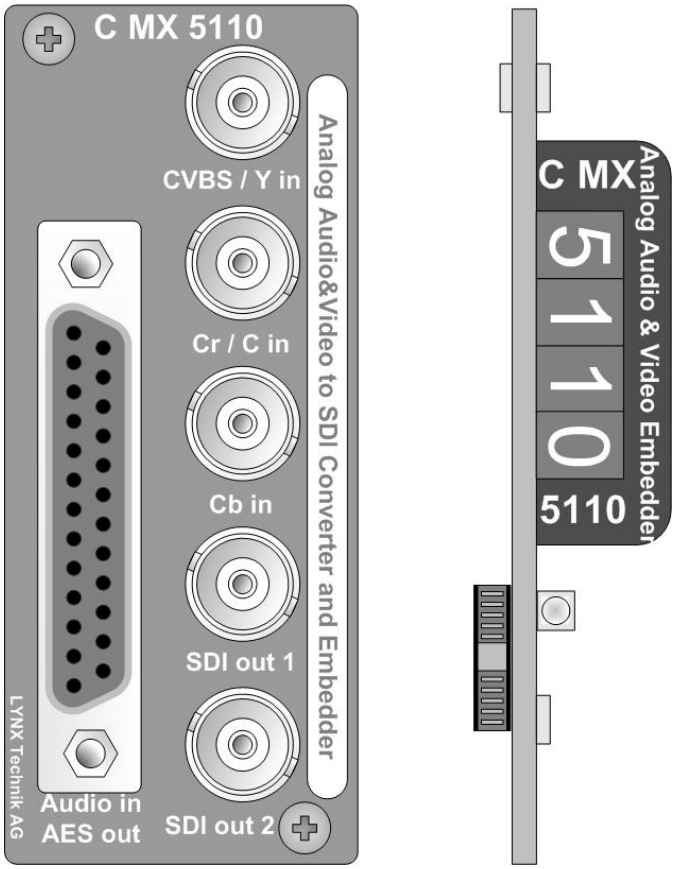
Version 1.0

Reference Manual

C MX 5110

Analog Audio & Video Multiplexer

Series 5000 CardModule



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In order to obtain service under this warranty, customer must notify LYNX Technik of the defect before expiration of the warranty period and make suitable arrangements for the performance of service. Customer shall be responsible for packaging and shipping the defective product to the service center designated by LYNX Technik, with shipping charges prepaid. LYNX Technik shall pay for the return of the product to the customer if the shipment is within the country which the LYNX Technik service center is located. Customer shall be responsible for payment of all shipping charges, duties, taxes and any other charges for products returned to any other locations.

This warranty shall not apply to any defect, failure, or damage caused by improper use or improper or inadequate maintenance and care. LYNX Technik shall not be obligated to furnish service under this warranty a) to repair damage resulting from attempts by personnel other than LYNX Technik representatives to install, repair or service the product; b) to repair damage resulting from improper use or connection to incompatible equipment; c) to repair any damage or malfunction caused by the use of non LYNX Technik supplies; or d) to service a product which has been modified or integrated with other products when the effect of such modification or integration increases the time or difficulty servicing the product.

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Regulatory information

Europe

Declaration of Conformity

We LYNX Technik AG
Brunnenweg 3
D-64331 Weiterstadt
Germany

Declare under our sole responsibility that the product

TYPE: C MX 5110

To which this declaration relates is in conformity with the following standards (environments E1-E3):

EN 55103-1 /1996
EN 55103-2 /1996
EN 60950 /2001

Following the provisions of 89/336/EEC and 73/23/EEC directives.

Winfried Deckelmann

Weiterstadt, October 2005

Place and date of issue *Legal Signature*

USA

FCC 47 Part 15

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to the part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense

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Getting Started

Packaging

The shipping carton and packaging materials provide protection for the module during transit. Please retain the shipping cartons in case subsequent shipping of the product becomes necessary.

Product Description

The C MX 5110 is a high performance Audio Multiplexer for analog Audio and Video signals. It contains a 12 Bit Video A/D Converter for analog PAL/NTSC composite, component Y, Pr, Pb, and S-Video Y, C signals and a dual stereo 24 bit audio A/D converter. The module is designed primarily for broadcast and professional applications.

The analog video signal is converted into an SDI signal, the analog audio signal is converted into digiatl AES3 (balanced), which can be multiplexed into the SDI signal and is in parallel available on separate audio outputs on a SubD 25pin connector.
The audio signals for embedding as well as for the external output can be selected from the input signals on a mono channel basis.

The C MX 5110 features a wide range of available adjustments (via optional Rack Controller), basic adjustments are possible using the local multi-function switch and integrated display.

CardModules are installed in the series 5000 card frame that can accommodate up to 10 CardModules. All modules are hot swappable and Options include full redundant power and a range of controller options.

Functional Diagram

Figure 1 below is the basic functional diagram for the C MX 5110 CardModule.

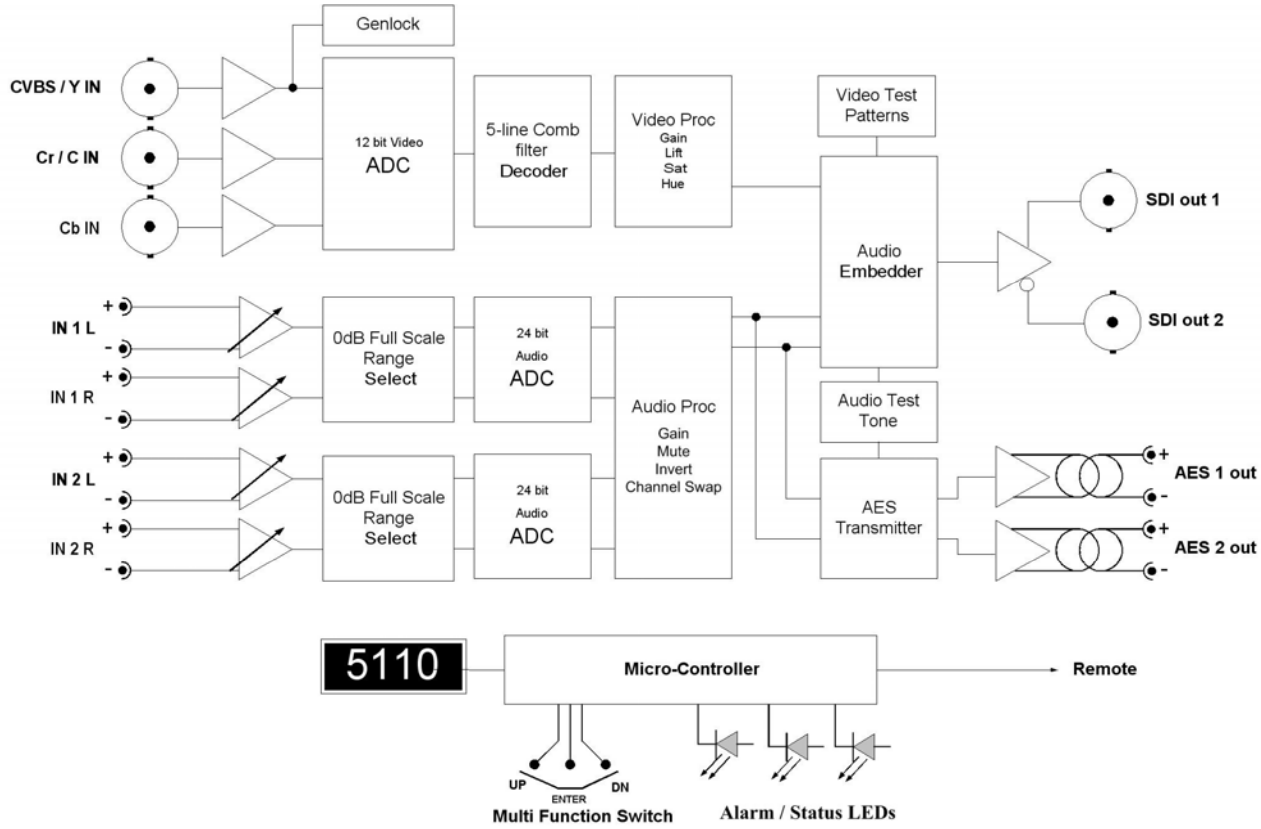


Figure 1- C MX 5110 Functional Diagram

Module Layout

Figure 2 shows the physical layout of the C MX 5110 CardModule and also the connection panel which is fitted to the rear of the rack.

PCB Layout

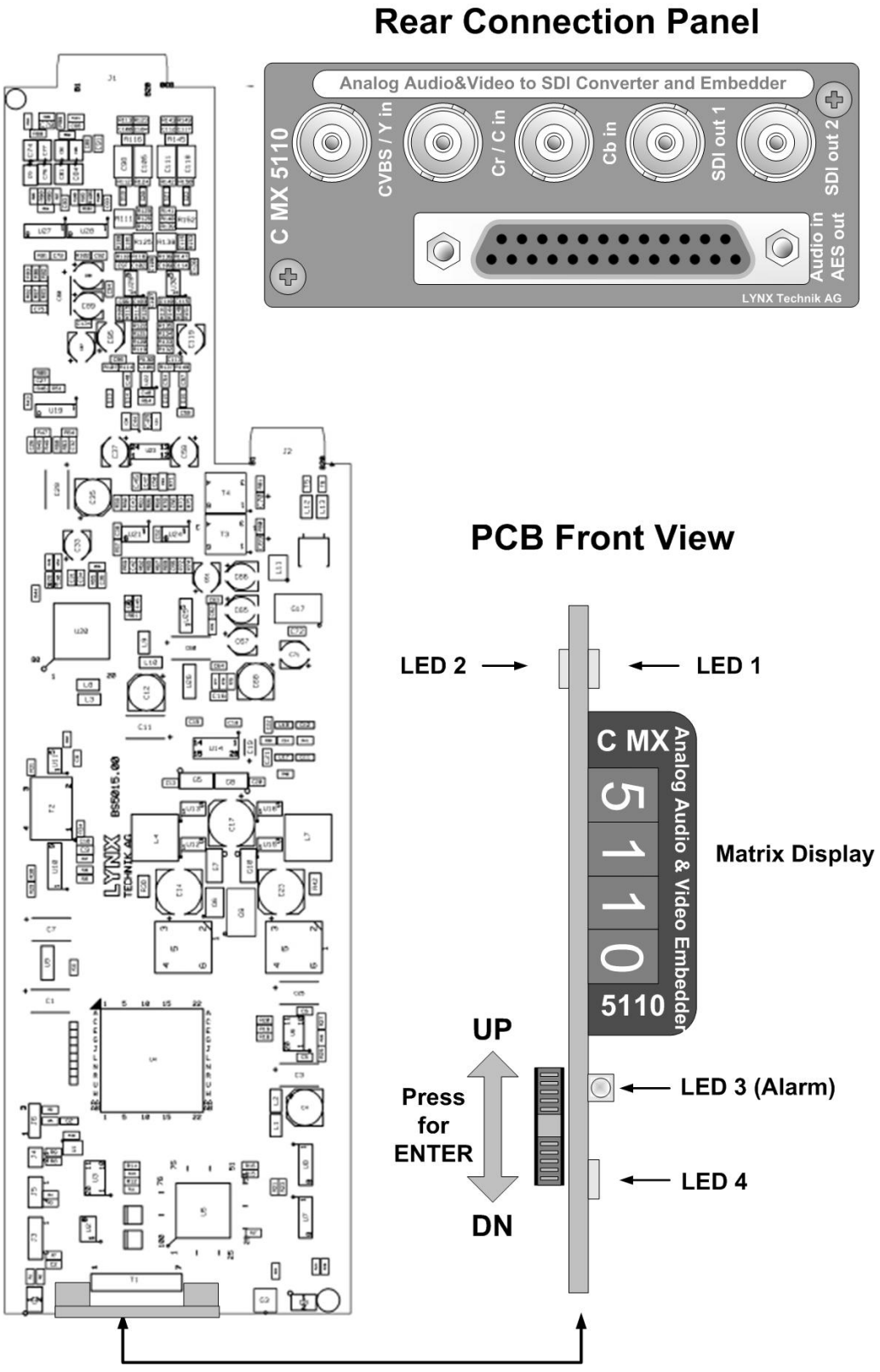
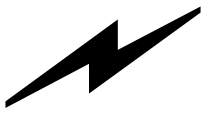


Figure 2 – Module Layout



Caution
Use static precautions when handling the PCB. Static discharge could result in serious damage to the module.

Connections

Video Connections

The C MX 5110 CardModule is configured with standard 75 Ohm BNC connectors. Connection is self-explanatory. We recommend the use of high quality video cable for digital video connections to reduce the risk of interference or errors due to excessive cable attenuation. Some guidelines for max cable length are shown below.

250m (820 feet) Belden 8281 (270Mbits/s)

Note. Due to the compact design of the connection plate it will be necessary to use a connection tool to secure the BNC video connectors.

Audio Connections

The C MX 5110 Module is configured for SubD audio connections for audio I/O. The SubD connector should be wired in accordance with the table below. Please use high quality screened cable to prevent the introduction of noise and interference to the audio signals (twisted pair suitable for balanced audio signals).

Audio Connections (balanced)

SubD 25 pin female connector. (TASCAM pinout)

Pin Number	Connection	Pin Number	Connection
1	+ IN Left 1	14	- IN Left 1
2	GND IN Left 1	15	+ IN Right 1
3	- IN Right 1	16	GND IN Right 1
4	+ IN Left 2	17	- IN Left 2
5	GND IN Left 2	18	+ IN Right 2
6	- IN Right 2	19	GND IN Right 2
7	+ AES 1 out		- AES 1 out
8	GND AES1 out		+ AES 2 out
9	- AES 2 out		GND AES 2 out
10			
11			
12			
13			

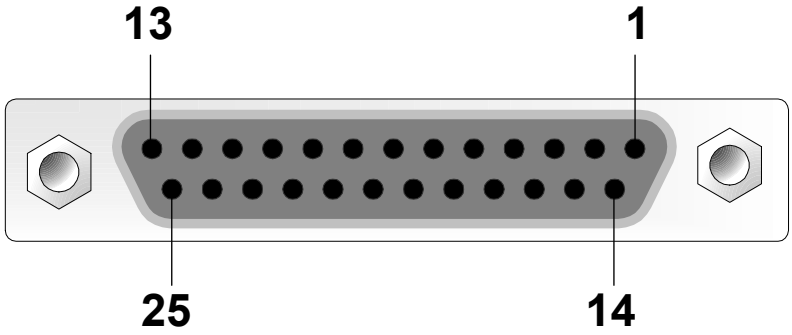


Figure 3 - Audio output connection detail

Audio Connections (un-balanced)

Although the module is designed primarily for balanced line audio connections it is possible to make un-balanced audio connections to the module. **NOTE**. When used in this manor certain technical specifications of the module cannot be maintained.

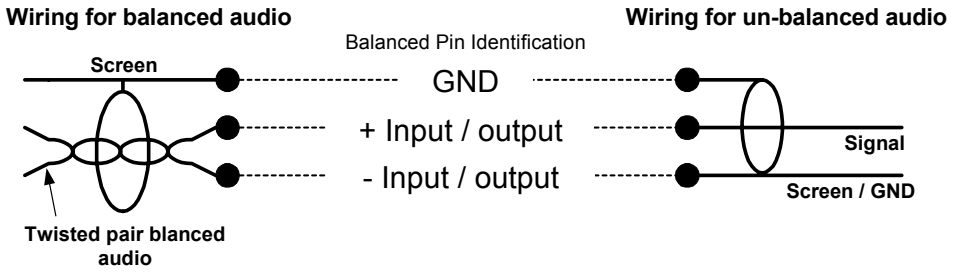


Figure 4 – Audio wiring detail

Installation

Caution
The CardModule is shipped in a protective anti-static bag. Please take suitable precautions to avoid static discharge onto any part of the PCB or components when handling module or serious damage could result.

Each Card Module is supplied with a rear connection panel and two mounting screws. Please follow the following procedure for installation of the card module into the Series 5000 Card Frame.

a) Select a slot in the card frame where the CardModule will be located
b) Remove the blank connection panel from the rear of the rack (if fitted)
c) Install the rear connection panel using the screws supplied. Do not tighten the screws fully
d) Slide the card module into the card frame and carefully check the CardModule easily connects to the rear connection plate. The card should fit easily and should not require excessive force to insert, if you feel any resistance, there could be something wrong with the rear connection panel location. Do not try and force the connection. Remove the rear connection panel and check alignment with the CardModule.
e) Insert and remove the CardModule a few times to ensure correct alignment and then tighten the two screws to secure the rear connection plate

Settings and Control

The C MX 5110 has an integrated micro-controller, which enables the module to be configured and controlled locally using the multifunction switch and 4 character dot matrix display, or from remote when using one of the optional controllers and control software.

Once set, all settings are automatically saved in non-volatile internal memory. (Flash ram) The module will always recall the settings used prior to power down.

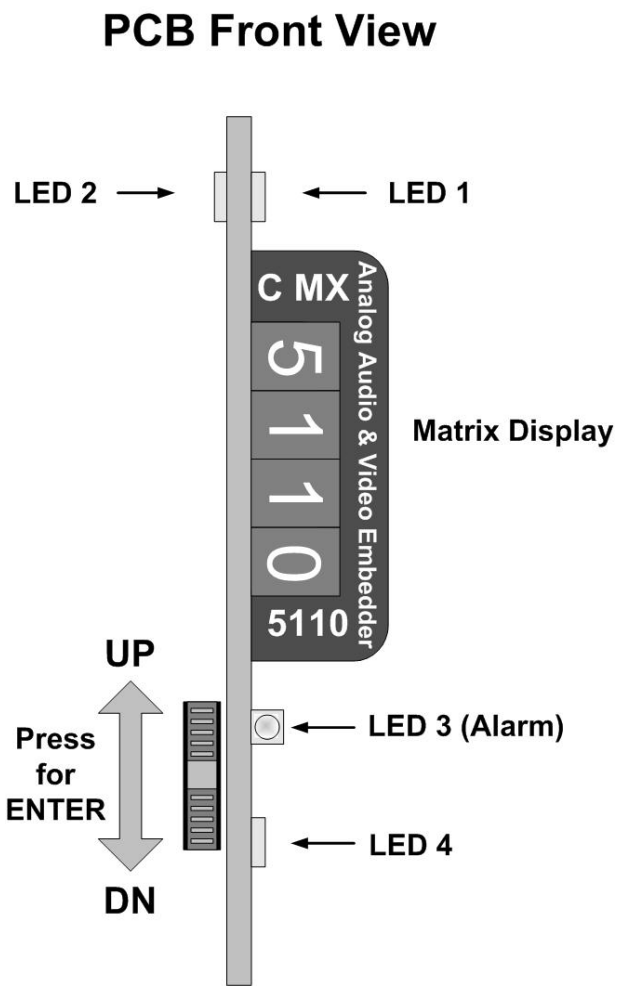


Figure 5 – Switch and Display Location

Multi Function Switch

The CardModule is equipped with a multi-function switch located on the front bottom edge of the card (refer to figure 2 and 5)

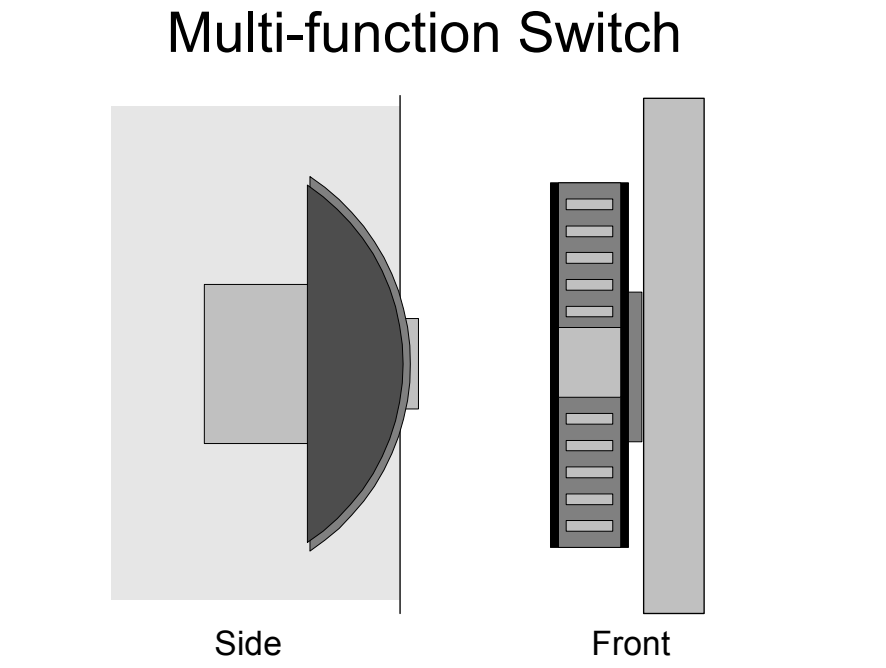


Figure 6 – Switch Operation

Using the Local Display Menus

Making local adjustments to the module is done using the multifunction switch and the integrated 4-character dot matrix display (figure 3). The menu system is layered, and navigation through the system is done using the **UP** and **DOWN** functions of the switch. **ENTER** is used to move between menu levels and also enter a selection.

Navigation

Switch Function	Operation
UP	Move UP within a level
DOWN	Move down within a level
ENTER	Change levels / Make selection

Local Adjustments Available

All of the critical adjustments to the module are accessible using the local display and multi - function switch, these include:

- Input select (CVBS, Component, Y/C)
- Genlock mode
- Luma-/ chroma filter settings
- Luma/ Chroma Comb mode
- Hue, Chroma, Pedestal, Gain
- CTI mode (Color Transition Improvement)
- DNR (Digital Noise Reduction)
- Test signal select
- Audio input selection
- Audio Gain
- Audio Full Scale Selection

Menu Structure

The Menu structure is defined in the next table, and should be used when navigating through the system.

Notes / Tips.

ENTER moves between Levels

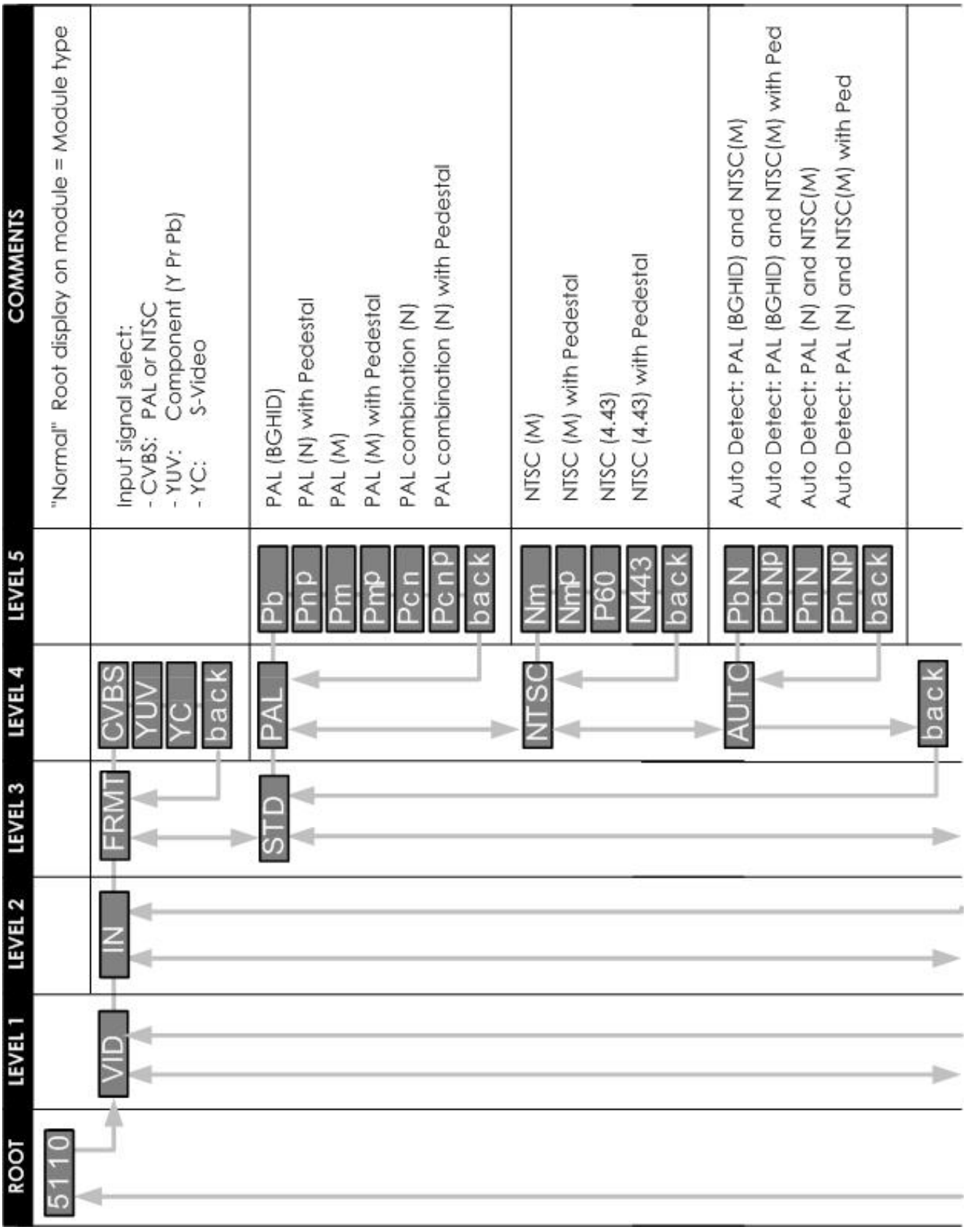
UP/DOWN moves between items within the level

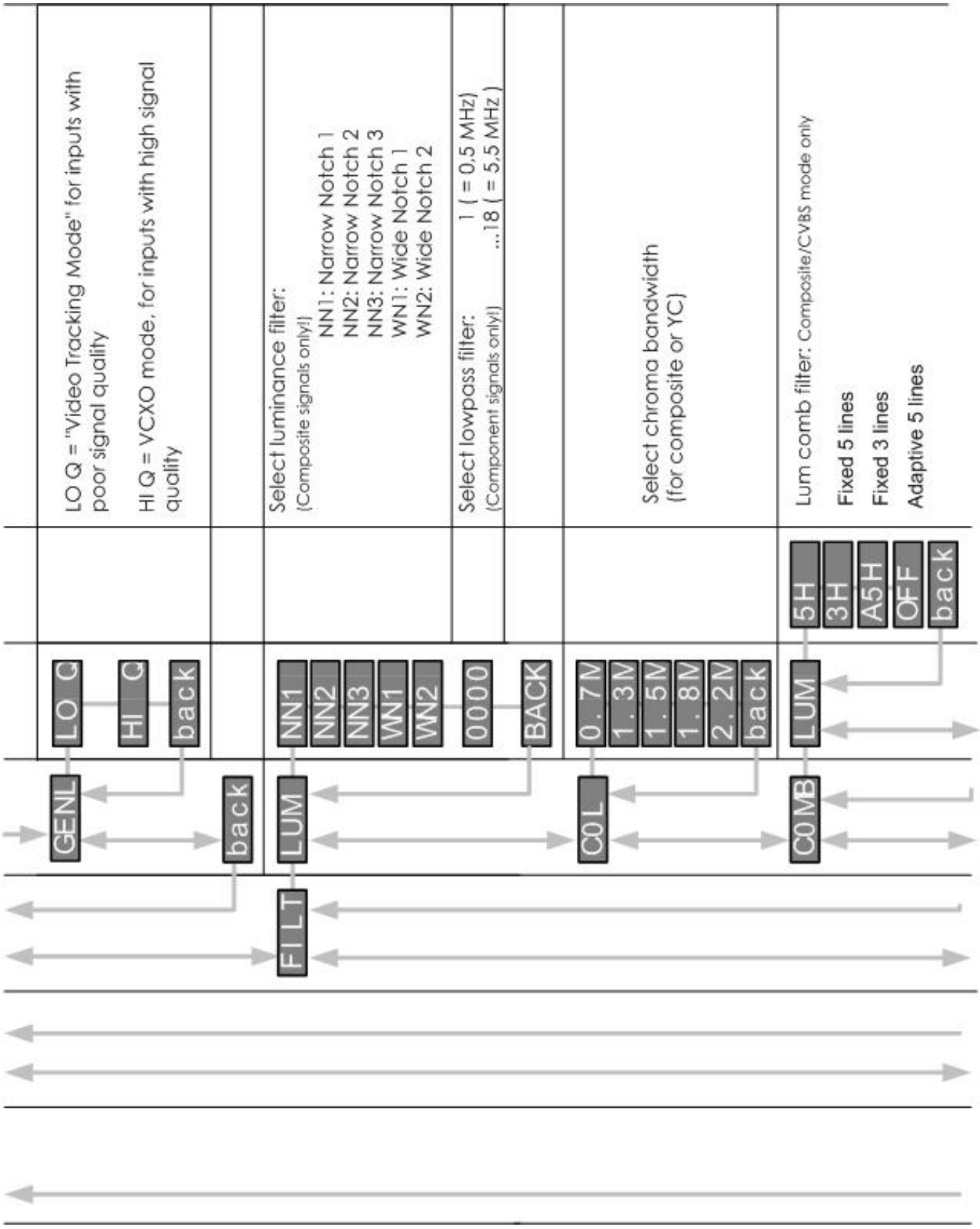
When you enter a new setting the system will jump back one level in the menu system.

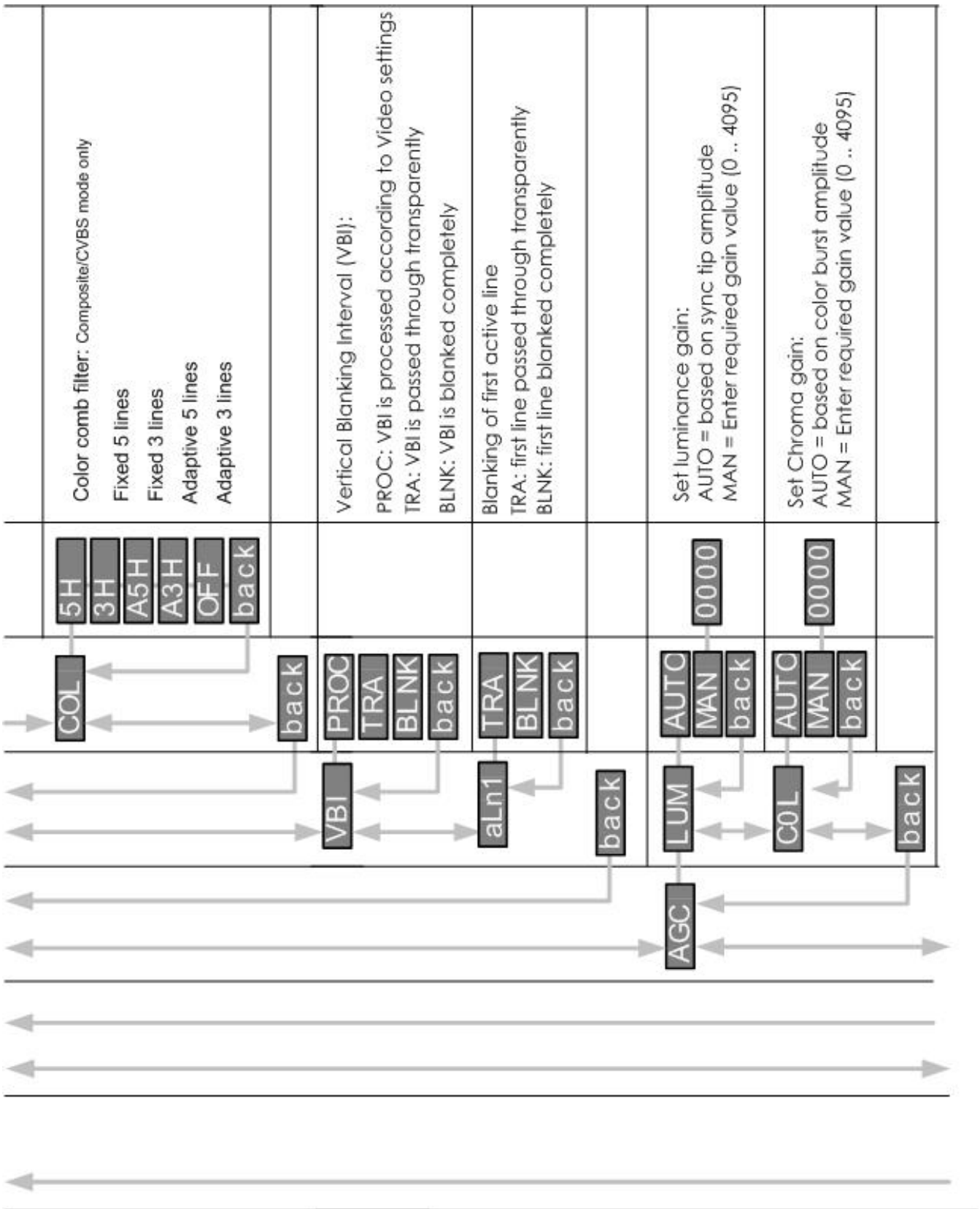
The "back" selection in the menu structure will take you back one level when selected.

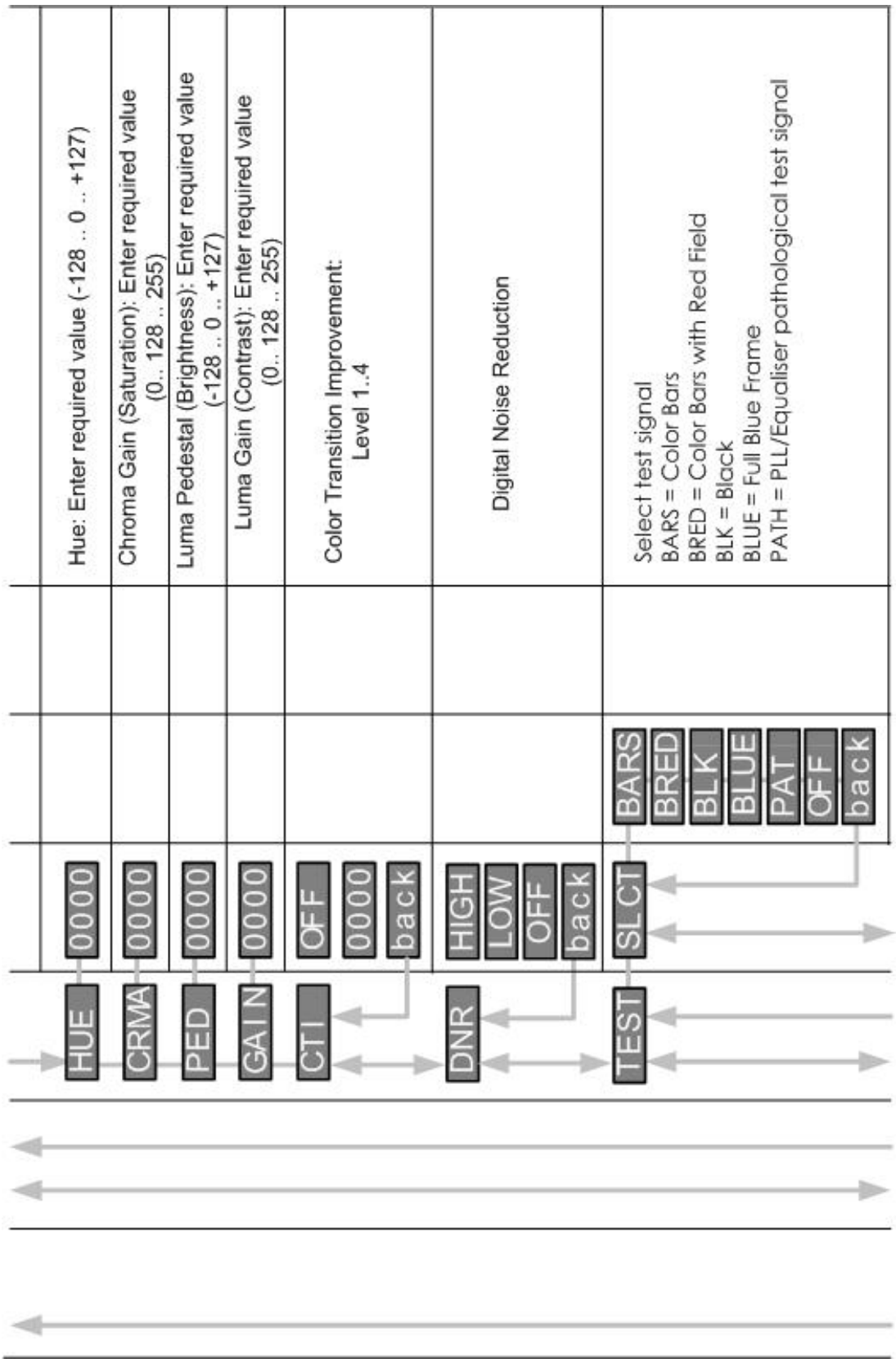
When an item is selected which has several setting possibilities the first value displayed will be the value currently stored in the system. The order of the available settings for any menu item in the table supplied does not represent the order he settings will actually be displayed.

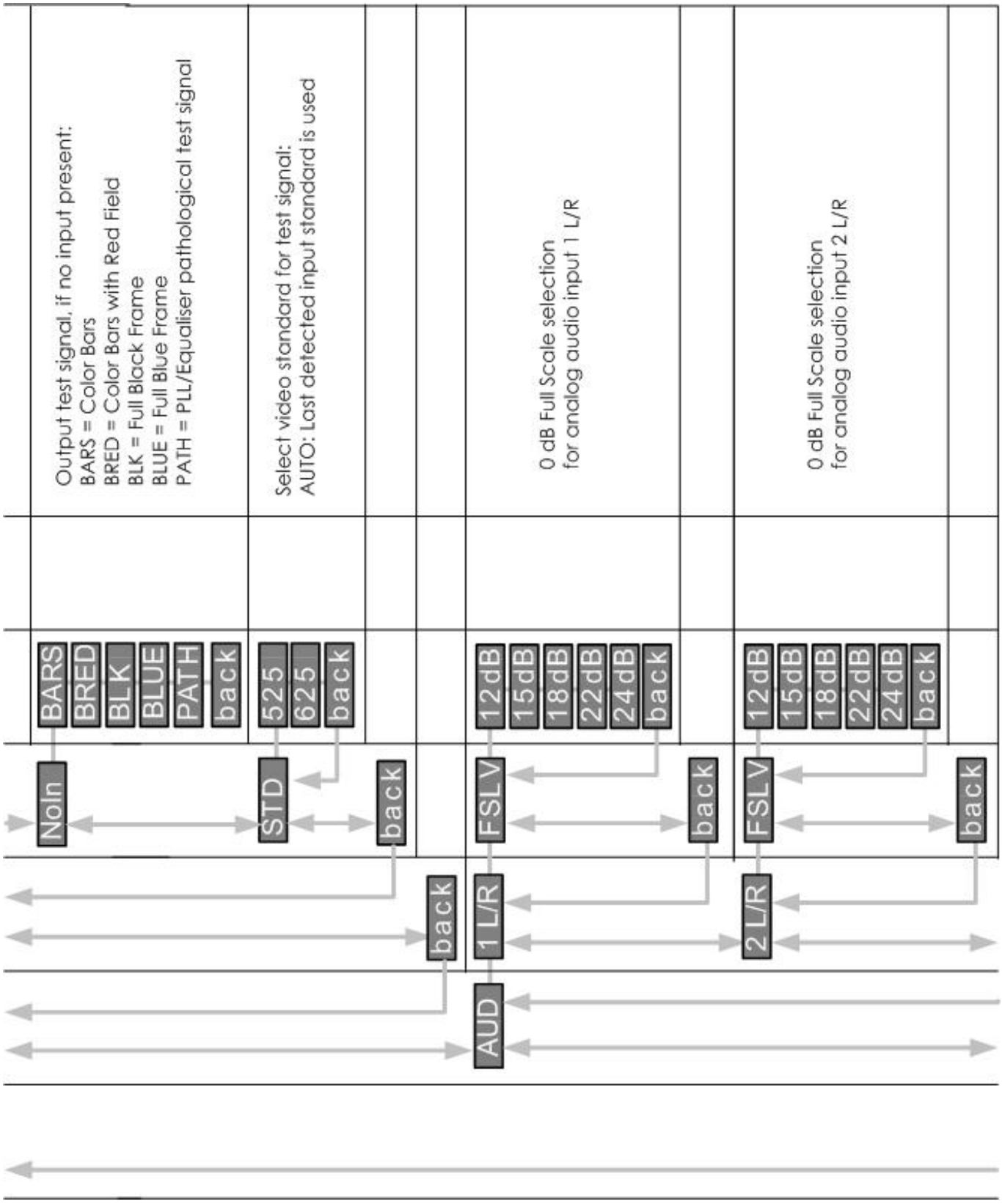
If left unattended, the menu will default to the root display after a preset timeout.

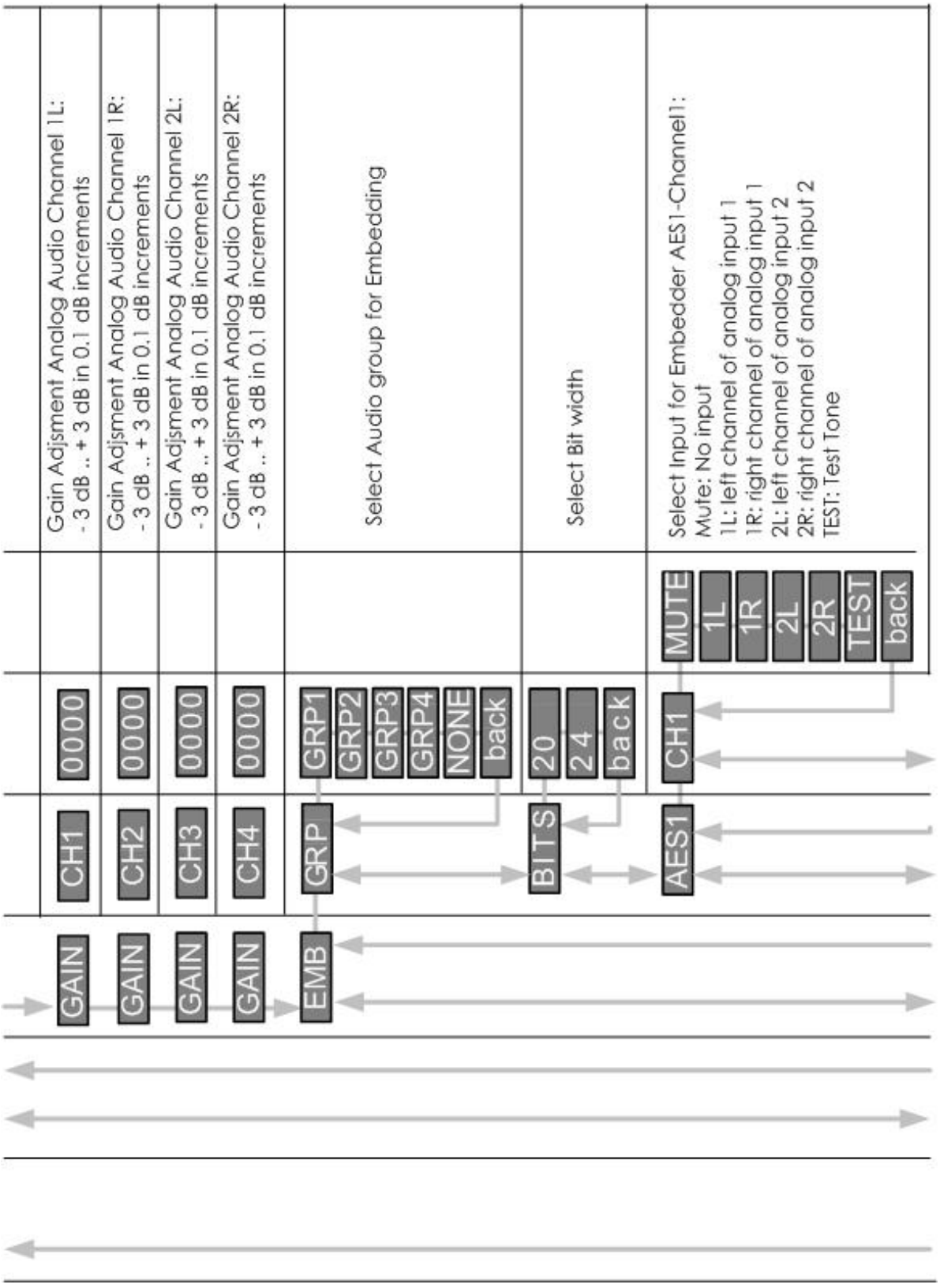

ROOT
LEVEL 1
LEVEL 2
LEVEL 3
LEVEL 4
LEVEL 5
COMMENTS
5110
VID
IN
FRMT
CVBS
YUV
YC
back
STD
PAL
NTSC
AUTO
back
Pb
PnP
Pm
PmP
Pcn
PcnP
back
Nm
NmP
P60
N443
back
PbN
PbNp
PnN
PnNp
back
"Normal" Root display on module = Module type
Input signal select:
- CVBS: PAL or NTSC
- YUV: Component (Y Pr Pb)
- YC: S-Video
PAL (BGHID)
PAL (N) with Pedestal
PAL (M)
PAL (M) with Pedestal
PAL combination (N)
PAL combination (N) with Pedestal
NTSC (M)
NTSC (M) with Pedestal
NTSC (4.43)
NTSC (4.43) with Pedestal
Auto Detect: PAL (BGHID) and NTSC(M)
Auto Detect: PAL (BGHID) and NTSC(M) with Ped
Auto Detect: PAL (N) and NTSC(M)
Auto Detect: PAL (N) and NTSC(M) with Ped

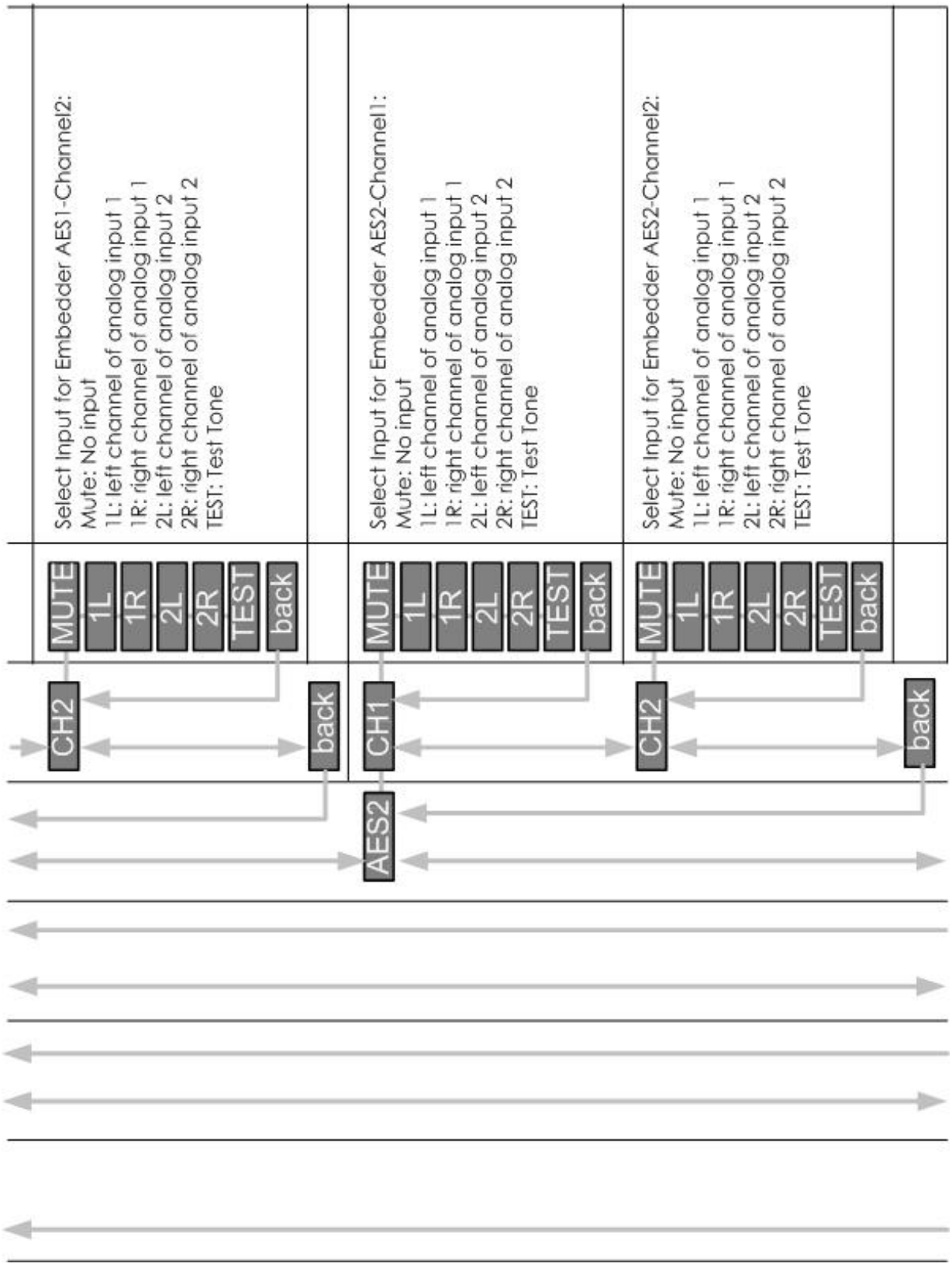

GENL
LO Q
HI Q
back
back
LUM
NN1
NN2
NN3
WN1
WN2
0000
BACK
FILT
C0L
0.7M
1.3M
1.5M
1.8M
2.2M
back
C0MB
LUM
5H
3H
A5H
OFF
back
LO Q = "Video Tracking Mode" for inputs with poor signal quality
HI Q = VCXO mode, for inputs with high signal quality
Select luminance filter:
(Composite signals only!)
NN1: Narrow Notch 1
NN2: Narrow Notch 2
NN3: Narrow Notch 3
WN1: Wide Notch 1
WN2: Wide Notch 2
Select lowpass filter: 1 (= 0,5 MHz)
(Component signals only!) ...18 (= 5,5 MHz)
Select chroma bandwidth
(for composite or YC)
Lum comb filter: Composite/CVBS mode only
Fixed 5 lines
Fixed 3 lines
Adaptive 5 lines

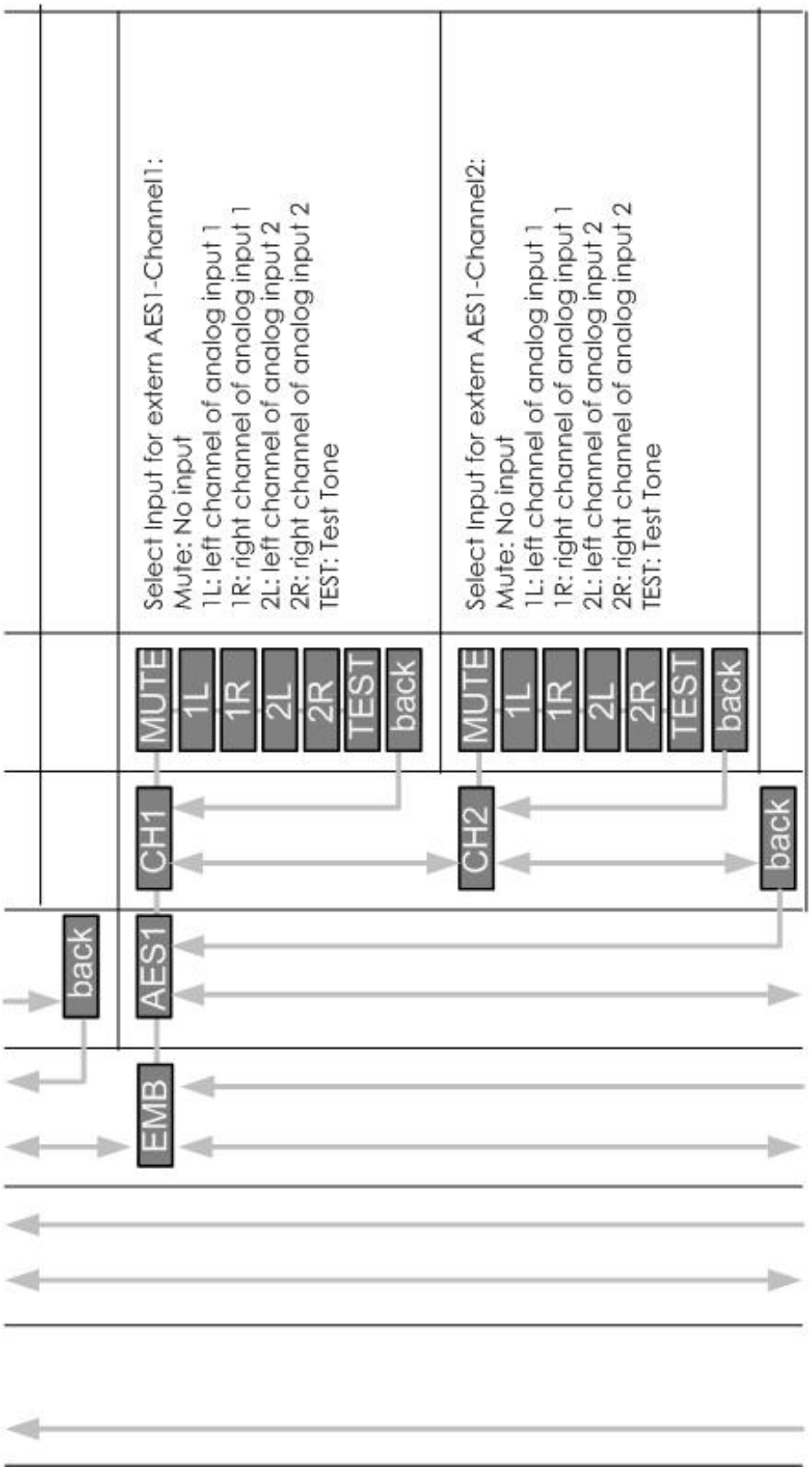

COL
5H
3H
A5H
A3H
OFF
back
Color comb filter: Composite/CVBS mode only
Fixed 5 lines
Fixed 3 lines
Adaptive 5 lines
Adaptive 3 lines
back
VBI
PROC
TRA
BLNK
back
Vertical Blanking Interval (VBI):
PROC: VBI is processed according to Video settings
TRA: VBI is passed through transparently
BLNK: VBI is blanked completely
aLn1
TRA
BLNK
back
Blanking of first active line
TRA: first line passed through transparently
BLNK: first line blanked completely
back
LUM
AUTO
MAN
back
0000
Set luminance gain:
AUTO = based on sync tip amplitude
MAN = Enter required gain value (0 .. 4095)
COL
AUTO
MAN
back
0000
Set Chroma gain:
AUTO = based on color burst amplitude
MAN = Enter required gain value (0 .. 4095)
AGC
back

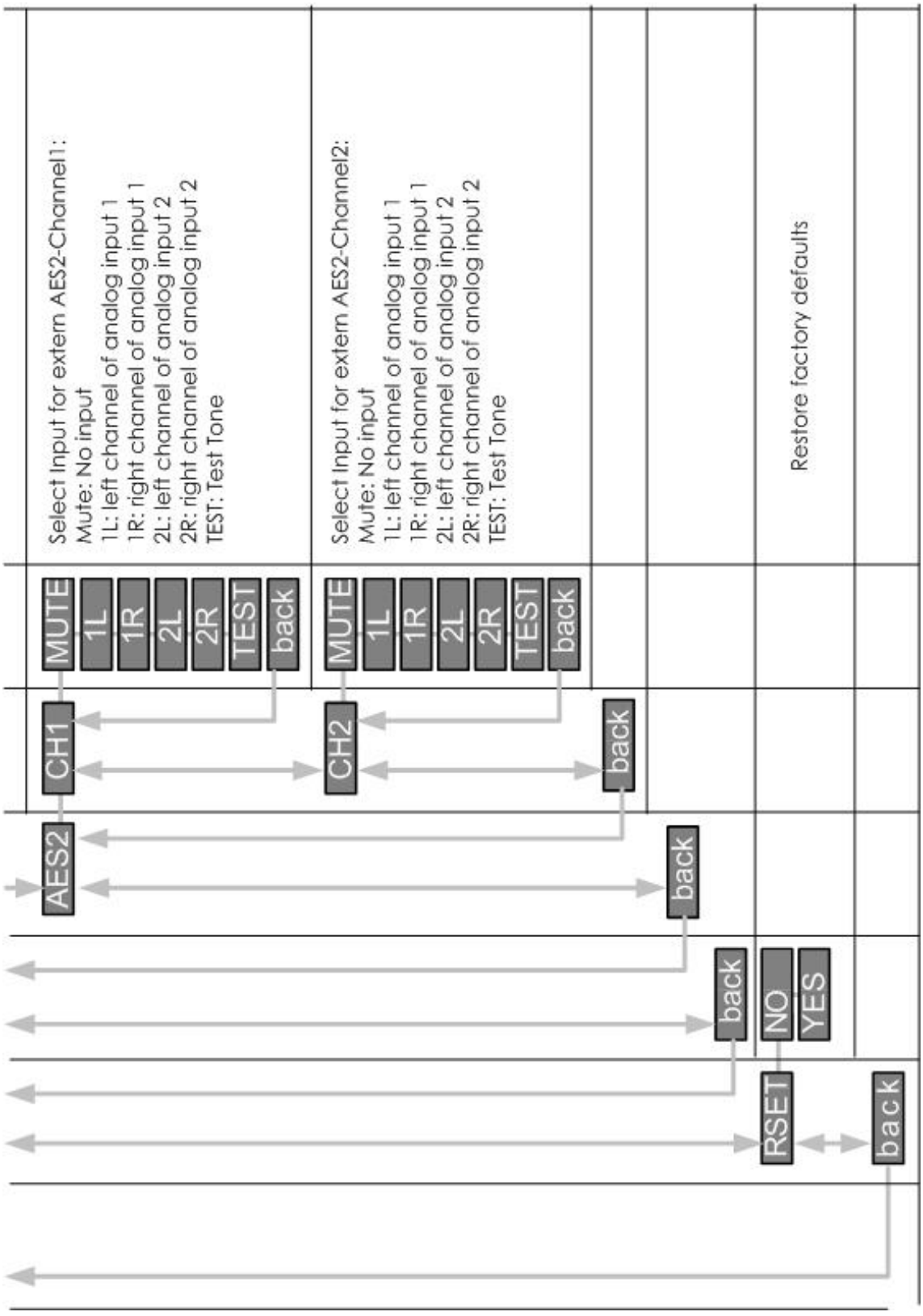

HUE
CRMA
PED
GAIN
CTI
DNR
TEST
0000
0000
0000
0000
OFF
0000
back
HIGH
LOW
OFF
back
SLCT
BARS
BRED
BLK
BLUE
PAT
OFF
back
Hue: Enter required value (-128 .. 0 .. +127)
Chroma Gain (Saturation): Enter required value (0.. 128 .. 255)
Luma Pedestal (Brightness): Enter required value (-128 .. 0 .. +127)
Luma Gain (Contrast): Enter required value (0.. 128 .. 255)
Color Transition Improvement: Level 1..4
Digital Noise Reduction
Select test signal
BARS = Color Bars
BRED = Color Bars with Red Field
BLK = Black
BLUE = Full Blue Frame
PATH = PLL/Equaliser pathological test signal


Output test signal, if no input present:
BARS = Color Bars
BRED = Color Bars with Red Field
BLK = Full Black Frame
BLUE = Full Blue Frame
PATH = PLL/Equaliser pathological test signal
Select video standard for test signal:
AUTO: Last detected input standard is used
0 dB Full Scale selection
for analog audio input 1 L/R
0 dB Full Scale selection
for analog audio input 2 L/R
NoIn
BARS
BRED
BLK
BLUE
PATH
back
STD
525
625
back
back
FSLV
12dB
15dB
18dB
22dB
24dB
back
back
1 L/R
AUD
FSLV
12dB
15dB
18dB
22dB
24dB
back
back
2 L/R


GAIN
GAIN
GAIN
GAIN
EMB
CH1
CH2
CH3
CH4
GRP
BITS
AES1
0000
0000
0000
0000
GRP1
GRP2
GRP3
GRP4
NONE
back
20
24
back
CH1
MUTE
1L
1R
2L
2R
TEST
back
Gain Adjsment Analog Audio Channel 1L:
- 3 dB .. + 3 dB in 0.1 dB increments
Gain Adjsment Analog Audio Channel 1R:
- 3 dB .. + 3 dB in 0.1 dB increments
Gain Adjsment Analog Audio Channel 2L:
- 3 dB .. + 3 dB in 0.1 dB increments
Gain Adjsment Analog Audio Channel 2R:
- 3 dB .. + 3 dB in 0.1 dB increments
Select Audio group for Embedding
Select Bit width
Select Input for Embedder AES1-Channel1:
Mute: No input
1L: left channel of analog input 1
1R: right channel of analog input 1
2L: left channel of analog input 2
2R: right channel of analog input 2
TEST: Test Tone


Select Input for Embedder AES1-Channel2:
Mute: No input
1L: left channel of analog input 1
1R: right channel of analog input 1
2L: left channel of analog input 2
2R: right channel of analog input 2
TEST: Test Tone
MUTE
1L
1R
2L
2R
TEST
back
CH2
back
Select Input for Embedder AES2-Channel1:
Mute: No input
1L: left channel of analog input 1
1R: right channel of analog input 1
2L: left channel of analog input 2
2R: right channel of analog input 2
TEST: Test Tone
MUTE
1L
1R
2L
2R
TEST
back
CH1
AES2
Select Input for Embedder AES2-Channel2:
Mute: No input
1L: left channel of analog input 1
1R: right channel of analog input 1
2L: left channel of analog input 2
2R: right channel of analog input 2
TEST: Test Tone
MUTE
1L
1R
2L
2R
TEST
back
CH2
back


Select Input for extern AES1-Channel1:
Mute: No input
1L: left channel of analog input 1
1R: right channel of analog input 1
2L: left channel of analog input 2
2R: right channel of analog input 2
TEST: Test Tone
Select Input for extern AES1-Channel2:
Mute: No input
1L: left channel of analog input 1
1R: right channel of analog input 1
2L: left channel of analog input 2
2R: right channel of analog input 2
TEST: Test Tone
MUTE
1L
1R
2L
2R
TEST
back
CH1
CH2
AES1
EMB


Select Input for extern AES2-Channel1:
Mute: No input
1L: left channel of analog input 1
1R: right channel of analog input 1
2L: left channel of analog input 2
2R: right channel of analog input 2
TEST: Test Tone
MUTE
1L
1R
2L
2R
TEST
back
CH1
Select Input for extern AES2-Channel2:
Mute: No input
1L: left channel of analog input 1
1R: right channel of analog input 1
2L: left channel of analog input 2
2R: right channel of analog input 2
TEST: Test Tone
MUTE
1L
1R
2L
2R
TEST
back
CH2
back
AES2
back
back
Restore factory defaults
NO
YES
RSET
back

Factory Preset Condition

The C MX 5110 is delivered programmed and preset for the following mode of operation:

Mode	**CVBS**
Standard	**PAL Pb (BGHID) or NTSC (auto detect)**
Genlock	**HI Q**
Lum filter	**LP 18 (5,5 MHz)**
Chroma filter	**3,0 MHz for Component 1,8 MHz for CVBS**
Chroma Comb filter	**adaptive 5 H**
Luma Comb filter	**adaptive 5 H**
VBI	**PROC (processed)**
CTI	**OFF**
DNR	**OFF**
AGC Lum	**Auto**
AGC Col	**Auto**
Hue, Pedestal	**0**
Chroma, Gain	**128**
Test Signal	**Bars**
Test Signal Standard	**Auto**
Audio Full Scale Level	**15dBu**
Audio Gain	**0 dB**
Audio Group	**Group 1**
Test Tone	**Off**

If this is the mode of operation required, then no adjustments are necessary.

These settings can be recalled at any time by selecting reset from the menu system.

Auto Store

If no parameters are changed for 10 seconds then the current settings will be written into flash memory automatically, this can be seen by the alarm LED flashing yellow four times.

Alarm/LED Status Indicators

The C MX 5110 module has integral LED indicators, which serve as alarm and status indication for the module. Function is described below.

Status Indicators

3 status LED`s are provided on the front edge of the module, LED 1, LED 2, LED 4 (figure 2 and 5)

LED	Color	Indication
1	Green	Video Input Present
	Yellow	Video Test Signal active
	Red	No Video Input and no test signal selected
2	Green	All Audio input present
	Yellow	Test tone active or 1..3 audio signals missing
	Red	No audio inputs present
4	Green	525 Mode
	Yellow	625 mode

Alarm Indicator

There is also a single alarm LED on the lower edge of the module LED 3. This is visible through the card frame front cover and provides a general indication of the module status.

LED Color	Indication
Green	Video and all audio signals present
Yellow	Video or audio inputs missing
Red	Video and audio missing

LED **OFF** indicates power is lost, or there is a power supply fault.

Locate Function

For larger systems which may have multiple cards of the same type in a single rack, or multiple rack systems on a large central control system we have added a useful utility which will help to visually locate a suspect module quickly (When used in conjunction with the optional control system and software)

Once the specific module has been selected on the control system there is a locate button on the top of the GUI:

Locate Function in Control System

When Locate is selected the status indicator on the GUI and the alarm LED will flash yellow in the following continuous sequence.

3 short flashes…. Pause…. 3 short flashes …

Use of the locate function will not interfere with the normal operation of the module.

For more details on this feature please check the documentation supplied with the controller software.

Specifications *(C MX 5110)*

Inputs (video)

Signal	NTSC (M/N), PAL (B/D/G/H/I/M/N), Y / Pr / Pb Y / C (S-Video) AC coupled, differential inputs
Input Impedance	75 Ohms, BNC

Outputs (Video)

Signal	2 x serial 4:2:2 SMPTE 259M-C (270 Mbps)
Output Level	0.8V p-p nom.
Jitter	< 0.2UI
Connection	BNC
Output Impedance	75 Ohms

Operating Modes (Video)

CCVS	NTSC/ PAL decoding modes can be adjusted according to the application. See remote adjustable parameters. Parameter settings can be stored in remote operation.
CAV	A/D conversion for CAV signals
YC	A/D conversion for chroma / luma separated systems (S-Video)
Test	Built in Color Bars, Color Bars with red field, EQ/PLL pathological, black flat field, blue flat field

Performance (Video)

Quantization	12 Bits for Luma and Chroma
Frequency Response	± 0,15 dB ...5,0 MHz, ± 0,2 dB ...5,5 MHz for Luma, input LP off
Sampling	54 MHz (4 x oversampling)
Filters	Selectable Luma/Chroma comb filters (5 line, adaptive), various Luma / Chroma filters
S/N Ratio	< -60 dB (unweighted to 5,75 MHz)

Inputs (Audio)

Signal	2x balanced analog stereo inputs
Connection	25 pin Sub D
Impedance	110 Ohms
Sampling	48kHz
Quantization	24 bit
Noise floor	< -90dB (A-weighted)
Distortion	< 0.002% @ 20Hz to 20kHz
Frequency response	0.1dB @ 20Hz to 20kHz
0 dB FS level	+ 12, 15, 18, 21, 24 dBu selectable

Outputs (Audio)

Signal	4 x SDI 4:2:2 SMPTE 259M-CD (270 / 360 Mbps) with EDH
Connection	BNC
Impedance	75 Ohms
Jitter	< 0.2 UI

Operating Modes (Audio)	
Embedding	Embed audio 2 x analog stereo audio (one group) in one of four user selectable groups in the SDI input stream
Delete	Delete all selected audio groups
Test	Built in Test Tone: 1kHz / -9dBFS
Electrical Specifications	
Operating Voltage	+ 12 VDC
Power Consumption	6 W
Safety	IEC 60950/ EN 60950/VDE 0805
Mechanical	
Size	283mm x 78mm
Weight	Card module 120g, connection panel 50g
Ambient	
Temperature	5°C to 40°C Maintaining specifications
Humidity	Max 90% non condensing
Supplied Accessories	
Documentation	C MX 5110 Reference Manual

Available Options

Below is a list of related products for the C MX 5110 CardModule. Please refer to product brochures or our web site for more detailed information.

Model	Description
R FR 5010	**Series 5000 Rack Frame (empty) with single power supply**
R PS 5010	**Redundant power supply for the R FR 5010 Card Frame**
R CT 5020	**Rack controller for the R FR 5010 Card Frame**
R CT 5030	**Master controllerwith TCP/IP Interface for the R FR 5010 Card Frame**
R CT 5010	**Rack Bus Extension for the R FR 5010 Card Frame. In combination with R CT 5020/5030**

Parts List

Due to the very dense design and miniature surface mount technology the module is not field serviceable. The information for a replacement assembly is below.

C MX 5110 CardModule (complete)

Description	Analog Audio & Vid. Muxer
Model Number	C MX 5110
Part Number	5.155.000.010

Sub Assemblies:

C MX 5110 Processing Board only (BS5015 B)

Part Number	5.155.000.015

Rear Connection Panel for C MX 5110 (MA5028 A)

Part Number	6.155.009.221

Service

If you are experiencing problems, or have questions concerning your C MX 5110 CardModule please contact your local distributor for assistance.

We offer a fixed cost service exchange program for defective Series 5000 CardModules out of Warranty. Please contact your distributor or check our web site for details on this program.

More detailed information and product updates may be available on our web site:

www.lynx-technik.com

You will also find links to contact us directly for assistance.

Contact Information

Please contact your local distributor; this is your local and fastest method for obtaining support and sales information.

LYNX Technik can be contacted directly using the information below.

Address	LYNX Technik AG Brunnenweg 3 D-64331 Weiterstadt Germany.
Website	www.lynx-technik.com
E-Mail	info@lynx-technik.com

LYNX Technik manufactures a complete range of high quality modular products for broadcast and Professional markets, please contact your local representative or visit our web site for more product information.

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