Innovation in the
Multi-Screen World

User Manual

Sirius 600

Medium-scale router offering a mix of AES, SDI, ASI and HD and 3G signals in one frame

Contents

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1. Introduction

The Sirius 600 range consists of four self-contained, multi-format, multi-level signal routers with a maximum size of 512 x 512. The use of a generic broadband crosspoint has given the Sirius 600 range the ability to pass any digital signal type, up to and including 3D-SDI, through the same crosspoint matrix. Input and output processing is performed by modular, signal specific, Input/Output cards. Standard input and output cards have eight signal paths, and are available in SD-SDI, HD-SDI and 3G-SDI and AES audio formats. The system is further enhanced by the addition of video and audio ADC and DAC cards, enabling full analogue/digital conversion as required.

The Sirius 600 range includes four sizes of chassis, each offering specific maximum router configurations, but using the same input and output cards, and thereby offering efficient and cost effective upgrade paths. The Sirius 600 range may be summarized as follows:

- Sirius Gold (39U): Maximum of 512 x 512 (up to HD-SDI rates)
- Sirius 630 (16U): maximum 256x256 using four 256x64 crosspoint cards
- Sirius 620 (7U): maximum 128x128 using four 128x32 crosspoint cards
- Sirius 610 (4U): maximum 64x64 using two 128x32 crosspoint cards

The Sirius 610 (4U) frame can offer:

- between 128x1 and 64x64 (increments of 8) routing, all signal types

The Sirius 600 series design philosophy provides a solution for systems undergoing an analogue to digital, or SDV to HDTV transition, and provides the platform for an array of modular enhancements and options. The Sirius 600 product range includes:

- SDV crosspoint modules, for cost effective routing up to 360Mb/s
- HDTV crosspoint modules, for routing all digital signals up to 3 Gb/s

Sirius 600 series uses the Snell Nebula control system, common to many Snell routers, allowing the direct connection of up to 32 control panels or Under Monitor Displays to the chassis. The user may select a pre-configured database to get the system up and running, or use a Windows based editor to customize the router to their own specific requirements. Nebula also allows the configuration of crosspoint salvoes, route protects and inhibits, multi-level operation and connection to Snell's Aurora router controller. The Sirius 600 chassis may control other Sirius 600, Freeway or Halo routers as slave systems using a control bus expansion connection, although an existing Freeway cannot control any Sirius 600 router.

Sirius 600 has been designed with true input and output monitoring available as an option. Additional modules have analogue and digital, video and audio outputs, such that any input or output may be accessed, on both video and audio levels within a single frame.

1.1 Design Features

Sirius 600, despite it's innovative design, has many of the features associated with Snell's hardware products, giving it a robustness and ease of maintenance essential in critical signal applications. All modules are 'hot-pluggable'; surge suppression circuitry, and phased power-up allow quick and safe module swapping, this is further aided by the retention of crosspoint and configuration data in non-volatile control card memory. All modules are addressed by their position in the frame, rather than by jumper settings, and the careful consideration of power routing and driver voltage levels ensures that mis-plugged modules are not damaged.

If dual control cards are fitted; crosspoint, configuration and database information is synchronized between the two cards. Changeover is automatic in the event of failure, and the tri-state buffering of all control signals ensures that changeover is also transparent to both the internal and any external systems.

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All the frames are non-expandable, therefore there is no requirement for signals to be bussed or 'rippled' through crosspoint cards, all signals are routed point to point, using discrete buffering, thereby maintaining signal integrity and quality. This approach also allows the router to be part equipped or 'partitioned' with no loss of functionality. A further advantage of maintaining a short, quality, signal path is that the re-clocking of digital signals on the output stage, usually a necessity on traditional routers, is no longer an essential requirement. Because some of the digital signal types currently used do not necessarily benefit from re-clocking, a full specification, non-re-clocking router is a distinct advantage. This allows the user to opt for non-re-clocking outputs without degrading the system specification, and at the same time providing a cost-effective and signal-independent solution.

The Sirius 600 video router operates in a mixed standard environment, providing both 525 and 625 line references are supplied to the frame, ensuring SMPTE RP168 compliant switching between sources of the same standards. The Sirius 600 audio router is designed to work with mixed stereo and mono channels, where the necessary combining and switching is applied at both the input and output stages, for both the analogue and digital formats. The audio signal mode of each channel may either be stored in the database, or configured dynamically from a standard master control panel.

The dual redundant power supply units only supply 48 volts, all modules convert this to the required levels locally, which not only makes the power routing simple, but provides thorough power rail de-coupling between modules.

1.2 Sirius 600 User Manuals

Sirius 600 is a modular product with an unknown number of permutations of router configuration, a single user manual for all users is not possible. What each user will receive is a core manual, giving general information for the Sirius 600 frames, control card configuration details and database information. They will also be supplied with supplement user manuals describing each crosspoint, input and output module currently available. Finally, the Nebula User Guide will also be supplied, along with the database editor software, allowing the user to configure the system to their own requirements. Module upgrades and additions will only affect the appropriate supplements, and simplify the documentation process.

General information on Snell products is now contained in a separate user manual, detailing warranty, customer support and EMC compliance data.

In summary, the following user manuals are available:

- Sirius 600 user guide: Sirius Gold (39U), Sirius 630 (16U), Sirius 620 (7U), Sirius 610 (4U), control module and database
- Nebula User Guide
- Sirius 600 Crosspoint Cards
- 3G Crosspoint Cards
- Sirius 600 SDI Input/Output cards
- Sirius 600 Audio Converters
- Sirius 600 AES Input/Output cards
- Sirius 600 Video Converters
- Sirius 600 Monitoring
- Sirius 600 HD Input/Output cards
- Sirius 600 3G Input/Output Cards
- General Information for Snell products

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2. Quick Start Guide

2.1 Router Configuration

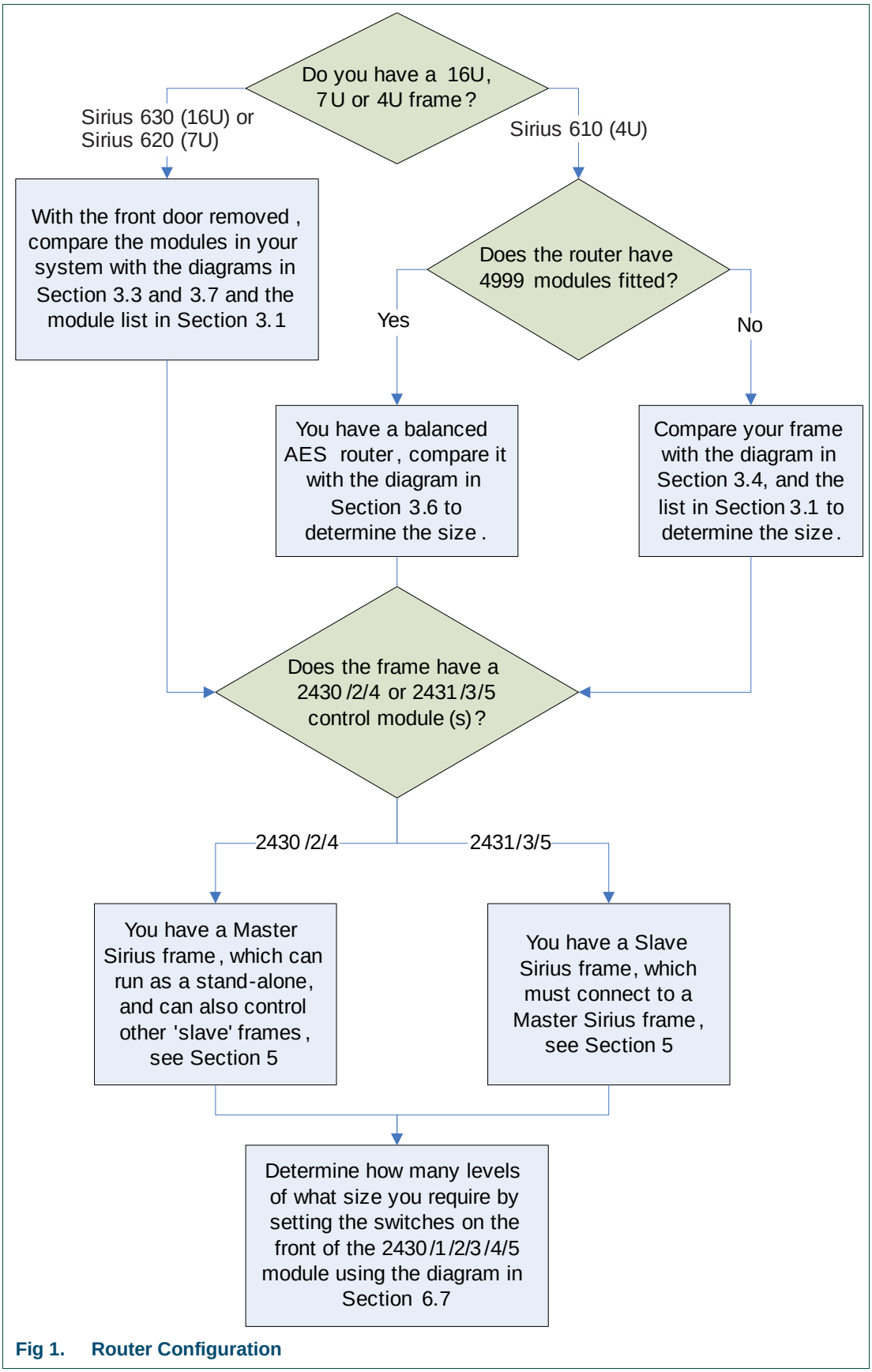

Fig 1. Router Configuration

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2.2 Sirius 600 Control

2.2.1 Master Sirius 600 Frames Only

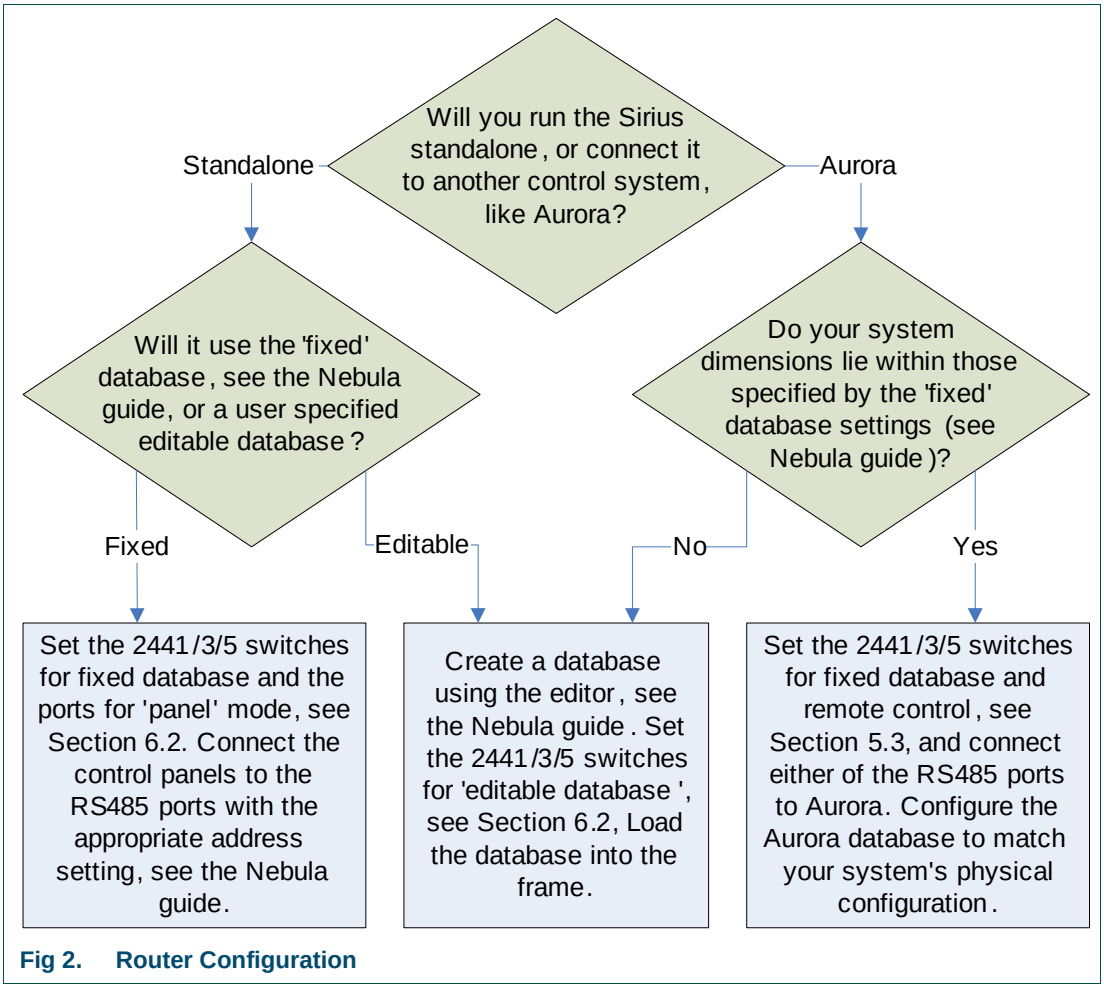

Fig 2. Router Configuration

2.2.2 Slave Sirius 600 Frames Only

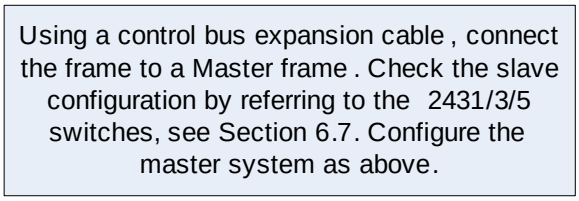

Fig 3. Router Configuration

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3. Installation

The Sirius 600 range of routers is supplied in 16U, 7U or 4U frames with integral power supplies and cooling. All cards and modules are accessible from the front after the door has been opened or removed, and all signal and control cables are connected to rear panels. Ventilation air is taken from the left hand side of the frame, and exhausted on the right hand side, and this must be considered when mounting the unit (see Section 3.12).

If you experience any difficulties with any Sirius 600 frame, please refer first to Section 8 - Trouble Shooting, and then if you are still having difficulties contact customer support as detailed in the General Information user manual.

3.1 System Components

The following table identifies all major Sirius 600 components; all modules are marked with a four-digit part number. Use this table to check the compatibility of module types in your system:

3.2 Sirius 600 Cards 1 & 2 Compatibility

Snell's Sirius 600 Router range contains both established and current products. The range can be classified as Series 1 and Series 2.

Note: It is important NOT to mix certain Series 1 cards with Series 2 cards.

Table 1. identifies whether the card is a series 1 or series 2 card and gives an indication on compatibility. Please read section 3.2.1.1 The table is correct at time of printing; if you are in any doubt please consult your Snell representative.

Snell Sirius 600 Card Description	Card Module	Rear Connector
SERIES I cards (Can be mixed with Series 2 xpoint card)		
SDV Output, Non-Re-clocking	3996	1764
SDV Output Re-clocking	3995	1764
SERIES I cards (Cannot be mixed with Series 2 xpoint card)		
AES Input, Asynchronous (Crash), Balanced	4992	1763
AES Output, Asynchronous (Crash), Balanced	4996	1766
AES Input, Synchronous (clean), Balanced	4993	1763
SERIES I cards (Cannot be mixed with Series 2 xpoint card)		
AA Input, Balanced	4790	1767
AA output Balanced	4795	1768
SERIES 2 cards (Can be mixed with Series I xpoint card)		
SDV Input	3994	1762
SDV Output, Non-Re-clocking	3999	1774
SDV Output Re-clocking	3998	1774
SERIES 2 cards		
HD Input	3992	3993
HD Output	3997	1774

Table 1. Sirius 600 Cards 1 & 2 Compatibility

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Snell Sirius 600 Card Description	Card Module	Rear Connector
3G cards		
3G Re-clocking Input	3972	3973 Coax
		3971 Fibre
3G Re-clocking Output	3978	1774
3G Re-clocking Output	3965	3966
3G/HD/SD Re-clocking Fibre Output	3976	3974
SERIES 2 cards (Can be mixed with Series I xpoint card)		
AES Input, Asynchronous (Crash), Balanced	4992	1763
AES Output, Asynchronous (Crash), Balanced	4996	1766
AES Input, Synchronous (Clean), Balanced	4993	1763
AES Output, Synchronous (Clean), Balanced	4997	1766
SERIES 2 cards		
AV Input	3790	1762
AV Output	3795	1764
SERIES 2 cards (Can be mixed with Series I xpoint card)		
AA Input, Balanced	4791	1767
AA Output, Balanced	4796	1768

Table 1. Sirius 600 Cards 1 & 2 Compatibility (Continued)

Table 2. is a comprehensive list of Snell Sirius 600 Cards and Modules. The list contains both legacy and current product. Please check availability.

Series	Card	Description
Sirius 600 1 Input/Output Cards		
1	3995	SDV Re-clocking Output
1	3996	SDV Non-Re-clocking
1	1764	Rear panel for SDV 3995/6 and analogue Video o/p
1	4992	AES Asynchronous Input
1	4993	AES Synchronous Input
1	4996	AES Synchronous or Asynchronous Output
1	4999	AES In/Out Sirius 610 (4U) frame with 4911 Crosspoints
1	4790	Stereo Analogue Audio I/P
1	4795	Stereo Analogue Audio O/P
Sirius 600 1 Input/Output Cards –Timecode & Data		
1	4793	Balanced Timecode Input
1	4797	Balanced Timecode Output
1	4794	Balanced Data Input
1	4798	Balanced Data Output
Sirius 600 1 and 2 Audio Rear Panels		
1 / 2	1763	AES 16 Channel Input Balanced
1 / 2	1770	AES 16 Channel Input Balanced
1 / 2	1762	AES 8 Channel I/P Unbalanced
1 / 2	1766	AES 16 Channel Output Balanced Sirius 610 (4U), Sirius 620 (7U), Sirius 630 (16U)
1 / 2	1771	AES 16 Channel Output Balanced Sirius 620 (7U) only

Table 2. Snell Sirius 600 Cards and Modules

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Series	Card	Description
1 / 2	1764	AES 8 Channel Output Unbalanced
1 / 2	1767	Analogue Audio Input
1 / 2	1768	Analogue Audio Output
Sirius 600 1 Crosspoints Legacy product – Check availability		
1	3906	128x32 HD/SDV/Audio Crosspoint Sirius 610 (4U)/Sirius 620 (7U) Legacy product – check availability
1	4909	256x64 Audio Crosspoint Audio/AES/Data/Timecode Legacy product – check availability
1	3909	256x64 SDV/Audio Crosspoint Sirius 630 (16U) Legacy product – check availability
1	3907	128x32 SDV/Audio Crosspoint Sirius 610 (4U)/Sirius 620 (7U) Legacy product – check availability
1	4911	128x32 in Sirius 610 (4U)/Sirius 620 (7U) frame with 4992/1/5 modules 128x64 Audio Sirius 610 (4U) with 4999 modules Crosspoint Legacy product – check availability
Sirius 600 2 Input/Output Cards		
2	3994	SDV Input
2	3998	SDV Re-clocking Output module
2	3999	SDV Non-Re-clocking Output module
2	3790	Composite Video Input
2	3795	Composite Video Output module
2	1762	SDV & Analogue Video Input module
2	1774	HD & Sirius 600 2 SD Outputs
2	1764	SDV rear panel for SDV 3995/6 and Analogue Video Output modules.
2	3972	3G Re-clocking Input
2	3973	3G Input rear (use with 3972 for co-ax)
2	3971	3G Input rear (use with 3972 for fibre)
2	3993	HD Input BNC module
2	3992	HD Input module
2	3991	HD Re-clocking Input
2	3997	HD Re-clocking Output
2	3978	3G Re-clocking Output (uses 1774 rear)
2	1774	3G/HD & Sirius 600 2 SD Outputs
2	3965	3G Re-clocking Output (uses 3966 rear)
2	3966	3G Re-clocking Output rear
2	3991	HD Re-clocking Input module
2	3970	HD/SD Fibre Input

Table 2. Snell Sirius 600 Cards and Modules (Continued)

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Series	Card	Description
2	3976	3G/HD/SD Re-clocking Fibre Output (uses 3974 rear)
2	3974	3G Fibre Output rear
2	3975	HD/SD Fibre Output 1310nm
2	3977	HD/SD Fibre Output 1550nm
2	4992	AES Asynchronous switching Input
2	4993	AES Synchronous switching Input
2	4996	AES Asynchronous switching Output
2	4997	AES Synchronous switching Output
2	4791	Stereo Analogue Audio Input
2	4796	Stereo Analogue Audio Output
2	4998	AES Input/Output Card for Sirius 610 (4U) frame with Audio crosspoint Should not be mixed with other input or output card types
Sirius 600 2 Input/Output Cards Timecode & Data		
2	4792	Timecode Balanced Input module
2	4799	Timecode Balanced Output module
2	4788	Data Balanced Input module
2	4789	Data Balanced Output
Sirius 600 2 Crosspoint Options		
2	4993	128x32 / 128x64 Audio Crosspoint Module for Sirius 610 (4U) and Sirius 620 (7U) frames. Operates as 128x32 in Sirius 620 (7U) frames and Sirius 610 (4U) frames with 4992/4993/4996/4997 modules, and as 128x64 in Sirius 610 (4U) with 4998 modules.
2	3912	128x32 HD/SD/Audio Crosspoint Module for Sirius 610 (4U) and Sirius 620 (7U) frames
2	3962	128x32 3GHD/SD/Audio Crosspoint Module for Sirius 610 (4U) and Sirius 620 (7U) frames
2	4908	256x64 Audio Crosspoint Module. Routes Audio / AES, data and timecode.
2	3908	256x64 HD/SD/Audio Crosspoint Module for Sirius 630 (16U) Frame.
2	3969	256x64 3GHD/SD/Audio Crosspoint Module for Sirius 630 (16U) Frame.
2	3913	Sirius 600 Gold 256x64 HD / SD / Audio Crosspoint Module. Routes signals from 2MBit/s to 1.5GBit/s

Table 2. Snell Sirius 600 Cards and Modules (Continued)

3.2.1 Sirius 600 Compatibility Rules

Do not use Sirius 600 1 Audio modules, Timecode or data in a frame with any Sirius 600 2 cards or Sirius 600 1 4911's (Sirius 610 (4U)/Sirius 620 (7U)) or 4909's (Sirius 630 (16U)) i.e. Sirius 600 1 Audio 4790's & 4992/4993's: DO NOT USE with all Sirius 600 2 crosspoint cards. Can only be used with Sirius 600 1 crosspoint cards except the 4911's (Sirius 610 (4U)/Sirius 620 (7U)) or 4909's (Sirius 630 (16U)).

The following cards are derived from the Sirius 600 1 4992/1 and hence also can only be used with Sirius 600 1 Crosspoint cards 4911/9's except the 4911's (Sirius 610 (4U)/Sirius 620 (7U)) or 4909's (Sirius 630 (16U)):

- 4999's (Sirius 600 1) AES Input/Output combined.

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- 4793 Sirius 600 1 Timecode I/P
- 4794 Sirius 600 1 Data I/P.

DO NOT USE with all Sirius 600 2 crosspoint cards.

Always use the correct rear panels. i.e Sirius 600 1 with 1 and Sirius 600 2 with 2. e.g. Sirius 600 1 3996 (3999) SDV Non-Re-clocking and 3995 (3998) SDV Re-clocking use the 1764 (1774) rear panel.

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3.3 Card locations in Sirius 620 (7U) Frame

Fig 4. shows the location and function of cards in the Sirius 620 (7U) frame.

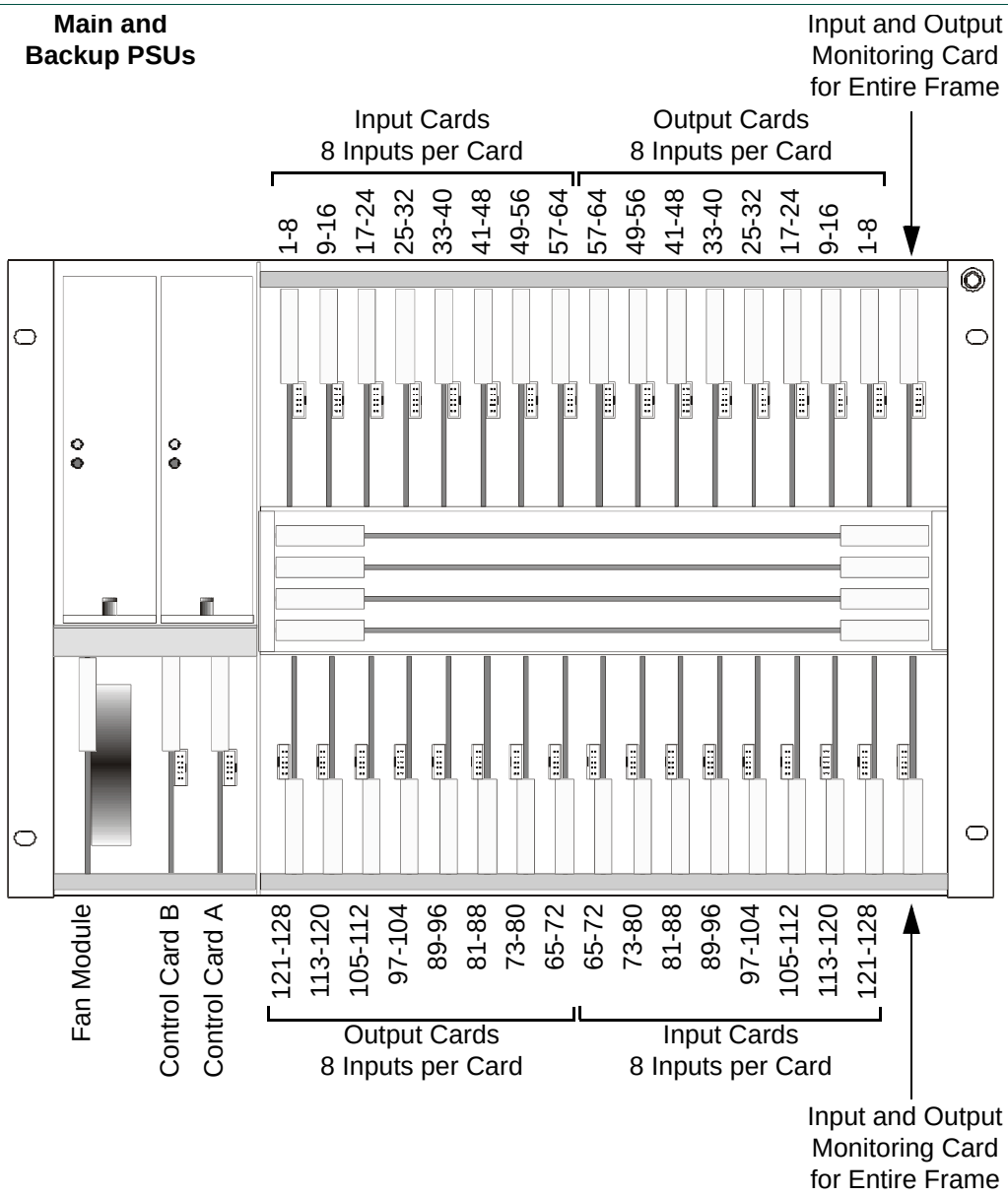

Fig 4. Card locations in Sirius 620 (7U) Frame

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3.4 Card Location in a Sirius 610 (4U) Frame - Video and Audio Combinations

This allows a mix of video and audio cards. The rear connections can either be balanced or unbalanced but separate input and output cards must be used.

Views from front of frame																				
Separate input and output boards (SDV, AES, HD)											out 57-64	out 49-56	out 41-48	out 33-40	out 25-32	out 17-24	out 9-16	out 1-8		
											OR	OR	OR	OR	OR	OR	OR	OR		
		PSU 1	PSU 2	in 1-8	in 9-16	in 17-24	in 25-32	in 33-40	in 41-48	in 49-56	in 57-64	in 65-72	in 73-80	in 81-88	in 89-96	in 97-104	in 105-112	in 113-120	in 121-128	monitor
				crosspoint inputs 1-128 (out 1-32)																
				crosspoint inputs 1-128 (out 33-64)																	
				control B										control A						
				slot 1	slot 2	slot 3	slot 4	slot 5	slot 6	slot 7	slot 8	slot 9	slot 10	slot 11	slot 12	slot 13	slot 14	slot 15	slot 16	slot 17

Table 3. Card Location in a Sirius 610 (4U) Frame

This router configuration allows 'non square' sizes to be constructed, as summarized in the next section.

Note: If an AES crosspoint card is fitted it is important to set the switches on this crosspoint card to match those of the control cards.

Router Configuration	4911 Inserted	4911 Switch settings		Control card switch settings	
		SW1	SW2	SW3-3	SW3-4
Square	NO	N/A	N/A	ON	ON
Square	YES	ON	ON	ON	ON
Non-square	NO	N/A	N/A	OFF	ON
Non-square	YES	OFF	ON	OFF	ON

Table 4. Router Configuration

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3.5 Sirius 610 (4U) Frame Options

Fig 4. shows that it is possible to replace output cards with input cards in a Sirius 610 (4U) frame. This 'trade-off' not only results in a non-square router, but also allows for the number of crosspoint cards to be reduced in certain configurations, giving a highly flexible and cost effective solution for a number of applications, see Table 5.

Number of input cards	Number of output cards	Number of crosspoint cards	Maximum router size
8	8	2	64x64
10	6	2	80x48
12	4	1	96x32
14	2	1	112x16
16	0	0	128x1 (using monitoring module)

Table 5. Sirius 610 (4U) frame Options

Note: The above configurations apply only to video, unbalanced AES and balanced AES using separate input and output cards. The following table is a review of the rules for matching Input/Output modules with crosspoint modules for the above configurations:

4911 Switch settings		Control card switch settings	
SW1	SW2	SW3-3	SW3-4
ON	OFF	ON	OFF

Table 6.

3.6 Card Locations in Sirius 610 (4U) Frame - Audio Only

This frame only allows a mix of audio cards as an AES crosspoint card is fitted. The rear connections can either be balanced or unbalanced but separate input and output cards must be used.

Separate input and output boards (audio only)		PSU 1	PSU 2	in 1-8	in 9-16	in 17-24	in 25-32	out 57-64	out 49-56	out 41-48	out 33-40	in 33-40	in 41-48	in 49-56	in 57-64	out 25-32	out 17-24	out 9-16	out 1-8	monitor
				crosspoint inputs 1-64 (out 1-64)																
				control B										control A						

Table 7. Card Locations in Sirius 610 (4U) Frame - Audio Only

This router CANNOT be mixed format and it must be equipped to use separate input and output AES cards.

It is important to set the switches on the AES crosspoint card to match those of the control cards.

4911 Switch settings		Control card switch settings	
SW1	SW2	SW3-3	SW3-4
OFF	OFF	OFF	OFF

Table 8.

No other switch settings are valid.

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3.7 Card Locations in Sirius 630 (16U) Video or Unbalanced AES Router Frame

The Sirius 630 (16U) frame uses physically larger crosspoint cards than used in the Sirius 610 (4U) and Sirius 620 (7U) frames, and each is equipped with 256x64 crosspoints. These fit vertically into the centre of the frame, and the user must note that the two on the right side of the frame are fitted 'upside down' with respect to the two on the left.

The input and output cards are the same types as used in the Sirius 610 (4U) and Sirius 620 (7U) frames, and occupy four 'quadrants' of the chassis, all with their card ejectors towards the outside of the frame.

If input and output monitoring is required, four cards are fitted, one serving each frame quadrant, the master output card being in the top left hand position.

If the frame is to be fitted with any video DAC cards, these will receive their analogue and digital references respectively from the monitoring cards fitted in positions 1 and 4, which in turn must be supplied with a suitable black and burst signal. This will not provide input and output monitoring, which if required will need the full compliment of four monitoring cards. The user must refer to the Sirius 600 monitoring user guide for full details.

The fan and power supply modules are the same as used in the Sirius 610 (4U) and Sirius 620 (7U) frames. With four power supplies fitted, the frame has full power supply redundancy, since only two are required to power a fully equipped frame, although it is necessary to fit four power supplies in order to achieve adequate cooling.

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Fig 5. shows the card positions and functions in a Sirius 630 (16U) frame:

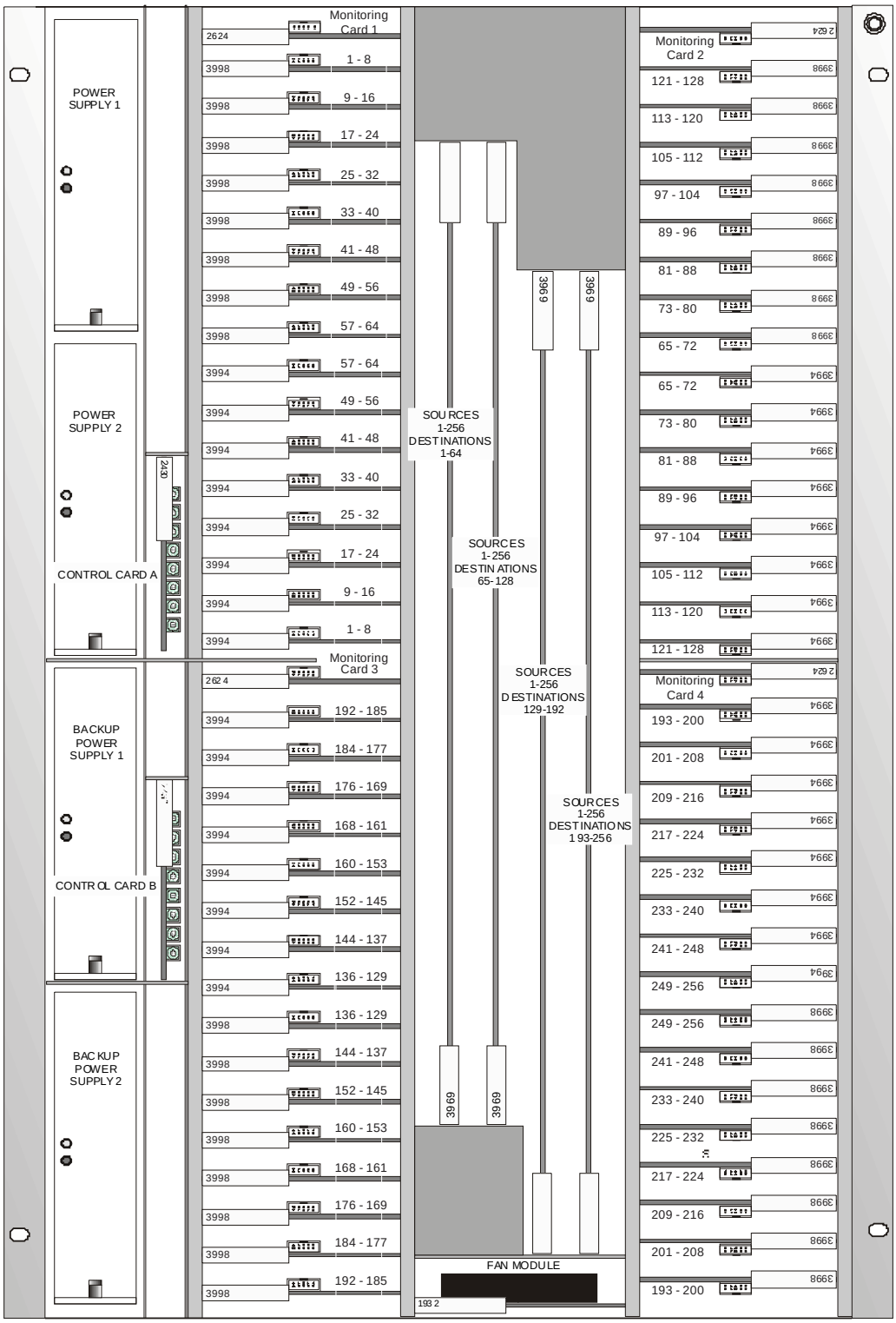

Fig 5. Card Locations in Sirius 630 (16U) Video or Unbalanced AES Router Frame

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3.8 SDV Router Configurations

Table 9. lists all the Serial Digital Video configurations:

Frame size	Input cards	Output cards	Crosspoint cards	Router size
Sirius 610 (4U)	8x3990/4	8x3998/9	2x3962	64x64
	10x3990/4	6x3998/9		80x48
	12x3990/4	4x3998/9	1x3962	96x32
	14x3990/4	2x3998/9		112x16
	16x3990/4	none	none	128x1 [1]
Sirius 620 (7U)	16x3990/4	16x3998/9	4x3962	128x128 max
		12x3998/9	3x3962	128x96 max
		8x3998/9	2x3962	128x48 max
		4x3998/9	1x3962	128x32 max
Sirius 630 (16U)	32x3990/4	32x3998	4x3969	256x256 max
		24x3998	3x3969	256x192 max
		16x3998	2x3969	256x128 max
		8x3998	1x3969	256x64 max

Table 9. SDV Router Configurations

[1] This configuration requires a 2429 Monitoring card to provide an output

Fig 5. shows card positions for all the configurations.

In a Sirius 610 (4U) frame, input cards may be 'traded off' against output cards to create non-square routers and use the surplus crosspoints. This is not possible in a Sirius 620 (7U) frame where the full crosspoint capacity is being used, however, any Sirius 620 (7U) configuration may be 'sub-equipped' to create smaller router dimensions.

3.9 AES Router Configurations

The 4911 AES crosspoint card is primarily designed for use in the Sirius 610 (4U) frame using 4999 combined Input/Output cards, giving a maximum router size of 128x128, but it may also be used in other configurations where cost effective AES routing is required. The restriction with using 4999 cards is that balanced D type connectors only may be used. Unbalanced AES routers must use 4992/4993 input cards and 4996 output cards, which may then be used with any crosspoint cards, with the knowledge that the 4911 is the most cost effective.

The 4911 card has a greater number of crosspoints accessible than the video crosspoint cards when used in a Sirius 610 (4U) frame, meaning that a 128x64 AES router can be built using one crosspoint card and separate Input/Output cards. These extra crosspoints cannot be accessed in a Sirius 620 (7U) frame, for which the 4911 card works as a direct replacement for the video crosspoint cards, but at a lower cost. These different configurations must be setup using switches, both on the crosspoint card and the host control card. The user must refer to both the control card section of this manual, and the 4911 user guide for full configuration details.

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Table 10. lists the full range of AES router options:

Connector type	Frame size	Input cards	Output cards	Crosspoint cards	Max router size
Balanced	Sirius 610 (4U)	4993	4997	3962/4911	64x64
					64x32
	Sirius 620 (7U)	4993	4997	3962/4911	128x128
					128x96
					128x64
					128x32
	Sirius 630 (16U)	4993	4997	3962/4911	256x256
					256x192
					256x128
					256x64
Unbalanced	Sirius 610 (4U)	4993	4997	3962/4911 [1]	64x64
					64x32
	Sirius 620 (7U)	4993	4997	3962/4911	128x128
					128x96
					128x64
					128x32
	Sirius 630 (16U)	4993	4997	3969	256x256
					256x192
					256x128
					256x64

Table 10. AES Router Configurations

[1] In this configuration the 4911 crosspoint card may be switched to use only 32 of its outputs, and therefore be used in conjunction with a video crosspoint card for a multi-level system. See the AES crosspoint user guide for details.

It is noted that the most cost effective option for a balanced AES router is the Sirius 610 (4U) frame using combined Input/Output cards, this however will result in a 'square' router. Non-square routers may be constructed using the separate input/output card types, with the knowledge that the full crosspoint capacity may not be used.

The user should refer to Section 3 of the main Sirius 600 user manual for a front view of card positions in the Sirius 610 (4U), Sirius 620 (7U) and Sirius 630 (16U) frames, and also for a full table of non-square router configurations.

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3.10 Inserting and Removing Cards

Fig 6.shows that all card handles locate into the metalwork of the Sirius 600 frame in such a way that allows easy insertion and removal. Pulling the bottom of the handle outwards will lever the card out of its socket for removal. When inserting the module, the handle must be lifted and located in the frame as shown, before using the handle to push the card fully home. Static precautions must be observed when inserting and removing all system modules.

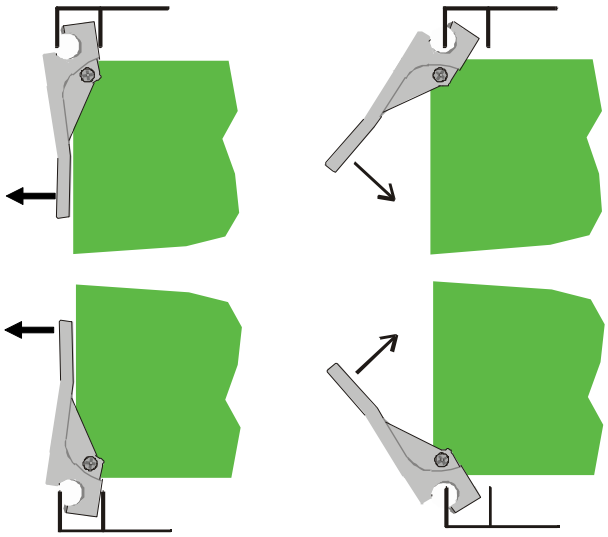

Fig 6. Inserting and Removing Cards

Cards in the bottom of a Sirius 620 (7U) frame are fitted upside down, and therefore their handles are at the bottom. In a Sirius 630 (16U) frame, handles are to the left in the left hand side of the frame, and to the right in the right hand side.

3.11 Ventilation

Each frame employs an internal fan assembly providing horizontal cross ventilation to maintain a cool, internal, air temperature. Frames may therefore be mounted directly on top of each other, or other equipment, without the need for vertical separation. Care should however be taken when mounting frames directly above other equipment to ensure that they are not subjected to excessive heat from that equipment, and that cooling vents in equipment directly above or below them are not obstructed.

Fig 7. Ventilation

It is therefore essential during the installation process to observe the following points:

- Do not obstruct the vents on the unit to allow cooling to take place, allow at least 40mm free space on each side of the frame
- Ensure that both the fans and vents have access to the ambient temperature room air
- Do not obstruct cooling vents in equipment directly above or below the frame.
- The door must be fitted and closed to ensure adequate cooling when the unit is powered

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3.12 Fan Module

The 1932 fan module is fitted in the Sirius 620 (7U) and Sirius 630 (16U) frames, and provides additional ventilation to the integral power supply fans. The three DC powered radial fans have their current consumption constantly checked in order to detect failure due to stalling, disconnection or burning out. Two LEDs are located on the front edge of the card as follows:

- Green: power is supplied to the module
- Red: any fan fault

Any faults are also reported to the Alarms connector on the rear of the frame, and also as serial data to the Ethernet port.

3.13 Power Supplies

Sirius 600 frames are fitted with auto-sensing 1931 power supply units which will operate from mains voltages between 100 and 240VAC ±10%, with frequencies of 50/60Hz. These PSU's automatically adapt to the supplied mains (line) input voltage, therefore no user adjustment of the PSU is required. The supplies are rated at 500 Watts and provide a single 48 Volt DC rail.

The PSU's are self-contained, plug-in modules with an integrated IEC mains input connector, which is accessed at the rear of the frame. For additional safety, the IEC connector is fitted with an integrated fuse holder.

Cooling for the power supplies is integrated into the unit using internal fans. These are powered from an internally derived 12 Volt rail.

For EMC and safety reasons the mains, chassis and signal earths are permanently connected together within the frame.

With the front door opened, two LED's are visible on each PSU, one indicating that the 48 Volt power rail is active and the other indicating the health of the fan units. The fans are internally monitored for a number of fault types:

- Fan disconnected
- Fan stalled
- Fan power rail failure

Fault conditions may also be monitored on a rear panel connector, and by interrogating the control card via the Ethernet port, both of which are detailed in a later section.

NOTE: The fans in the Sirius 600 PSU have a sensitive monitoring circuit to ensure detection of any failed fans. The circuit is affected by many factors, including temperature, air restriction in the frame and also air inlet restrictions, plus the ageing of the fans themselves.

It is possible after a few weeks of operation or during commissioning that the fan fail alarm may trigger when all fans are active and working, causing the fan fail LED to light or flash intermittently. If this happens the fan alarm sensitivity needs to be adjusted. This is done as follows:

1. Remove power from the PSU
2. Remove it from the frame
3. Locate the fan adjust potentiometer on the side of the PSU
4. Turn the potentiometer ¼ turn clockwise
5. Reinstall the PSU, re-establish power and check for failure alarm

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6. If the alarm remains repeat, turning another ¼ turn clockwise (It should not be necessary to adjust more than ½ turn, in total)

7. If the fault alarm is still present return the unit to Snell or your local dealer, as described in 'General Information' on the user manual CD.

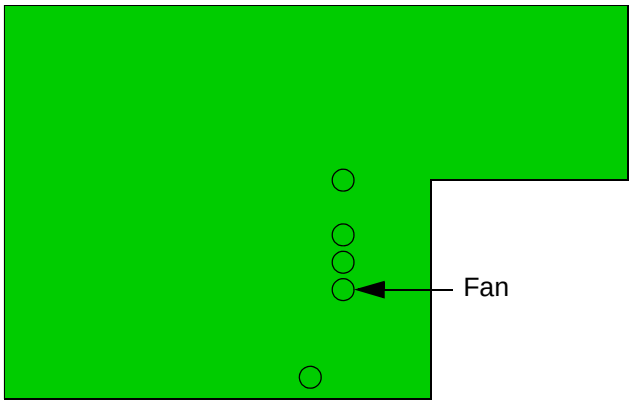

Fig 8. Fan Adjustment

It is not possible to adjust the fan fail on the bench with power connected, as the alarm is affected by the flow of air through the unit, which will be different on a bench to in a frame.

3.14 Rear Panel Control Connections and Switches

All Sirius 600 frames have a COMMON set of rear control connections and switches, as follows:

- Two RJ45 Ethernet control sockets, one for each control or interface module, available as an option to RS485 port control number 2
- A rotary Hex switch, not currently used
- Two 9 pin D type sockets configured as RS232, for connecting the PC Router Editor to the main and backup control cards
- 9 pin D type socket for a timecode (LTC) input, not currently used
- 15 pin D type socket for power supply and fan alarm relay contact outputs. Two are fitted on the Sirius 630 (16U) frame to accommodate the extra PSUs
- two 9 pin D type sockets configured as RS485, configurable as remote control or multi-drop panel and UMD connections
- a third 9 pin D type socket, only active when a 2434 control module is used, and a customer specified control protocol has been implemented by Snell, the port may be configured as RS232 or RS485 using a jumper setting
- 9 pin D type socket for a balanced AES reference signal, and a BNC for an unbalanced AES reference, and a switch to select which is in use. Two BNCs and two switches are fitted on the Sirius 630 (16U) frame as two AES references are required. The second balanced reference uses other pins on the single 9 pin D type socket. Note that modifications to some early Sirius 630 (16U) frames fixed the AES references as either balanced or unbalanced, in which case there is no switch
- a loop through analogue 625 line black and burst reference input
- a loop through analogue 525 line black and burst reference input
- a terminated HD tri-level reference input, only active if 2434 or 2435 control cards used
- 37 pin D type control bus for frame expansion to other Sirius 600 or Freeway frames

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Fig 9. shows the rear panel on the Sirius 610 (4U) and Sirius 620 (7U) frames:

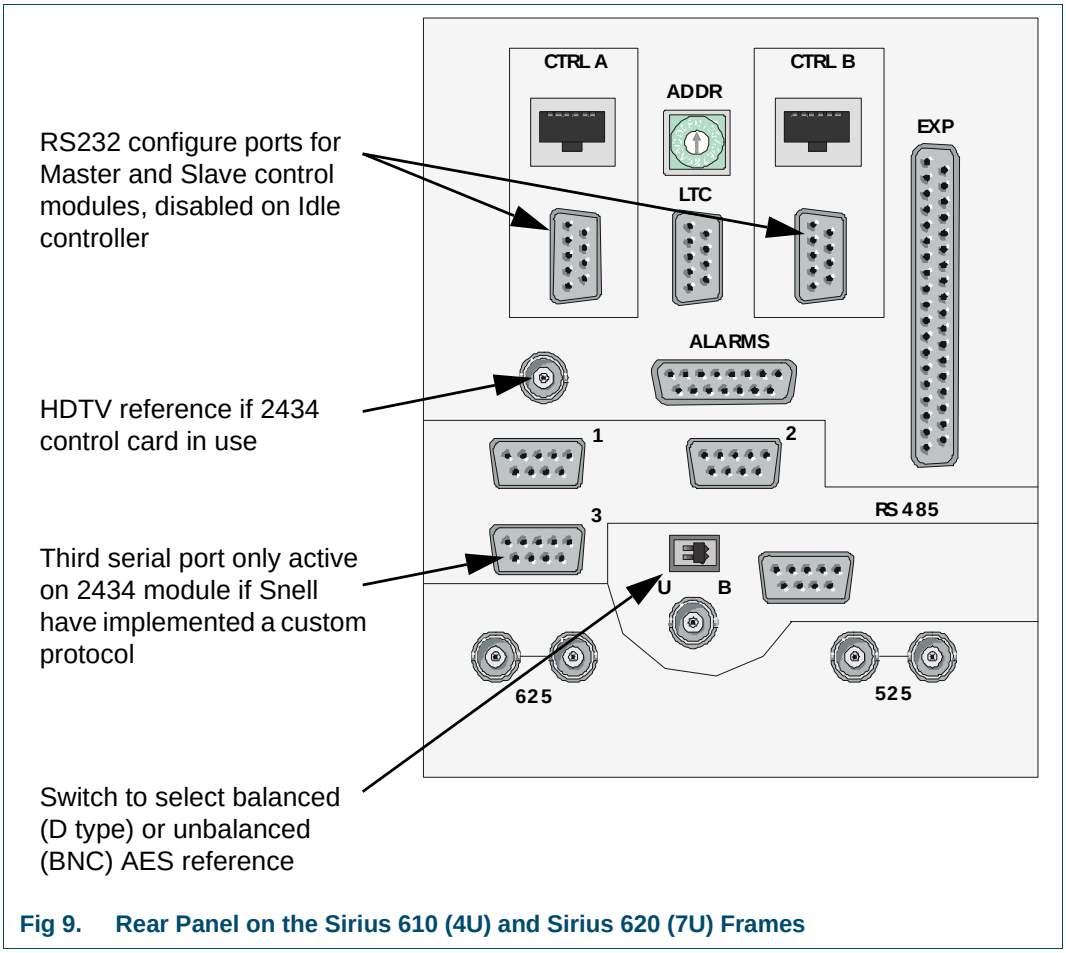

Fig 9. Rear Panel on the Sirius 610 (4U) and Sirius 620 (7U) Frames

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Fig 10. shows the rear panel on the Sirius 630 (16U) frame:

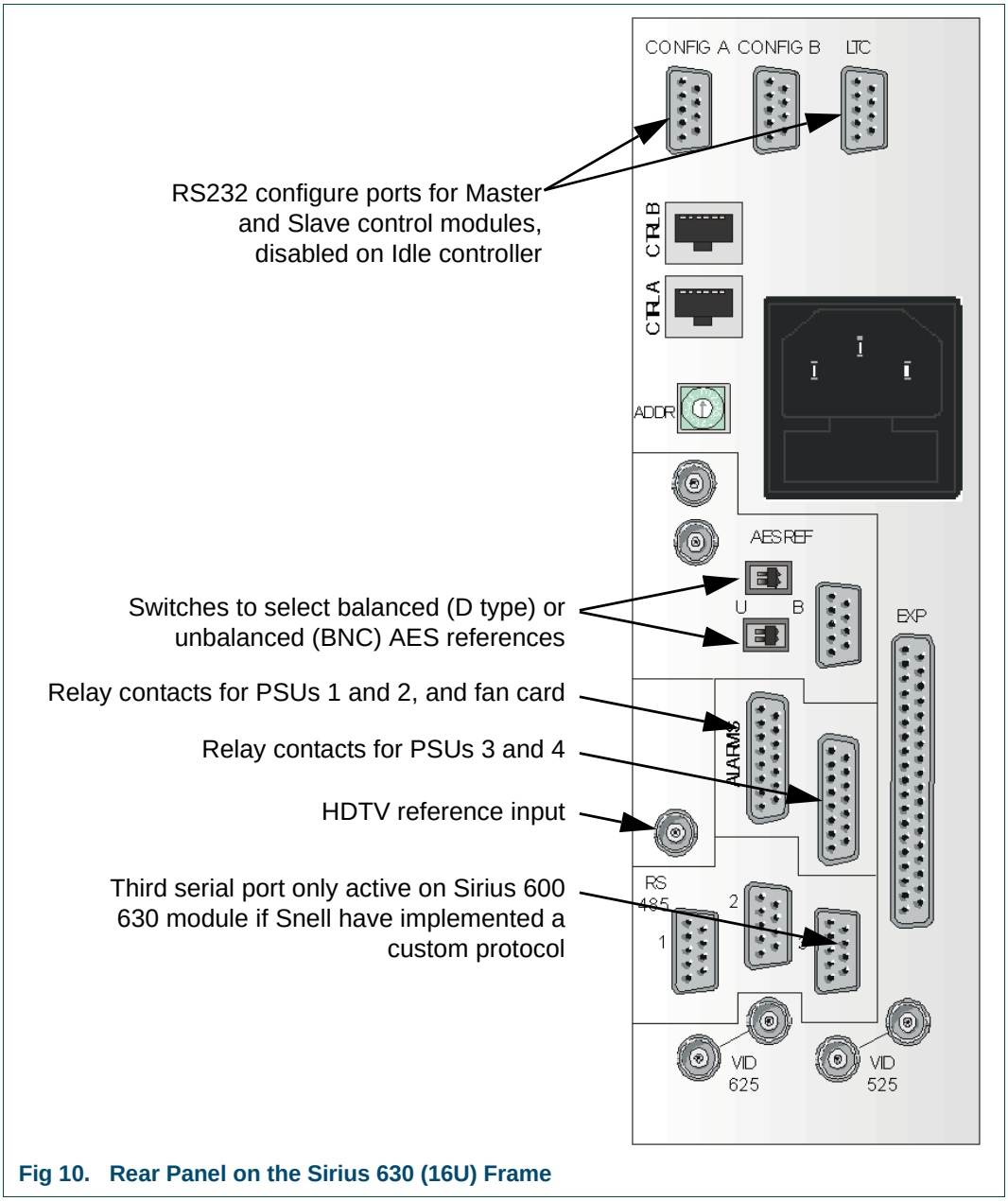

Fig 10. Rear Panel on the Sirius 630 (16U) Frame

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3.15 Control Connector Pinouts

Fig 9. shows the control connectors on the rear panel of the Sirius 610 (4U) and 620 (7U) frames. Fig 10. shows the control connectors on the rear panel of the Sirius 630 (16U) Frame.

3.15.1 'EXP' Connector Pinout

The Parallel control connector provided on both Master and Slave frames, extends the internal crosspoint control bus to the rear of each frame. This permits Master and Slave frames to be interconnected using the control cable supplied with Slave frames to construct multi-level routing switchers.

Pin	Function	Pin	Function
1	Enable	20	H/Shake
2	Level A3	21	Level A2
3	Level A1	22	Level A0
4	Dest A6	23	Dest A5
5	Dest A4	24	Dest A3
6	Dest A2	25	DestA1
7	Dest A0	26	A6 Source
8	A5 Source	27	A4 Source
9	A3 Source	28	A2 Source
10	A1 Source	29	A0 Source
11	Aud 0	30	Aud 1
12	Aud 2	31	F/Sync
13	Strobe	32	Dest A7
14	A7 Source	33	N/C
15	N/C	34	N/C
16	N/C	35	N/C
17	N/C	36	N/C
18	N/C	37	Chassis
19	Chassis		

Table 11. 'EXP' Connector Pinout

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3.15.2 'RS485-1 and 2' Connector Pinouts

9 way 'D' type fixed sockets on frame.

These ports are configured in the system database as either 'General Switcher' or 'Multi-drop' protocol, see Section 6 The pinout for these modes is as follows.

Pin	Pinout of socket when configured as:	
	Multi-drop	General Switcher
1	CHASSIS	CHASSIS
2	Rx-	Tx-
3	Tx+	Rx+
4	0V	0V
5	n/c	n/c
6	0V	0V
7	Rx+	Tx+
8	Tx-	Rx-
9	CHASSIS	CHASSIS

Table 12. 'RS485-1 and 2' Connector Pinouts

3.15.3 'Config A and B' RS232 Connector Pinouts

This connector is configured so that it may be directly connected, pin for pin, with the COM port of a PC.

9 way 'D' type fixed sockets on frame.

Pin	Function
1	N/C
2	Rx
3	Tx
4	N/C
5	0V
6	DTR COMMON
7	RTS
8	CTS
9	N/C

Table 13. 'Config A and B' RS232 Connector Pinouts

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3.15.4 RS485 Port 3 Pinout

The configuration of this port is determined by the customer-defined protocol implemented by Snell. The port can either be RS485 or RS232 with pinouts as shown:

RS232			RS485	
Pin	**Function**		**Pin**	**Function**
1	GND		1	GND
2	Tx		2	Tx-
3	Rx		3	Rx+
4	GND		4	GND
5	N/C		5	N/C
6	GND		6	GND
7	DO NOT CONNECT		7	Tx+
8	DO NOT CONNECT		8	Rx-
9	GND		9	GND

Table 14. RS485 Port 3 Pinout

3.15.5 Alarms Pinouts

One 15 way 'D' type fixed socket on Sirius 620 (7U) and Sirius 610 (4U) frame, and two on Sirius 630 (16U) to accommodate the extra PSUs. Note that the following states are for a powered frame which is functioning correctly:

All Frames

All Frames	
Pin	**Function**
1	PSU 1 RELAY NORMALLY CLOSED
2	PSU 1 RELAY NORMALLY OPEN
3	FAN 1 RELAY NORMALLY CLOSED
4	FAN 1 RELAY NORMALLY OPEN
5	PSU 2 RELAY NORMALLY CLOSED
6	PSU 2 RELAY NORMALLY OPEN
7	FAN 2 RELAY NORMALLY CLOSED
8	FAN 2 RELAY NORMALLY OPEN
9	FAN CARD RELAY COMMON
10	PSU 1 RELAY COMMON
11	FAN 1 RELAY COMMON
12	FAN CARD RELAY NORMALLY OPEN
13	PSU 2 RELAY COMMON
14	FAN 2 RELAY COMMON
15	FAN CARD RELAY NORMALLY CLOSED

Table 15. Alarms Pinouts - All Frames

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The relay contacts change state to indicate any power or fan failure within the master frame.

Pin	Function
1	PSU 3 RELAY NORMALLY CLOSED
2	PSU 3 RELAY NORMALLY OPEN
3	FAN 3 RELAY NORMALLY CLOSED
4	FAN 3 RELAY NORMALLY OPEN
5	PSU 4 RELAY NORMALLY CLOSED
6	PSU 4 RELAY NORMALLY OPEN
7	FAN 4 RELAY NORMALLY CLOSED
8	FAN 4 RELAY NORMALLY OPEN
9	NOT CONNECTED
10	PSU 3 RELAY COMMON
11	FAN 3 RELAY COMMON
12	NOT CONNECTED
13	PSU 4 RELAY COMMON
14	FAN 4 RELAY COMMON
15	NOT CONNECTED

Table 16. Alarms Pinouts - Sirius 630 (16U) Frame

3.15.6 Balanced AES Reference Pinout

9 way 'D' type fixed socket on frame.

Pin	Function Sirius 610	Function Sirius 630 (16U)
1	Ground	Ground
2	AES balanced +	AES balanced 1 +
3	Ground	Ground
4	AES unbalanced	Not connected
5	Not connected	AES balanced 2 +
6	Ground	Ground
7	AES balanced -	AES balanced 1 -
8	Not connected	Not connected
9	Not connected	AES balanced 2 -

Table 17. Balanced AES Reference Pinout

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3.16 Using the AES Reference

In order to perform 'click-less' switching of digital audio signals, a 'cut' must be made during a point in the data stream when no audio is present. For this to happen all the digital audio signals must be 're-framed', or time-aligned synchronous with the AES reference, at the input stage.

The Sirius 600 AES input and Input/Output cards are capable of re-framing AES audio at fixed sample frequencies, and the user must refer to the relevant user manual supplement for configuration details.

Note that in a frame containing both a video and audio level, an audio cut is performed at the first audio pre-amble following a television field boundary (as derived from the video reference input). In this mode the router will switch each input according to the video reference configured in the system database, see Section 6. In an audio only frame, the switch will occur at the next audio pre-amble. The Sirius 600 router can accept unbalanced or balanced digital audio references, via the appropriate rear connectors. The Sirius 630 (16U) router needs two identical AES reference signals. These must not be wired together, as each input is terminated internally and one signal cannot drive the whole frame. The selector switch(es) next to the connectors must then be switched as follows:

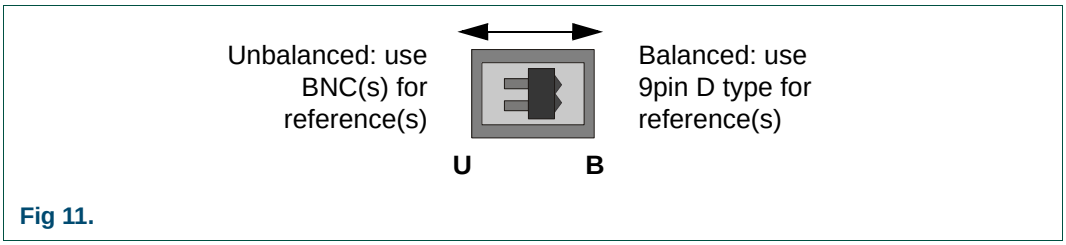

Fig 11.

3.17 Using the Video Reference

Sirius 600 allows for vertical interval switching of both PAL and NTSC line standards. This is possible because reference signals of both standards can be connected to the master frame, and the control card will switch routes according to information held in it's database. This functionality is only restricted when the Nebula fixed database is in use, and the user must select the system reference to be either 525 or 625, see Section 6 of this manual for details. When a configured database is in use, you can individually select different references for each source. See the Nebula User Guide for details on editing the database.

The Sirius 600 control card will switch NTSC video signals half way through line 10 of the next field, and PAL signals half way through line 6, providing a valid analogue reference signal is supplied to the frame, and the database is configured appropriately. The control card has status LEDs to indicate the presence of each reference, see Section 6.3. If no reference is detected, a 'crash' switch will be implemented. The database editor also allows the user to select between field and frame switching, on a source by source basis, for use in situations where associated equipment may not be field precise.

The Sirius 630 (16U) frame, because it uses the 2434 control card, is further enhanced by including a 1080i HDTV reference input, which may only be selected when a configured database is in use.

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4. Sirius Gold

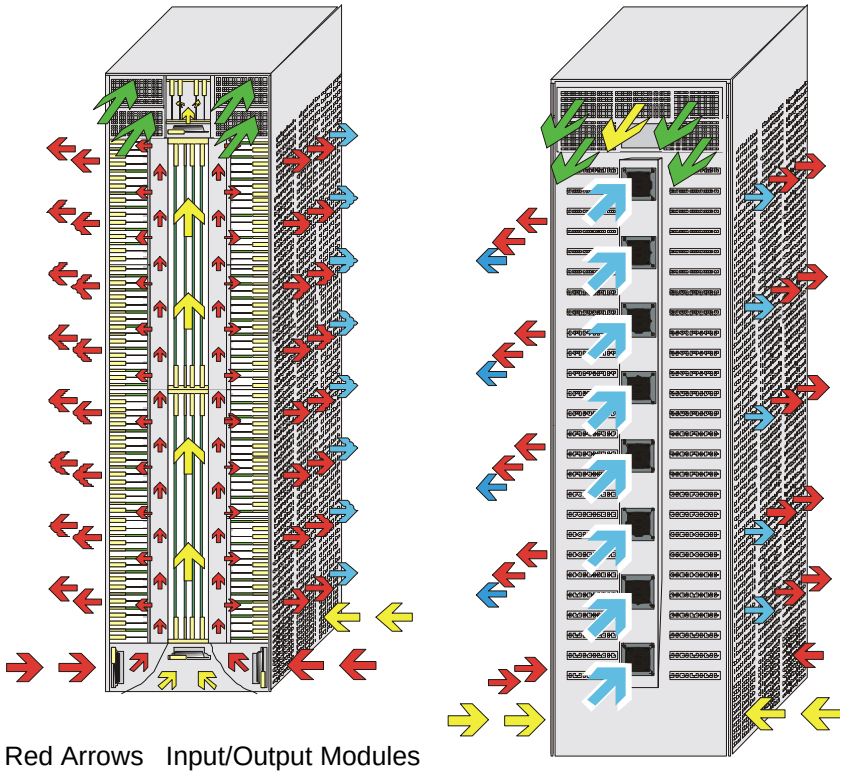
Sirius Gold is a multi-format, expandable modular system, for high-end applications of 512 x 512 and above. The innovative design fully integrates with the existing Snell product range whilst incorporating latest design and best of breed technologies.

Some of the key features are:

- Broadband Crosspoints
- Modularity
- Built-in Nebula Control System
- Serial or Ethernet Control

4.1 Ventilation

As with any large routing system ventilation is an important consideration. Sirius Gold uses an active fan assisted ventilation system. The graphic shows the airflow through the frame. As can be seen air is drawn in at the bottom and distributed throughout the router. Key areas have their own ventilation system such as the Input/Output cards, the crosspoint cards, the power supplies, and the rear spine.



Red Arrows Input/Output Modules

Yellow Arrows Crosspoints

Green Arrows PSUs

Blue Arrows Rear connections (Spine Boards)

Fig 12. Sirius Gold ventilation Flow

The Crosspoint and Control cards (yellow arrows) have air sucked in at the bottom side vents. The air is forced up through the mid-section of the router by a push-pull system of fans. The fans at the bottom suck air in through the bottom side vents, and the fans at the top, pull the air up through the cards ensuring a smooth and continuous flow of air. The air then exits through the rear vents.

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The Input and Output cards (red arrows) use a custom designed ventilation shaft system. Again air is sucked in at the bottom and forced up the shaft. The shaft has a series of holes, which direct air across the cards, and again out through the side vents.

Because, in some applications, the rear spine has active components a dedicated airflow (Blue arrows) is used. The system uses a series of eight fans mounted on the back. The air is sucked into the rear cavity and over the active components and vented through the sides.

The power supply modules (green arrows) are a sealed unit design and have an integral fan cooling system. They suck air in through their front grill and exit at the rear.

Although Sirius Gold does use a sophisticated ventilation system, it is important not to leave the front doors open for an extended period of time. It is also important to leave an area free around the router to allow for airflow.

Fig 13. The 1932 Fan Module

In addition to the rear fans, Sirius Gold uses four 1932 fan modules; three fitted in the bottom and one in the top cavities. The three DC powered radial fans have their current consumption constantly checked in order to detect failure due to stalling, disconnection or burning out. Two LED's are located on the front edge of the card as follows:

- Green: power is supplied to the module
- Red: any fan fault

Any faults are also reported to the Alarms connector on the rear of the frame, and also as serial data to the Ethernet port.

Note:

Ensure the flow of air through the vents is not restricted.

This unit is very heavy.

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4.2 Frame Layout

4.2.1 Front Layout

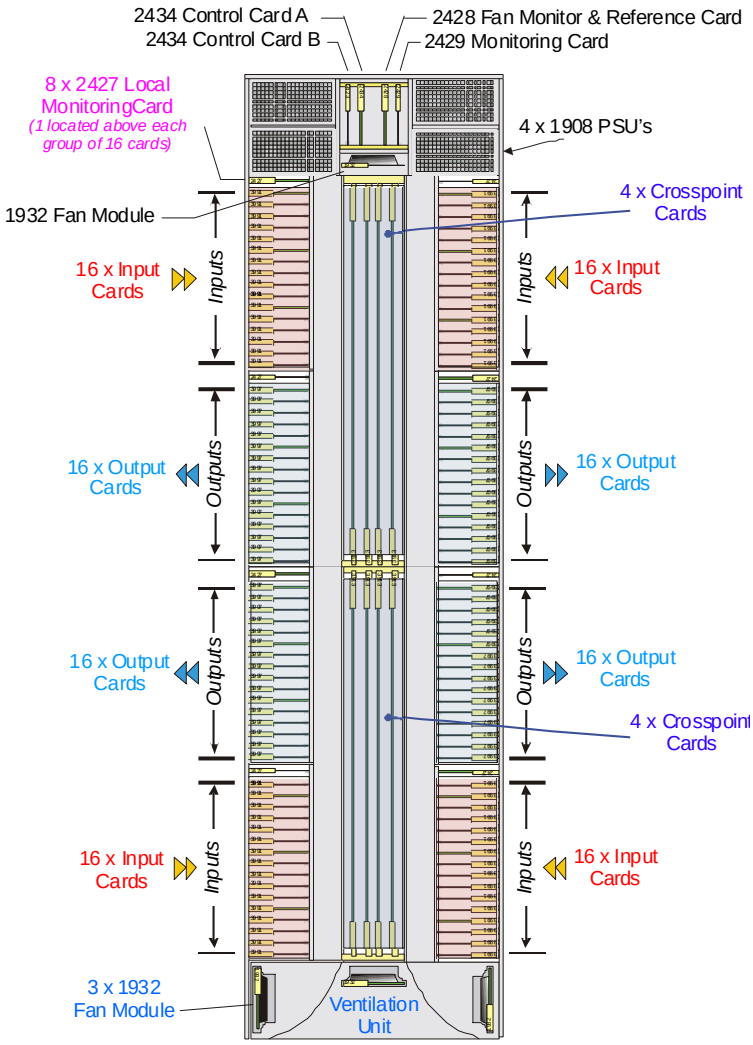

Fig 14. Front View of Snell Sirius Gold Router

Fig 14. shows the front view of the router with the doors removed. The 39U frame may have up to 128 Input/Output cards fitted depending on the configuration. The Input and Output Card area is divided into eight sections. Each compartment (see Fig 15.) may have up to 16 cards plus one Local Monitoring card.

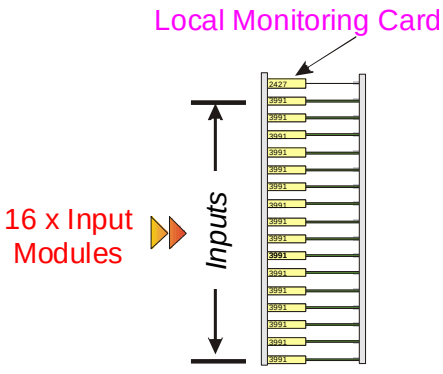

Fig 15. Example of Input Card Layout

This example shows 16 x 3991 HD Input cards plus 1 x 2427 Local Monitoring Card. Each card is held in place by side runners and electrically connected at the rear by a multi-pin socket. The card is designed to move freely in the side runners. If any resistance is felt, stop

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immediately and re-position the card until it runs smoothly. The card fits firmly into the socket and should never be forced as damage may occur. Sirius Gold is compatible with all current Sirius Gold Audio and Video Input/Output cards. Take the usual electrostatic precautions when handling the cards.

	**Electrostatic Damage** Static precautions must be observed when inserting and removing all system modules

Table 18.

4.2.2 Inserting and Removing Cards

For details on Inserting and Removing cards see section 3.10.

4.2.3 Rear Layout

Fig 16. shows the rear view of the Sirius Gold. For the purposes of this document, the sections in the Sirius Gold frame are lettered as follows, when looking at the frame from the front (the side with the door):

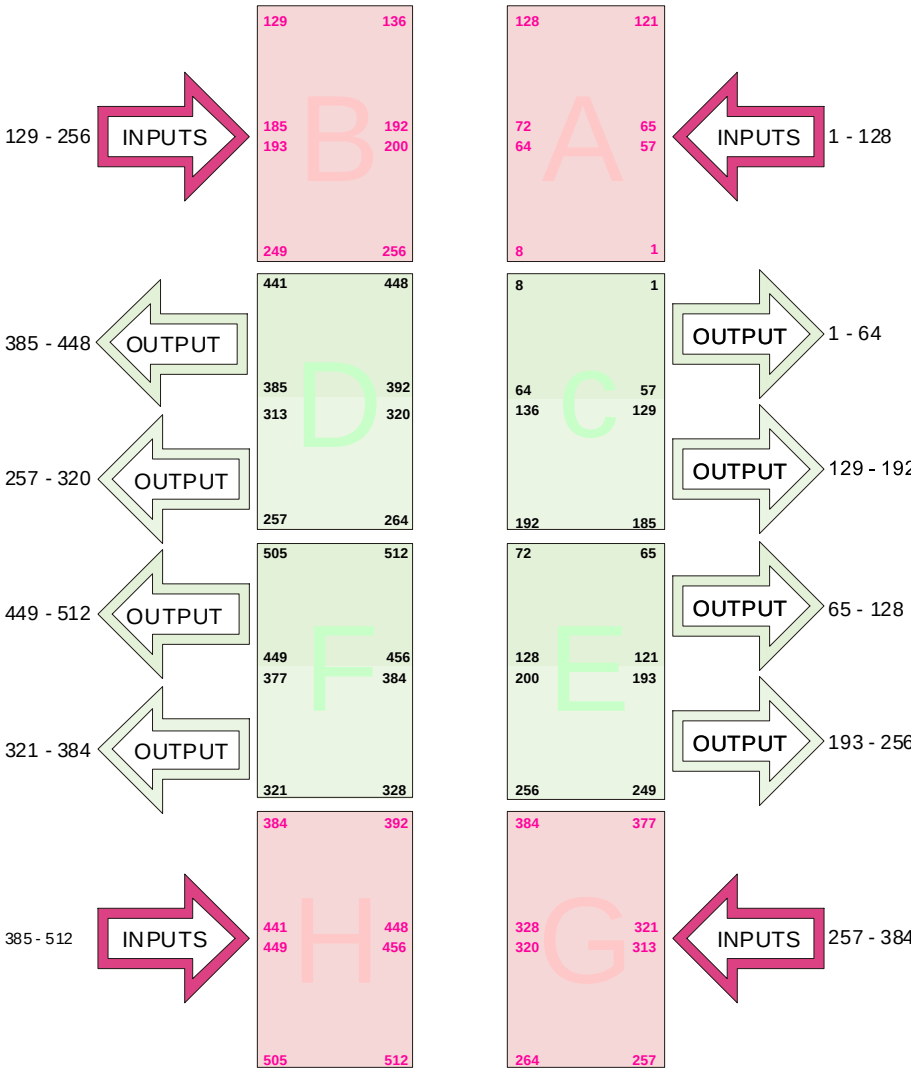

Fig 16. Inserting and Removing Cards

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4.3 Sirius Gold Cards

4.3.1 Sirius Gold Crosspoint Cards

The Crosspoint cards are large PCB's (16U) and care should be taken when handling them both from a physical and an electrostatic point of view.

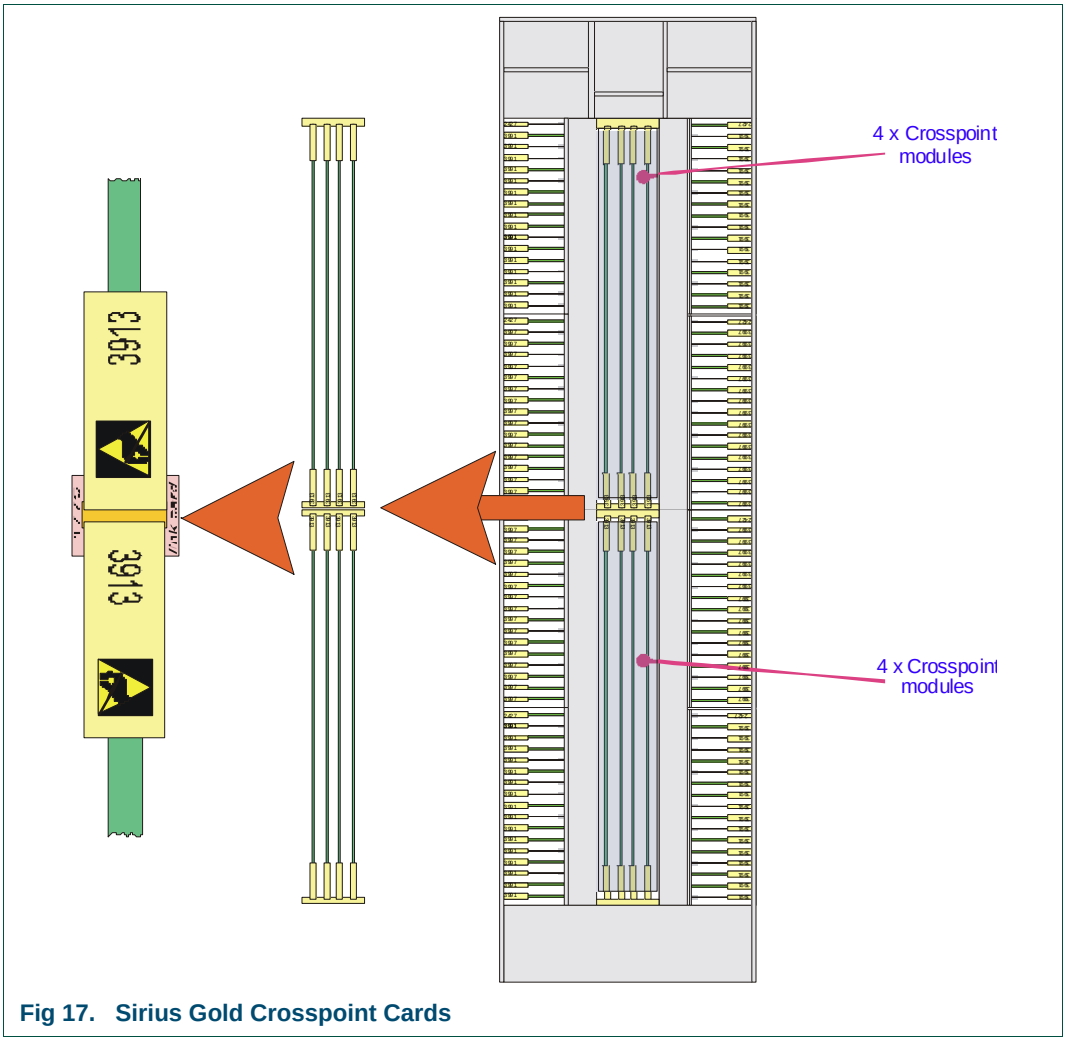

Fig 17. Sirius Gold Crosspoint Cards

Fig 17. shows the arrangement of the Sirius Gold Crosspoints, located in the front middle section of the frame.

- 3913 HD, SD, and AES Crosspoint

Crosspoints are normally supplied and fitted in pairs. Fig 17. shows that the two cards are mounted vertically, and a factory fitted link card passes signals between cards fitted in the top and bottom halves of the frame. To allow a more direct signal path the bottom card is reverse mounted facing the opposite direction (see graphic).

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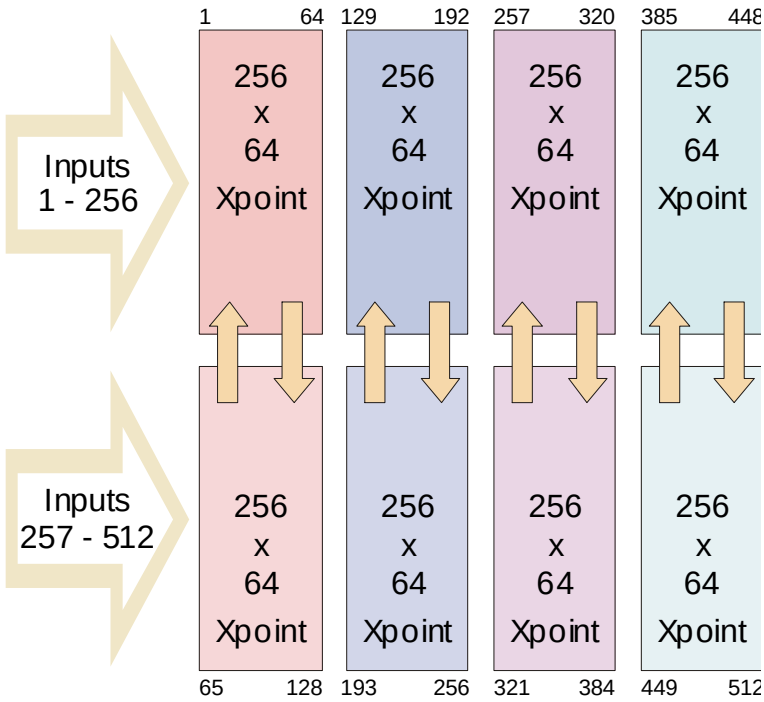

Fig 18. Sirius Gold Crosspoint Structure

Fig 18. shows the crosspoint structure. The crosspoint cards are as viewed from the front of the frame. Routes that pass between the upper and lower frame pass through both crosspoint cards in the same pair. The system uses four logical 512 x 128 crosspoint cards in four physical pairs.

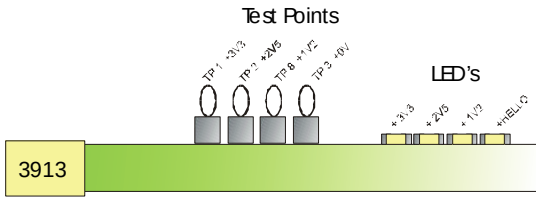

Fig 19. Edge View of Sirius Gold 3913 Crosspoint

The Sirius Gold 3913 Crosspoint has no user adjustments. The main four test points are easily accessible along the edge for measuring. There are also four LED's which give a visual indication of the three voltage rails: 3V3, 2V5, and 1V2. The Hello LED gives an indication of control and polling as it interrogates each condition.

4.3.2 Sirius Gold Fan Monitoring and Reference Card (2428)

The 2428 buffers and produces copies of the references generated by the 2429 for the video and audio ADC / DAC cards in the Sirius Gold frame. The 2428 also generates the 12V required for powering the 8 fans in the rear of the Sirius Gold frame, and has fan fail detectors for monitoring these fans.

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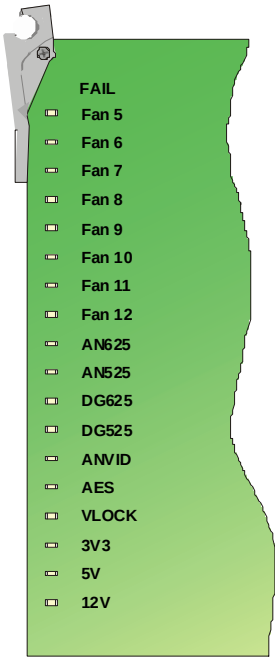

Fig 20. Sirius Gold Fan Monitoring and Reference Card (2428)

The 2428 has the following inputs:

- 625 line analogue video (from the same rear connector panel reference input).
- 525 line analogue video (from the same rear connector panel reference input).
- 625 line digital video (via a dedicated rear panel connector).
- 525 line digital video (via a dedicated rear panel connector).
- Balanced AES (via a dedicated rear panel connector).
- Unbalanced AES (via a dedicated rear panel connector).

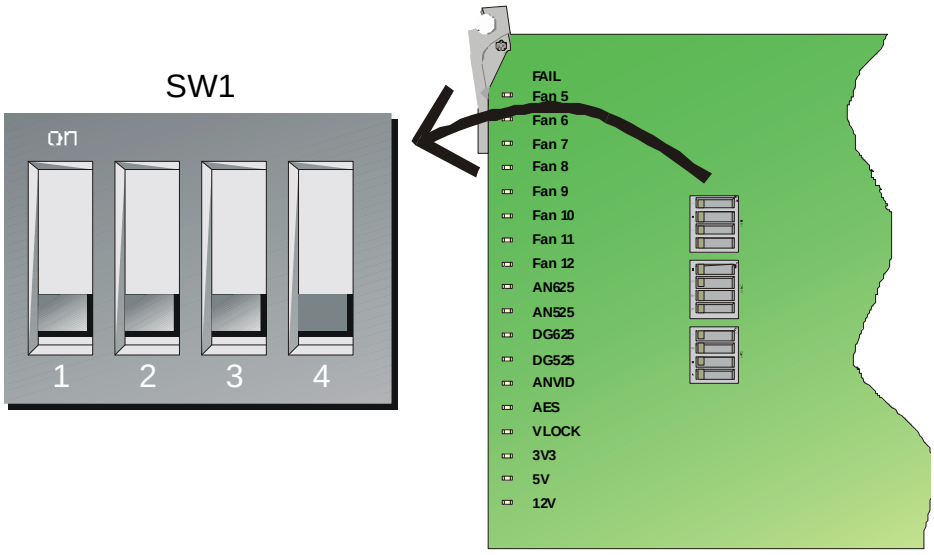

Fig 21. Fan and Monitoring Card Showing SW1 Switch

SW1 defines which of the two analogue video inputs is used as a reference (see Table 19.). The AES references will run at a sample rate of 32kHz, 44.1kHz or 48kHz. When the AES reference is locked to analogue video or is free running, an AES reference is generated, and switches on the 2428 determine the sample rate generated. When the AES reference is locked to the balanced or unbalanced AES input the sample rate will follow that applied to the

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input. The phase shifted AES reference output leads the other AES reference outputs by approximately 1uS (@ 48kHz). This signal feeds the 2434 controller to provide the correct switching point. A 2428 must be fitted if the crosspoint switching point is required to be referenced to an AES reference.

The 2428 generates sixteen 27MHz clocks and 4 color field ID signals which feed the ADC & DAC cards in the frame. There are eight 27MHz clocks 625 line operation, and another eight 27MHz clocks for 525 line operation. For each standard 2 color field ID signals are also supplied. For each standard a corresponding digital video and analogue video reference must be applied to the rear of the frame. Analogue video references are obtained from the same connector that feeds the 2434 controller, and the digital video references have their own dedicated connector. The 27MHz clocks are derived from the digital video references as this provides a low jitter clock, and the color field ID is derived from the analogue reference.

The 2428 needs both an analogue and digital reference applied if it is to correctly generate the reference required for the video ADCs/DACs.

The 2428 provides eight 12v power lines for driving the fans in the rear of the frame, LEDs on the front edge of the card indicate if a fan has failed.

SW	Position	Purpose
1	2	Sets the analogue video input used as a reference by the AES generator: On (0) – 625 line analogue input Off (1) – 525 line analogue input
1	3	FS0
1	4	FS1 (On = 0)
2	1	FS2

Table 19. Switch Descriptions

FS [2..0]	Sampling Frequency (kHz)
000	Audio Clock Generation Disabled
001	32
010	44.1
011	48

Table 20.

4.3.2.1 Replacing a Rear Fan

There are eight fans fitted to the rear of the frame. As previously described they are monitored and the appropriate LED will indicate a failure.

The fans are very reliable, but it is important in the case of a failure to be able to replace them safely and speedily. The fans are hot swappable but great care should be taken not to drop tools inside the frame.

The fan assembly edges are sharp.

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Fig 22. Rear Fan Screws

1. Unscrew the four retaining screws, see Fig 22. The screws are of the captive type and will remain with the assembly.
2. The fans may be electrically disconnected using the plug and socket connector (stereo jack). There is no need to unsolder any of the leads; the replacement fan is supplied with a pre-fitted plug. There is also no need to unscrew the fan from its assembly, as the supplied replacement is a complete assembly.
3. Connect the power lead plug (Stereo Jack) of the replacement fan assembly into the socket. The fan should power-up. Be very careful of the exposed rotating fan blades.
4. Position the power lead safely in the cavity, and screw assembly back onto the router frame.
5. The fan fail LED should now be showing normal.

When the fan assembly is removed, the fan blades are exposed, so care should be taken to keep fingers clear whilst the fans are rotating.

4.3.3 Sirius Gold Monitoring Card (2429)

The Sirius Gold Monitoring Card (2429) is described in section 4.4.1.

4.4 Monitoring Architecture

Each Input/Output card carries an 8x1 crosspoint which routes any of that cards inputs/outputs to a dedicated monitoring output. The monitoring outputs from each Input/Output card are then routed through the motherboard to the 2427 card. A 2427 card is fitted in each section of the frame and contains a 16 x 2 crosspoint feeding a video monitoring output and an audio monitoring output. The two monitoring outputs from each 2427 card are carried through the motherboard to the 2429 fitted at the top. The 2429 contains a 16x2 crosspoint that feeds a video monitoring output and an audio monitoring output on the rear of the frame. An analogue copy of each of these signals is also provided. It is therefore possible to simultaneously monitor a video signal and an audio signal from any slot in the frame.

4.4.1 Sirius Gold Monitoring Card (2429)

The 2429 card is a monitoring card for use in Sirius Gold only. The 2429 card is strongly based on the 2426 card, but has some modifications to allow it to work properly with signals originating from the lower half of the frame. The 2429 card also has the reference generation circuitry removed, as this is not required on the Sirius Gold (in a Gold frame references are generated from the 2428 card).

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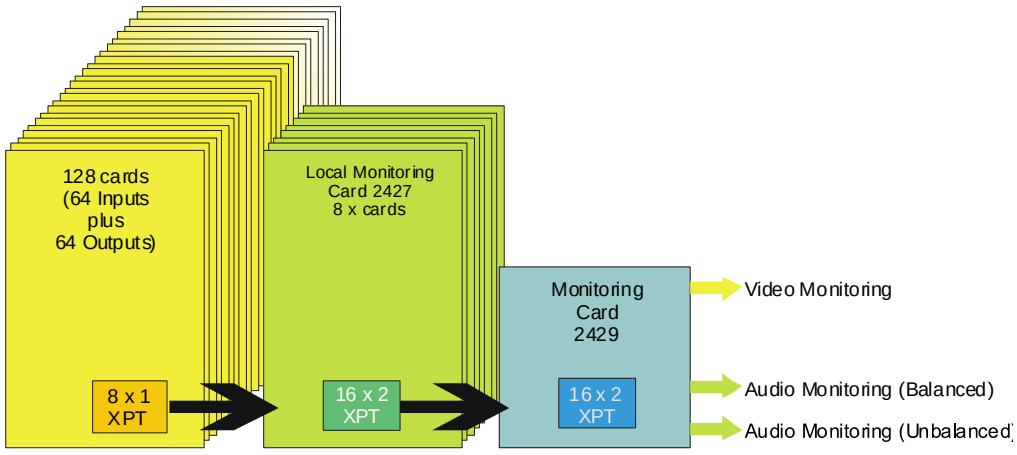

Table 21. Overview of the Sirius Gold Monitoring

The video and audio monitoring outputs from every 2427 card feed into the 2429 card, and the 2429 card has a 16 x 2 crosspoint, which allows audio and video to be simultaneously monitored. The video monitoring signal is re-clocked before being fed to the rear connector.

The audio monitoring signal is fed out in both balanced and unbalanced formats, and an analogue audio copy is also provided.

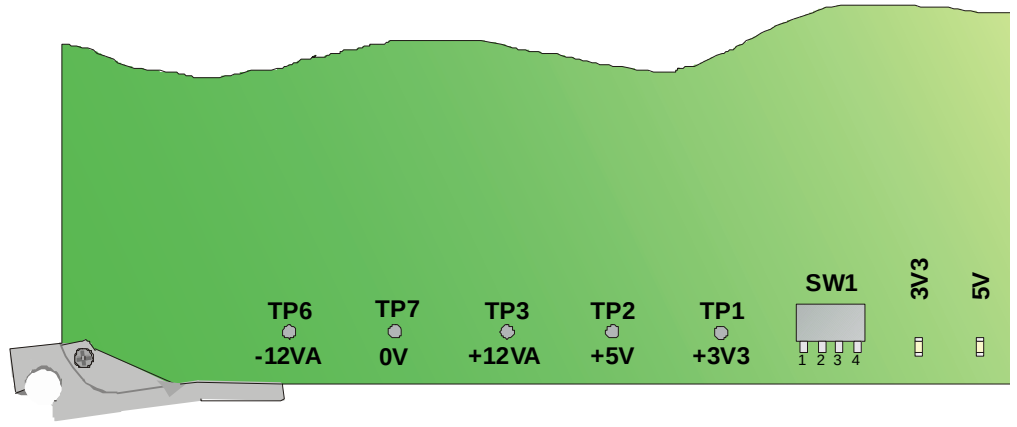

Table 22. 2429 Monitoring Card

The key voltage rails may be measured at the test points along the edge. The two LED's indicate the presence of the 3V3 and 5V voltages. There are no customer user adjustments on the 2429 card.

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4.5 Sirius Gold Rear Connectors

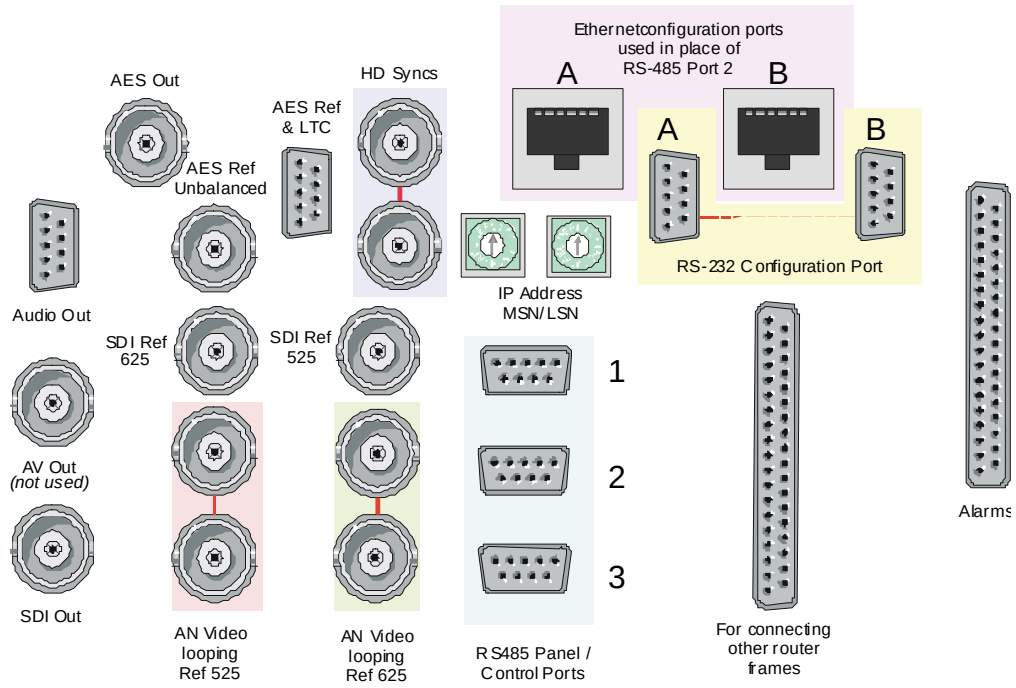

Table 23. Sirius Gold Rear Connectors

4.5.1 Sirius Gold Inputs and Outputs

Table 24. lists the Sirius Gold ports and connectors:

625 looping analogue reference	2 x BNC
525 looping analogue reference	2 x BNC
AES unbalanced reference	1 x BNC
AES balanced reference	1 x 9-way
Timecode - LTC only	1 x 9-way ** (for future use)
Looping HD Syncs (Tri-level syncs)	2 x BNC
Ethernet to each control card	2 x RJ45
RS-232 port - configuration 1 per card	2 x 9-way
RS-422 control ports External controller Automation Spare (could be emergency x-y panel)	3 x 9-way
GPI failure signals	1 x 37-way

Table 24. Sirius Gold Connectors

There is an internal communications port between the 2 controllers, and two local SPI buses to the top row and bottom row of cards for internal monitoring information.

** these functions are not currently implemented, but the connections are provided for any future developments.

The third port is for customer protocol via the Beck chip - see The Sirius Gold System User Guide 5.8.2.

All the ports can be configured to any of the protocols currently implemented on routers such as General Switcher, General Remote etc. This increases the flexibility of the ports for the user.

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4.5.1.1 Expansion Port

37 way 'D' type fixed socket

Pin	Description	Pin	Description
1	Enable (Freeway)	20	Handshake
2	Level A3	21	Level A2
3	Level A1	22	Level A0
4	Dest A6	23	Dest A5
5	Dest A4	24	Dest A3
6	Dest A2	25	Dest A1
7	Dest A0	26	Source A6
8	Source A5	27	Source A4
9	Source A3	28	Source A2
10	Source A1	29	Source A0
11	Audio 0	30	Audio 1
12	Audio 2	31	F Sync
13	Strobe	32	Dest A7 (Sirius Gold)
14	Source A7 (Sirius Gold)	33	Not Connected
15	Not Connected	34	Not Connected
16	Not Connected	35	Not Connected
17	Not Connected	36	Reserved
18	Not Connected	37	0V
19	OV		

Table 25. Expansion Port Connections

4.5.1.2 Alarm Connector

37 way 'D' type fixed socket

Note that the following states are for a powered frame, which is functioning correctly.

Pin	Function
1	PSU 1 relay normally open
2	PSU 1 relay normally closed
3	PSU 2 relay common
4	PSU 3 relay normally open
5	PSU 3 relay normally closed
6	PSU 4 relay common
7	FAN CARD 1 relay normally closed
8	FAN CARD 1 relay normally open
9	FAN CARD 2 relay common
10	FAN CARD 3 relay normally closed
11	FAN CARD 3 relay normally open
12	FAN CARD 4 relay common
13	FAN CARD 5 relay normally closed
14	FAN CARD 5 relay normally open
15	FAN CARD 6 relay common
16	Not connected

Table 26. Alarm Connector Port Connections

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Pin	Function
17	Not connected
18	Not connected
19	GND
20	PSU 1 relay common
21	PSU 2 relay normally open
22	PSU 2 relay normally closed
23	PSU 3 relay common
24	PSU 4 relay normally open
25	PSU 4 relay normally closed
26	FAN CARD 1 relay common
27	FAN CARD 2 relay normally closed
28	FAN CARD 2 relay normally open
29	FAN CARD 3 relay common
30	FAN CARD 4 relay normally closed
31	FAN CARD 4 relay normally open
32	FAN CARD 5 relay common
33	FAN CARD 6 relay normally closed
34	FAN CARD 6 relay normally open
35	Not connected
36	Not connected
37	Not connected

Table 26. Alarm Connector Port Connections

Router Monitoring Status Reporting:

This is done through the Ethernet port using SNMP protocol.

The power supplies report fan fail or power fail status. The cards are able to report what type they are, the crosspoint cards are able to relay video standard detection and some audio cards can report valid signals however this is not currently available to the system controllers.

4.5.1.3 Ethernet Port:

Any router database configuration is done through the RS232 ports using the Snell router editor program. Configuration of the Ethernet set-up is via a custom program or using a web browser.

Panel names and source destination names will all be done on a remote PC using editors and downloaded to the router database. Online changes can also be done.

IP addressing is achieved by setting each router with a unique static IP address. The units are shipped with dynamic IP enabled. There is a custom piece of software shipped with the router that enables the user to find the device on their network and to configure it as required. The chip can be given a unique name, location and system identifier, to show up on a local SNMP client.

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4.6 Connecting Your Router

Table 23. shows the rear connectors.

If SMPTE RP168 compliant switching is required, an appropriate reference must be connected such as an analogue video 'black and burst' feed of either 625 line PAL, 525 line NTSC SD, or a tri-level sync; or all three for a mixed standard system. A digital audio router may require a balanced or unbalanced AES reference if it is not being run synchronously with video.

To connect a Nebula database editor, use the 'RS232 configuration port' for 'CTRL A', this will work unless a controller changeover has occurred, in which case the 'CTRL B' port must be used.

An external control system may be connected using an Ethernet or RS485 serial port. Ensure that the jumpers on the 2434 control card are configured appropriately by referring to the 'Configuring the control module section of the main Sirius Gold user guide.

4.6.1 Controlling Your Router

Every Sirius Gold router must have at least one control card; this may be a 2434 or 2435. Two of the same type may be fitted for redundancy. The 2434 card is the Nebula controller, which holds the system database. The 2435 is an 'interface' card and is only fitted in frames that are 'slaved' to frames with a 2434 Nebula controller. The only difference between the two card types is that the 2434 is fitted with a 2445 sub-board, and the 2435 is not.

4.6.2 Configuration

The configuration is described in the Nebula manual.

4.7 Power Supplies

The Power supplies are fitted in the top section of the frame. The door is constructed of heavy gauge metal and care should be taken when removing it from the frame.

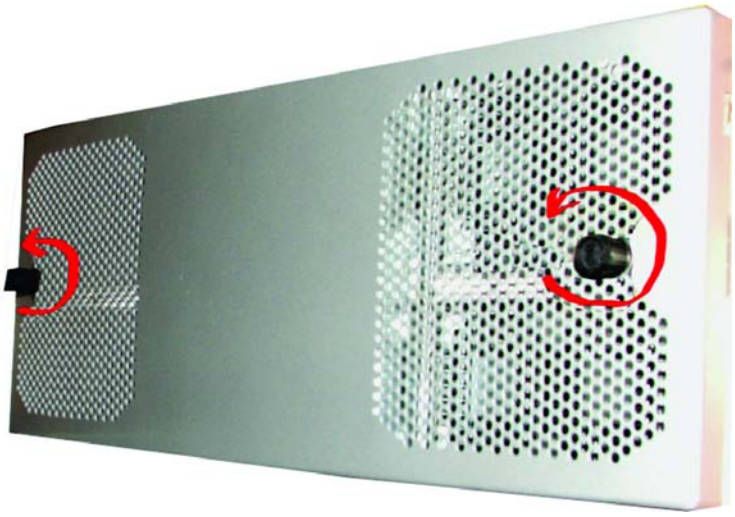

Fig 23. Sirius Gold Top Door

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4.7.1 Releasing the door

The door is held in place by two side catches, see Fig 24. Support the weight of the door and turn the knurled knobs CCW to release the catches. The catches have a self return spring mechanism and need to be held open. Take care as the doors are relatively heavy and upon release will separate from the frame completely.

Fig 24. Door Catch

4.7.2 Fitting the Door

Offer the door up to the frame and press firmly to fit into place. Ensure that each of the catches click into place before supporting the weight.

4.7.3 Power Supplies

Sirius Gold uses a minimum of two PSU's, which may be fitted, in any of the slots. The normal redundancy configuration uses four power supplies.

Fig 25. Power Supplies

HIGH VOLTAGE
The Power Supplies are sealed units
They do not contain any serviceable items

Each power supply is a sealed unit and does not contain any serviceable items.

The units have auto-sensing inputs, which can accept inputs of between 100 - 240 Vac ±10% 50/60Hz.

The IEC mains connectors are fitted with a 10A fuse and should always be replaced with the same type. The output is 48V and is fed to all the frame cards. All four power PSU's are always live and are electrically arranged to share the load equally between them. The units are hot swappable.

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4.7.4 Removing a Power Supply Unit (PSU)

The units are located in the top of the frame and are heavy, so be prepared to support their weight.

1. Remove the retaining plate by turning the two knurled knobs CCW. The screws are spring-loaded and captive; they will not separate from the retaining plate.
2. Using a screwdriver or a similar tool, release and swing the handle into the serviceable position.
3. Pull the PSU slowly out whilst supporting its weight.

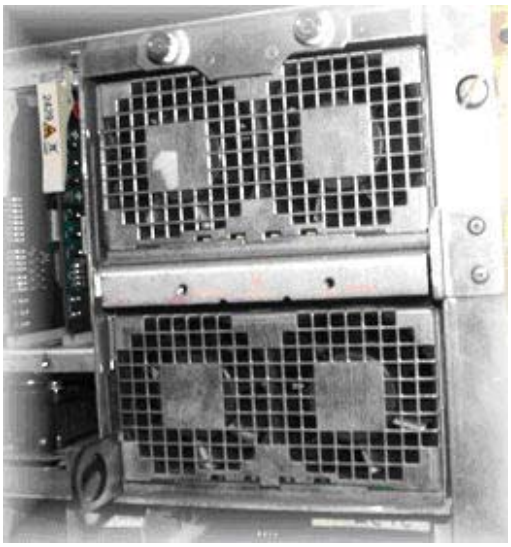

Fig 26. Right-Hand PSUs

4.7.5 Fitting a Replacement Power Supply

1. Offer the PSU to the frame. Keeping the unit straight and level, push into place.
2. Close handle by rotating upwards and inwards.
3. Fit retaining plate.
4. PSU will now be live.

4.8 Specification

General	
PSU monitor	Failure alarm relay and reported on SNMP I/F
Fan monitor	Failure alarm relay and reported on SNMP I/F
Control	
Control	2 x RS-485, panel/remote control
	2 x Ethernet
Configuration	1 x RS-232 main
	(1 x RS-232 backup optional)
Expansion	1 x parallel port
Reference	Analogue loop through 625 and 525.
AES-11 for audio.	
HD tri level sync	

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Connectors	
Power	3 way IEC
PSU/Fan monitor	37 - way D-type socket
Control	9 way D-type socket
Configuration	9 way D-type socket
Control expansion	37 way D-type socket
AES Ref	9 way D-type socket or BNC
Mechanical	Gold - 39U high 19 inch rack
	mounting x 490mm (19 inch) deep
Environmental	Cooling Fan assisted
	0-40°C air inlet temperature (operating)
	0-70°C storage.

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5. The Nebula Control System

5.1 Controlling Sirius

All Master Sirius routers are supplied with a built-in 'Nebula' control system, meaning that control panels and Under Monitor Displays may be directly connected to the unit. Any router control system requires a 'database' of configuration details, such as the number of logical levels, signal types and control panel functions. For ease of use, such a database is supplied with Nebula, known as a 'fixed' database, the exact details of which are described in the Nebula User Guide. Alternatively, the user may connect a database editor to the unit, using the supplied software and a cable, and use either a sample database, or edit their own custom database.

The sample databases are located on the Snell user manual CD ROM, in the control section and are described in the Nebula User Guide.

5.2 Control Module Functions

The control module is fundamental to the operation of the Sirius routing system. It is a microprocessor-based module with battery backed-up non-volatile memory (NVRAM). The system code is contained in flash memory, allowing rapid boot-up and easy code upgrades. The NVRAM holds a record of the system crosspoint settings (known as the 'tally table'), ensuring that the router status is maintained following power interruptions or signal card removal. It also holds an exact record of the router crosspoint hardware, known as the 'configuration', which allows the control card to check that all crosspoints are present following a reset or power down. Finally, the system database is also held in this memory.

The control module connects to all router crosspoint cards using a parallel control bus, this is used to detect card presence and for setting crosspoints. Input and output cards are detected by the control module using a serial bus, while PSUs and fan modules connect to the controller via logic lines, which pass all status data.

All external communication is passed through the control module, whether it is for remote control of the router, or for the connection of control panels and Under Monitor Displays. Finally, the control module detects reference signals, both audio and video, and determines at what point to make a crosspoint switch, in the absence of valid reference signals a 'crash' switch will be implemented.

The control module has configuration switches which determine the operation of the system, details of these switches are given in the next section of this manual. Some of these switches are used to configure the number and size of logical levels that the user wishes to implement, these levels must then correspond to the database in use. At its upper limit, Sirius may have 8 levels, each of 256x256 in size. Such a configuration would require eight 16U Sirius frames, one being designated the 'master', and containing the control module, the others being 'slave' frames, requiring only an 'interface' module. The smallest level size permitted is 16x16, which would allow 8 levels of 16x16 to occupy a single 7U frame, under the control of a single control module.

An important distinction between the Sirius 16U frame and the 7U version is the level 'boundary'. A fully equipped 7U router may be 'partitioned' into different levels, usually of different signal types. For instance, a 7U frame could contain a 64x64 video level and a 64x64 audio level. The smallest level size for a 7U frame is 16x16, and all levels can only be a multiple of this dimension, i.e. 32x32, 48x48, 64x64, 80x80, 96x96, 112x112 or 128x128. In a 16U frame the level boundary is 32, therefore the smallest level size is 32x32, and level sizes increase by 32x32 up to a maximum of 256x256. This level partitioning is configured using HEX switches on the control and interface cards, as detailed in the next chapter.

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5.3 An Example Multi-level System

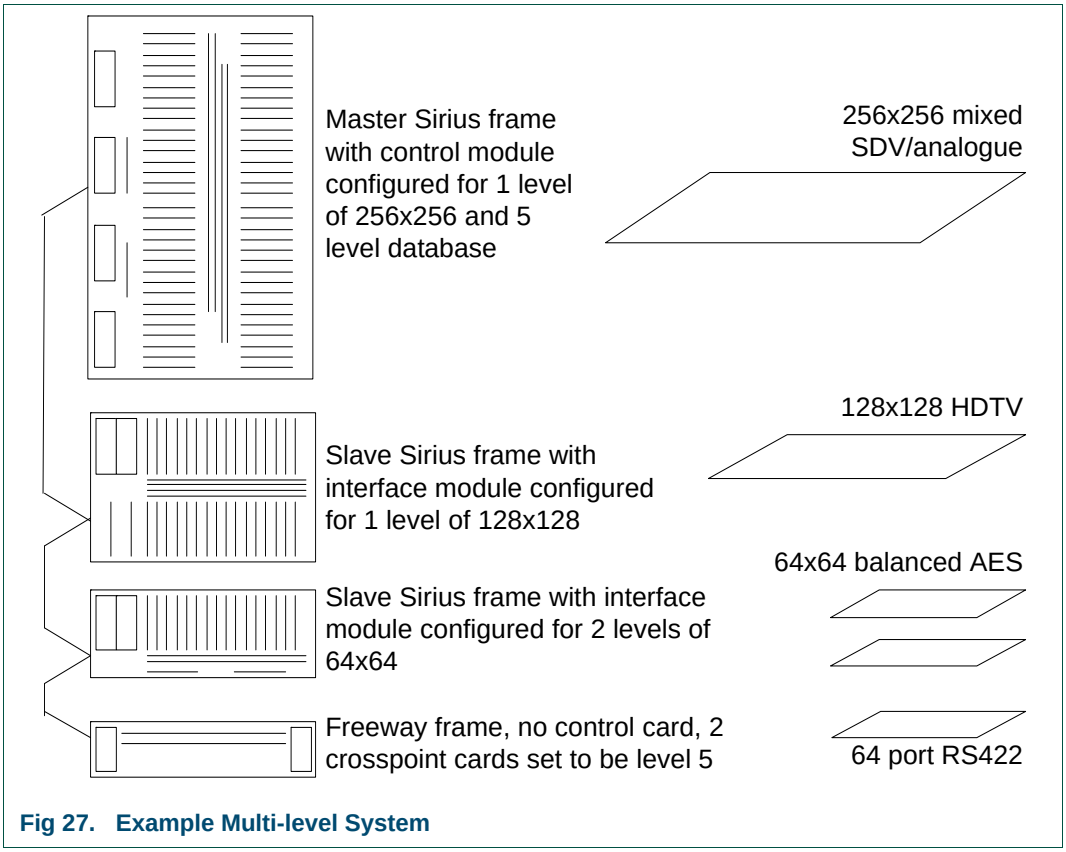

Fig 27. Example Multi-level System

General notes for configuring a multi-level system:

- The Sirius control module must be in the first frame in the control chain.
- The Sirius frame with the control module is known as the Master frame.
- The Master frame does not have to contain the primary level.
- Slave Sirius frames need an interface module in place of a control module.
- Slave Freeway frames do not require a control module.
- Control interconnect cables are supplied with Slave Sirius or Freeway frames.
- Slave AES or Analogue Audio levels require an AES reference to ensure click-free switching, see Section 3.12, but do not need a video reference.

5.4 Control Module and Editor Versions

Since the Sirius 4U and 7U frames were developed as replacements for Freeway, they were able to make use of the system structure built into the Freeway control card, which is now used as the basis for these frames. However, with the development of the Sirius 16U frame, and the consequent increase in the maximum router size from 128x128 to 256x256, a new control structure was required. For this reason there are currently two builds of Sirius control module, the 2430 for the 4U and 7U frames, based around the Freeway control card, and the 2432 for the 16U frame, based around a new control card. Later updates for Sirius Gold means that Sirius 600 systems are now supplied with a 2434 controller which expands the maximum router size to 512 x 512.

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5.4.1 2430 Control Module

The Sirius 4U and 7U control module consists of a 2445 processor sub-board fitted to a 2434 carrier card. The 2445 has the same electronics as the Freeway control card and uses battery-backed RAM to hold the database, tally table and configuration data.

5.4.2 2431 Interface Module

Used in the 4U and 7U Sirius Slave frame, and consists of the 2430 control module without the 2441 sub-board.

5.4.3 2432 Control Module

A new build of carrier card, with a new design of control module sub-board, now designated 2443. The 2443 uses newer technology for the Non-Volatile RAM, known as FRAM (Ferro-electric RAM), for which no battery is required. Replaces the 2430 for use in all frames.

5.4.4 2433 Interface Module

Used in all Sirius Slave frames, and consists of the 2432 control module without the 2443 sub-board. Replaces the 2431.

5.4.5 2434 and 2435

- 2434: Updated version of 2432 using Nebula V3 databases. Expands the router size to 512 x 512.
- 2435: Updated slave interface to be used with the 2434 controllers in expanded systems.

5.4.6 Snell Router Editor

Early 4U and 7U Sirius routers used the same control processor as Freeways, fitted to a 2430 Sirius controller. These cards use the Snell router editor for database configuration.

5.4.7 Nebula Editor

2432 control cards have a different database structure and additional features. These cards require the Nebula Editor.

Note:

Important Notes:

- 2430s will not work with Nebula Editors
- 2432s will not work with Snell Router Editors
- 2430s cannot be mixed with 2432s in the same frame
- 2431s cannot be mixed with 2433s in the same frame
- 2434s cannot be mixed with 2430s or 2432s in the same frame
- 2435s cannot be mixed with 2430s or 2432s in the same frame

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5.5 Dual Redundant Controller Operation

Since the Sirius control module not only holds the database, but is also the channel of communication with the routing switcher, its failure would render the system inoperable. When dual control modules are fitted, a fully redundant control system is available, where changeover is both transparent and immediate.

When two control modules are fitted in a Sirius control system, one must be designated 'Master' and the other as 'Slave', using switches on the module. See the next section of this manual.

In a dual control system one module will always be 'ACTIVE' while the other is 'IDLE'. In the event of the 'ACTIVE' controller failing, the 'IDLE' controller will take over control of the frame and become 'ACTIVE'.

On power up, the control module designated MASTER will become 'ACTIVE'. Every main loop, the software checks whether a changeover has occurred. When a controller changes state from 'IDLE' to 'ACTIVE', a message is issued to the remote control ports, such that any external system, such as Aurora, will be able to report the change.

All data is synchronised constantly between the dual controllers, using an internal serial link. This data includes the tally table, configuration and database, ensuring that in the event of a changeover no crosspoints change and all configuration parameters remain the same. Since all control ports and reference signals connect only to the active controller, using tri-state drivers, a controller changeover will be transparent to the user.

A controller changeover may be forced by the user by either pressing the reset button on the active controller, or by removing the active controller.

In the event of a second controller, configured as a slave, being plugged into a single controller system, all data is automatically transferred from the active controller.

Do not press the reset on the ACTIVE control module or remove the ACTIVE module after plugging in the IDLE controller. It takes up to ten minutes to download the database. If the reset is pressed during this time ALL DATABASE SETTINGS WILL BE LOST, and the default database and tally table loaded.

Both the Master and Slave modules have an RS232 configuration port, and only one of these will ever be active at any time, being the port associated with the Active controller. The RS232 port for the Idle controller will always be disabled. If the user needs to load or edit a system database, they must connect the editor to the active port, any attempted connection to the idle controller will fail.

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5.6 System Diagram

Fig 28. shows the interconnection of control modules within the Sirius and Freeway systems:

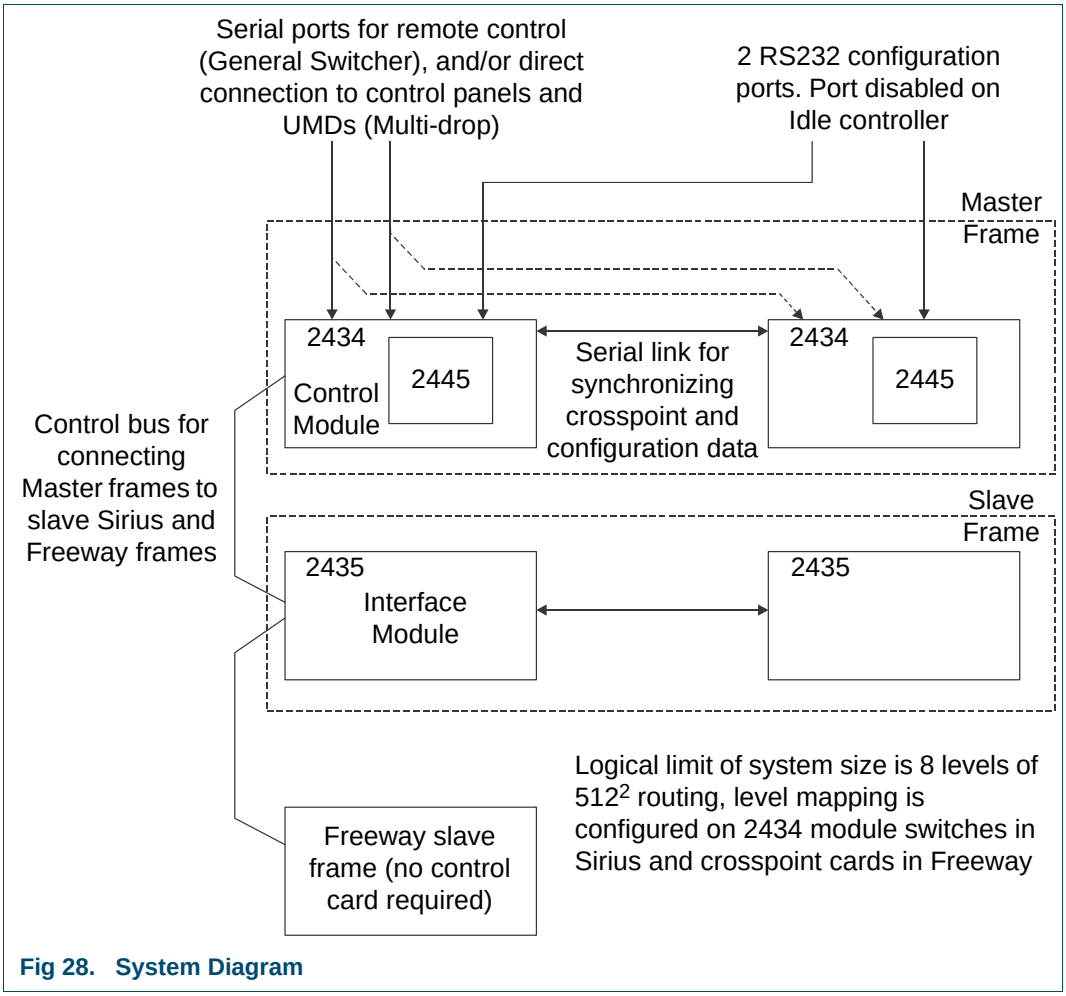

Fig 28. System Diagram

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6. Configuring the Control Module

6.1 Choosing a Fixed or Editable Database

In order to use the built-in Nebula control system, or control Sirius 600 from another control system, such as Aurora, the user must configure the Sirius 600 control module appropriately. Any router control system requires a 'database' of configuration details, such as the number of logical levels, signal types and control panel functions. For ease of use, the control module has a 'fixed' control database embedded in it's program code, which the user may select to activate, enabling a basic system to be controlled 'out-of-the-box', either locally or remotely. Full details of this database are described in the Nebula User Guide. If the user needs to program the system with their own data, such as source and destination names, non-standard level sizes or the ability to use audio parameters, then the Windows based editor will be required to edit a 'configurable' database.

If the user decides to use a 'configurable' database they should refer to the Nebula User Guide, which explains the installation and connection of the editor. Having done this, a selection of 'sample' databases are also available on the supplied CD ROM, which may be used directly, or edited for the users own purpose.

6.2 The Sirius 600 Control and Interface Modules

The Sirius 600 control module consists of a processor sub-board fitted to a carrier card. Both cards have configuration switches which determine the operation of the system, details of these switches are given in the following sections. If the users system includes any slave frames, each of these will also have a control module, but it will not have the processor sub-board fitted, this module will be referred to as the 'interface' module and is given the part number 2431, 2433 or 2435.

There are three builds of Sirius 600 control module, the 2430, 2432 and 2434 for use with the Sirius 610 (4U) and Sirius 620 (7U) Master frames only, and its replacements the 2432 and 2434 for use with all frames.

6.2.1 2430/2/4 Control Modules

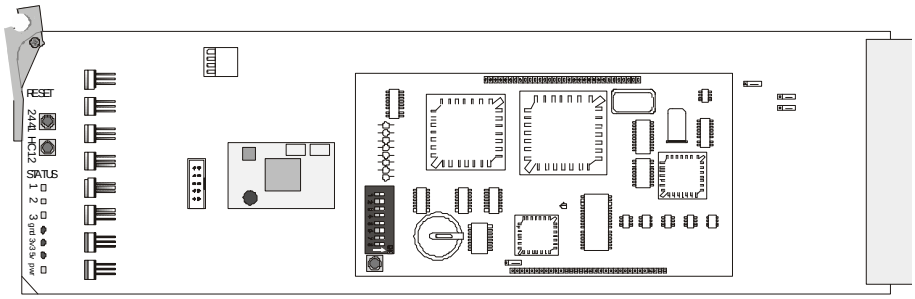

Fig 29. 2430/2/4 Control Module

6.2.2 2431/3/5 Interface Modules

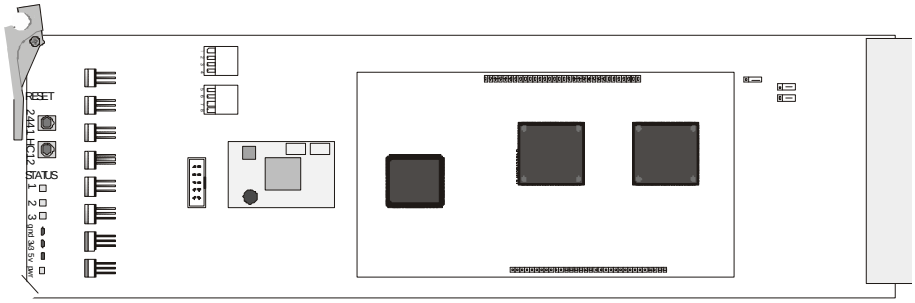

Fig 30. 2431/3/5 Interface Module

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6.3 2441/3/5 Configuration Switches

These switches are basic to the operation of the control system, it is therefore important that reference is made to the following table before the system is used:

Switch SW 2	Function	Selection	
		OFF	ON
1	MASTER/SLAVE SELECT	SLAVE	MASTER
2	µP CLOCK SELECT	10 MHz	20 MHz
3	SYSTEM RUN MODE	NORMAL	TEST
4	RS232 PORT BAUD RATE	9Sirius 600	38400
5	DEFAULT TRIGGER SELECT	625	525
6	RE-CONFIGURE	MANUAL	AUTO
7	DATABASE TYPE	FIXED	CONFIGURE
8	CONTROL MODE	GENERAL SWITCHER	PANELS

Table 27. 2441/3/5 Configuration Switches

6.3.1 Switch Descriptions

SW2_1 Master/Slave select is used, in dual control situations, to assign Master/Slave status to the 244X control modules. One module would be set to MASTER and the other to SLAVE so that on reset or power up the Master 244X powers up first and, hence, always becomes the active controller.

SW2_2 P clock select is used to select between 10 MHz and 20MHz uP clock frequency, the lower rate is only used for debugging purposes.

SW2_3 System Run Mode determines which mode of operation the Sirius 600 powers up in (i.e. NORMAL or TEST). NORMAL is the standard mode of operation. TEST selects a special test mode where various features of the 244X hardware can be tested by Snell.

SW2_4 RS232 port BAUD rate select. This port is used by the Windows database editor which runs on a PC using it's COM port. The editor software will automatically detect the BAUD rate configured, and therefore this rate only needs changing to 9Sirius 600 BAUD if the PC being used has difficulty communicating at 38400 BAUD.

SW2_5 Default trigger select is used to select between 625 or 525 reference to be assigned to each source for the fixed databases.

SW2_6 Reconfigure selects between AUTOmatic reconfigure of cards in the system on power-up or reset and MANUAL, in which the system configuration is compared to that held in non-volatile memory. It is recommended that during initial configuration the switch be set to AUTO, and when the final desired configuration is achieved, the switch changed to MANUAL. In this way the control card will always look for the intended system card configuration, and if cards or slave systems appear after the initial power-up, they will not be de-configured from the system.

SW2_7 Database Type selects whether to use the fixed, non-editable database or the editable one.

SW2_8 Control mode is used in conjunction with sw2_7 to select which protocol the serial control ports will use. 'GENERAL' configures both RS485 ports to support General Switcher protocol. 'PANELS' configures both RS485 Remote ports to support Multi-drop Communications protocol. See the next section for a description of these protocols.

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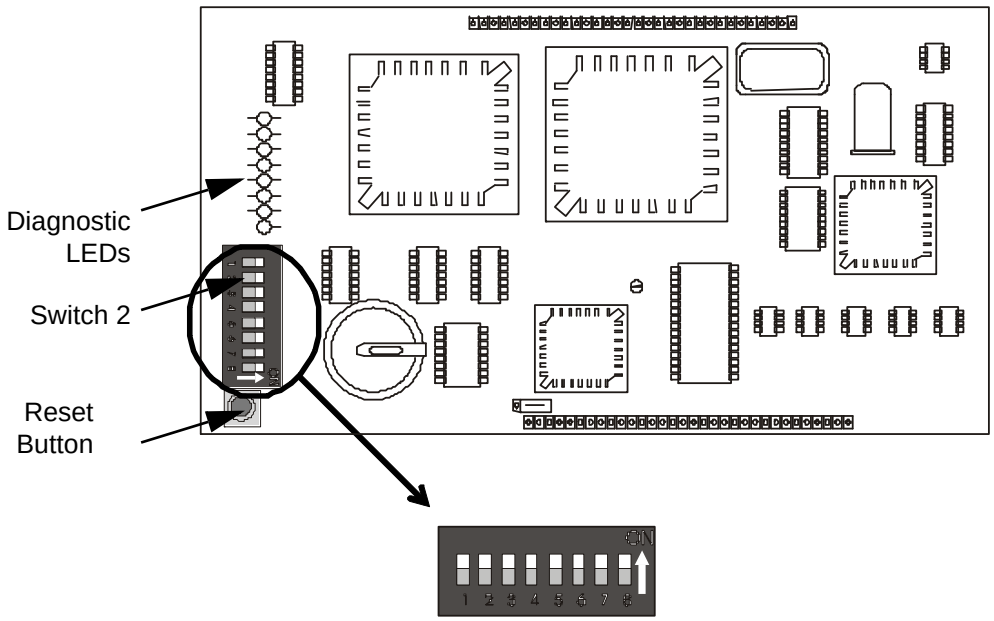

Fig 31. 2441/3/5 Control Module

6.4 2441/3/5 Diagnostic LEDS

The 8 yellow diagnostic LEDS on the 2441/3/5 have the following definitions:

LED	Function
1	POWER ON
2	RESET
3	CONTROL CARD ACTIVE
4	Flashing at 2Hz - ACTIVE CONTROLLER Flashing at 1Hz - STANDBY CONTROLLER
5	CROSSPOINT SET - FLASHES WHEN SET
6	NO HANDSHAKE FROM A MODULE
7	525 REFERENCE INPUT DETECTED
8	625 REFERENCE INPUT DETECTED
4,8	4 on & 8 flashing: R/W error with RAM
4,7	4 on & 7 flashing: Checksum error in EPROM

Table 28. 2441/3/5 Diagnostic LEDS

6.5 Reset Buttons

The 2430, 2432 and 2434 control modules have reset buttons on the front edge labelled 2440, 2442 and 2444, which perform exactly the same function as the reset button on the sub board (which is not normally accessible). This reset causes the processor to re-boot, a process that takes only a few seconds, it will NOT lose the system database or change any crosspoint settings. If switch 2_6 on the 2441/3/5 card is set to 'AUTO', a reset will also force the control module to interrogate all the cards in the frame and update it's configuration information. It is therefore important to perform a reset whenever the system size has been increased or decreased, and then set switch 2_6 to MANUAL, to avoid over-writing this configuration should the system be partially powered on a reset.

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All modules also have a Reset button labelled 'HC12', which forces the on-board processor, common to both modules, to re-boot. This action will not cause any change of status, but will interrupt all control functions for several seconds.

Both modules may be safely 'hot plugged', which performs the same function as a reset.

6.6 Control Port Details

Sirius 600 has three serial and two Ethernet ports available on the rear connector panel as follows:

- 2 x RS485 ports (9 pin D type), common to both control cards but only connected to the active controller, configured by the system database
- 1 x RS232 Editor port for each control card (9 pin D type) for connecting directly to a PC COM port
- 1 x Ethernet port (RJ45) for each control card, available as an alternative to the second RS485 port, as configured by the 2445/2/4/4 jumper setting (see Section 5.8.3). The second RS485 port must be configured for General Switcher protocol in the database for this port to function.
- A third serial port available as an alternative to the Ethernet port (2432 and 2434 only), as configured by the jumper settings, which also configure this port to be RS232 or RS485. This port is intended for a customer specified control protocol implemented by Snell, and therefore by default will be inactive.

When using the Fixed Database (as selected by control module switch 2_7), the RS485 ports must then be configured using control module switch 2_8. See the previous section for these details. When using an editable database, the user must select from one of four protocols for each of these ports, as follows:

- General Switcher Protocol (SW-P-02)
- Multi-drop Communications Protocol (SW-P-06)
- General Remote Control Protocol (SW-P-08), not available with fixed database
- Simple Switcher Protocol (SW-P-03), not available with fixed database

6.7 Control Protocol Descriptions

6.7.1 Snell General Switcher Protocol (SW-P-02)

Snell General Switcher Communication Protocol is the preferred method of controlling Snell routers. It uses numbers in the range 0 to 1023 to set, acknowledge and poll crosspoints via a single router control module. Sirius 600 ports must be configured for this protocol if the router is to be controlled by an Aurora control system. If the Sirius 600 is a multi-level router, and configured as such in it's database, all levels may be controlled using an appropriate destination offset in the Aurora database settings. For example:

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Aurora Port to Matrix Assignments		Sirius 600 Database settings
Level 1:		Level 1:
source offset 0		128 sources
destination offset 0		128 destinations
Level 2:		Level 2:
source offset 0	General switcher protocol	128 sources
destination offset 128		128 destinations
Level 3:		Level 3:
source offset 0		128 sources
destination offset 256		128 destinations

Table 29. Example General Switcher Protocol

In summary, in order for Aurora (or any system using General Switcher protocol) to control a multi-level Sirius 600, the user must have knowledge of the local database in use, only then can the router control module direct the correct the data to the correct crosspoints.

The normal electrical parameters for this port are:

- RS485 on a 9 pin D type socket configured as 'device'
- 8 bit data
- 1 stop bit
- EVEN parity
- 38.4K baud

Although labeled 'RS485', this port is actually software configured to be point to point, as with RS422, when using this protocol.

The full specification for this protocol is available from Snell, or on our website (www.Snell.com/documentation).

6.7.1.1 Snell General Remote Control Protocol (SW-P-08)

This protocol has been developed to provide a common method of interfacing Snell router control systems to a variety of standard and custom applications. An example of the use of this protocol would be the interfacing of the Sirius 600 system to an Aurora Soft Panel control system, or to a TSL Under Monitor Display system. General Remote protocol allows the controlling system to access and control all system parameters, using the database configured names, as well as level, source and destination numbers.

The full specification for this protocol is available from Snell.

6.7.2 Snell Multi-Drop Communications Protocol (SW-P-06)

This protocol is designed to communicate between a Snell router control system and router control panels and Under Monitor Displays. Up to sixteen 'devices' may be 'daisy-chained' onto one multi-drop control port, each device requires a unique address, identified using a rotary HEX switch. The control system database must hold configuration data for all devices.

The full specification for this protocol is available from Snell.

6.7.3 Snell Simple Switcher Protocol (SW-P-03)

Similar to General Switcher Protocol but with reduced capability, such as only being able to address 128 destinations. Has the advantage of being able to set more crosspoints per video frame than General Switcher. The port may also be configured for baud rates up 230kbaud.

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6.8 2430/2432/2434 Configuration Switches

The 2430/2/4 module has a number of configuration switches which are critical to the operation of the system. These switches are active for both the control and interface versions of the module; see Section 6.1.2 for an explanation of these modules.

The switches on this module are as follows:

- 4-way DIP switch for setting the Master/Slave mode in a dual controller system, and also for identifying the frame type
- 8 rotary HEX switches for setting up the level mapping
- 2 jumpers for selecting between RS485 or Ethernet port operation
- 1 jumper to select RS232 or RS485 for the third serial port (2432 and 2434 only)

6.8.1 Setting the 4-way DIP switches

The 4-way DIP switches on these modules must be set correctly to match the master/slave mode and the host frame type.

In a dual controller system, that is, a master frame with two 2430/2/4 control modules fitted, one module must be configured as 'Master' and one as 'Slave'. See the section entitled 'Dual Redundant Controller Operation' for an explanation. A slave Sirius 600 frame may also be fitted with dual 2431/3/5 interface modules, which then operate completely independently to the control modules in the master frame. Master or slave mode is selected using the 'CONFIG' switch; on a 2430/2/4 module this mode must match that configured on the 2441/3/5 sub-board.

Positions 3 and 4 of the DIP switch set the frame type, which must be one of the following types:

- Any Sirius 620 (7U), or a Sirius 610 (4U) with 'square' levels (16x16, 32x32, 64x64 etc.)
- A Sirius 610 (4U) with non-square levels (96x32, 120x8 etc.)
- A Balanced AES Sirius 610 (4U) (using 4999 Input/Output cards)
- An Unbalanced AES Sirius 610 (4U) with up to 64 destinations, with only one 4911 crosspoint card

Positions 5,6 and 7 are not used

Position 8 is used to define the frame as Sirius 610 (4U) or Sirius 620 (7U) for SNMP monitoring. It has no effect on the function of the controller when not running the router SNMP agent on the Ethernet interface.

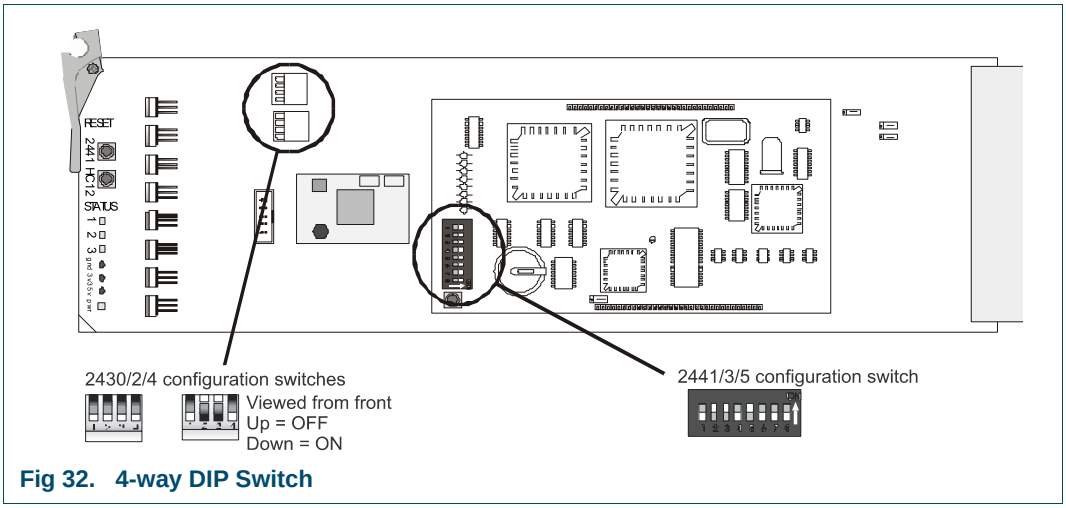

Fig 32. 4-way DIP Switch

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Table 30. lists the 4-way DIP switch settings.

Switches	ON	OFF
1	Master	Slave
2	Defines 2430/2/4 (with 2431/3/5)	Defines 2430/2/4 (without 2431/3/5)
3	See table below.	
4		
5,6,7	Not used	
8	Sirius 610 (4U)	Sirius 620 (7U)

Table 30. 4-way DIP Switch Settings

Switches 3 and 4	3	4
All systems with 'square' levels	ON	ON
Sirius 610 (4U) with non-square levels	OFF	ON
Combined AES in Sirius 610 (4U) (4999 Input/Output cards)	ON	OFF
Unbalanced 64x64 in Sirius 610 (4U) (1x4911 crosspoint card)	OFF	OFF

Table 31. DIP Switch Settings for Switch 3 and 4

2441/3/5 configuration switch	
1	ON: Master, OFF: Slave

Table 32. 2441/3/5 configuration switch

It is important that when configuring a control module, the 2430/2/4 configuration switch 1 setting matches the 2441/3/5 configuration switch 1 setting.

If a 4911 crosspoint card is fitted, SW1 positions 1 and 2 on the 4911 must be set to match switches 3 and 4 of the host 243X

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6.8.2 Selecting Serial RS485-2, RS485-3, or Ethernet Control

The Sirius 600 controller has several user selectable options for control interfaces. RS485 ports 2 and 3 and the Ethernet port can be selected using jumpers and functionality changed using different software loaded onto the Ethernet interface chip.

Fig 33. shows a diagram of the Serial/Ethernet interfaces:

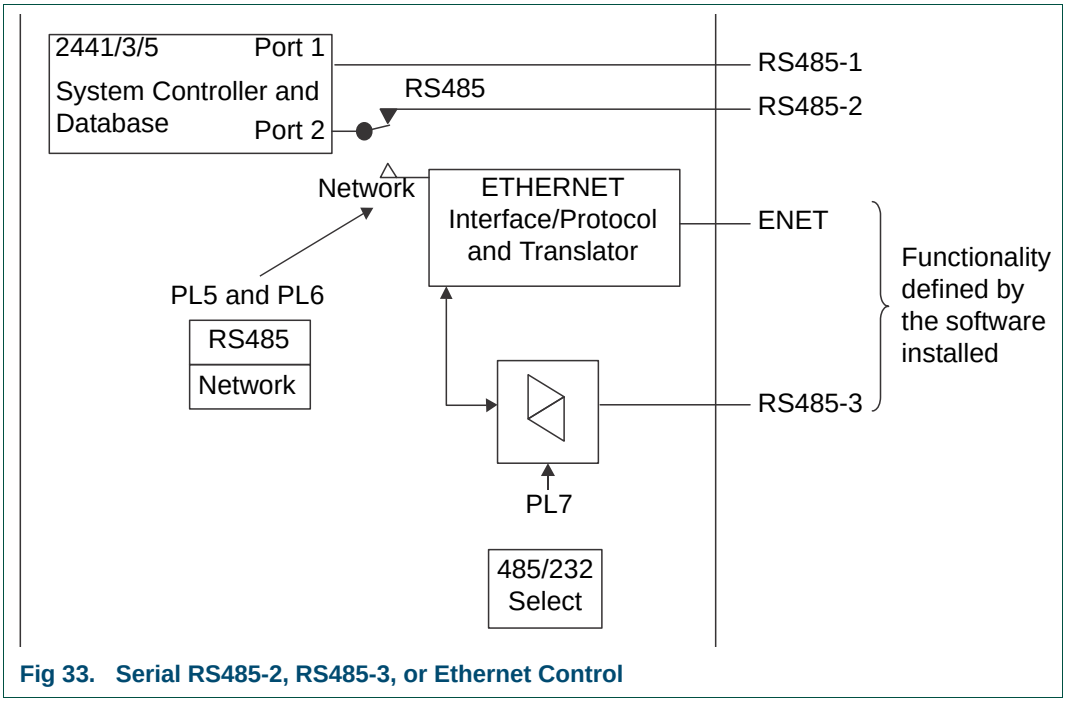

Fig 33. Serial RS485-2, RS485-3, or Ethernet Control

All control modules have the Ethernet port available. On the 2430/2/4 this may be used to control the router using General Switcher protocol over SNMP, and on the 2431/3/5 it will issue alarm and status information for the host frame using General Switcher protocol format. The user may select either the second or third RS485 port, or the Ethernet port, using jumpers PL5, 6 and 7, see Table 33. and Table 34.

Select Ethernet or RS485 Control	
PL5 & 6 set to NETWORK	Ethernet port configured for General Switcher over SNMP, RS485 port 2 disabled OR RS485 port 2 disabled, serial control now via RS485 port 3 using internal protocol translation (using software loaded via the ethernet port)
PL5 & 6 set to RS485	RS485 port 2 enabled with protocol as set in database, Ethernet disabled

Table 33. Select Ethernet or RS485 control

Select RS232 or RS485 on Third Serial Port	
PL7 set to RS232 or RS485	Selects unbalanced or balanced configuration using pinouts specified in the agreed protocol

Table 34. Select RS232 or RS485 on third serial port

Important: These settings must be the same on both the A and B control cards in any frame, or the port functionality will be lost in the event of a master/slave changeover.

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6.8.3 Level Mapping in a Sirius 630 (16U)

The level mapping in a Sirius 630 (16U) is exactly the same as in a Sirius 620 (7U) with the important difference that the level boundary is 32 instead of 16. The smallest level size for a Sirius 620 (7U) is 16x16, and all levels can only be a multiple of this dimension, i.e. 32x32, 48x48, 64x64, 80x80, 96x96, 112x112 or 128x128. In a Sirius 630 (16U) the level boundary is 32, therefore the smallest level size is 32x32, and level sizes increase by 32x32 up to a maximum of 256x256. Therefore the 8 HEX switches on a Sirius 600 630 control card correspond to blocks of 32 outputs, see Table 35.

HEX Switch	A	B	C	D	E	F	G	H
Destination Range	1-32	33-64	65-96	97-128	129-160	161-192	193-224	225-256

Table 35. Level Mapping in a Sirius 630 (16U)

6.8.4 Level Mapping in a Sirius 620 (7U)

Every Master and Slave Sirius 600 frame must have the level mapping configured to reflect the desired system operation. This mapping must also lie within the database configuration in use, whether it is the fixed or configured database.

Level mapping describes how many routing levels, and of what size, exists in the system. A single Sirius 600 frame may contain up to eight levels of differing sizes, and it is the level mapping switches that determine this.

The level mapping is set up with eight rotary HEX switches on the front edge of the control and interface module, which are labelled like this:

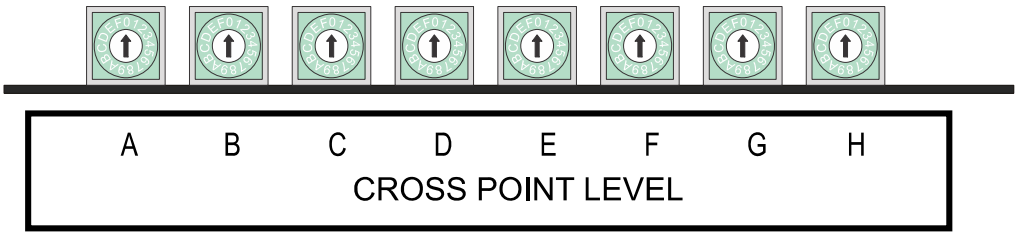

Fig 34. Level Mapping in a Sirius 620 (7U)

Each switch defines which level each block of 16 sources and destinations are allocated to, with numbering starting at zero, see Table 36.

HEX Switch Position	0	1	2	3	4	5	6	7
Control Routing Level	1	2	3	4	5	6	7	8
HEX Switch	A	B	C	D	E	F	G	H
Destination Range	1-16	17-32	33-48	49-64	65-80	81-96	97-112	113-128

Table 36. Level Mapping in a Sirius 620 (7U)

6.8.5 Level Mapping in a Sirius 610 (4U)

If a Sirius 610 (4U) has 'square' levels, the level mapping is configured exactly as with the Sirius 620 (7U) in the previous section, except that switches E to H will be unused, because the total router size will not exceed 64x64. Switches E to H should be left set to 0.

A Sirius 610 (4U) has the extra flexibility that it may be configured to have non-square levels, see Section 3.4, in which case the HEX switches have extended meaning.

The following is an explanation of how to set the HEX switches in a Sirius 610 (4U) with non-square levels:

- Each switch corresponds to 2 Input/Output card slots, switch A to the right most slots, switch H to the left most

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- Each switch therefore sets the level number for 16 inputs or outputs
- Any level may be partially equipped as 8 inputs or outputs, but the adjacent slot must be left empty
- HEX switches corresponding to output cards are set between 0 and 7 for levels 1 to 8
- HEX switches corresponding to input cards are set between 8 and F for levels 1 to 8

Table 37. lists the Levels, inputs and outputs:

Control level	Inputs	Outputs
1	0	8
2	1	9
3	2	A
4	3	B
5	4	C
6	5	D
7	6	E
8	7	F

Table 37. Level Mapping in a Sirius 610 (4U)

- Unused HEX switches must be set to expand inputs, and not set to 0
- Switches 3 and 4 on the 2434/1 configuration switch must be set to ON, OFF (see Section 6.7.1)

6.8.6 Examples of Non-square Configurations

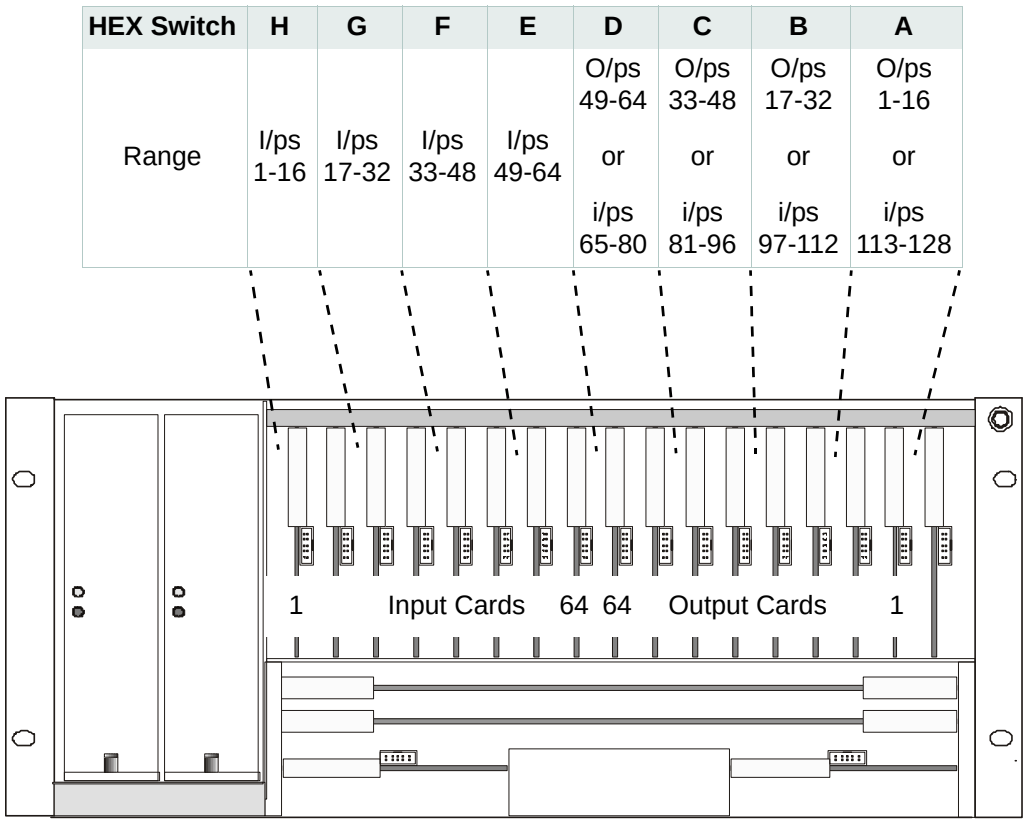

Fig 35. Examples of a Non-square Configuration

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6.8.6.1 Example 1

Level 1: 32x32
Level 2:16x16
Level 3: 16x16

HEX Switch	H	G	F	E	D	C	B	A
Set	8	8	9	A	2	1	0	0

6.8.6.2 Example 2

Level 1: 96x32

HEX Switch	H	G	F	E	D	C	B	A
Set	8	8	8	8	8	8	0	0

6.8.6.3 Example 3

Level 1: 32x16
Level 2: 32x16

HEX Switch	H	G	F	E	D	C	B	A
Set	8	8	9	9	9 [1]	9[1]	1	0

[1] Unused switches set to match previous input level setting.

6.8.6.4 Example 4

Level 1: 32x16
Level 2: 16x8
Level 3: 16x8

HEX Switch	H	G	F	E	D	C	B	A
Set	8	8	9	A	A [1]	2	1	0

[1] Unused switches set to match previous input level setting.

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7. Using the Ethernet Port

The Sirius 600 rear panel has two RJ45 type Ethernet connectors fitted, one each for the A and B control modules. Only one of these ports will ever be active, the port connected to the idle controller will be disabled. The user must ensure that the control module is correctly configured, by referring to Chapter 6. If dual controllers are fitted, both control modules must be configured to use the Ethernet port, otherwise communication will be lost in the event of a changeover. In summary, the following must be configured to activate the Ethernet port:

- PL5 and PL6 on 2434 set to 'NETWORK', RS485 port 2 will be disabled
- RS485 port 2 protocol must be set to General Switcher protocol in database

The port is configured for connecting to a 10 Base T Ethernet Hub, and when configured correctly, will allow the router to be controlled, and for status information to be requested, using Snell's General Switcher protocol over SNMP.

Ethernet support for Sirius 600 is provided using a 'SC12' chip, which is a 80186 processor system complete with RAM, NVRAM, serial and Ethernet ports all in one package. The chip has system software and configuration files, which may all be loaded and edited using a software tool supplied with the system. This tool may also be used to test the Ethernet connection, control basic router functions and view the status.

This chapter describes the software configuration of the SC12 chip using the supplied configuration tool.

7.1 Connecting Sirius 600 to a Network

A standard CAT5 patch cord may be used to connect the Sirius 600 active Ethernet port to a 10 Base T hub or switch. By default, the SC12 chip is configured for DHCP, meaning that a DHCP Server must be present on the same network segment in order an IP address to be assigned. Without this, the Snell configuration tool must be used to manually assign an address. The SC12 chip includes TELNET and FTP servers in order to support the configuration tool.

7.2 Configuration Tool

A separate configuration tool is provided for configuration of the ethernet interface on the Sirius 600. For information, refer to the separate user manual, which describes how to configure the ethernet interface, and the available protocols.

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8. Troubleshooting

This chapter is a brief guide for diagnosing faults associated with a Sirius 600 router.

It should be noted that Sirius 600 frames contain no user serviceable parts, therefore should this product require servicing, you should refer to Snell or your local distributor.

All the following assume that at least one power supply is powered and functioning in each frame in the system, that the frames are correctly cooled and ventilated, and that all cards are fully seated in their sockets.

The PC Editor will not connect 'on-line'

- Check that the cable is connected to the correct Sirius 600 port, see section 3.14
- Check that the router has a 2430/2/4 module fitted, and is therefore a Master frame
- Check that the correct editor is being used, Nebula for Sirius 600, 630 and the Router Editor for 2434
- Check the Editor is configured for the correct PC COM port, see the Nebula guide
- Check the baud rate and parity setting in the editor matches the 2441/3/5 switch setting, see section 6.3
- Check cable continuity

The control panels connected to Sirius 600 do not function

- Check whether you are using the 'fixed' or 'editable ' database, see section 6.1
- If 'fixed', check that the 2441/3/5 module is set for 'Multi-drop' protocol setting, see section 6.3
- If 'editable', check the protocol settings with the on-line editor
- Check the correct Sirius 600 port is being used, RS485 1 or 2
- If using RS485 port 2 for control panels, check that it is not jumper selected as an Ethernet port, see section 6.8.2
- Check the panel HEX address against the database setting
- Check the panel DIP switch settings against the table in the Nebula guide
- Check cable continuity

The external control system does not control Sirius 600

- Check whether you are using the 'fixed' or 'editable ' database, see section 6.1
- If 'fixed', check that the 2441/3/5 module is set for 'General Switcher' protocol, see section 6.3
- If 'editable', check the protocol settings with the on-line editor
- Check cable interconnections
- Check electrical characteristics and protocol of controlling device are compatible with that configured into the database

The panel status changes, but the route does not make

- Check the appropriate input, output and crosspoint cards all exist in the frame
- Check all cards are fully seated in the frame

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Some routes make, but not others

- If using 4911 audio crosspoints check that the switch settings on the cards are correct, see section 3.6 and 6.7.1.
- Check that the relevant input, output and crosspoint cards exist in the frame
- Make sure the 2441/3/5 card is configured for 'auto reconfigure', see section 6.3, and reset the frame
- Check that the 2430/1/2/3/4/5 switches match the system requirements, see section 6.8

The panel is communicating but there are no (or incorrect) responses to button presses - panels not in self-test

- Check cable interconnections
- Check that the panel has been configured in the database as the correct type
- Ensure that each panel on the multidrop chain has a unique serial address
- Check that the panel configuration switches are set correctly, see the Nebula guide

Video or audio routes do not switch 'cleanly'

- The Sirius 600 router is designed for SMPTE RP168 compliant video switching.
- When using audio clean switch modules audio signals can be switched without causing disturbance to the audio data stream.
- Check that video and audio references are plugged to the correct rear connections
- Check that the correct AES reference is selected from the rear panel switch
- If using a 'fixed' database, check that the 2441/3/5 card has the correct reference selected, see section 6.3
- If using an 'editable' database, check the source references with the on-line editor
- Check the 2441/3/5 card LED status for correct reference detection, see section 6.4
- Check that the analogue video references are correctly terminated

The panel controls the wrong destination

- Check that the panel is assigned correctly in database
- Check the panel is set to the correct address

The panel cannot select a crosspoint?

- Check database for:
  - panel assignment
  - level active
  - route not inhibited
  - no override active
  - level controllable
- Check router level address

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The Master unit is switching but Slave levels are not following

- Ensure that the SLAVE bus cable is fitted correctly
- Check that the Master and Slave routers have the appropriate level mappings set by the switches on the 2430/1/2/3/4/5 modules, see section 6.8
- Check the database is set up for a multi-level system

Dual redundant controllers are not functioning correctly

- Check that switch settings on each card for master/slave are correct - see section 6.8

Ethernet control not working, RS485 port 3 not working

- Check controller configurations, see section 6.8.2. Remember both controllers must be set up the same way.

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9. Specification

For the specification of specific signal types refer to the module user manual supplements.

9.1 General

9.1.1 Control

RS485 ports:	2; independently configurable for either; driving chains of 16 multidrop devices (panels/under monitor displays) OR for external control
RS232 ports:	2; for system database configuration, one for each control module fitted
Parallel ports	1; for control of slave Sirius 600, Freeway, Halo or Axis routers
Ethernet	2; 1 each for the master and slave control modules, used instead of RS485 port for external control

9.1.2 Reference

Analog video	1 each of 525/625 line PAL/NTSC looping, high impedance
High Definition TV	1 terminated input for tri-level signal to SMPTE274M (1080i)
Digital audio	selectable between unbalanced AES (75ohm BNC) and balanced AES (9pin D type)

9.1.3 Power Supplies

Supply:	100Vac to 240Vac auto sensing	
Power:	4U	– 400W max
	7U	– Sirius 600W max
	Sirius 630 (16U)	– 1100W max

9.1.4 General

Frame Size:	4U x	19' rack mounting x 500mm deep
	7U x	
	16U x	
Power:	4U	20 Kg max
	7U	30 Kg max
	Sirius 630 (16U)	50 Kg max

9.1.5 Temperature Range

Operating:	0 °C to +40 °C
Storage:	10 °C to +70 °C

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