAN A and CAN B terminals linked as shown below. On the 'R' series Podules this link is a push button.

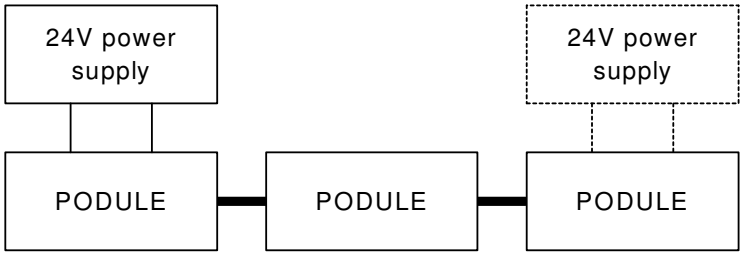


Power supply

All Podules operate from a 24V D.C. supply. Screw terminals, and / or a DC connector are provided on each Podule to allow easy daisy chaining, as shown below up to a maximum of 6, then another power supply needs to be added.



The 24V supply is also feed through the cat 5 PodNet network so only one Podule on the network needs to be connected to a power supply (See appendix C for current Consumptions.)



Appendix C

Relay Podule Specification

8 I/P 4 x Digital or Analog
4 x Digital
8 O/P 4 x Relays (Relays DPDT 240V AC, 110V DC, 8A),
4 x Open Collectors, 30V 100ma max.

1 Serial Port
Up to 24 Different O/P Strings (up to 32 Bytes Long)
Up to 24 Different I/P Strings (up to 32 Bytes Long)

2 PodNet Ports
Up to 32 messages in and out

Internal Devices
16 x Flip/Flops
8 x Timers
16 x Logical Gates
2 x Analog Pots

Power Requirements

Voltage 24V DC, 18V Min, 30V max.

Current Requirements

Quiescent current 80mA (inrush current 220mA).
Relay coil current 20mA each.
Open Collect current max 100ma each.
RS232 Tx, 12mA per port .

Mechanical Data

Wall Podule 105mm (W) x 90mm (H) x 60mm (D) excluding connectors.

Nett weight = 370g.

Appendix D

Pin out of DC Plug, RS232 & PodNet

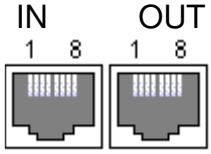
Programming Lead, PC to POD
Connection Details of "D" Type connectors

PC End	**POD End**
Female 9 way D	**Female 9 way D**
Pin 2	Pin 2
Pin 3	Pin 3
Pin 5	Pin 5
Pin 7	Pin 7

Podule RS 232 Pin OUT

Pin 2 Tx, Data O/P
Pin 3 Rx, Data I/P
Pin 5 Ground (0V)

PodNet Connector

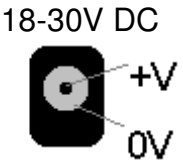


IN		OUT		RJ 45 Patch
Pin 1	24V In	Pin 1	24VOut	Orange
Pin 2	24V in	Pin 2	24V Out	Orange/white
Pin 3	N/C	Pin 3	N/C	Green/White
Pin 4	CAN H	Pin 4	CAN H	Blue
Pin 5	CAN L	Pin 5	CAN L	Blue/White
Pin 6	N/C	Pin 6	N/C	Green
Pin 7	0V	Pin 7	0V	Brown/White
Pin 8	0V	Pin 8	0V	Brown

CAUTION **DO NOT INTERCONNECT TO ETHERNET OR PERMANENT DAMAGE MAY OCCUR TO THE ETHERNET DEVICES.**

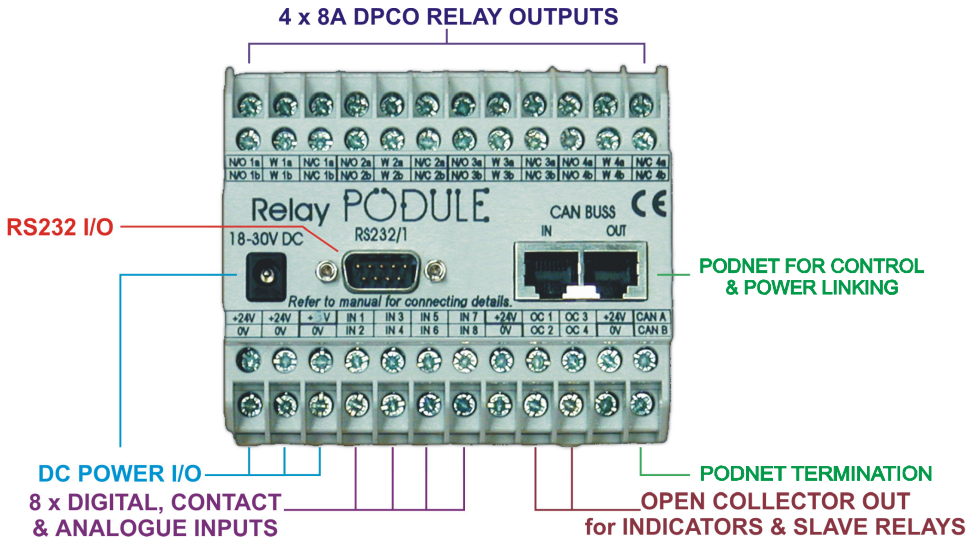
DC Connector

2.1mm Centre pin +V



Appendix E

Relay Podule - Screw Terminals



DC INPUT END of RELAY PODULE

	Lower	Upper				Upper	Lower	
	0V	**+24V**	IN		Relay 1	**NO1b**	**NO1a**	Relay 1
	0V	**+24V**	OUT		Relay 1	**W1b**	**W1a**	Relay 1
	0V	**+5V**	OUT		Relay 1	**NC1b**	**NC1a**	Relay 1
IN	**IN 2**	**IN 1**	IN		Relay 2	**NO2b**	**NO2a**	Relay 2
IN	**IN 4**	**IN 3**	IN		Relay 2	**W2b**	**W2a**	Relay 2
IN	**IN 6**	**IN 5**	IN		Relay 2	**NC2b**	**NC2a**	Relay 2
IN	**IN 8**	**IN 7**	IN		Relay 3	**NO3b**	**NO3a**	Relay 3
	0V	**+24V**	OUT		Relay 3	**W3b**	**W3a**	Relay 3
OUT	**OC2**	**OC1**	OUT		Relay 3	**NC3b**	**NC3a**	Relay 3
OUT	**OC4**	**OC3**	OUT		Relay 4	**NO4b**	**NO4a**	Relay 4
	0V	**+24V**	OUT		Relay 4	**W4b**	**W4a**	Relay 4
	CAN B	**CAN A**			Relay 4	**NC4b**	**NC4a**	Relay 4

IMPORTANT

Relays may be connected and used as double pole only up to 110V AC/DC. For voltages in excess of this, i.e. UK mains of 240V AC, the relays should only be used as single pole utilising the ‘a’ set of contacts.

When connecting external motor or similar loads the use of contact suppression is recommended.

Electromagnetic Compatibility

This equipment has been designed, manufactured and tested to conform to the European EMC directives EN55103-1 & EN55103-2 for classifications E2 and E4.

Limitations as to use: The specified equipment is not to be mounted adjacent to RF transmitting or receiving equipment.

Manufacturers Information

The RELAY PODULE is manufactured in England by Nebula Audio Ltd.

For service or warranty advice please initially contact your supplier. Alternatively contact the manufactures at:-

Nebula Audio Ltd
40 Saint Dunstans Close
Worcester
Worcestershire
WR5 2AJ

Telephone: +44 (0) 1299 250991

Website www.ikonavs.com

Technical support e-mail

support@ikonavs.com

Document Issue Number RPM V1021