IQDMSDN Multi-standard Digital Decoder

Module Description

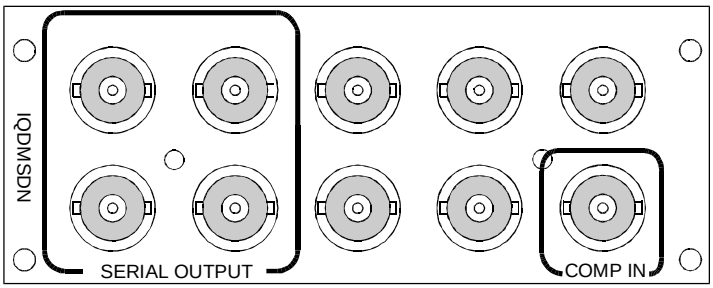
The IQDMSDN provides high quality adaptive decoding of PAL/NTSC/PAL-M/PAL-N composite signals and noise reduction with 10-bit data paths

The IQDMSDN module accepts a composite input in any one of four standards (PAL/NTSC/PAL-N/PAL-M) which it digitises to 10-bits. This is decoded, selecting adaptively between either field or line combs or conventional low pass/bandpass filters.

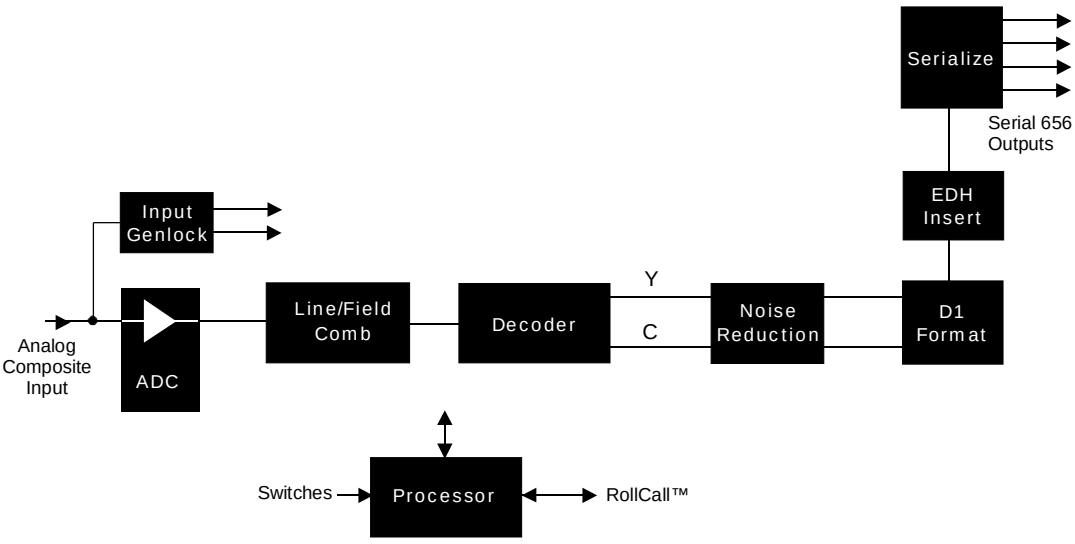
This is then formatted before being converted to a component serial output with embedded EDH.

The IQDMSDN also features a powerful recursive noise reducer with motion adaption and automatic noise floor measurement

REAR PANEL VIEWS



BLOCK DIAGRAM



Versions of the module cards available are:

IQDMSDN-2-0 *For details refer to "Feature Variations" on page 5*

Features

Multi-standard decoding of PAL/NTSC/PAL-M/PAL-N

- Auto color standard detect
- Adaptive recursive noise reduction with automatic noise floor measurement
- 10-bit sampling
- Multi-mode operation:
- Adaptive field comb
- Adaptive line comb
- Simple mode
- Full proc.amp controls
- 4 x 10-bit serial component outputs
- Switchable EDH insertion
- RollCall™ compatible
- Test pattern generator
- 20-character caption generator
- 4 nameable user memories

TECHNICAL PROFILE

Features

Signal Inputs

Composite Video	1 Differential input

Signal Outputs

10-bit Serial Component	4 outputs

Processing

3 Decoder Modes	Adaptive 10-bit Field Comb Adaptive 10-bit Line Comb Simple Mode
Sampling	10-bit

Preset Controls

Input Standard	PAL/ PAL-M/ PAL-N/ NTSC / Auto
Decode Mode	Adaptive 10-bit Field Comb Adaptive 10-bit Line Comb Simple Mode
Test Pattern Select	Black/100% Color bars/75% Color bars/Multiburst
Video Gain	+6 dB to –3 dB
Black Level	75 Units (Approximately ±120 mV)
Chrominance Gain	±3 dB
NTSC Hue	±30°
Y/C Delay	-222 ns to +148 ns in 74 ns steps
Picture Position	±2220 ns in 148 ns steps
Luma Noise Reduction	Off/Low/Medium/High
Chroma Noise Reduction	Off/Low/Medium/High
VITS Pass	Pass or Strip
EDH Insertion	On/Off
Noise Reduction Split Screen	On/Off

Additional RollCall™ Functions

Decode Mode Reporting	Reports Decoder Mode (Field, Line or Simple) or Pattern
Input Standard Reporting	Reports PAL/ PAL-M/ PAL-N/ NTSC
Signal input State Reporting	
Preset Unit	
Edit Caption	
Caption On/Off	
Manual/Auto Noise Floor	On/Off
Manual Noise Floor	8 Settings
Save Memory	4 Memories for each decode standard (total of 20)
Read Memory	4 Memories for each decode standard (total of 20)
Clear Memory	Independent clearing of each memory location
Name Memory	20 Character user name

Specifications

Input Standard	PAL/ PAL-M/ PAL-N/ NTSC
Y Frequency Response	5.5 MHz ± 0.2 dB
Signal/Noise Ratio	Better than 65 dB Weighted
PbPr Frequency Response	1.5 MHz -3 dB
2T Pulse-Shape k-rating	Better than 1%
Y-C Timing Error	Better than 25 ns
Y non-linearity Error	Better than 1%
Subcarrier Rejection	better than 46 dB (Test signal Modulated Staircase)
Insertion Delay	9.1 µs (Field Comb) 9.1 µs + 1 Line (Line Comb)
Input Return Loss (Analog)	Better than -35 dB at 5 MHz
Output Return Loss (Digital)	Better than -15 dB to 270 MHz

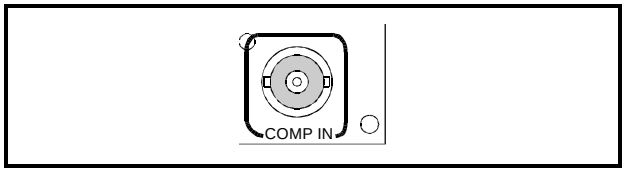
FEATURE VARIATIONS OF THE IQDMSD CARDS

FEATURE	IQDMSDP	IQDMSDA	IQDMSDN	IQDMSDD	IQDMSDS
Crystal lock for stable inputs	YES	YES	YES	YES	YES
Has VHS Mode	YES	YES			YES
Has frame synchroniser	YES	YES			YES
8 bit Decoding	YES	YES			YES
10 bit Decoding	YES	YES	YES	YES	
Has delay flag output (Frame Synchroniser)/RollTrack	YES	YES			YES
Decodes NTSC/PAL/PAL-M/PAL-N standards	YES	YES	YES	YES	
Decodes SECAM	YES				YES
Decoder Mode: Adaptive Field Comb	YES	YES	YES	YES	
Decoder Mode: Adaptive Line Comb	YES	YES	YES	YES	YES
No reference input indication	YES	YES			YES
Recursive Noise Reducer	YES		YES		
Auto standard detect	YES	YES	YES	YES	YES
EDH Insertion	YES	YES	YES	YES	YES
Field Freeze	YES	YES			YES
Has user memories	YES	YES	YES	YES	YES
Caption Generator	YES	YES	YES	YES	YES

INPUTS AND OUTPUTS

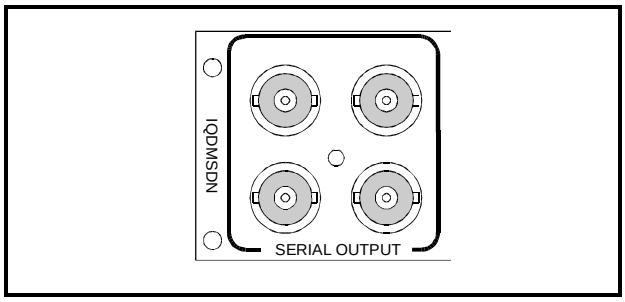
COMPOSITE INPUT

The connector is the composite video input to the decoder via a BNC connector terminated in 75 Ohms.
Nominal input level is 1V p-p.

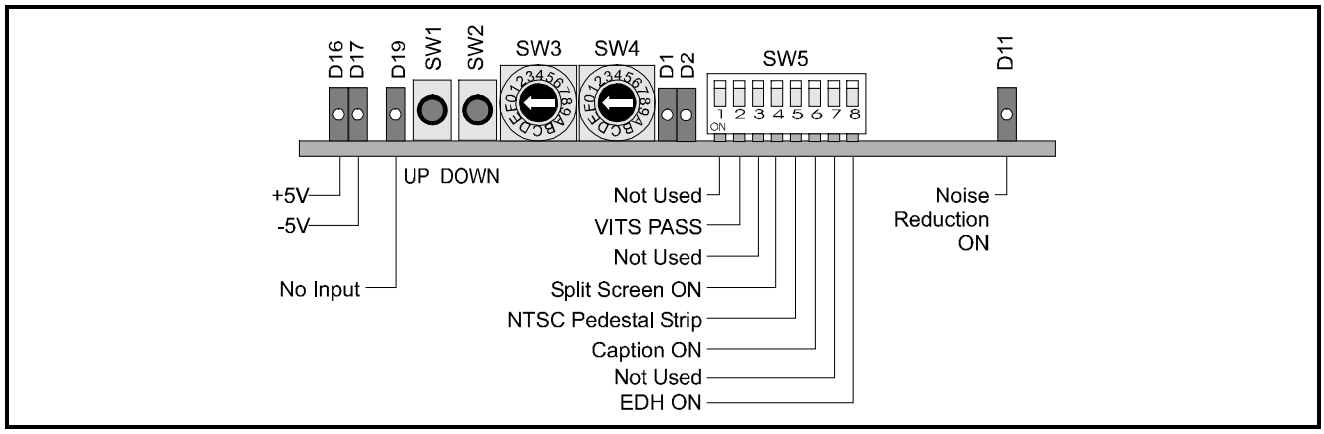


SERIAL OUTPUTS

These are the four Serial Digital outputs of the unit via BNC connectors for 75 Ohms.



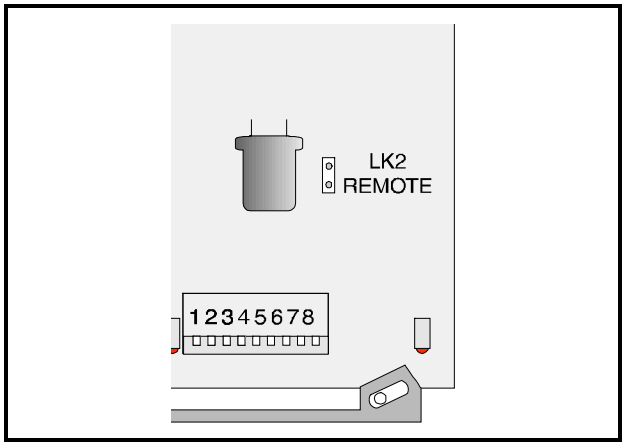
CARD EDGE CONTROLS



The unit will respond simultaneously to either remote RollCall commands or card-edge control settings.
The current settings are saved in an on-board memory.

If the remote link (LK2) is fitted the saved control settings are used when the unit is powered-up.

If the remote link (LK2) is not fitted the unit will take its control settings from the card edge switches where possible and otherwise will use the default settings.

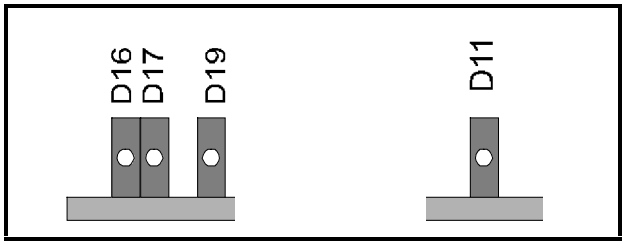


LED INDICATORS D11, D16, D17, & D19

When D11 is illuminated this indicates that the noise reduction function is switch ON.

When illuminated D16 indicates that the +5 V supply is present and D17 indicates that the -5 V supply is present.

When D19 is illuminated this indicates that the unit is not receiving a video input signal.



SW1, SW2, SW3 & SW4

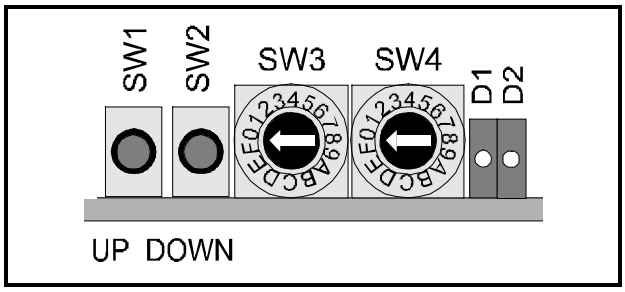
These two push buttons and two Hex switches allow various functions and modes to be set.

SW3 selects a particular function and SW4 selects the mode or value of that function.
To change a function select the required function with SW3 and change the setting using SW4 or the push buttons SW1/SW2. The setting will be saved after the value remains unchanged for a few seconds.
To change another function setting use SW3 to select the new function.

The push buttons SW1 & 2 allow the value of the selected function to be adjusted.
SW1 (UP) increases the value and SW2 (DOWN) decreases the value; D1 and D2 indicate which direction away from the default position that is currently set.

Note that to select the default value both buttons should be pressed together. D1 and D2 will both be extinguished when the default position reached.

FUNCTION AND MODE SELECTIONS



The various modes and selections made with SW3 & SW4 are detailed in the table below:

SW3 SETTING		SW4 SETTING									
		0	1	2	3	4	5	6	7	8	9
0	Standard	Auto	PAL	NTSC	PAL-N	PAL-M					
1	Decode Mode	Field Comb	Line Comb	Simple							
2	Default Output	Black	100% Bars	75% Bars	Multiburst						
3	Pattern	Video	Black	100% Bars	75% Bars	Multiburst					
4	Video Gain	Use Buttons									
5	Black Level	Use Buttons									
6	Chroma Gain	Use Buttons									
7	NTSC Hue	Use Buttons									
8	Unused										
9	YC Delay	Use Buttons									
A	Unused										
B	Unused										
C	Picture Position	Use Buttons									
D	Luma N R	Off	Low	Medium	High						
E	Chroma N R	Off	Low	Medium	High						
F	Preset	Press both buttons together to preset unit									

ADJUSTMENT RANGES

Video Gain	+6 dB to –3 dB
Chrominance Gain	±3 dB
Black Level	±75 units Overall range ±120 mV
NTSC Hue	±30° in 1° steps
YC Delay	-222 ns to +148 ns in 74 ns steps
Picture Position	±2220 ns in 148 ns steps

SW5 SWITCH FUNCTIONS

(Functions enabled when switch is set to ON)

Position 1 Not Used

Position 2 VITS Pass

Position 3 Not used

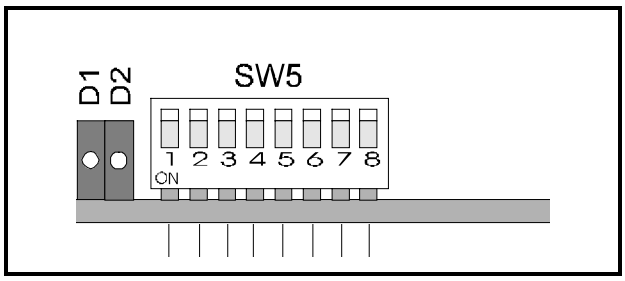
Position 4 Split Screen ON

Position 5 Pedestal strip (NTSC only)

Position 6 Caption ON

Position 7 Not Used

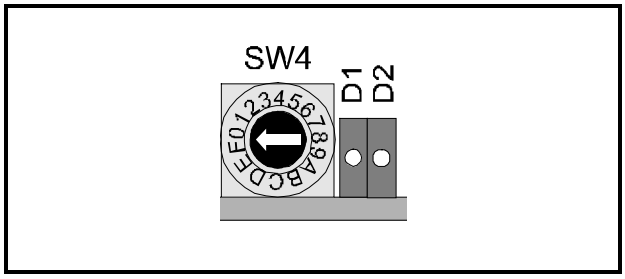
Position 8 EDH ON

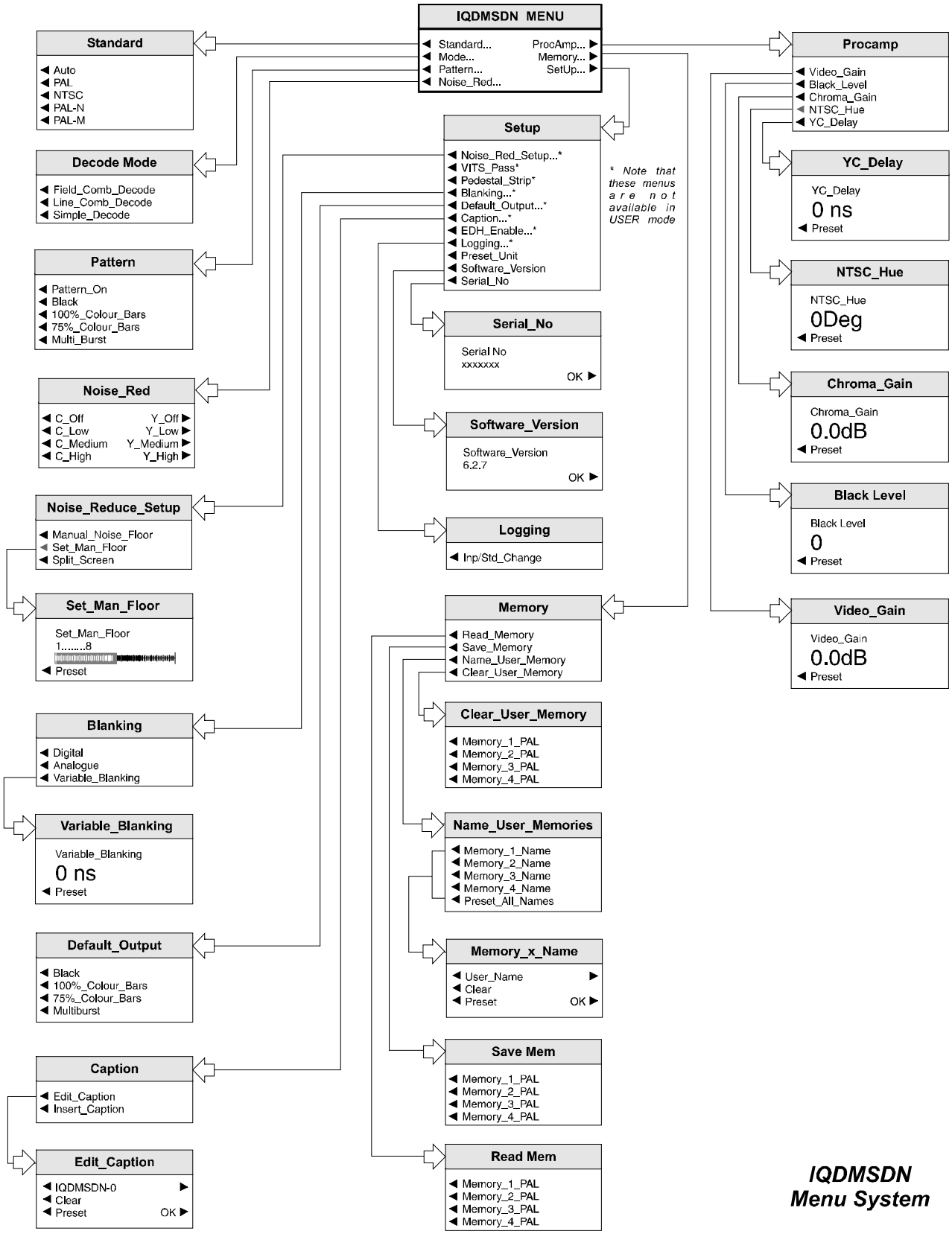


LED INDICATORS D1 and D2

These LED's will indicate the state of a selected function.

D1	D2	State of Variable
Off	Off	Default Value
Off	On	Above Default Value
On	Off	Below Default Value
On	On	N/A





IQDMSDN Menu System

OPERATION FROM AN ACTIVE CONTROL PANEL

The card may be operated with an active control panel via the RollCall™ network. For details of local operation
see page 30b.6 *Card Edge Controls*.
The menus available for this card are shown on the previous page and will appear in the Control display window.
Operational details for the remote control panel will be found in SECTION 1 of the Modular System Operator's Manual.

MENU DETAILS
(see *IQDMSDN* Menu System Diagram)

MAIN MENU

The main, or top level menu allows various sub-menus to be selected by pressing the button adjacent to the required text line.

Note that where a menu item is followed by three dots (...) this indicates that a further sub-menu may be selected.

Whenever a menu item is selected the parameters of that selection will be displayed in the Information window of the front panel. Where the selection is purely a mode selection and does not enable a sub-menu, the text will become reversed (white-on-black) indicating that the mode is active. If the mode is not available for selection the text will remain normal.

◄ STANDARD

This menu selection allows the operating standard of the unit to be set.

◄ Auto

If this is selected the IQDMSDN will automatically select the decode standard based on the input line standard and by polling through the subcarrier frequencies appropriate to that input standard until a lock is obtained. Switching between standards in the Auto mode will take about 5 seconds before a lock is achieved. Mode and standard are displayed in the information menu.

◄ PAL

When PAL is selected the decoder will decode assuming the input is PAL.

◄ NTSC

When NTSC is selected the decoder will decode assuming the input is NTSC.

◄ PAL-N

When PAL-N is selected the decoder will decode assuming the input is PAL-N.

◄ PAL-M

When PAL-M is selected the decoder will decode assuming the input is PAL-M.

Note that if the detected input line standard is different to the forced line standard the output will be forced to become black.

PROCAMP ▶

This selection allows various adjustments to made to the processed signal.

◀ Video_Gain

This selection reveals a numerical readout display for the gain of the composite video signal.

The overall range of adjustment is +6 dB to –3 dB.

Selecting Preset returns the setting to the calibrated value of 0.

◀ Black Level

This selection reveals a numerical readout display for the Y pedestal or black level. By rotating the spinwheel the pedestal may be adjusted by ±75 units in steps of 1 unit.

Note that the overall range of adjustment is approximately ±120 mV

Selecting Preset returns the setting to the calibrated value of 0.

◀ Chroma Gain

This selection reveals a numerical readout display for the gain of the chrominance signal.
By rotating the spinwheel the gain may be adjusted by ±3 dB

Selecting Preset returns the setting to the calibrated value of 0.

◀ NTSC_Hue

This selection reveals a numerical readout display for the Hue of an NTSC signal. By rotating the spinwheel the Hue may be adjusted by ±30 ° in steps of 1°

Selecting Preset returns the setting to the calibrated value of 0°

Note that when the standard is not NTSC, the NTSC Hue menu is not available.

◀ YC Delay

The relative timing between the luminance and the chrominance signals may be set using this function and rotating the spinwheel. The range is -222 ns to +148 ns in steps of 74 ns.

When viewing a picture, the chrominance will move to the right for positive values and to the left for negative values of shift.

Selecting Preset returns the setting to 0 ns.

◀ Picture_Position

This selection reveals a numerical readout display for the start position of the active picture.
The position may be varied over a range of ±2220 ns in steps of 148 ns.

Selecting Preset returns the setting to 0 ns.

◀ MODE

The decoding mode may be selected using this sub-menu:

◀ Field_Comb_Decode	This is an adaptive field comb
◀ Line_Comb_Decode	This is an adaptive line comb
◀ Simple_Decode	Enables a lowpass/high pass band-split filter

MEMORY ►

This function reveals a sub-menu which allows control of the user memories.

◄ Read Memory

This function reveals a sub-menu which allows 4 different settings of Standard, ProcAmp and Mode items to be recalled from the 4 memory locations as saved in the Save_Mem function.
Note that there are 4 memory locations available for each of the operating standards, PAL, NTSC, PAL-N and PAL-M plus NTSC no-pedestal-strip. They can all be renamed using the Name_User_Memory menu.

◄ Save Memory

This function reveals a sub-menu which allows the settings of Standard, ProcAmp and Mode items to be saved. Up to 4 different set-ups may be saved in the 4 memory locations.
Note that there are 4 memory locations available for each of the operating standards, PAL, NTSC, PAL-N and PAL-M plus NTSC no-pedestal-strip. They can all be renamed using the Name_User_Memory menu.

◄ Name User Memory

This selection allows renaming of the Save 1, 2, 3 and 4 memory locations.

Note that there are 4 memory locations available for each of the operating standards, PAL, NTSC, PAL-N and PAL-M plus NTSC no-pedestal-strip.(This is designated as NTSC-J, the NTSC system used in Japan which has no pedestal; NTSC-M is used to define the normal NTSC system)

To rename a memory location when operating in a particular standard, select:

◄ Name_User_Memories to reveal the sub-menu.

Select the memory location to be renamed e.g.

◄ Memory_1_Names

To compile/edit the text the right ► and left ◄ buttons adjacent to the upper text line in the menu should be used to select the character position in the text and the spinwheel used to select the character.

The ◄ **Clear** function blanks out the selected character.

The ◄ **Preset** function loads the default text, for example **Memory_1_NTSC-M** if operating in the normal NTSC standard.

O.K. ► saves the caption text and returns to the main menu.

Now, when the Read_Mem function is selected (and the unit is operating in the NTSC standard) Read_1 will now appear with the new name.

◄ Preset_All_Names

Selecting this function will reset all the memory names to their default names.

e.g. in NTSC-M memory x will become

Memory_x_NTSC-M

◄ Clear User Memory

This selection allows individual memory locations to be cleared and returned to their default (factory) settings.

◄ SETUP

This selection reveals a sub-menu that allows the following functions to be set up:
**** Note that these items will not be available in USER mode.***

◄ PATTERN*

This menu selection selects the type of pattern which will be available as the output signal when the Pattern_On item is enabled.

◄ Pattern_On

When this item is selected (text highlighted) the pattern selected in the pattern menu will become the output signal.
When unselected (text normal) the decoded video will become the output signal.

Note that this function will override the default output selection if the input signal is lost.

Patterns available are:

◄ Black	The output will be standard black.
◄ 100% Colour_Bars	The output will be 100% colour bars.
◄ 75% Colour_Bars	The output will be 75% colour bars.
◄ Multiburst	The output will be a multiburst signal.

◄ Noise_Reduce_Setup*

This selection reveals a sub-menu that allows the noise floor measurement to be set either manually or automatically and the output picture to be split to show the before/after effects of noise reduction.

◄ Manual_Noise_Floor

This function allows the noise floor measurement to be set manually.

When selected the

◄ Set_Manual_Floor

item will be enabled and the noise floor setting adjusted using the spinwheel to set to the value shown by the bargraph and numerical display.
The adjustment is from 1 (low) to 8 (high); the higher the setting the higher the amount of noise reduction that is applied to the signal.

If the ◄ Manual_Noise_Floor item is not enabled the noise floor is applied automatically based on a measurement of the degree of noise in the video signal. The higher the level of noise the higher the amount of noise reduction that is applied.

The current noise floor value (manual or automatic measurement) will be shown in the information display window.
Note that if any of the noise reduction settings are set to ON, noise floor values will be displayed.

◄ Split_Screen

When this function is enabled a grey vertical line will split the output picture into 2 parts, left and right. Noise reduction will only be applied to the right-hand side of the picture; the left-hand side will be unprocessed.

VITS

This item will reveal a sub-menu that allows various actions to be applied to the VITS lines.

◄ **VITS_Pass**

When selected (text reversed) the unit will pass data (unprocessed) present on VITS lines, to the digital Y output.

The PbPr channels are always blanked during the vertical interval. When de-selected (text normal) all data in the vertical interval will be blanked.

When this item is selected the word VTS will appear on the bottom line in the information window.

VBI InternalDecoding			
NTSC	PAL	Operation	Comments
L1-L9	L1-L5	Blanked	Field Group
	L6	Blanked	
L10-L20	L7-L22	Flat	Decoder bypassed on luminance, blanked on chrominance
	L23	Decoded/Flat	Half line. Normally blanked/decoded but option to pass flat.
L21			Closed caption Normally decoded but option to pass flat.
L22-L263½	L24-L310	Decoded	Active picture
L263½-L272	L311-L317	Blanked	Field Group
L273-L283½	L319-L335	Flat	Decoder bypassed on luminance, blanked on chrominance
L283		Decoded/Flat	Half line. Normally blanked/decoded but option to pass flat.
L283½-L525	L336-L623½	Decoded	Active picture
	L623½-L625	Blanked	

◄ Pass L23

When this item is selected and if a 625 line standard is present, the unit will pass line 23 flat through the luminance channel and will be blanked on the chrominance channel. Under any other conditions this line will be decoded.

◄ Pass L21

When this item is selected and if a NTSC colour standard is present, the unit will pass this closed caption line, flat. Under any other conditions this line will be decoded.

◄ Pass L283

When this item is selected and if a 525 line standard is present, the unit will pass this line flat through the luminance channel and will be blanked on the chrominance channel. Under any other conditions this line will be decoded.

◄ **Pedestal Strip***

This toggle ON/OFF function allows the effect of any set-up on the input signal to be cancelled. This function only operates in NTSC but is always enabled in PAL-M mode.

◄ **Blanking***

This menu allows control of the blanking width of the active picture.

Selections available are:

◄ Digital

This sets the active video to 720 pixels in length.

◄ Analogue

This sets the active video to 702 (625 line standard) or 714 (525 line standard) pixels in length. The blanking may be varied using the Variable Blanking function.

◄ Variable Blanking

This selection reveals a numerical readout display for the variation in blanking.

The overall range of adjustment is ±1184 ns in 74 ns steps.

Selecting Preset returns the setting to the calibrated value of 0.

◄ **Default_Output***

This menu allows a particular pattern to become the output signal if the input signal is lost.

Patterns available are:

◄ Black	The output will be standard black.
◄ 100% Colour_Bars	The output will be 100% colour bars.
◄ 75% Colour_Bars	The output will be 75% colour bars.
◄ Multiburst	The output will be a multiburst signal.

◄ **Caption***

This selection allows text to be compiled which may be overlaid on the pattern or default pattern output signal when the
◄ Insert_Caption items are enabled.

◄ Insert_Caption

When enabled the caption overlaid on the pattern output signal.

To compile/edit the text the ◄ Edit_Caption function should be selected and the right ► and left ◄ buttons adjacent to the upper text line in the Caption menu used to select the character position in the text and the spinwheel used to select the character.

The ◄ **Clear** function blanks out the selected character.

The ◄ **Preset** function loads the default text (card identification)

O.K. ► saves the caption text and returns to the main menu.

◄ **EDH_Enable***

Selecting this item (appears as reversed text) enables the error detection system and the generation of EDH on the SDI output.

◄ **Logging***

If a logging device is attached to the RollCall™ network, information about various parameters will be reported to the logging device assigned in the Remote Control Interface system. (See Section 1) The RCIF Menu System can be made available to such a device.

◄ Inp/Std_Change

When activated, a loss of input signal condition or change of input line standard will be available for the logging device.

◄ **Preset_Unit**

Selecting this function presets various functions such that some sort of signal is produced at the output even though some settings may be inappropriate for the input signal. This is useful if many settings have been set in error such that no output signal is being produced.

Note that this function does not clear the memories or the caption data.

◄ **Software_Version**

Selecting this item reveals a display showing the version of the software fitted in the module.
Select OK to return to the Setup Menu.

◄ **Serial No**

This displays the serial number of the unit. Select OK to return to the setup menu

◄ NOISE_REDUCE

This menu allows various levels of noise reduction to be applied to the Luminance (Y) and/or Chrominance (C) parts of the signal.

The levels that may be selected are:

OFF
LOW
MEDIUM
HIGH

The noise reducer operates by recursive averaging so incoherent signals (noise) are reduced in the picture. To avoid blurring of moving objects the noise reduction is reduced if movement is detected in the image.

The noise floor may be set manually or automatically and the output picture may be split to show the effect of the noise reduction.
These functions are selected and set-up from the ***Noise_Reduce_Setup*** menu item.

Manual Revision Record

Date	Version No.	Issue No.	Change	Comments
041197	2	1	New manual for 1B issue card (previously 1Y issue card; manual version 1 issue 4)	First Issue for 1B Issue card
181197	2	2	Changes to menu	
281197	2	3	Changes to menu, spec, and functions	New manual issued
230198	2	4	New feature table	New manual issued
030498	2	5	Changes/corrections ref MG	New manual issued
130898	2	6	To spec, menus and for Revision H Raytheon Chip	New manual issued