VISTEK V6302
AUDIO PROCESSOR FRS10
USER GUIDE

www.pro-bel.com

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1 DESCRIPTION

The V6302 has an all-digital Audio Processing Engine (APE) that provides synchronisation, gain, routing, fixed and tracking delay functions on the inputs and is intended for application in both Standard Definition and High Definition installations. It has six AES inputs and four AES outputs on the rear panel. An optional Dolby Decoder submodule has Dolby E® and Dolby Digital® decoding capability and provides a maximum of 8 decoded channels plus a single downmixed stereo pair, all of which are inputs to the Audio Processing Engine. The V6302 is a 3U high card which is fitted into either a V1601 or V1606 rack (or even the earlier generation V1603) from which it obtains its power and control. A passive rear module is required for all signal interconnections. A range of these are available for both the V1601 and V1606/V1603 chassis.

In addition to standalone operation, the V6302 may be paired with the V6402 HD Frame Synchroniser, using a special passive rear module that provides a number of direct interconnections between the V6302 and the V6402. When paired with the V6402 in this manner, the V6302 can be fitted with an optional Demux/Mux submodule that provides a further four (or eight) AES inputs and four (or eight) AES outputs to the V6302 APE.

An external analogue video reference, usually Black and Burst, may be applied and may be NTSC, PAL, or any of a number of High Definition formats. Alternatively an AES reference may be used, or the V6302 can use any of the rear panel AES inputs or anything received by the Dolby decoder as an AES reference. When the V6302 is paired with the V6402, a video reference may also be obtained from the optional Demux/Mux submodule.

The audio delay in the V6302 consists of a settable delay ganged on all 16 output channels and a settable differential delay on each of 16 output channels; each of these delays can range from 0 to 8192ms with 1ms resolution. There is also a variable tracking delay which changes according to the video delay through a paired V6402 Frame Synchroniser, or supplied to a rear panel socket on the V6302. Delays from 0 to 80ms can be tracked.

The digital input signals, including those output by the optional Dolby Decoder and the optional Demux/Mux submodule are passed through sample rate converters on the V6302 so there is no need for them to be synchronous with the reference and in fact they can have any sample rate in the range 32kHz to 192kHz.

There is a versatile front panel with an alphanumeric display which lets the operator set up a large number of parameters and read the internal status of the unit. Also it is fully compatible with the DART remote control system which means it can be controlled by the V1601 1U Control Panel, Viewfind PC based control software or any other 3rd party software written for the DART system.

2 INSTALLATION

Due to the large amount of I/O available on the V6302 a variety of rear panels are available. Presently there are four for the V1606 3U chassis. The rear units come in two variants, V6402-paired and standalone. Each variant has two types: balanced and unbalanced. The balanced rears are single width and have an HDD44 connector carrying balanced AES, which means that if separate audio connections are needed then a 'break-out' box will be required. The unbalanced rears are double width and use BNC connectors to carry unbalanced AES, facilitating individual connections.

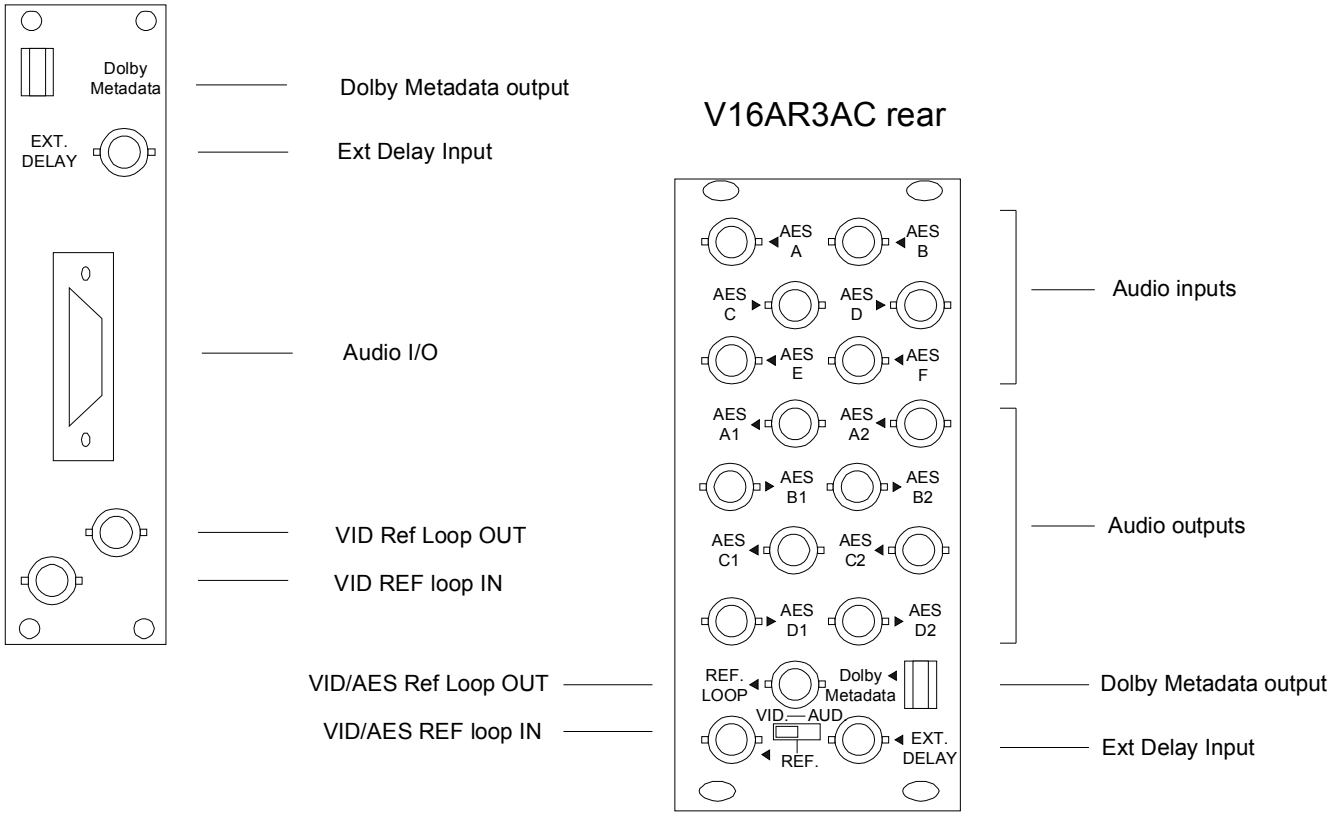
V6402-paired rears have the single width V6402 rear unit appended and are thus double width for balanced AES and triple width for unbalanced AES. This manual has generally been written assuming that one of the standalone unbalanced type rear panels is being used with access to all signals.

2.1 3 U Rear Panels

For the 3U Chassis two types of rear panel are available. The V16AR3AB provides connections for all possible I/O using a high density D-type connector for the audio and other ancillary signals, such as AES reference. For those applications where unbalanced audio is used and not all connections are needed, then a 17 BNC panel is available, the V16AR3AC. This has the advantage of simpler cable connections, but at the expense of losing some signals. V6402-paired versions of both of the above are available.

Connection details are given in section 2.3.

V16AR3AB rear



2.2 1 U Rear Panels

Rear panels for the 1U chassis are not yet available. Due to the height restriction, only single-width panels will be available, which means there will be one type only: standalone with balanced audio through an HDD44 connector.

2.3 Connections

2.3.1 REF BNCs and EXT. DELAY BNC

These BNCs are present on all types of rear panel and are used as follows:

BNC	Description
REF LOOP IN	External refererence input. Reference may be Video (NTSC/PAL/HD bi-level and tri-level sync) or AES reference. There is a switch on the rear panel which must be set to V for video reference or A for AES reference. A jumper on the V6302 allows the input impedance of the Ref Loop In to be set to either Hi-Z or 75Ω.
REF LOOP OUT	External reference loop-through. This facilitates daisy chaining references. The maximum recommended length of such a video or AES daisy chain is 4, and the last V6302 in a daisy chain should have the termination jumper set for 75Ω.
EXT. DELAY	External delay pulse is input here. This is a TTL-level (3.3V or 5V) logic pulse with width equal to the required delay. Standard TTL/LVTTL logic thresholds are used (0.8V, 2V) and the input impedance is 4.7kΩ

2.3.2 Audio I/O on BNCs

These are only available on the unbalanced rear panels. They provide for unbalanced AES inputs for channels AES A IN . . . AES F IN, and unbalanced outputs for channels AES A1 OUT . . .AES D1 OUT. A duplicate set of outputs is provided, AES A2 OUT . . . AES D2 OUT.

2.3.3 Audio I/O on HDD44 connector

On the 16AR3AB balanced rear panel and associated V6402-paired balanced rear panel there is a 44 way connector in the same footprint size as a standard 25 way D type connector. (HDD44) It is used for all the balanced digital audio connections, and other signals.

If the HDD socket is to be used for audio and connected with multi-way cable it is essential that the audio pairs are individually screened, otherwise crosstalk will almost certainly occur.

The signals to and from the pins on this connector are as shown in this table:

Signal Group Label	HDD44 Pin	Signal Function
Audio 1 AES A ⇐	14	Input AES A Pos
	44	Input AES A Neg
	15	Input AES A Gnd
Audio 2 AES B ⇐	13	Input AES B Pos
	43	Input AES B Neg
	28	Input AES B Gnd
Audio 3 AES C ⇐	12	Input AES C Pos
	42	Input AES C Neg
	26	Input AES C Gnd
Audio 4 AES D ⇐	11	Input AES D Pos
	41	Input AES D Neg
	40	Input AES D Gnd
Audio 5 AES E ⇐	9	Input AES E Pos
	39	Input AES E Neg
	10	Input AES E Gnd
Audio 6 AES F ⇐	8	Input AES F Pos
	38	Input AES F Neg
	24	Input AES F Gnd
Audio 7 AES A1 ⇒	7	Output AES A1 Pos
	37	Output AES A1 Neg
	21	Output AES A1 Gnd
Audio 8 AES A2 ⇒	6	Output AES A2 Pos
	36	Output AES A2 Neg
	5	Output AES A2 Gnd
Audio 9 AES B1 ⇒	4	Output AES B1 Pos
	34	Output AES B1 Neg
	19	Output AES B1 Gnd
Audio 10 AES B2 ⇒	3	Output AES B2 Pos
	33	Output AES B2 Neg
	19	Output AES B2 Gnd
Audio 11 AES C1 ⇒	2	Output AES C1 Pos
	32	Output AES C1 Neg
	16	Output AES C1 Gnd
Audio 12 AES C2 ⇒	1	Output AES C2 Pos
	31	Output AES C2 Neg
	16	Output AES C2 Gnd
Audio 13 AES D1 ⇒	23	Output AES D1 Pos
	22	Output AES D1 Neg
	35	Output AES D1 Gnd
Audio 14 AES D2 ⇒	18	Output AES D2 Pos
	17	Output AES D2 Neg
	35	Output AES D2 Gnd
AES Ref 1 AES REF ⇐	20	AES REF input Pos
	25	AES REF input Neg
	29	AES REF input Gnd
Misc EXT. DELAY ⇐	30	Ext. Delay pulse input
	29	Ext. Delay pulse GND
	27	

Note: 1. Pin 1 is at the bottom 2. The HD44 connector provides only balanced inputs and outputs.

2.3.4 Breakout Cable Specification

In many cases it may be desirable to make up a breakout cable from the HDD socket. It is important that this cable cable is made with separately screened sections to minimise NEXT crosstalk interference. Each of the Signal Groups listed under 2.3.3 should be individually screened.

2.3.5 Breakout Cables and Panels

Breakout Cables and Panels specifically for the V6302 are not yet available. Some commonality exists with the breakout panels used for the V1641 but not all I/O can be accomodated.

2.4 Signal Specifications

SIGNAL	TYPE	COMMENTS
Power (no submodule)	< 9W	Supplied from rack
Power (with Dolby submodule)	< 12.5W	Supplied from rack
Power (with Demux/MuxModule)	< 12.5W	Supplied from rack
Power (with both submodules)	< 15 W	Supplied from rack
Video Reference	B+B	Any 1V Composite video may be used, but Black & Burst is recommended. Format may be PAL, NTSC or HD with bi or tri-level sync.
Audio, Digital (AES)	Balanced	Zin = 110Ω Zout = 110Ω Input Sample rate 32–192kHz Output Sample rate 48kHz
Audio, Digital (AES)	Unbalanced	Zin = 75Ω Zout = 75Ω Input Sample rate 32–192kHz Output Sample rate 48kHz
AES Reference	Balanced	Zin = 110Ω or HI Z Sample rate 48kHz
AES Reference	Unbalanced	Zin = 75Ω or HI Z Sample rate 48kHz
External Delay Pulse	TTL/LVTTL	Zin = 4k7. Logic thresholds 0.8V/2.0V Positive pulse duration represents the video insertion delay. Max repeat period is 85ms.
Dolby MetaData output	RS485	Pins: Top = GND, Centre = '+', Bottom = '-' Refer to spec of Dolby Cat. 552 OEM Decoder for signal protocols.

2.5 Audio Insertion Delay

The V6302 acts as an audio synchroniser. To do this the audio data is resampled so that it is synchronous with the applied reference. This resampling is done in a Sample Rate Converter (SRC) which has a minimum processing time, and there is further processing delay due to pipelining in the Digital Signal Processor (DSP). It is also possible to include a fixed amount of delay, and enable an additional tracking delay, so that the total audio delay varies at the same rate as video through some external video path. The fixed delay can be set by the user and the tracking delay varies according to the applied external delay pulse (or a delay signal derived from a paired V6402 frame synchroniser. A more detailed discussion of audio delay is given in section 4.3.8 The total audio insertion delay is made up of three components – the core delay from the processing hardware, the Fixed Delay as set by the user and the Tracking Delay to match some external video processing path .

The core delay is mainly a combination of the SRC group delay and the DSP processing block size, and is about 4ms.

2.6 Adjustment Ranges

2.6.1 Audio Adjustments

This table shows the full ranges of the audio adjustments:

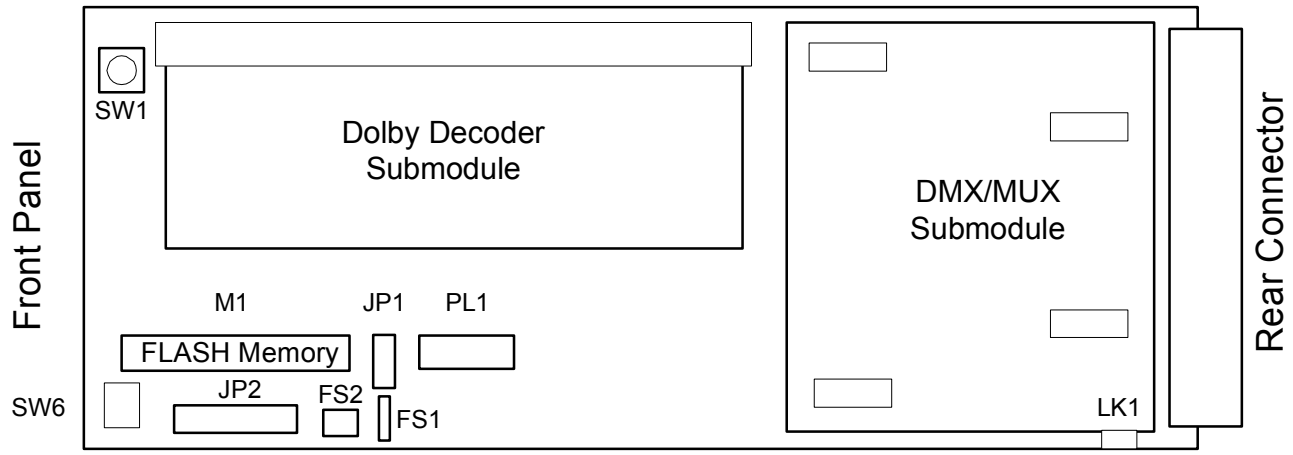
VARIABLE	RANGE	RESOLUTION
Input Gain	-16.000dB → +15.875dB on each input channel	0.125dB
Input Phase	0° or 180° on each input channel.	
Routing	Each output comprises the sum of up to 4 inputs.	
Fixed Delay	0 → 8192ms	1ms
Output Gain	-16.000dB → +15.875dB	0.125dB

2.7 Hardware

2.7.1 The PCB

The figure below shows diagrammatically the printed circuit board along with certain other components of interest. In particular it shows the position and orientation of the links and switches which set up the operation modes and the location of the sub-modules if fitted.

The FLASH Memory Module is shown, as it is the component that would need to be changed as a result of any software upgrade in the field. It is a custom Vistek module and care must be taken to ensure that a replacement is inserted the right way round and pushed fully 'home'. When removing the FLASH Memory Module, care must be taken to extract it evenly to avoid bending the pins. No special tools are needed for extracting or inserting the FLASH Memory Module.



2.7.2 Links and Switches

The purposes of the links and switches is shown in the following table. Details of their operation are described in later sections.

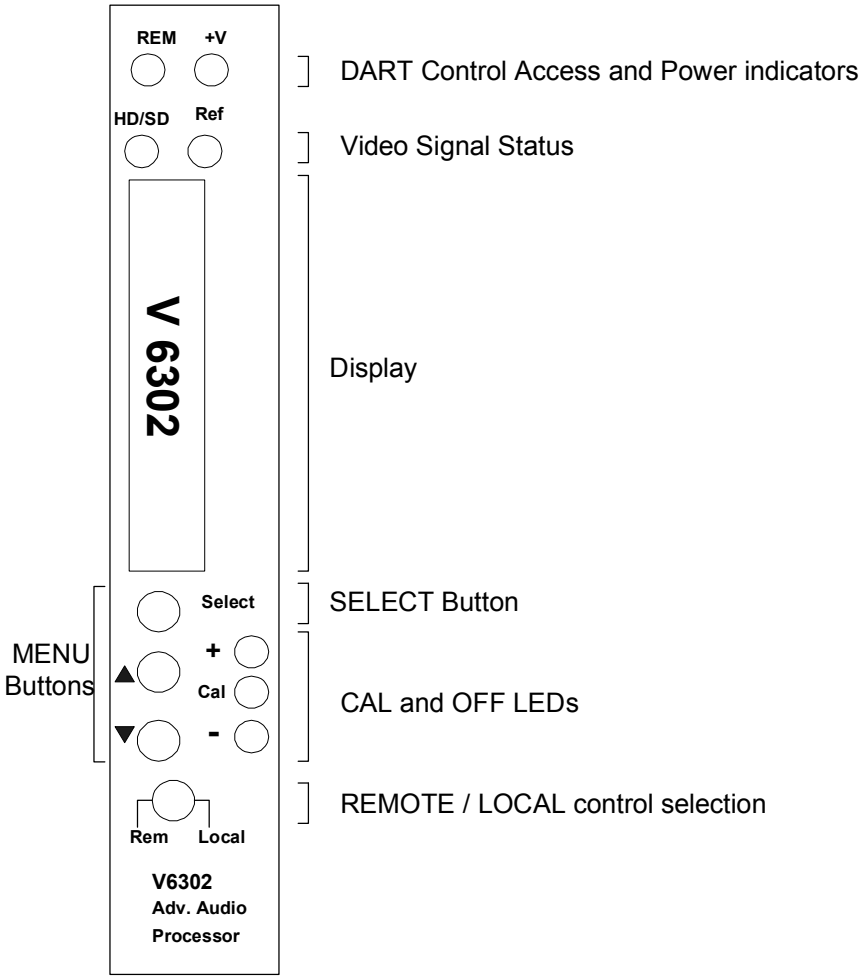
ITEM	Title	Comments
SW 1	RESET switch	Used to reset the internal microcontroller and DSP.
SW6	DEBUG switch	For development and test use only. Both switches should always be set 'north'.
U7	Dolby Decoder Submodule	Optional Dolby Cat. 552 OEM Decoder Module decodes Dolby E® and Dolby Digital® . The decoded signals are input to the V6302 Audio Processing Engine.
SKT1..4	DMX/MUX Submodule	Optional submodule performs de-embedding and re-embedding of of 2 audio groups (4 AES signals) from/to a digital video signal when the V6302 is paired with a V6402 Frame Synchroniser.
PL 1	JTAG Connector	For development and test use only. (May not be fitted)
JP 1	JTAG enable	Never used in operation. (May not be fitted)
JP2	H8 Programming Connector	For development and test use only.
LK 4	AES REF Term	North – High Z South – Terminated
LK 1	Video REF Term	Open – High Z Closed – Terminated 75Ω

2.7.3 Fuse

There are two fuses on the V6302:

FS 1	Fuse 2 Amp Wire ended		In series with the +15V input to the module.
FS2	Resettable fuse 0.5A SMD		Protects 3V3 power feed to JP2 programming connector. Factory use only.

2.8 Front Panel



The front panel on the V6302 is a considerable advance on what is usually available on single module interface equipment. It provides the user with total control and monitoring of the unit without the need to consult manuals and read unlabelled indications. While this kind of control is generally available with a remote control system, as it is over DART, it is unusual to have this level of access locally.

At first use the menu system may seem cumbersome but with only a small amount of practice it will become very easy to use.

2.8.1 Direct Indications

The four LEDs at the top of the panel provide these direct indications of the unit:

REM	Short blinks to indicate access by the DART controller, if fitted. It does **not** directly indicate that the unit is in remote control mode. If the rack frame does not have a Rack Controller fitted then this LED will not blink.
+V	Indicates that the main +5V is present on the board. This is derived from the +15V distributed through the rack. The V6302 does have many power rails, but only the main +5V is indicated here. It will, of course, be off if the fuse, FS1, were to have been blown.
SD/HD	Indicates that a Standard Definition (SD) or High Definition (HD) digital video signal is being received. This LED is only operative when the V6302 is paired with a V6402 and is also fitted with the optional Demux/Mux submodule.
REF	Indicates that a valid reference signal is being received from whichever reference source is selected.

2.8.2 Display and Switches

The main display is an eight character LED matrix display. It has been set so that when fitted into a 3U rack (V1606) it can be read from the left, and when fitted to a 1U rack (V1601) it is horizontal and the 'proper' way up.

The three buttons are labelled **Select**, ▲ and ▼. The **Select** button is used to move down and up the menus. A short press will move down one level, while pressing and holding for about half a second will move up one level. If you continue to hold it will progressively move up a level every half second until it reaches the top level (**SLEEP**), or you let go, in which case it will stay where it is. When at any level the ▲ and ▼ buttons will move through the list of options, or if in an actual variable (such as Fixed Delay) they will change the values.

The menu system is described in more detail later in section **4.1.2**.

If the unit is in Local control then the display and switches are used to set up and show the operation the module. If in remote mode then they are still active for showing the status but cannot be used to actually change anything.

Beside the ▲ and ▼ buttons are three LEDs marked **+**,**CAL** and **–**. In general the **CAL** LED is used to show that a variable is set to its normalised value and if not then the others show which direction to which it has been changed or that it is no longer on its CAL value.

2.8.3 Remote/Local Control

The lowest switch selects between Local control and Remote control over DART:

Local	Control is from the front panel itself.
Rem	Control is from the DART system. This requires the use of an external controller running a suitable programme, which communicates with multiple racks using the Dartnet protocol.

2.9 Configuration

At present the V6302 has no configuration options. Indication of whether any sub-modules are fitted is easily visible from the front panel by going to

STATUS Options

Note that even if a Demux/Mux submodule is fitted, if the video input to it from the paired V6402 is not present, or is of incorrect standard for the particular Demux/Mux submodule (eg HD instead of SD or vice versa), the V6302 will not show the presence of the Demux/Mux submodule.

2.10 Submodules

Various audio sub-modules are available for the V6302 depending on the audio requirements.
To change the Demux/Mux submodule remove the V6302 from the chassis and carefully remove the existing one, if fitted, by lifting evenly at both ends. To fit a new one check the orientation by aligning the offset connectors and place the module carefully. Push it home evenly at both ends. It may be stiff but do not force it aggressively since if the connectors are not mating correctly then one or more of the pins may get bent.
The Dolby® Decoder submodule is in a SIMM72 socket. To remove it, loosen the two screws, push the side spring clips both outwards and carefully withdraw the submodule at an oblique angle. To fit the Dolby® submodule, insert it into the SIMM socket at an oblique angle as far as it will go. Then push the south edge of the module towards the V6302 baseboard until two clicks are heard as the spring clips snap home. Finally replace the screws.

These are the available modules:

Product Code	Part No.	Description
/DB	130-9552	Dolby Cat. 552 OEM Decoder for Dolby E® and Dolby Digital®
/AP (V63APSM)	130-4260	Demux / Mux submodule for use with V6402, V6404, V6406, V6408, and V6418

3 BLOCK DIAGRAMS

3.1 Audio Processing

The diagram on the next page shows the Audio Flow for the V6302 with a Class 7 DART interface.

The V6302 has 6 AES inputs on the rear panel, each of which will accept AES of 32kHz to 192kHz sampling frequency. From these a set of four Main Input pairs may be selected by the **I/P SEL** router. These pairs comprise the set of eight Main Input channels which are numbered Inp 1L, Inp 1R . . Inp 4L, Inp 4R. If the optional Demux/Mux submodule is fitted, a further sixteen inputs denoted DMX 1L . . .DMX 8R are sourced from the submodule.

If the V6302 is fitted with the optional Dolby Decoder submodule, this may be fed with PCM, Dolby E or Dolby Digital encoded bitstreams, which are obtained via the **I/P SEL** router. In addition to the six AES inputs on the rear panel, the Dolby **I/P SEL** options also include the eight de-embedded bitstreams (AES pairs) DMX1 . . DMX8 which are present if the optional DMX/MUX submodule is fitted, and the selected bitstream is fed straight to the input of the Dolby Decoder submodule without any synchronisation stage. The Dolby decoder *input* is not resampled to the System Reference, because Dolby-encoded signals cannot tolerate any processing like sample rate conversion that alters the bit pattern. The Dolby Decoder has four pairs of decoded outputs named A1, A2 through D7, D8. In addition there is a Mixed Down stereo pair named Dolby ML, MR. All these PCM *outputs* of the Dolby decoder are resampled to the System Reference.

The eight Main Inputs (and optional sixteen DMX inputs and ten Dolby decoder outputs) are resynchronised to the System Reference, before being subjected to an **INPUT GAIN** control through which gain of -16.000dB through +15.875dB may be applied with resolution of 0.125dB. The **INPUT GAIN** controls are separate for each channel.
The signals with gain applied then pass through an **INPUT PHASE** stage, by means of which a 180° phase inversion may be applied to each and any of the channels. After gain and phase reversal, the 34 signals are then fed into the Main Router.

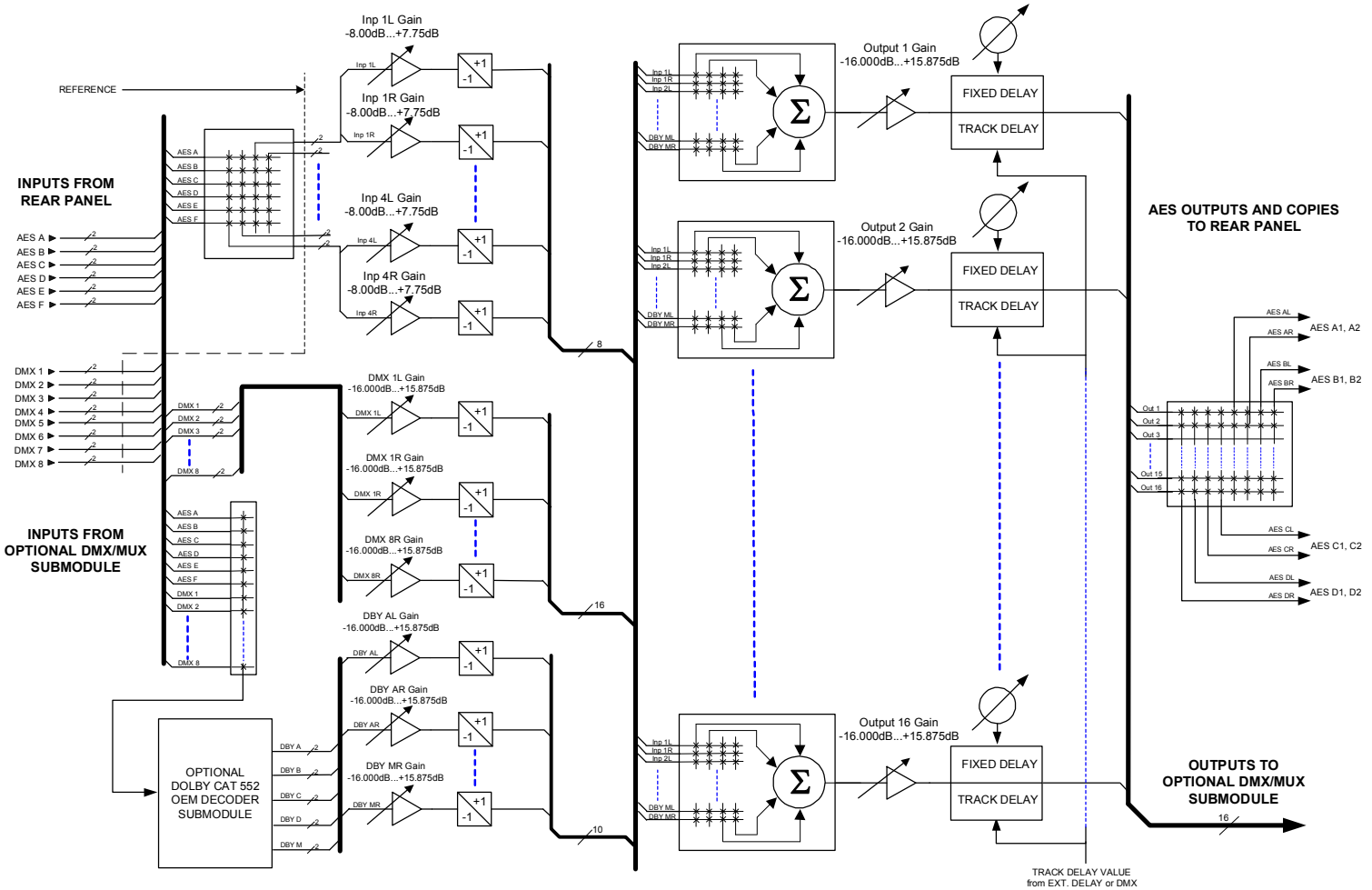
The Main Router operates on individual channels as a set of controls under the **MIX 1-4, MIX 5-9, MIX 10-12** and **MIX 13-16** menus. Each of 16 Main Router Outputs, OP 1 through OP 16 is a channel which is the sum of four sources, called ***n* Src 1..*n* Src 4** where n is the channel number. Each of these sources may be selected from any of the available input channels to the Main Router.

An Output Gain Stage allows gain of -16.000dB. . .+15.875dB to be applied to the individual Main Router outputs OP 1 through OP 16.

The sixteen channels then pass through a Delay stage wherein both a fixed Adjustable Delay and a variable Tracking Delay are applied. The fixed delay comprises two components: a ganged Adjustable Delay common to all 16 channels, and 16 individual Delta Delays, one for each channel. The ganged Adjustable Delay may be set in 1ms steps from 0ms to 8192ms. The Delta Delays may be adjusted from –8192ms to +8192ms, with the overall delay on each channel being the sum of the ganged Adjustable Delay and the channel's Delta Delay. The overall delay is bounded in the range 0..8192ms.
The Tracking Delay has a range of 0 to 80ms with resolution of one 48kHz audio sample period.

If the module is fitted with the optional DMX/MUX submodule, all sixteen outputs OP 1 through OP 16 are sent to this submodule where they may be assigned to MUX groups and embedded in a digital video stream. The sixteen outputs OP1. .OP16 also appear as inputs to the Main Output Router, in which any eight of the sixteen may be routed to the eight subframes of the four AES outputs on the rear panel.

V6302 AUDIO PROCESSOR WITH CLASS 7 DART CONTROL
AUDIO FLOW DIAGRAM



4 SYSTEM OPERATION

4.1 Local Control

4.1.1 Start up

Local control and monitoring of the V6302 is done through the front panel with its eight character LED display and three control buttons **Select**, ▲ and ▼. There are three LEDs which also contribute to the status indication; these are labelled **+**, **Cal** and **–**.

After power up the display will start at the top level and show the unit type as **`V6302`**.

4.1.2 Menu Control

The **Select** and▲ and ▼ buttons are used to manoeuvre around the menu system. The menu structure has five levels and the **Select** button is used to go up and down the structure. The ▲ and ▼ buttons are used to move between selections or to adjust a parameter depending on which sort of menu is displayed. The five levels are as follows:

Sleep	Display is blank (except for Banner warnings).
Top Level	As above, **`V6302`**
Main Menu	The Main Menu items, such as **`I/P SEL, IP SETUP, ENG'ING`** etc. These items are all in Upper Case.
Sub Menu	Menu items under each main heading, such as **`Inp 1`** under the **`I/P SEL`** Main menu. These items are all in Sentence Case (generally lower case but with upper case first letters).
Parameter	The lowest level under the Sub Menu, and used to actually adjust a parameter. The display will depend on the actual parameter and may be a value such as **`+0.000dB`** for a gain or **`ON`** or **`OFF`** for a switch variable. There is usually a title to describe the variable and a small icon in the left hand character position, but 8 characters cannot provide for a detailed description.

Some menu options are only available if certain optional submodules have been included. For example the **`DMX1 . . .DMX 4`** controls under **`I/P GAIN`** are only available if the DMX/MUX submodule is fitted, and functions related to the Dolby Decoder are only available if the Dolby Decoder submodule is fitted.

To move down a level just press the **Select** button briefly; then press either the **Select** button again to go down another level or the ▲ and ▼ buttons to move around the options within a level.

To move up a level press and hold the **Select** button for about half a second which will move up one level. If you continue to hold the **Select** button then it will move up a level every half a second until it reaches the Sleep level (one above the Top Level).

A complete list of all the menus is given in Section 1.

4.1.3 Menu Examples

This section has examples of how to manoeuvre through the menu system. The first one starts with the unit in its 'sleep' mode where the display is blank, and then proceeds to set the Output Gain for **OP/MUX A** to -1.0 dB.

Action	Display	Comments
Select	**V6302**	Top Level
Select	**I/P SEL**	First Main Menu
▼	**IP GAIN**	
▼	**I/P PHASE**	
▼	**. . .**	
▼	**O/P CTRL**	The Main Menu we want
Select	**OP1 Gain**	The Sub Menu we want
	0.00 dB	The default setting
▼	**-0.125 dB**	. . .
▼	**-0.250 dB**	. . .
▼	**. . .**	. . .
▼	**-1.00 dB**	Set it to -1.00 dB that we want

Now we shall go set the System Reference to External AES. The following steps should be taken from the current position (Select+Hold means that you should press and hold the select button for about half a second):

Action	Display	Comments
Select+Hold	**OP/MUX B**	UP to the Sub Menu level
Select+Hold	**OUT GAIN**	UP again to the Main Menu
▼	**DELAY**	
▼	**STATUS**	
▼	**ENG'ING**	Along to the Engineering Main Menu
Select	**Ref. Src**	To the Sub Menu we want
Select	**Free**	The default setting
▼	**Extern**	The setting we want

4.1.4 Sleep

If the front panel is not used for a certain amount of time then the display will automatically go into a sleep mode when it will be blank. Pressing any of the buttons will cause it to 'wake up' back into the top level. The time delay before the unit slips into sleep mode can be set up using the **ENG'ING** : **Sleep** menu.

The brightness of the display can also be adjusted using the **ENG'ING** : **LEDLevel** menu.

4.1.5 Banner

There are some conditions which need to be directly indicated to the operator and although the display system is highly versatile for a lot of complex operations it is not really convenient for immediate indications. In the past LEDs on the front panel have been used for this purpose.

To help with this a banner message will pass across the screen from right to left to show any critical statuses when the display is in sleep mode. This saves the need to manoeuvre down the menus to find out, for example, that an input has failed. Remember it is not necessary to wait for the time-out period for the unit to go into sleep mode, it can be forced there by going up a level from the so-called Top Level. The following conditions will be displayed on the Banner:

Banner function not yet implemented

4.1.6 High Level Signal Status

There are two LEDs on the top of the front panel to indicate that the video from a paired V640x and the reference inputs are present, and consequently these also indicate that they are absent. However there is no direct indication as to the format of the reference signals, i.e. the video could be SD or HD, and the reference could be any of the selected references. Since many installations may use multiple formats and therefore need a quick indication there are parallel menus with the Top Level.

If you press the ▲ and ▼ buttons from the Top Level then you will see the SDI and Video Reference status directly. In each case this will show the signal presence and if it is there then what format it is. Again this is considerably faster than manoeuvring down the menu structure. There are presently five different stati available at this level. They are:

I/P 1	√	or	**I/P 1**	**X**
I/P 2	√		**I/P 2**	**X**
I/P 3	√		**I/P 3**	**X**
I/P 4	√		**I/P 4**	**X**
REF AES	√	or	**REF VID**	√
		or	**REF**	**X**

These indications are still at the Top Level, so a single press of the Select button will immediately move down the menu tree.

It's important to realise that the status determination is made *after* the **I/P SEL** router, and that the status applies to the health of the *selected signal for that input*, not the raw input itself. So it's possible to have, for example, three of the four inputs selected to AES A rear panel input and in this case the status for three of the inputs will be the same.

4.1.7 Variable Calibration

Most variables have a calibrated or normalised value. In some cases this is obvious, such as the Input or Output Gains should be normalised to 0dB, but in others it is less so. In the listing of all the variables in Section 1 the normalised value is shown.

Any variable can be individually set to its normalised value by pressing the ▲ and ▼ buttons at the same time.

Within each the Main Menu at the end of the list of Sub Menus is a pseudo Sub Menu called **Norm**. Selecting into this will let you normalise all the parameters within the Main Menu item to their normalised value.

The three LEDs beside the ▲ and ▼ buttons are used to show whether the variable is calibrated or not. After calibration the **CAL** LED will be ON.

4.2 Remote Control

In addition to being controlled with the menu system on the front panel the V6302 can also be controlled over the DART remote control system. For this it should be fitted into a rack which also contains a V6081 Rack Controller. ***Note that thew earlier V606 Rack Controllers cannot be used with this Class 7 module.*** The V6081 Rack Controller provides an interface between all the units in the rack and the external DARTNET network. Various controlling devices are available for accessing units on the DARTNET; these include the V1605 1U hardware panel, the V1602 2U hardware panel, and the more sophisticated ViewNet Client Server PC-based interface. The earlier ViewFind PC-based control system does not support the Class 7 version of the V6302. It is also possible to have third party software written to interact with DARTNET. The details and specification of the DART interface are described elsewhere.

There are separate settings for the unit when operating in Local and Remote control modes. This means that if the unit is changed between Local and Remote mode then the settings may change. The advantage of this is that if the unit has been set up locally and the operator inadvertently changes to Remote mode (which probably has different, or even default, settings) the local settings are not lost. There could be a disadvantage in that once the unit has been set up remotely it cannot not be switched to Local without causing a disturbance.

ENG'ING	**Frm Len**	Sets the value of the variable **video frame length** to 33/40ms so that Fixed Delay may be entered in multiples of video frames.
ENG'ING	**Inp SRC**	Used to bypass the sample rate converters on the four Main inputs. This should only be used if the System Reference is set to one of the inputs and all inputs are pre-locked together. When Inp SRC is set to Off, non-audio data can be passed through if all settings are at CAL.
	DMX SRC	As above for the four DMX inputs.
ENG'ING	**Sleep**	Set the display Sleep timeout
ENG'ING	**LEDLevel**	Set the Display brightness
CONFIG	**Banner**	Turn the top level display Banner On or Off

4.3 Audio Processing

4.3.1 Input Selection and DMX Group

The source of audio for each Main Input Inp1 (L,R) through Inp 4(L,R) can be from any of the rear panel inputs AES A through AES F. For example Input Selection menu for Inp 1 is as follows:

I/P SEL	**Inp 1**	**AES A**
		AES B
		AES C
		AES D
		AES E
		AES F

Once you have selected the source of audio for a given Main Input, you can find out what the status is of that input from the Status menu, an example of which is shown below for Inp 3:

STATUS	**Inp 3**	**I/P 3** √

Also included under the Input Selection menu is the DMX group selection, which appears as an option if the DMX/MUX submodule is fitted.

4.3.2 Synchronisation

All audio signals input to the V6302, including those from the optional DMX/MUX submodules and Dolby Decoder, are resynchronised to the 48kHz System Reference by means of sample rate converters, in order that they may be coherently processed. The System Reference may be the V6302's free running oscillator, an external video B/B input, an external AES reference, or whichever of AES A . . . AES F is selected on Inp 1 Main Input. A video synchronous reference derived from the optional DMX/MUX submodule may also be used. The reference is selected from the Engineering menu at the Ref Src sublevel as follows:

ENG'ING	**Ref Src**	**V640x**	displayed only if DMX/MUX submodule is fitted
		Inp 1	
		Extern	
		Free	

The **Extern** setting will select an external AES reference or an external B/B video reference. When the BNC rear panels are used, there is a pair of BNC sockets for a REF. LOOP (in and out), and a slide switch that selects between 'A' and 'V', where the 'A' position denotes AES reference and the 'V' position denotes video reference. This switch routes the incoming external reference to the appropriate receiver circuitry and must be correctly set, and the STATUS will display the type of reference present, for example:

STATUS	**Ref**	**AES REF √**

When the rear panels with HDD connector are used, it is circumstantially possible to have both a video reference (through the REF. LOOP BNC pair) and an AES reference (through the HDD connector) applied at the same time. If both external references are detected simultaneously, the V6302 will default to the video reference.

Because the V6302 resynchronises the incoming audio to 48kHz and therefore any signal used as a reference through Inp 1 Main Input or the External Reference connector, must have 48kHz sampling rate. Other sampling rates will not be recognised as valid references.

Through the ENG'ING menu it is possible to bypass all the input sampling rate converters and effectively disable the resynchronisation process if it is necessary to pass non-audio data. This will only work if all other channels of audio data input to the V6302 are pre-synchronised w.r.t. each other and to the non audio data which is being passed through. In this case the System Reference is selected to be a non-audio channel through either Inp 1 reference, the Dolby reference, or V640x reference (if the non-audio data originates from the optional DMX/MUX submodule).
A further condition for passing non-audio data is that all gain settings be set to CAL and Tracking Delay is disabled.

Separate controls are provided for disabling the SRCs on the Main Inputs and those on the DMX inputs (when the submodule is fitted).

ENG'ING	**Inp SRC**	**On**	Normal operation with audio PCM on Main Inputs
		Off	Used to bypass the sample rate converters on the four Main Inputs. This should only be used if the System Reference is set to one of the inputs and all inputs are pre-locked together.
	DMX SRC	**On**	Normal operation with audio PCM on DMX Inputs
		Off	Used to bypass the sample rate converters on the four DMX Inputs. This should only be used if the System Reference is set to one of the inputs and all inputs are pre-locked together.

4.3.3 Dolby Decoder

If the module is fitted with the optional Dolby decoder, it can decode Dolby E® and Dolby Digital® bitstreams. The input to the Dolby Decoder must be selected using the **INPUT SEL** menu from the options shown below:

I/P SEL	**DBY Inp**	**AES A**	
		AES B	
		AES C	
		AES D	
		AES E	
		AES F	
		DMX 1	only available if DMX/MUX submodule is fitted
		DMX 2	"

comprises five channelpairs, **DBY A . . .D and DBY M**. **DBY A. . .D** are the main output channels, and are fed to the Input Gain stage. On present modules having a Class 4 DART interface, the gain of the Dolby main output channels **DBY A..D** are ganged, and they bypass the Input Setup Stage. The DBY M is a stereo pair obtained from a mix down of the encoded Dolby multichannel signal. All pairs are fed into the Main Router.

The Dolby decoder provides a wealth of status information, which is available from the **STATUS** menu. The Input status describes what's present at the input of the Dolby Decoder and is displayed only if the decoder is fitted.

STATUS	**DBY I/P**	**No I/P**	A valid AES input not present at Decoder input
		PCM	Normal PCM (eg AES 3) audio detected
		Dby Dig	Dolby Digital® bitstream detected
		Dolby E	Dolby E® bitstream detected

Bitstreams described as Dolby Digital® include the following:

- Dolby Digital® 32-bit
- Dolby Digital® 16-bit channel 1
- Dolby Digital® 16-bit channel 2
- Dolby Digital® 16-bit channel 1 and Channel 2

Bitstreams described as Dolby E® include the following:

Dolby E® 24-bit

- Dolby E® 20-bit
- Dolby E® 16-bit

Also available from the STATUS menu (if the Dolby decoder is fitted) is Decoder Status, which describes what Program Configuration is present on the outputs of the Dolby decoder. A *program* is defined as an ensemble of channels carrying related information content, such as a mono signal, a stereo pair, or a multichannel ensemble such as surround sound 5.1. *Program Configurations* describe how one or more programs are combined into the ensemble of channels. The interpretation of the displayed decoder status is best described by some examples:

When a Dolby Digital® is present on the decoder input, the Decoder Status is in the format **X/YZ**, where **X** is the number of 'front' channels, **Y** is the number of 'surround' channles, and **Z** (if present) indicates that there is a 'subwoofer' channel, also known as Low Frequency Effects (LFE) channel present. **3/2L** would therefore indicate the popular 5.1 configuration comprising three front channels, two surround channels, and an LFE channel. All but one of the Dolby Digital® formats supported contain a single program.

STATUS	**DBY DEC**	**1/0**	single mono channel
		2/0	stereo pair
		3/0	left front + right front + centre front
		2/1	left front + right front + 1 surround
		3/1	left front + right front + centre front + 1 surround
		2/2	left front + right front + 2 surround
		3/2	left front + right front + centre front + 2 surround
		3/0L	left front + right front + centre front + LFE
		2/1L	left front + right front + 1 surround + LFE
		3/1L	left front + right front + centre front + 1 surround + LFE
		2/2L	left front + right front + 2 surround + LFE
		3/2L	left front + right front + centre front + 2 surround + LFE
		1+1	two mono channels

When Dolby E® is decoded, the format of the Decoder Status is somewhat different, because unlike Dolby Digital®, Dolby E® can include more than one program. The format of the Decoder Status for Dolby E is of the form: **a + b + c +...** where **a, b, c** are *separate programs* and are denoted by a number (or number code) indicating the *number of channels within that program*. There are many program configuration possibilities; the full list is given in a later section and only a few examples are shown below:

STATUS	**DBY DEC**	**5.1 + 2**	5.1 surround program + 1 stereo program
		5.1 + 2x1	5.1 surround program + 2 mono programs
		4 + 4	2 4-channel surround programs
		4 + 2x2	4-channel surround program + 2 stereo programs
		...	
		...	
		... etc	

The **STATUS** menu provides further Dolby-related information in the form of a description of the signals on each of the Dolby outputs **DBY A ... D and DBYM**. This is called *Output Channel Allocation.* The few examples below have been tailored to feature all the individual display codes and their meanings. A full list is given later in this manual under the section on Controls.

STATUS	**DBY A**	**0L**	**0R**	Ch 1 = L of program no. 0 Ch 2 = R of program no. 0
		1C	**1S**	Ch 1 = centre front of program no. 1 Ch 2 = single surround of program no. 1
		2C	**3C**	Ch 1 = mono program no. 2. Ch 2 = mono program no. 3
		1Ls	**1Rs**	Ch 1 = Left surround of program no. 1 Ch 2 = Right surround of program no. 1
		0C	**0LF**	Ch 1 = centre front of program no. 1 Ch 2 = Low Frequency Effects of program no. 1
		off	**off**	Ch 1 = mute Ch 2 = mute
		Lt	**Rt**	Ch 1 = Left downmix of Dolby Digital® program Ch 2 = Right downmix of Dolby Digital® program

4.3.4 Input Phase

In the V6302 each of the 34 inputs can have a 180° phase shift (inversion) applied. This operations are shown on the example menu for Inp 1 below.

IP PHASE	**Inp 1L**	**0°**	Inp 1 Lout <= Inp 1L in
		180°	Inp 1L out <= -Inp 1L in
	Inp 1R		
	. . .		
	DMX 3L		
	. . .		
	Dby MR		

The phase inversion is implemented as a true a two's complement negation. When phase inversion is applied, the maximum negative input value (MAX NEG = 800000 Hex) is clipped to 800001 Hex and complemented to 7FFFFF Hex, becauseMAX NEG does not have a 2's complement in 24 bits. This clipping of MAX NEG is only done when phase inversion is applied.

4.3.5 Input Gains

All eight Main Input channels, all decoded PCM outputs eminating from the Dolby decoder (if fitted), and all DMX'd channels (if the DMX/MUX submodule is fitted),have Input Gains which are adjustable on an individual channel basis.
The Input Gains are adjustable over the range –16.000dB to +15.875dB, with 0.125dB resolution. The gain is applied to the channels after the resynchronisation. If the optional submodules are fitted, gain options appropriate to the signals sourced from these submodules will appear on the menu.

I/P GAIN	**Inp 1L**		
	Inp 1R		
	Inp 2L		
	Inp 2R		
	Inp 3L		
	Inp 3R		
	Inp 4L		
	Inp 4R		
	DMX 1L	only if DMX/MUX submod fitted	
	DMX 1R	"	
	. . .	"	
	DMX 7R	"	
	DBY A1	only if Dolby Decoder fitted	
	DBY A2	"	
	. . .		
	Dby ML	"	Mixed down down pair L
	Dby MR	"	Mixed down down pair R

Unity gain of 0.000dB is a true 1.0 multiplicative process and will not alter the audio bitstreams, which facilitates pass through operations when the sample rate converters are bypassed.

4.3.6 Main Router

The Main Router is a 34:16 summing router which allows each of the Main Outputs and MUX outputs to be assembled as the sum of four input sources, Src 1 through Src 4. There are 16 outputs from the Main Router and they are called OP1 through OP16. Each of these outputs may be individually set up as the sum of any four of the 34 inputs.

No gain changes are made in the summation. The router simply adds the signals and will saturate at the 24-bit digital audio maxima. No checking is done as to whether clipping will occur when the two source signals are added, and the user must ensure that sufficient headroom is available on the source signals. When mono-fying stereo signals, the user should use the input gains to apply either –3dB or –6dB on the L and R channels to suit constant voltage or constant power applications.

Any of the Inp1L through Inp 4R Main Inputs may be used as a source signal, and if the optional DMX/MUX submodule is fitted, DMX1L through DMX7R de-embedded channels are also available in the route pool. If the Dolby Decoder submodule is fitted, its decoded ouputs are also available in the route pool as channels Dby A1 through Dby D8, and the mixed-down pair ML and MR.

Setting up the router from the menu is simple. There are four submenus, **`1-4 MIX, 5-8 MIX, 9-12 MIX and 13-16 MIX.`** Each of these submenus handles four output channels, denoted by the numbers 1-4, 5-8 etc. For each output channel n, four sources may be selected: **`n Src 1, n Src 2, n Src 3`** and **`n Src 4`**. The available channels in the route pool are available as for selection options for each source. Note that the **`None`** option means that the particular source is not present, or may be thought of as a source that is muted. And if, for example, the same input is selected for, say n Src1 and n Scr 2, the output will be that input with 6dB gain increase.

Control of the Main Router is through the four **`MIX`** menus, and the menu fragment shown below illustrates the selection of sources for Output OP 1. Selection of sources and sources for the other outputs follow the same pattern.

`MIX 1-4`	**`1 Src 1`**	**`None`**	1 Src 1 = mute
		`Inp 1L`	
		`Inp 1R`	
		`. . .`	
		`DMX 1L`	Only if DMX/MUX submodule is fitted
		`DMX 1R`	"
		`. . .`	"
		`Dby A1`	Only if Dolby Decoder submodule fitted
		`Dby A2`	"
		`. . .`	"
		`Dby ML`	"
		`Dby MR`	"
	`1 Src 2`	**`None`**	
		`Inp 1L`	
		`Inp 1R`	
		`. . .`	
		`Dby MR`	

4.3.7 Output Gains

All sixteen Main Output signals can have their gain adjusted over the range –16.000dB to +15.875dB, with 0.125dB resolution.

O/P CTRL	**OP1 Gain**	
	OP2 Gain	
	. . .	
	OP16 Gain	

Unity gain of 0.000dB is a true 1.0 multiplicative process and will not alter the audio bitstreams, which facilitates pass through operations when the sample rate converters are bypassed.

4.3.8 Output Router

When the optional DMX/MUX submodule is fitted, all 16 output channels OP1. .OP16 can be routed to the MUX. The full SD/HD MUX can accommodate 4 groups x 2 AES = 16 channels. Because channel selection can be made in the Main Router, the sixteen Main Outputs are mapped to consecutive channels in consecutive groups in the MUX. The output router control can individually turn off groups on the DMX/MUX submodule, also the mux can be set to embed at either 20 bit or 24 bit resolution. Note that HD embedding is always done at 24 bit.

The panel outputs are configurable through the Output Router. Each of the 8 channels fed to the rear panel sockets, ie AES AL, AES AR, AES BL . . AES DR may be sourced from any of the outputs OP1. . .OP16 by means of the Output Router, which is a 16:8 router.

OP ROUTE	**AES AL**	**OP 1**	AES AL <= Main Output 1
		. . .	
		OP 16	
	MUX Grp1	**Gp1 Off**	Turn Group Off
		Gp1 24	Set Mux to 24 bit
		Gp1 20SD	Set Mux to 20 bit (SD only)

4.3.9 Delay Processing

When used with the DMX/MUX submodule the V6302 can automatically set an appropriate delay to match the video delay through the V640X companion card (**ADelMode = ADel Vid**). This will only be done if the video delay through the V6402 is greater than the insertion delay of the V6302. When **ADelMode** is set to **ADel Man** the manually set delays will take effect.

The Fixed Delay and Tracking Delay functions are implemented in software version V2_0_0 and above. Fixed delay has two parts: A ganged Fixed Delay common to all channels, and sixteen individual Delta Delays used to trim the delays of the channels individually relative to the Fixed Delay value. The Fixed Delay may be adjusted in the range 0 to 8192ms with 1ms resolution and the Delta Delays may be adjusted from –8192ms to +8192ms with 1ms resolution. The absolute delay for a given channel is the sum of the Fixed Delay and the given channel's Delta Delay, and is bounded to the range 0 to 8182 ms.

DELAY	**ADelMode**	**ADel Man**	Manually set delay are used
		ADel Vid	Delays to match video delay
	FixedDel	**0ms ... 8192ms**	User adjust Δ=1ms
	OP1 ΔDel	**-8192ms...+8192ms**	User adjust Δ=1ms
	OP2 ΔDel	**-8192ms...+8192ms**	User adjust Δ=1ms
	. . .		
	OP16 ΔDel	**-8192ms...+8192ms**	User adjust

		Δ=1ms
OP1 Trk	**Trk On**	OP1 Tracking delay enabled
	Trk Off	Op1 Tracking delay = 0.0ms. Track pulse input is ignored
OP2 Trk	**Trk On**	OP2 Tracking delay enabled
	Trk Off	Op2 Tracking delay = 0.0ms. Track pulse input is ignored
. . .		
OP16 Trk	**Trk On**	OP16 Tracking delay enabled
	Trk Off	Op16 Tracking delay = 0.0ms. Track pulse input is ignored
Trk Src	**Extern √**	
	V640X √	
	Absent	
Trackdel	**0.0ms ... 80.0ms**	Read Only

The Tracking Delay may be enabled for each channel from the **DELAY** menu by the **OPn Trk** option for that channel as shown above. If **Opn Trk** is set to **Trk Off**, all tracking delay information is disregarded and the Tracking Delay value is set to 0 on that channel.

When enabled, the Tracking Delay is controlled by a pulse input to the Ext. Delay I/P socket on the rear panel, or by numeric information passed over the backplane when the unit is paired with the V6402 HD Frame Synchroniser or derivative module (V6404/08/06/18). The V6302 detects which is present, and if both are present, the numeric data from the V6302 Frame Synchroniser takes precedence.

The status of the Tracking Delay control source is shown under **DELAY** menu by the **Trk Src** status. If tracking control info is present in the form of a pulse applied to the Ext. Delay socket, the status shows **Extern √** . If numeric tracking info is being received from a paired V6402 Frame Sync, the status shows **V640X √**. If no tracking control pulse is present from either source, the status shows **Absent** and the Tracking Delay value is set to 0.0ms.

The Tracking delay is fully automatic and requires no user intervention. The resolution of the Tracking Delay is one audio sample period (20.6μs) and the current value is displayed under the status **TrackDel** from the **DELAY** menu. Dynamically changing the delay of an audio signal always causes a pitch change, and so like other Vistek tracking delay products, the V6302 limits the maximum rate of change of Tracking Delay to a value where the pitch change is considered subjectively inaudible.

The DSP algorithm employs a polyphase filtering mechanism that ensures low noise and distortion during tracking of a frame rollover (typically -60dB) and the constrained rate of delay change ensures very small pitch change, typically < 0.1%

The V6302 has a minimum core delay of 4ms. (I/P SRC on, Tracking On)

Notes:

1. *When applying different Delta Delays to channels of a stereo pair or a multichannel ensemble, you will introduce a phase shift between the channels which varies with frequency. This is not generally desirable.*
2. *When enabling tracking delay on some but not all channels of a stereo pair or a multichannel ensemble, you will introduce a phase shift between the channels which varies with frequency. This is not generally desirable.*

4.4 System

4.4.1 Version Numbers

There are three separate items of software/firmware in the V6302 and they all have separate version numbers. These can be read on the following read only menus:

STATUS	**Soft ver**	**0.00.00**	Version of the H8S/2633 operating code
	FPGA ver	**0.00.00**	Version of the EP1C12 Cyclone FPGA
	APFW Ver	**00.00**	Version of the FPGA on the DMX/MUX submodule
	CPLD ver	**0.00.00**	Version of the MAX7128AETC CPLD
	PCB ver	**0.00.00**	Version of the PCB
	APPCBVer	**0**	Version of the DMX/MUX PBC
	Boot ver	**0.00.00**	Version of the H8 bootloader software

4.4.2 Display Sleep

Since, for the vast majority of its life, the V6302 will operate behind the front panel of a rack frame the display on the local front panel will not be visible so it will go to sleep after a certain time. This timeout delay can be changed on the **ENG'ING** : **Sleep** menu to be anything between 0 and 30 minutes; 0 minutes means that it will stay on indefinitely. The sleep timeout always counts from the last front panel button push. The default time is 5 minutes.
The panel can also be forced into its sleep mode by moving up a level from the Top Level menu which displays the module type, **V6302**.

To get the display to come on again simply press one of the buttons and the menus will start again at the Top Level.

4.4.3 Display Brightness

The brightness of the front panel display can be adjusted on the **ENG'ING** : **LEDLevel** menu.

ENG'ING **LEDLevel** ▓ ▓ ▓ ▓

5 TROUBLE SHOOTING GUIDE (FAQS)

This section is to be a help in solving some common difficulties with the V6302. If there is no control from the front panel first check that the switch is set to Local.

5.1 Audio

Symptom	Possible explanation
There is no audio from one of the channels, A, B, C, D	1. Check that the **OUTPUTS** setting for **Src 1** and **Src 2** for the output channel in question are set to source the desired input. 2. Check that the **I/P SEL** for the sources in (1) above is set to the input where the signal is applied. 3. Check that the fixed delay value is not set to a very high value resulting in no audio output for the first few seconds
There is no signal at the output of the Dolby decoder	1. Check that the **I/P SEL** for the sources in (1) above is set to the input where the signal is applied.
The menus don't show the options for the Dolby decoder	1. Check that the Dolby Decoder has been fitted by looking under **STATUS -> Options**. 2. Check that the V6302 is fitted with a memory module which has in it firmware of V6302_V1_1_0 or higher. Earlier software did not have Dolby support.
Apparent phase shift between channels of a stereo pair or multichannel group.	1. The two (or more) channels have been set with different Delta Delays. 2. One (or more) channels have Tracking Delay Enabled, while others do not. 3. One (or more) channels have Input Phase = 180° applied while others do not..The two (or more) channels have been set with different Delta Delays.
No groups present on output video when using DMX/MUX submodule.	1. The **OP ROUTE > MUX Grp** controls default to **Gp Off**. Set the required groups to **Gp On**.

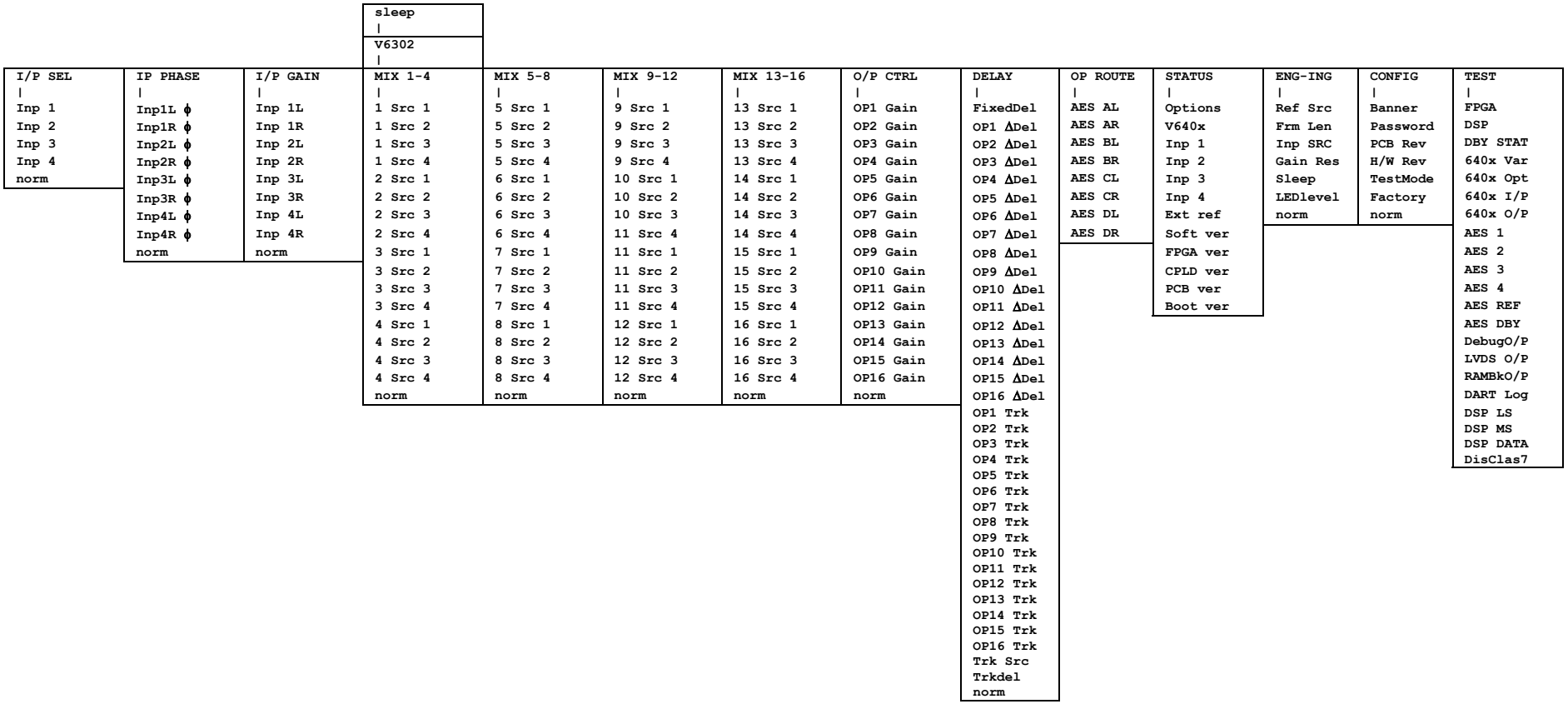
5.2 Others

Symptom	Possible explanation
Display never goes to sleep	Check whether the Sleep delay has been set to 0 Mins which means stay awake.
Front panel can change but there is no control	The unit is probably in Remote mode. The panel is still life for monitoring.
No Dolby Reference on menu	PCB revision less than 3. Function not supported.
No remote control available	Old V606 rack controller is used. Exchange it for a V6081 rack controller

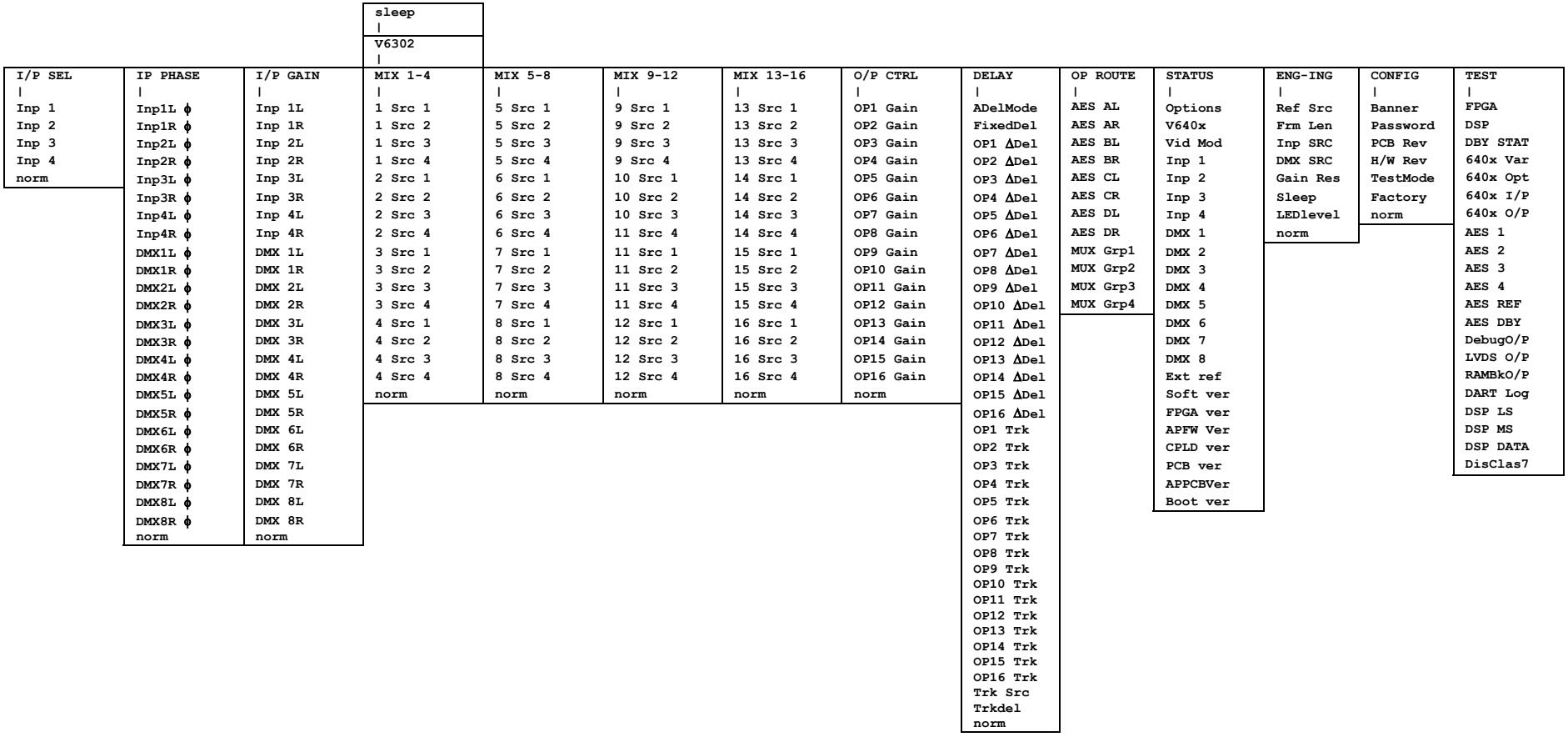
6 FRONT PANEL MENUS

The next three sections show the menus available on a V6302/AP/VP with no submodules, a DMX/MUX submodule only, a Dolby Decoder submodule only, and both a DMX/MUX submodule and a Dolby Decoder submodule. Some menu items may only appear with certain configurations. For example the **`Dmux Grp`** under menu **`I/P SEL`** is only present if the DMX/MUX sub-module is present.

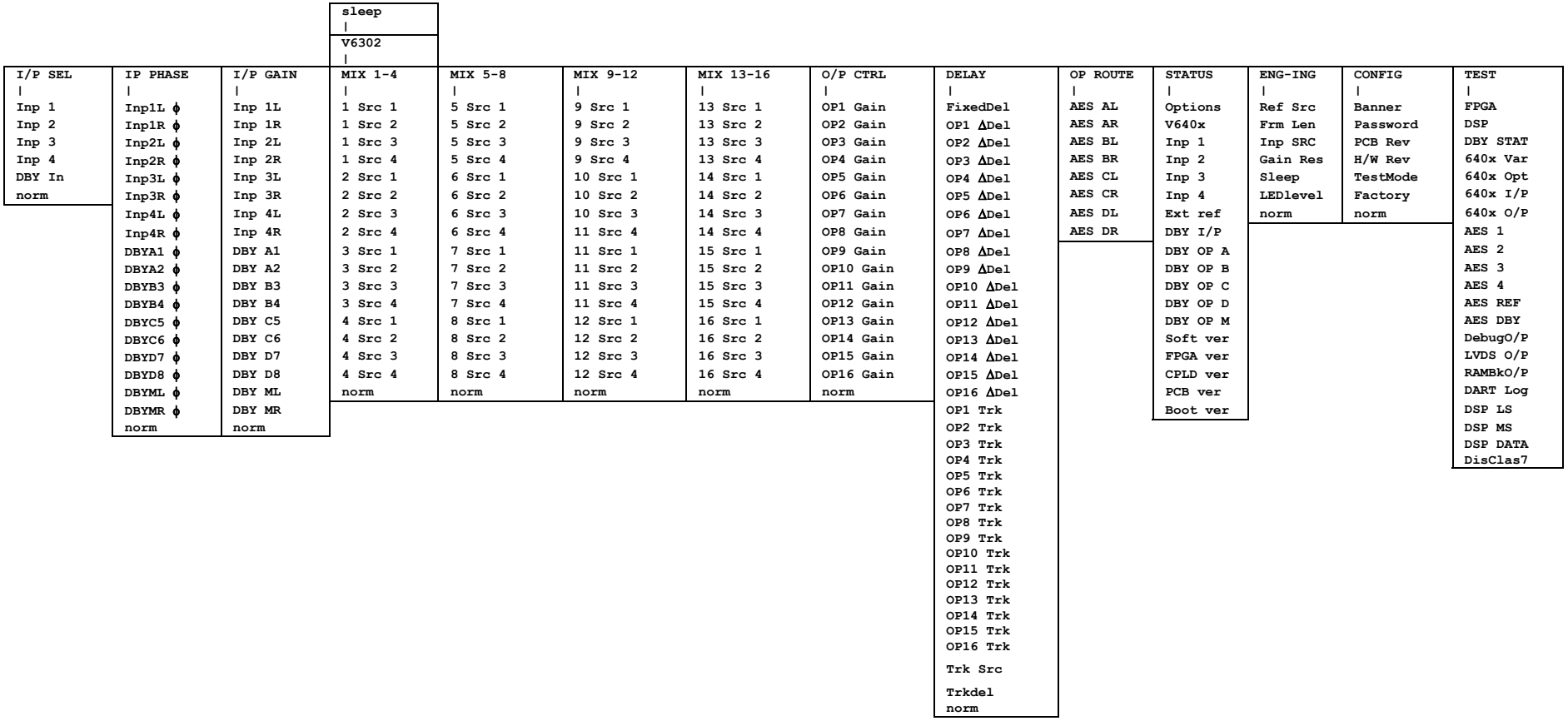
6.1 V6302 – No Submodules



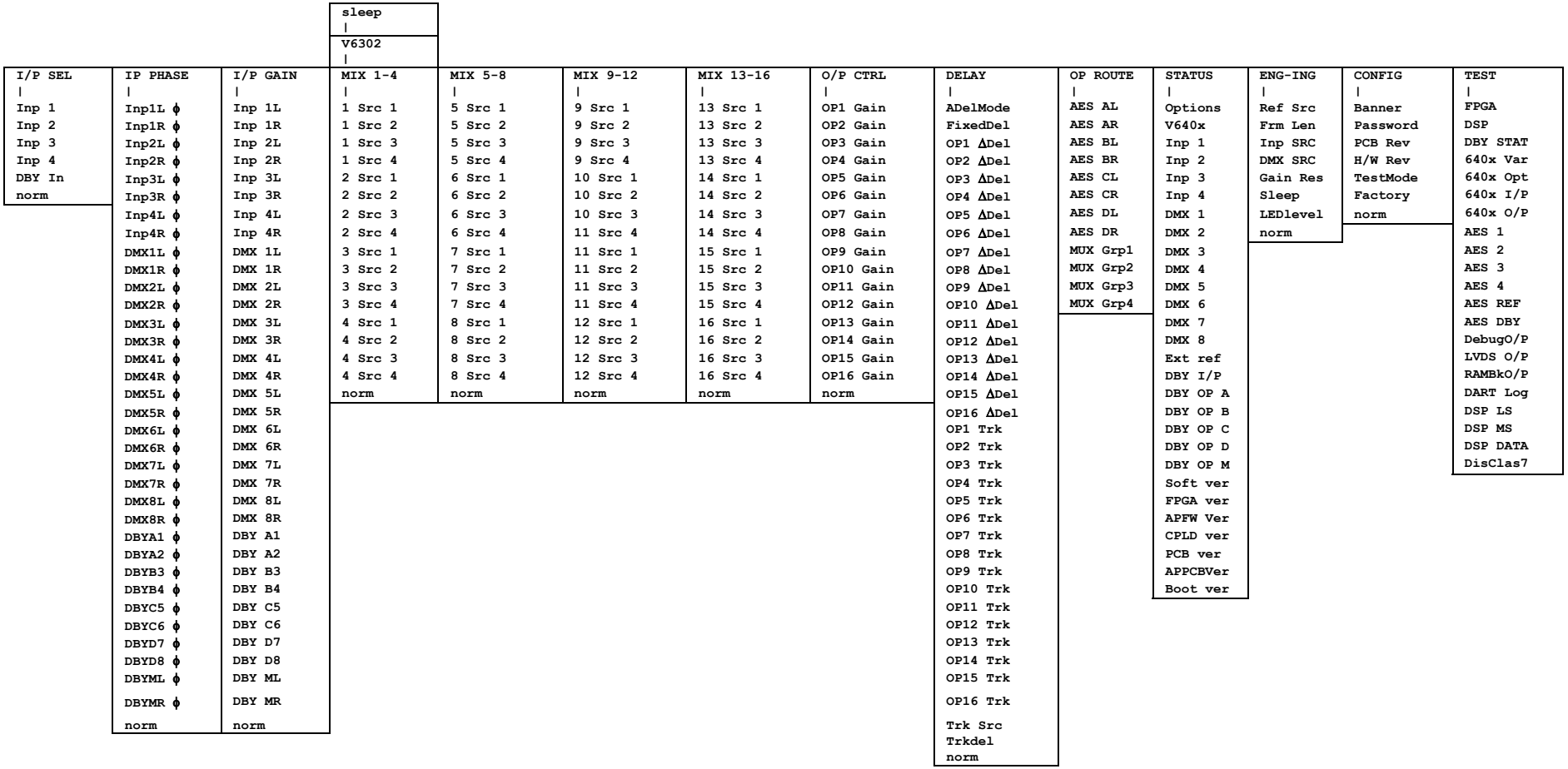
6.2 V6302 – DMX/MUX Submodule



6.3 V6302 – Dolby Decoder Submodule



6.4 V6302 - DMX/MUX & Dolby Submodules



7 CONTROLS

These tables show a complete list of all the parameters that can be controlled locally for the various configurations. Unless otherwise shown they can also be controlled over the DART remote control system. Not all menus are available at any one time, since they depend on which submodule type may be fitted, and sometimes on the operating conditions.

The tables also show the full range of the controls and their ranges and normalised value, if appropriate. The normalised value or setting is shown by the '**n**'.

Note that controls for the optional DMX/MUX module have not been shown since this submodule is not yet available.

7.1 Input Selection - I/P SEL

I/P SEL	Inp 1	AES A	n	
		AES B		
		AES C		
		AES D		
		AES E		
		AES F		
	Inp 2	AES A		
		AES B	n	
		AES C		
		AES D		
		AES E		
		AES F		
	Inp 3	AES A		
		AES B		
		AES C	n	
		AES D		
		AES E		
		AES F		
	Inp 4	AES A		
		AES B		
		AES C		
		AES D	n	
		AES E		
		AES F		
	DBY In	AES A	n	
		AES B		
		AES C		
		AES D		
		AES E		
		AES F		
	Norm	N ******		

7.2 Input Phase – IP PHASE

IP SETUP	Inp1L ϕ	0°	n	
		180°		
	Inp1R ϕ	0°	n	
		180°		
	Inp2L ϕ	0°	n	
		180°		
	Inp2R ϕ	0°	n	
		180°		
	Inp3L ϕ	0°	n	
		180°		
	Inp3R ϕ	0°	n	
		180°		
	Inp4L ϕ	0°	n	
		180°		
	Inp4R ϕ	0°	n	
		180°		
	DBYA1 ϕ	0°	n	If Dolby decoder submodule fitted
		180°		
	DBYA2 ϕ	0°	n	"
		180°		
	DBYB3 ϕ	0°	n	"
		180°		
	DBYB4 ϕ	0°	n	"
		180°		
	DBYC5 ϕ	0°	n	"
		180°		
	DBYC6 ϕ	0°	n	"
		180°		
	DBYD7 ϕ	0°	n	"
		180°		
	DBYD8 ϕ	0°	n	"
		180°		
	DBYML ϕ	0°	n	"
		180°		
	DBYMR ϕ	0°	n	"
		180°		
	Norm	N ******		

7.3 Input Gains – I/P GAIN

I/P GAIN	Inp 1L	+15.875dB		
		⇑		
		0.000dB	n	
		⇓		
		+16.000dB		
	Inp 1R	+15.875dB		
		⇑		
		0.000dB	n	
		⇓		
		+16.000dB		
	Inp 2L	+15.875dB		
		⇑		
		0.000dB	n	
		⇓		
		+16.000dB		
	Inp 2R	+15.875dB		
		⇑		
		0.000dB	n	
		⇓		
		+16.000dB		
	Inp 3L	+15.875dB		
		⇑		
		0.000dB	n	
		⇓		
		+16.000dB		
	Inp 3R	+15.875dB		
		⇑		
		0.000dB	n	
		⇓		
		+16.000dB		
	Inp 4L	+15.875dB		
		⇑		
		0.000dB	n	
		⇓		
		+16.000dB		
	Inp 4R	+15.875dB		
		⇑		
		0.000dB	n	
		⇓		
		+16.000dB		
	DBY A1	+15.875dB		
		⇑		
		0.000dB	n	
		⇓		
		+16.000dB		
	DBY A2	+15.875dB		
		⇑		
		0.000dB	n	
		⇓		
		+16.000dB		

	DBY B3	+15.875dB		
		⇑		
		0.000dB	n	
		⇓		
		+16.000dB		
	DBY B4	+15.875dB		
		⇑		
		0.000dB	n	
		⇓		
		+16.000dB		
	DBY C5	+15.875dB		
		⇑		
		0.000dB	n	
		⇓		
		+16.000dB		
	DBY C6	+15.875dB		
		⇑		
		0.000dB	n	
		⇓		
		+16.000dB		
	DBY D7	+15.875dB		
		⇑		
		0.000dB	n	
		⇓		
		+16.000dB		
	DBY D8	+15.875dB		
		⇑		
		0.000dB	n	
		⇓		
		+16.000dB		
	DBY ML	+15.875dB		
		⇑		
		0.000dB	n	
		⇓		
		+16.000dB		
	DBY MR	+15.875dB		
		⇑		
		0.000dB	n	
		⇓		
		+16.000dB		
	Norm	N ******		

7.4 Main Router - MIXING

1-4 MIX	1 Src 1	None		
		Inp 1L	n	
		Inp 1R		
		Inp 2L		
		Inp 2R		
		Inp 3L		
		Inp 3R		
		Inp 4L		
		Inp 4R		
		DBY A1		Option only present if Dolby dec. submodule fitted
		DBY A2		"
		DBY B3		"
		DBY B4		"
		DBY C5		"
		DBY C6		"
		DBY D7		"
		DBY D8		"
		DBY ML		"
		DBY MR		"
	1 Src 2	None	n	
		. . .		
	1 Src 3	None	n	
		. . .		
	1 Src 4	None	n	
		. . .		
	2 Src 1	None		
		. . .		
		Inp 1R	n	
		. . .		
		DBY MR		
	2 Src 2	None	n	
		. . .		
	2 Src 3	None	n	
		. . .		
	2 Src 4	None	n	
		. . .		
	3 Src 1	None		
		. . .		
		Inp 2L	n	
		. . .		
		DBY MR		
	3 Src 2	None	n	
		. . .		
	3 Src 3	None	n	
		. . .		
	3 Src 4	None	n	
		. . .		

	4 Src 1	None		
		. . .		
		Inp 2R	n	
		. . .		
		DBY MR		
	4 Src 2	None	n	
		. . .		
	4 Src 3	None	n	
		. . .		
	4 Src 4	None	n	
		. . .		
5-8 MIX	5 Src 1	None		
		. . .		
		Inp 3L	n	
		. . .		
		DBY MR		
	5 Src 2	None	n	
		. . .		
	5 Src 3	None	n	
		. . .		
	5 Src 4	None	n	
		. . .		
	6 Src 1	None		
		. . .		
		Inp 3R	n	
		. . .		
		DBY MR		
	6 Src 2	None	n	
		. . .		
	6 Src 3	None	n	
		. . .		
	6 Src 4	None	n	
		. . .		
	7 Src 1	None		
		. . .		
		Inp 4L	n	
		. . .		
		DBY MR		
	7 Src 2	None	n	
		. . .		
	7 Src 3	None	n	
		. . .		
	7 Src 4	None	n	
		. . .		

	8 Src 1	None		
		. . .		
		Inp 4R	n	
		. . .		
		DBY MR		
	8 Src 2	None	n	
		. . .		
	8 Src 3	None	n	
		. . .		
	8 Src 4	None	n	
		. . .		
9-12 MIX	9 Src 1	None	n	
		. . .		
	9 Src 2	None	n	
		. . .		
	9 Src 3	None	n	
		. . .		
	9 Src 4	None	n	
		. . .		
	10 Src 1	None	n	
		. . .		
	10 Src 2	None	n	
		. . .		
	10 Src 3	None	n	
		. . .		
	10 Src 4	None	n	
		. . .		
	11 Src 1	None	n	
		. . .		
	11 Src 2	None	n	
		. . .		
	11 Src 3	None	n	
		. . .		
	11 Src 4	None	n	
		. . .		
	12 Src 1	None	n	
		. . .		
	12 Src 2	None	n	
		. . .		
	12 Src 3	None	n	
		. . .		
	12 Src 4	None	n	
		. . .		
13-16MIX	13 Src 1	None	n	
		. . .		
	13 Src 2	None	n	
		. . .		
	13 Src 3	None	n	
		. . .		
	13 Src 4	None	n	
		. . .		

	14 Src 1	None	n	
		. . .		
	14 Src 2	None	n	
		. . .		
	14 Src 3	None	n	
		. . .		
	14 Src 4	None	n	
		. . .		
	15 Src 1	None	n	
		. . .		
	15 Src 2	None	n	
		. . .		
	15 Src 3	None	n	
		. . .		
	15 Src 4	None	n	
		. . .		
	16 Src 1	None	n	
		. . .		
	16 Src 2	None	n	
		. . .		
	16 Src 3	None	n	
		. . .		
	16 Src 4	None	n	
		. . .		
	Norm	N ******		

7.5 Output Gains – O/P CTRL

O/P CTRL	OP 1	+15.875dB		
		⇑		
		0.000dB	n	
		⇓		
		+16.000dB		
	OP 2	+15.875dB		
		⇑		
		0.000dB	n	
		⇓		
		+16.000dB		
	OP 3	+15.875dB		
		⇑		
		0.000dB	n	
		⇓		
		+16.000dB		
	OP 4	+15.875dB		
		⇑		
		0.000dB	n	
		⇓		
		+16.000dB		
	OP 5	+15.875dB		
		⇑		
		0.000dB	n	
		⇓		
		+16.000dB		
	OP 6	+15.875dB		
		⇑		
		0.000dB	n	
		⇓		
		+16.000dB		
	OP 7	+15.875dB		
		⇑		
		0.000dB	n	
		⇓		
		+16.000dB		
	OP 8	+15.875dB		
		⇑		
		0.000dB	n	
		⇓		
		+16.000dB		
	OP 9	+15.875dB		
		⇑		
		0.000dB	n	
		⇓		
		+16.000dB		
	OP 10	+15.875dB		
		⇑		
		0.000dB	n	
		⇓		
		+16.000dB		

	OP 11	+15.875dB		
		⇑		
		0.000dB	n	
		⇓		
		+16.000dB		
	OP 12	+15.875dB		
		⇑		
		0.000dB	n	
		⇓		
		+16.000dB		
	OP 13	+15.875dB		
		⇑		
		0.000dB	n	
		⇓		
		+16.000dB		
	OP 14	+15.875dB		
		⇑		
		0.000dB	n	
		⇓		
		+16.000dB		
	OP 15	+15.875dB		
		⇑		
		0.000dB	n	
		⇓		
		+16.000dB		
	OP 16	+15.875dB		
		⇑		
		0.000dB	n	
		⇓		
		+16.000dB		
	Norm	N ******		

7.6 Delay Processing – DELAY

DELAY	ADelMode	ADel Man	n	Use manually set Delays
		ADel Vid		Automatically set to video delay of V640x
	FixedDel	8192ms		Δ = 1ms
		⇑		
		0ms	n	
	OP1 ΔDel	+8192ms		Δ = 1ms
		⇑		
		0ms	n	
		⇓		
		-8192ms		
	OP2 ΔDel	+8192ms		Δ = 1ms
		⇑		
		0ms	n	
		⇓		
		-8192ms		
	OP3 ΔDel	+8192ms		Δ = 1ms
		⇑		
		0ms	n	
		⇓		
		-8192ms		
	OP4 ΔDel	+8192ms		Δ = 1ms
		⇑		
		0ms	n	
		⇓		
		-8192ms		
	OP5 ΔDel	+8192ms		Δ = 1ms
		⇑		
		0ms	n	
		⇓		
		-8192ms		
	OP6 ΔDel	+8192ms		Δ = 1ms
		⇑		
		0ms	n	
		⇓		
		-8192ms		
	OP7 ΔDel	+8192ms		Δ = 1ms
		⇑		
		0ms	n	
		⇓		
		-8192ms		
	OP8 ΔDel	+8192ms		Δ = 1ms
		⇑		
		0ms	n	
		⇓		
		-8192ms		
	OP9 ΔDel	+8192ms		Δ = 1ms
		⇑		
		0ms	n	
		⇓		
		-8192ms		

	OP10 ΔDel	+8192ms		Δ = 1ms
		⇑		
		0ms	n	
		⇓		
		-8192ms		
	OP11 ΔDel	+8192ms		Δ = 1ms
		⇑		
		0ms	n	
		⇓		
		-8192ms		
	OP12 ΔDel	+8192ms		Δ = 1ms
		⇑		
		0ms	n	
		⇓		
		-8192ms		
	OP13 ΔDel	+8192ms		Δ = 1ms
		⇑		
		0ms	n	
		⇓		
		-8192ms		
	OP14 ΔDel	+8192ms		Δ = 1ms
		⇑		
		0ms	n	
		⇓		
		-8192ms		
	OP15 ΔDel	+8192ms ⇑ 0ms ⇓ -8192ms	n	Δ = 1ms
	OP16 ΔDel	+8192ms ⇑ 0ms ⇓ -8192ms	n	Δ = 1ms
	OP1 Trk	On Off	n	

7.7 Output Router – OP ROUTE

OP ROUTE	AES AL	OP 1	n	
		OP 2		
		OP 3		
		OP 4		
		OP 5		
		OP 6		
		OP 7		
		OP 8		
		OP 9		
		OP 10		
		OP 11		
		OP 12		
		OP 13		
		OP 14		
		OP 15		
		OP 16		
	AES AR	OP 1		
		OP 2	n	
		OP 3		
		. . .		
		OP 16		
	AES BL	OP 1		
		OP 2		
		OP 3	n	
		. . .		
		OP 16		
	AES BR	OP 1		
		. . .		
		OP 4	n	
		. . .		
		OP 16		
	AES CL	OP 1		
		. . .		
		OP 5	n	
		. . .		
		OP 16		
	AES CR	OP 1		
		. . .		
		OP 6	n	
		. . .		
		OP 16		
	AES DL	OP 1		
		. . .		
		OP 7	n	
		. . .		
		OP 16		

	AES DR	OP 1		
		. . .		
		OP 8	n	
		. . .		
		OP 16		
	MUX Grp1	Gp Off	n	
		Gp 24		
		Gp 20SD		
	MUX Grp2	Gp Off	n	
	MUX Grp3	Gp Off	n	
	MUX Grp4	Gp Off	n	

7.8 Status – STATUS

STATUS	Options	None	n	
		Vid		if DMX/MUX submodule is fitted
		Dolby		if Dolby Decoder submodule is fitted
		Dby + Vid		if both submodules are fitted
	Inp 1	I/P 1 √		
		I/P 1 X		
	Inp 2	I/P 2 √		
		I/P 2 X		
	Inp 3	I/P 3 √		
		I/P 3 X		
	Inp 4	I/P 4 √		
		I/P 4 X		
	DMX 1	DMX 1 √		if DMX/MUX submodule is fitted
		DMX 1 X		"
	DMX 2	DMX 2 √		"
		DMX 2 X		"
	DMX 3	DMX 3 √		"
		DMX 3 X		"
	DMX 4	DMX 4 √		"
		DMX 4 X		"
	DBY I/P	No I/P		if Dolby decoder submodule is fitted
		PCM		
		Dby Dig		
		Dolby E		
	DBY DEC	1 + 1		Dolby decoder fitted and Dolby Digital® on input
		1/0		"
		2/0		"
		3/0		"
		2/1		"
		3/1		"
		2/2		"
		3/2		"
		3/0L		"
		2/1L		"
		3/1L		"
		2/2L		"
		3/2L		"
		5.1 + 2		Dolby decoder fitted and Dolby E on input
		5.1 + 2x1		"
		4 + 4		"
		4 + 2x2		"
		4 + 2 + 2x1		"
		4 + 4x1		"
		4x2		"
		3x2 + 2x1		"
		2x2 + 4x1		"
		2 + 6x1		"
		8x1		"

		5.1		"
		4 + 2		"
		4 + 2x1		"
		3x2		"
		2x2 + 2x1		"
		2 + 4x1		"
		6x1		"
		4		"
		2 + 2		"
		2 + 2x1		"
		4x1		"
		Reserved		"
		No I/P		Dolby decoder fitted and no input.
		2/0		Dolby decoder fitted and PCM on input
	DBY A	0C 1C		Dolby decoder fitted
		off off		"
		0L 0R		"
		0C 1C		"
		TBD TBD		"
	DBY B	off off		Dolby decoder fitted
		0C off		"
		0C 0LF		"
		0C 0S		"
		2L 2R		"
		2C 3C		"
		3C 4C		"
		TBD TBD		"
	DBY C	off off		Dolby decoder fitted
		0S off		"
		0Ls 0Rs		"
		1C 1S		"
		2L 2R		"
		2C 3C		"
		3C 4C		"
		3L 3R		"
		4C 5C		"
		5C 6C		"
		TBD TBD		"
	DBY D	off off		Dolby decoder fitted
		1L 1R		"
		1C 2C		"
		6C 7C		"
		TBD TBD		"
	DBY M	off off		Dolby decoder fitted
		0L 0R		"
		Lt Rt		"
		TBD TBD		"
	Ext Ref	REF X		
		REF AES √		
		REF VID √		

	Soft ver	XX.XX.XX		
	FPGA ver	XX.XX		
	APFW Ver	XX.XX		
	CPLD ver	XX.XX		
	PCB ver	XX.XX		
	APPCB Ver	X		
	Boot ver	XX.XX.XX		

The complete table of Output Channel Allocations for the Dolby decoder is shown below.

Input Bitstream format	Program Configuration DBY DEC	Decoder Output Channel Assignments DBY O/P									
		A1	A2	B3	B4	C5	C6	D7	D8	ML	MR
Dolby E®	5.1+2	0L	0R	0C	0LF	0Ls	0Rs	1L	1R	TBD	TBD
	5.1+2x1	0L	0R	0C	0LF	0Ls	0Rs	1C	2C	TBD	TBD
	4+4	0L	0R	0C	0S	1C	1S	1L	1R	TBD	TBD
	4+2x2	0L	0R	0C	0S	2L	2R	1L	1R	TBD	TBD
	4+2+2x1	0L	0R	0C	0S	2C	3C	1L	1R	TBD	TBD
	4+4x1	0L	0R	0C	0S	3C	4C	1C	2C	TBD	TBD
	4x2	0L	0R	2L	2R	3L	3R	1L	1R	TBD	TBD
	3x2+2x1	0L	0R	2L	2R	3C	4C	1L	1R	TBD	TBD
	2x2+4x1	0L	0R	2C	3C	4C	5C	1L	1R	TBD	TBD
	2+6x1	0L	0R	3C	4C	5C	6C	1C	2C	TBD	TBD
	8x1	0C	1C	2C	3C	4C	5C	6C	7C	TBD	TBD
	5.1	0L	0R	0C	0LF	0Ls	0Rs	off	off	TBD	TBD
	4+2	0L	0R	0C	0S	off	off	1L	1R	TBD	TBD
	4+2x1	0L	0R	0C	0S	off	off	1C	2C	TBD	TBD
	3x2	0L	0R	2L	2R	off	off	1L	1R	TBD	TBD
	2x2+2x1	0L	0R	2C	3C	off	off	1L	1R	TBD	TBD
	2+4x1	0L	0R	3C	4C	off	off	1C	2C	TBD	TBD
	6x1	0C	1C	2C	3C	4C	5C	off	off	TBD	TBD
	4	0L	0R	0C	0S	off	off	off	off	TBD	TBD
	2+2	0L	0R	off	off	off	off	1L	1R	TBD	TBD
	2+2x1	0L	0R	off	off	off	off	1C	2C	TBD	TBD
	4x1	0C	1C	2C	3C	off	off	off	off	TBD	TBD
	reserved	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
	reserved	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Dolby Digital®	1+1	0C	1C	off	off	off	off	off	off	TBD	TBD
	1/0	off	off	0C	off	off	off	off	off	TBD	TBD
	2/0	0L	0R	off	off	off	off	off	off	0L	0R
	3/0	0L	0R	0C	off	off	off	off	off	Lt	Rt
	2/1	0L	0R	off	off	0S	off	off	off	Lt	Rt
	3/1	0L	0R	0C	off	0S	off	off	off	Lt	Rt
	2/2	0L	0R	off	off	0Ls	0Rs	off	off	Lt	Rt
	3/2	0L	0R	0C	off	0Ls	0Rs	off	off	Lt	Rt
	3/0L	0L	0R	0C	0LF	off	off	off	off	Lt	Rt
	2/1L	0L	0R	off	0LF	0S	off	off	off	Lt	Rt
	3/1L	0L	0R	0C	0LF	0S	off	off	off	Lt	Rt
	2/2L	0L	0R	off	0LF	0Ls	0Rs	off	off	Lt	Rt
	3/2L	0L	0R	0C	0LF	0Ls	0Rs	off	off	Lt	Rt
PCM	2/0	0L	0R	off	off	off	off	off	off	0L	0R
No I/P	No I/P	off	off	off	off	off	off	off	off	off	off

7.9 Engineering - ENG'ING

ENG'ING	Ref Src	Free	n	
		Extern		
		Inp 1		
		V640X		only available if DMX/MUX submodule fitted
	Frm Len	33 ms	n	only available as a LOCAL control
		40 ms		
	Inp SRC	SRC On	n	
		Bypass		
	DMX SRC	SRC On	n	only available if DMX/MUX submodule fitted
		Bypass		
	Gain Res	High	n	Δ = 0.25dB, range -8.00dB...+7.75dB
		Low		Δ = 0.50dB, range -16.0dB...+15.5dB
	Sleep	zz 30 min		
		⇑		
		z z 0 min		Set sleep = 0 to disable sleep function
	LED level	▓ ▓ ▓ ▓		Bargraph shows relative LED intensity
	norm	N ******		

7.10 Configuration – CONFIG

CONFIG	Banner	On		Function not presently implemented
		Off		
	Password	*****		Password entry for restricted options
	PCB Rev	15		Sets PCB version: A= 1, B=2, etc *Password required.*
		⇑		
		0		
	H/W Rev	15		Sets ECN mod status: A=First = 1, B=second = 2, etc *Password required*.
		⇑		
		0		
	TestMode	On		Controls TEST menu availability
		Off		

7.11 Test Mode – TEST

This section is not designed for users but is shown here for completeness and for the aid of field service personnel.

TEST	FPGA	Load	n	Controls whether FPGA loaded from FLASH
		No Load		
	Test Opts	None	n	Can force presence of submodule
		Video		
		Dolby		
	TestdBIp			simulates an I/P status from Dolby decoder
	TestdBDec	31		simulates an O/P status from Dolby decoder
		⇑		
		0		
	Dby Mute	Mute		mutes O/Ps of Dolby decoder
		Normal	n	sets outputs of Dolby decoder into Auto
	AES 1	STAT XX		AES RX chip 1 receiver status
	AES 2	STAT XX		AES RX chip 2 receiver status
	AES 3	STAT XX		AES RX chip 3 receiver status
	AES 4	STAT XX		AES RX chip 4 receiver status
	REF	STAT XX		AES RX chip REF receiver status
	AES DBY	STAT XX		AES RX chip Dolby receiver status
	DebugO/P	Off		Standard debug dump to RS232 comms
		On		
	RAMBkO/P	Off	n	Dumps FPGA RAM Block to RS232 comms
		On		
	DSP LS			Displays 16-bit DSP word address and data 16 LSBs. Address changed by UP/DN buttons
	DSP MS			Displays 16-bit DSP word address and data 16 MSBs. Address changed by UP/DN buttons.
	DSP DATA			Displays full 32-bit DSP data at last set 16-bit DSP word address.
	DisClas7	Enabled	n	Module functions as a Class 7 DART module
		Disabled		Class 7 disabled for REFdata programming

8 SOFTWARE VERSIONS

This table gives a brief summary of the various versions of software that have been issued with the corrections and improvements for each. This has been included in this manual so that users with earlier versions can understand when some facilities, or menu options may not appear.

VERSION	DATE	REMARKS
V1_0_0	26 Aug 04	Initial version. Fixed Delay, Tracking Delay, Dolby Decoder or DMX/MUX submodule functions not implemented
V1_1_0	16 Sep 04	As V1_0_0 and with Dolby decoder functions implemented
V2_0_0	26 Nov 04	As V1_0_0 and with Fixed Delay , Tracking Delay, and V640x datalink functions supported.
V2_0_1	20 Jan 05	Bit-for-bit passing of Dolby encoded signals was not working - this has been corrected.
V2_0_2	7 Feb 05	As V2_0_0 but the separate Fixed Delay adjustments for MUX O/Ps and Main O/Ps have been commoned into a single coarse adjustment in frame increments. An additional fine adjustment in 1ms steps has been provided.
V3_0_0 FRS 3	10 May 05	Gain controls for Inp1..Inp4 have been split into individual L and R controls, only if the DMX/MUX submodule is not fitted. A new ENG'ING control, Gain Res has been added. It is used to set the gain resolution to Δ=0.25dB or Δ=0.50dB. In the case of Δ=0.50dB, the gain range is doubled to -16.00dB to +15.5dB.
PA745A	24 Apr 06	First Class 7 version. Separate input gain, tracking enable, delta fixed delay, output mixing and output gain has been provided for each channel, including Dolby decoder outputs. Input phase control has been added for each channel, including Dolby decoder outputs. Output mixing now has 4 sources for each channel. A 16:8 output router has been added. DMX inputs expanded to 32. MUX outputs expanded to all 16 output channels.
PA745B	14 March 07	V63APSM the DMX/MUX submodule functionality was added.