



Genesis Electronics Australia Pty Ltd

www.genesiselectronics.com.au

info@genesiselectronics.com.au

Australian Owned, Designed and Manufactured



Distributed By:-



Genesis reserves the right to change or modify products without notice.

This manual assumes installers of this product are professionals within the electronic security, access control and automation industry. As such, knowledge of these industries on the part of the installer is assumed.

Genesis takes no responsibility for any damage, financial loss or injury caused to any equipment, property or persons resulting from the correct or incorrect use of any Genesis devices.



16-Input Expander Unit GEN-010



TECHNICAL MANUAL



V4 – EU Manual, November 2005
Revision - 1.0
Genesis Electronics Australia Pty Ltd
www.genesiselectronics.com.au
info@genesiselectronics.com.au

16 Input Expander

The GEN-010 16-Input expander unit provides 16 inputs plus 4 auxiliary outputs, and a separate tamper input. For additional input expansion, the unit also supports the GEN-020 I/O expander module GEN-020 that expands to an additional 16 inputs and 4-relay outputs. The built-in 1 Amp power supply also incorporates sealed led-acid battery charging.

The expander provides four state DEOL monitoring per input to ensure the highest level of security is achieved. The ability to specify up to 16 selectable end of line resistor values make it incredibly simple to upgrade existing sites.

Each input is totally configurable. It could be an alarm point that triggers the dialer, it could control the air conditioning or the lights. Scripting makes it possible to use any input to control any output, area, dialler or even control other inputs.

The four programmable high-current outputs are primarily intended for strobes and sirens but are totally programmable for any other application.

The device provides a cost effective method of expanding a system over the 2-wire RS485 LAN network that can expand up-to 1500m from the master panel.

NOTES

[illegible]

I/O Expansion Unit:

	Description	Sector	I	T	Area List	Script
17						
18						
19						
20						
21						
22						
23						
24						
25						
29						
27						
28						
29						
30						
31						
32						

I = Inverted (blank = normally closed, Y= normally open)
T = tamper monitored

Table of Contents

<u>TABLE OF CONTENTS</u>	<u>3</u>
<u>PARTS CHECKLIST</u>	<u>4</u>
<u>SPECIFICATIONS</u>	<u>5</u>
<u>POINTS TO NOTE</u>	<u>5</u>
<u>FEATURES AND BENEFITS</u>	<u>6</u>
<u>INPUT LAYOUT AND WIRING</u>	<u>8</u>
<u>POWER SUPPLY AND OUTPUT LAYOUT</u>	<u>9</u>
<u>EXPANDER UNIT PCB</u>	<u>10-11</u>
<u>MOUNTING</u>	<u>12</u>
<u>MOUNTING</u>	<u>11</u>
<u>SYSTEM LAYOUT</u>	<u>13</u>
<u>GENESIS LAN</u>	<u>14-15</u>
<u>RS-232 CONECTION</u>	<u>16</u>
<u>EOL RESISTOR VALUES SAMPLES</u>	<u>17-18-19</u>
<u>INPUT / OUTPUT DETAILS</u>	<u>20-21-22</u>

Parts Checklist:

- 1 x Expander Unit (GEN-010) in Metal Equipment Cabinet (HDW-001)
- 1 x 16 volt AC, 1.5 Amp Plug Pack
- 1 x Pair of Battery Leads
- 16 x 10K Resistors (1% Tolerance)
- 16 x 4.7K Resistors (1% Tolerance)
- 23 x 2 pin Terminal Blocks
- 2 x 3 pin Terminal Blocks
- 1 x 2 pin jumper
- 1 x Expander Unit – Technical Manual (this manual)

Caution: All Genesis devices are electrostatic sensitive devices. As such, all care should be taken to ensure appropriate procedures are in place when handling and installing Genesis devices. This may include, but is not limited to wearing an appropriately earthed, conductive wrist strap – to limit electrostatic discharge into Genesis devices.

Input information:

	Description	Sector	I	T	Area List	Script
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						

I = Inverted (blank = normally closed, Y= normally open)
T = tamper monitored

16-Input Expander:

Serial number	
Address	
Location	
Installation date	

Outputs	Description/Location
Siren 1:	
Siren 2:	
Strobe 1:	
Strobe 2:	
Buzzer:	
Auxiliary 1	
Auxiliary 2	
Auxiliary 3	
Auxiliary 4	

Specifications:

Dimensions (H x W x D):	GEN-010 PCB = 152 x 150 x 50 mm HDW-001 box = 442 x 305 x 78 mm
Processor:	16 bit microprocessor
Memory:	256k ROM and 20k RAM
Input Voltage:	16v AC
Battery Voltage:	12v DC
Standby Current Draw:	80mA

Outputs

Fixed:	2 x 12v DC, 1 Amp maximum – fused and monitored outputs
Programmable:	4 x 12vDC, 1 Amp maximum fused and monitored transistor outputs
Piezo Buzzer:	Programmable on-board Piezo Buzzer

Inputs

Programmable Inputs	16 x four state, tamper monitored inputs
Fixed Inputs	1 x onboard tamper input

Expansion

	With GEN-020 I/O Expander
Inputs	Additional 16 (totalling 32)
Outputs:	Additional 4 (totalling 8)

Points to Note:

DO NOT common the 0v DC, or +12v DC, of power supplies and Genesis devices.

Removal of the Serial Number from any Genesis device will immediately void any warranty applicable to it, or any interconnected Genesis device.

Features and Benefits:

The Genesis Expander Unit (EU) has the same functions as the Genesis Master Unit, with the exception being the on-board dialler.

Designed to expand the system up to 512 four-state monitored inputs, through it's two-wire RS-485 high-speed LAN network, it can be installed up to 1500m from the master panel.

Each Expander Unit has 16 four-state monitored inputs and four fused auxiliary outputs, ideal for sirens and strobe lights. The outputs can be configured for any chosen automation functions.

With a 16-input I/O Expander board connected, the Expander Unit can provide up to 32 inputs and an additional four auxiliary relays. The I/O Expander fits neatly in to the same cabinet as the Genesis Expander Unit.

Each alarm input provides four-state end of line monitoring with the option of selecting 16 different resistor values providing additional security and the flexibility of selecting site unique resistor values.

The selectable resistor values also provide flexibility for expanding or retro-fitting existing systems.

The Expander Unit provides an on board RS-232 port, allowing for connection to a local PC, or other third party RS-232 device.

Sample EOL Resistor Values on MU & EU:

3K3/3K3 – N/C	3K3=Sealed	6K6=Unsealed
		Genesis ADC Values
	Tamper High	135
	Tamper Low	72
	Unsealed High	85
	Unsealed Low	72
3K3/3K3 – N/C	3K3=Sealed	1K7 = Unsealed
		Genesis ADC Values
	Tamper High	135
	Tamper Low	72
	Unsealed High	135
	Unsealed Low	110
10K	Single EOL	
		Genesis ADC Values
	Tamper High	255
	Tamper Low	0
	Unsealed High	165
	Unsealed Low	140
6K8	Single EOL	
		Genesis ADC Values
	Tamper High	255
	Tamper Low	0
	Unsealed High	135
	Unsealed Low	110
4K7	Single EOL	
		Genesis ADC Values
	Tamper High	255
	Tamper Low	0
	Unsealed High	110
	Unsealed Low	85
3K3	Single EOL	
		Genesis ADC Values
	Tamper High	255
	Tamper Low	0
	Unsealed High	95
	Unsealed Low	60
2K2	Single EOL	
		Genesis ADC Values
	Tamper High	255
	Tamper Low	0
	Unsealed High	70
	Unsealed Low	50
1K	Single EOL	
		Genesis ADC Values
	Tamper High	255
	Tamper Low	0
	Unsealed High	35
	Unsealed Low	25

Sample EOL Resistor Values on MU & EU:

10K/4K7 – N/C	10K=Sealed,	14K7=Unsealed
		Genesis ADC Values
	Tamper High	180
	Tamper Low	140
	Unsealed High	165
	Unsealed Low	140
10K/4K7 – N/O	14K7 = Sealed	10K = Unsealed
		Genesis ADC Values
	Tamper High	180
	Tamper Low	140
	Unsealed High	180
	Unsealed Low	165
Short Circuit	Short = Sealed	Open = Unsealed
		Genesis ADC Values
	Tamper High	255
	Tamper Low	0
	Unsealed High	20
	Unsealed Low	0
Open Circuit	Open = Sealed	Short = Unsealed
		Genesis ADC Values
	Tamper High	255
	Tamper Low	0
	Unsealed High	255
	Unsealed Low	25
10K/10K – N/C	10K = Sealed	20K = Unsealed
		Genesis ADC Values
	Tamper High	200
	Tamper Low	140
	Unsealed High	165
	Unsealed Low	140
10K/10K – N/O	10K = Sealed	5K = Unsealed
		Genesis ADC Values
	Tamper High	165
	Tamper Low	85
	Unsealed High	165
	Unsealed Low	140
2K2/6K8 – N/C	2K2= Sealed	9K = Unsealed
		Genesis ADC Values
	Tamper High	160
	Tamper Low	50
	Unsealed High	76
	Unsealed Low	50
2K2/6K8 – N/O	9K = Sealed	2K2 = Unsealed
		Genesis ADC Values
	Tamper High	160
	Tamper Low	50
	Unsealed High	160
	Unsealed Low	135

Input Layout and Wiring:

16 Input Terminals, with individual common returns are supplied on the Genesis Expander Unit.

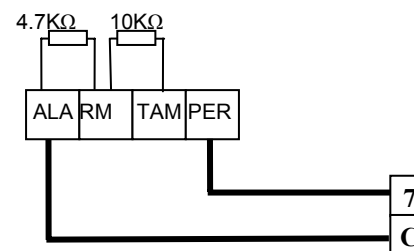
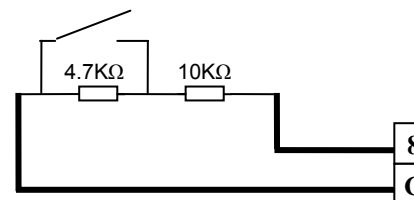
The Genesis Expander Unit allows for each input to have a different End of Line resistor value. (up to 16 EOL values). This includes tamper monitoring, through Dual End of Line resistors.

The Genesis panel is supplied with the following resistor combination as standard:

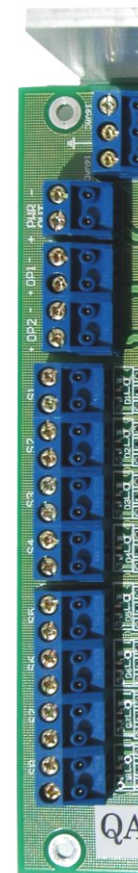
10KΩ = Sealed

14.7KΩ = Alarm

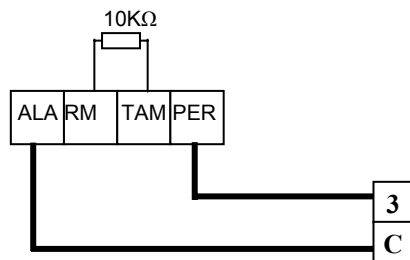
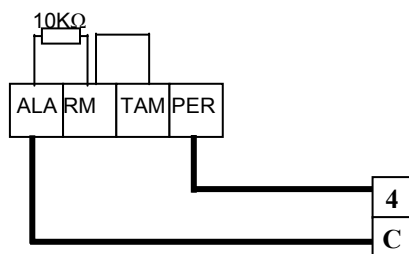
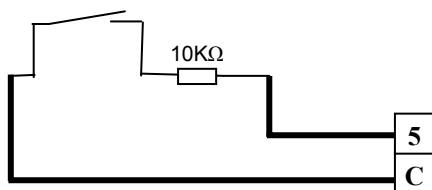
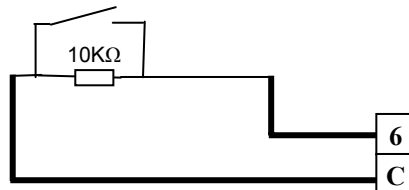
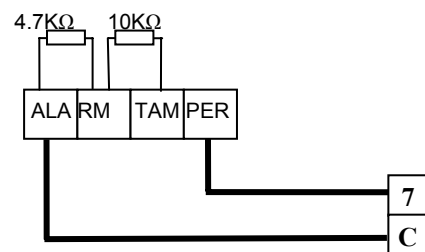
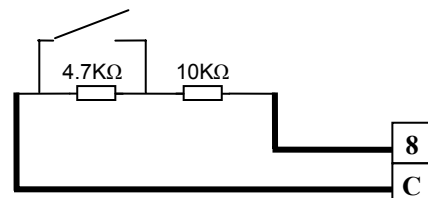
(10KΩ + 4.7KΩ)

Example 7 – Smoke Detector – Dual EOL, Normally Open**Example 8 – Switch – Dual EOL, Normally Open**

- 1 C
- 2 C
- 3 C
- 4 C
- 5 C
- 6 C
- 7 C
- 8 C

**Note:**

Inputs 9 to 16 are mirrored on the right hand side of the Expander Unit

Input Wiring:**Example 3 – PIR – Single EOL, Normally Closed****Example 4 – Smoke Detector – Single EOL, Normally Open****Example 5 – Switch – Single EOL, Normally Closed****Example 6 – Switch – Single EOL, Normally Open****Example 7 – Smoke Detector – Dual EOL, Normally Open****Example 8 – Switch – Dual EOL, Normally Open****Note:**

These examples are for the purpose of illustrating the most commonly used input wiring configurations. Different detection devices may require wiring in a different fashion to these examples.

EOL Resistor Values

The following tables list approximate EOL resistor values for several common EOL Resistor combinations.

Please note that it is possible for the EOL resistor values to vary, depending on the % tolerance of the resistors used. It is recommended to use 1% tolerance resistors, which will allow for any tolerances in the Genesis ADC values to be reduced.

Remember, one of the strengths of Genesis is that it can greatly reduce the chances of having resistors replaced by an intruder. This feature is governed by the relationship between the unsealed value and the tamper value. You need to ensure that any resistor replacements in a Genesis System cause a tamper alarm – if possible.

These values are provided as a starting point only. Please ensure that any inputs are fully tested and commissioned before leaving the EOL values in place.

Please note:

Genesis MU and EU devices use different EOL values to the egress inputs and door monitoring inputs on the RAS or TDC devices. Ensure that you use the correct EOL value with the correct device. EOL values table for the RAS and TDC are located in their respective Technical Manuals.

RS232 Connection:

PC INTERFACE CABLING REQUIREMENTS

This page provides information for installing and connecting the cable between the Genesis Master Unit and the Client PC for the purpose of front-end software. (IE.Genie, Aladdin)

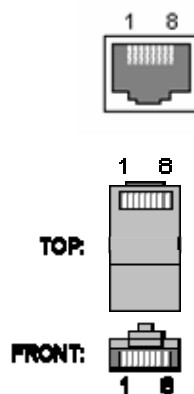
RS-232

RS-232 communication is used between a master unit and a PC, modem and/or Ethernet RS-232 is a point-to-point protocol; it will only support two devices. It is not designed to be run over long distances, the official specification is for a cable run between two devices to be less than 10m. In reality it can be run up 50 metres but is not recommended.

RS-232 should not use twisted pairs. The close twisting of the signals can cause crosstalk and interrupt the communication.

If shielded cable is used, the ground signal is not to be used for the shield. The ground signal is actually 0v and is critical to the clean reception of the data. The ground should be a signal within the shielding. The shield should be connected to a true ground and at one end only.

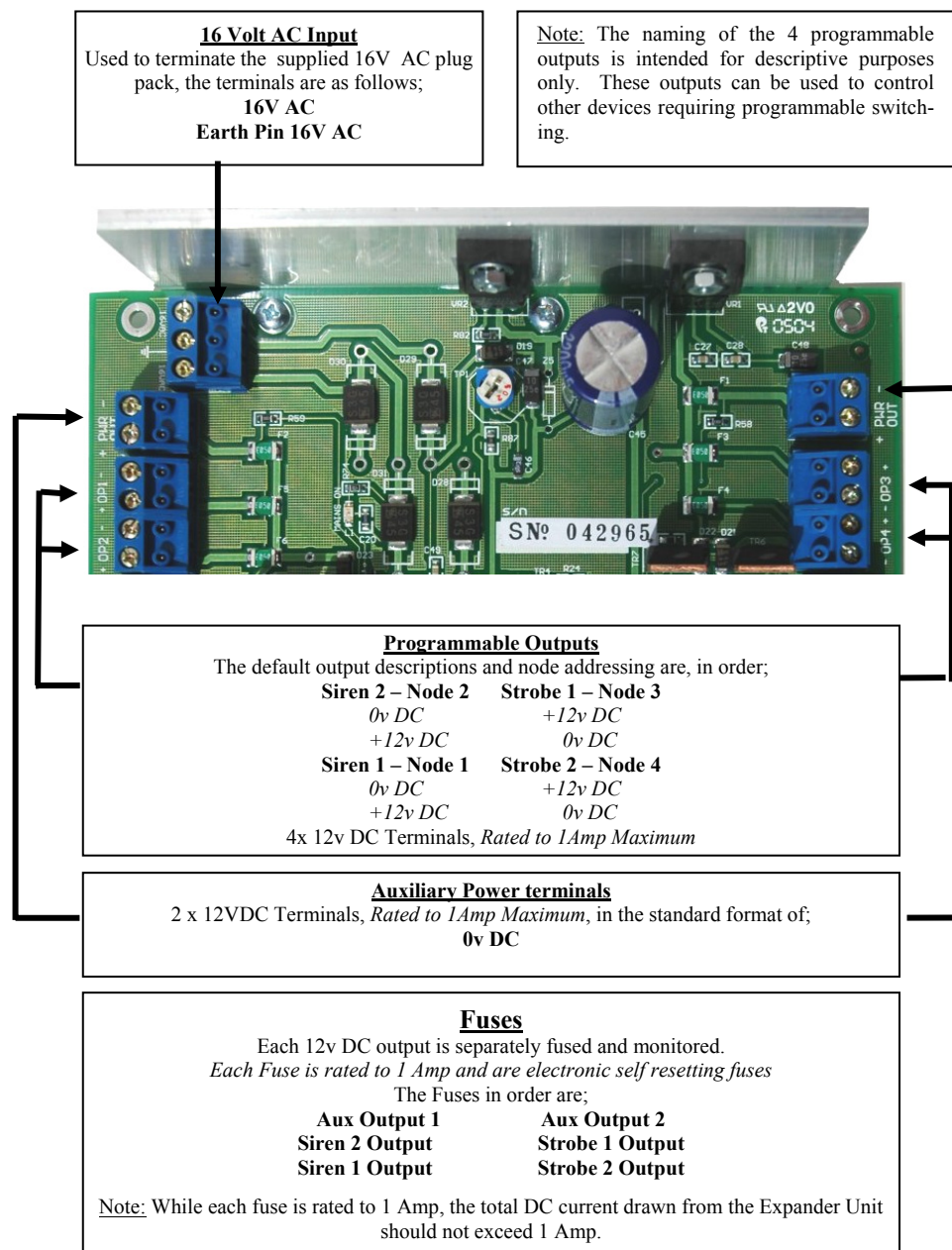
RJ45 Pin	Colour (std)	Description	DB9 Pin
1	Green/White	N/C	
2	Green	DTR	4
3	Orange/White	N/C	
4	Blue	RxD	2
5	Blue/White	TxD	3
6	Orange	Gnd	7
7	Brown/White	CTS	5
8	Brown	N/C	



CONNECTION TABLE:

This table provides details between the Master Panel and RJ-45 socket and the PC DB9 comport.

Power Supply and Output Layout:



Expander Unit PCB:**RS-232 PORT**

Use to allow connection to User Interface Software, or other third party device driven by RS-232. Only available for use if enabled in Genesis Technician Software.

Piezo Buzzer

Fully programmable piezo buzzer is supplied on the Genesis Expander Unit.

**LAN TERMINALS:**

The **A** and **B** LAN terminals are designed for the Genesis LAN to be terminated into. The **A** and **B** lines must *always* be connected to the **A** and **B** terminals on other Genesis devices. The shield (**SHLD**) terminal has been supplied to secure the cable shield only. Please refer to page 12 for further information on the Genesis LAN.

12V DC battery terminals

Connect to terminals as follows;
+12V DC
0V DC

Note: Reversal of battery terminals

TAMPER INPUT:

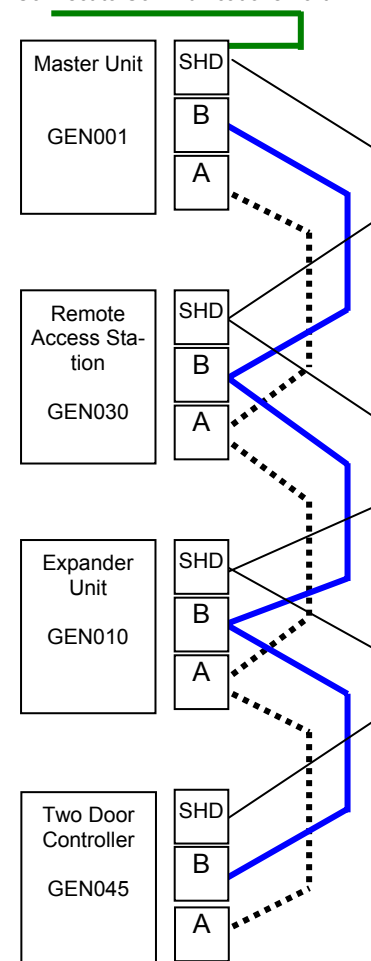
Provided to allow normally closed connection of a cabinet tamper switch to this device.

I/O EXPANDER BUS

This 16 pin socket is provided for connection between the GEN-010 Expander Unit and the GEN-020 I/O Expander. The I/O Expander provides an additional 16 system

Genesis LAN (cont.):

Connect to Communications Earth



The Master Unit *must* always be the first device on the LAN. This device is factory fitted with a 180Ω LAN Termination Resistor.

The shield from the LAN cable should run the length of the LAN, and should be connected to a *communications earth*, at the *Master Unit only*.

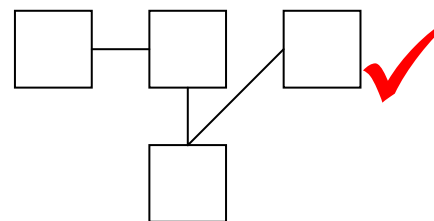
The shield terminals on each device are for connection of shield cables, and do not connect to the device proper in any way

Up to 127 additional Genesis devices in total can be connected to the Genesis LAN, across a total LAN length of *up to* 1500 meters.

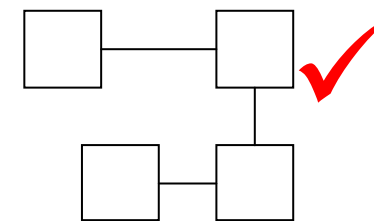
The *last* device on the Genesis LAN *must* be fitted with its termination link. This link fits a 180Ω resistor to the last device on the LAN.

No other devices should have a termination link fitted. If connected as described above, the LAN should have an impedance of approximately 90Ω , plus the resistance of the LAN cable. *Don't test LAN impedance with any devices powered up.

Ensure the cable shield is *not* connected to any ground or to any voltage on any device and that the cable shield is only connected to a commu-



Correct LAN configuration



Correct LAN Configuration

Genesis LAN:

Genesis uses industry standard *RS-485 LAN* communication to ensure fast efficient network communication between devices. The Genesis LAN operates at a communication speed of *19,200 baud* between up to *128 devices* over a total LAN distance of up to 1500 meters.

In order to ensure that a high level of performance is achieved, it is necessary to connect the Genesis LAN in the recommended method.

To this end, it must be twisted pair data cable that is used for the Genesis LAN. Belden 8723 (RS-485) cable, *or equivalent* is recommended.

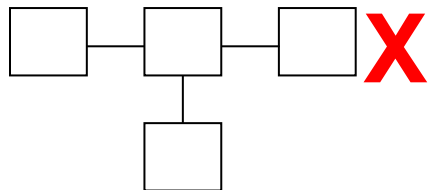
A standard must be applied when wiring from one LAN leg to another. For example, the A leg on a Master Unit must always be connected to the A legs on other Genesis devices, while the B leg must always be connected to the B legs on other Genesis devices.

A very common communication problem is where the A and B lines are reversed.
If this occurs, then some devices may appear on-line, while others are off-line.

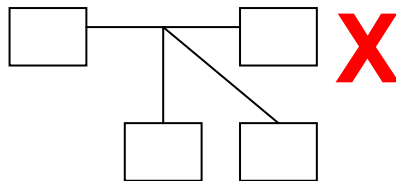
The Genesis LAN is an industry standard multi-drop RS-485 configuration.

Do Not Tee Off, or **Star** configure your LAN. For STAR configuration please refer to information on GEN-129 4-way LAN distribution module.

While the LAN may function in these configurations, Genesis cannot guarantee proper LAN performance.



Improper Star Configuration



Improper Tee Off Configuration

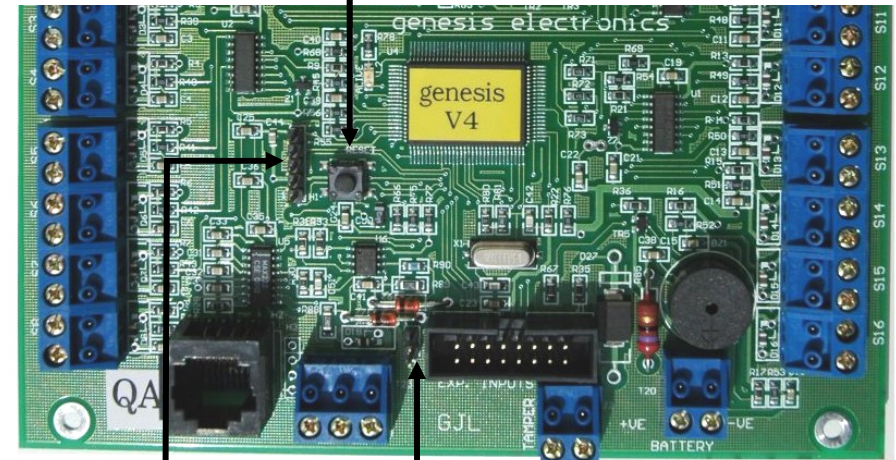
Expander Unit PCB:

RESET BUTTON

Used when generating a hardware reset to the device processor. Use only under instruction from your Genesis Distributor.

SERIAL NUMBER

Each Genesis device is fitted with it's own unique Serial Number. This number will need to be entered into the Genesis Master Unit, via the technician software, before the device will come on line.



PROGRAMMING HEADER

The programming header is supplied to allow easy *flash* upgrading to any future Genesis features. Please contact your distributor for more details.

H4 – LAN TERMINATION LINK:

The LAN Termination Link should only be fitted on the last device on the Genesis LAN. Please refer to page 12 for further information on the Genesis LAN.

Mounting:

The Expander Unit is supplied in a HDW-001, metal equipment cabinet. Using this cabinet, it is possible to mount the Genesis Expander Unit, as well as three other small Genesis devices (Two Door Controller, 32 Output Open Collector Module, 8 Relay Output Module or I/O Expander).

Avoid installing the Expander Unit outdoors.

Avoid installing the Expander Unit where it may be exposed to moisture, either directly (Rain, Sprinklers, Hoses), or by condensation.



System Layout

