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1 Introduction

The TX 420 Digital Master Control Switcher is designed to perform everything from basic transitions to full multi-channel operation with a choice of either manual or automated operation.

The emphasis is on ease of use, with all commonly used functions available from a single button press, and less frequently used functions accessible via soft keys associated with the integral display. By making use of coloured buttons, button groups are differentiated by colour according to their function. In addition, the plasma display provides the audio metering facility while doubling up to provide access to system set-up and configuration screens, enabling on line changes to be made without the need for an external PC or terminal.

The TX 420 provides every feature you need from a master control switcher. All the transition types that you would expect to find in a master control switcher plus a choice of ten wipe patterns are provided by the TX 420, as standard.

Up to four downstream linear keyers can be provided, enabling captions and logos to be inserted into the programme video, with each keyer able to be independently cut or mixed to air, or preset to follow the next transition. In addition, comprehensive control of a DVE to provide squeeze effects is available as an option.

The four audio over inputs provided with the system have independent level control, and may be cut or faded to air. Like the downstream keyers, the over facility can also be preset to follow the next transition.

Enhanced audio facilities offer up to four AES levels for either balanced or unbalanced operation, plus embedded or analogue options without the need for external converters. The panel also provides the ability to modify audio level, phase and channel routing for each source.

Extensive routing options permit seamless integration with either the dedicated TX Series internal routing system or a larger station router via Pro-Bel's Aurora control system. The internal router supplied with standalone systems provides up to eight additional outputs which can be controlled from standard router panels and used as monitoring or bypass outputs.

The "open system architecture" provided by the TX Series ensures that it can easily be integrated with any automation system however, when used in conjunction with Pro-Bel's own Compass and Sextant automation packages the TX 420 has the ability to change the on-air schedule from the panel, inserting events or modifying transition types by simply selecting them. Independent manual intervention buttons provide direct operation of key automation functions.

Fully redundant power supplies in both the control panel and associated frames, and the ability to 'hot swap' any system module provide the on air reliability and ease of maintenance demanded in the master control environment.

The integral plasma display with its soft keys and extra assignable panel buttons give the flexibility to easily incorporate new features and operations within the system.

The plasma display also provides 'at a glance' monitoring of audio levels and single keystroke access to less commonly used operational functions. System set-up and configuration screens permit on line changes to be made without the need for external equipment.

Comprehensive machine control facilities are provided as standard. The three machine control ports can either be connected to dedicated machines, or assigned to operate with routed machines via an RS422 router.

Notable characteristics of the TX 420 are:

Fully digital operation

Multi-channel control

DVE integration for squeeze effects

Advanced audio options

Total integration with automation systems

Enhanced routing options

Bypass router control directly from the master control position

Control of up to six channels

1.1 Using this manual

The information contained in this manual is divided into chapters for ease of use. The organisation of the chapters is as follows:

Introduction - this chapter contains general information about the manual

Installation - this chapter describes the various types of installation that may be Performed with configuration details where appropriate

Operator settings - this chapter provides information on using the top level screens on the plasma display

Configuration - this chapter deals with the system configuration options

Hardware configuration - this chapter details the settings for the internal cards

Problem solving - providing a quick help guide

Support information and warranty details

Important safeguards - includes safety guidelines for installing and using the TX 420

EMC compliance statement

Specification

Note: Purely operational functions are covered in the 'Operator's manual' provided with the system and are only shown in this manual where necessary.

1.2 Typographical conventions

Certain conventions are used in this guide to indicate different types of information.

Names of buttons and controls on the TX 420 are shown in this guide in bold capitals, within brackets, like this : <**VIDEO ONLY**> .

1.2.1 Abbreviations

Within this document the following acronyms are used.

PST	Preset
PGM	Programme
RTC	Real Time Clock
TOD	Time Of Day
TC	Time Code
VU	Volume Meter
PPM	Peak Program Meter
dBFS	Decibels relative to Full Scale Digital
dBu	Decibels relative to 1mW, impedance assumed 600Ω
AUX	Auxiliary
DSK	Downstream Keyer
FTB	Fade to Black
PIN	Personal Identification Number

2 Installation

The basic TX 420 package consists of the following elements:

Control panel

Vision mixer

Main frame(s) incorporating:

Control module,

Audio mixer(s)

One set of panel interconnection cables

Systems may also be supplied with further options, enhancing system operation, and include:

Video and audio router modules, for systems with internal routing capability

Optional DVE

Each frame used in the TX 420 (except the control panel) conforms to 19" rack mounting standards. See section 2.3 for frame installation guidelines.

2.1 Preparing for installation

During the installation process it is important to observe the following points:

The shipping brackets on frames and transit screws on the control panel should be removed prior to installation as it may not be, in some cases, possible to remove them once the equipment is installed

Rack equipment should be securely mounted

Do not obstruct any vents on the units as this may cause equipment to overheat, or prevent cooling from taking place

2.1.1 Shipping brackets and transit screws

The control panel

Two transit screws are located beneath the front edge of the control panel. These should be removed before proceeding with the installation.

An additional securing screw to prevent the panel lid being opened during shipping, and after the removal of the transit screws, is located beneath the red **<PRE ROLL & TAKE>** button. To access this screw, lift off the button, and release the screw. Once released, the **<PRE ROLL & TAKE>** button can be replaced.

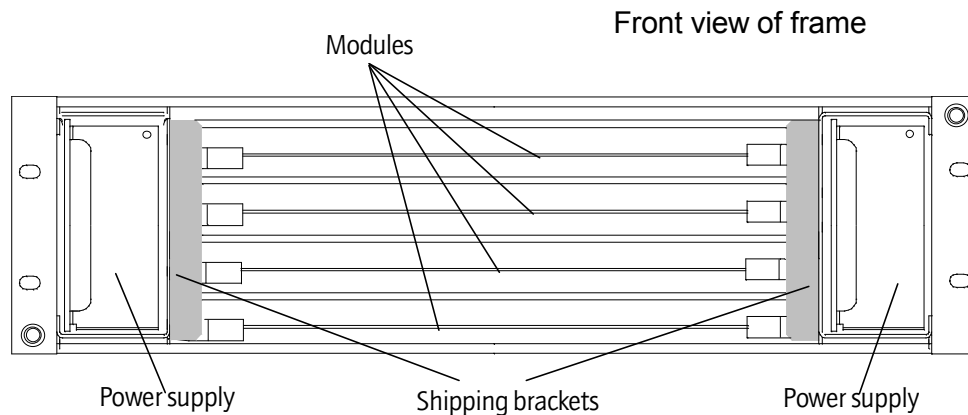


WARNING: If the **<PRE ROLL & TAKE>** button is removed while the panel is active, replacing the button may cause the next event to be taken.

For added security, and safety, during normal operation, the lid can be secured with this screw to prevent unauthorised access to the PSU and control module contained within the panel.

The frames

For shipping purposes, modules in the control and router frames are secured in place with brackets mounted by two screws on the sides of the power supply slots. These should be removed prior to installing the frame.



2.1.2 Installing the equipment frames

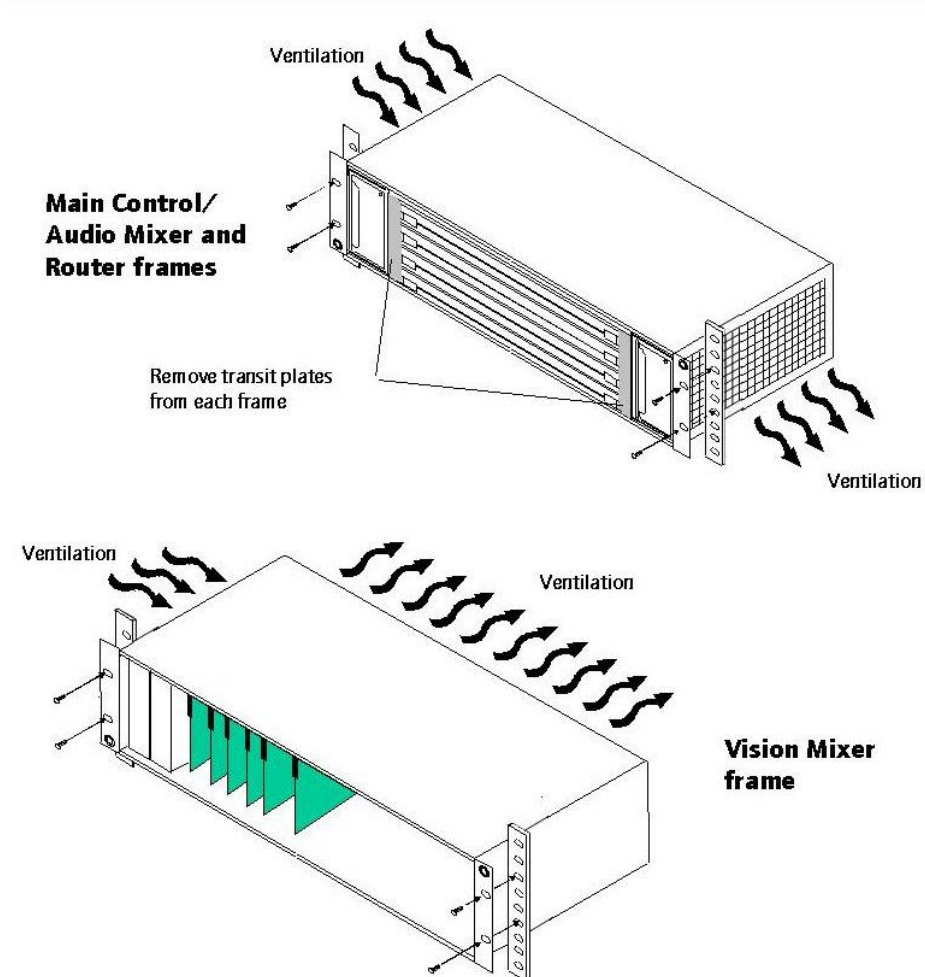
The main and vision mixer frames should be installed in standard 19" wide equipment racks with sufficient depth to accommodate cable bundles at the rear. Ensure that the cable bundle weight is properly supported within the equipment rack to avoid undue stress on the connectors.

For safety reasons, all equipment racks should be securely fastened to the floor or wall to eliminate the possibility of tipping.

After ensuring that all packing materials have been removed from the frames, align them so that the screw holes match up with those in the rack and secure each frame with four rack screws and washers.

As cooling is forced, using integral fan assemblies, care must be taken to ensure that the vents on the sides (router and control frames) or rear (vision mixer frame) of the frame are not obstructed. The following diagrams show the airflow through the frames.

The drawings show the frames with doors removed to aid identification. For correct cooling, the doors must be fitted and closed.



Fitting and removing the frame doors

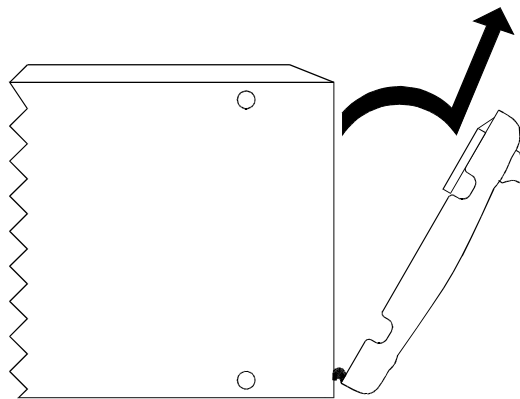
To prevent damage to the frames or doors during transit, the frames are packed and shipped without having the doors fitted. Once the frames are installed, the horizontally hinged doors can easily be fitted to the frames as detailed below.

For correct fitting of the door, hold the door at approximately 30° from the front of the frame ensuring that it is centrally located above the hinge. The door can then be placed on the hinge and then closed.

To remove the door from the frame, open it to approximately 30° and lift upwards. The design of the hinge assembly prevents the door from being removed if it is at a greater angle.

For correct cooling, the doors must be fitted and closed except when access to the modules is required.

Removing the frame door



Installing system modules

Note: It is not necessary to remove power from the frames when inserting or removing system modules as they have been designed so that they can be inserted or removed from the frame, while it remains powered.

Inserting modules

In both frame types, the modules slide along guide rails in the frame and plug into connectors attached to the motherboard, or rear connector assembly.

Ensure that the module is located in the correct position

Slide the card along the guide rail of the required slot, gently pushing it fully home until it marries up with the connector

Connect ribbon cables, where applicable, by pushing them home until the catches locate

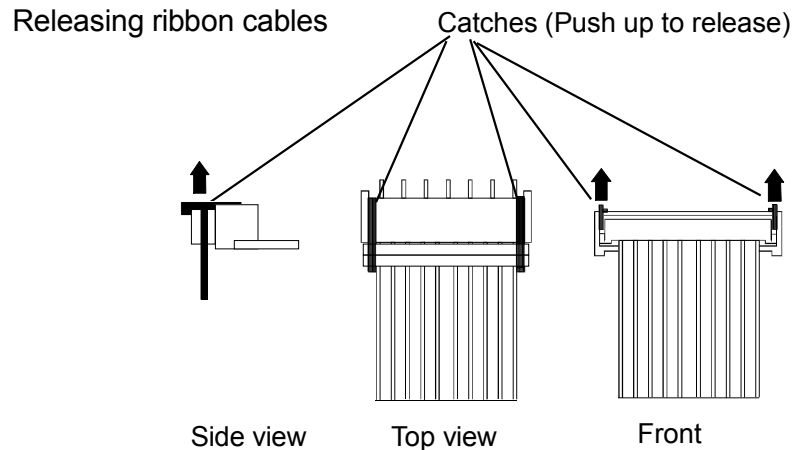
If a card has a board reset switch, it is wise to exercise this after plugging a board in with the power on.

Removing modules

For removal purposes it is advisable to remove the ribbon cables, where applicable, from the card edge prior to removal.

Release the ribbon cables by pushing the catches up on either end of the connector as shown in the following diagram

Lift up the card ejector on the module and gently pull the card out



Fitting rear connector panels

The rackframes are supplied with rear connector panels and, where necessary, blanking plates. In cases where a frame is being upgraded, to add more audio levels for example, it may be necessary to fit new rear panels. To fit panels, or to later change the position of a module, the procedure is as follows:

Locate the correct position on the frame and remove any blanking plates or existing rear connector panels

Before fitting new rear panel ensure that the connectors mate on a one-to-one basis and that there is no offset either vertically or horizontally. Misalignment could result in damage to the connectors on the motherboard (Note that only minimal force is required for this operation)

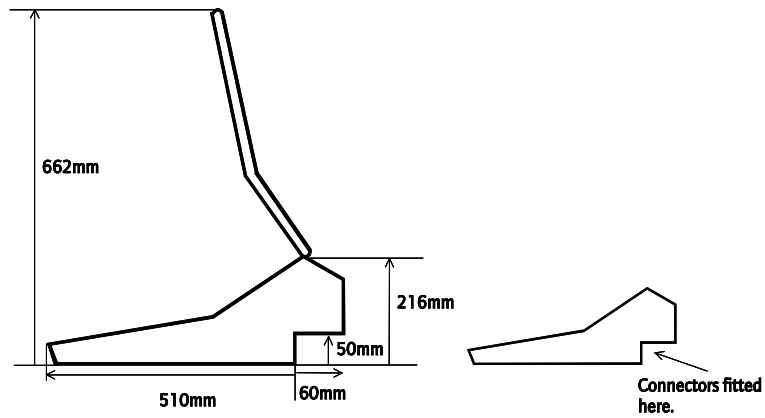
Once fitted, secure the rear connector panel to the frame using the supplied fixings.



WARNING: Where screws are present, they form an essential chassis connection for EMC compliance and must not be omitted

2.1.3 Installing the control panel

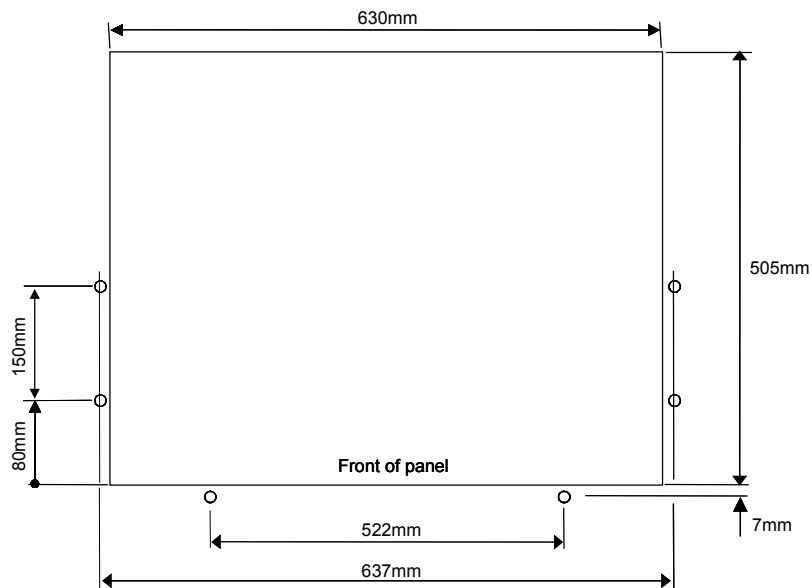
The TX 420 panel has been designed to either sit on the desktop or be flush mounted. The 8° incline on the panel ensures that all areas of the panel are visible when free standing, while the added incline of the panels' top section enhances the visibility of the plasma display.



Note: When installing the control panel, ensure that there is enough clearance to open the top fully and that the rear of the panel can be accessed for cable connections.

Flush mounting the control panel

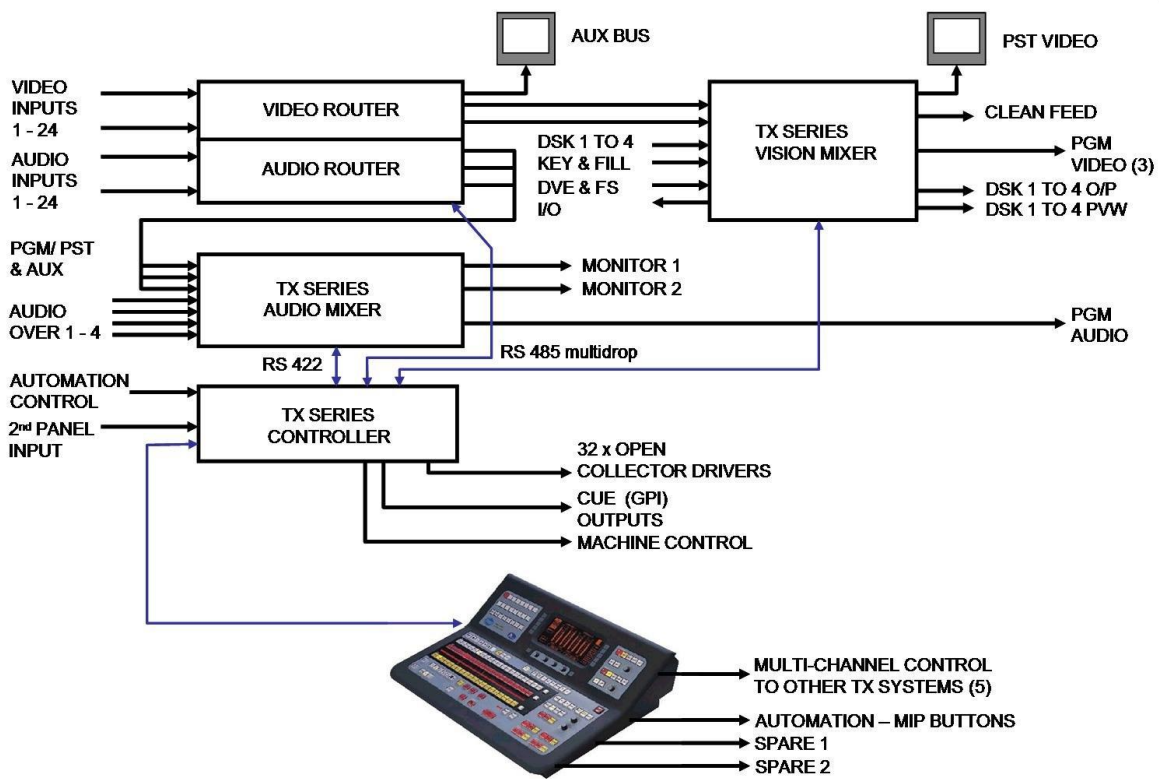
The base of the control panel fits into the cut-out (630mm x 505mm) from above and is held in place by three mounting flanges secured by six screws - two on the left and right flanges and two along the front.



3 System interconnections

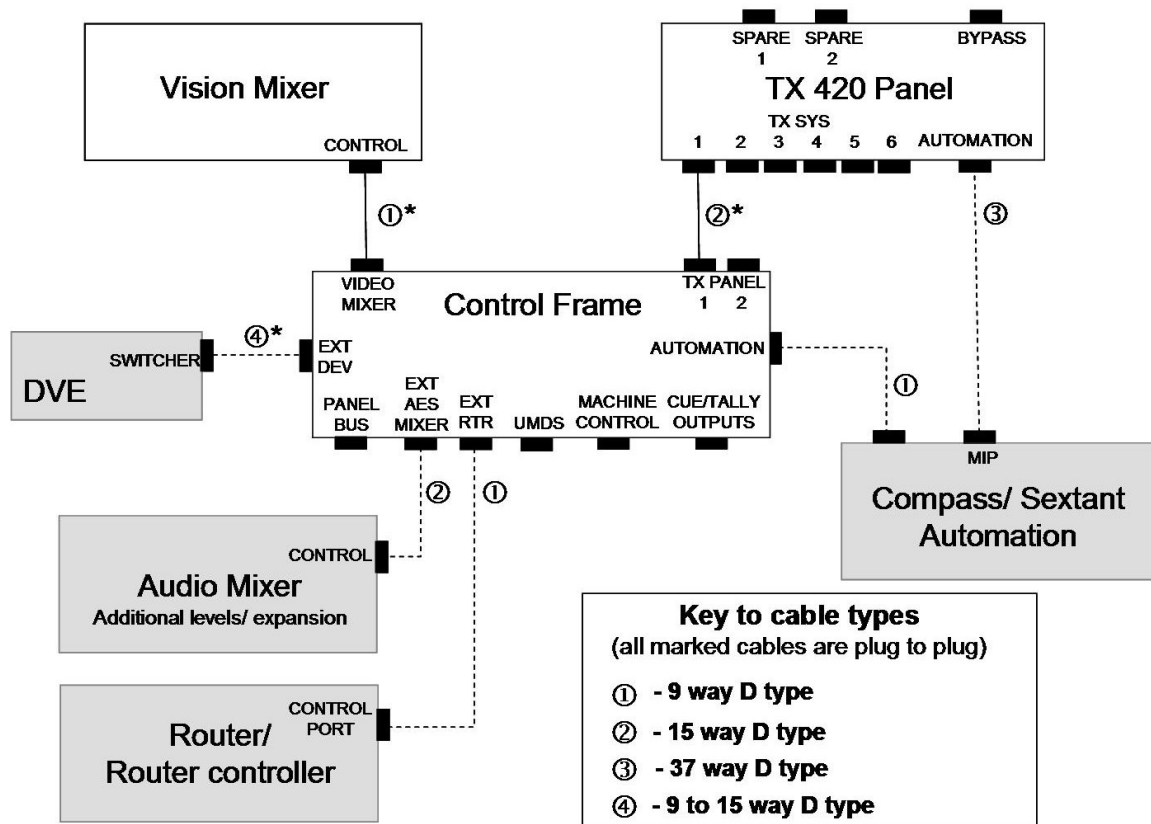
This section of the manual is divided into sub-sections each covering a particular aspect of system installation, detailing the control, video and audio interconnections required within the TX 420 system. As the audio mixer can be supplied for AES balanced or unbalanced, embedded or analogue audio operation, the audio section is subdivided, covering each signal type independently.

The following diagram details the typical connections required for a TX 420 system with a single AES audio level.



3.1 Control and PSU monitoring

The control interfaces for the TX 420 have been designed to make use of pin to pin cables. The block diagram below details the control interconnections required for the system to operate correctly, while the tables following the diagram show the pinouts for these connectors, detailing the signals present on them.



Note:

Cables marked with a * are supplied with the equipment.

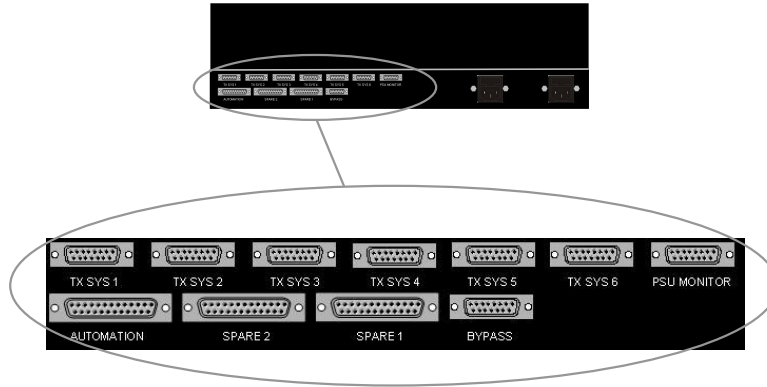
Supplied cables are approximately 1m long, with the exception of the panel to mainframe cable, which is 15m long.

Items that appear in the diagram as shaded blocks are either optional, or are only required for certain system configurations.

The external audio mixer and router frames are only required where either the audio mixer cards, or the internal (local) router modules for the system will not fit within the main control frame. For systems using an external router, via an Aurora system controller, the EXT RTR connection is required.

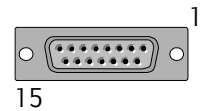
3.1.1 The control panel

All connections to the TX 420 control panel are recessed at the rear. Each main frame is supplied with a 15m panel interconnect cable.



The following connector pinouts are for the control outputs from the panel.

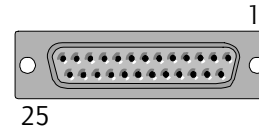
15 way 'D' type fixed sockets



Pin	TXSYS1-6	BYPASS	PSU MONITOR
1	TX +	SW1	COMMON 5V (1)
2	RX -	SW2	CLOSE 5V (1)
3	GND	SW3	OPEN 5V (1)
4	N/C	SW4	N/C
5	N/C	SW5	COMMON 12V (1)
6	N/C	SW6	CLOSE 12V (1)
7	PPM -	SW7	OPEN 12V (1)
8	GND	SW8	N/C
9	TX -	N/C	COMMON 5V (2)
10	RX +	N/C	CLOSE 5V (2)
11	N/C	N/C	OPEN 5V (2)
12	N/C	N/C	N/C
13	GND	LED COMM	COMMON 12V (2)
14	N/C	0V	CLOSE 12V (2)
15	PPM +	N/C	OPEN 12V (2)

The Bypass connector provides access to the Bypass switch control button row in the top left corner of the panel. By offering pin to pin compatibility with the ICON 8x1 switcher range, they can be used to provide an emergency bypass router facility for the TX 420.

25 way 'D' type fixed sockets

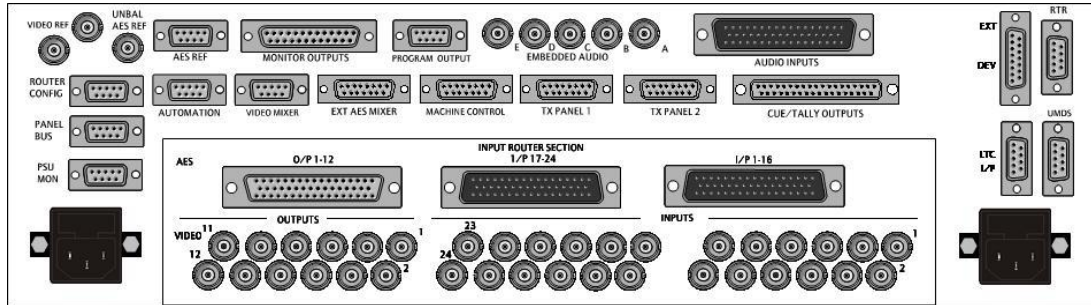


Pin	SPARE 1	SPARE 2	AUTOMATION
1	SW1	SW1	AUTO ON
2	SW3	SW3	HOLD
3	SW5	SW5	SKIP NEXT
4	SW7	SW7	PREVIEW
5	N/C	N/C	RECUE
6	LED1	LED1	TAKE
7	LED3	LED3	DELETE
8	LED5	LED5	UNDELETE
9	N/C	N/C	ARROW UP
10	LED7	LED7	ARROW DOWN
11	N/C	N/C	STANDBY
12	N/C	N/C	EXPLODE BREAK
13	N/C	N/C	AUTO LED
14	SW2	SW2	HOLD LED
15	SW4	SW4	N/C
16	SW6	SW6	PREVIEW LED
17	SW8	SW8	N/C
18	SW COMMON	SW COMMON	N/C
19	LED 2	LED 2	TAKE LED
20	LED4	LED4	N/C
21	LED6	LED6	EXPLODE LED
22	LED8	LED8	12V OUT
23	LED COMMON	LED COMMON	LED COMMON
24	N/C	N/C	SW COMM
25	OV	OV	OV OUT

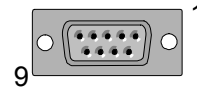
The connectors Spare 1 and 2, provide access to the two rows of eight pushbuttons below the Bypass switch control button row. These buttons can be used to control any equipment requiring a closing contact. However in systems with multi level audio, or if the panel is to provide control of more than one system, these buttons are used for that purpose and are therefore not available externally.

Connecting the Automation port to the MIP (manual intervention panel) port on a Compass or Sextant automation controller provides the operator with direct access to key automation controls, permitting the 'on air' schedule to be effected without the need to access an automation edit terminal.

3.1.2 The main frame



9 way D type fixed sockets

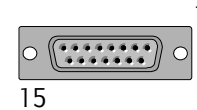


Pin	VIDEO MIXER ¹	UMDs	AUTOMATION	PANEL BUS
1	GND	GND	GND	GND
2	RX -	RX -	TX -	TX -
3	TX +	TX +	RX +	RX +
4	GND	GND	GND	GND
5	N/C	N/C	N/C	N/C
6	GND	GND	GND	GND
7	RX +	RX +	TX +	TX +
8	TX -	TX -	RX -	RX -
9	GND	GND	GND	GND

¹ 15m interconnection cable is supplied with the panel

Pin	EXT RTR	ROUTER CONFIG	PSU MONITOR
1	GND	N/C	GND
2	TX -	RX	PSU 1 COMMON
3	RX +	TX	PSU 1 CLOSED FOR FAULT
4	GND	N/C	PSU 1 OPEN FOR FAULT
5	N/C	GND	PSU 2 COMMON
6	GND	DTR COMMON	PSU 2 CLOSED FOR FAULT
7	TX +	RTS	PSU 2 OPEN FOR FAULT
8	RX -	CTS	N/C
9	GND	N/C	N/C

15 way D type fixed sockets

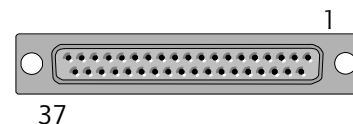


Pin	PANEL 1/2 ¹	EXT DEV (i.e. DVE)	EXT AES MIXER	MACHINE CONTROL
1	RX +	N/C	RX+	RX3 +
2	TX –	N/C	GND	TX3 –
3	GND	GND	TX –	GND
4	N/C	N/C	PPM +	RX1 +
5	N/C	N/C	GND	TX1 –
6	N/C	TX +	N/C	RX2 +
7	PPM –	RX –	SPARE +	TX2 –
8	GND	GND	GND	GND
9	RX –	N/C	RX –	RX3 –
10	TX +	N/C	TX +	TX3 +
11	N/C	N/C	GND	RX1 –
12	N/C	N/C	PPM –	TX1 +
13	GND	GND	N/C	GND
14	N/C	TX –	GND	RX2 –
15	PPM +	RX +	SPARE	TX2 +

¹ 15m interconnection cable supplied with panel

Note: As machine control within the TX 420 provides two methods of operation, it is recommended that the configuring VTR sources section 5.6.5 is read prior to cabling.

37 way 'D' type fixed socket

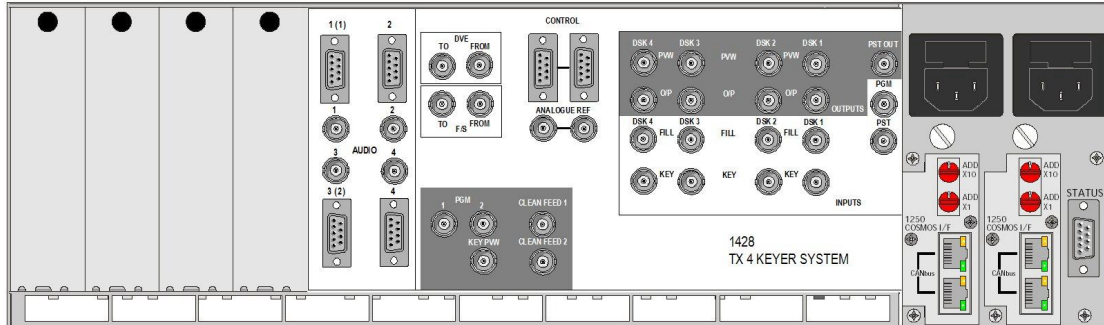


CUES

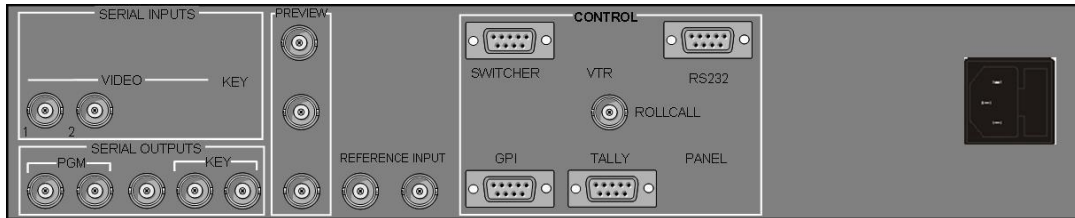
Pin	Function	Pin	Function	Pin	Function	Pin	Function
1	OUT1	12	OUT23	23	OUT8	34	OUT30
2	OUT3	13	OUT25	24	OUT10	35	OUT32
3	OUT5	14	OUT27	25	OUT12	36	N/C
4	OUT7	15	OUT29	26	OUT14	37	0V
5	OUT9	16	OUT31	27	OUT16		
6	OUT11	17	N/C	28	OUT18		
7	OUT13	18	N/C	29	OUT20		
8	OUT15	19	N/C	30	OUT22		
9	OUT17	20	OUT2	31	OUT24		
10	OUT19	21	OUT4	32	OUT26		
11	OUT21	22	OUT6	33	OUT28		

The TX 420 provides 32 programmable GPI outputs, which can be configured to offer on air tallies or pre-roll contact closures.

3.1.3 The vision mixer and DVE



Vision Mixer



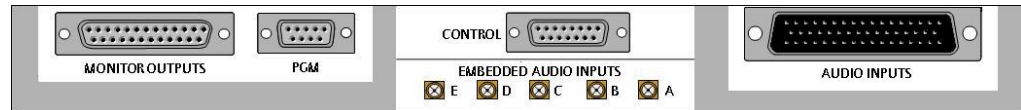
DVE

9 way 'D' type fixed socket 

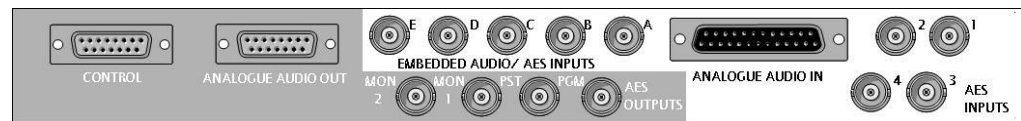
Pin	CONTROL (Vision mixer -loop)	STATUS - PSU (Vision mixer)	SWITCHER (DVE)
1	GND	GND	GND
2	TX -	PSU 1 COMMON	TX -
3	RX +	PSU 1 CLOSED FOR FAULT	RX +
4	GND	PSU 1 OPEN FOR FAULT	GND
5	N/C	PSU 2 COMMON	N/C
6	GND	PSU 2 CLOSED FOR FAULT	GND
7	TX +	PSU 2 OPEN FOR FAULT	TX +
8	RX -	N/C	RX -
9	GND	N/C	GND

3.1.4 Audio mixer

External audio mixer frames are only required if the audio mixer modules cannot be housed within the main frame. This should only be necessary when systems with multiple levels of audio are being built. Frames can house up to 4 audio mixer modules and are fitted with external mixer rear panels as shown below. Audio control is connected via the rear 'CONTROL' connector and should be linked to all levels fitted in this frame. The ribbon cable, running across the front of the audio mixer modules, is also required to be connected to all of the fitted audio mixer modules.

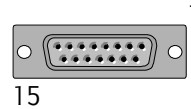


Balanced audio rear panel



Unbalanced audio rear panel

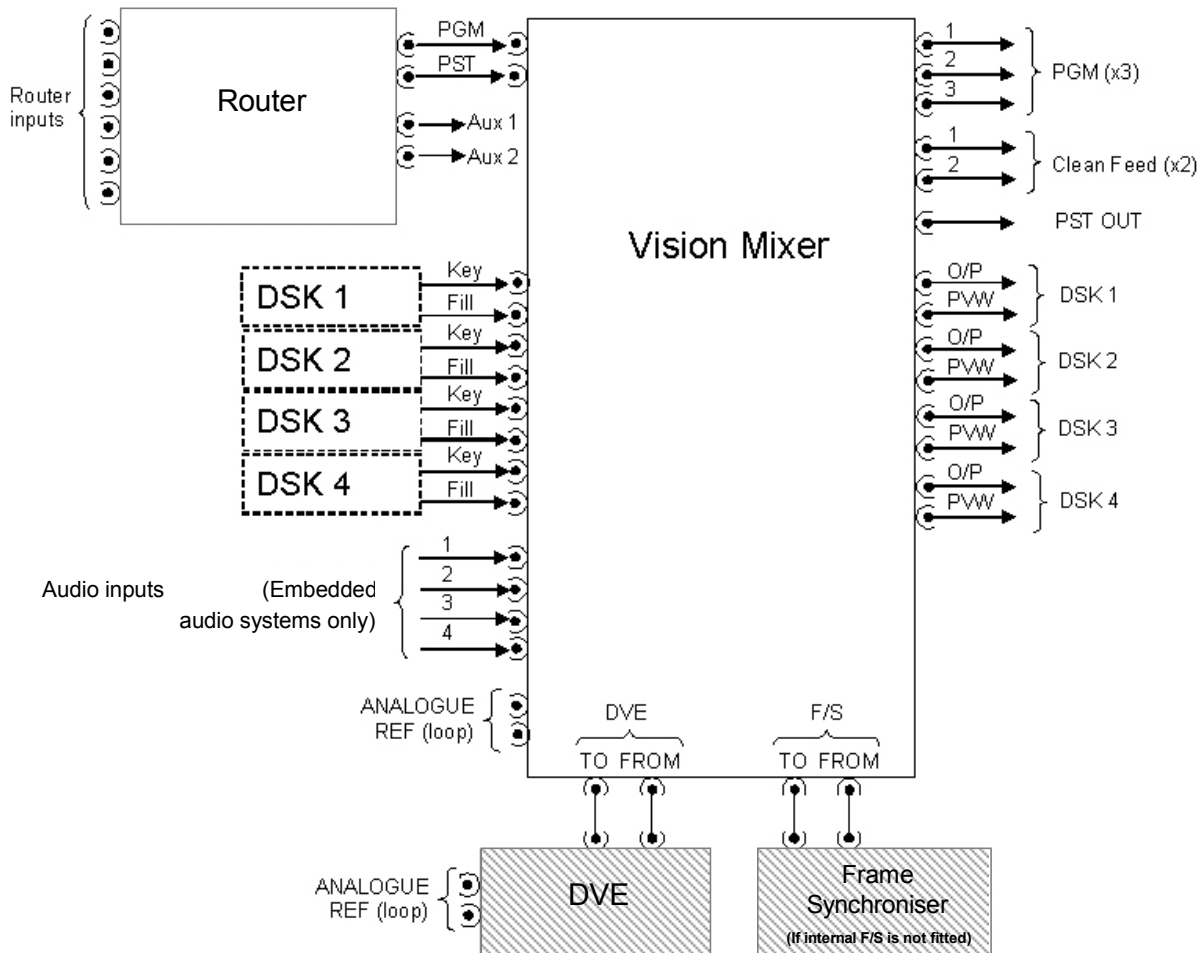
15 way D type fixed socket



Pin	CONTROL
1	TX+
2	GND
3	RX -
4	PPM +
5	GND
6	N/C
7	SPARE
8	GND
9	TX -
10	RX +
11	GND
12	PPM -
13	N/C
14	GND
15	SPARE

3.2 Video signals

As the TX 420 can be supplied for operation with either an 'internal' (local), or 'external' router, all signal interconnections between the router and the video and audio mixers require external cabling as shown in the diagram below. The following sections detail these connections.

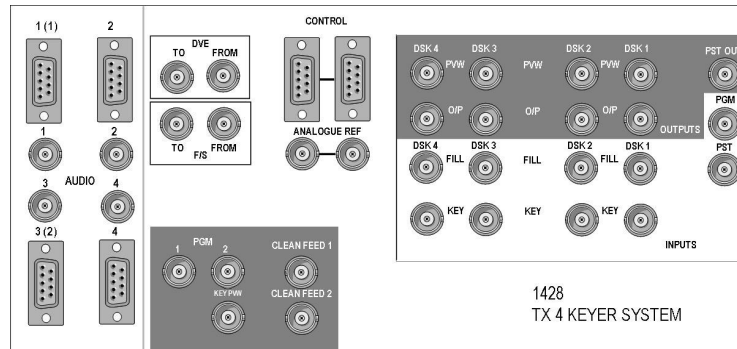


Note:

Items that appear in the diagram as shaded blocks are either optional, or are only required for certain system configurations.

The number of DSKs required, for the system depends upon the system configuration.

The third PGM output is routed via the BNC labelled 'KEY P/W'.



Vision mixer rear panel

3.2.1 Routed inputs (PGM/ PST)

For systems using an internal or local router connected directly to the TX Series controller it is possible to define which outputs are used for these functions via the control panel configuration screens. In systems controlling an external router, via an external system controller, the system controller is used to determine the source and destination associations used.

Dedicated router destinations feed the PGM and PST inputs of the TX Series vision mixer frame while two additional destinations, under the control of the TX 420 panel, provide the AUX1 and 2 outputs for video monitoring. These auxiliary (AUX) outputs do not feed the vision mixer, and can therefore be connected directly to picture monitors.

3.2.2 Downstream keyers (DSKs)

On the rear of the frame the inputs for each of the DSKs are labelled 'FILL' and 'KEY' and the outputs labelled 'P/W' and 'O/P'.

The keyer P/W (preview) outputs should be connected to a video monitor, either directly or via a router, for monitoring purposes when Clip and Gain levels for each keyer are adjusted, without the keyer being forced to air.

In addition, a copy of the keyer output enables feeds from different points within the signal path to be used for transmission, or monitoring purposes.

3.2.3 Clean feed

A clean video feed may be taken as an output for viewing, or distributing, the PGM video without the DSKs or DVE squeeze. The TX 420 provides two clean feed outputs.

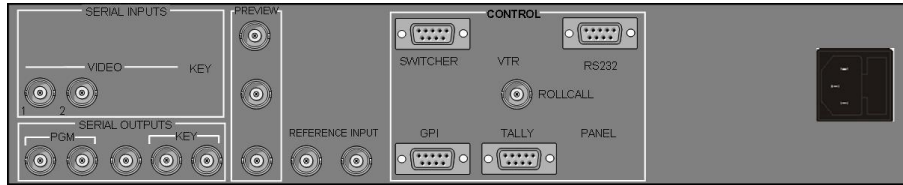
The signal is in serial digital video format to SMPTE 259M, and is also fed to DSK1, or the DVE if it has been positioned upstream of DSK1.

3.2.4 PGM output

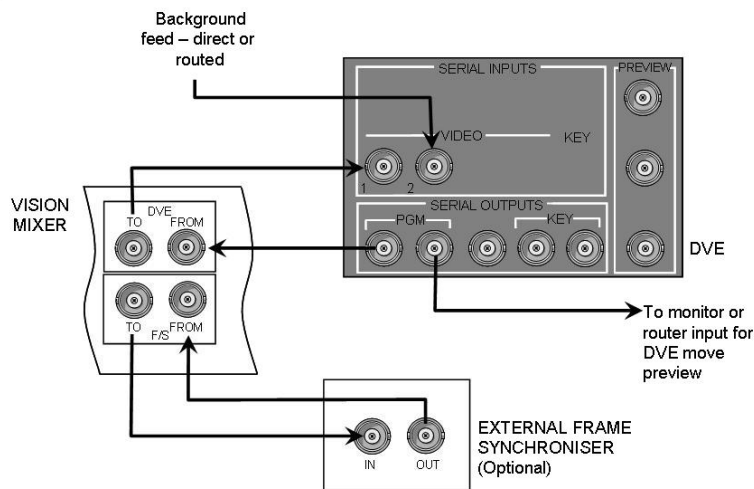
Three copies of the final PGM output are available on the rear panel. These are taken from the last point in the programme chain within the mixer, and depend on the system configuration as defined by the mixer configuration card. Full details for configuration of the video mixer can be found in section 6.2. The BNC providing the third PGM output is labelled 'KEY P/W'.

3.2.5 Connecting the DVE

The following diagram shows the rear panel of the Magic DaVE, DVE.



The signal connectors used when integrating with the TX 420 are as shown below:



As the DVE has an inherent one frame delay, it is necessary to have an equivalent frame of delay from a frame synchroniser in the alternate path when the DVE is not active. When the DVE is not in circuit, the PGM output is routed through the frame synchroniser path. When the DVE is taken to air, the active picture to PGM output is taken from the DVE path. All ancillary data is taken from the delay path, unaltered. The vision mixer has provision for either an external or an internal frame synchroniser.

It is recommended that the second DVE output is taken directly to a monitor, or that it appears as a source on the router which is accessible from the AUX bus (input 21 to 24) enabling it to be selected and the DVE sequences previewed before use.

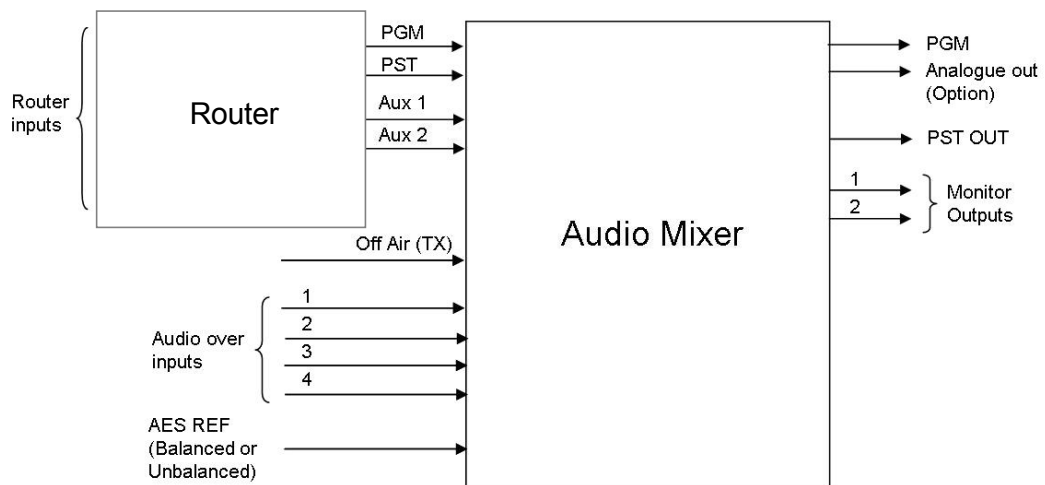
Note:

1. The audio mixer card (5025) is fitted with the ability to set an equivalent audio delay to compensate for the DVE delay. This is set by jumper PL12 being in position 1 (see section 6.1).
2. If an internal, ICON, Frame Synchroniser module is fitted within the vision mixer frame the external frame synchroniser module is not required. (see section 6.2.3 for setup of 3403 ICON module).

3.3 Audio signals

As with the video signals, it is necessary to feed, for each audio level, the PGM and PST inputs of the audio mixer from two router outputs. For systems using embedded audio, these router destinations are taken from the video router. Two further router outputs, AUX1 and AUX2, should be connected into the mixer enabling the Aux busses to be monitored not only by the control panel metering, but also from the audio monitor outputs.

The TX 420 provides up to four audio over sources, which can be configured to be fed either from a single router output, permitting selection of four router sources, or from four dedicated audio over inputs on the rear of the mixer.



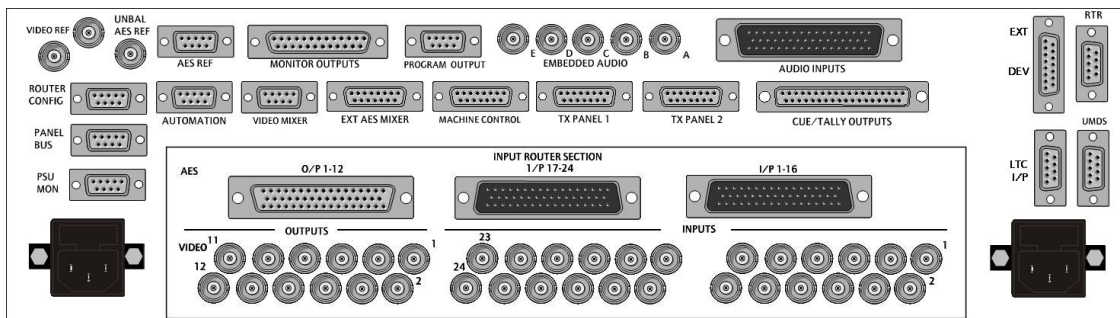
The audio connections shown above are common across all signal formats. However the use of on-board converters, and dedicated backplanes, permit the system to be adapted for AES (balanced and unbalanced), embedded or analogue operation. Details for audio mixer configuration of these audio formats are covered in section 6.1.

Multi level audio

Where more than one audio mixer is required within a system, for example; in a multi-level audio system, the audio mixers must be housed within the same frame as they share audio signals via a card edge ribbon cable. This allows channel swapping across all of the audio levels within the system. Additionally, the system only requires one multidrop control connection from the main frame for mixer control.

By passing signals between mixers, a single output is provided for each of the audio monitoring outputs, Mon 1 and Mon 2 while audio level selection to these outputs is provided by the row of buttons immediately below the Bypass switcher buttons on the control panel. Details of their operation can be found in the operators guide in the 'Using the audio monitoring' section, while further information covering multilevel audio systems can be found in section 8.

3.3.1 Balanced AES

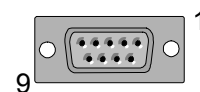


The main frame and external audio mixer rear panel for balanced AES operation can also be used for systems with embedded or analogue audio.

There are two operating modes available to the mixer, mode 0 and 1, which determine how the mixer channels are fed. Before connecting any audio inputs to the mixer, it is important to check which mode the mixer has been set, or is required, to operate in. For more information about setting the mixer mode, see section 6.1.

For systems where all inputs are AES, either operating mode can be used, however if the system requires analogue audio over inputs, mode 0 should be used.

9 way 'D' type fixed connectors

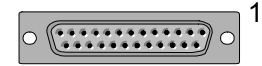


Pin	PGM Output	Timecode I/P (LTC)	AES Reference
1	GND	LTC+	N/C
2	PGM L+ (ANALOGUE)	N/C	AES +
3	PGM+ (AES)	N/C	N/C
4	PGM R+ (ANALOGUE)	N/C	N/C
5	GND	N/C	N/C
6	GND	LTC -	GND
7	PGM L - (ANALOGUE)	N/C	AES -
8	PGM - (AES)	N/C	N/C
9	PGM R - (ANALOGUE)	0V	N/C

25 way 'D' type fixed socket

MONITOR OUTPUTS

Pin	Function
1	N/C
2	N/C
3	GND
4	N/C
5	N/C
6	GND
7	N/C
8	GND
9	MON2 - (AES)
10	MON2 + (AES)
11	GND
12	PST - (AES)
13	PST + (AES)

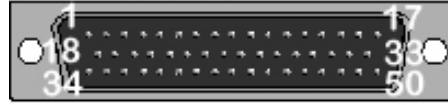


25

Pin	Function
14	N/C
15	N/C
16	GND
17	N/C
18	N/C
19	N/C
20	GND
21	SPARE 2 - (AES)
22	SPARE 2 + (AES)
23	GND
24	MON 1 - (AES)
25	MON 1 + (AES)

Audio Mixer inputs

50 way 'D' type fixed plug



Input	Function	Pin	Mode 0	Mode 1	Input	Function	Pin	Mode 0	Mode 1
N/A	CHASSIS GND	1	N/A	N/A		(L)SIGNAL +	26		
1	SIGNAL +	18	PGM IN	OVER 2	9	(L)SIGNAL –	10	OVER 3 (L)	AUX1 IN (L)
	SIGNAL –	2				SIGNAL GND	42		
	SIGNAL GND	34							
2	SIGNAL +	35	PST IN	OVER 3	10	(R)SIGNAL +	43	OVER 3 (R)	AUX1 IN (R)
	SIGNAL –	19				(R)SIGNAL –	27		
	SIGNAL GND	3				SIGNAL GND	11		
3	SIGNAL +	20	AUX1 IN	OVER 4	11	(L)SIGNAL +	28	OVER 4 (L)	AUX2 IN (L)
	SIGNAL –	4				(L)SIGNAL –	12		
	SIGNAL GND	36				SIGNAL GND	44		
4	SIGNAL +	37	AUX2 IN	SPARE	12	(R)SIGNAL +	45	OVER 4 (R)	AUX2 IN (R)
	SIGNAL –	21				(R)SIGNAL –	29		
	SIGNAL GND	5				SIGNAL GND	13		
5	(L)SIGNAL +	22	OVER 1 (L)	PGM IN (L)	13	(L)SIGNAL +	30	SPARE (L)	OVER 1 (L)
	(L)SIGNAL –	6				(L)SIGNAL –	14		
	SIGNAL GND	38				SIGNAL GND	36		
6	(R)SIGNAL +	39	OVER 1 (R)	PGM IN (R)	14	(R)SIGNAL +	47	SPARE (R)	OVER 1 (R)
	(R)SIGNAL –	23				(R)SIGNAL –	31		
	SIGNAL GND	7				SIGNAL GND	15		
7	(L)SIGNAL +	24	OVER 2 (L)	PST IN (L)	15	(L)SIGNAL +	32	OFF AIR (L)	OFF AIR (L)
	(L)SIGNAL –	8				(L)SIGNAL –	16		
	SIGNAL GND	40				SIGNAL GND	48		
8	(R)SIGNAL +	41	OVER 2 (R)	PST IN (R)	16	(R)SIGNAL +	49	OFF AIR (R)	OFF AIR (R)
	(R)SIGNAL –	25				(R)SIGNAL –	33		
	SIGNAL GND	9				SIGNAL GND	17		
N/A	CHASSIS GND	50	N/A	N/A					

NOTE: Letters in brackets refer to left and right channels when using analogue input option. Analogue options are not available on inputs 1-4. Even numbered inputs between 6 and 16 are unused in AES applications but provide the right channels when using the analogue input option.

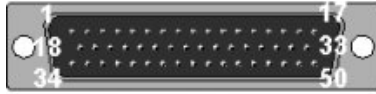
For more information on setting mixer MODE 0 and 1 see section 6.1

For systems supplied with the internal (local) router option, the router pinout is as detailed below. The router is a 24x12 AES level, which can be housed either in the main frame or, in cases where

there are multiple audio levels, in external router frames. The router inputs are shared across two connectors, with 1-16 on the first and 17-24 on the second.

AES router pinouts

AES inputs



50 way 'D' type fixed plug

Input/Output	Function	Pin
N/A	CHASSIS GND	1
1	SIGNAL +	18
	SIGNAL -	2
	SIGNAL GND	34
2	SIGNAL +	35
	SIGNAL -	19
	SIGNAL GND	3
3	SIGNAL +	20
	SIGNAL -	4
	SIGNAL GND	36
4	SIGNAL +	37
	SIGNAL -	21
	SIGNAL GND	5
5	SIGNAL +	22
	SIGNAL -	6
	SIGNAL GND	38
6	SIGNAL +	39
	SIGNAL -	23
	SIGNAL GND	7
7	SIGNAL +	24
	SIGNAL -	8
	SIGNAL GND	40
8	SIGNAL +	41
	SIGNAL -	25
	SIGNAL GND	9

AES outputs



50 way 'D' type fixed socket

Input/Output	Function	Pin
9	SIGNAL +	26
	SIGNAL -	10
	SIGNAL GND	42
10	SIGNAL +	43
	SIGNAL -	27
	SIGNAL GND	11
11	SIGNAL +	28
	SIGNAL -	12
	SIGNAL GND	44
12	SIGNAL +	45
	SIGNAL -	29
	SIGNAL GND	13
13	SIGNAL +	30
	SIGNAL -	14
	SIGNAL GND	36
14	SIGNAL +	47
	SIGNAL -	31
	SIGNAL GND	15
15	SIGNAL +	32
	SIGNAL -	16
	SIGNAL GND	48
16	SIGNAL +	49
	SIGNAL -	33
	SIGNAL GND	17
N/A	CHASSIS GND	50

3.3.2 Embedded audio (balanced AES over)

Systems supplied for use with embedded audio and balanced AES overs use the same frame/ rear connectors as those used for balanced AES operation, shown in section 3.3.1.

Audio inputs

The audio mixer module is fitted with five AES extractor submodules for the PGM, PST, AUX 1, AUX 2 and Off Air return (TX) inputs, fed from the rear panel BNCs labelled A to E.

Four outputs from the video router, independent of those supplying the vision mixer, should be assigned for the PGM, PST and two AUX busses, ensuring that video/ audio breakaway operation is available within the system.

In multi level audio systems, it is necessary to feed these router outputs to every audio mixer. As most routers provide only one or two outputs per bus, distribution amplifiers are used to buffer the feeds from the PGM, PST and Aux busses to the respective inputs on each audio mixer.

The mixer should be set to operate in 'mode 1', and the router outputs connected to the audio mixer inputs as detailed in the following table.

Router output/ Signal	Mixer input number	BNC number
PGM	5	A
PST	7	B
AUX 1	9	C
AUX 2	11	D
TX	15	E

Audio overs

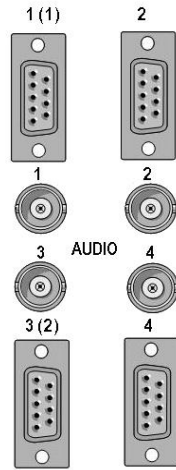
The over inputs, when operating in an embedded system, can be wired in two ways;

- 1) As balanced AES inputs. This is the most common implementation, feeding the audio mixer inputs 13, 1, 2 and 3, via the 50 way 'D' type input connector, as shown in the previous sub section for the balanced audio system (mode 1), or
- 2) As an embedded source from the router. To operate in this way, an output from the router should feed the fifth embedded input BNC (E) replacing the Off Air input and the extractor submodule used for Off Air (position 8) should be moved to position 7, the Over input on the mixer (see section 6.1). The system must then be configured to control a router destination for the over inputs, with sources 21 to 24 used as over inputs 1 to 4 respectively. If the Off Air input is still required it can feed audio mixer input 15, as balanced AES, via the 50 way 'D' type input connector.

Outputs

The audio mixer provides a balanced AES PGM output which can then be connected, using a pin to pin cable, to an embedder module housed within the vision mixer frame. The dedicated slot is wired to accept up to four audio channels which can in turn be embedded into the Main PGM video output.

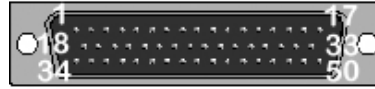
As an earlier embedder module (4422) supplied with the TX 420 was a two channel device, the frame design took this into account by allowing the inputs to be wired, as shown below, into the ports marked 1 (1) and 3 (2). The numbers in parenthesis represent the input channel numbers for a two channel device.



Pin	AES Embedder Input
1	GND
2	N/C
3	PGM+ (AES)
4	N/C
5	GND
6	GND
7	N/C
8	PGM- (AES)
9	N/C

Audio Mixer inputs (Mode 1)

50 way 'D' type fixed plug



Input	Function	Pin	Signal
N/A	CHASSIS GND	1	N/A
1	SIGNAL +	18	OVER 2
	SIGNAL -	2	
	SIGNAL GND	34	
2	SIGNAL +	35	OVER 3
	SIGNAL -	19	
	SIGNAL GND	3	
3	SIGNAL +	20	OVER 4
	SIGNAL -	4	
	SIGNAL GND	36	
4	SIGNAL +	37	SPARE
	SIGNAL -	21	
	SIGNAL GND	5	
5 (A)	(L)SIGNAL +	22	PGM IN
	(L)SIGNAL -	6	
	SIGNAL GND	38	
6	(R)SIGNAL +	39	N/A
	(R)SIGNAL -	23	
	SIGNAL GND	7	
7 (B)	(L)SIGNAL +	24	PST IN
	(L)SIGNAL -	8	
	SIGNAL GND	40	
8	(R)SIGNAL +	41	N/A
	(R)SIGNAL -	25	
	SIGNAL GND	9	

Input	Function	Pin	Signal
9 (C)	(L)SIGNAL +	26	AUX1 IN
	(L)SIGNAL -	10	
	SIGNAL GND	42	
10	(R)SIGNAL +	43	N/A
	(R)SIGNAL -	27	
	SIGNAL GND	11	
11 (D)	(L)SIGNAL +	28	AUX2 IN
	(L)SIGNAL -	12	
	SIGNAL GND	44	
12	(R)SIGNAL +	45	N/A
	(R)SIGNAL -	29	
	SIGNAL GND	13	
13	(L)SIGNAL +	30	OVER 1
	(L)SIGNAL -	14	
	SIGNAL GND	36	
14	(R)SIGNAL +	47	N/A
	(R)SIGNAL -	31	
	SIGNAL GND	15	
15 (E)	(L)SIGNAL +	32	OFF AIR
	(L)SIGNAL -	16	
	SIGNAL GND	48	
16	(R)SIGNAL +	49	N/A
	(R)SIGNAL -	33	
	SIGNAL GND	17	
N/A	CHASSIS GND	50	N/A

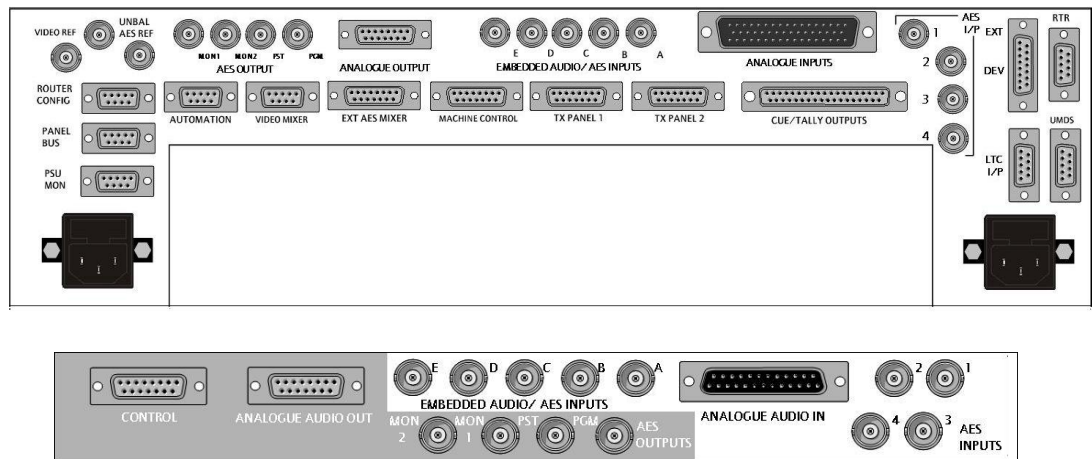
NOTE: Letters A to E in brackets next to the input numbers refer to the BNC on the rear panel feeding that input.

For more information on setting the mixer operating mode see section 6.1

3.3.3 Unbalanced AES

The main frame and external audio mixer rear panel for unbalanced AES operation can also be used for systems requiring embedded audio with unbalanced over inputs.

Before wiring the audio inputs to the mixer, it is important to check which operating mode the mixer has been set to, or is required to operate with. Mode 0 or 1 can be used with unbalanced AES configurations; however it is recommended that 'Mode 0' is used for these configurations as it provides greater flexibility and ease of connection. For more information about setting the mixer mode, see section 6.1.



Audio inputs

The audio mixer modules are fitted with five unbalanced to balanced converters for the inputs connected to the BNCs labelled A to E. The table below details the input assignment for each operating mode.

Mixer input	Mode 0	Mode 1
A	OVER 1	PGM
B	OVER 2	PST
C	OVER 3	AI IX 1
D	OVER 4	AI IX 2
E	OFF AIR	OFF AIR /OVER 1 ²
1	PGM	OVER 2
2	PST	OVER 3
3	AI IX 1	OVER 4
4	AI IX 2	SPARE

Audio Over inputs

Mixer Mode 0

Overs 1 to 4 should be connected to inputs A to D as detailed in the Audio inputs table above.

Mixer Mode 1

In order to have access to all four audio over inputs, they can be wired in two ways;

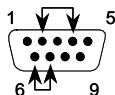
- 1) As four unbalanced AES inputs to inputs E, 2, 3 and 4.
- 2) As a routed source. To operate in this way, an output from the router is used to feed the input, marked E, in place of the Off Air signal. The unbalanced to balanced submodule in position 8 should be moved to position 7 and the system configured to control a router destination for the overs. Sources 21 to 24 on the router are then used as over inputs 1 to 4 respectively.

The Off Air input can, however, still be used in either of the following ways;

- i) As a balanced AES source to input 15 – This option requires no additional submodules, or
- ii) As an analogue source to inputs 15 (left) and 16 (right) – providing an ADC submodule is fitted in submodule position 7 on the audio mixer.

Reference input

When using the Unbalanced reference input, it is necessary to link pins 2 to 4 and 6 to 7 on the Balanced AES Reference mating connector and plug it onto the AES reference input connector. This ensures that the reference input is correctly terminated.



Audio outputs

The audio mixer provides unbalanced AES outputs for PGM, PST, MON 1 and MON 2.

3.3.4 Embedded audio (unbalanced AES over)

Systems supplied for use with embedded audio and unbalanced AES overs use the same frame/ rear connectors as those used for unbalanced AES operation, as shown above.

Audio inputs

The audio mixer module is fitted with five AES extractor submodules for the PGM, PST, AUX 1, AUX 2 and Off Air return (TX) inputs, which are connected internally to the rear panel BNCs labelled A to E.

Four outputs from the video router, independent of those supplying the vision mixer, should be assigned for the PGM, PST and two AUX busses, ensuring that video/ audio breakaway operation is available within the system.

In multi level audio systems, it is necessary to feed these router outputs to every audio mixer. In these cases, distribution amplifiers are used to buffer the feeds from the PGM, PST and Aux busses to the respective inputs on each audio mixer.

The mixer should be set to operate in 'mode 1' and the router outputs and other signals connected as detailed in the following table.

Mixer input	Router output/ Signal
A	PGM
B	PST
C	AUX 1
D	AUX 2
E	OFF AIR /OVER 1 ²
1	OVER 2
2	OVER 3
3	OVER 4
4	SPARE

Audio overs

In order to have access to all four audio over inputs, they can be wired in two ways;

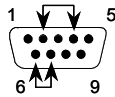
- 1) As four unbalanced AES inputs to inputs E, 2, 3 and 4.
- 2) As a routed source. To operate in this way, an output from the router is used to feed the input, marked E, in place of the Off Air signal. The unbalanced to balanced submodule in position 8 should be moved to position 7 and the system configured to control a router destination for the overs. Sources 21 to 24 on the router are then used as over inputs 1 to 4 respectively.

The Off Air input can, however, still be used in either of the following ways;

- i) As a balanced AES source to input 15 – This option requires no additional submodules, or
- ii) As an analogue source to inputs 15 (left) and 16 (right) – providing an ADC submodule is fitted in submodule position 7 on the audio mixer.

Reference input

When using the Unbalanced reference input, it is necessary to link pins 2 to 4 and 6 to 7 on the Balanced AES Reference mating connector and plug it onto the AES reference input connector. This ensures that the reference input is correctly terminated.

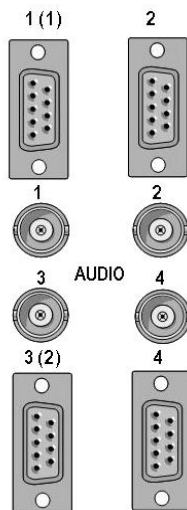


Outputs

The audio mixer provides unbalanced AES outputs for PGM, PST, MON 1 and MON 2.

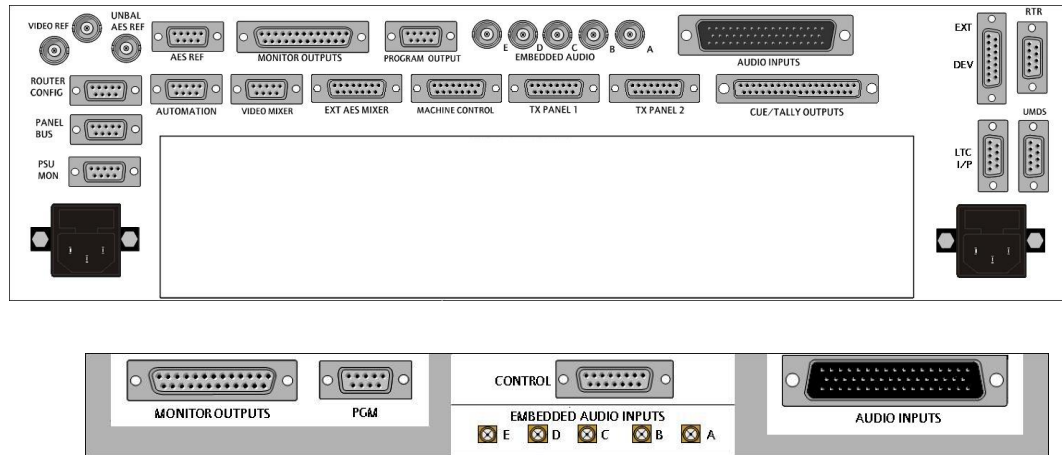
A dedicated slot housing an embedder module in the vision mixer frame is wired to accept up to four audio channels which can in turn be embedded into the Main PGM video output.

As an earlier embedder module (4422) supplied with the TX 420 was a two channel device, the frame design took this into account, allowing the first two audio levels to be connected into the BNCs labelled 1 and 3. The corresponding 9 way connectors are labelled 1 (1) and 3 (2), where the numbers in parenthesis represent the input channel numbers for a two channel device. This can be seen in the picture below.



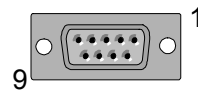
3.3.5 Analogue audio

The analogue TX 420 system uses the same rear connector assembly as balanced audio systems. Before wiring the audio inputs to the mixer, it is important to check which operating mode the mixer has been set to, or is required to operate with.



Systems using an analogue audio router to provide the PGM, PST and AUX inputs should be set to 'mode 1', as this allows ADC submodules to be fitted to the audio mixer for these inputs. For more information about setting the mixer mode, see section 6.1

9 way 'D' type fixed connectors

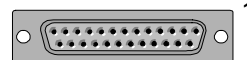


Pin	PGM Output	Timecode Input (LTC)	AES Reference
1	GND	LTC+	N/C
2	PGM L+ (ANALOGUE)	N/C	AES +
3	PGM+ (AES)	N/C	N/C
4	PGM R+ (ANALOGUE)	N/C	N/C
5	GND	N/C	N/C
6	GND	LTC -	GND
7	PGM L - (ANALOGUE)	N/C	AES -
8	PGM - (AES)	N/C	N/C
9	PGM R - (ANALOGUE)	0V	N/C

25 way 'D' type fixed socket

Monitor Outputs

Pin	Function
1	N/C
2	N/C
3	GND
4	N/C
5	N/C
6	GND
7	N/C
8	GND
9	MON2 - (AES)
10	MON2 + (AES)
11	GND
12	PST - (AES)
13	PST + (AES)



Pin	Function
14	N/C
15	N/C
16	GND
17	N/C
18	N/C
19	N/C
20	GND
21	SPARE 2 - (AES)
22	SPARE 2 + (AES)
23	GND
24	MON 1 - (AES)
25	MON 1 + (AES)

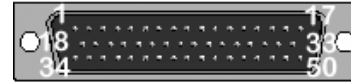
Audio Overs

In order to have access to all four audio over inputs, they can be wired in two ways;

- 1) As four balanced AES inputs wired to inputs 13, 1, 2 and 3.
- 2) As an analogue source from a router. The audio mixer must have an ADC submodule fitted in position 7, with the router destination(s) wired into inputs 15 (left channel) and 16 (right channel). Sources 21 to 24 on the router can then be used as over inputs 1 to 4 respectively.

Audio Mixer inputs (Mode 1)

50 way 'D' type fixed plug



Input	Function	Pin	Signal
N/A	CHASSIS GND	1	N/A
1	SIGNAL +	18	OVER 2
	SIGNAL -	2	
	SIGNAL GND	34	
2	SIGNAL +	35	OVER 3
	SIGNAL -	19	
	SIGNAL GND	3	
3	SIGNAL +	20	OVER 4
	SIGNAL -	4	
	SIGNAL GND	36	
4	SIGNAL +	37	SPARE
	SIGNAL -	21	
	SIGNAL GND	5	
5	(L)SIGNAL +	22	PGM IN (L)
	(L)SIGNAL -	6	
	SIGNAL GND	38	
6	(R)SIGNAL +	39	PGM IN (R)
	(R)SIGNAL -	23	
	SIGNAL GND	7	
7	(L)SIGNAL +	24	PST IN (L)
	(L)SIGNAL -	8	
	SIGNAL GND	40	
8	(R)SIGNAL +	41	PST IN (R)
	(R)SIGNAL -	25	
	SIGNAL GND	9	

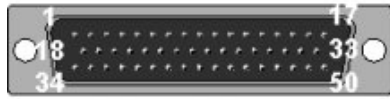
Input	Function	Pin	Signal
9	(L)SIGNAL +	26	AUX1 IN (L)
	(L)SIGNAL -	10	
	SIGNAL GND	42	
10	(R)SIGNAL +	43	AUX1 IN (R)
	(R)SIGNAL -	27	
	SIGNAL GND	11	
11	(L)SIGNAL +	28	AUX2 IN (L)
	(L)SIGNAL -	12	
	SIGNAL GND	44	
12	(R)SIGNAL +	45	AUX2 IN (R)
	(R)SIGNAL -	29	
	SIGNAL GND	13	
13	(L)SIGNAL +	30	OVER 1 (L)
	(L)SIGNAL -	14	
	SIGNAL GND	36	
14	(R)SIGNAL +	47	OVER 1 (R)
	(R)SIGNAL -	31	
	SIGNAL GND	15	
15	(L)SIGNAL +	32	OFF AIR (L)
	(L)SIGNAL -	16	
	SIGNAL GND	48	
16	(R)SIGNAL +	49	OFF AIR (R)
	(R)SIGNAL -	33	
	SIGNAL GND	17	
N/A	CHASSIS GND	50	N/A

NOTE: Letters in brackets refer to left and right channels when using analogue input option. Analogue options are not available on inputs 1-4. Even numbered inputs between 6 and 16 are unused in AES applications but provide the right channels when using the analogue input option.

For more information on setting mixer MODE 0 and 1 see section 6.1

Analogue Audio router

Inputs



50 way 'D' type fixed plug

Input/Output	Function	Pin
N/A	CHASSIS GND	1
1	SIGNAL +	18
	SIGNAL -	2
	SIGNAL GND	34
2	SIGNAL +	35
	SIGNAL -	19
	SIGNAL GND	3
3	SIGNAL +	20
	SIGNAL -	4
	SIGNAL GND	36
4	SIGNAL +	37
	SIGNAL -	21
	SIGNAL GND	5
5	SIGNAL +	22
	SIGNAL -	6
	SIGNAL GND	38
6	SIGNAL +	39
	SIGNAL -	23
	SIGNAL GND	7
7	SIGNAL +	24
	SIGNAL -	8
	SIGNAL GND	40
8	SIGNAL +	41
	SIGNAL -	25
	SIGNAL GND	9

Outputs



50 way 'D' type fixed socket

Input/Output	Function	Pin
9	SIGNAL +	26
	SIGNAL -	10
	SIGNAL GND	42
10	SIGNAL +	43
	SIGNAL -	27
	SIGNAL GND	11
11	SIGNAL +	28
	SIGNAL -	12
	SIGNAL GND	44
12	SIGNAL +	45
	SIGNAL -	29
	SIGNAL GND	13
13	SIGNAL +	30
	SIGNAL -	14
	SIGNAL GND	36
14	SIGNAL +	47
	SIGNAL -	31
	SIGNAL GND	15
15	SIGNAL +	32
	SIGNAL -	16
	SIGNAL GND	48
16	SIGNAL +	49
	SIGNAL -	33
	SIGNAL GND	17
N/A	CHASSIS GND	50

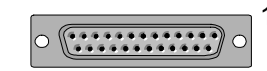
Analogue audio monitoring

As the audio mixer core is digital, the Monitor 1 and 2 outputs are supplied as AES outputs. A dual channel audio DAC is supplied with analogue systems to derive the analogue audio outputs for Monitor 1 and Monitor 2. The DAC is an ICON module and can be fitted into one of the spare slots in the vision mixer frame before having the Monitor 1 and 2 AES outputs wired to it. Further module information can be found in the 4411 handbook.

25 way 'D' type fixed socket

Dual channel DAC - AES Inputs

Pin	Function
1	N/C
2	Sample rate Clock, Ch 1
3	GND
4	N/C
5	CBL Ch 1
6	AES I/P2 -
7	AES I/P2 +
8	GND
9	N/C
10	Channel Status, Ch 1
11	GND
12	N/C
13	User data, Ch 1



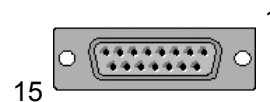
25

Pin	Function
14	N/C
15	Sample rate Clock, Ch 2
16	GND
17	N/C
18	CBL Ch 2
19	AES I/P1 -
20	AES I/P1 +
21	N/C
22	Channel Status, Ch 2
23	GND
24	N/C
25	User data, Ch 2

15 way 'D' type fixed socket

Dual channel DAC - Analogue outputs

Pin	Function
1	AUD L1 +
2	GND
3	AUD R1 -
4	N/C
5	GND
6	AUD L2 -
7	AUD R2 +
8	GND



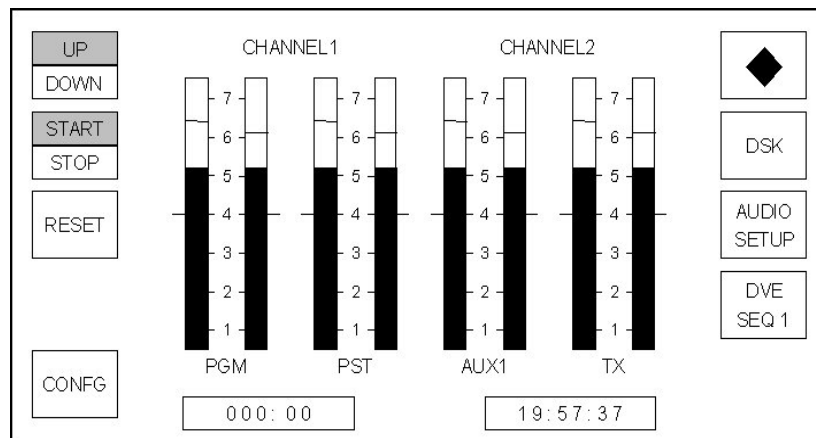
15

Pin	Function
9	AUD L1 -
10	AUD R1 +
11	GND
12	N/C
13	AUD L2 +
14	GND
15	AUD R2 -

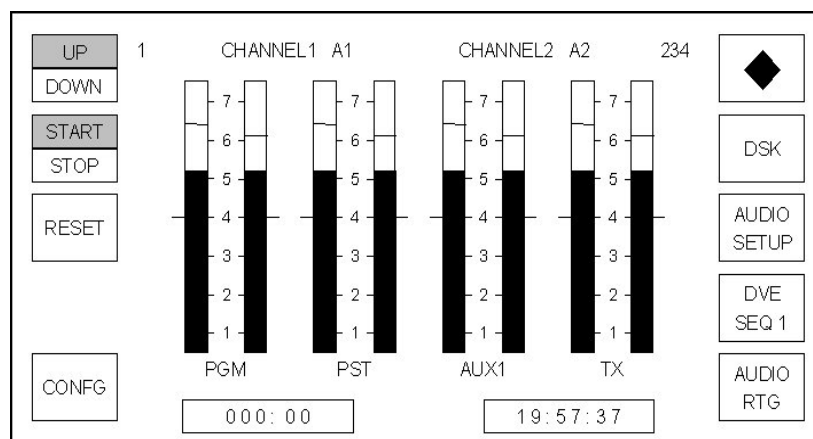
4 Operator settings

4.1 The home page

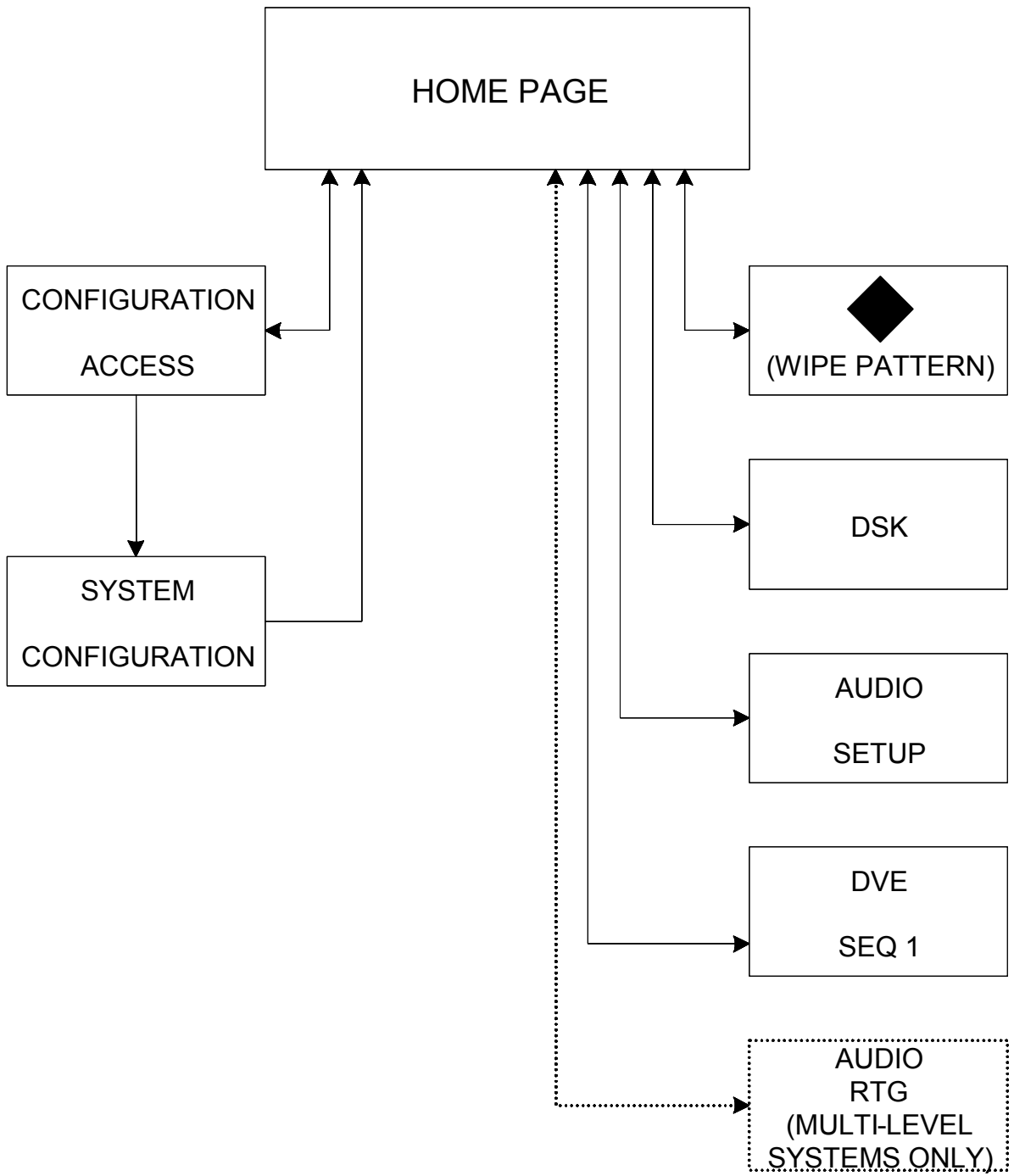
This is the default plasma display screen for the system. The display consists of four stereo meters, real time clock, stop watch facilities and buttons to select various setup screens. The diagram shows the home page for a single level audio system.



A multi-level display, for systems with two or more audio levels, provides an enhanced title bar and an audio routing button (AUDIO RTG), as shown below.



The following diagram shows the pages accessible from the home page. The pages and sub-pages that are accessible from the system configuration menu are shown within separate diagrams. Exiting the system configuration menu returns the operator to the home page, not back to the configuration access page.



HOME PAGE MENU TREE

4.1.1 Page title

In a single level audio system, the page is titled with the names of the audio channels, for example 'CHANNEL1 CHANNEL2' as shown in the first diagram in section 4.1..

For systems with multi-level audio, any one of, up to, four pages each displaying two audio levels at a time can be displayed. With these, the title bar provides more information regarding the audio levels. The page is titled with the

page (audio level) number,

channel names,

the channels routed and any other page (level) numbers where these channels are also routed.

Within the diagram the title is '1 CHANNEL1 A1 CHANNEL2 A2 234', where '1' is the page number, 'CHANNEL1' is the channel name, 'A1' is the channel routed, 'CHANNEL2' is the channel name, 'A2' is the channel routed and '234' indicates that either A1 or A2 is also on routed on levels 2, 3 and 4.

If there is no communication with the routing system then the page title is displayed as '1 CHANNEL1 A? CHANNEL2 A? ???', indicating that the audio inputs may be routed on other levels.

4.1.2 Page and home buttons

In a single level system the <PAGE> button performs no action, whilst in a multi-level system it allows monitoring of the different audio levels to be cycled through. On each page button press the title of the page changes to reflect the audio levels being monitored.

On submenu screens, where the <PAGE> button is active, a rectangle is drawn on the screen above it, whilst the <HOME> button always forces the screen back one page.



4.1.3 Audio metering

Four stereo meters are displayed for the PGM, PST, AUX1 and TX audio channels. Double markers on the sides of each bar indicate the line-up level for the meter.

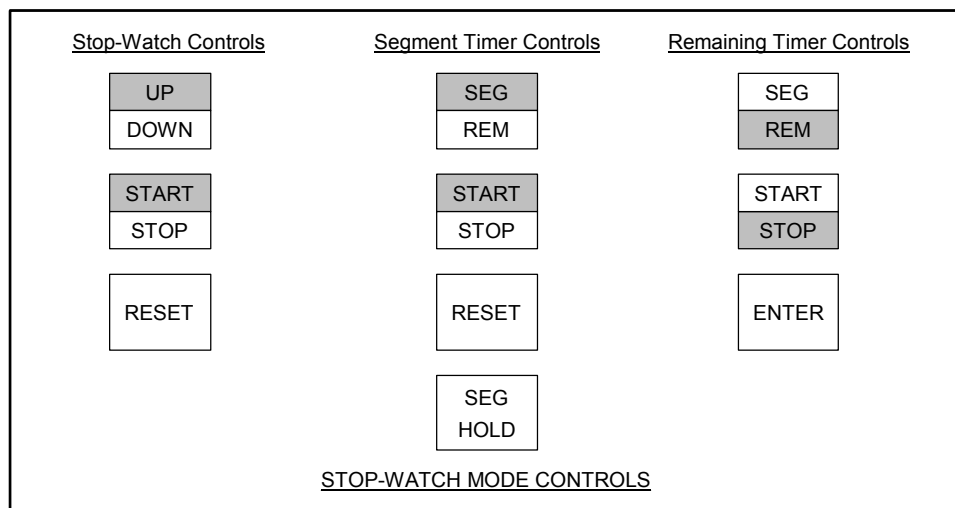
4.1.4 Real time clock

In stop-watch mode the time of day display (HH:MM:SS) is provided in 24 hour format, as illustrated. This time is derived from the station TC input. If no input is present, the clock will free run.

4.2 Stop-watch and timer modes

The timer modes shown on the plasma display are configurable. For details of how to configure them see section 5.14. The subsequently available modes are either stop-watch or timer mode.

The options selectable on the left hand side of the plasma display in each mode are as follows:



4.2.1 Stop-watch mode

If stop-watch mode is selected then the current count is displayed along with three button controls for the stop watch, as illustrated. The stop-watch can count up or down (from a preset value) and can be reset. The count down preset value is selected using shaft encoder one to set the MMM value. The shaft encoder second from the left is used to set the SS value.

The stop-watch is locked to the station TC input. Due to this feature a count started half way through a second will count that half second as a second to keep in step with the station TC.

The stop-watch, once started counts continually until terminal count, and does not stop once display pages are changed.

A toggle button provides **<START/STOP>** indication. On system startup the stop-watch is shown as stopped, after which it always displays the current operational state as set by the operator. When the stop-watch reaches terminal count (999:59 or 000:00) the count state is changed from start to stop.

A button provides **<COUNT UP>** and **<COUNT DOWN>** indication. On system startup the stop-watch is shown as counting **<UP>**, after which it always displays the current operational state as set by the operator. When the stop-watch reaches terminal count (999:59 or 000:00) the count direction indication remains unchanged in its current state.

A button provides stop watch **<RESET>**. If selected while counting up the count is reset to zero and the count continues, if selected while counting down the preset count down time is reloaded and the count continues.

4.2.2 Timer modes

If timer is selected, the display can be switched between segment and remaining mode.

4.2.3 Segment timer

In segment mode the timer value is displayed along with four button controls. In this mode, the timer is always active and counts independently to the stop-watch and segment count, even if timer mode is never selected.

It is always automatically started at the start of each transition and can be manually started and stopped once counting. Once started the timer counts up each second and can only be stopped manually or when the terminal count of 999:59 is reached.

At the start of each transition the timer always counts up from the zero. The **<SEG HOLD>** button stops the count from being zeroed at the start of each transition.

The timer is locked to the station TC input. Due to this feature a count started by a transition half way through a second will count that half second as a second to keep in step with the station TC.

The **<RESET>** button resets the count to zero from where it continues.

4.2.4 Remainder timer

In remainder mode the timer value is displayed along with three control buttons. In this mode, the timer is always active and counts independently to the stop-watch and segment count, even if timer mode is never selected.

It is always automatically started at the start of each transition and can be manually started and stopped once counting. Once started the timer counts down each second and can only be stopped manually or when the terminal count of -999:59 is reached.

The preset value is selected using the first shaft encoder to set the MMM value. The second shaft encoder is used to set the SS value. At the start of each transition the timer counts down from the preset value or zero if none has been specified.

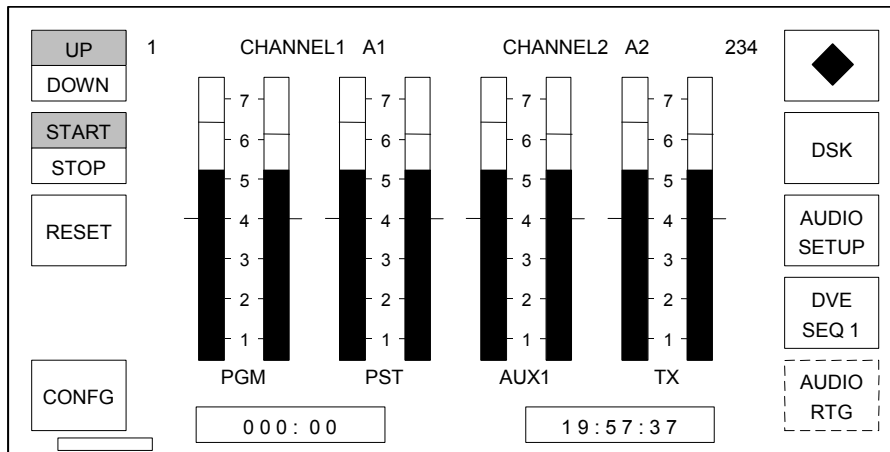
The timer is locked to the station TC input. Due to this feature a count started by a transition half way through a second will count that half second as a second to keep in step with the station TC.

The **<ENTER>** button only appears if the remaining count has been stopped and a positive remaining time is visible on the display. Selecting this button calculates the duration of the programme remaining from the last transition by performing the calculation shown. The button is then removed from the display and the duration is displayed as the remaining count, which is automatically started (the **<START/STOP>** button automatically toggles from stop to start).

Duration = currently remaining count - (time of day - time of transition).

4.3 Screens accessible from the home page

The buttons on the home page change the displayed page to the system configuration and operational setup pages.



The **<WIPE PATTERN>** button showing the currently selected wipe pattern graphic allows entry to the wipe pattern selection page. When control is by an automation system (e.g. Pro-Bel Compass) the displayed wipe pattern changes to reflect the currently selected setting by the automation system.

<DSK> allows entry to the down stream keyer (DSK) setup page, from which the settings for each of the DSKs can be adjusted.

<AUDIO SETUP> allows entry to the audio gain setup page, from which levels may be adjusted for each of the audio sources.

<DVE> provides access to the DVE sequence selection pages..

<AUDIO RTG> is only available in multi-level audio operation (as illustrated by the non-solid button) and allows entry to the audio channel routing viewing and editing pages.

The above are all operational features and are detailed in the operators guide.

<CONFIG> allows entry to the system configuration menu page via the PIN page (see chapter 5).

5 System configuration

5.1 Accessing the system configuration page

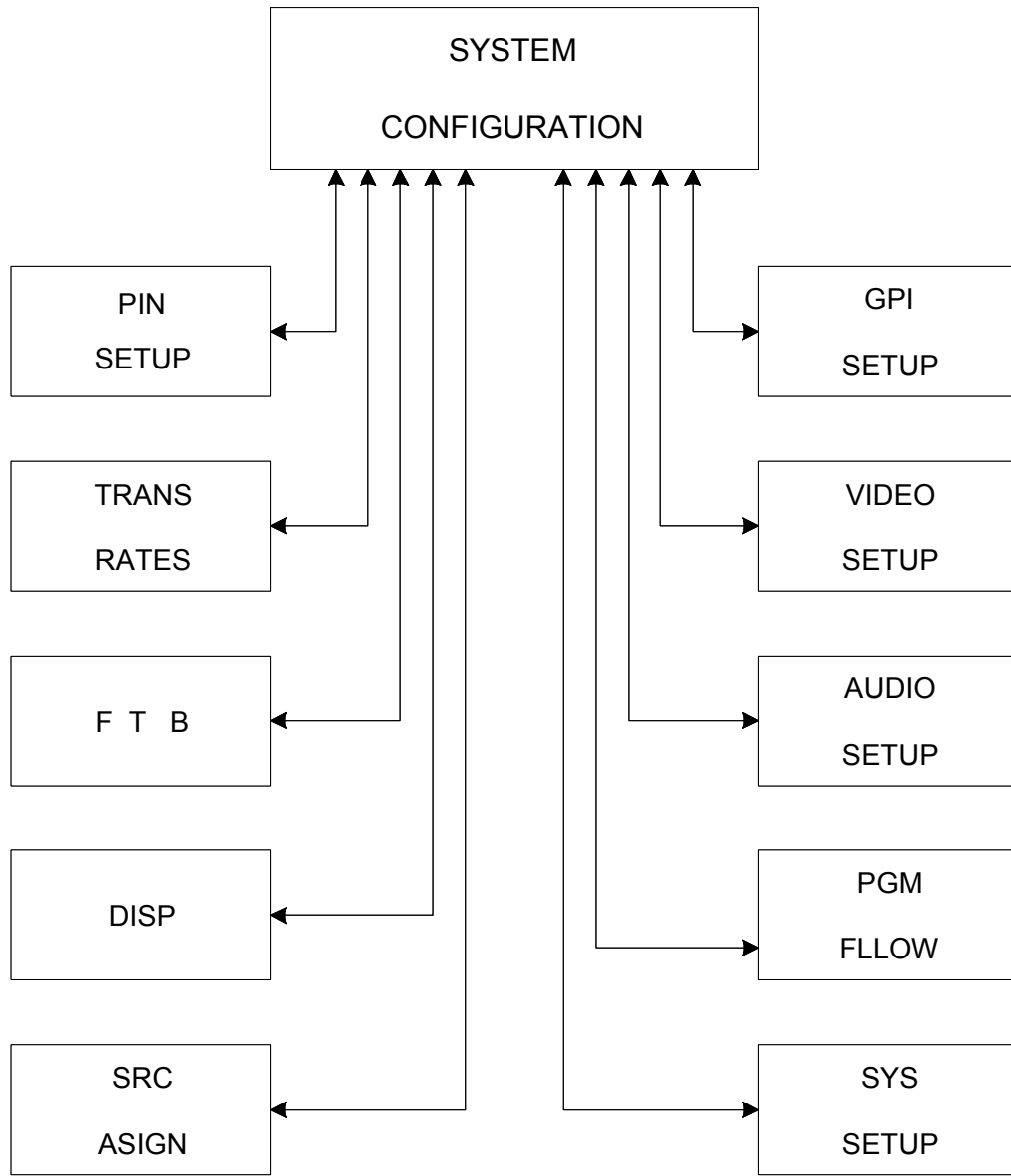
The system configuration page provides access to the system configuration options and is protected by a PIN (Personal Identification Number). This four digit number should be changed from the default setting of '0000' to ensure system security, while changing it periodically can help to maintain this security (see section 5.2).

To access the system configuration page from the home page push the **<CONFIG>** button. The configuration access page will prompt the operator to enter a four digit PIN by pressing the appropriate buttons.

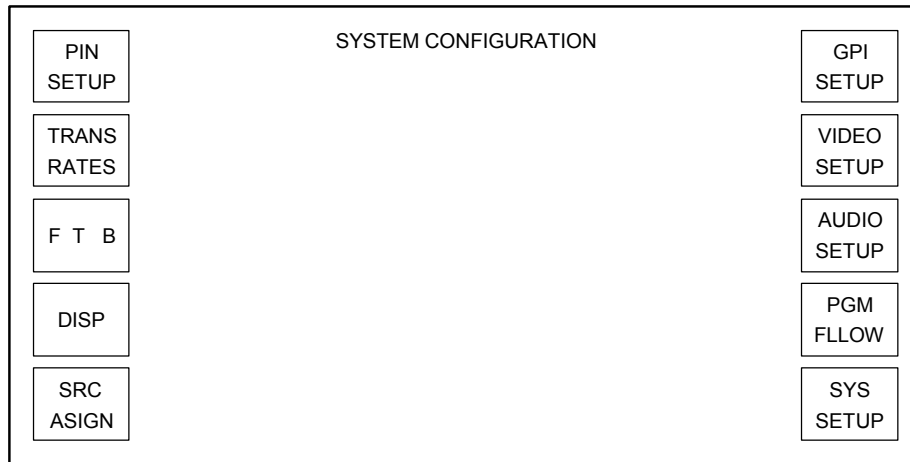
If the PIN is not entered within ten seconds, or if an invalid PIN is entered, the screen automatically reverts to the home page.

The screenshot shows a screen titled "CONFIGURATION ACCESS". In the center, there is a text box that says "ENTER PIN ----". Surrounding this central box is a numeric keypad with buttons for digits 0 through 9, arranged in two columns: 0-4 on the left and 5-9 on the right.

The following diagram shows the pages which are accessible from the system configuration menu. Each menu item is displayed as a unique page, although some menu items may have access to further sub-menus for selecting the various options for example the **<SRC ASSIGN>** page.



SYSTEM CONFIGURATION PAGE MENU TREE



Operation of each page accessed from the system configuration page is detailed within this section (section 5) of the handbook. The following list provides a description of the pages accessed by each button from the system configuration screen, and the section detailing their operation.

<**PIN SETUP**> displays the 'change configuration PIN' page (section 5.2)

<**TRANS RATES**> displays the 'transition rate setup' page (section 5.3)

<**FTB**> displays the 'fade to black' page (section 5.4)

<**DISP**> displays the 'display configuration' page (section 5.5)

<**SRC ASIGN**> displays the 'source setup' page (section 5.6)

<**GPI SETUP**> displays the 'GPI setup' page (section 5.9)

<**VIDEO SETUP**> displays the 'video setup' page (section 5.7)

<**AUDIO SETUP**> displays the 'audio setup' page (section 5.8)

<**PGM FLOW**> displays the 'programme follow setup' page (section 5.10)

<**SYS SETUP**> displays the 'system setup' page (section 5.11)

Pressing the <**HOME**> button, below the display on the right hand side, from any of these pages will return you to the system configuration page, while pressing it from the system configuration page returns to the home page.

5.2 Changing the configuration page PIN

From the system configuration page, select the **<PIN SETUP>** button. The change configuration PIN screen will then be displayed.

CHANGE CONFIGURATION PIN

0 1 2 3 4

NEW PIN - - - -

VERIFY - - - -

5 6 7 8 9

A focus rectangle highlights the 'active' screen area, prompting the user first to enter a new PIN then, after four digits have been entered, to verify the PIN by re-entering it. For this page the hyphens are replaced, after each button press, with asterisks indicating that the button presses have been read.

If the new and verify PINs match, the change configuration screen is closed, and the display returns to the system configuration page.

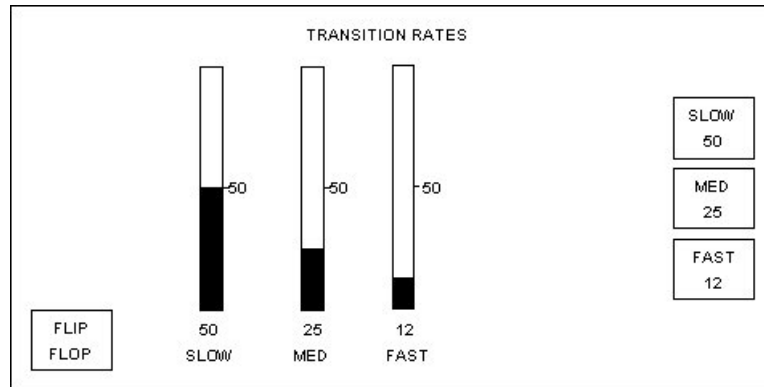
If the new and verify PINs do not match, the page is redrawn to its initial state, allowing the operator to retry the operation.

The **<PAGE>** button is inactive, whilst the **<HOME>** button returns to the system configuration page without affecting the currently selected PIN.

5.3 Transition rates

To access this page from the system configuration page, press the **<TRANS RATES>** button.

This page allows the system transition rates to be modified, and set, and also enables flip-flop operation of the PGM bus to be activated



The **<PAGE>** button is inactive, while the **<HOME>** button returns the display to the system configuration page.

5.3.1 Changing the transition rates

The transition rate setup page allows the three transition rates for the system to be adjusted and set. These three rates, **<SLOW>**, **<MED>** and **<FAST>** determine the rate a PST/PGM transition occurs at, and are recalled by selecting a transition rate button from the bottom left hand corner of the control panel.

Each of the three current settings is shown on the right of the screen as the number of frames over which the transition will occur.

The default settings are:

Fast = 12 frames

Medium = 25 frames

Slow = 50 frames

Each rate is adjusted by using the shaft encoder directly below the relevant bar on the screen.

Turning the shaft encoder clockwise increases the number of frames, while turning it anti-clockwise decreases the value. The bar, and numeric value beneath it, reflects the changes being made. The new settings will not take effect until they have been saved. To save a new setting, press the button on the right of the screen corresponding to the rate that has been altered. The figure displayed will change to that shown below the corresponding bar.

5.3.2 Configuring 'flip-flop' for transitions

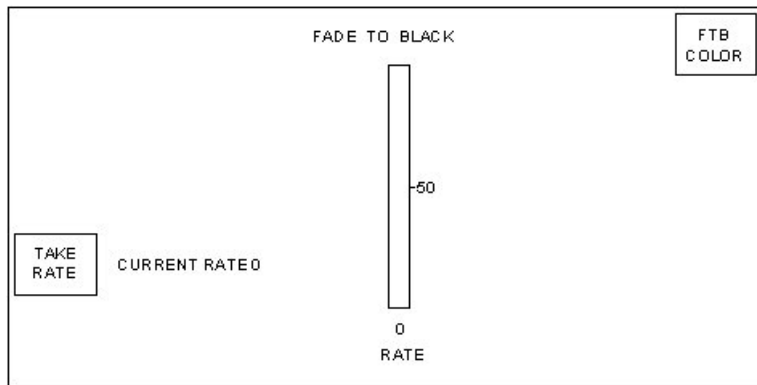
The <FLIP FLOP> button at the bottom left of the transition rates page can be toggled to enable (button highlighted) or disable (button not highlighted) flip-flop operation. Flip-flop mode, when activated, swaps the PST and PGM sources at the end of a PGM bus transition.

Note: *When using the TX 420 with Pro-Bel automation systems, it is important to ensure that Flip Flop mode is NOT active as the action of selecting sources on the PST bus inserts manual events into the schedule.*

5.4 Configuring fade to black options

It is possible to adjust the fade rate for the 'fade to black/silence' button. Additionally, the fade to Black can be changed to be fade to colour. Access to the fade to black page is by pressing the **<FTB>** button on the system configuration page.

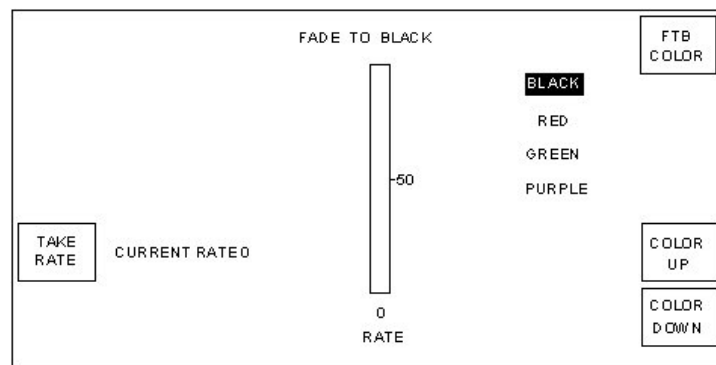
5.4.1 Fade to black rate



The shaft encoder below the fade to black rate bar adjusts the fade rate, and is displayed in frames. The possible range of values is between 0 and 99 frames, where 0 = cut. The bar, and numeric value beneath it, reflects the changes being made. Once the rate has been set, pressing the **<TAKE RATE>** 'locks' the new rate, indicating it alongside the button.

5.4.2 FTB Colour selection

Pressing the **<FTB COLOR>** button provides the ability to set the TX 420 to fade to a colour rather than to black. Colours available are Black, Red, Green or Purple. This feature is only available when using the ICON mixer.



5.5 Configuring the display

The plasma display setting may be changed via the display configuration page. To access this page, press the **<DISP>** button on the system configuration page.

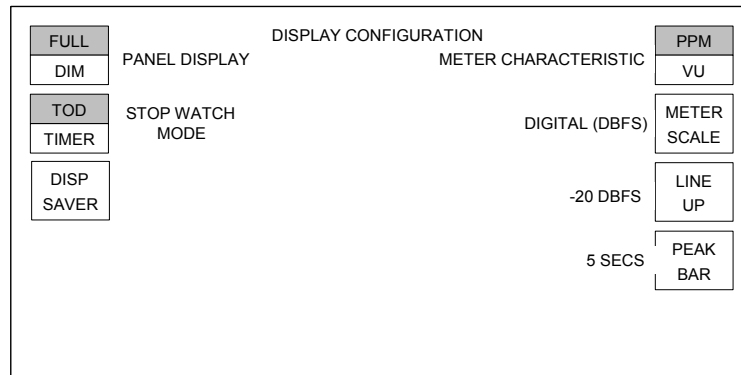
5.5.1 Panel Display

To cater for different ambient lighting levels, the brightness of the panel display can be changed. The button in the top left corner of the display provides toggle operation between the two options **<FULL>** or **<DIM>**. The current setting for the display is indicated by inverse text.

The default setting for the panel brightness is **<DIM>**.

5.5.2 Stop Watch Mode

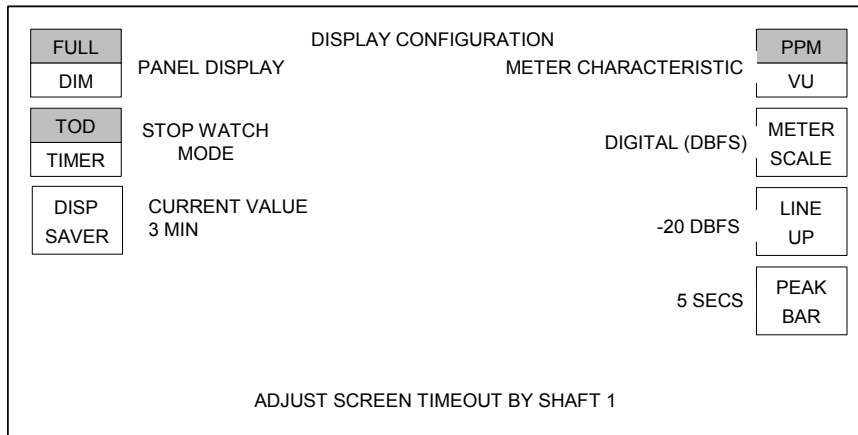
The button **<TOD/TIMER>** provides toggle operation, allowing either stop watch mode or segment/remaining timer mode to be available on the home page, with the current setting indicated by inverse text.



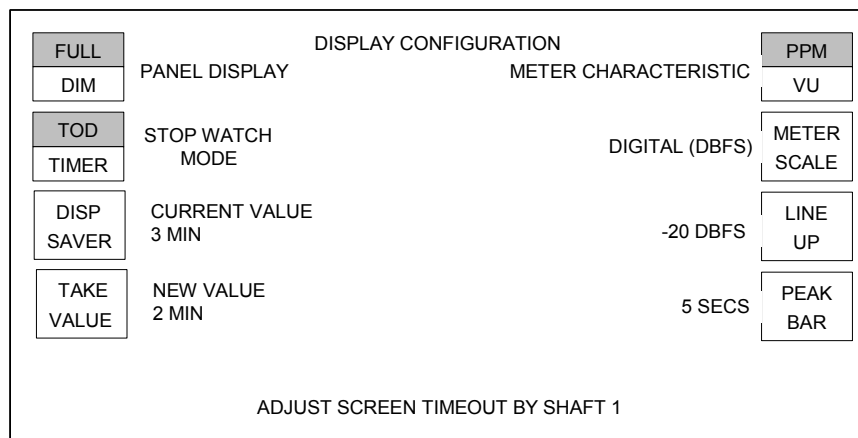
5.5.3 Display Saver

The TX 420 has been supplied with a screen saver feature, which can be set from the Display Configuration screen.

Pressing the **<DISP SAVER>** button displays the current timeout value for the screen saver. This time can be adjusted by the first, left hand, rotary encoder under the display.



Once the timeout has been changed, a **<TAKE VALUE>** button and confirmation of the time to be taken is displayed under the **<DISP SAVER>** button.



Pressing the **<TAKE VALUE>** button accepts the new value.

5.5.4 Audio monitoring display characteristics

The buttons on the right hand of the screen are used to configure the operation of the audio meters on the home page.

Meter Characteristic

<METER CHAR> - is used to select the meter type (operation) for the audio meters. Pressing the button toggles between the two available options, PPM and VU.

If VU is selected on the **<METER CHAR>** button, the meter scale is fixed for analogue VU and no further configuration options are available.

Meter Scale

The audio meter scale, once set as PPM, can be set to operate in one of three possible modes.

<DIGITAL (DBFS)>,

<PPM> or

<NORDIC>.

Pressing the **<METER SCALE>** button cycles around these options,

Line Up

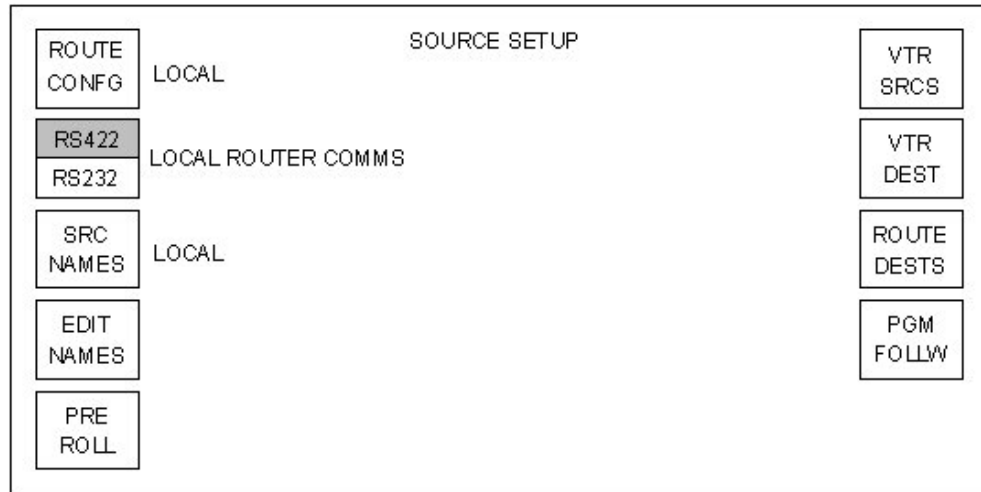
<LINE UP> - Pressing the **<LINE UP>** button sets the scale for the audio meters, when configured for Digital DBFS operation, to indicate 0dBu at either -18.06dbFS or -20dbFS.

Peak Bar

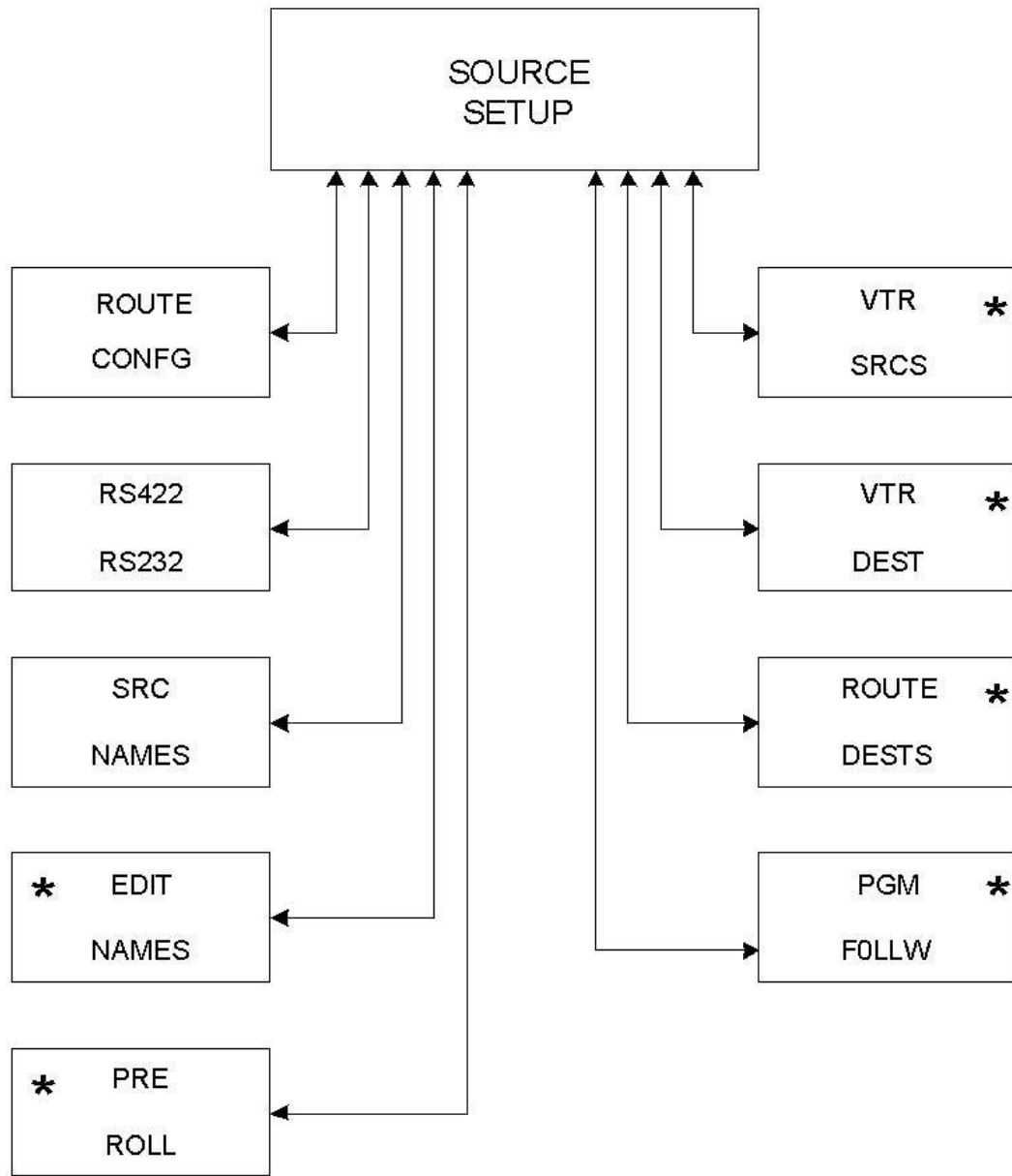
<PEAK BAR> - this allows the peak hold bar for all the meters to be selected, either turned off or held for between one and ten seconds. The button will toggle through the available options.

5.6 Configuring the source signals

The source setup page provides the source configuration options. This page is accessible from the configuration page (section 5.1) by pressing the **<SRC ASIGN>** button. The controls allow for the assignment of the router providing the sources and the assignment of the source names, which are displayed along with other source control and setup facilities.



The following diagram shows pages that are accessible from the source assign sub-menu. Some of the menu items access further pages (e.g. **<EDIT NAMES>**) while other menu items (e.g. **<ROUTE CONFG>**) provide toggle operation around the available options. Buttons indicated with a * access sub-menu screens. The sub-menus associated with these buttons are shown in the following pages with their descriptions.



SOURCE SETUP SUB-MENU TREE

5.6.1 Router configuration

Pressing the **<ROUTE CONFIG>** button cycles through three available control modes; 'local', 'external – fixed' and 'external - auto'. The currently selected mode is shown alongside the button. Once the router type has been configured, pressing the **<HOME>** button returns the display to the Source setup page.

'**<LOCAL>**' control mode, in this case, refers to any router under direct control of the TX Series controller using Pro-Bel general switcher protocol (SW-P-02). The router can either be a dedicated TX Series router housed in the TX Series controller, or a separate framed router such as Freeway connected via the *Ext Rtr* port on the TX Series controller.

'**<EXT FIXED>**' and '**<EXT AUTO>**' should be selected for systems where the TX Series controller uses an external controller, such as Aurora, for router control and to assign sources to the system.

The Aurora **<EXT FIXED>**/ Automation **<EXT AUTO>** interface

For external router control via an Aurora controller to operate, the router configuration page must be set for either '**<EXT FIXED>**' or '**<EXT AUTO>**'. In addition, the physical link between the Aurora and TX Series controller is via a single RS-422 link between the TX 420 controller, Ext Rtr port, and a panel port on the controller.

The TX 420 emulates 2 Multi-drop panels on this port, at the first and second positions. The panel type used is 'Master Control' and each panel should be configured with a different suite number (refer to the control system documentation for further details). The first panel is used to control the Video crosspoints (PGM, PST, AUX 1 and AUX 2), while the second panel is used for Audio crosspoints (PGM, PST, AUX 1, AUX 2 and Over). Note that if dedicated overs are used the last destination, over, is not required. This interface then operates in one of two modes as follows.

Mode 1 - **<EXT FIXED>**

In this mode all assignments to channels are made separately using a channel assignment panel connected to one of the panel ports on the Aurora controller. This panel should be configured to use video and audio panels with the same suite numbers as the 'pres panel'. Any assignment to channels made from this panel will then be reflected on the TX 420.

Mode 2 - **<EXT AUTO>**

In this mode the assignments to the channels are set as described for the Ext Fixed mode, via a channel assignment panel, however they are not fixed. The TX 420 will assign a source to a channel, if the source requested on the automation port is not currently assigned to the panel.

When a command to set a channel, on a bus is received from the automation port, the channel number is assumed to be equal to the association number on Aurora. This source association number is assigned to a channel. The video and audio suites are expected to have the same panel assigned and will always have the same source association assigned for both video and audio.

When a source is requested via the automation port, the TX 420 will check the source association against those sent by the system controller and if found, the matching channel will be used. If it is not found, then the highest unused channel will be assigned that source association. The maximum number of channels that can be automatically assigned is 8 (channels 13 to 20). These sources are assigned from the right hand side of the mixer bus.

5.6.2 Local router comms

The button **<RS422/RS232>**, toggles between the RS422 and RS232 half of the button being highlighted. This allows the comms link between the controller and an externally connected router to be either RS422 or RS232. For systems fitted with an internal router, this button should be set for RS422.

5.6.3 Source Names

The **<SRC NAMES>** button cycles between the options: 'local', 'external - system3' and 'external - automation' for selection of source names. If the local option is selected then the button immediately below is displayed to allow the local editing of the source names. If either of the external choices are selected then the button immediately below is removed from the display as that option has no meaning when the source names are coming from an external device. On pressing the **<EDIT NAMES>** button the operator is taken to the source name editor page.

<	SOURCE NAME				>
	1 BLCK	2 LMS1	3 LMS2	4 LMS3	
	5 S005	6 S006	7 S007	8 S008	
	9 S009	1 S010	1 S011	12 S012	
	1 S013	1 S014	1 S015	16 S016	
	1 S017	1 S018	1 S019	20 S020	
	2 S021	2 S022	2 S023	24 S024	

This page provides the source name editor, which allows all twenty-four source names to be edited on-screen. As each source name is edited the change can be seen within the four character source name displays in the lower half of the panel. Each source name is four characters long and is numbered (1-24). The characters available for the source names are:

0123456789

ABCDEFGHIJKLMN OPQRSTUVWXYZ

abcdefghijklmnopqrstuvwxyz

space character ''

The four shaft encoders are used to cycle through these characters for the source names. Shaft encoder one changes the first letter of the four character name, shaft encoder two the second etc. The characters available do not wrap around, stopping on the first and last characters.

Two buttons are provided to move the focus rectangle around the screen display. The source name, highlighted with a rectangle is the one currently being edited. The focus rectangle wraps around the first and last source names to allow a continual cycling.

The **<PAGE>** button is inactive, whilst the **<HOME>** button returns to the source setup page.

5.6.4 Pre-roll

On pressing the **<PRE ROLL>** button the operator is taken to the source pre-roll time editor page.

This page provides the source pre-roll time editor and allows the pre-roll times for the first twenty sources on the buses to be edited on screen. The pre-roll times are displayed next to the source name. The pre-roll time is displayed in seconds between 0 and 62. Where '-' is displayed, it indicates no pre-roll for the channel. i.e. A pre-roll command will not be sent on the Preset port for the **<ROLL>** and **<PRE-ROLL/ TAKE>** buttons.

All four shaft encoders provide the same control which allows the range of seconds to be cycled through.

Two buttons are provided to move the focus rectangle around the screen display. The source name that is bound by the rectangle is the one that is currently being edited. The focus rectangle wraps around the first and last source names to allow a continual cycling.

The **<PAGE>** button is inactive, whilst the **<HOME>** button returns to the source setup page.

<		PRE - ROLL EDITOR				>	
BLCK	10	LMS 1	30	LMS 2	20	LMS 3	--
S005	08	S006	--	S007	00	S008	00
S009	00	S010	20	S011	02	S012	10
S013	16	S014	14	S015	32	S016	40
S017	10	S018	25	S019	23	S020	62

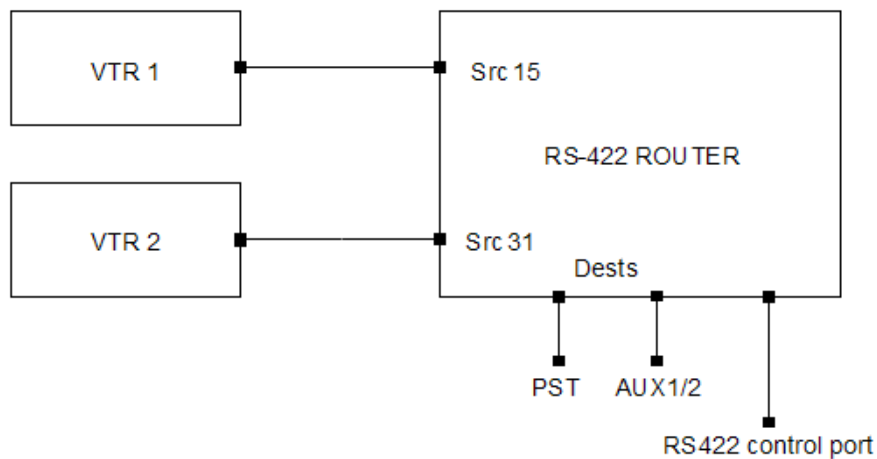
5.6.5 VTR sources

On pressing the **<VTR SRCS>** button the operator is taken to the VTR control sources editor page.

This page provides the editor, which assigns RS-422 router source numbers to the sources on the buses. The router source numbers correspond to RS-422 router inputs and are used by the TX 420 main controller to route its control port on the RS-422 router to allow control of the VTRs.

The VTR control sources are displayed next to the bus source names with '-' indicating no VTR source or a number in the range 1 to 64 indicating the RS-422 router source number.

In the control connections VTR1 is connected to source (input) 15 of the RS-422 router. In the screen layout the VTR source number 15 is assigned to the bus source which is 'VTR1'. The same RS-422 source can be used with more than one mixer source.



VTR CONTROL INTERCONNECTIONS

The Machine Control port should be cabled to the router as follows;

TX/RX1 - Controls the machine on the PST bus, TX/RX2 - The Aux1/2 machine and TX/RX3 - provide the RS422 router control to its remote control port.

All four shaft encoders provide the same control which allows the range of numbers to be cycled through.

Two buttons are provided to move the focus rectangle around the screen display. The source name that is bound by the rectangle is the one currently being edited. The focus rectangle wraps around the first and last source names to allow a continual cycling.

The **<PAGE>** button is inactive, whilst the **<HOME>** button returns to the source setup page.

VTR CONTROL SOURCES			
<			>
BLCK 10	LMS 1 30	LMS 2 20	LMS 3 --
S005 08	S006 --	S007 00	S008 00
S009 00	S010 20	S011 02	S012 10
S013 16	S014 14	S015 32	S016 40
S017 10	S018 25	S019 23	S020 62

5.6.6 VTR Destinations

On pressing the **<VTR DEST>** button the operator is taken to the VTR control destination editor page.

This page provides the editor, which assigns the RS-422 router destination numbers, which the TX controller will use to control the VTRs from. When a VTR is to be controlled, the VTR control source number is routed to this destination on the RS-422 router making the duplex link from which the VTR can be controlled. This depends on which router bus is in use.

The VTR control destination is displayed on a single line with '-' indicating no VTR control destination or a number in the range 1 to 64 indicating the RS-422 router destination number.

All four shaft encoders provide the same control which allows the range of destination numbers to be cycled through. After a VTR destination has been changed, an **<UPDATE>** button is displayed in the lower right hand corner of the display. Pressing the associated soft button accepts the new value.

M/C control port 1 = PST, port 2 = Aux 1 or 2, port 3 = RS422 router control.

The **<PAGE>** button is inactive, whilst the **<HOME>** button returns to the source setup page.

VTR CONTROL DESTINATIONS	
Preset Destination:	32
AUX1/2 Destination:	31

5.6.7 Router Destinations

On pressing the **<ROUTE DESTS>** button the operator is taken to the Local router destination editor page. This page allows the destinations for the TX 420 video and audio buses along with the PGM follow destinations (see section 5.6.8) to be specified on the local router. For systems with a system controller providing the interface between the TX system and router, settings on this page will have no effect on system operation, except audio over, where '-' indicates the use of dedicated audio over inputs, and 'NN' specifies the destination number for routed audio over inputs.

The local router destination is displayed next to the bus name as a number in the range 1 to 64 or a '-' indicating there is no destination for this bus.

All four shaft encoders provide the same control, which allows the range of destinations to be cycled through. The range of values displayed may 'jump' as the editor does not allow the same destination to be specified more than once. The destinations specified have to include any offsets required to stack the commands down a single RS-422 port.

Two buttons are provided to move the focus rectangle around the screen display. The bus name, which is bound by the rectangle, indicates the one currently being edited. The focus rectangle wraps around the first and last source names to allow a continual cycling. The diagram below shows typical router destination numbers for a system with an internal AES router.

LOCAL ROUTER DESTINATIONS						
<					>	
VID	PGM 01	PST 02	AUX1 03	AUX2 04		
AUD	PGM 25	PST 26	AUX1 27	AUX2 28		
AUD	OVER 29					
VID	PGM1 --	PGM2 --				
AUD	PGM1 --	PGM2 --				

The **<PAGE>** button is inactive, whilst the **<HOME>** button returns to the source setup page.

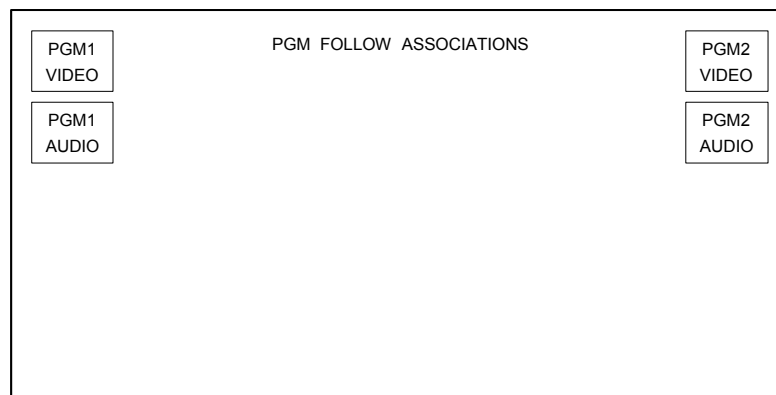
5.6.8 PGM follow

The TX Series provides a programme follow facility, for use with systems using Local/ Internal routing, allowing up to two, video/ audio, router outputs to 'follow' the main PGM bus.

These additional busses, PGM 1 and 2, provide cuts only transitions and can be used as a 'shadow' output for the PGM bus. These can be fed into an emergency/ bypass switcher, or be used to provide 'clean' outputs for recording, or other as regional feeds. For these to operate correctly, each bus should be assigned a destination number to control (see section 5.6.7) and source associations to select.

Source associations can be set for each 'follow' bus, with independent control over video and audio (providing all audio levels in multi-level systems are married) outputs, enabling PGM breakaways to be achieved.

From the source setup page, pressing the **<PGM FOLLOW>** button takes the operator to the video and audio PGM follow associations editor main page. This page enables the video and audio follow source associations for both PGM follow destinations to be selected.



The standard buttons allow the following associations to be edited using the generic association editing page.

<PGM1 VIDEO> allows the programme 1 video associations to be edited.

<PGM1 AUDIO> allows the programme 1 audio associations to be edited.

<PGM2 VIDEO> allows the programme 2 video associations to be edited.

<PGM2 AUDIO> allows the programme 2 audio associations to be edited.

The follow source association editor page provides the editor which allows the video or audio follow source associations for the first twenty video sources on the PGM bus to be specified for a follow destination.

Follow source associations for each of the twenty PGM bus sources can be defined as a source between 1 and 64, up to the maximum size of the local router. The 'follow' source number is entered and displayed next to the PGM bus source name. If, however, there is no follow source for a specific PGM bus source, it is indicated as '-'. When this source is selected during normal operation, the follow bus will remain on the last selected source. The title of the page indicates which destinations follow sources are being edited, for example 'PGM1 VIDEO ...', or 'PGM2 AUDIO ...'.

<		PGMx xxxxx FOLLOW ASSOCIATIONS				>	
BLCK S064	LMS1	LMS2	LMS2 ----	LMS3	S004		
S005 ----	S006	S064	S007 ----	S008	BLCK		
S009 ----	S010	----	S011 ----	S012	----		
S013 ----	S014	BLCK	S015	S004	S016	LMS2	
S017	LMS2	S018	BLCK	S019	LMS2	S020	S064

As an example in the diagram above, for PGM 1 Video bus, sources LMS1 and LMS 3 have PGM 1 follow associations. If source 'LMS 1' is routed on the programme bus then source 'LMS 2' will be routed to the programme follow destination. If source '-' (no source) is selected as the follow source for a PGM bus source (e.g. 'LMS 2'), then when 'LMS 2' is routed on the programme bus, whatever was routed on the associated follow destination previously will remain unchanged.

To edit a source association, select the required source by using the buttons in the top left and right hand corners of the plasma display to move the focus rectangle around the screen. Once selected, the associated source can be changed using the shaft encoders below the display.

Any changes which may occur from the main control system to the follow sources are updated on the page while it is visible, with the exception of the current source which is not updated by the main control system.

The <PAGE> button is inactive, whilst the <HOME> button returns to the source setup page.

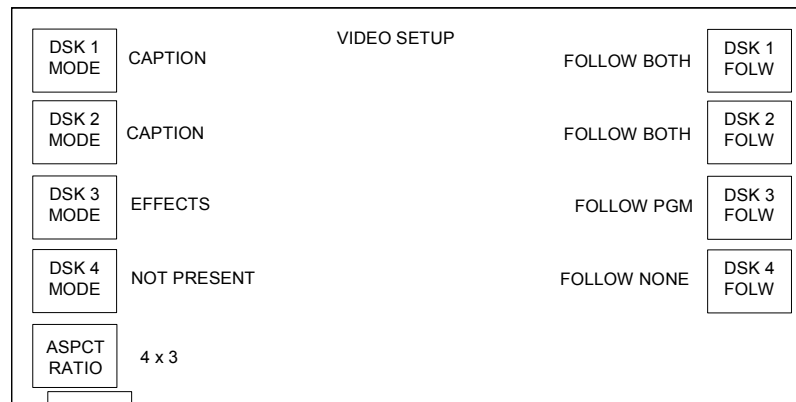
5.7 Video path setup

By selecting **<VIDEO SETUP>** from the System Configuration page, the video setup screens provide the ability to define which DSKs are present in the system, their operating mode, adding DVEs into the system and also setting the order/ position in which the DSKs, DVE and FTB functions appear in the programme path. When using S & W mixer the DVE is always before the mixer and FTB can be after DSK1 or DSK2.

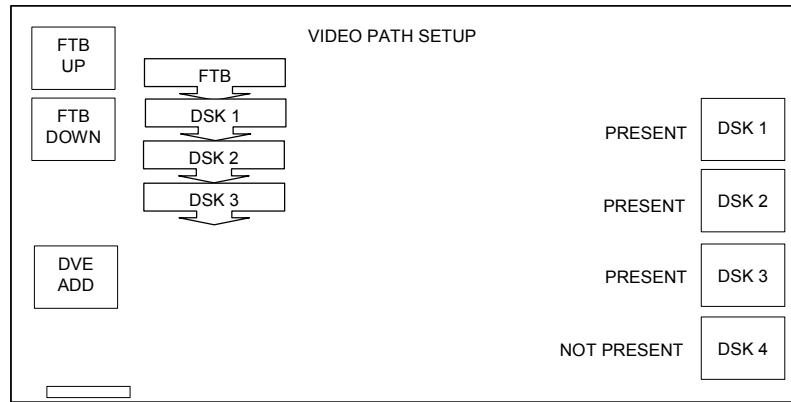
5.7.1 Configuring the DSKs

A downstream keyer (DSK) enables images such as captions and logos to be displayed on top of the programme output. The TX 420 can be fitted with up to four DSK cards in the vision mixer frame. These cards are type 3423 and are interchangeable, providing the correct line and fraction settings are made. The settings for these cards are detailed in chapter 6.2.1. However, when using S & W mixer only 2 fixed DSKs are present.

The operating mode of the downstream keyers is set via the video setup screen. This page is accessed from the system configuration page by pressing the **<VIDEO SETUP>** button.



Pressing the **<PAGE>** button, indicated with a rectangle in the bottom left hand corner of the screen, displays the Video Path Setup screen. By pressing the keys at the right hand side of the screen, **<DSK 1>**, **<DSK 2>**, **<DSK 3>** or **<DSK 4>** to toggle between Present and Not present; the system can be 'told' how many keyers are fitted in the vision mixer frame. It is important to set the number of keyers available to the system before going on to set the operating mode for each keyer. This operation depends on the state of the rotary switch on the 3428 module in the mixer frame, see section 6.2.2.



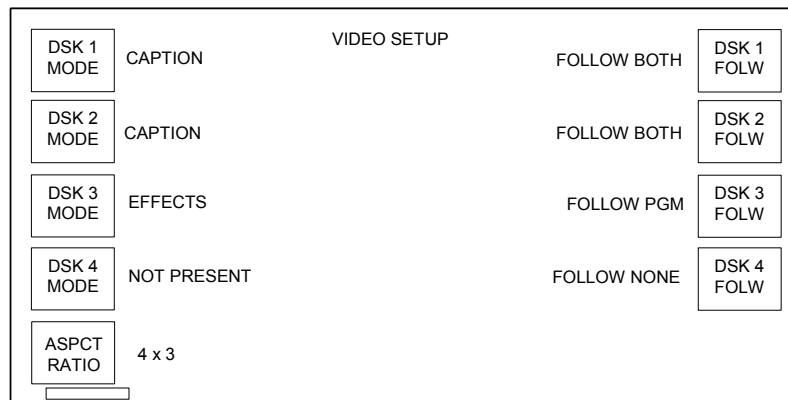
The buttons in the top left hand corner of the screen are used to set where the Fade to black/silence is positioned when active. This can be either before or after any of the keyers in the system. A graphic showing the position of the FTB in relation to the keyers is shown alongside the Up/ Down buttons. When FTB is before DSK 1, it is positioned at the mixer output.

DSK operating mode

Once the DSKs have been configured into the system, pressing the **<PAGE>** button returns the plasma screen to the Video Setup screen. From here the operating mode for DSK1 to DSK4 can be set. Pressing the **<DSK MODE>** key for each of the keyers toggles the mode between caption **<CAPTION>**, effects **<EFFECTS>** or **<NOT PRESENT>**.

In caption mode, the background signal is attenuated by the key in the caption area, then the fill is added over the entire picture. The fill signal must be presented against a totally black background so as to avoid output in unwanted areas of the picture.

In effects mode the keyer produces a mix of the foreground and background inputs. With no key or with black as key, then output is 100% background and the foreground input is off.



Selecting the follow mode

The follow mode acts in the same manner as the audio-over follow, following a PST/PGM video transition, a DVE move or both. The four buttons **<DSK1 FOLW>** to **<DSK4 FOLW>** on the right of the screen are used to select the mode for each DSK.

<FOLLOW PGM> sets the DSK to follow PST/PGM video transitions only.

<FOLLOW DVE> sets the DSK to follow DVE moves only.

<FOLLOW BOTH> sets the DSK to follow either the next PST/PGM video transition or DVE move.

5.7.2 DVE positioning in the programme path

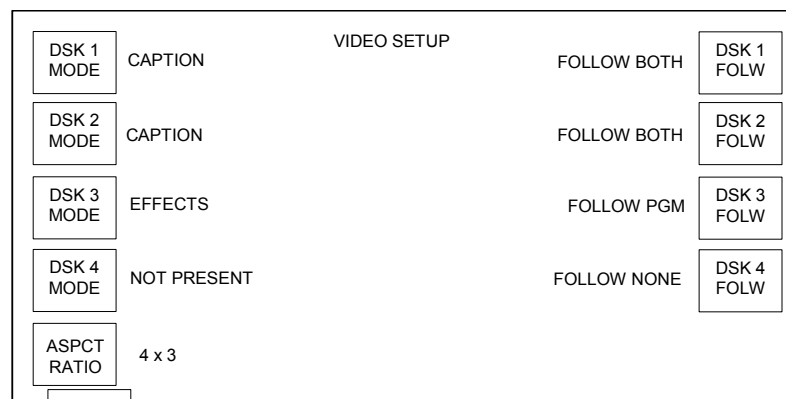
The vision mixer architecture has been designed to enable the DVE to be positioned anywhere in the PGM video path. The DVE position is determined by the card edge rotary switch on the 3428 mixer configuration module, for either fixed or dynamic positioning via the video setup screen.

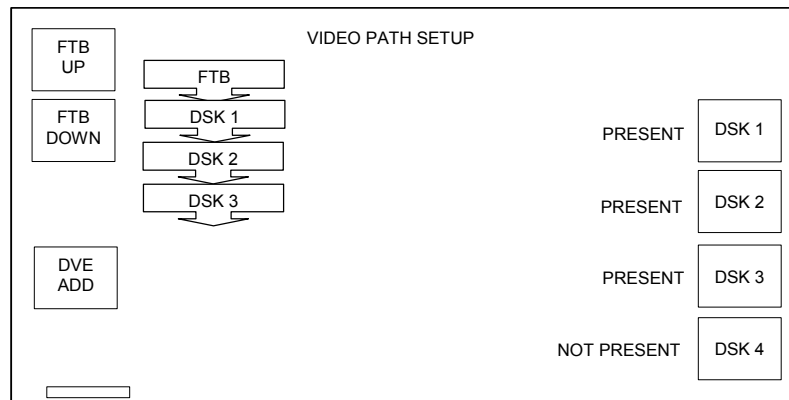
Fixed positioning

Switch positions 1 to 5 allow the DVE to be set in a fixed position within the programme path, either after the mixer (position 1) or after each of the keyers (positions 2 to 5). Changes made from the control panel will be ignored when the DVE is set to a fixed position.

Dynamic positioning

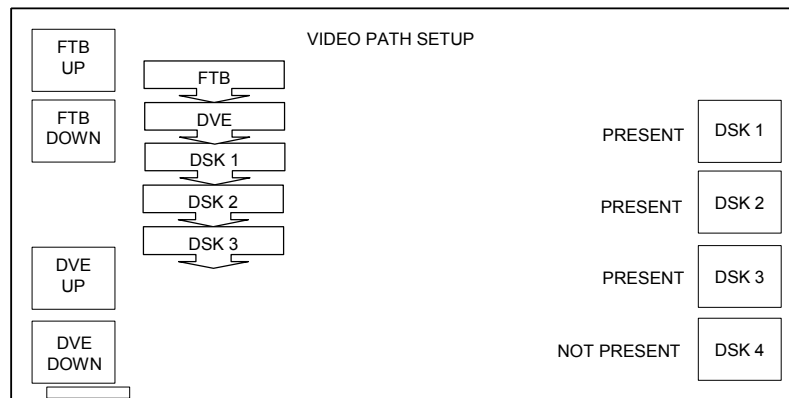
To add a DVE into the system, open the Video Setup screen by selecting the **<VIDEO SETUP>** button from the System Configuration screen, and then pressing the **<PAGE>** button, indicated with a rectangle in the bottom left hand corner of the screen



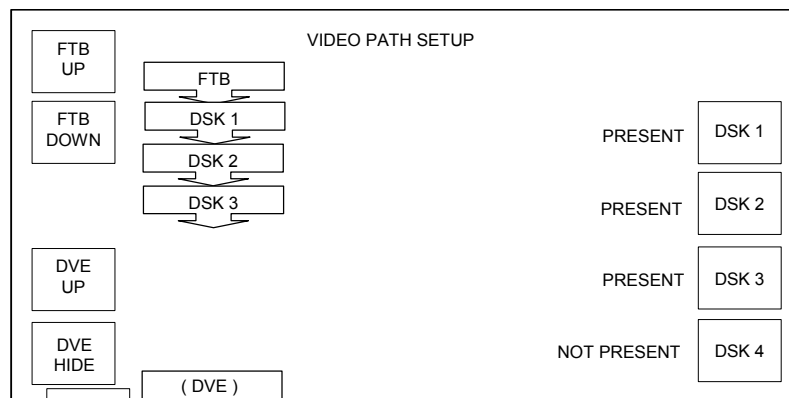


Pressing the **<DVE ADD>** key places the DVE after the last keyer in the system.

Note It is recommended that the number of keyers available to the system is set before going on to configure the DVE position, as adding or removing keyers may cause the DVE to be removed from the circuit.

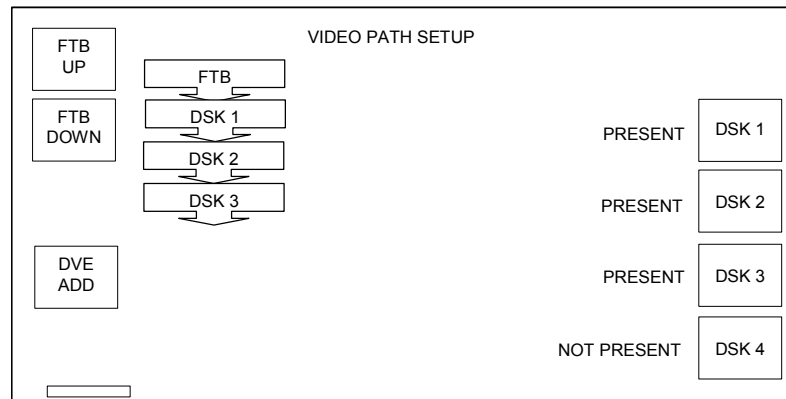


Once the DVE appears in the system mimic diagram, it can be moved up and down in the programme chain by using the **<DVE UP>** and **<DVE DOWN>** keys. With the DVE at the end of the chain, it can be removed by pressing **<DVE OUT>**, and subsequently hidden by selecting **<DVE HIDE>**.



5.7.3 Fade to black (FTB) position

To reposition the FTB, open the Video Setup screen by selecting the **<VIDEO SETUP>** button from the System Configuration screen, and then pressing the **<PAGE>** button, indicated with a rectangle in the bottom left hand corner of the screen



The buttons in the top left hand corner of the screen are used to set where the Fade to black/silence is positioned when active.

This can be either before or after any of the keyers in the system. A graphic showing the position of the FTB in relation to the keyers is shown alongside the Up/ Down buttons. When FTB is before DSK 1, it is positioned on the mixer output.

5.7.4 Setting the aspect ratio for wipes

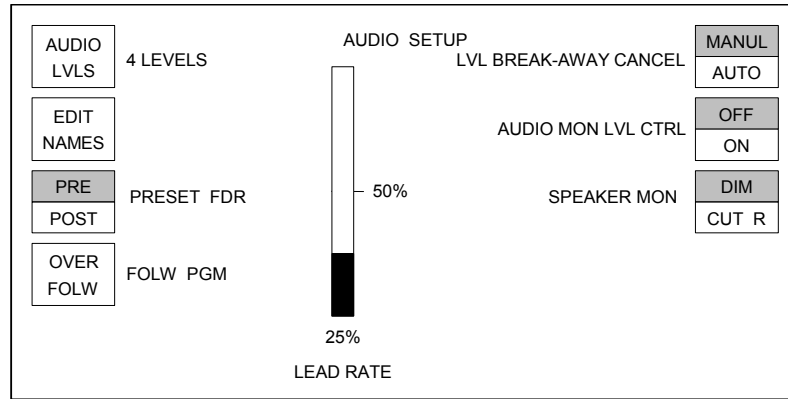
This feature is inoperative when using the ICON mixer. Selection of these buttons when an ICON mixer is present will have no effect as the wipes used remain in proportion regardless of the picture aspect ratio.

With the S&W vision mixer however, it is possible to change the aspect ratio for the wipe patterns by pressing the **<ASPCT RATIO>** button from the video setup screen. The options available for the aspect ratios are '4 x 3', '16 x 9' and 'Assignable'. The current selection is displayed to the right of the push button.

If the setting is 'assignable', operator intervention is required when setting up a wipe transition (refer to the operators guide).

5.8 Audio setup

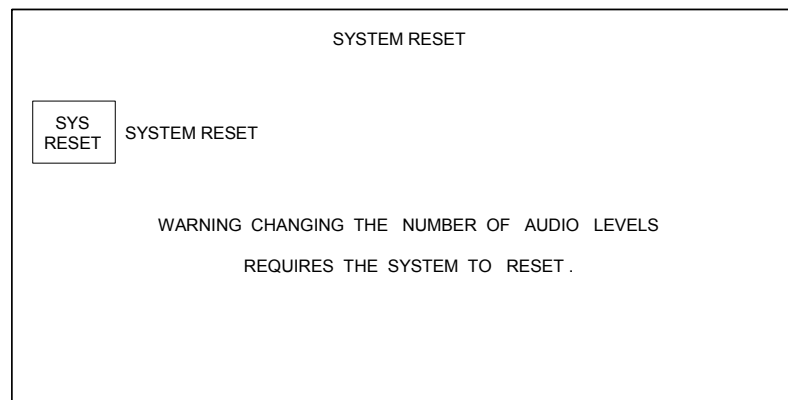
Selecting the **<AUDIO SETUP>** button from the System Configuration screen accesses the audio setup page. From here the audio system can be defined, in terms of number of levels, the level names right through to the audio over follow operation.



5.8.1 Levels

The **<AUDIO LVLS>** button allows the number of audio levels within the system to be specified. On each press of the button the number of audio levels is incremented up to a maximum of four, after which the number of levels cycles back to one.

If the number of levels has been changed, the changes do not come into effect until changes have been made and this page has been left. On exiting the page, after a change, the TX 420 system reset page is displayed.

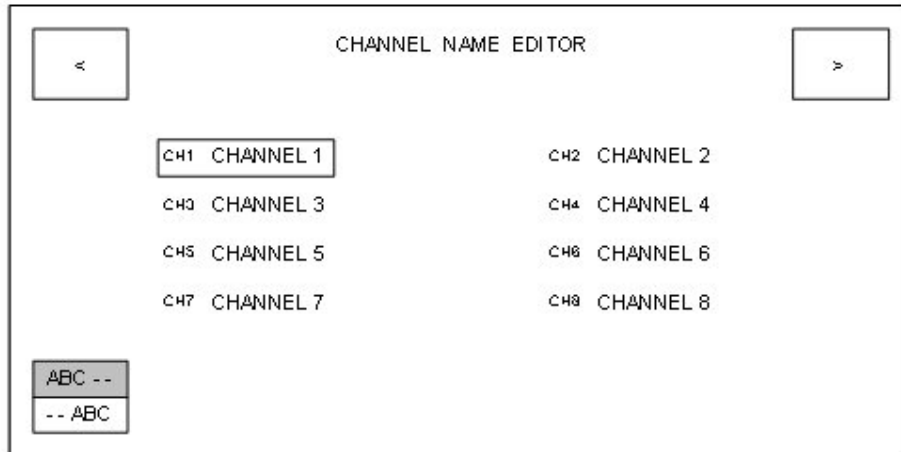


After pressing the **<SYS RESET>** key, there is a 10 second window in which to accept the change by pressing the **<SYS RESET>** key again. Once the system has been reset the user is notified that the system has been reset and it indicates the number of audio levels now in the system.

Note: Pressing the **<HOME>** key at any time during this process will return the screen to the audio setup page.

5.8.2 Edit names

On pressing the **<EDIT NAMES>** button the operator is taken to the channel name editor. The editor only allows the number of audio levels shown on initial entry to the audio setup page to be edited.



This page allows the name of each channel to be edited on-screen. Channel names can be up to eight characters long. The characters available for the channel names are:

0123456789

ABCDEFGHIJKLMNOPQRSTUVWXYZ

abcdefghijklmnopqrstuvwxyz

space character ' '

The four shaft encoders are used to cycle through these characters for the channel names in groups of four depending on the state of the **<ABC- - /- -ABC>** button. When **<ABC- - ->** is selected the shaft encoders adjust the first four characters within the channel name, and when **<- - -ABC>** is selected the shaft encoders adjust the last four characters within the channel name.

The shaft encoders cycle through the available characters but do not wrap around to allow continual cycling, stopping on the first and last characters. Two buttons are provided to move the focus rectangle around the screen display.

The channel name that is bound by the rectangle indicates the one currently being edited. The focus rectangle wraps around the first and last channel names to allow continual cycling.

The **<PAGE>** button is inactive, whilst the **<HOME>** button returns to the audio setup page.

5.8.3 Preset fader position

Pressing the **<PST FDR>** button toggles the preset fader position between **<POST>** and **<PRE>**. The current selection is displayed on the button.

When set to **<PRE>**, the PST bus fader is located with the PGM bus fader - before the Audio Over fader. This is the normal operational mode as any audio from the PST and / or PGM bus contributing to the PGM output will have its gain reduced as the result of an audio over being taken to air.

If the Preset fader position is set to **<POST>**, the PST bus fader is positioned after the audio over fader. When configured in this way, the PST bus, when contributing to the main output, for example during a mix transition will be at full level.

5.8.4 Audio Over follow

The over follow mode acts in the same manner as the DSK follow, except it follows an audio transition, DVE move or both.

Pressing the Over Follow, **<OVR FOLW>**, button cycles the over follow selection through the three available follow modes.

<FOLW PGM> sets the over to follow PST/PGM audio transitions only.

<FOLW DVE> sets the over to follow DVE moves only.

<FOLW BOTH> sets the over to follow either the next PST/PGM audio transition or DVE move.

The currently selected mode is shown on the button.

5.8.5 Level break-away cancel

Operation of the level buttons, for the PGM/ PST bus in the lower left hand corner of the panel, after a breakaway operation can be defined as either manual or automatic.

When set to **<MANUL>**, the level buttons remain in breakaway mode until cancelled by the operator, whereas **<AUTO>** cancels the breakaway, re-marrying video and audio levels, once a selection has been made on the PST or PGM bus.

The Level breakaway button provides toggle operation between manual, **<MANUL>**, or automatic, **<AUTO>** operation, with the button legend indicating the currently selected state.

5.8.6 Lead rate

The Lead Audio function permits the audio from the currently selected source on the PST bus to be mixed with the PGM bus audio before a video transition takes place. The Lead rate, defines the time in frames that the PST bus audio will take to reach the same level as the PGM bus audio. The lead rate is set using either of the rotary encoders underneath the display, while the rate is indicated by the status bar and a numeric readout.

5.8.7 Audio monitor level control

Audio monitors 1 and 2 each have independent level controls and **<CUT>** (no sound) and **<DIM>** (reduced level) buttons. Operation of these controls can be enabled or disabled by the Audio Mon Level control button.

The button provides toggle operation and, when indicating **<OFF>**, disables the controls preventing the output level, which is set to full, from being adjusted. Additionally, the **<SPEAKER MONITORING>** button is removed from the screen.

When indicating **<ON>** the audio monitoring controls are enabled and function as normal. The **<SPEAKER MONITORING>** function is also available.

5.8.8 Speaker monitoring

The speaker monitoring function sets the operation of the **<CUT>** and **<DIM>** speaker monitoring buttons. When set to **<DIM>**, the buttons operate as **<CUT>** and **<DIM>** buttons exclusively, where **<CUT>** represents a complete silence in the audio and **<DIM>** represents a 12dB reduction in the level. When set to **<CUT R>** the **<DIM>** button operates as a cut right with **<CUT>** being cut left and the buttons no longer operate mutually exclusively.

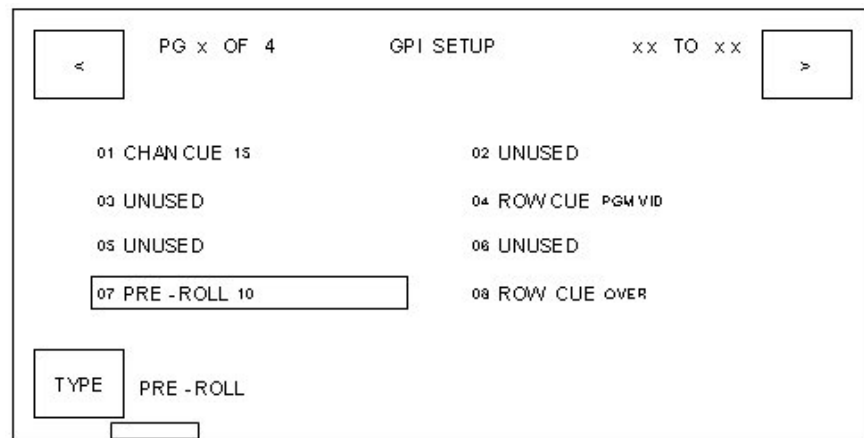
5.9 Configuring the GPIs

The GPI configuration page allows the operation of the GPIs to be configured. Each GPI can either be a channel cue, a pre roll or a row cue.

This page can be accessed by pressing the **<GPI SETUP>** button from the system configuration page.

Any change made by the main controller to the GPI configuration is actively updated on the page while it is visible.

Pressing the **<HOME>** button returns to the system configuration page.



5.9.1 Page button

There are a total of 32 GPIs that can be configured, but only 8 can be shown on the screen at any one time. To navigate through the GPIs the **<PAGE>** button is used. Pressing the **<PAGE>** button toggles pages between 1 to 4, so GPIs 1 - 8 are displayed on the page 1, GPIs 9 - 16 on page 2, GPIs 17 - 24 on page 3 & GPIs 24 - 32 on page 4.

5.9.2 TAB buttons

Two buttons, **<<>** and **<>>** are provided at the top on the either sides of the display, to move the focus rectangle around the screen display. The GPI bound by the rectangle indicates the one to be edited. The focus rectangle wraps around the first and last GPIs to allow a continual cycling.

5.9.3 Changing GPI assignment

To change the function of a GPI, select the GPI to edit, then press the **<TYPE>** button at the bottom left hand side of the display. This toggles through the four available options, channel cue, row cue, pre-roll & unused.

Shaft encoders change the value associated with that GPI i.e. source number, bus name etc. The available functions are as follows:

GPI function	GPI assignment
Channel cue	Input channel, 1-20 refer to the main sources, and 21-24 to the 4 audio-overs
Row cue	PGM video, PGM audio, PST video, PST audio and Over
Pre-roll	Select an input channel, 1-20, to assign the pre-roll to. This function operates in conjunction with the channel pre-roll time setting (see section 5.6.4) and is used to start machines that require a GPI start trigger.
Unused	Disables the GPI, no settings required

Pressing the **<HOME>** button returns to the system configuration page, saving any changes.

5.10 PGM Follow

After configuring programme follow destinations and associations, see sections 5.6.7 and 5.6.8, it is necessary to define which of the PGM follow destinations will be active.

From the System Configuration page, select the **<PGM FOLLOW>** button, then select the required operation for the follow busses. The current selection will be displayed in inverse text as shown below.

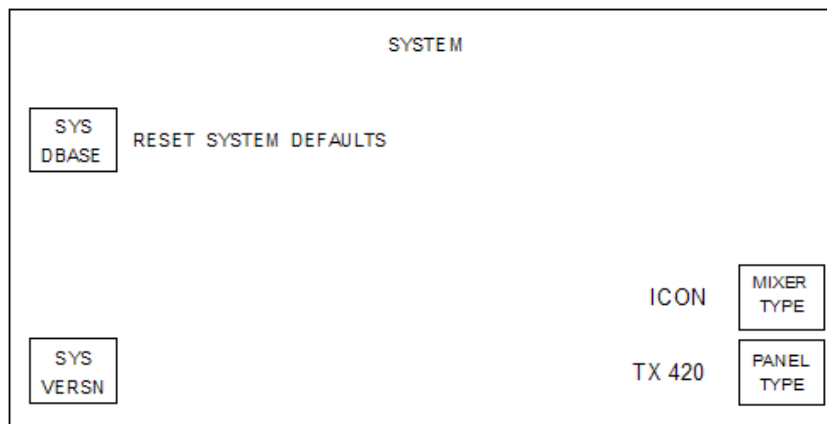
PGM 1	PGM FOLLOW	PGM 2
<input type="checkbox"/> FLOW OFF		<input checked="" type="checkbox"/> FLOW OFF
<input type="checkbox"/> FLOW VIDEO		<input type="checkbox"/> FLOW VIDEO
<input type="checkbox"/> FLOW AUDIO		<input type="checkbox"/> FLOW AUDIO
<input checked="" type="checkbox"/> FLOW BOTH		<input type="checkbox"/> FLOW BOTH

5.11 System setup

The values in the TX 420 database can be reset to the factory defaults by using the system reset page. To access this page from the system configuration page, press the **<SYS SETUP>** button.

The button **<SYS DBASE>** provides the means to reset the database back to factory defaults, whilst the **<SYS VERSN>** button displays the installed system software version information page.

The **<PAGE>** button is inactive, whilst the **<HOME>** button returns to the system configuration page.



Reset System Defaults

To reset the system to the factory defaults, press the **<SYS DBASE>** button. A countdown of 10 seconds is then displayed. Confirmation, a second press, is required before the countdown reaches 0. If the countdown reaches 0 before confirmation is given, the screen reverts back to the 'RESET SYSTEM DEFAULTS' text.

If the operator confirms, then the defaults for the system are loaded into the database from EPROM. The main control system is immediately updated.

The factory default values are as follows:

Panel defaults to TX 420

Mixer setting reflects the switch setting on the 2645 module in the frame.

Wipe pattern default settings

Wipe pattern selection = left to right horizontal wipe

Wipe softness = 0%

Wipe softness = off

Wipe direction = normal (forward)

DSK default settings

The default settings are, for all four DSKs, for true linear 'keying':

DSK Clip = 100%

DSK Gain = 18%

DSK Keying = EXT

DSK Rate = SLOW

DSK Follow = OFF

Transition rates

Slow = 50 frames

Medium = 25 frames

Fast = 12 frames

Audio metering

Characteristic = PPM

Scale = DIGITAL (DBFS)

Line up level = -18.06 DBFS line up

Peak bars = OFF

Audio gains

The audio gains for each AES pair are set to +00.00 (UNITY).

PIN number

The default PIN number is 0000.

Source names

All the source names are defaulted to be their number as a four character ASCII string left padded with leading zeros. Source numbering starts at zero, the names start from one, E.g. source 0 = 'S001', source 1 = 'S002'.

Source mono/stereo state

All the sources are set to be stereo with no phase reversal.

Source set-up

Router configuration = local with RS-422 communication

Source names = local edit

Pre-roll times for all sources = 0 seconds

All VTR control sources are unassigned '--'

The VTR control destination is unassigned '--'

All Pre-Roll values are unassigned '--'

Video set-up

DSK 1 Present

DSK 2 Present

DSK 3 Not Fitted

DSK 4 Not Fitted

DSK1 keying mode = DSK caption

DSK2 keying mode = DSK caption

DSK3 keying mode = DSK caption

DSK4 keying mode = DSK caption

DVE Fitted

DVE Position = After mixer, before DSK 1

DVE sequence 1 selected

Local router destinations

These values are displayed counting from one:

Video PGM bus	1
Video PST bus	2
Video AUX1 bus	3
Video AUX2 bus	4
Audio PGM bus	25
Audio PST bus	26
Audio AUX1 bus	27
Audio AUX2 bus	28
Audio over	'--'
Video PGM1 follow	'--'
Video PGM2 follow	'--'
Audio PGM1 follow	'--'
Audio PGM2 follow	'--'

Programme source follow

The two programme follow modes are defaulted to 'FOLLOW OFF'.

The video and audio source follow associations are defaulted to '--', not assigned for both programme 1 and programme 2.

Fade to black and silence

Position = after DSK2

Fade rate = 0 (cut)

Miscellaneous database items

Display brightness = DIM

Timer mode

The default mode of operation is the stopwatch mode.

Multi-level audio

The number of audio levels is set to 1.

The channel routing is defaulted to a 1-to-1 connection, for example A1 is routed to CH1, A2 is routed to channel CH2 and A3 is routed to channel CH3 etc.

All the channel names are defaulted to be their number as an eight character ASCII string. Channel numbering starts at one, for example channel 1 = 'CHANNEL1' and channel 2 = 'CHANNEL2'.

Audio

Lead sound rate is 25 frames

Level break-away does not automatically cancel after a take

The speaker control operates as 'cut/dim' instead of 'cut left/cut right'

The speaker level selection is not assigned and awaits status from the main control system

The software lock on the audio monitoring section of the control panel is off

Audio overs

The preset audio fader operates prior to the over fader

The over fade rate is slow (same rate as the slow transition rate)

The over follow mode is defaulted to 'NO FLOW'

Aspect ratio

The aspect ratio defaults to 4 x 3.

GPI setup

All GPIs are defaulted to not used.

Mixer flip-flop

Mixer flip-flop (programme/preset toggle) is off.

Unused values

The VTR machine control mode is defaulted to 0, no control

The dedicated machine control port assignment for each channel is defaulted to '-' indicating no machine control

The AURORA VTR lockout mode is defaulted to 0, no lockout

5.11.1 Checking system versions

On pressing the **<SYS VERSN>** standard button the operator is taken to the installed system software version information page. This displays the version information for the display control system, main control system and the audio mixer.

The top line indicates the overall release of the installed software. The version information is the highest release number and its associated sub-release number from all the EPROMs for which version information is available. The release is taken as a beta release if any of the EPROMs within the system are indicated as a beta release.

Each EPROM displayed has the form SPxxx/yyz, where xxx is the EPROM number, yy is the EPROM version number and z is a beta release indicating character. The beta release character is an ASCII character starting from 'A', with a space indicating a formal release of that EPROM.

Each version number has the form Vxx.yy, where xx is the release version number of the EPROM and yy is the release sub-version number of the EPROM. If the EPROM is displayed as SPXXX/XX, VXX.XX then there is no version information available, for example:

SYSTEM VERSION INFORMATION	
OVERALL SYSTEM VERSION V01.07	
PANEL :	SP201/08 SP202/08 V01.07 V1.07
MAIN :	SP217/06 C SP218/06 C V01.05 V1.05
AUDIO :	PA430/C V01.00

6 Hardware configuration

This section has been provided as a guide to the settings required on each of the boards contained within the system, including the DVE. The Pro-Bel module number, where applicable, is listed in brackets for ease of identification. These numbers can be found on the card ejectors.

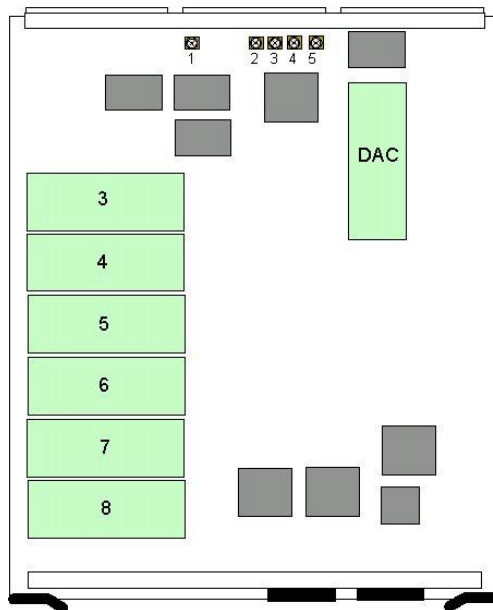
To access the Pro-Bel cards, open the frame doors as shown in section 2. To open the DVE frame, remove the four screws from the front corners and pull the door forward to remove.

The switch/jumper and LED numbers indicated in the table are silk-screened onto the boards themselves beside the relevant part.

6.1 Audio Mixer (5025)

The 5025 is a sixteen input, six output digital audio mixer. The basic module provides operation for balanced AES inputs and outputs; however it has been designed to accept up to six input submodules, permitting it to be configured for operation with embedded, analogue or unbalanced AES audio inputs. An additional slot for a digital to analogue converter on the Programme output further enhances the flexibility of the mixer.

The board layout is as shown below:



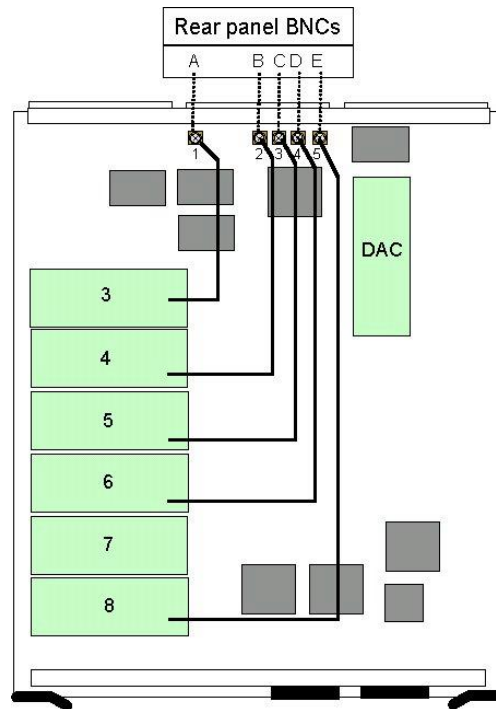
The DAC position can only be occupied by a 5635 DAC, providing an analogue version of the Programme output.

Positions 3 to 8 can be populated with extractor modules, unbalanced to balanced AES converters, ADC's or Sample rate converters. Each of these submodules converts their respective input into a balanced AES signal so that it can be processed by the mixer.

The sub module types are as follows:

- AES extractor (5026)
- Analogue to Digital converter (5634) and
- Unbalanced to Balanced AES converter (5027)
- Sample Rate Converters (5636)

At the rear of the module there are five subminiature BNCs (1 to 5) that connect to BNCs A to E on the rear panel respectively. These are used in to bring signals from the BNCs, using miniature coax cables, to the extractor and unbalanced/balanced converter submodules. Typically, they would be wired as shown below; however the submodule indicated in position 8, may be repositioned as described below to accommodate Over 1.



6.1.1 Operating modes

The mixer can operate in one of two modes, Mode 0 or Mode 1, and is determined by the position of jumper PL11. The mapping of these inputs can be defined as shown in the table below.

Input	BNC	Mode 0	Mode 1	Input	BNC	Mode 0	Mode 1
1	1	PGM IN	OVER2	9	C	OVER3 (L)	AUX 1 (L)
2	2	PST IN	OVER3	10		OVER3 (R)	AUX 1 (R)
3	3	AUX 1	OVER4	11	D	OVER4 (L)	AUX 2 (L)
4	4	AUX 2	Unused	12		OVER4 (R)	AUX 2 (R)
5	A	OVER1 (L)	PGM IN (L)	13	E*	Unused	OVER1 (L)
6		OVER1 (R)	PGM IN (R)	14		Unused	OVER1 (R)
7	B	OVER2 (L)	PST IN (L)	15	E*	OFF AIR (L)	OFF AIR (L)
8		OVER2 (R)	PST IN (R)	16		OFF AIR (R)	OFF AIR (R)

* Note: BNC E can be patched to either position as described in the installation section.

The letters in brackets refer to left and right channels when using analogue input option. Analogue and embedded options are not available on inputs 1-4. The even numbered inputs between 6 and 16 are unused in AES/ embedded applications but provide the right channels when using the analogue input option.

6.1.2 Mixer card settings

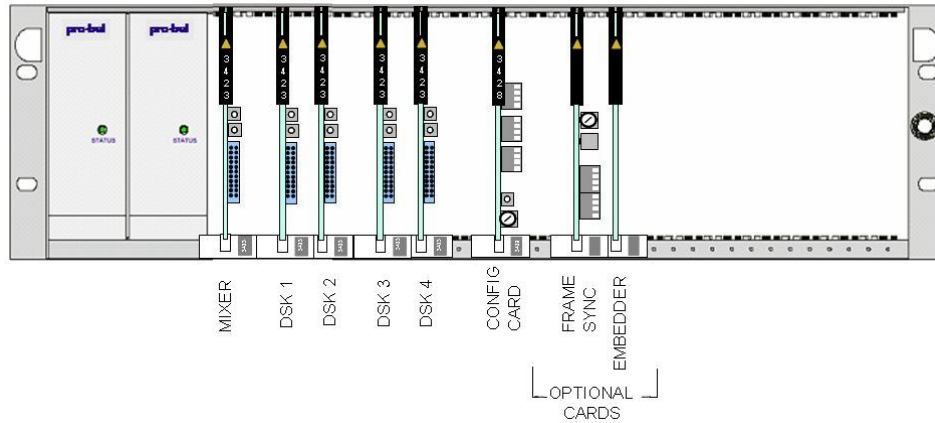
Switch and jumper settings

Switch/Jumper number	Function	Default
PL24,26,28,30	AES impedance for inputs 1-4	110 Ω (bal) OR 75 Ω (unbal)
PL25,29,33,37,32,36	AES impedance for inputs 5,7,9,11,13,15	110 Ω (bal) OR 75 Ω (unbal)
PL40	AES impedance for reference	110 Ω (bal) OR 75 Ω (unbal)
PL22,24	AES reference sampling lock frequency - only 48K implemented	48K
PL19	AES reference signal type - only AES implemented	AES
PL10	DSP reset control : NORMAL allows host processor to reset dsp DEBUG forces dsp reset line low	NORMAL
PL4	SIMM size selector only 4/16M implemented	4/16M
PL9	IC5 size - 27040 or 27256	040
PL6 & 7	Memory type ROM/RAM/Flash	ROM
PL8	Clock speed for 68EC000 processor - FST (20MHz) or SLW (10MHz)	FST
PL5	Selects mixer software IC5 or boot eprom IC7	not BOOT
PL15	ENABle or DISable watchdog for 68EC000 processor	ENA
PL11	Input configuration mode - 0 or 1	0
PL12	One frame PGM delay - 1 for on, 0 for off	0
PL13	Not used at present	0
PL14	ENABle or DISable watchdog for dsp	ENA
SW1	Mixer level address 1-4	1

LED indications

LED	FUNCTION	NORMAL STATUS
1-16	Lit when audio present on input	On
D0-D7	D0 when lit indicates PL11 set to 1 D1 when lit indicates PL12 set to 1 D2 when lit indicates PL13 set to 1 D3 flashes when data received on RS232 port D4 flashes when data received on RS422 port D5 flashes when data transmitted on RS422 port D6 when lit indicates dsp ok D7 flashes to indicate 68ec000 processor active	Off Off Off Off Flashes Flashes On Flashes
D19 (13LK OK)	13MHz oscillator locked to video reference	Off
D17 (12LK OK)	12MHz oscillator locked to video/AES reference	On
D20 (NO VID)	Lit if video reference absent	On
D18 (AES PRES)	Lit if AES reference present	On
D21	+5V	On
D22	-5V	On

6.2 Vision mixer configuration



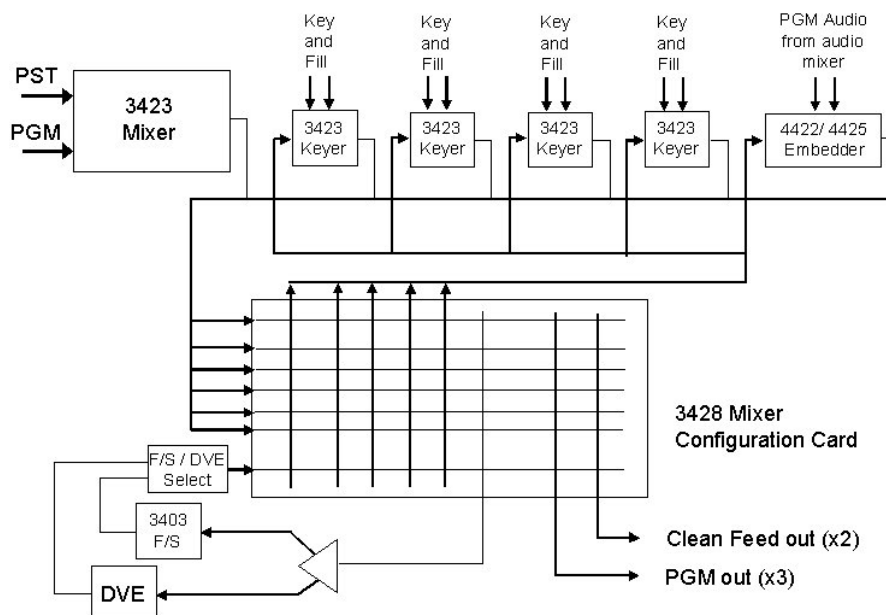
The basic vision mixer consists of two card types, the 3423 Keyer/ Mixer and the 3428 configuration (config) card. Additional modules such as the 3403 frame synchroniser and 4422/ 4425 embedder modules can be added to the system where necessary.

The 3423 provides the mixing and keying functions within the system, while the 3428 ensures the correct routing of the programme signal between these video processing modules.

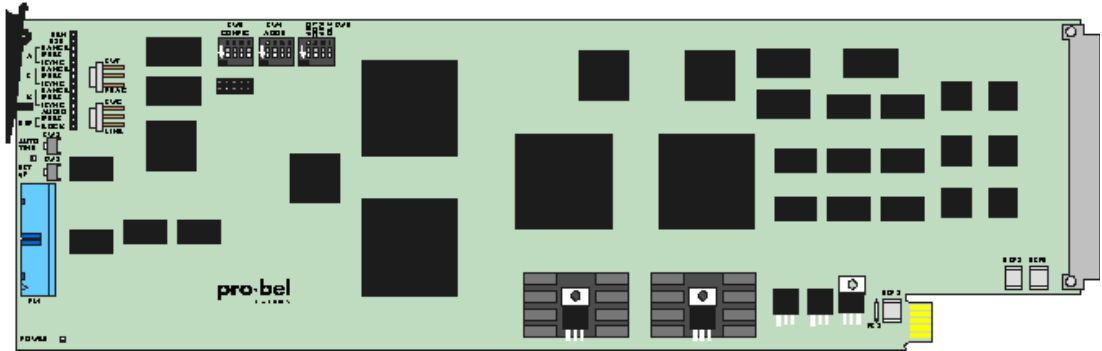
Embedded audio systems are supplied with an embedder module, type 4422 or 4425 dependent on the system age (Note: These cards are not interchangeable), while the DVE option can also be supplied with a frame synchroniser, type 3403, to compensate for the DVE insertion (framestore) delay. These optional modules are covered in their technical manuals.

The simplified block diagram below shows the system architecture and signal path.

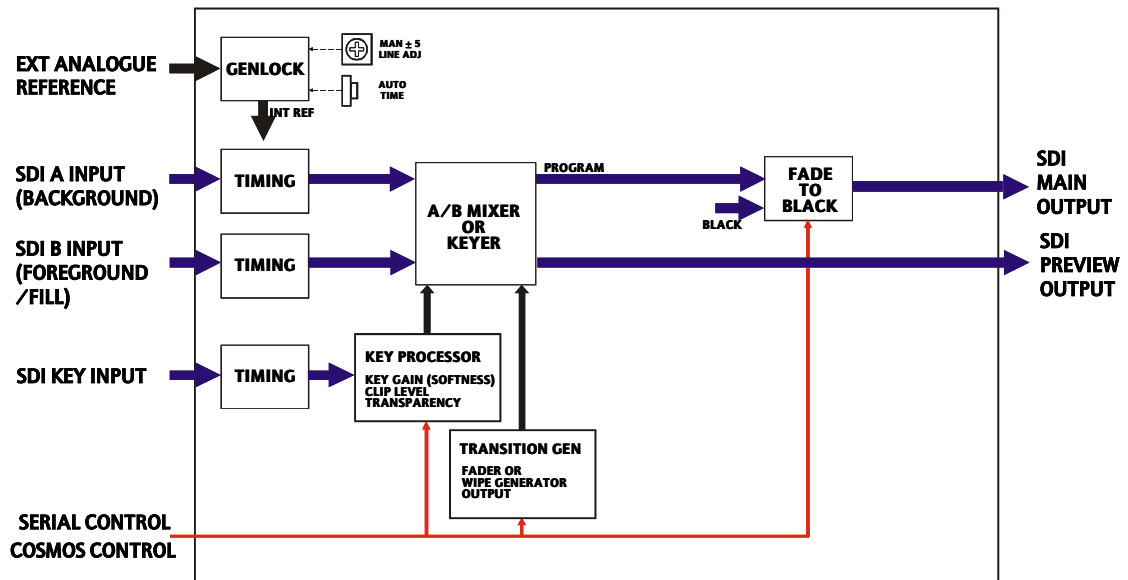
6.2.1



Keyer/ Mixer module (3423)

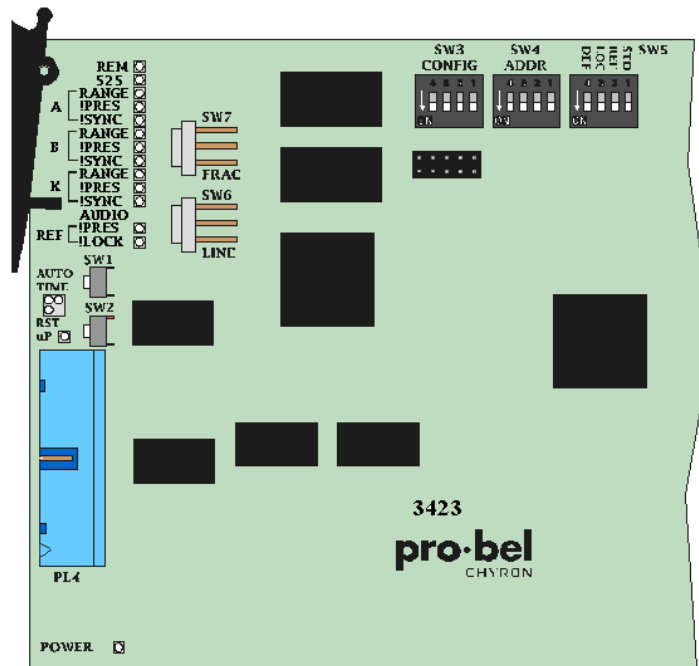


The 3423 Component Digital Video Keyer/Mixer is a dual function, linear keyer/ mixer for use with 270Mbit/s component serial digital video signals providing high quality 10 bit 4:2:2 signal processing. The following block diagram shows the internal architecture of the module.



Each card is fitted with 16 status LEDs. These are as follows:

LED	Indication/ colour	Function
Power	Green	+5 V and +12 V on-board regulators OK
CPU	Flash Yellow	Processor OK & reference present
REF !LOCK	Red	Lights to show 'Genlock' is not locked
RANGE (x3)	Green	Lights when input is within the 1 line timing window from reference
!SYNC (x3)	Red	Lights when INPUT is NOT synchronous to reference, i.e. Not the same standard.
!PRES (x4)	Red	Lights when REF or the INPUT is NOT present
AUDIO		LED Not fitted on 3423
525	Yellow	TV standard, OFF=625, ON=525
REM	Yellow	OFF = LOCAL, ON = REMOTE (COSMOS control)



3423 Keyer/ mixer hardware configuration controls and indicators

DIL switches SW 3, 4 and 5 provide access to system configurations as follows:

SW 3			Default
Switch lever	Function		
1	RS485 serial port:	ON = Normal, OFF = Factory test only	ON
2	RS485 Tx/Rx swap:	ON = Bus controller or Master, OFF = Tributary or Slave	ON
3	TX mode:	ON = normal or stand alone, OFF = TX mode	OFF
4	Ancillary data mode:	ON = normal or stand alone, OFF = TX mode	OFF

SW 4 RS 485 address setting for each card						
Switch lever	Function	Mixer	DSK 1	DSK 2	DSK 3	DSK 4
1	Address 0	OFF	ON	OFF	ON	OFF
2	Address 1	OFF	OFF	ON	ON	OFF
3	Address 2	OFF	OFF	OFF	OFF	ON
4	Address 3	OFF	OFF	OFF	OFF	OFF

NOTE: When plugged into the 1429 (TX Series rear connector), any settings on switch SW4 are ignored as the addresses are picked up from hardwired links across the GPI pins on the rear panel.

SW 5			
Switch lever	Function		
1 (STD)	Standard:	ON = 525 (yellow 525 LED) OFF = 625 (LED off)	As video
2 (REF)	Reference select:	ON = SDI A Input, OFF = EXT Reference	OFF
3 (LOC)	Local/Remote:	ON = COSMOS remote (REM LED on), OFF = Local (LED off)	OFF
4 (DEF)	Default GPI assignment:	ON = USER (Configured by COSMOS only), OFF = Factory	OFF

Note: ON is obtained with switch levers in the ON position, away from the card edge as shown by the arrow.

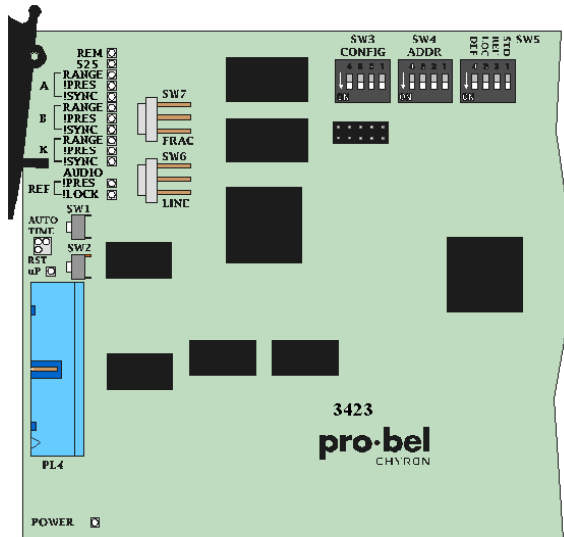
GPI assignments are loaded on power-up or reset. When used in the TX series the 3423 modules use the GPI inputs to 'read' their address from the motherboard.

To ensure that the video inputs to each card fall within its timing window (if the signal sources are all from exactly timed outputs), the keyer cards need to have their line/fraction delays set as follows using switches on the front of the cards, if they are in local mode (Actual switch column), or by using COSMOS (using actual offsets as described), if they are in remote mode. If the signal sources are not from exactly timed sources, the cards must be timed according to the instructions in the timing adjustments section.

	Line switch – SW 6		Fraction switch – SW 7	
	Line	(Actual Switch)	Fraction	(Actual switch)
Mixer	0	0	0	1
Keyer 1	0	0	1/8	2
Keyer 2	0	0	1/4	3
Keyer 3	0	0	3/8	4
Keyer 4	0	0	1/2	5

Timing adjustments

The 3423 Keyer/Mixer is provided with an on board timing generator to enable the unit to be easily integrated into a variety of system designs as flexibly as possible. Timing adjustment may be performed from the card edge in local mode using the manual line and fraction delay controls



Each input has a variable one line delay, and normal keying and mixing can occur providing all three inputs are within a total timing spread of one TV line.

The card generates its own internal reference which may be locked to an external analogue reference, when selected.

The internal reference may be advanced or retarded by -5 to +4 7/8 lines to allow the inputs to fall within the timing window.

This allows the unit to be used with a reference that is between 4 7/8 lines earlier and 5 lines later than the required output timing.

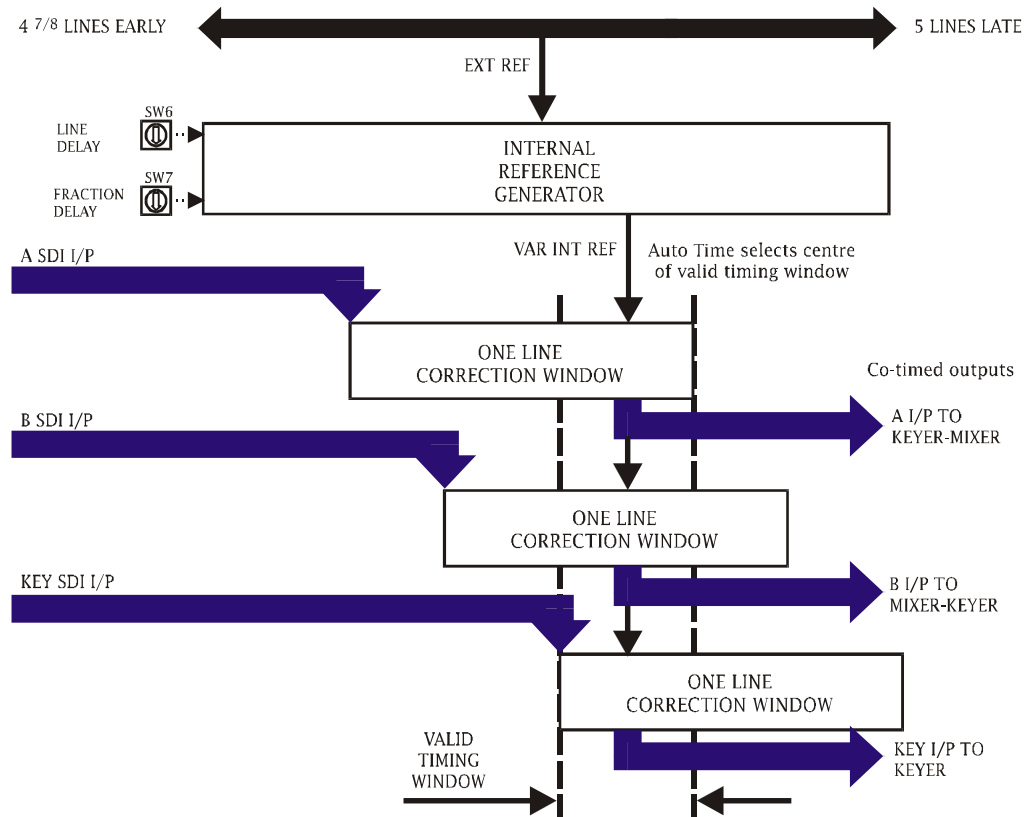
The internal reference may be timed manually by using the line and fraction controls or automatically by pressing the Auto Time button.

When all three inputs are within their timing windows, each Range LED will illuminate green. The Range LED will not illuminate for any input that is out of range. Orange illumination on the auto time LED indicates that the auto-timing function is seeking the best timing.

Note: Corresponding controls are provided by COSMOS when in remote mode.

Line and Fraction adjustment

For the three video inputs to be synchronised for keying and mixing, they must each lie inside their one line timing window. This is shown in the following diagram.



The auto-phasing timing window may be thought of as a variable one line delay through which each SDI input passes. Once all the inputs are centred within their window the amount of delay is automatically adjusted for each input to give constant output timing. This will hold true despite changes in input timing, providing those changes remain within the correction window range. Larger changes in input timing can only be accommodated by re-adjusting the internal reference timing to bring all the inputs back inside the timing windows. This is achieved by pressing auto-time or by adjusting SW 7 and SW 6 until all the Range LEDs illuminate green.

It is not recommended to use Auto time in the TX frame due to the system operation. It is normally best to set the timing as early as possible and NOT in the middle.

Note: The delay through a single card is $\frac{1}{8}$ of a line therefore it is advisable to set the mixer card to the earliest possible timing to allow the 4th Keyer card, where used, $\frac{1}{2}$ line flexibility for the Key and Fill inputs.

The early settings accommodate an input earlier than the reference and should not be taken to imply that the unit can advance the input.

Manual adjustment:

Adjust the internal reference to centre the inputs within their correction windows using SW 6 for whole line delay and SW 7 for adding delay in steps of 1/8th of a line.

Whole line delay - SW 6

Output timing	position
-5 lines early	5
-4 lines early	6
-3 lines early	7
-2 lines early	8
-1 line early	9
In sync	0
+1 line late	1
+2 lines late	2
+3 lines late	3
+4 lines late	4

Fractional delay - SW 7

Output timing	Position
Line delay + 1/8	1
Line delay + 1/4	2
Line delay + 3/8	3
Line delay + 1/2	4
Line delay + 5/8	5
Line delay + 3/4	6
Line delay + 7/8	7
Line delay + 7/8	8
Line delay + 7/8	9
Exact line delay	0

Differently timed inputs can be accommodated providing timing variations are less than one line. Proceed as follows to work with a number of differently timed inputs:

Start at the earliest reference delay setting with SW 6 at 5 and SW 7 at zero - all range LEDs should be off

Increase SW 6 until all range LEDs are green

Go back one position on SW 6

Increase SW 7 until all range LEDs again go green - if necessary increase SW 6 by one position and set SW 7 to zero

Note this setting in lines and fractions - it represents the earliest valid setting

Increase SW 7 until one range LED turns off, then go back one position on SW 7 - if a range LED does not turn off, increase the setting of SW 6 by one position, set SW 7 to zero and continue as before

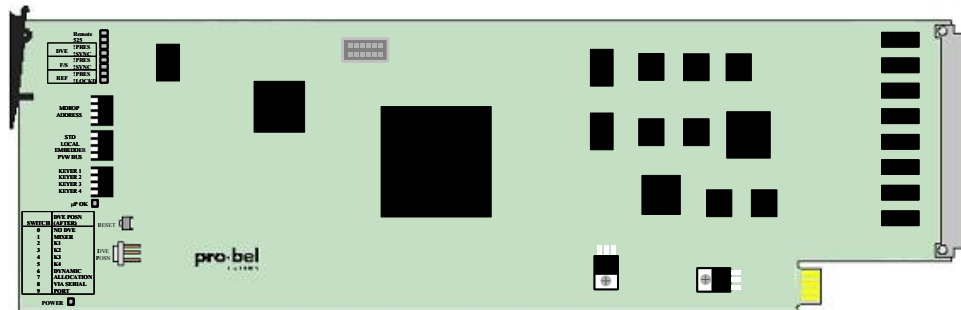
Note this setting in lines and fractions - it represents the latest valid setting

Choose a reference delay as required between the earliest and latest reference delay settings noted above.

Once the mixer card has been timed, the setting for each of the keyer cards, Keyer 1 to 4 should be increased by 1/8 of a line relative to the previous card.

6.2.2 Mixer configuration card (3428)

The 3428, provides the mixer with the ability to set the system up for any number of keys, from none through to four. It also allows the DVE to be positioned anywhere in the active programme path.



The 3428 can operate in either of two modes, independent or serial control. With the 3428 module set for 'local' (DVE switch set in positions 0 to 5), the mixer will ignore settings made from the system control panel configuration screen, and will read the mixer configuration from the piano type, and rotary, switches located at the card edge. Conversely, with the module in 'remote' mode (DVE switch set in positions 6 to 9), any settings made from the control panel will be used to determine the system operating mode.

On reset, the module will initially revert to the switch settings until a command is received from the TX Series controller

The 3428 piano key switch functions are detailed below;

SW 2–ADDR switch (must be set to binary 5 for correct operation)

Switch	Description	Default
SW 2-1	0 or 1	1
SW 2-2	0 or 1	0
SW 2-3	0 or 1	1
SW 2-4	0 or 1	0

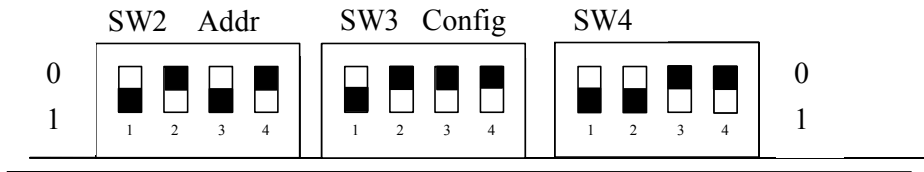
SW 3 - Config

Switch	Description	Default
SW 3-1	STD ; 1 => 625, 0 => 525	As video
SW 3-2	LOC; 1 => Local, 0 => COSMOS	1
SW 3-3	EMBEDDER; Audio embedder present =>1, not present => 0 (when not dynamic control)	As system
SW 3-4	PVW_BUS - Used as RS-485 pinswap. (ignore card label)	0

SW 4 - Keyers

Switch	Description	Default
SW 4-1	Keyer 1; Present in system => 1, not present => 0	1
SW 4-2	Keyer 2; Present in system => 1, not present => 0	1
SW 4-3	Keyer 3; Present in system => 1, not present => 0	0
SW 4-4	Keyer 4; Present in system => 1, not present => 0	0

Default settings for 3428 module



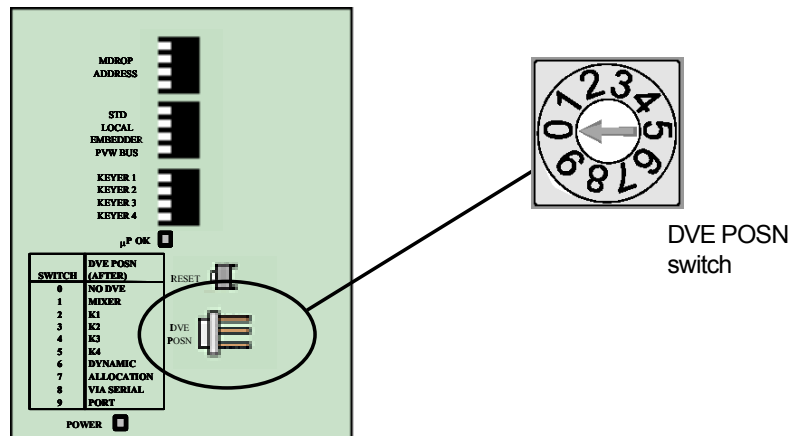
This set-up means that the card is set for 625 operation, in remote mode, no audio embedder present and pinswap is off.

If however in this configuration the mixer does not talk with the TX controller, try changing SW3-4 (labelled as PVW_BUS) this will invert the Tx & Rx pins.

Note: While Fade to Black can be positioned after any DSK, this is a control function only as each DSK has its own fade to black function. No video switching is required for this function.

DVE positioning in the programme path

The vision mixer architecture has been designed to enable the DVE to be positioned anywhere in the PGM video path. The DVE position is determined by the card edge rotary switch on the 3428 mixer configuration module, for either fixed or dynamic positioning via the video setup screen.



The following table shows the settings for the DVE POSN switch on the 3428 module.

Position	DVE Position (After)
0	No DVE
1	Mixer
2	Keyer 1
3	Keyer 2
4	Keyer 3 (Not TX 410)
5	Keyer 4 (Not TX 410)
6	Dynamic allocation via control panel
7	
8	
9	

Fixed positioning

Switch positions 1 to 5 allow the DVE to be set in a fixed position within the programme path, either after the mixer (position 1) or after each of the keyers (positions 2 to 5). Changes made from the control panel will be ignored when the DVE is set to a fixed position.

Dynamic positioning

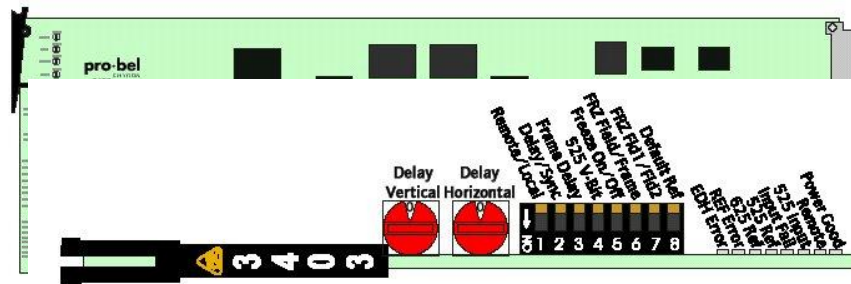
Switch positions 6 to 9 allow the positioning of the DVE to be determined from the control panel via the video path setup screen. This page is accessed from the system configuration page (see chapter 5.) by pressing the **<VIDEO SETUP>** button, and then pressing the **<PAGE>** button, indicated with a rectangle in the bottom left hand corner of the screen

Audio embedder position

Note, when using dynamic positioning ensure that SW1/5 on the 2645 is set correctly to reflect the presence or not of the audio embedder, see section 6.3.1. Under local control, routing is configured by the position of SW3/3 on the 3428 as described above.

6.2.3 3403 SDI Frame store synchroniser

The 3403 is an advanced SDI frame store synchroniser capable of synchronising asynchronous feeds or providing a fixed delay. When used with the TX Series master control systems the unit is used to provide a fixed 1 frame delay compensating for the delay introduced by the system DVE.



Configuration of the module is from a card edge switch, shown in the diagram below and, detailed in the following tables.

Switch	Switch Down (ON)	Switch Up (OFF)	Default
1	Remote (COSMOS)	Local	OFF
2	Delay mode	Synchroniser mode	ON
3	Whole frame (Delay mode only)	Adjustable delay	ON
4	525 V bit early	V bit as input	OFF
5	Freeze on	Pass video (live)	OFF
6	Field Freeze	Frame Freeze	OFF
7	Field 1 Freeze	Field 2 Freeze	OFF
8	Default Ref 525	Default Ref 625	OFF

Delay/ Offset controls

In Delay mode, switch 2 ON, the rotary controls alter the delay with respect to the input. Full details of these switch settings can be found in the 3403 handbook, however when used within the TX Series mixer, both switches should be set to the '0' position, co-timing (Delay vertical) and aligning (Delay Horizontal) the output with the input signal.

6.3 TX series control card (2645)

6.3.1 Switch and jumper settings

Switch/Jumper number	Function	Normal setting
PL7	ROM/FLASH	ROM
PL8	ROM/RAM (for debug purposes only)	ROM
PL9	ON/OFF (Enables/Disables the main watchdog timer)	ON
PL 10	Instruction and Data cache Enable/Disable	Enable
PL11	VIDCLK - SLOW/FAST	Not used
PL12	68030 Clock - SLOW/FAST	FAST
PL13	TC VIDO	Not used
PL14	NORMAL - Second panel port active/TEST - Panel 2 routed to front 232 port	NORMAL
PL15	RS232/RS485 - Configure router port	RS485
PL16	RS232/RS485 - Configure router port	RS485
PL17	RS232/RS485 - Configure router port	RS485
PL18	RS232/RS485 - Configure router port	RS485
PL19	RS232/RS485 - Configure router port	RS485
PL20	RS232/RS485 - Configure router port	RS485
PL22	RS232/RS485 - Configure router port	RS485
PL23 PROC	68030/68000 - For test purposes only	68030
PL24 BOOT	RUN - Enables BOOT EPROM OFF - Disables BOOT EPROM	OFF
SW1/ 1	Sets monitor port baud rate. 9,600 (Down)/ 38,400 (Up)	Down
SW1/ 2	Enables RTS/CTS Flow control./Enabled (Down)/ Disabled (Up)	Down
SW1/ 3	Set vision mixer type – ICON (Up) or Snell and Wilcox (Down)	Up
SW1/ 4	Audio take/lead. Take enabled (Down), lead enabled (Up)	Down
SW1/ 5	Set audio embedder – Present (Up), Not Present (Down)	Down
SW1/ 6	Unused.	
SW1/ 7	Unused.	
SW1/ 8	Unused.	
SW1/ 8	Unused.	
SW1/ 8	Unused.	

6.3.2 LED indications

LED	FUNCTION	NORMAL STATUS
D1	Video mixer/ DSK timeout	Off
D2	Audio mixer timeout	Off
D3	Video matrix / Video Aurora timeout	Off
D4	Audio matrix / Audio Aurora timeout	Off
D5	Panel 1 and Panel 2 timeout	Off
D6	Automation timeout	Off
D7	DVE timeout (If configured)	Off
D8	Flashes at 2 Hz to show card active.	Flashes

Note: LEDs used for timeout are off if communications with the corresponding device are present. If communications are lost, or there is no device connected, then the LED is illuminated.

6.4 TX series panel control card (2646)

6.4.1 Switch and jumper settings

Switch number	Function	Normal setting
SW2-1	On to run TX software/Off to run Boot/test software	ON
SW2-2	On for ROM/off for RAM	ON
SW2-3	On for test/off for Hicross monitor	ON
SW2-4	On to enable watchdog	OFF

6.4.2 LED indications

LED	FUNCTION	NORMAL STATUS
1	flashes to indicate processor active	Flashes
2	internal queue error	Off
3	comms queue error	Off
4	not used	Off
5	shaft encoder moved	Off
6	ppm data received	On
7	button pressed	Off
8	not used	Off

7 TX Series routing

7.1 Internal routing modules

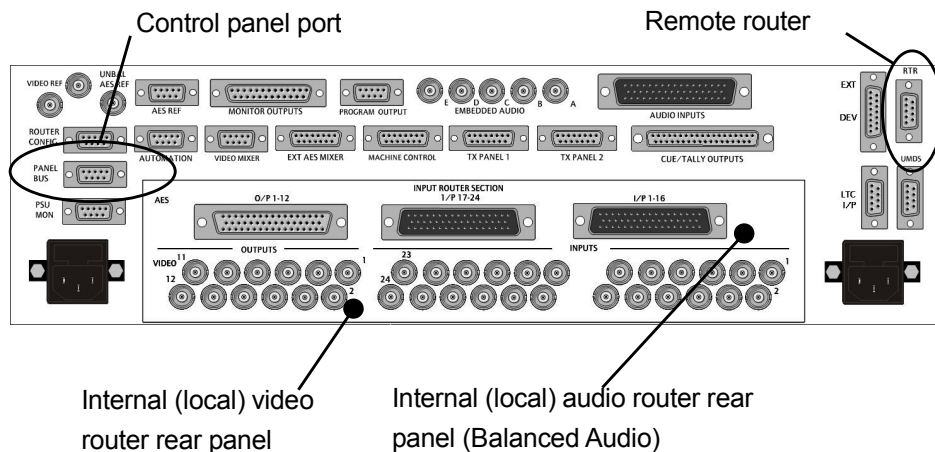
The TX Series routing modules, available in Serial Digital Video and AES Digital Audio, each provide a 24x12 routing switcher level. This section of the manual covers the installation, configuration and operational alignment of these routing cards.

Within a system equipped for single level audio, the video and audio router modules are housed in the main TX control frame. For systems with more than one audio level, these router cards are housed in remote 3RU frames and connect to the TX controller via an RS485 control connection to the remote router port (RTR). In both of these configurations, the routers are controlled as a local router.

Remote router frames house up to four router modules and can be 'stacked' to work together, permitting systems with video and up to four audio levels to be constructed in two frames.

Each TX routing system requires a control module, containing the router configuration data, which is housed on one of the router modules. As the TX system does not use all of the twelve available outputs on the router (four in discrete audio systems and eight in embedded systems), a control panel port fitted to the TX control system (or device port on remote frames) permit these additional destinations to be controlled using standard Pro-Bel control panels.

For the TX router to operate correctly, the controller must contain a valid database, and each module should have its level address switch set correctly. The following paragraphs detail the level switch settings, and how to connect the router configuration editor to the system.



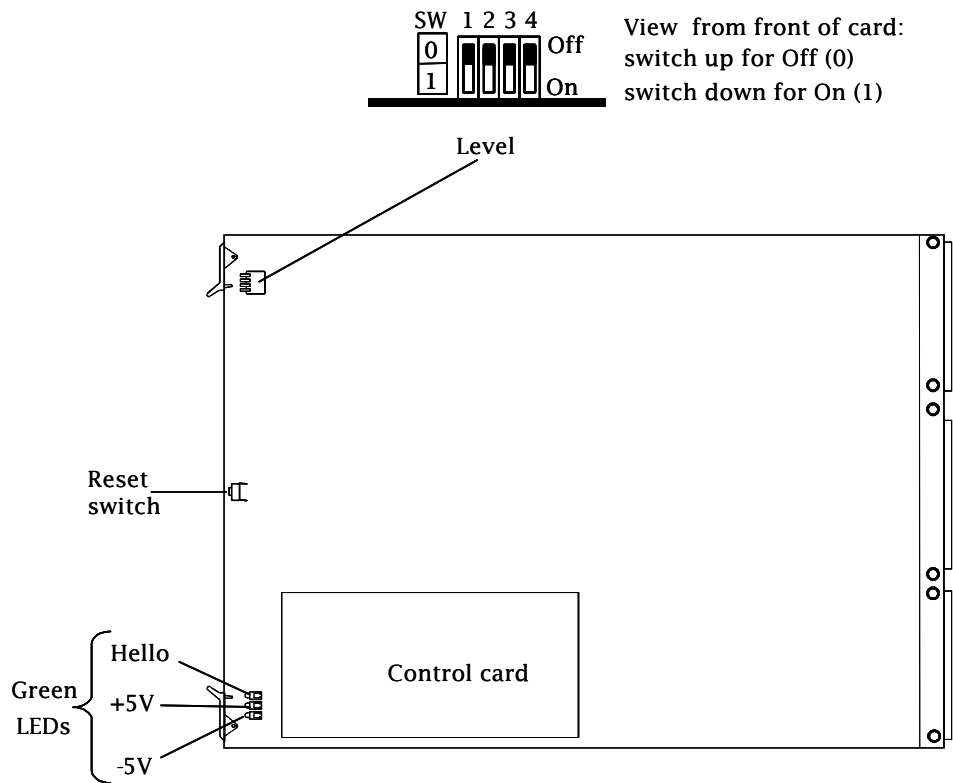
7.1.1 Setting the level switch

A TX Series master control routing switcher can comprise of up to five levels, video and four audio, accommodating the multi-level audio processing supported by the TX Series master control switchers.

Note: As audio breakaway between router sources, on multi-level systems, is carried out within the audio mixer it is necessary for the TX controller to switch all audio levels together, i.e. married. In this case, the address for every audio level should be set the same.

The Level address switch can be found on the front card edge and should be set, depending on level type, as follows:

SW 1	SW 2	SW 3	SW 4	Level No (Name)
0	0	0	0	1 (video)
1	0	0	0	2 (audio)



7.1.2 Serial digital video router (3678)

The TX Series serial digital video router is fitted with 24 equalising inputs and 12 reclocking outputs. The adaptive cable equaliser on each input provides automatic equalisation for different lengths of cable, while the output reclocking circuitry guarantees exemplary signal quality ensuring fully transparent operation for ancillary data and embedded audio.

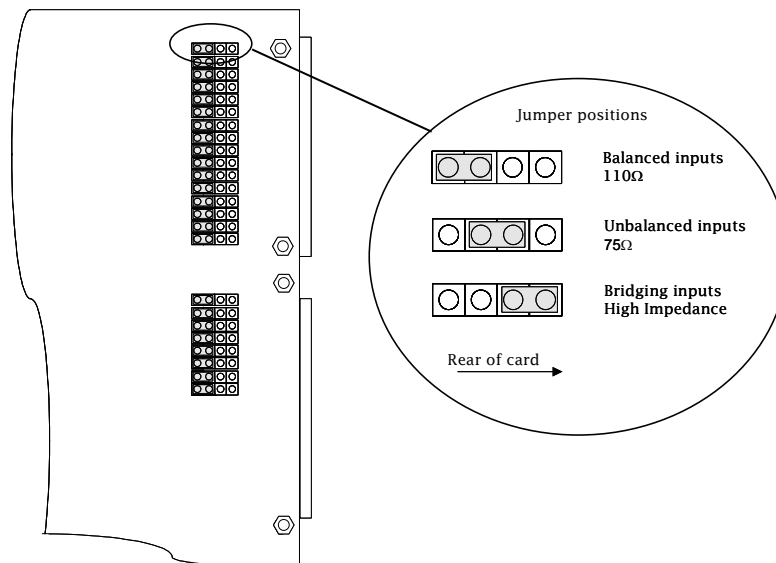
The digital video router card does not require customer alignment therefore has no user-serviceable adjustments beyond the card edge level assign switches

7.1.3 AES digital audio router (5178)

The TX Series AES digital audio router is fitted with 24 reframing inputs and 12 regenerating outputs. In order to promote flexible integration within any digital audio environment, modules may be ordered for operation as balanced (110Ω) or unbalanced (75Ω).

Twelve miniature LEDs appear along the front edge of the AES router card. These LEDs are intended for output-status monitoring and may be used to determine whether audio signal (or audio modulation) is present on each output of the card.

There are twenty-four sets of jumper selectable pins at the rear of the module for setting the module operating impedance. These will be factory set and are dependant upon the chosen system configuration of either Balanced or Unbalanced audio. The following diagram shows the jumper positioning and details the three available jumper positions.



The AES router card does not require customer alignment and has no user-serviceable adjustments beyond the card edge level assign switches and input impedance jumpers.

7.1.4 LED indications

Two of the three LEDs located on the card edge indicate that power, $\pm 5V$, is arriving on the board. The third LED is labelled 'HELLO'. This is useful in determining whether the control module is communicating with a particular board and, specifically, to tell you if the LEVEL switch is set correctly.

When the control system sends a command, for example in response to a button push, the appropriate part of the router responds, depending on how the board configuration switches are set.

When a board receives a command on which it should act, the 'HELLO' LED 'flashes'. Meaning, *'Hello, I've just received a command that's relevant to my programmed place in the system.'*

7.1.5 Router control module

Central to the operation of the TX router is the control card. The card, type 2440, is a sub-module fitted to one of the router cards within the system and is used to provide control to the router and hold configuration data. This router level is known as the master level and is typically the Video level, although it will work if fitted to one of the audio cards. Two default databases are supplied on disk with the editor package, one for 525 systems and the other for 625. The relevant database will already have been loaded into the controller before being shipped from the factory.

The TX Series router control module has two control ports available externally:

ROUTER CONFIG (RS232 Router Configuration port) *

PANEL BUS/ RS485 General Remote port.

A third, RS485, control port is wired internally to the TX Series controller for router control and should be set for General Switcher Protocol within the database. For systems where the router is housed in an external frame, this port is available on the remote frame and should be connected using a 'pin to pin' control cable to the Remote Router port on the TX Series control frame.

The Router Configuration port permits the internal router database to be re-configured, if necessary, while the General Remote port can be configured to support one of the following protocols:

Multi-drop Communications Protocol (SW-P-06)

The Multi-drop protocol, is a proprietary Pro-Bel protocol used to interface with Pro-Bel router control panels. A single port using this protocol will support a mixture of up to sixteen Pro-Bel control panels or undermonitor displays.

General Switcher Protocol (SW-P-02) **(Factory Default setting)**

This protocol provides a robust, asynchronous method of controlling routing switchers. It is the preferred method of controlling Pro-Bel routers from a system controller.

The normal electrical parameters of the interface are:

RS485

8 bit data

1 stop bit

EVEN parity

38.4K baud

General Remote Control Protocol (SW-P-08)

This protocol has been developed to provide a common method of interfacing Pro-Bel control systems to a variety of standard and custom applications. It is the standard protocol for interfacing a controller to a remote device.

* The Router Configuration port (RS232) does not support multi-drop or General Switcher Communications protocol.

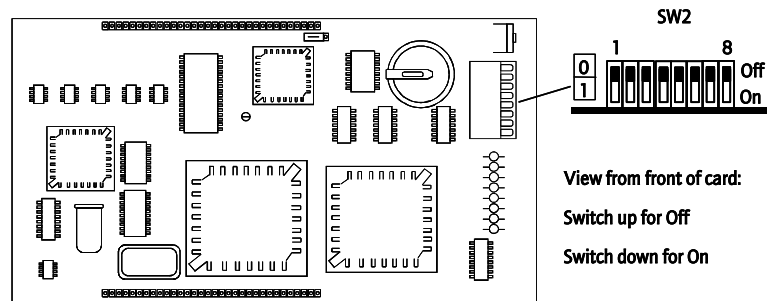
7.1.6 Port characteristics

The characteristics for each port are defined in the table below:

Port Name	Standard	Protocol	Baud rate	Data bits	Parity	Stop bits
Internal router control port (Gen Remote 1)	RS485	General Switcher Protocol to TX Controller. Only available externally when fitted in remote frame				
Panel Bus/ Gen Remote 2	RS485	Configurable – as detailed above				
Router Config	RS232	SW-P-08	38400	8	N	1

7.1.7 The router control card (2440)

The 2440 controller is fitted with eight switches for overall system configuration. These switches define the mode of operation for the controller.



The function of each switch located on the 2440 is defined in the table below. Where a newer 2440 has been fitted, switches are no longer UP and DOWN but labelled ON and OFF.

Switch SW 2	Function	Selection		Default
		UP (OFF)	DOWN (ON)	
1	MASTER/SLAVE SELECT	SLAVE	MASTER	DOWN
2	μP CLOCK SELECT	10 MHz	20 MHz	DOWN
3	SYSTEM RUN MODE	NORMAL	TEST	UP
4	RS232 PORT SELECT	EDITOR	REMOTE	DOWN
5	DEFAULT TRIGGER SELECT	625	525	UP
6	RE-CONFIGURE	MANUAL	AUTO	UP
7	DATABASE TYPE	FIXED	CONFIGURE	DOWN
8	CONTROL MODE	GENERAL	PANELS	UP

A description of the function of each of the switches is given below:

Sw2_1 Master/Slave select is used, in dual control situations, to assign Master/Slave status to the 2440 control cards. One card would be set to MASTER and the other to SLAVE so that on reset or power up the Master 2440 powers up first and, hence, always becomes the active controller.

Sw2_2 μP clock select is used to select between 10 MHz and 20MHz μP clock frequency.

Sw2_3 System Run Mode determines which mode of operation the system powers up in (i.e. NORMAL or TEST). NORMAL is the standard mode of operation. TEST selects a special test mode intended for use by Pro-Bel personnel only.

Sw2_4 RS232 port select determines the function of the RS232 port. EDITOR configures the RS232 port to be an editor port. REMOTE configures the port to be a General Remote port. For systems using the Windows editor, this switch should always be set for REMOTE operation.

Sw2_5 Default trigger select is used to select between 625 or 525 reference to be assigned to each source for the fixed databases. When using the editable database, the controller ignores this switch setting.

Sw2_6 Reconfigure selects between AUTOMATIC reconfigure of cards in the system on power-up or reset and MANUAL reconfigure where a reconfigure only occurs if manually invoked via the terminal editor. For systems using the Windows editor, this switch must be set to AUTO.

Sw2_7 Database Type selects whether to use the fixed, non-editable database or the editable one. For systems using the Windows editor, this should always be set to editable database

Sw2_8 Control mode is used in conjunction with sw2_7 to select which fixed database to use. GENERAL database configures both RS485 Remote ports to support SW-P-02 General Switcher protocol. The PANELS option configures both RS485 Remote ports for SW-P-06 Multi-drop Comms protocol. For the TX Series routers, using the editable database, the controller ignores this switch setting.

Diagnostic LEDS

The 8 diagnostic LEDS fitted on the card edge provide status information for the controller as detailed below:

LED	Function
1	POWER ON
2	RESET
3	CONTROL CARD ACTIVE
4	Flashing at 2Hz - ACTIVE CONTROLLER Flashing at 1Hz - IDLE CONTROLLER
5	CROSSPOINT SET - FLASHES WHEN SET
6	NO HANDSHAKE FROM A MODULE
7	REF 1 INPUT DETECTED
8	REF 2 INPUT DETECTED

The card supplies additional diagnostic information by using certain combinations of these LED's.

4 on & 8 flashing indicates a read/ write error with the onboard RAM

4 on & 7 flashing indicates that the database is either invalid or corrupted.

For a system with an invalid or corrupt database, it is necessary to load a valid system database into the controller. It is recommended that the system remains powered for at least 72 hours before the module housing the controller is removed. This will ensure that the battery used to power the battery-backed memory has been allowed to fully charge.

7.1.8 Router control card database editor

The TX series router control card is shared with the Freeway routing system and therefore utilises the same database editor package. The editor with associated programs requires about 3.2 Mbytes of hard drive space and has been designed to run on the Microsoft Windows 2000, Me or XP operating systems. Each saved database typically requires 1.3 Mbytes.

7.1.9 Installing the Editor

The Pro-Bel routers editor is supplied either on a CD ROM or as an e-mail attachment.

To install from CD;

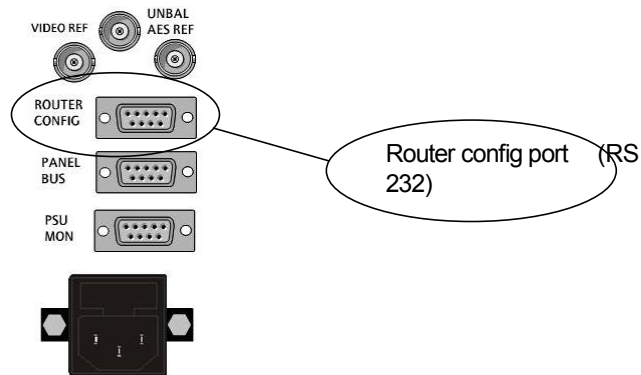
Insert the CD ROM into the PC's CD drive and either:

Click 'Start', then select Run from the start menu, then type D:Setup and click OK, or

Run Explorer, view the contents of the CD ROM and select Setup.exe and follow the instructions on screen.

An HTML help file is provided with the editor package.

To use the editor 'On-Line', the PC must have an RS 232 port capable of operating at 38.4 Kbaud and should be connected to the ROUTER CONFIG port on the rear of the frame, using a 9 way pin to pin cable.



Two default databases are supplied with the editor package, one for 525 systems and the other for 625. The relevant database will already be loaded into the controller, as the configured database, before being shipped from the factory. This database can be modified either on or off line, using the editor, before being saved onto the PC's hard disk.

7.1.10 Resetting the router control card

There are two RESET switches available to perform a hard reset of the controller. One is located on the edge of the 2440 sub-module, while the other is on the front edge of the host card. Pressing either has the same effect.

Initiating a hard reset is similar to powering down and powering up the control frame. The controller re-boots and follows the usual power-up sequence. It should be noted that any router control panels connected to the system will shut down, and then be restored after initialisation is complete. If no changes have been made to the database then no crosspoints will be changed.

It is advisable to perform a reset after database parameters have been changed as certain operations only take effect after a reset, e.g. changing level type, panel type, source overrides, and controllable destinations. Note however that crosspoint settings may be affected if changes to the level type have been made prior to the system reset.

8 Multi level audio

In systems requiring multi-level audio, then an audio mixer (5025), and where necessary a router level is required for each audio level in the system. Systems using embedded audio are the exception to this as they only require a single video router level; however independent outputs for video and audio from the router are still required in order to permit video/ audio breakaway. Where the audio is required to be fed to multiple audio levels, a distribution amplifier should be used to split the signal and supply it to each mixer.

When configuring these systems, it is important to remember that the audio mixers must all be in the same frame as they share a common control and signal bus, permitting channel swapping and monitoring to take place. The same is also true for the internal (local) router modules as the frames they are housed in must be interconnected by a control bus. Therefore as soon as a TX 410 system has two or more audio levels the routing modules are removed from the main frame and are housed in an independent frame.

Note: In multi-level systems, all of the audio mixer modules must be interconnected across the front of the modules using a mixer card interconnect ribbon cable. In order for the panel to receive PPM audio data from each audio mixer, the CONTROL port on all mixers should be connected, in parallel, using a pin to pin cable back to the EXT AES MIXER port on the TX Controller. In these systems, each audio mixer must have a unique address so that the TX Series controller can enable the correct mixer to transmit the PPM data.

8.1 System configurations

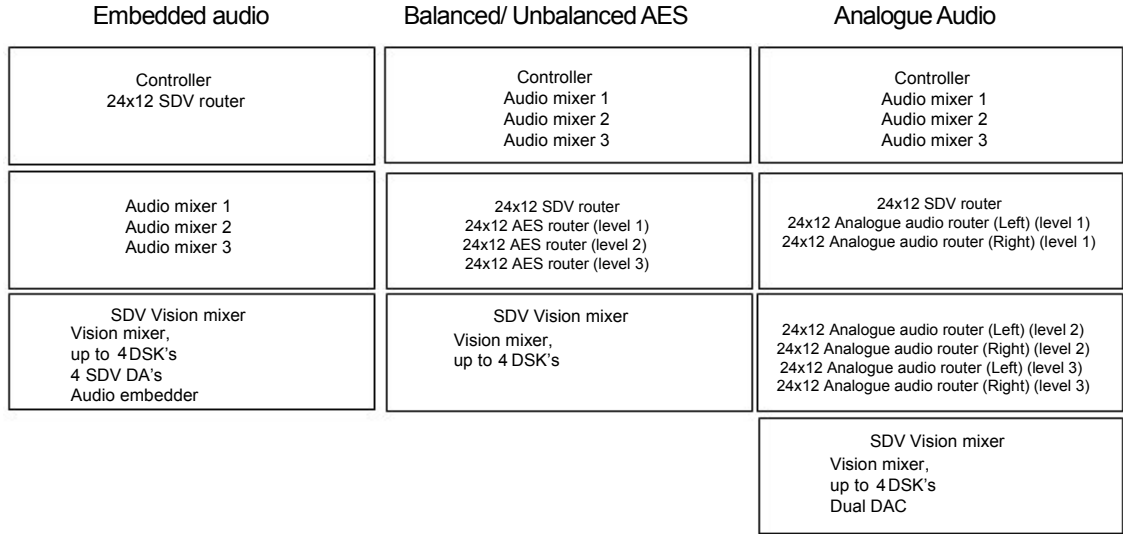
The following diagrams detail the number of 3U frames required within multi-level audio systems and indicate the recommended module layout.

8.1.1 Internal router configurations

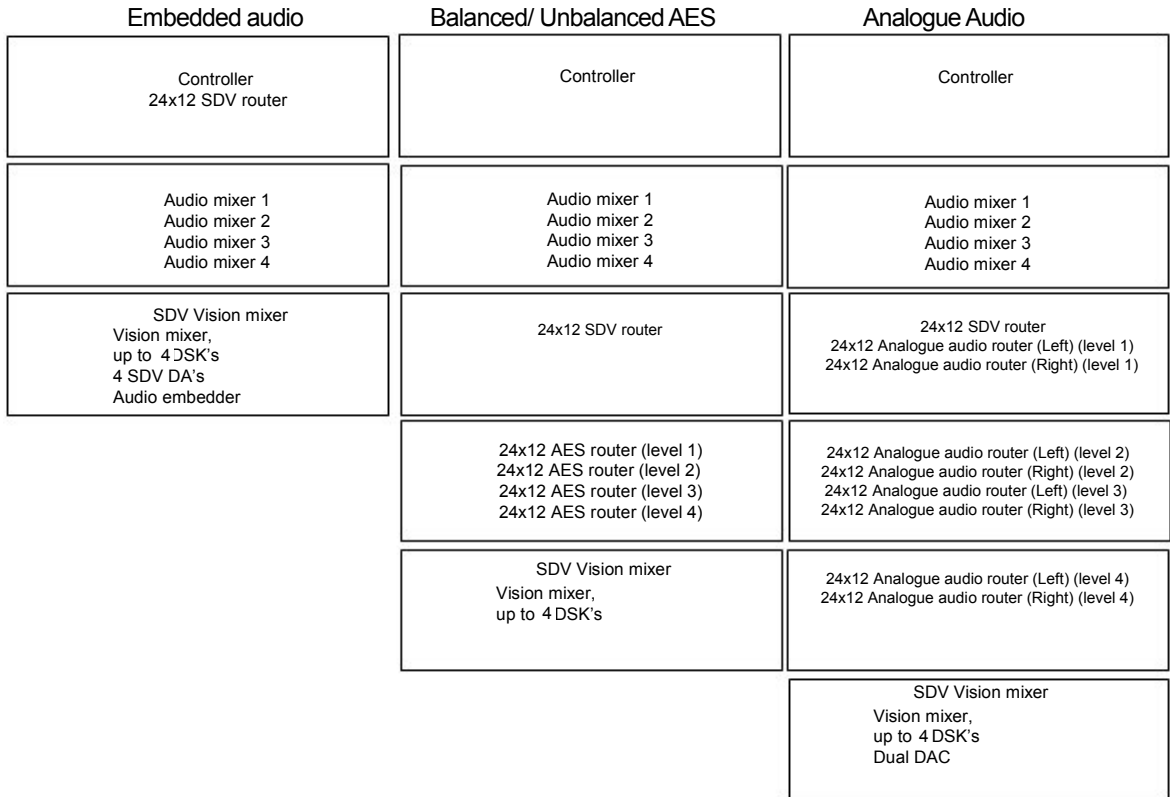
2 audio levels (All frames are 3U)

Embedded audio	Balanced/ Unbalanced AES	Analogue Audio
Controller 24x12 SDV router Audio mixer 1 Audio mixer 2	Controller Audio mixer 1 Audio mixer 2	Controller Audio mixer 1 Audio mixer 2
SDV Vision mixer Vision mixer, up to 4 JSK's 4 SDV DA's Audio embedder	24x12 SDV router 24x12 AES router (level 1) 24x12 AES router (level 2)	24x12 SDV router
	SDV Vision mixer Vision mixer, up to 4 DSK's	24x12 Analogue audio router (Left) (level 1) 24x12 Analogue audio router (Right) (level 1) 24x12 Analogue audio router (Left) (level 2) 24x12 Analogue audio router (Right) (level 2)
		SDV Vision mixer Vision mixer, up to 4 JSK's Dual DAC

3 audio levels (All frames are 3U)



4 audio levels (All frames are 3U)



8.1.2 External router configurations

2 audio levels (All frames are 3U)

Embedded audio

Controller
Audio mixer 1
Audio mixer 2

SDV Vision mixer
Vision mixer,
up to 4 DSK's
4 SDV DA's
Audio embedder

Balanced/ Unbalanced AES
and Analogue Audio

Controller
Audio mixer 1
Audio mixer 2

SDV Vision mixer
Vision mixer,
up to 4 DSK's
Dual DAC (Analogue only)

3 audio levels (All frames are 3U)

Embedded audio

Controller
Audio mixer 1
Audio mixer 2
Audio mixer 3

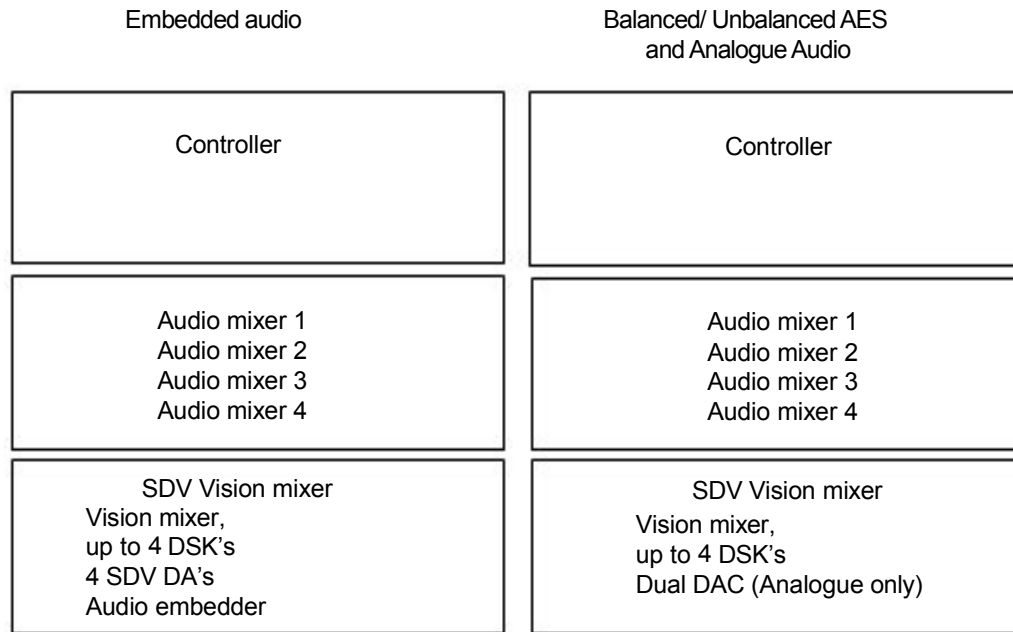
SDV Vision mixer
Vision mixer,
up to 4 DSK's
4 SDV DA's
Audio embedder

Balanced/ Unbalanced AES
and Analogue Audio

Controller
Audio mixer 1
Audio mixer 2
Audio mixer 3

SDV Vision mixer
Vision mixer,
up to 4 DSK's
Dual DAC (Analogue only)

4 audio levels (All frames are 3U)



9 Saving system configurations

9.1 Configuration save/recall software

This software can be used to back up TX Series system configurations to a floppy disk or hard drive, and is supplied with the TX System.

Before attempting to run the save/ recall programme, it is first necessary to load the programme onto a PC, and then connect the PC to either, the TX PANEL ports (RS422) or the main system controller card edge (front) RS 232 port

NOTE: Before attempting any TX Series system software upgrades, it is recommended that the current system configuration be saved. This will enable the system settings to be restored if necessary.

Configuring the hardware

The system controller can operate with the remote configuration save/ recall software by using either:

The 2645 card edge port (RS232),

The TX PANEL ports (RS422)

When using the TX PANEL port, system configurations can be saved and recalled without the need to remove any system modules.

To use the 2645 card edge RS232 port

Remove the 2645 from the main frame

Locate the jumper marked PL14 and set it to the TEST position

Connect the PC RS 232 port to the card edge 9 way D type connector using a pin to pin cable.

See Using the Software section below to use the program.

When finished using the save/ recall programme, remove the 2645, return jumper PL14 to the NORMAL position and replace the card.

To use the TX PANEL port

Connect the PC to the TX controller TX 1 or 2 panel port. (As the TX panel port uses RS 422, the PC must either have an internal RS422 port or an RS 232 to RS 422 converter for correct operation)

The cable pin out is as follows

15 W D type plug panel 1 or TX panel 2		TX	9 W D type plug PC/ 232/422 converter
Pin	Function		Pin
1	RX +		3
2	TX –		2
3	GND		4
8	GND		9
9	RX –		8
10	TX +		7

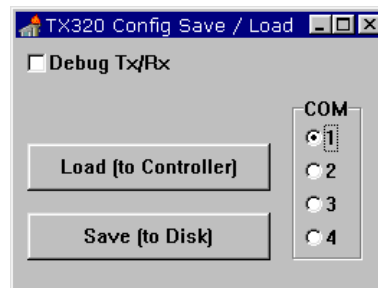
9.1.1 Using the software

Double clicking the configuration save/ recall icon will cause the TX Series Config Save/ Load programme to start.



Cfgstore.exe

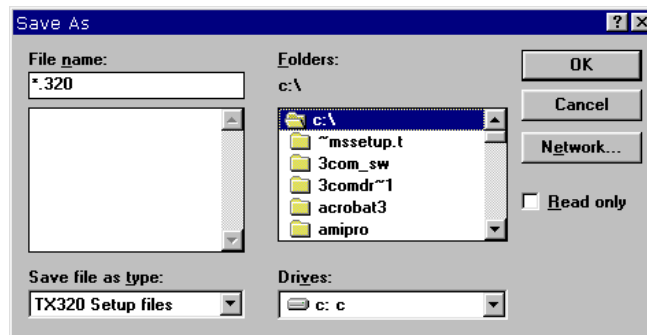
To activate the programme, it is necessary to select a communication port for the PC to use when connected to the TX Series control card. Once communications are established, the Load and Save buttons will become active as shown below.



9.1.2 Saving the current system configuration

1 Press the Save (to Disk) button

A save screen will open.



2 After entering the configuration file name and specifying the location it should be stored in, press OK.

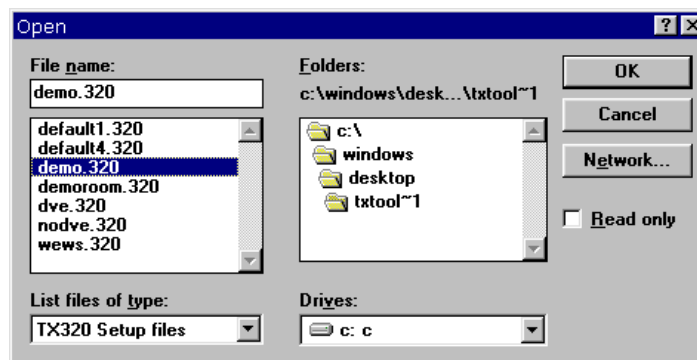
Once the configuration has been saved in the specified location; a confirmation dialogue screen is displayed, indicating the save was successful.



9.1.3 Downloading a saved configuration

1 Press the Load (to Controller) button

A recall configuration screen will open.

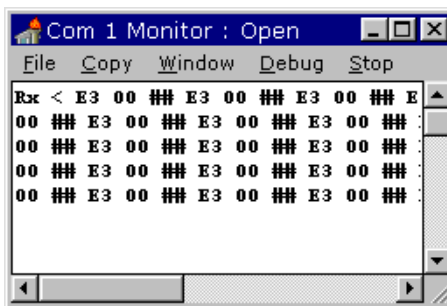
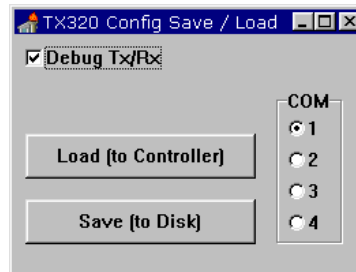


2 Select the required configuration by clicking it, and then press OK

Once the configuration has been downloaded to the controller, a confirmation dialogue screen is displayed, indicating the download was successful. The panel will now reflect the changes to the system.

9.1.4 The Debug Tx/Rx function

Selecting the Debug Tx/Rx function opens up a port monitor window. This port monitor shows details of communications between the TX Series controller and the PC. An example of the information displayed is shown below. This function is intended for use by Pro-Bel personnel only.



10 Problem solving

This section is intended as a brief guide for diagnosing faults associated with the TX 420. If you need further help, please contact our support department (see section 11.3) for further information.

There is no power from the PSU?

Check mains is connected

Ensure that the fuse is intact

The source names are all '????'

Ensure that the router configuration is correctly set

There is no audible audio from the monitoring speakers

Check that the <CUT> buttons are not lit on the monitoring section

Check that the monitor select buttons are set to monitor the correct row and that a valid source is selected

Ensure that an audio-over is not on air and/or the PGM level is at zero

The split transition selection buttons remain lit after a selection

Confirm that the audio-level breakaway is set to 'AUTO'

The DVE sequence will not change

Check that the DVE is not active or being previewed

The follow (DSK or audio-over) will not follow the PGM or DVE

Ensure that the follow buttons are configured correctly

The audio monitor volume controls are inoperative

Verify that the the monitor controls are assigned to be active

The DVE will not operate

Verify that the DVE to mainframe control connection is correct

Check that the 'To DVE' and 'From DVE' connections to the back of the vision mixer are connected to DVE input 1 and DVE PGM output respectively

Ensure that a DVE has been configured into the system

10.1 Removing a frame power supply

All equipment is provided with auto sensing power supplies. For EMC and safety reasons the mains, chassis and signal earths are permanently connected together within the module.

A green LED on each PSU indicates the status of the power supply fans. PSU relay alarms are also fitted.

The power supply modules are inserted into the frame from the front, and are secured by screws on the rear of the frame.

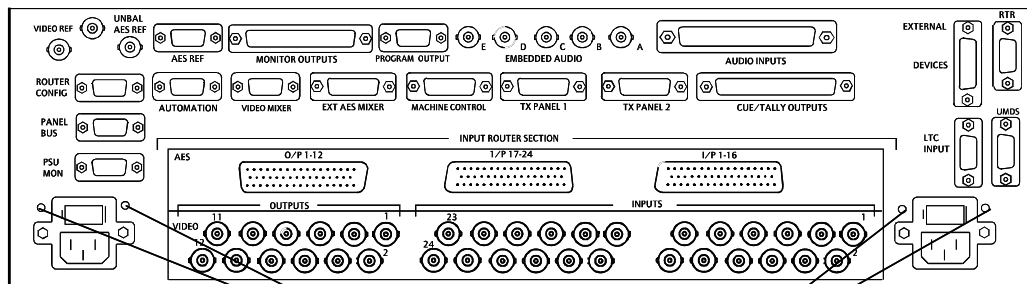
When replacing the power supply the following recommendations **must** be observed:

Always disconnect the mains from the unit before removal or during repair

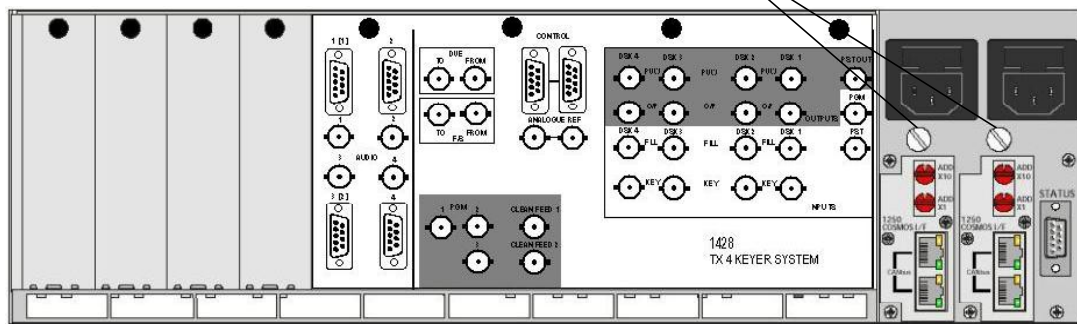
The securing screws should always be fitted before connecting the mains to provide essential chassis earthing



WARNING: The screws form an essential chassis connection for EMC compliance and must not be omitted. All equipment frames have two power cords. To reduce the risk of shock, remove both cords before servicing.



Position of screws on rear of panel



11 Support information

11.1 Warranty

11.1.1 Warranty statement

The warranty period covering Pro-Bel hardware is 2 years from the date of shipment. During the first two months of this period, any defective product will be exchanged free of charge.

For the remainder of this period any defective product returned carriage paid will be repaired or replaced free of charge within our normal turnaround period of 21 days. Where the defect is attributable to misuse or physical damage the warranty will be deemed void with all costs associated with the repair or replacement subject to charge.

Standard repair charges will apply to bought in items such as power supplies, etc.

Repairs required in less than the normal 21-day period will incur additional charges.

The warranty period covering software products is 90 days. Beyond this support/maintenance contracts are available and depending on the equipment may be mandatory for a 3 year period.



WARNING: Ensure that any returned unit is adequately and appropriately packed; for example, do not pack static sensitive products in common polythene.

11.2 Telephone support

If technical help or advice is required, then in the first instance, Customers are advised to contact their local sales office.

Customers with equipment directly supplied from Pro-Bel, are advised to contact Customer Support, which has been set up to provide hardware, systems and product support for all Pro-Bel supplied equipment.

To use this service please ensure you have the following information:

Order acknowledgement no.

System product type no.

Your order no.

Any of these numbers will help us to quickly identify the equipment referred to.

Product type numbers - 4 digits

System type numbers - 4 digits beginning with 7 or 8 found on top of rear panel of (custom equipment) frames or on system handbooks

- Any module numbers relevant to the fault and their serial numbers
(a letter followed by 5 numbers)
- A clear description of the fault
- Any relevant historical information
- Any other information that might help diagnose the fault

11.3 Contacting our support departments

UK office

- Telephone number - +44 (0)118 9214214
- Fax number - +44 (0)118 9214268
- E-mail address - support@pro-bel.co.uk

Standard business hours are 8.00am to 7.00pm Monday to Friday (excluding UK public holidays).

Additional support is available outside these hours by purchasing a support contract - details from the above number.

US office

- Telephone number - 1-888-84PROBEL (USA toll free)
1-631-845-2132
- Fax number - 1-631-845-1267
- E-mail address - support@chyron.com

Standard business hours are 9.00am to 7.00pm EST Monday to Friday

Additional support is available outside these hours by purchasing a support contract - details from the above number.

11.4 Equipment repairs

If the fault can be isolated to a single module, then the module can be sent for repair in the following way:

Please have the following information ready before telephoning your nearest Support/Service department:

Type of board/module number

Barcode/serial number – this is a six digit alphanumeric code on a small label attached to the module

UK repairs

Phone the helpdesk on: +44 (0) 118 9214214

A helpdesk operator will ask for the above information and issue you with your unique RMA number (Returned Merchandise Authorization), which must be quoted on the outside of the packaging.

Complete a returns label in full (especially the RMA number) - if you do not have a supply of labels we can send you some.

Remove the self-adhesive address label and attach it to your return envelope

Pack the module securely and post

US repairs

Phone the helpdesk on: 1-888-84PROBEL (US toll free)

1-631-845-2132

Fax number 1-631-845-3888

You will be asked for the above information and issued with your unique repair number

Note: All repairs must be accompanied by a repair number.

11.5 Equipment loans

If a loan module is required to cover a repair being sent:

- Please contact Customer Support, who will arrange the loan, if available
- A small charge is made to cover administration, so please have an order number ready
- The loan will be sent to you in the normal way (urgent deliveries will be charged at cost)
- Provide a contact name and phone number

When returning the loan please provide the following:

- Indicate the RMA number on the outside of the packaging (supplied with the loan)
- A contact name and telephone number
- A list of modules being returned with their serial numbers

For correct address to send your loan returns to, see *Sending equipment to Pro-Bel*

It is very important that you advise us if you need to keep the loan beyond the 'return by' date.

11.6 Equipment exchanges

Exchanges are normally issued if a module has gone faulty within the first two months of delivery.

When returning your faulty module, which has been exchanged, please supply the following information:

- The exchange reference number
- A contact name and telephone number
- A description of the fault symptoms
- A list of modules supplied with their serial numbers

For the correct address to send your exchange returns to, see *'Sending equipment to Pro-Bel'*.

11.7 Sending equipment to Pro-Bel

The following addresses should be used when sending repairs, loan returns and exchange returns to Chyron.

UK customers

Customer Support Telephone: +44 (0)118 9214214
Pro-Bel Limited
680 Eskdale Road
Winnersh
Wokenham RG41 5TS
UK

US customers

Customer Support Telephone: 1-631-845-2132
Pro-Bel America
5 Hub Drive
Melville
NY 11747

Other customers

All other customers should contact their local agent, or UK Customer Support for their correct return address

12 Important safeguards

12.1 Checking the equipment

If this equipment is being used for the first time, is being installed in a new location or has not been used for a long time then the following checks should be carried out.

Check that the equipment is not mechanically damaged; if it is a qualified engineer should check the unit and, if necessary return it to Pro-Bel or its agent - see section 11 for customer support information.

12.2 Safety guidelines

All Pro-Bel equipment meets the requirements of specifications:

European/British Standard EN60950 - 'Safety of Information Technology Equipment including Electrical Business Equipment'

American National Standard UL1419 - 'Standard for Safety for Professional Video and Audio Equipment'

Note: When installing rack-mounted equipment, ensure that all external metal work is earthed.

12.2.1 High temperatures

Under normal circumstances certain internal components, such as heat sinks and mains transformers, may be too hot to touch; also, if a fault develops one or more components may become unusually hot. However no part that can be touched in normal use should ever exceed 65°C; nevertheless **always take care**.

12.2.2 Disposal

None of the active devices or other components in this unit contains any hazardous or dangerous chemicals or substances and therefore there are no special precautions that need to be observed if this equipment is disposed of.

12.2.3 Connection to a.c. Power

Depending on the location in which this unit is installed, it may require different types of power cords. A suitable cord, complying with local regulations, should be used. The cord must be rated to at least 6.3A.

Note: The mains plug is the disconnect device, it must be located close to the equipment and accessible at all times.

12.2.4 High voltages

To prevent electrical shock when working on this equipment disconnect the ac line cord from the a.c. source before working on any internal components.

12.2.5 ESD warning



WARNING: All of the modules fitted contain static sensitive components. Full anti-static precautions should be taken when handling them.

12.2.6 Warnings

Heed all warnings on the unit and in the operating instructions

Do not use this product in or near water

Disconnect a.c. power before installing any options

Route power cords and cables so that they are not easily damaged

Disconnect power before cleaning

Do not use liquid or aerosol cleaners

Dangerous voltages exist at several points in this product - to avoid personal injury, do not touch exposed connections and components while the power is on

Do not wear hand jewellery or watches when troubleshooting high current circuits, such as the power supply

To prevent damage to equipment when replacing fuses, locate and correct the trouble that caused the fuse to blow before applying power

To avoid fire hazard, replace fuses only with the specified type, voltage and current rating - always refer fuse replacement to qualified service personnel

To avoid explosion, do not operate this product in an explosive atmosphere unless it has been specifically certified for such operation

During installation, do not use the door handles or front panels to lift the equipment because they may open abruptly and injure you

Have qualified personnel perform safety checks after any completed service

12.2.7 Cautions

Use only specified replacement parts

The front door of the cabinet is part of the fire enclosure and should be kept closed during normal operation

This product should be powered only as described in this technical manual

Operate only as described in the operators guide



WARNING: These servicing instructions are for use by qualified personnel only. To reduce the risk of electric shock, do not perform any servicing other than that contained in the Operating Instructions unless you are qualified to do so. Refer all servicing to qualified service personnel.

13 EMC compliance information

General

Pro-Bel equipment has been tested against the European standards EN50081-1 and -2 and American National Standard UL1419. In all cases, the results depended on the use of the correct cables, connectors and their correct assembly. Precautions applicable to each common signal type are specified below. Installation provisions must be followed in order that compliance is maintained in service. Normal practice as regards pushing cards fully home and ensuring that connectors are well seated is essential to good EMC performance.

Digital audio connections

Cable should be of good 110Ω design with a foil shield. This shield must make contact all round at the entry to the mating connector body. Pro-Bel equipment with AES3 interfaces is fitted with 'D' type connectors and the shield is grounded to the chassis at the point of entry. The 'D' type shield should be of the tinned type fitted with screw-locks and with dimples on the male part. Where a number of channels use the same connector, an overall shield is preferred in addition to individual shields and this must also be firmly grounded at both ends.

Serial digital video inputs and outputs

Cable should be good quality 75Ω design with double braided screens. Pro-Bel equipment with Digital Video ('SDI' or SMPTE 259M) interfaces is fitted with BNC type connectors where the shield is grounded to chassis at the point of entry. BNC plugs must be of the best quality as this type is prone to EMC leakage if contact is not good all round the shell.

It is possible to improve the emissions caused by this leakage by using cables with ferrite collars. This prevents leakage affecting adjacent cables in the installation space.

Analogue audio (including time-code)

This causes the least problem as the signal spectrum is benign and the circuit designs generally reject most unwanted signals. Some interference could occur if the equipment contains processors, etc.; so all screens are grounded at the point of entry. Good quality cables with foil shields should be used with the shield carried through from end to end, and connected to the chassis earth at the point of entry using a very short tail.

Equipment with control ports

Cable should be of good quality with a foil shield. This shield must make contact all round at the entry to the mating connector body at both ends of the cable. Pro-Bel equipment with control interfaces are fitted with 'D' type connectors and the shield is grounded to chassis at the point of entry. The 'D' type shield should be of the tinned type fitted with screw-locks and with dimples on the male part. Ribbon cables are NOT suitable under any circumstances outside of the equipment frames.

14 Specification

14.1 Serial digital video

Inputs

Number and type:

Router:	24: Serial component digital to SMPTE 259M-ABCD, 20 programme, 4 auxiliary
Mixer:	12: Serial component digital to SMPTE 259M-C, PGM*, PST*, DSK1 to 4 Key, DSK1 to 4 Fill, DVE and ext Frame Synchroniser
Standard:	Serial EBU Tech 3267E. SMPTE 259M-C
Input Impedance:	75Ω
Data rate:	
Mixer:	270Mbit/s only
Return loss:	>13dB 10MHz to 360MHz
Amplitude:	800mV p-p nominal
DC offset:	<5V
Equaliser (internal router):	Adaptive automatic for up to 250m cable (typ. Belden 8281, PSF 1/2M or equivalent)
Reference:	Analogue video, Looping

* PGM and PST inputs fed from system router

Outputs

Number and type:

Router:	12: PGM, PST, AUX1, AUX2 plus 8 external outputs for ancillary monitoring, unbalanced NRZI coded serial data
Mixer:	15: DSK 1 to 4 Output, DSK1 to 4 PVW, System PST, Clean Feed (2), Main PGM output (2 + 1 on Key PVW output), 'To Frame Synchroniser' (1), 'To DVE' (1)
Standard:	Serial EBU Tech 3267E. SMPTE 259M-C
Input Impedance:	75Ω
Data rate:	270 Mbit/s
Return loss:	>13dB 10MHz to 360MHz

Amplitude:	800mV p-p nominal
DC offset:	<5V
Overshoot:	<7%

14.2 AES digital audio

Inputs

Number and type:

Router	24; 20 programme, 4 auxiliary, 110 Ω transformer coupled, balanced and floating to AES 3 – 1992, or 75 Ω transformer coupled, unbalanced operation to AES 3 id – 1995
Mixer:	PGM*, PST*, AUX1, AUX 2, Return TX feed, Over 1 to 4. 110 Ω transformer coupled, balanced and floating to AES 3 – 1992, or 75 Ω transformer coupled, unbalanced operation to AES 3 id – 1995

Optional interfaces for:

Asynchronous digital audio, 32-56kHz

Analogue dual channel audio

Embedded audio to SMPTE 272

Reference:	110 Ω transformer coupled, balanced and floating to AES 3 – 1992, or 75 Ω transformer coupled, unbalanced operation to AES 3 id – 1995
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Outputs

Number and type:

Router:	12; PGM, PST, AUX1, AUX2 plus 8 external outputs for ancillary monitoring, Single output per destination, 110 Ω transformer coupled, balanced and floating to AES 3 – 1992, or 75 Ω transformer coupled, unbalanced operation to AES 3 id – 1995
Mixer:	Programme AES 3-1992 (1); analogue option (1) Preset AES3 (1) AUX1/2 AES 3-1992 (1per AUX) Monitor 1/2 AES 3-1992 (1 per AUX). Single output per destination, 110 Ω transformer coupled, balanced and floating to AES 3 – 1992, or 75 Ω transformer coupled, unbalanced operation to AES 3 id – 1995

* PGM and PST inputs fed from system router

14.3 Performance

System

Timing - Video For PGM output to be transparent to embedded information, all router inputs must be within 54µS of the reference input, and each other.

Genlock range with respect to analogue video reference Between 5 lines early and $4\frac{7}{8}$ lines late

System Delay**

No DVE 1 line

With DVE 1 Frame and 1 line

**The system delay is defined with respect to the settings of the card edge switches relative to the analogue reference. i.e. if the switches are set to 0, then the PGM output will be coincidental with the analogue reference. The overall delay also depends on the number of keyer cards present in the system. The Mixer card gives $\frac{1}{2}$ line delay from switch setting and each additional keyer card adds a further $\frac{1}{8}$ line, when tuned to REF but can be set $\frac{1}{2}$ line earlier – so output is only $\frac{1}{8}$ delayed from input.

Vision

Data acquisition period: 20ms

Rise and fall time: <0.5ns (rise and fall shall not differ by > 0.25ns)

Jitter: <0.5ns (<0.75ns with >200m input cable)

Audio

Sample rate 48kHz

Output Wordlength 24bit

Re-frame performance (mixer) Re-framers on all inputs, outputs AES-11 compliant

Channel status data re-written

Transients No disturbance in digital bitstream

Operating temperature

Range: 0°C to 40°C

Cooling: Internal fans

14.4 External router configurations

Under Aurora control, any 20 sources may be pre-assigned from an external router.

Refer to external router documentation for router specification.