



**Vistek V1649 SDI Video Index / WSS /
ETSI Line 23 Inserter / Reader**

V1649

SDI Video Index / WSS / ETSI Line 23 Inserter / Reader

User Guide

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1 Description

The V1649 is a wide screen signaling data processing card which forms part of the Vistek V1600 range of interface products. It 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.

The V1649 offers 4 configurable product variants for the reading and insertion of wide screen signaling data, of which there are a number of forms. The 4 product variants are:-

V1649INS	Video Index and WSS data inserter
V1649RDR	Video Index and WSS data reader
V1649ETI	ETSI Line 23 data inserter
V1649ETR	ETSI Line 23 data reader

The card may be re-configured to function as any of the above mentioned variants by the user in the field by simply entering the product configuration menu, and selecting the desired function.

The V1649 has a single component serial SDI input. It offers full dual standard operation for both 625/50 and 525/60 inputs, and automatically detects the presence and format of the incoming input signal.

There are three component serial SDI outputs from the V1649. One output is a buffered, but un-reclocked, version of the input signal. The other two are the processed SDI outputs.

There are two configurable 9 way D-type connector ports on the rear panel of the V1649. The function of each port is product dependent (GPI input / GPI output or RS485). See sections 1.1 through to 1.4 for a general definition of each.

All 4 product variants offer a number of common video processing functions. Namely:

Video delay A choice of 4 fixed video insertion delay settings: 0,30,60 lines or 1 frame.

VBI processing Facility to pass or blank data within the vertical interval.

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.



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1.1 V1649INS – Video Index and WSS Data Inserter

The V1649INS allows the user to insert source Aspect Ratio (AR) and Active Format Descriptor (AFD) information into a D1 data stream. The AR bit defines either a 4:3 or 16:9 input. The AFD is a three bit code, allowing eight separate values. The table below describes the definition of the 8 possible AFD values:-

Active Format Descriptor (AFD)	Description
0	Active region is same as coded frame.
1	4:3
2	16:9
3	14:9
4	Reserved for future use.
5	4:3 with shoot-and-protect 14:9 centre
6	16:9 with shoot-and-protect 14:9 centre
7	16:9 with shoot-and-protect 4:3 centre

There are two transport mechanisms for carrying the AR and AFD data: Video Index (a digital based coding mechanism) and WSS (an analogue based coding mechanism).

The V1649INS supports a modified version of class 1.1 video index data insertion. Classes 1.2, 1.3, 2.1, 2.2 and 2.3 may be inserted into the D1 data stream, but are default to zero (no information state). See the following section in the appendix for a general description of Video Index coding, and which classes are supported by the V1649:-

Section 8.1 An Introduction To Video Index Coding

WSS insertion is a modified version of the ETSI Line 23 wide screen signalling format. The waveform used is of the same specification, but the 14 bits of data (Information bits) convey different data, specifically the AR and AFD codes. See the following section in the appendix for a general description of WSS coding, and how the AR and AFD data are coded within it:-

Section 8.2 An Introduction To ETSI Line 23 Coding And WSS Coding

WSS data may be added to the first half line of any line in the vertical blanking interval (1 – 23).

The AR and AFD information to be integrated into the D1 data stream may be defined locally via the front panel, remotely over the DART interface or via GPI or RS485 interfaces (configurable GPI2 / RS485 connector on the rear panel).

Vistek V1649 SDI Video Index / WSS / ETSI Line 23 Inserter / Reader



1.2 V1649RDR – Video Index and WSS Data Reader

The V1649RDR allows the user to read source Aspect Ratio (AR) and Active Format Descriptor (AFD) information contained in a D1 data stream. The V1649RDR may derive the AR and AFD information from either Video Index or WSS data integrated into the incoming D1 data stream.

Incoming AR and AFD data status may be read via the front panel or over the DART remote control system.

Two GPI output ports (GPI1 and GPI2) are available on the rear panel of the V1649. Each may be independently configured to output the AR and AFD status, or alternatively to control 2 independent Vistek V1647 Aspect Ratio Converters.

1.3 V1649ETI – ETSI Line 23 Data Inserter

The V1649ETI allows the user to insert an ETSI encoded line 23 signal into the D1 output data stream.

All 14 user information bits may be defined locally via the front panel, remotely over the DART control system or via an RS485 interface.

A GPI input port (GPI 2) is also available to the user. This port may be used to define the three bit Aspect Ratio (AR) data field. All the remaining user information bits may then be defined via the front panel or over the DART remote control system.

1.4 V1649ETR – ETSI Line 23 Data Reader

The V1649ETR allows the user to read all 14 user information bits available on an incoming ETSI encoded line 23 signal.

All user information bit data statuses may be read via the front panel or over the DART remote control system.

Furthermore, the three bit Aspect Ratio (AR) data field is made available to the user via the GPI 1 output port, as is another bit which indicates if the incoming D1 input signal contains valid ETSI line 23 data.

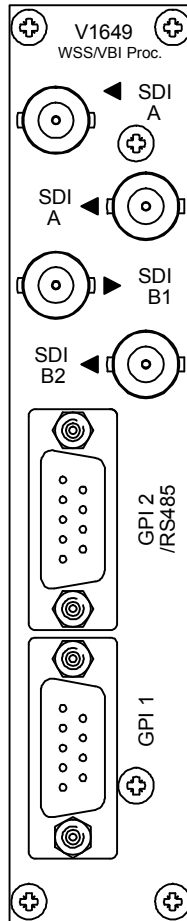


Vistek V1649 SDI Video Index / WSS / ETSI Line 23 Inserter / Reader

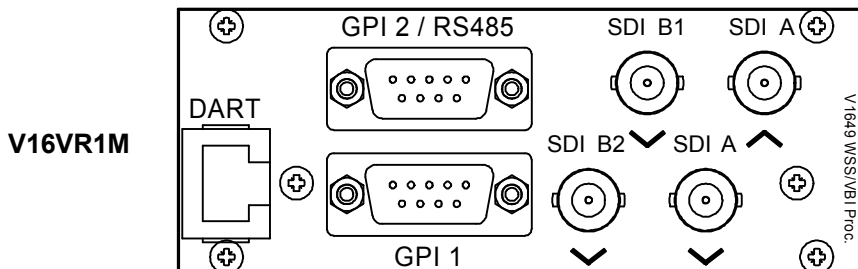
2 Installation

2.1 3U Rear Panel

V16VR3M



2.2 1U Rear Panel



Vistek V1649 SDI Video Index / WSS / ETSI Line 23 Inserter / Reader



2.3 Connections

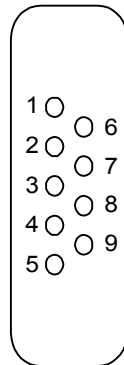
Connector	Input / Output Description	Comments
SDI A (IN)	SDI Input	SDI Input to unit.
SDI A (OUT)	SDI Output	Buffered SDI output:- Equalised, but not reclocked, version of the SDI input signal.
SDI B1	SDI Output	Processed SDI output.
SDI B2	SDI Output	Processed SDI output.
GPI 1	GPI Output port.	V1649INS:- AR / AFD status output V1649RDR:- AR / AFD status output or V1647 ARC GPI control o/p V1649ETR:- Aspect Ratio status output
GPI 2 / RS485	GPI Input or Output port (product dependent) RS485 interface port	V1649INS:- AR / AFD control input V1649RDR:- AR / AFD status output or V1647 ARC GPI control o/p V1649ETI:- Aspect Ratio control input V1649INS:- RS485 control interface V1649ETI:- RS485 control interface



Vistek V1649 SDI Video Index / WSS / ETSI Line 23 Inserter / Reader

2.3.1 GPI And RS485 Connections To Rear Panel D-Type Connectors

V1649INS Inserter:- GPI2 Input Pinout

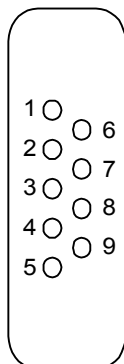


- 1 RESERVED
- 2 INPUT :- AFD[0]
- 3 INPUT :- AFD[1]
- 4 INPUT :- AFD[2]
- 5 RESERVED
- 6 GND
- 7 INPUT :- AR = 4:3 or 16:9
- 8 RESERVED
- 9 GPI ENABLE INPUT

Each of the GPI input pins has an internal pull-up resistor of 10K to +5V and should be made active by closing a contact between the relevant pin and the local ground (pin 6) or the D-type shell.

See Section 4.4.1 V1649INS Inserter:- GPI2 Input Description for a more detailed description that includes input timing requirements and a GPI input control mapping table.

V1649INS Inserter:- GPI1 Output Pinout



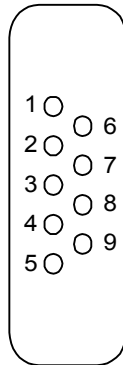
- 1 RESERVED
- 2 OUTPUT :- AFD[0]
- 3 OUTPUT :- AFD[1]
- 4 OUTPUT :- AFD[2]
- 5 RESERVED
- 6 GND
- 7 OUTPUT :- AR = 4:3 or 16:9
- 8 RESERVED
- 9 RESERVED

See Section 4.4.2 V1649INS Inserter:- GPI1 Output Description for a more detailed description that includes a GPI output mapping table.

Vistek V1649 SDI Video Index / WSS / ETSI Line 23 Inserter / Reader



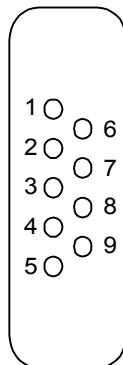
V1649RDR Reader:- GPI1 and GPI2 Output Pinout (AFD Output Format)



- 1 RESERVED
- 2 OUTPUT :- AFD[0]
- 3 OUTPUT :- AFD[1]
- 4 OUTPUT :- AFD[2]
- 5 RESERVED
- 6 GND
- 7 OUTPUT :- AR = 4:3 or 16:9
- 8 RESERVED
- 9 OUTPUT:- VI + WSS STATUS

See Section **5.4.1 GPI1 and GPI2 Configured To Output The AR and AFD Read Values** for a more detailed description that includes an output timing diagram and a GPI output mapping table.

V1649RDR Reader:- GPI1 and GPI2 Output Pinout (V1647 ARC Control Output Format)



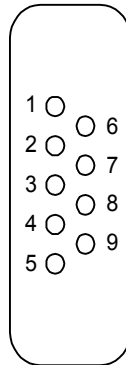
- 1 RESERVED
- 2 OUTPUT
- 3 OUTPUT
- 4 OUTPUT
- 5 RESERVED
- 6 GND
- 7 OUTPUT
- 8 BYPASS OUTPUT
- 9 GPI ENABLE OUTPUT

See Section **5.4.2 GPI1 and GPI2 Configured To Drive Vistek V1647 ARCs** for a more detailed description.



Vistek V1649 SDI Video Index / WSS / ETSI Line 23 Inserter / Reader

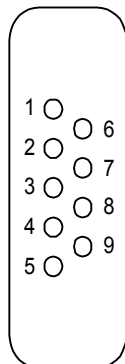
V1649ETI Inserter:- GPI2 Input Pinout (Connections To Rear Panel D-type Connector)



- 1 RESERVED
- 2 INPUT :- AR[0]
- 3 INPUT :- AR[1]
- 4 INPUT :- AR[2]
- 5 RESERVED
- 6 GND
- 7 RESERVED
- 8 RESERVED
- 9 GPI ENABLE INPUT

See Section **6.4.1 V1649ETI Inserter:- GPI2 Input Description** for a more detailed description that includes input timing requirements and a GPI input control mapping table.

V1649ETR Reader:- GPI1 Output Pinout (AR Status Output)



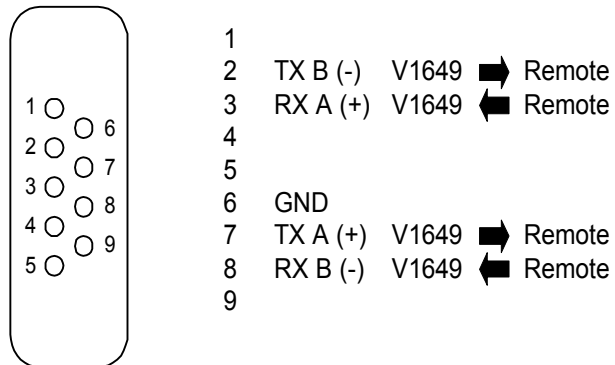
- 1 RESERVED
- 2 OUTPUT :- AR[0]
- 3 OUTPUT :- AR[1]
- 4 OUTPUT :- AR[2]
- 5 RESERVED
- 6 GND
- 7 RESERVED
- 8 RESERVED
- 9 OUTPUT:- AR STATUS

See Section **7.4.1 V1649ETR Reader:- GPI1 Output Description** for a more detailed description that includes an output timing diagram and a GPI output mapping table.

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V1649INS and V1649ETI Inserters:- RS485 Interface Pinout



See Sections **4.5.1 V1649INS Inserter:- RS485 Interface Description** and **6.5.1 V1649ETI Inserter:- RS485 Interface Description** for a more detailed description that includes input timing requirements and references to the RS485 message protocol.



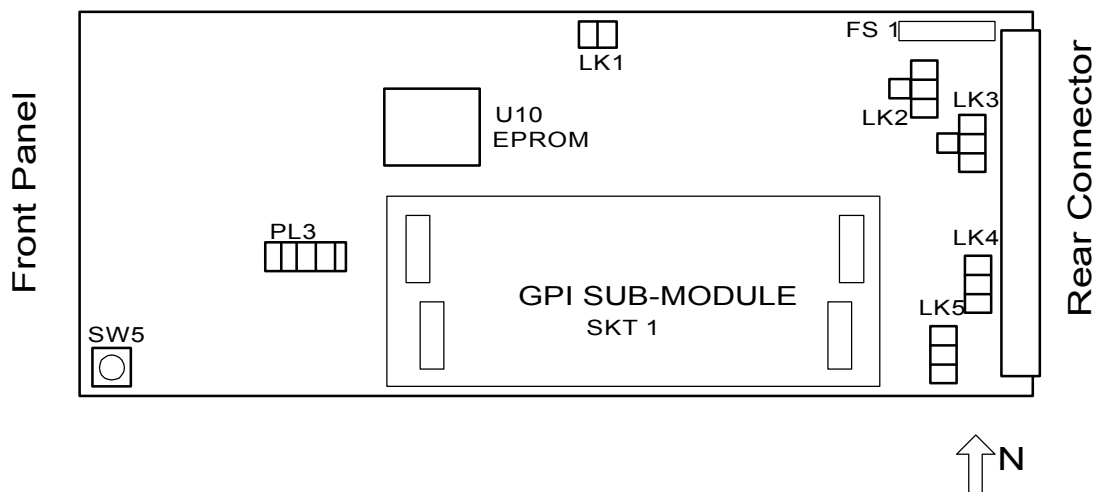
Vistek V1649 SDI Video Index / WSS / ETSI Line 23 Inserter / Reader

2.4 Hardware

2.4.1 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 audio sub-module if fitted.

The EPROM location is shown, as it is the component that would need to be changed as a result of any software upgrade in the field. This is a PLCC type and the proper tool should be used to remove a device and care must be taken to ensure that a replacement is inserted the right way round and pushed fully 'home'.



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2.4.2 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	Section	Comments
FS 1	Fuse		In series with the +15V input to the module.
SW 5	RESET		Used to reset the internal microcontroller and DSP.
SKT 1	GPI Sub-module		Provides circuitry to drive ALL external GPI interfaces to the V1649 product.
PL 3	JTAG Connector		For development and test use only. (May not be fitted)
LK 1	JTAG enable		Never used in operation. (May not be fitted)
LK 2, 3	Define SDI A (OUT)		North – SDI A (OUT) defined as a buffered (but not re-clocked) version of SDI A (IN)
LK 4	Not applicable to this product		North
LK 5	Not applicable to this product		North

2.4.3 Fuse

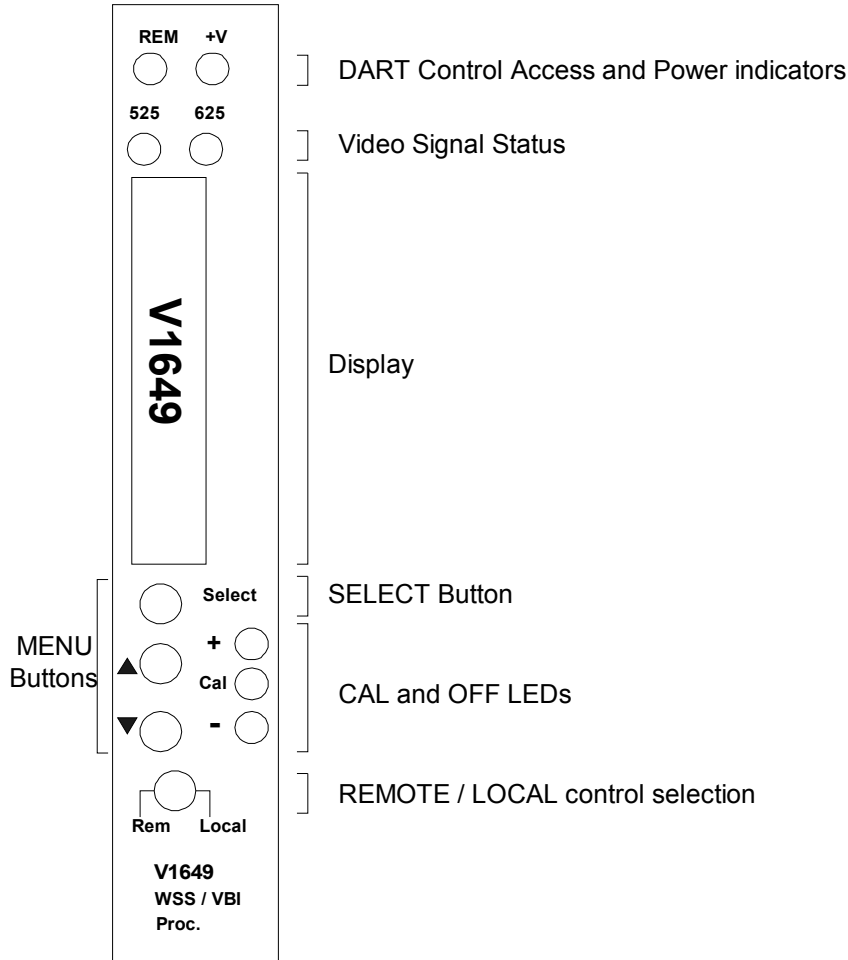
There is only one fuse on the V1649 which is in series with the main DC input:

FS 1	Fuse 2 Amp Wire ended		In series with the +15V input to the module.
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Vistek V1649 SDI Video Index / WSS / ETSI Line 23 Inserter / Reader

2.5 Front Panel



The front panel on the V1649 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.



2.5.1 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 V1649 has 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.
625	Indicates that a valid 625 D1 signal is present at the input to the unit.
525	Indicates that a valid 525 D1 signal is present at the input to the unit.

2.5.2 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**, **p** and **q**. 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 **p** and **q** buttons will move through the list of options, or if in an actual variable (such as Insert Line number) they will change the values.

The menu system is described in more detail later in section 3.1.2.

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 any parameter.

Beside the **p** and **q** 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.

2.5.3 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.



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2.6 Configuration

The V1649 can be re-configured to function as any of the variants shown below by the user in the field by simply entering the product configuration menu, and selecting the desired function.

V1649INS	Video Index and WSS data inserter
V1649RDR	Video Index and WSS data reader
V1649ETI	ETSI Line 23 data inserter
V1649ETR	ETSI Line 23 data reader

The user may change the product function by entering the **CONFIG: Function** menu and selecting the required new product type.

CONFIG	Function	V1649INS	n	
		V1649RDR		
		V1649ETI		
		V1649ETR		



3 General System Operation

3.1 Local Control

3.1.1 Start up

Local control and monitoring of the V1649 is done through the front panel with its eight character LED display and three control buttons **Select**, **p** and **q**. There are three LEDs which also contribute to the status indication; these are labeled **+**, **Cal** and **-**.

After power up the display will start at the top level and will indicate the unit type. The display will be one of these:

V1649INS	V1649 VI and WSS inserter module
V1649RDR	V1649 VI and WSS reader module
V1649ETI	V1649 ETSI Line 23 inserter module
V1649ETR	V1649 ETSI Line 23 reader module

3.1.2 Menu Control

The **Select** and **p** and **q** 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 **p** and **q** 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.
Top Level	As above, e.g. V1649INS
Main Menu	The Main menu items, such as SETUP , ENG' ING etc. These items are all in Upper Case.
Sub Menu	Menu items under each main heading, such as Insert or Ins Line under the INSERT 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 1 Frame for insertion delay 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.

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 **p** and **q** buttons to move around the options within a level.



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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 front panel menu diagram is provided at the following references for each product:-

- Section 4.2 V1649INS Inserter front panel menu diagram.
- Section 5.2 V1649RDR Reader front panel menu diagram.
- Section 6.2 V1649ETI Inserter front panel menu diagram.
- Section 7.2 V1649ETR Reader front panel menu diagram.

3.1.3 Menu Example

This section has an example of how to manoeuvre through the menu system. It starts with the V1649INS Inserter unit in its 'sleep' mode, where the display is blank, and then proceeds to change the video insertion delay between the default setting of 0 **Lines** and a new setting of 1 **Frame**. Finally, after adjusting the video delay, the example illustrates how to return to the 'sleep' mode by pressing and holding down the select button.

Action	Display	Comments
		Start in 'sleep' mode.
Select	V1649INS	Top Level.
Select	SETUP	First Main Menu.
q	VIDEO	The Main Menu we want.
Select	V Delay	The Sub Menu we want.
Select	0 Lines	The default setting.
q	30 Lines	
q	60 Lines	
q	1 Frame	Video delay set to 1 frame.
Select+Hold	V Delay	Up one level.
Select+Hold	VIDEO	Up another level.
Select+Hold	V1649INS	Up to the Top Level.
Select+Hold		Return to 'sleep' mode.

3.1.4 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 : LEDLevel1** menu.

Vistek V1649 SDI Video Index / WSS / ETSI Line 23 Inserter / Reader



3.1.5 High Level Signal Status

There are two LEDs at the top of the front panel which indicate the SDI input status. The LED labeled 625 will be illuminated if there is a valid 625/50 serial D1 input signal. Similarly, the LED labeled 525 will be illuminated if there is a valid 525/60 serial D1 input signal. If neither LED is illuminated then there is not a valid input to the unit.

If you press the **p** and **q** buttons from the Top Level then you will see the SDI input status and the AR + AFD signal status directly.

On the **V1649INS Inserter** product pressing the **q** button from the Top level will give one of the following SDI input status indications:

	IP 625 Ü	Indicates a valid 625/50 D1 SDI input signal
or	IP 525 Ü	Indicates a valid 525/60 D1 SDI input signal
or	IP FAIL	Indicates there is not a valid D1 SDI input signal

Depressing the **q** button again will indicate the AR and AFD values being inserted into the SDI output signal. For example:-

	[] AFD04	Indicates a 4:3 source AR and an AFD value of 0
or	[] AFD54	Indicates a 4:3 source AR and an AFD value of 5
or	[] AFD24	Indicates a 16:9 source AR and an AFD value of 2
or	[] AFD74	Indicates a 16:9 source AR and an AFD value of 7

There are 16 combinations of source AR and AFD. The above examples only illustrate four of the possible 16.

On the **V1649RDR Reader** product pressing the **q** button from the Top level will give one of the following SDI input status indications:

	IP 625 Ü	Indicates a valid 625/50 D1 SDI input signal
or	IP 525 Ü	Indicates a valid 525/60 D1 SDI input signal
or	IP FAIL	Indicates there is not a valid D1 SDI input signal

Depressing the **q** button again will indicate the AR and AFD values being read from the SDI input signal. For example:-

	4 [] AFD1	Indicates a 4:3 source AR and an AFD value of 1
or	4 [] AFD3	Indicates a 4:3 source AR and an AFD value of 3
or	4 [] AFD0	Indicates a 16:9 source AR and an AFD value of 0
or	4 [] AFD4	Indicates a 16:9 source AR and an AFD value of 4
or	AFD OFF	Indicates an invalid Video Index or WSS input signal

There are 16 combinations of source AR and AFD. The above examples only illustrate four of the possible 16.



Vistek V1649 SDI Video Index / WSS / ETSI Line 23 Inserter / Reader

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

3.1.6 Variable Calibration

Most variables have a calibrated or normalised value. Any variable can be individually set to its normalised value by pressing the **p** and **q** 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 **p** and **q** buttons are used to show whether the variable is calibrated or not. After calibration the **CAL** LED will be ON.

Vistek V1649 SDI Video Index / WSS / ETSI Line 23 Inserter / Reader



3.2 Remote Control

In addition to being controlled with the menu system on the front panel the V1649 can also be controlled over the DART remote control system. For this it should be fitted into a rack which also contains a Rack Controller. The 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 ViewFind PC program and the more sophisticated ViewNet Client Server interface. 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.

3.3 Product Configuration

The V1649 can be re-configured to function as any of the variants shown below by the user in the field by simply entering the product configuration menu, and selecting the desired function.

V1649INS	Video Index and WSS data inserter
V1649RDR	Video Index and WSS data reader
V1649ETI	ETSI Line 23 data inserter
V1649ETR	ETSI Line 23 data reader

The user may change the product function by entering the **CONFIG: Function** menu and selecting the required new product type.

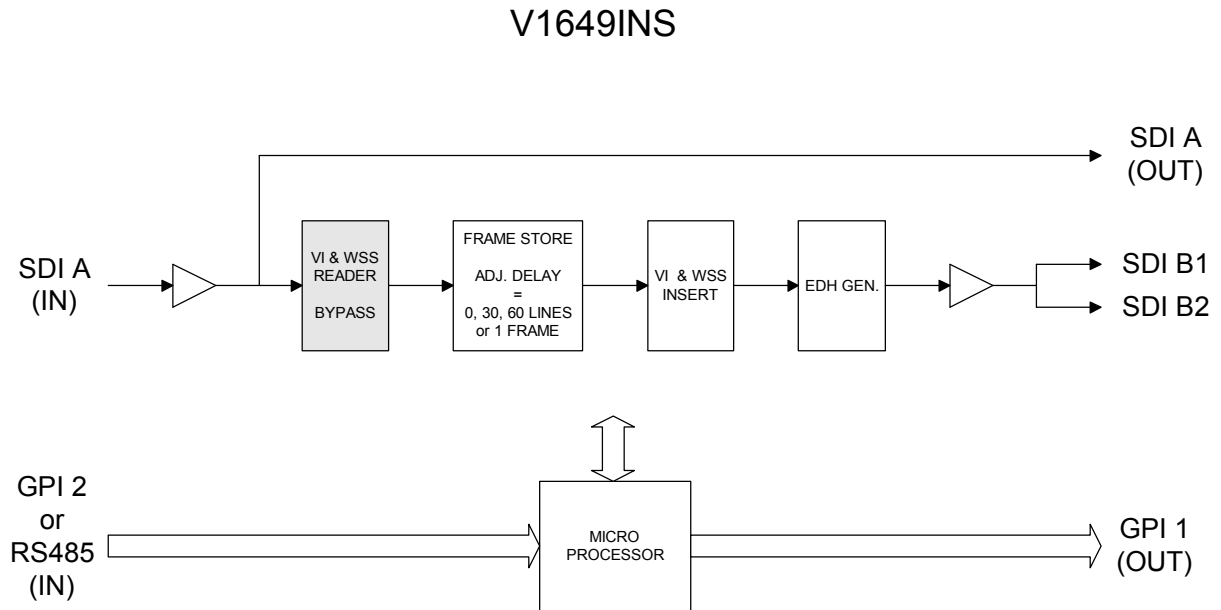
CONFIG	Function	V1649INS	n	
		V1649RDR		
		V1649ETI		
		V1649ETR		



Vistek V1649 SDI Video Index / WSS / ETSI Line 23 Inserter / Reader

4 V1649INS – Video Index And WSS Data Inserter

4.1 Block Diagram



Vistek V1649 SDI Video Index / WSS / ETSI Line 23 Inserter / Reader



4.2 Front Panel Menu

			sleep V1649INS 		
SETUP Insert AFD Src AFD Ins Line Norm	VIDEO V Delay VFL Mode Norm	STATUS Module SDI I/P Ins AFD Soft Ver GPI Ver VideoVer	ENG'ING Anc Data 525 Vbit ¹ Free-run Sleep LEDLevel VBI VBI 7 ² VBI 8 ² VBI 9 ² VBI 10 ³ VBI 11 ³ VBI 12 ³ VBI 13 ³ VBI 14 ³ VBI 15 ³ VBI 16 ³ VBI 17 ³ VBI 18 ³ VBI 19 ³ VBI 20 ³ VBI 21 ² VBI 22 ² Norm	CALIB CntrFreq Norm	CONFIG Function RS485 AD Password TestMode

¹ Available with 525/60 video only.

² Available with 625/50 video and VBI in Select mode.

³ Available when VBI in Select mode only.



Vistek V1649 SDI Video Index / WSS / ETSI Line 23 Inserter / Reader

4.3 Controls

4.3.1 Insert

SETUP	Insert	None	n	No data inserted at the output of the unit.
		VI		Insert Video Index data.
		WSS		Insert WSS data.
		VI + WSS		Insert Video Index and WSS data.

As the table above shows, this control allows the user to choose which form of data to insert into the output SDI signal.

4.3.2 AFD Source

SETUP	AFD Src	Rem/Loc	n	AR and AFD selection made via the front panel or over the DART remote control system; dependent on the position of the Rem/Loc front panel switch.
		GPI 2		AR and AFD selection made via GPI2 port on the rear panel of the V1649.
		RS485		AR and AFD selection made through the RS485 interface on the rear panel of the V1649.

This control allows the user to decide how to set/adjust the AR and AFD data values to be inserted into the output D1 signal.

If **AFD Src** is set to **Rem/Loc** then selection will be made via the front panel or over the DART remote control system depending on the position of the Rem/Loc front panel switch.

If **AFD Src** is set to **GPI 2** then selection will be made via the GPI2 port on the rear panel assembly of the V1649.

If **AFD Src** is set to **RS485** then selection will be made via the RS485 port on the rear panel assembly of the V1649.

Vistek V1649 SDI Video Index / WSS / ETSI Line 23 Inserter / Reader



4.3.3 AFD

SETUP	AFD		n	
		0 [] Full		AR = 4:3 AFD = 0
		1 [] 4:3		
		2 [] 16:9		
		3 [] 14:9		
		4 [] Rsvd		
		5 [] 14:9P		
		6 [] User		
		7 [] User		
		0 [] Full		
		1 [] 4:3		
		2 [] 16:9		
		3 [] 14:9		
		4 [] Rsvd		
		5 [] Full		
		6 [] 14:9P		
		7 [] 4:3P		AR = 16:9 AFD = 7

This control allows the user to select the AR and AFD data to be inserted into the output SDI signal. All 16 possible combinations are made available to the user.

This control will only be available if AFD source selection (**AFD Src**) has been set to **Rem/Loc**.

4.3.4 Insert Line

SETUP	Ins Line	1-23		Normalisation line number = Line 23.

This control allows the user to insert WSS signaling data on any line in the range 1 to 23.

This control will only be available if WSS (or VI + WSS) data insertion has been selected.

4.3.5 Video Insertion Delay

VIDEO	V Delay	0 Lines	n	
		30 Lines		
		60 Lines		
		1 Frame		

This control allows the user to adjust the video insertion delay through the unit. On the V1649INS inserter product this control should be set to 0 **Lines**.



Vistek V1649 SDI Video Index / WSS / ETSI Line 23 Inserter / Reader

4.3.6 Video Fail Mode

VIDEO	VFL Mode	Black	n	Cut to black.
		1 sec		Freeze for 1 second, then cut to black.
		↓		
		14 sec		
		Freeze		Freeze picture indefinitely.

This control allows the user to determine how the unit functions when the SDI video input fails. As shown in the table above, the unit may cut to black at its output immediately, or alternatively freeze the picture for a pre-defined period before again cutting to black.

Under most operating conditions it is recommended that this control be set to cut to **Black**.

4.3.7 Module Status Menu

STATUS	Module	Product code:- V1649INS
	SDI I/P	SDI input signal status.
	Ins AFD	AR and AFD codes actively being inserted.
	Soft Ver	Software version number.
	GPI Ver	GPI ACEX version number.
	VideoVer	Video ACEX version number.

4.3.8 Ancillary Data

ENG' ING	Anc Data	Anc Blk	n	
		Anc Pass		

Ancillary data is all the information embedded in the D1 data between the EAV and SAV TRSs. In most installations this is digital audio and EDH data but can include any other data that is embedded using the appropriate standard.

This control allows the user to pass or blank ancillary data, as required.

Vistek V1649 SDI Video Index / WSS / ETSI Line 23 Inserter / Reader



4.3.9 525 V-Bit Of TRS

ENG' ING	525 Vbit	Long	n	
		Short		

There has been some inconsistency in the 525 D1 standard in regard of the number of line within the vertical blanking interval for which the V-bit is set in the TRS. Early versions of CCIR Rec. 656 (1986) called for it to be active only for 10 lines per field in 525/60 signals. However it became common practice for a longer V-bit so as to be active for all the non picture lines and much equipment has been produced like this. Recently the original specification has again come to the fore.

So the V1649INS normally produces the proper CCIR Rec. 656 V-bit, but it is possible to produce the longer version using the **ENG' ING : 525 VBit** menu.

This option is only available if the unit is operating in 525/60 mode.

4.3.10 Free-Run

ENG' ING	Free-run	Free Off	n	Normal position.
		Free On		Test mode only.

This is a production test facility. The user is advised to leave this control permanently set to the **Free Off** position (normalisation position).

4.3.11 Sleep

ENG' ING	Sleep	0-30 min		Normalisation delay before sleep = 5 minutes 0 min = display permanently enabled
----------	-------	----------	--	---

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.

4.3.12 LEDLevel

ENG' ING	LEDLevel	■ ■ ■ ■		
----------	----------	---------	--	--

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



Vistek V1649 SDI Video Index / WSS / ETSI Line 23 Inserter / Reader

4.3.13 Vertical Interval (VBI) Data

There is individual control of which active lines in the vertical blanking interval are passed through the Frame Synchroniser. The exact lines which can be selected depends on the operating standard and are shown here using the usual line numbering conventions for the particular standard:

Standard	Field 1	Field 2
625/50	Lines 7 – 22	Lines 320 – 335
525/60	Lines 10 – 20	Lines 10 – 19

If the unit is operating in 525/60 then the selection menu will only show the relevant lines.

The lines are selected in pairs across the two fields, so that if, for example, you wish to pass Line 12 on Field 1 then you will have to also pass Line 12 on Field 2.

This only selects whether the active picture part of the VBI is passed, that between the SAV and EAV, and not the ancillary data which is discussed in section **4.3.8 Ancillary Data**.

Changing the VBI selections is a little different to the other menus. First go to the **ENG' ING : VBI** menu and select whether you want all lines to be Passed, or all to be Blanked or to Sel to make a selection. Only if you have selected Sel will there be the individual lines pairs on the **ENG' ING** menu below **VBI**. The easiest way to do this is to decide whether you want the majority of lines to be passed or blanked and set the unit accordingly, then change to Sel and change those lines you want to be different.

4.3.14 Crystal Oscillator:- Centre Frequency Adjustment

CALIB	CentrFrq	+127		
		↓		
		0	n	Normalisation position.
		↓		
		-127		

If the input SDI signal is removed, then the internal crystal voltage controlled oscillator will free-run at a frequency determined by this 8 bit control. This control is set up in the test department at Vistek and will not normally require re-adjustment in the field. Consequently, the user is advised not to make any adjustment to this parameter.

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4.3.15 Product Configuration

CONFIG	Function	V1649INS	n	
		V1649RDR		
		V1649ETI		
		V1649ETR		

The user may change the product function by entering the **CONFIG: Function** menu and selecting the required new product type.

4.3.16 RS485 Address

CONFIG	RS485 AD	0	n	Normalised address.
		↓		All addresses between 0 and 63 available.
		63		Top available address.

This control is available only when the AFD source control (**AFD Src**) is set to **RS485**.

4.4 GPI Interfaces

4.4.1 V1649INS Inserter:- GPI2 Input Description

The AR and AFD data may be set on the V1649INS inserter card either locally from the front panel, remotely over the DART interface or via a GPI interface available on the rear panel of the V1649INS. GPI2 is used for this purpose.

The function of GPI2 is product dependent; on the V1649INS product it is a GPI input port, and on the V1649RDR product it is a GPI output port.

The GPI2 port is available via a 9 way D-type connector on the rear panel of the V1649. When configured as a V1649INS inserter there are 5 input control lines, of which one is dedicated as the GPI enable (pin 9). The other 4 lines are binary coded to allow the user to define any one of the 16 optional AR and AFD combination settings.

Each of the inputs is activated by closing a contact between the relevant input pin and ground (pin 6).

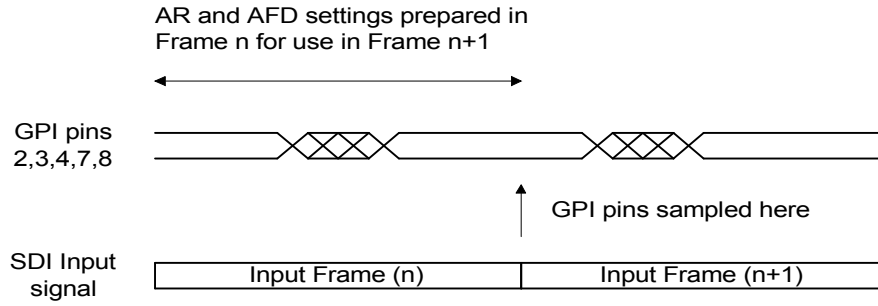
The GPI input port becomes operational when **AFD source** has been set to GPI2 (rather than Loc/Rem). Once the GPI input has been selected, and the GPI enable input pin has been closed to ground, the on board micro-processor reads the GPI input settings once per frame, roughly within the first two lines of field 1. It is incumbent on the user to ensure that the levels on all the GPI input pins are stable before this point.

If the GPI enable pin is released (OPEN connection) then the AR and AFD values will be latched.

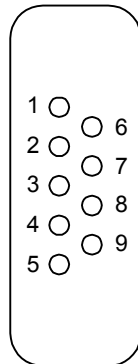


Vistek V1649 SDI Video Index / WSS / ETSI Line 23 Inserter / Reader

V1649INS:- GPI2 Input Timing Requirements



V1649INS:- GPI2 Input Pinout (Connections To Rear Panel D-type Connector)



- 1 RESERVED
- 2 INPUT :- AFD[0]
- 3 INPUT :- AFD[1]
- 4 INPUT :- AFD[2]
- 5 RESERVED
- 6 GND
- 7 INPUT :- AR = 4:3 or 16:9
- 8 RESERVED
- 9 GPI ENABLE INPUT

Vistek V1649 SDI Video Index / WSS / ETSI Line 23 Inserter / Reader



V1649INS:- GPI2 Input Control Map

	PIN 9 Enable	PIN 7 (AR Bit)	PIN 4 AFD[2]	PIN 3 AFD[1]	PIN 2 AFD[0]
AR = 4:3 AFD = 0	CLOSED	OPEN	OPEN	OPEN	OPEN
AR = 4:3 AFD = 1	CLOSED	OPEN	OPEN	OPEN	CLOSED
AR = 4:3 AFD = 2	CLOSED	OPEN	OPEN	CLOSED	OPEN
AR = 4:3 AFD = 3	CLOSED	OPEN	OPEN	CLOSED	CLOSED
AR = 4:3 AFD = 4	CLOSED	OPEN	CLOSED	OPEN	OPEN
AR = 4:3 AFD = 5	CLOSED	OPEN	CLOSED	OPEN	CLOSED
AR = 4:3 AFD = 6	CLOSED	OPEN	CLOSED	CLOSED	OPEN
AR = 4:3 AFD = 7	CLOSED	OPEN	CLOSED	CLOSED	CLOSED
AR = 16:9 AFD = 0	CLOSED	CLOSED	OPEN	OPEN	OPEN
AR = 16:9 AFD = 1	CLOSED	CLOSED	OPEN	OPEN	CLOSED
AR = 16:9 AFD = 2	CLOSED	CLOSED	OPEN	CLOSED	OPEN
AR = 16:9 AFD = 3	CLOSED	CLOSED	OPEN	CLOSED	CLOSED
AR = 16:9 AFD = 4	CLOSED	CLOSED	CLOSED	OPEN	OPEN
AR = 16:9 AFD = 5	CLOSED	CLOSED	CLOSED	OPEN	CLOSED
AR = 16:9 AFD = 6	CLOSED	CLOSED	CLOSED	CLOSED	OPEN
AR = 16:9 AFD = 7	CLOSED	CLOSED	CLOSED	CLOSED	CLOSED
GPI NOT ACTIVE	OPEN	X	X	X	X



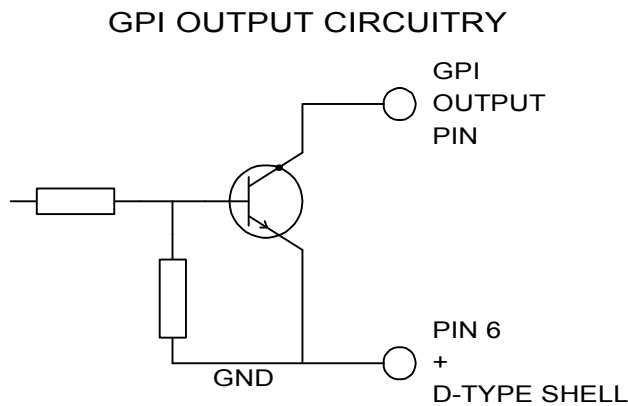
Vistek V1649 SDI Video Index / WSS / ETSI Line 23 Inserter / Reader

4.4.2 V1649INS Inserter:- GPI1 Output Description

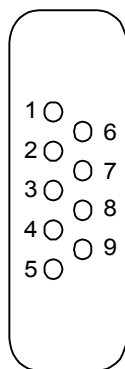
On the V1649INS Inserter product GPI1 is configured as an output port, and gives a status indication of the AR and AFD values being inserted into the output D1 data stream.

Each output pin is driven by an open collector transistor switch. It is the responsibility of the user to provide a pull up resistor to a suitable positive supply (wrt gnd) at the GPI port receive end.

Please also ensure that the screen of the GPI cable is connected to the shell of the 9 way D-type connector at each end of the cable.



V1649INS Inserter:- GPI1 Output Pinout



- 1 RESERVED
- 2 OUTPUT :- AFD[0]
- 3 OUTPUT :- AFD[1]
- 4 OUTPUT :- AFD[2]
- 5 RESERVED
- 6 GND
- 7 OUTPUT :- AR = 4:3 or 16:9
- 8 RESERVED
- 9 RESERVED

Vistek V1649 SDI Video Index / WSS / ETSI Line 23 Inserter / Reader



V1649INS:- GPI1 Output Control Map

	PIN 7 (AR Bit)	PIN 4 AFD[2]	PIN 3 AFD[1]	PIN 2 AFD[0]
AR = 4:3 AFD = 0	OPEN	OPEN	OPEN	OPEN
AR = 4:3 AFD = 1	OPEN	OPEN	OPEN	CLOSED
AR = 4:3 AFD = 2	OPEN	OPEN	CLOSED	OPEN
AR = 4:3 AFD = 3	OPEN	OPEN	CLOSED	CLOSED
AR = 4:3 AFD = 4	OPEN	CLOSED	OPEN	OPEN
AR = 4:3 AFD = 5	OPEN	CLOSED	OPEN	CLOSED
AR = 4:3 AFD = 6	OPEN	CLOSED	CLOSED	OPEN
AR = 4:3 AFD = 7	OPEN	CLOSED	CLOSED	CLOSED
AR = 16:9 AFD = 0	CLOSED	OPEN	OPEN	OPEN
AR = 16:9 AFD = 1	CLOSED	OPEN	OPEN	CLOSED
AR = 16:9 AFD = 2	CLOSED	OPEN	CLOSED	OPEN
AR = 16:9 AFD = 3	CLOSED	OPEN	CLOSED	CLOSED
AR = 16:9 AFD = 4	CLOSED	CLOSED	OPEN	OPEN
AR = 16:9 AFD = 5	CLOSED	CLOSED	OPEN	CLOSED
AR = 16:9 AFD = 6	CLOSED	CLOSED	CLOSED	OPEN
AR = 16:9 AFD = 7	CLOSED	CLOSED	CLOSED	CLOSED



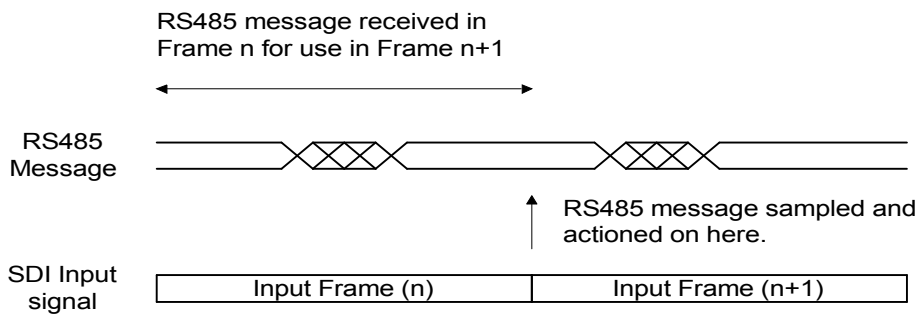
Vistek V1649 SDI Video Index / WSS / ETSI Line 23 Inserter / Reader

4.5 RS485 Interface

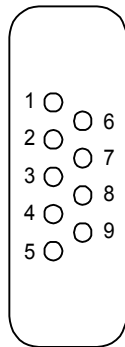
4.5.1 V1649INS Inserter:- RS485 Interface Description

If the control source (*Source*) is set to **RS485** then the AR and AFD data bits will be set via the RS485 interface. The RS485 interface is available via the GPI 2 / RS485 9 pin D-type connector on the rear panel assembly of the V1649.

V1649INS:- RS485 Interface Timing Requirements



V1649INS Inserter:- RS485 Interface Pinout



- | | | | |
|---|----------|-------|----------|
| 1 | | | |
| 2 | TX B (-) | V1649 | ➡ Remote |
| 3 | RX A (+) | V1649 | ⬅ Remote |
| 4 | | | |
| 5 | | | |
| 6 | GND | | |
| 7 | TX A (+) | V1649 | ➡ Remote |
| 8 | RX B (-) | V1649 | ⬅ Remote |
| 9 | | | |

See section **8.3 RS485 Message Protocol:- Revision 1.0** for a detailed description of the RS485 control protocol for the V1649INS Inserter.

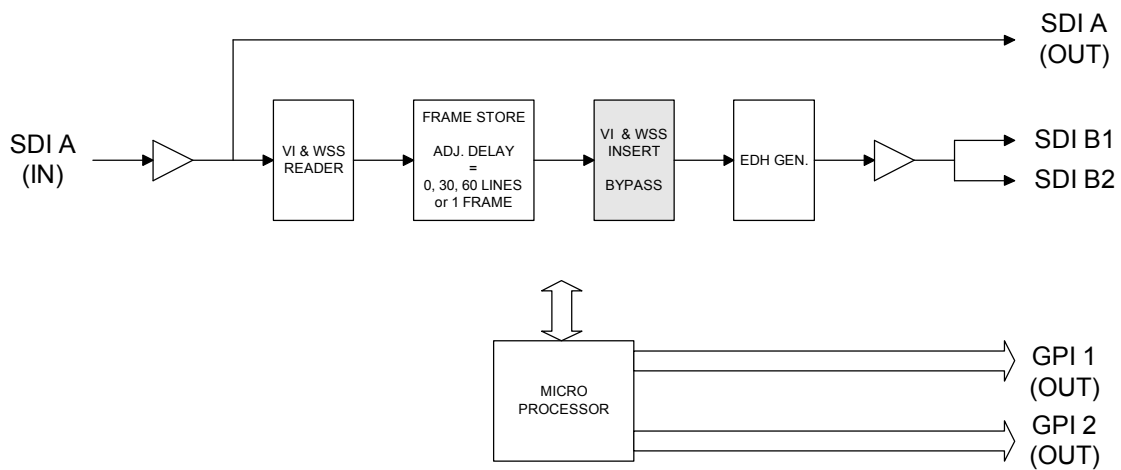
Vistek V1649 SDI Video Index / WSS / ETSI Line 23 Inserter / Reader



5 V1649RDR – Video Index And WSS Data Reader

5.1 Block Diagram

V1649RDR





Vistek V1649 SDI Video Index / WSS / ETSI Line 23 Inserter / Reader

5.2 Front Panel Menu

			sleep				
			V1649RDR				
SETUP	ARC 1 []	ARC 2 []	VIDEO	STATUS	ENG' ING	CALIB	CONFIG
Read	0[] Full	0[] Full	V Delay	Module	Anc Data	CntrFreq	Function
Rdr Line	1[] 4:3	1[] 4:3	VFL Mode	SDI I/P	525 Vbit ¹	Norm	Banner
GPI 1	2[] 16:9	2[] 16:9	Norm	Rdr AFD	Free-run		Password
GPI 2	3[] 14:9	3[] 14:9		Soft Ver	Sleep		TestMode
ARC 1 AR	4[] Rsvd	4[] Rsvd		GPI Ver	LEDLevel		
ARC 2 AR	5[] 14:9P	5[] 14:9P		VideoVer	BI		
Norm	6[] User	6[] User			VBI 7 ²		
	7[] User	7[] User			VBI 8 ²		
	0[] Full	0[] Full			VBI 9 ²		
	1[] 4:3	1[] 4:3			VBI 10 ³		
	2[] 16:9	2[] 16:9			VBI 11 ³		
	3[] 14:9	3[] 14:9			VBI 12 ³		
	4[] Rsvd	4[] Rsvd			VBI 13 ³		
	5[] User	5[] User			VBI 14 ³		
	6[] 4:9P	6[] 4:9P			VBI 15 ³		
	7[] 4:3P	7[] 4:3P			VBI 16 ³		
	Norm	Norm			VBI 17 ³		
					VBI 18 ³		
					VBI 19 ³		
					VBI 20 ³		
					VBI 21 ²		
					VBI 22 ²		
					Norm		

¹ Available with 525/60 video only.

² Available with 625/50 video and VBI in Select mode.

³ Available when VBI in Select mode only.

Vistek V1649 SDI Video Index / WSS / ETSI Line 23 Inserter / Reader



5.3 Controls

5.3.1 Read

SETUP	Read	None	n	No data read.
		VI		Read Video Index data.
		WSS		Read WSS data.

This control allows the user to choose which form of data to read from the input SDI signal, in order to extract the AR and AFD values.

5.3.2 Read Line

SETUP	Rdr Line	1-23		Normalisation line number = Line 23.

This control allows the user to read WSS signaling data from any line in the range 1 to 23.

This control will only be available if WSS data read has been selected.

5.3.3 GPI 1

SETUP	GPI 1	AFD Out	n	
		Vis ARC1		

This control determines if the GPI 1 port is to output the AR and AFD read status codes or will be used to control a Vistek Aspect Ratio Converter.

5.3.4 GPI 2

SETUP	GPI 2	AFD Out	n	
		Vis ARC2		

This control determines if the GPI 2 port is to output the AR and AFD read status codes or will be used to control a Vistek Aspect Ratio Converter.

5.3.5 ARC 1 AR:- 4:3 or 16:9 Output Service

SETUP	ARC 1 AR	4:3 []	n	
		16:9 []		

This control determines if the ARC being controlled via GPI 1 (ARC 1) is to feed a 4:3 or 16:9 output service.

This control is available only if GPI 1 has been configured to control a Vistek ARC (*vis ARC1*).



Vistek V1649 SDI Video Index / WSS / ETSI Line 23 Inserter / Reader

5.3.6 ARC 2 AR:- 4:3 or 16:9 Output Service

SETUP	ARC 2 AR	4:3 []	n	
		16:9 []		

This control determines if the ARC being controlled via GPI 2 (ARC 2) is to feed a 4:3 or 16:9 output service.

This control is available only if GPI 2 has been configured to control a Vistek ARC (**vis ARC2**).

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5.3.7 ARC 1:- AFD Mapping Presets

ARC 1 []	0 [] Full	0 [] Auto	n	Auto ratio selection
		0 [] 1		V1647 ARC Preset 1
		↓		V1647 ARC Presets 2-9
		0 [] 10		V1647 ARC Preset 10
		0 [] 16:9		4:3 I/P 16:9 O/P; Full width
		0 [] 14:9		4:3 I/P 16:9 O/P; 14:9 Pbox aspect
		0 [] PBox		4:3 I/P 16:9 O/P; Pillar box aspect
		0 [] 4:3		16:9 I/P 4:3 O/P; Full height aspect
		0 [] 14:9		16:9 I/P 4:3 O/P; 14:9 Lbox aspect
		0 [] LBox		16:9 I/P 4:3 O/P; Full letterbox aspect
		0 [] Bypass		Vistek ARC forced to Bypass
		1 [] 4:3		As above ie 18 optional settings
	2 [] 16:9		As above ie 18 optional settings	
	3 [] 14:9		As above ie 18 optional settings	
	4 [] Rsvd		As above ie 18 optional settings	
	5 [] 14:9P		As above ie 18 optional settings	
	6 [] User		As above ie 18 optional settings	
	7 [] User		As above ie 18 optional settings	
	0 [] Full		As above ie 18 optional settings	
	1 [] 4:3		As above ie 18 optional settings	
	2 [] 16:9		As above ie 18 optional settings	
	3 [] 14:9		As above ie 18 optional settings	
	4 [] Rsvd		As above ie 18 optional settings	
	5 [] Full		As above ie 18 optional settings	
	6 [] 14:9P		As above ie 18 optional settings	
	7 [] 4:3P		As above ie 18 optional settings	



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If GPI 1 (GPI 1) has been set to control a Vistek Aspect Ratio Converter (vis ARC1), then a mapping function will become available to the user via the front panel, under a main heading. One of two mapping tables, similar to the one above, become available; one for when ARC 1 is to feed a 4:3 service (ARC 1 []), and another for when it feeds a 16:9 service (ARC 1 []).

This mapping function enables the user to assign one of 18 optional ARC settings to each of the 16 possible AR and AFD input combinations. The 18 optional settings available are:

Automatic ratio selection	See section 5.5 for a description.
User presets 1-10	Not available on the V1647F Fixed Ratio ARC.
The 6 standard conversion ratios	Available on both V1647 and V1647F ARCs.
Bypass	Available on both V1647 and V1647F ARCs.

Please note that access to these mapping functions is only available via the front panel i.e. they are NOT adjustable over the DART remote control system.

5.3.8 ARC 2:- AFD Mapping Presets

If GPI 2 (GPI 2) has been set to control a Vistek Aspect Ratio Converter (vis ARC2), then a mapping function will become available to the user via the front panel, under a main heading. One of two mapping tables, similar to the one shown in section 5.3.7 ARC 1:- AFD Mapping Presets, become available; one for when ARC 2 is to feed a 4:3 service (ARC 2 []), and another for when it feeds a 16:9 service (ARC 2 []).

This mapping function enables the user to assign one of 18 optional ARC settings to each of the 16 possible AR and AFD input combinations. The 18 optional settings available are:

Automatic ratio selection	See section 5.5 for a description.
User presets 1-10	Not available on the V1647F Fixed Ratio ARC.
The 6 standard conversion ratios	Available on both V1647 and V1647F ARCs.
Bypass	Available on both V1647 and V1647F ARCs.

Please note that access to these mapping functions is only available via the front panel i.e. they are NOT adjustable over the DART remote control system.

5.3.9 Video Insertion Delay

VIDEO	V Delay	0 Lines	n	
		30 Lines		
		60 Lines		
		1 Frame		

This control allows the user to adjust the video insertion delay through the unit. On the V1649RDR reader product this will be dependent on the system architecture in which the reader is being used.

Vistek V1649 SDI Video Index / WSS / ETSI Line 23 Inserter / Reader



When controlling a Vistek ARC using the V1649RDR it is generally recommended to set the video insertion delay to 0 Lines.

5.3.10 Video Fail Mode

VIDEO	VFL Mode	Black	n	Cut to black.
		1 sec		Freeze for 1 second, then cut to black.
		↓		
		14 sec		
		Freeze		Freeze picture indefinitely.

This control allows the user to determine how the unit functions when the SDI video input fails. As shown in the table above, the unit may cut to black at its output immediately, or alternatively freeze the picture for a pre-defined period before again cutting to black.

Under most operating conditions it is recommended that this control be set to cut to **Black**.

5.3.11 Module Status Menu

STATUS	Module	Product code:- V1649RDR
	SDI I/P	SDI input signal status.
	Rdr AFD	AR and AFD codes read from input SDI source.
	Soft Ver	Software version number.
	GPI Ver	GPI ACEX version number.
	VideoVer	Video ACEX version number.

5.3.12 Ancillary Data

ENG' ING	Anc Data	Anc Blnk	n	
		Anc Pass		

Ancillary data is all the information embedded in the D1 data between the EAV and SAV TRSs. In most installations this is digital audio and EDH data but can include any other data that is embedded using the appropriate standard.

This control allows the user to pass or blank ancillary data, as required.



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5.3.13 525 V-Bit Of TRS

ENG' ING	525 Vbit	Long	n	
		Short		

There has been some inconsistency in the 525 D1 standard in regard of the number of line within the vertical blanking interval for which the V-bit is set in the TRS. Early versions of CCIR Rec. 656 (1986) called for it to be active only for 10 lines per field in 525/60 signals. However it became common practice for a longer V-bit so as to be active for all the non picture lines and much equipment has been produced like this. Recently the original specification has again come to the fore.

So the V1649INS normally produces the proper CCIR Rec. 656 V-bit, but it is possible to produce the longer version using the **ENG' ING : 525 VBit** menu.

This option is only available if the unit is operating in 525/60 mode.

5.3.14 Free-Run

ENG' ING	Free-run	Free Off	n	Normal position.
		Free On		Test mode only.

This is a production test facility. The user is advised to leave this control permanently set to the **Free Off** position (normalisation position).

5.3.15 Sleep

ENG' ING	Sleep	0-30 min		Normalisation delay before sleep = 5 minutes 0 min = display permanently enabled
----------	-------	----------	--	---

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.

5.3.16 LEDLevel

ENG' ING	LEDLevel	■ ■ ■ ■		
----------	----------	---------	--	--

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

Vistek V1649 SDI Video Index / WSS / ETSI Line 23 Inserter / Reader



5.3.17 Vertical Interval (VBI) Data

There is individual control of which active lines in the vertical blanking interval are passed through the Frame Synchroniser. The exact lines which can be selected depends on the operating standard and are shown here using the usual line numbering conventions for the particular standard:

Standard	Field 1	Field 2
625/50	Lines 7 – 22	Lines 320 – 335
525/60	Lines 10 – 20	Lines 10 – 19

If the unit is operating in 525/60 then the selection menu will only show the relevant lines.

The lines are selected in pairs across the two fields, so that if, for example, you wish to pass Line 12 on Field 1 then you will have to also pass Line 12 on Field 2.

This only selects whether the active picture part of the VBI is passed, that between the SAV and EAV, and not the ancillary data which is discussed in section 4.3.8 Ancillary Data.

Changing the VBI selections is a little different to the other menus. First go to the **ENG' ING** : **VBI** menu and select whether you want all lines to be Passed, or all to be Blanked or to Sel to make a selection. Only if you have selected Sel will there be the individual lines pairs on the **ENG' ING** menu below **VBI**. The easiest way to do this is to decide whether you want the majority of lines to be passed or blanked and set the unit accordingly, then change to Sel and change those lines you want to be different.

5.3.18 Crystal Oscillator:- Centre Frequency Adjustment

CALIB	CentrFrq	+127		
		↓		
		0	n	Normalisation position.
		↓		
		-127		

If the input SDI signal is removed, then the internal crystal voltage controlled oscillator will free-run at a frequency determined by this 8 bit control. This control is set up in the test department at Vistek and will not normally require re-adjustment in the field. Consequently, the user is advised not to make any adjustment to this parameter.

5.3.19 Product Configuration

CONFIG	Function	V1649INS	n	
		V1649RDR		
		V1649ETI		
		V1649ETR		

The user may change the product function by entering the **CONFIG: Function** menu and selecting the required new product type.



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5.4 GPI Interfaces

On the V1649RDR Reader the two GPI ports on the rear panel assembly are defined as outputs. Each may be independently configured to output the AR and AFD values read from the input signal, or alternatively each may drive a Vistek V1647 Aspect Ratio Converter.

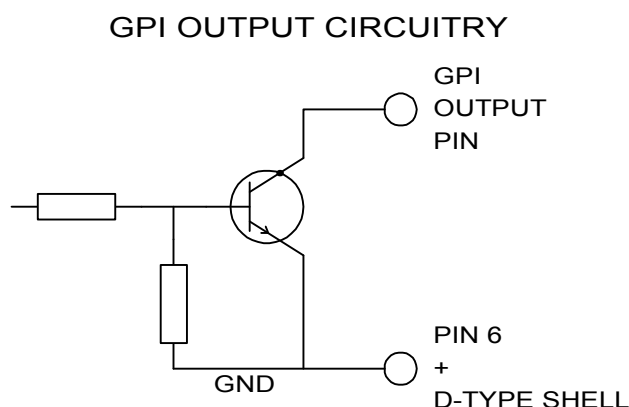
5.4.1 GPI1 and GPI2 Configured To Output The AR and AFD Read Values

In this situation, the AR and AFD values are read from the Video Index or WSS input data, and then output on the relevant GPI port. **The GPI pins change state at approximately line 30 of the frame in which the AR and AFD data has changed.**

There are 5 output pins, 4 of which directly indicate the AR bit and the three bit AFD value. The last pin is used to indicate if the Video Index or WSS data being read is valid. If the data is valid then the VI + WSS STATUS output will produce a closed contact. If the incoming data becomes invalid then the VI + WSS STATUS output will produce an open contact, and the status of the other 4 outputs will be held at the values set prior to the data going invalid.

Each output pin is driven by an open collector transistor switch. It is the responsibility of the user to provide a pull up resistor to a suitable positive supply (wrt gnd) at the GPI port receive end.

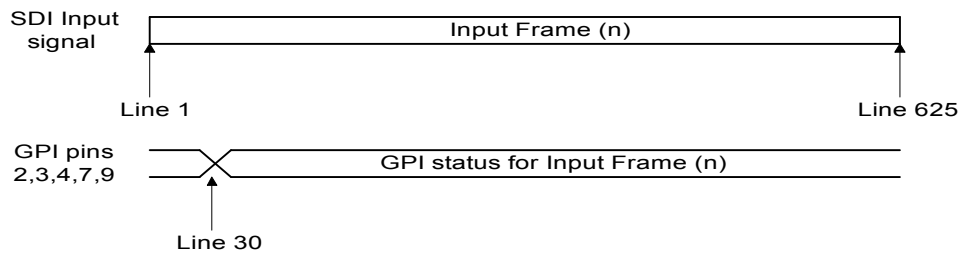
Please also ensure that the screen of the GPI cable is connected to the shell of the 9 way D-type connector at each end of the cable.



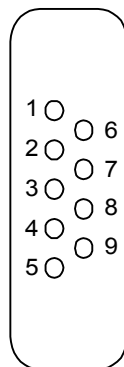
Vistek V1649 SDI Video Index / WSS / ETSI Line 23 Inserter / Reader



V1649RDR Reader:- GPI1 / GPI2 Output Timing (AFD Output Status)



V1649RDR Reader:- GPI1 and GPI2 Output Pinout (AFD Output Format)



- 1 RESERVED
- 2 OUTPUT :- AFD[0]
- 3 OUTPUT :- AFD[1]
- 4 OUTPUT :- AFD[2]
- 5 RESERVED
- 6 GND
- 7 OUTPUT :- AR = 4:3 or 16:9
- 8 RESERVED
- 9 OUTPUT:- VI + WSS STATUS



Vistek V1649 SDI Video Index / WSS / ETSI Line 23 Inserter / Reader

V1649RDR Reader:- GPI1 / GPI2 Output Control Map (AFD Output Format)

	PIN 9 (Status)	PIN 7 (AR Bit)	PIN 4 AFD[2]	PIN 3 AFD[1]	PIN 2 AFD[0]
AR = 4:3 AFD = 0	CLOSED	OPEN	OPEN	OPEN	OPEN
AR = 4:3 AFD = 1	CLOSED	OPEN	OPEN	OPEN	CLOSED
AR = 4:3 AFD = 2	CLOSED	OPEN	OPEN	CLOSED	OPEN
AR = 4:3 AFD = 3	CLOSED	OPEN	OPEN	CLOSED	CLOSED
AR = 4:3 AFD = 4	CLOSED	OPEN	CLOSED	OPEN	OPEN
AR = 4:3 AFD = 5	CLOSED	OPEN	CLOSED	OPEN	CLOSED
AR = 4:3 AFD = 6	CLOSED	OPEN	CLOSED	CLOSED	OPEN
AR = 4:3 AFD = 7	CLOSED	OPEN	CLOSED	CLOSED	CLOSED
AR = 16:9 AFD = 0	CLOSED	CLOSED	OPEN	OPEN	OPEN
AR = 16:9 AFD = 1	CLOSED	CLOSED	OPEN	OPEN	CLOSED
AR = 16:9 AFD = 2	CLOSED	CLOSED	OPEN	CLOSED	OPEN
AR = 16:9 AFD = 3	CLOSED	CLOSED	OPEN	CLOSED	CLOSED
AR = 16:9 AFD = 4	CLOSED	CLOSED	CLOSED	OPEN	OPEN
AR = 16:9 AFD = 5	CLOSED	CLOSED	CLOSED	OPEN	CLOSED
AR = 16:9 AFD = 6	CLOSED	CLOSED	CLOSED	CLOSED	OPEN
AR = 16:9 AFD = 7	CLOSED	CLOSED	CLOSED	CLOSED	CLOSED
VI or WSS DATA INVALID	OPEN	HOLD LEVEL	HOLD LEVEL	HOLD LEVEL	HOLD LEVEL

Vistek V1649 SDI Video Index / WSS / ETSI Line 23 Inserter / Reader



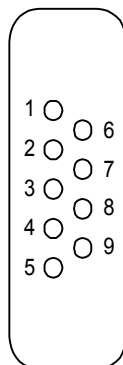
5.4.2 GPI1 and GPI2 Configured To Drive Vistek V1647 ARCs

In this situation, the AR and AFD values are initially read from the Video Index or WSS input data. A mapping function is then applied to map each AR and AFD combination to a user defined V1647 Aspect Ratio Converter setting. A detailed description of the ARC mapping functions may be found in sections **5.3.7 ARC 1:- AFD Mapping Presets** and **5.3.8 ARC 2:- AFD Mapping Presets**.

Each of the two GPI ports may be independently configured to control a Vistek ARC. Furthermore, each ARC may be assigned to serve either a 4:3 or 16:9 service output.

The pinouts of GPI1 and GPI2 when controlling a Vistek V1647 Aspect Ratio Converter are shown in the diagram below. They are a pin-to-pin match of the GPI input pinout on the Vistek ARC i.e. pin 1 to pin 1, pin 2 to pin 2, etc.. Suitable cables for interconnection between V1649RDR Readers and V1647 Aspect Ratio Converters may be available from Vistek on request.

V1649RDR Reader:- GPI1 and GPI2 Output Pinout (V1647 ARC Control Output Format)



- 1 RESERVED
- 2 OUTPUT
- 3 OUTPUT
- 4 OUTPUT
- 5 RESERVED
- 6 GND
- 7 OUTPUT
- 8 BYPASS OUTPUT
- 9 GPI ENABLE OUTPUT



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V1649RDR Reader:- GPI1 / GPI2 Output Control Map (V1647 Control Output Format)

V1647 Standard Ratios

Standard Ratios	PIN 9 Enable	PIN 8 Bypass	PIN 7 Output	PIN 4 Output	PIN 3 Output	PIN 2 Output
4:3 I/P $\bar{\text{O}}$ 16:9 O/P Full width aspect	CLOSED	OPEN	OPEN	OPEN	OPEN	CLOSED
4:3 I/P $\bar{\text{O}}$ 16:9 O/P 14:9 Pillarbox aspect	CLOSED	OPEN	OPEN	OPEN	CLOSED	OPEN
4:3 I/P $\bar{\text{O}}$ 16:9 O/P Full Pillarbox aspect	CLOSED	OPEN	OPEN	CLOSED	OPEN	OPEN
16:9 I/P $\bar{\text{O}}$ 4:3 O/P Full height aspect	CLOSED	OPEN	CLOSED	OPEN	OPEN	CLOSED
16:9 I/P $\bar{\text{O}}$ 4:3 O/P 14:9 Letterbox aspect	CLOSED	OPEN	CLOSED	OPEN	CLOSED	OPEN
16:9 I/P $\bar{\text{O}}$ 4:3 O/P Full Letterbox aspect	CLOSED	OPEN	CLOSED	CLOSED	OPEN	OPEN
Bypass mode	CLOSED	CLOSED	X	X	X	X
VI or WSS DATA INVALID	OPEN	HOLD LEVEL	HOLD LEVEL	HOLD LEVEL	HOLD LEVEL	HOLD LEVEL

Vistek V1649 SDI Video Index / WSS / ETSI Line 23 Inserter / Reader



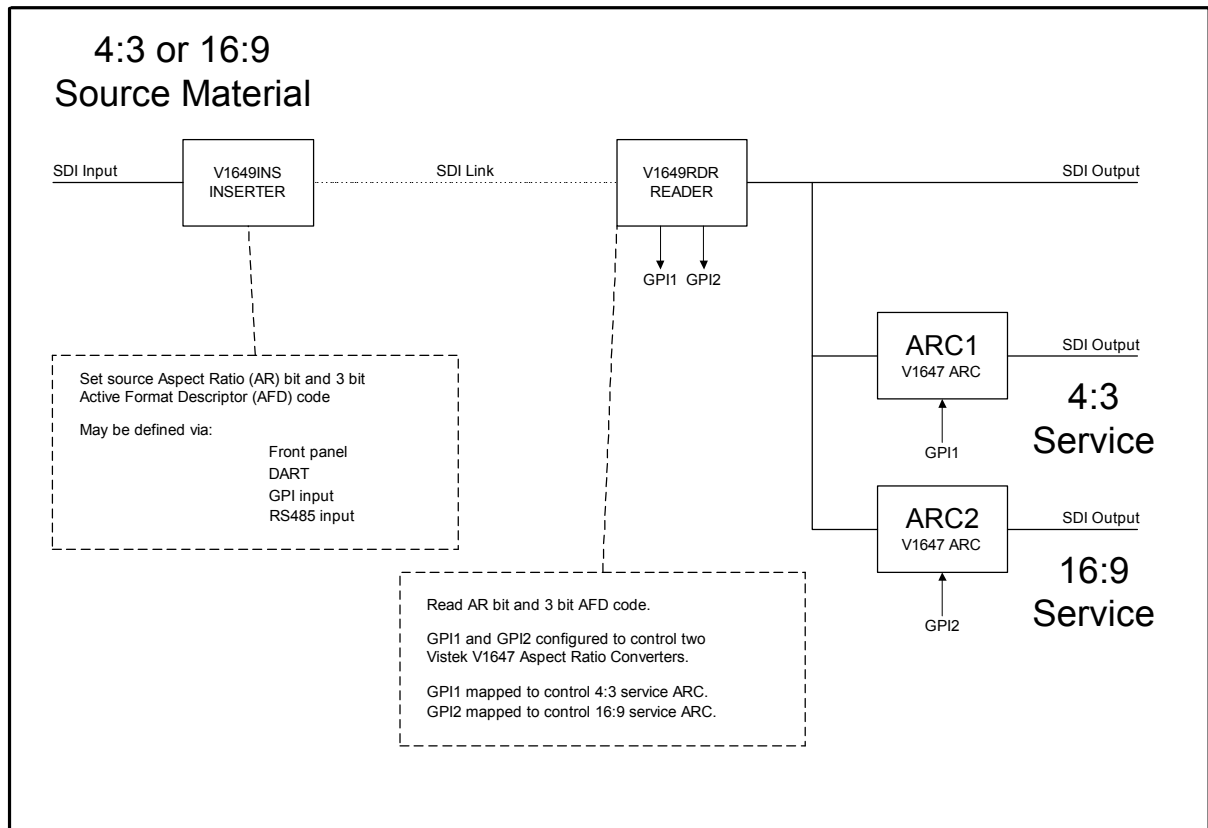
V1649RDR Reader:- GPI1 / GPI2 Output Control Map (V1647 Control Output Format)

V1647 User Presets

User Presets	PIN 9 Enable	PIN 8 Bypass	PIN 7 Output	PIN 4 Output	PIN 3 Output	PIN 2 Output
1	CLOSED	OPEN	OPEN	OPEN	OPEN	OPEN
2	CLOSED	OPEN	OPEN	OPEN	CLOSED	CLOSED
3	CLOSED	OPEN	OPEN	CLOSED	OPEN	CLOSED
4	CLOSED	OPEN	OPEN	CLOSED	CLOSED	OPEN
5	CLOSED	OPEN	OPEN	CLOSED	CLOSED	CLOSED
6	CLOSED	OPEN	CLOSED	OPEN	OPEN	OPEN
7	CLOSED	OPEN	CLOSED	OPEN	CLOSED	CLOSED
8	CLOSED	OPEN	CLOSED	CLOSED	OPEN	CLOSED
9	CLOSED	OPEN	CLOSED	CLOSED	CLOSED	OPEN
10	CLOSED	OPEN	CLOSED	CLOSED	CLOSED	CLOSED
Bypass mode	CLOSED	CLOSED	X	X	X	X
VI or WSS DATA INVALID	OPEN	HOLD LEVEL	HOLD LEVEL	HOLD LEVEL	HOLD LEVEL	HOLD LEVEL

5.5 V1649RDR Reader / V1647 ARC System Integration

The diagram below shows a typical system application in which a single V1649RDR Reader controls two Vistek V1647 Aspect Ratio Converters via its two GPI output ports, GPI1 and GPI2.



The V1649INS Inserter, at the input to the SDI link, inserts the source Aspect Ratio (AR) bit and the Active Format Descriptor (AFD) three bit code into the SDI data stream. The transport mechanism for conveying this data may be Video Index (digital based) or WSS (analogue based).

The SDI link could be a link between a television studio and a remote transmission site from where both analogue (4:3) and digital (16:9) services are transmitted.

At the receiver end of the link the V1649RDR Reader reads the AR and AFD values integrated into the SDI signal. A mapping function is then applied to map each AR and AFD combination to a user defined V1647 Aspect Ratio Converter setting, for each of the two ARCs connected to the reader. A detailed description of the ARC mapping functions may be found in sections **5.3.7 ARC 1:- AFD Mapping Presets** and **5.3.8 ARC 2:- AFD Mapping Presets**.

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In our application GPI1 is assigned to control ARC1, which feeds the 4:3 output service, and GPI2 is assigned to control ARC2, which feeds the 16:9 output service. Defining the output service mode for each GPI port is described in sections **5.3.5 ARC 1 AR:- 4:3 or 16:9 Output Service** and **5.3.6 ARC 2 AR:- 4:3 or 16:9 Output Service**.

Let us assume the mapping functions for all input signal AR and AFD combination values, for each output service, have been set to auto (the default setting). If an automatic ARC setting has been selected then the on board micro-processor assumes the AR bit defines the input source aspect ratio, and the **AFD** describes which portion of the **input** signal has active picture, ie.

- AR = 16:9 Defines a 16:9 full format input signal
AFD = 0
- AR = 4:3 Defines a 4:3 full format input signal
AFD = 0
- AR = 16:9 Defines a 16:9 full Pillarbox input signal
AFD = 1 16:9 input signal with a 4:3 active image in the middle of the screen
- AR = 4:3 Defines a 4:3 full Letterbox input signal
AFD = 2 4:3 input signal with a 16:9 active image in the middle of the screen

The micro-processor then selects the most appropriate available ARC setting for converting the input signal to the relevant output service. See table below for a few examples:-

Input AR / AFD	Input Signal Description	4:3 Output Service Automatic ARC Mapping Ratio	16:9 Output Service Automatic ARC Mapping Ratio
AR = 16:9 AFD = 0	16:9 Full Format Input Signal	16:9 I/P \rightarrow 4:3 O/P Full Letterbox aspect	Bypass
AR = 4:3 AFD = 0	4:3 Full Format Input Signal	Bypass	4:3 I/P \rightarrow 16:9 O/P Pillar box aspect
AR = 16:9 AFD = 1	16:9 Full Pillarbox Input Signal	16:9 I/P \rightarrow 4:3 O/P Full height aspect	Bypass
AR = 4:3 AFD = 2	4:3 Full Letterbox Input Signal	Bypass	4:3 I/P \rightarrow 16:9 O/P Full width aspect

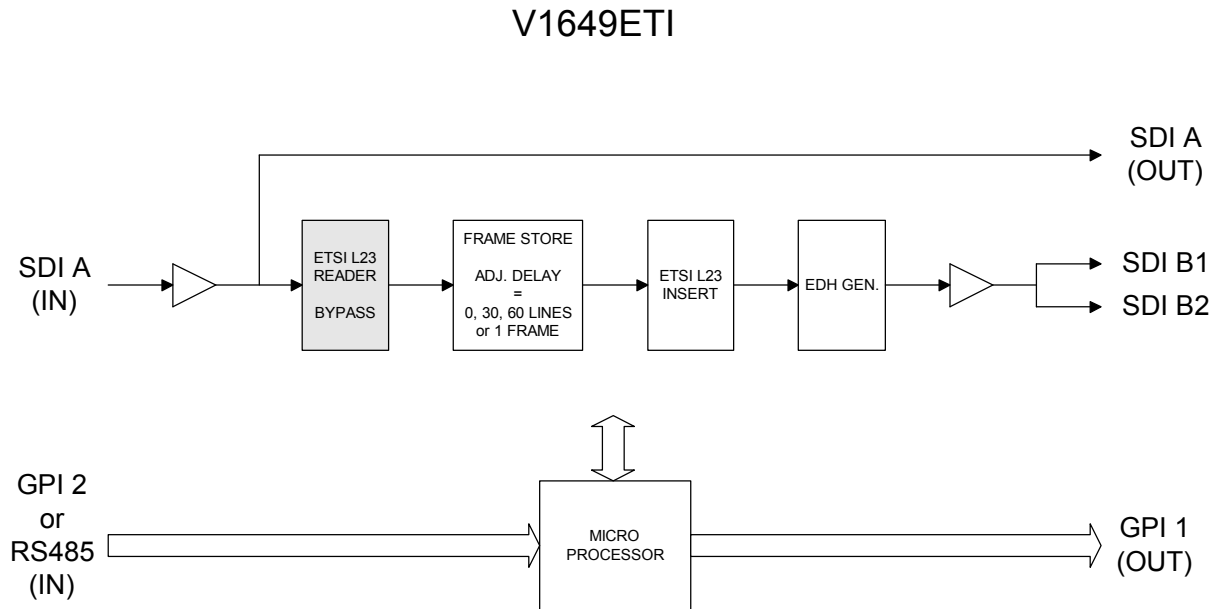
Please note that in many applications the AFD code is used to describe how the input source image (defined by the AR bit) should be displayed on a screen after conversion or transmission. For this type of application the user would not choose automatic ARC setting selection, but would need to choose one of the other 17 optional settings.



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6 V1649ETI – ETSI Line 23 Data Inserter

6.1 Block Diagram



Vistek V1649 SDI Video Index / WSS / ETSI Line 23 Inserter / Reader



6.2 Front Panel Menu

			sleep V1649ETI 		
SETUP Source Insert Aspect R Mode Coding Helper Teletext Subtitle S/Sound Copyrgh Copy Norm	VIDEO V Delay VFL Mode Norm	STATUS Module SDI I/P Soft Ver GPI Ver VideoVer	ENG' ING Anc Data 525 Vbit ¹ Free-run Sleep LEDLevel VBI VBI 7 ² VBI 8 ² VBI 9 ² VBI 10 ³ VBI 11 ³ VBI 12 ³ VBI 13 ³ VBI 14 ³ VBI 15 ³ VBI 16 ³ VBI 17 ³ VBI 18 ³ VBI 19 ³ VBI 20 ³ VBI 21 ² VBI 22 ² Norm	CALIB CntrFreq Norm	CONFIG Function RS485 AD Password TestMode

¹ Available with 525/60 video only.

² Available with 625/50 video and VBI in Select mode.

³ Available when VBI in Select mode only.



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6.3 Controls

6.3.1 Source

SETUP	Source	Rem/Loc	n	All ETSI information bits selected and adjusted via the front panel or over the DART remote control system; dependent on the position of the Rem/Loc front panel switch.
		GPI 2		Aspect Ratio (AR) information bits defined via the GPI2 port on the rear panel assembly of the V1649. All other information bits set via the front panel or over the DART remote control system.
		RS485		All ETSI information bits selected and adjusted via the RS485 interface (GPI2/RS485 connector on the rear panel assembly of the V1649).

This control allows the user to decide how to set/adjust the ETSI information data bit values to be inserted into the output D1 signal.

6.3.2 Insert

SETUP	Insert	None	n	No data inserted at the output of the unit.
		ETSI		Insert ETSI Line 23 data.

6.3.3 Aspect Ratio

SETUP	Aspect R	0 [] Full	n	Full format 4:3
		1 [] 14:9		Box 14:9 centre
		2 [] 14:9		Box 14:9 top
		3 [] 16:9		Box 16:9 centre
		3 [] 16:9		Box 16:9 top
		5 [] >16:9		Box > 16:9 centre
		6 [] 14:9P		Full format 4x3 (shoot and protect 14:9 centre)
		7 [] 16:9A		Full format 16:9 (anamorphic)

This control is available **only** when the source control (Source) is set to Rem/Loc.

6.3.4 Mode

SETUP	Mode	Camera	n	Camera mode
		Film		Film mode

This control is **not** available when the source control (Source) is set to RS485.

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6.3.5 Coding

SETUP	Coding	Standard	n	Standard coding
		MACP		Motion Adaptive Colour Plus

This control is **not** available when the source control (**Source**) is set to RS485.

6.3.6 Helper

SETUP	Helper	NoHelper	n	No helper
		HelperOn		Modulated helper

This control is **not** available when the source control (**Source**) is set to RS485.

6.3.7 Teletext

SETUP	Teletext	No STs	n	No subtitles within teletext
		ST in TT		Subtitles within teletext

This control is **not** available when the source control (**Source**) is set to RS485.

6.3.8 Subtitle

SETUP	Subtitle	None	n	No open subtitles
		In AIR		Subtitles in Active Image Region/area
		Out AIR		Subtitles out Active Image Region/area

This control is **not** available when the source control (**Source**) is set to RS485.

6.3.9 Surround Sound

SETUP	S/Sound	No S/S	n	No surround sound information
		S/S Mode		Surround sound mode

This control is **not** available when the source control (**Source**) is set to RS485.

6.3.10 Copyright

SETUP	Copyrghrt	No Cpyrht	n	No copyright asserted or status unknown
		Asserted		Copyright asserted

This control is **not** available when the source control (**Source**) is set to RS485.

6.3.11 Copy

SETUP	Copy	Copy OK	n	Copying not restricted
		Restrict		Copying restricted

This control is **not** available when the source control (**Source**) is set to RS485.



Vistek V1649 SDI Video Index / WSS / ETSI Line 23 Inserter / Reader

6.3.12 Video Insertion Delay

VIDEO	V Delay	0 Lines	n	
		30 Lines		
		60 Lines		
		1 Frame		

This control allows the user to adjust the video insertion delay through the unit. On the V1649ETI inserter product this control should be set to 0 Lines.

6.3.13 Video Fail Mode

VIDEO	VFL Mode	Black	n	Cut to black.
		1 sec		Freeze for 1 second, then cut to black.
		↓		
		14 sec		Freeze for 14 seconds, then cut to black.
		Freeze		Freeze picture indefinitely.

This control allows the user to determine how the unit functions when the SDI video input fails. As shown in the table above, the unit may cut to black at its output immediately, or alternatively freeze the picture for a pre-defined period before again cutting to black.

Under most operating conditions it is recommended that this control be set to cut to **Black**.

6.3.14 Module Status Menu

STATUS	Module	Product code:- V1649ETI
	SDI I/P	SDI input signal status.
	Soft Ver	Software version number.
	GPI Ver	GPI ACEX version number.
	VideoVer	Video ACEX version number.

6.3.15 Ancillary Data

ENG' ING	Anc Data	Anc Blnk	n	
		Anc Pass		

Ancillary data is all the information embedded in the D1 data between the EAV and SAV TRSs. In most installations this is digital audio and EDH data but can include any other data that is embedded using the appropriate standard.

This control allows the user to pass or blank ancillary data, as required.

Vistek V1649 SDI Video Index / WSS / ETSI Line 23 Inserter / Reader



6.3.16 525 V-Bit Of TRS

ENG' ING	525 Vbit	Long	n	
		Short		

There has been some inconsistency in the 525 D1 standard in regard of the number of line within the vertical blanking interval for which the V-bit is set in the TRS. Early versions of CCIR Rec. 656 (1986) called for it to be active only for 10 lines per field in 525/60 signals. However it became common practice for a longer V-bit so as to be active for all the non picture lines and much equipment has been produced like this. Recently the original specification has again come to the fore.

So the V1649INS normally produces the proper CCIR Rec. 656 V-bit, but it is possible to produce the longer version using the **ENG' ING : 525 Vbit** menu.

This option is only available if the unit is operating in 525/60 mode.

6.3.17 Free-Run

ENG' ING	Free-run	Free Off	n	Normal position.
		Free On		Test mode only.

This is a production test facility. The user is advised to leave this control permanently set to the **Free Off** position (normalisation position).

6.3.18 Sleep

ENG' ING	Sleep	0-30 min		Normalisation delay before sleep = 5 minutes 0 min = display permanently enabled
----------	-------	----------	--	---

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.

6.3.19 LEDLevel

ENG' ING	LEDLevel	■ ■ ■ ■		
----------	----------	---------	--	--

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



Vistek V1649 SDI Video Index / WSS / ETSI Line 23 Inserter / Reader

6.3.20 Vertical Interval (VBI) Data

There is individual control of which active lines in the vertical blanking interval are passed through the Frame Synchroniser. The exact lines which can be selected depends on the operating standard and are shown here using the usual line numbering conventions for the particular standard:

Standard	Field 1	Field 2
625/50	Lines 7 – 22	Lines 320 – 335
525/60	Lines 10 – 20	Lines 10 – 19

If the unit is operating in 525/60 then the selection menu will only show the relevant lines.

The lines are selected in pairs across the two fields, so that if, for example, you wish to pass Line 12 on Field 1 then you will have to also pass Line 12 on Field 2.

This only selects whether the active picture part of the VBI is passed, that between the SAV and EAV, and not the ancillary data which is discussed in section 4.3.8 Ancillary Data.

Changing the VBI selections is a little different to the other menus. First go to the **ENG' ING** : **VBI** menu and select whether you want all lines to be Passed, or all to be Blanked or to Sel to make a selection. Only if you have selected Sel will there be the individual lines pairs on the **ENG' ING** menu below **VBI**. The easiest way to do this is to decide whether you want the majority of lines to be passed or blanked and set the unit accordingly, then change to Sel and change those lines you want to be different.

6.3.21 Crystal Oscillator:- Centre Frequency Adjustment

CALIB	CentrFrq	+127		
		↓		
	0	n	Normalisation position.	
	↓			
	-127			

If the input SDI signal is removed, then the internal crystal voltage controlled oscillator will free-run at a frequency determined by this 8 bit control. This control is set up in the test department at Vistek and will not normally require re-adjustment in the field. Consequently, the user is advised not to make any adjustment to this parameter.

Vistek V1649 SDI Video Index / WSS / ETSI Line 23 Inserter / Reader



6.3.22 Product Configuration

CONFIG	Function	V1649INS	n	
		V1649RDR		
		V1649ETI		
		V1649ETR		

The user may change the product function by entering the **CONFIG: Function** menu and selecting the required new product type.

6.3.23 RS485 Address

CONFIG	RS485 AD	0	n	Normalised address.
		↓		All addresses between 0 and 63 available.
		63		Top available address.

This control is available only when the source control (**Source**) is set to **RS485**.



Vistek V1649 SDI Video Index / WSS / ETSI Line 23 Inserter / Reader

6.4 GPI Interfaces

6.4.1 V1649ETI Inserter:- GPI2 Input Description

The Aspect Ratio (AR) data may be set on the V1649ETI inserter card either locally from the front panel, remotely over the DART interface, through the RS485 interface or via a GPI interface available on the rear panel of the V1649ETI. GPI2 is used for this purpose.

The function of GPI2 is product dependent; on the V1649ETI and V1649INS products it is a GPI input port, and on the V1649RDR product it is a GPI output port.

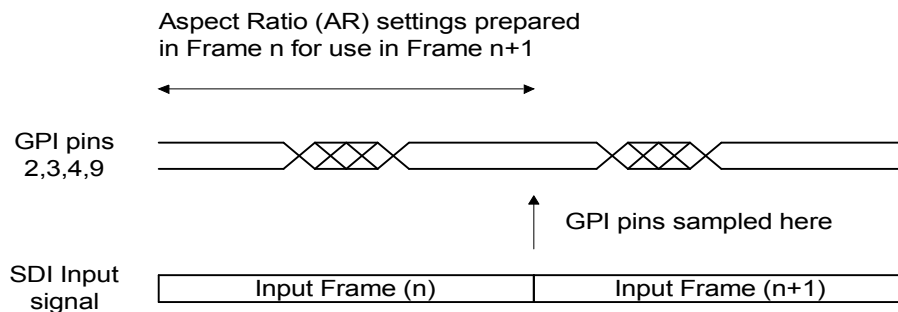
The GPI2 port is available via a 9 way D-type connector on the rear panel of the V1649. When configured as a V1649ETI inserter there are 4 input control lines, of which one is dedicated as the GPI enable (pin 9). The other 3 lines are binary coded to allow the user to define any one of the 7 optional Aspect Ratio (AR) combination settings.

Each of the inputs is activated by closing a contact between the relevant input pin and ground (pin 6).

The GPI input port becomes operational when **source** has been set to **GPI 2** (rather than Loc/Rem or RS485). Once the GPI input has been selected, and the GPI enable input pin has been closed to ground, the on board micro-processor reads the GPI input settings once per frame, roughly within the first two lines of field 1. It is incumbent on the user to ensure that the levels on all the GPI input pins are stable before this point.

If the GPI enable pin is released (OPEN connection) then the Aspect Ratio (AR) values will be latched.

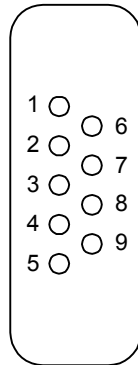
V1649ETI:- GPI2 Input Timing Requirements



Vistek V1649 SDI Video Index / WSS / ETSI Line 23 Inserter / Reader



V1649ETI:- GPI2 Input Pinout (Connections To Rear Panel D-type Connector)



- 1 RESERVED
- 2 INPUT :- AR[0]
- 3 INPUT :- AR[1]
- 4 INPUT :- AR[2]
- 5 RESERVED
- 6 GND
- 7 RESERVED
- 8 RESERVED
- 9 GPI ENABLE INPUT

V1649ETI:- GPI2 Input Control Map

Aspect Ratio (AR) Setting	AR Value	PIN 9 Enable	PIN 4 AR[2]	PIN 3 AR[1]	PIN 2 AR[0]
Full format 4:3	AR = 0	CLOSED	OPEN	OPEN	OPEN
Box 14:9 centre	AR = 1	CLOSED	OPEN	OPEN	CLOSED
Box 14:9 top	AR = 2	CLOSED	OPEN	CLOSED	OPEN
Box 16:9 centre	AR = 3	CLOSED	OPEN	CLOSED	CLOSED
Box 16:9 top	AR = 4	CLOSED	CLOSED	OPEN	OPEN
Box > 16:9 centre	AR = 5	CLOSED	CLOSED	OPEN	CLOSED
Full format 4x3 (S & P 14:9 centre)	AR = 6	CLOSED	CLOSED	CLOSED	OPEN
Full format 16:9 (anamorphic)	AR = 7	CLOSED	CLOSED	CLOSED	CLOSED
GPI NOT ACTIVE		OPEN	X	X	X



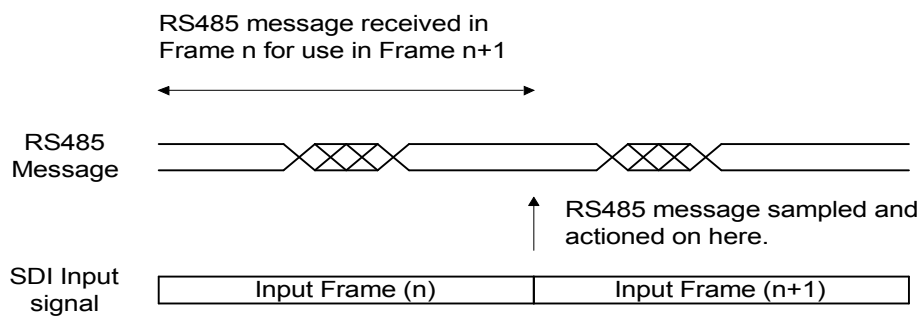
Vistek V1649 SDI Video Index / WSS / ETSI Line 23 Inserter / Reader

6.5 RS485 Interface

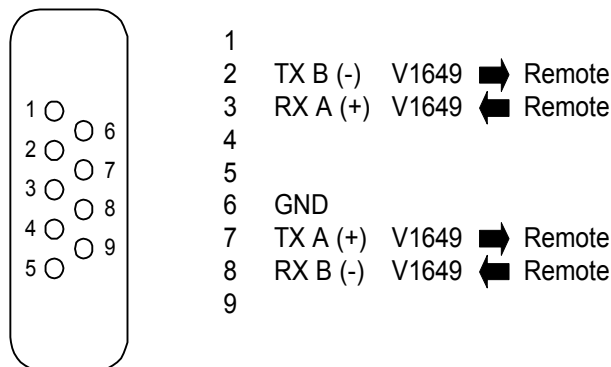
6.5.1 V1649ETI Inserter:- RS485 Interface Description

If the control source (**source**) is set to **RS485** then **ALL** 14 ETSI information bits will be set via the RS485 interface. The RS485 interface is available via the GPI 2 / RS485 9 pin D-type connector on the rear panel assembly of the V1649.

V1649ETI:- RS485 Interface Timing Requirements



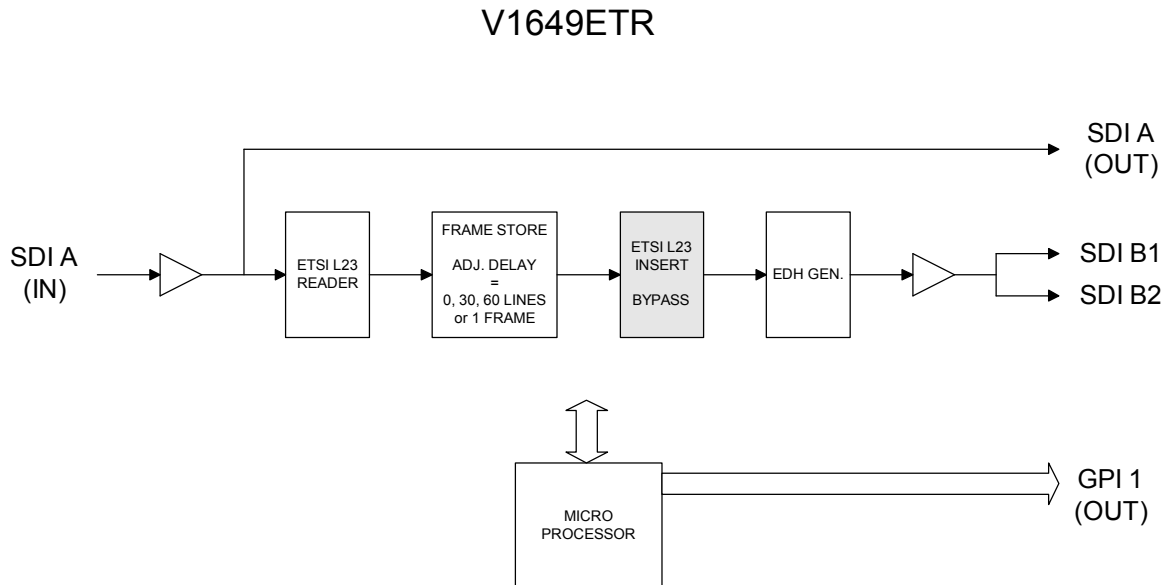
V1649ETI Inserter:- RS485 Interface Pinout



See section **8.3 RS485 Message Protocol:- Revision 1.0** for a detailed description of the RS485 control protocol for the V1649ETI ETSI Inserter.

7 V1649ETR – ETSI Line 23 Data Reader

7.1 Block Diagram





Vistek V1649 SDI Video Index / WSS / ETSI Line 23 Inserter / Reader

7.2 Front Panel Menu

sleep					
V1649ETR					
SETUP	VIDEO	STATUS	ENG' ING	CALIB	CONFIG
Read	V Delay	Module	Anc Data	CntrFreq	Function
Norm	VFL Mode	SDI I/P	525 Vbit ¹	Norm	Password
	Norm	ETSI	Free-run		TestMode
		Aspect R	Sleep		
		Mode	LEDLevel		
		Coding	VBI		
		Helper	VBI 7 ²		
		Teletext	VBI 8 ²		
		Subtitle	VBI 9 ²		
		S/Sound	VBI 10 ³		
		Copyright	VBI 11 ³		
		Copy	VBI 12 ³		
		Soft Ver	VBI 13 ³		
		GPI Ver	VBI 14 ³		
		VideoVer	VBI 15 ³		
			VBI 16 ³		
			VBI 17 ³		
			VBI 18 ³		
			VBI 19 ³		
			VBI 20 ³		
			VBI 21 ²		
			VBI 22 ²		
			Norm		

¹ Available with 525/60 video only.

² Available with 625/50 video and VBI in Select mode.

³ Available when VBI in Select mode only.

Vistek V1649 SDI Video Index / WSS / ETSI Line 23 Inserter / Reader



7.3 Controls

7.3.1 Read

SETUP	Read	None	n	No data read.
		ETSI		Read ETSI Line 23 data.

7.3.2 Video Insertion Delay

VIDEO	V Delay	0 Lines	n	
		30 Lines		
		60 Lines		
		1 Frame		

This control allows the user to adjust the video insertion delay through the unit. On the V1649ETR inserter product this control should be set to 0 **Lines**.

7.3.3 Video Fail Mode

VIDEO	VFL Mode	Black	n	Cut to black.
		1 sec		Freeze for 1 second, then cut to black.
		↓		
		14 sec		
		Freeze		Freeze picture indefinitely.

This control allows the user to determine how the unit functions when the SDI video input fails. As shown in the table above, the unit may cut to black at its output immediately, or alternatively freeze the picture for a pre-defined period before again cutting to black.

Under most operating conditions it is recommended that this control be set to cut to **Black**.



Vistek V1649 SDI Video Index / WSS / ETSI Line 23 Inserter / Reader

7.3.4 Module Status Menu

STATUS	Module	Product code:- V1649ETR
	SDI I/P	DI input signal status.
	ETSI	Status of incoming data:- ETSI valid or invalid
	Aspect R	Status of the 3 bit Aspect Ratio user information bit field
	Mode	Status of the Mode user information bit
	Coding	Status of the Coding user information bit
	Helper	Status of the Helper user information bit
	Teletext	Status of the Teletext user information bit
	Subtitle	Status of the 2 bit Subtitle user information bit field
	S/Sound	Status of the Surround Sound user information bit
	Copyrgh	Status of the Copyright user information bit
	Copy	Status of the Copy user information bit
	Soft Ver	Software version number.
	GPI Ver	GPI ACEX version number.
VideoVer	Video ACEX version number.	

7.3.5 Ancillary Data

ENG' ING	Anc Data	Anc Blnk	n	
		Anc Pass		

Ancillary data is all the information embedded in the D1 data between the EAV and SAV TRSs. In most installations this is digital audio and EDH data but can include any other data that is embedded using the appropriate standard.

This control allows the user to pass or blank ancillary data, as required.

7.3.6 525 V-Bit Of TRS

ENG' ING	525 Vbit	Long	n	
		Short		

There has been some inconsistency in the 525 D1 standard in regard of the number of line within the vertical blanking interval for which the V-bit is set in the TRS. Early versions of CCIR Rec. 656 (1986) called for it to be active only for 10 lines per field in 525/60 signals. However it became common practice for a longer V-bit so as to be active for all the non picture lines and much equipment has been produced like this. Recently the original specification has again come to the fore.

So the V1649INS normally produces the proper CCIR Rec. 656 V-bit, but it is possible to produce the longer version using the **ENG' ING : 525 VBit** menu.

This option is only available if the unit is operating in 525/60 mode.

Vistek V1649 SDI Video Index / WSS / ETSI Line 23 Inserter / Reader



7.3.7 Free-Run

ENG' ING	Free-run	Free Off	n	Normal position.
		Free On		Test mode only.

This is a production test facility. The user is advised to leave this control permanently set to the **Free Off** position (normalisation position).

7.3.8 Sleep

ENG' ING	Sleep	0-30 min		Normalisation delay before sleep = 5 minutes 0 min = display permanently enabled
----------	-------	----------	--	---

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.

7.3.9 LEDLevel

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



Vistek V1649 SDI Video Index / WSS / ETSI Line 23 Inserter / Reader

7.3.10 Vertical Interval (VBI) Data

There is individual control of which active lines in the vertical blanking interval are passed through the Frame Synchroniser. The exact lines which can be selected depends on the operating standard and are shown here using the usual line numbering conventions for the particular standard:

Standard	Field 1	Field 2
625/50	Lines 7 – 22	Lines 320 – 335
525/60	Lines 10 – 20	Lines 10 – 19

If the unit is operating in 525/60 then the selection menu will only show the relevant lines.

The lines are selected in pairs across the two fields, so that if, for example, you wish to pass Line 12 on Field 1 then you will have to also pass Line 12 on Field 2.

This only selects whether the active picture part of the VBI is passed, that between the SAV and EAV, and not the ancillary data which is discussed in section 4.3.8 Ancillary Data.

Changing the VBI selections is a little different to the other menus. First go to the **ENG' ING : VBI** menu and select whether you want all lines to be Passed, or all to be Blanked or to Sel to make a selection. Only if you have selected Sel will there be the individual lines pairs on the **ENG' ING** menu below **VBI**. The easiest way to do this is to decide whether you want the majority of lines to be passed or blanked and set the unit accordingly, then change to Sel and change those lines you want to be different.

7.3.11 Crystal Oscillator:- Centre Frequency Adjustment

CALIB	CentrFrq	+127		
		↓		
	0	n	Normalisation position.	
	↓			
	-127			

If the input SDI signal is removed, then the internal crystal voltage controlled oscillator will free-run at a frequency determined by this 8 bit control. This control is set up in the test department at Vistek and will not normally require re-adjustment in the field. Consequently, the user is advised not to make any adjustment to this parameter.

7.3.12 Product Configuration

CONFIG	Function	V1649INS	n	
		V1649RDR		
		V1649ETI		
		V1649ETR		

The user may change the product function by entering the **CONFIG: Function** menu and selecting the required new product type.

Vistek V1649 SDI Video Index / WSS / ETSI Line 23 Inserter / Reader



7.4 GPI Interfaces

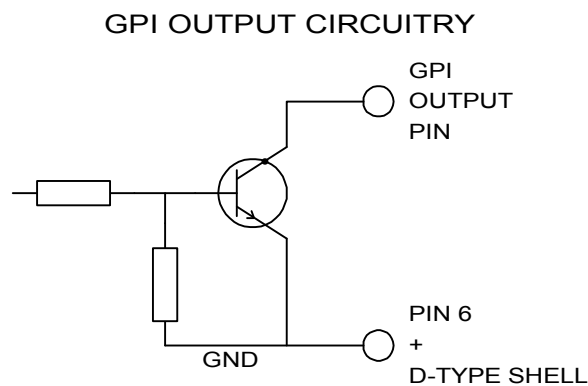
7.4.1 V1649ETR Reader:- GPI1 Output Description

In this situation, the three bit Aspect Ratio (AR) value is read from the ETSI line 23 input data, and then output on GPI 1. **The GPI pins change state at approximately line 30 of the frame in which the Aspect Ratio (AR) data has changed.**

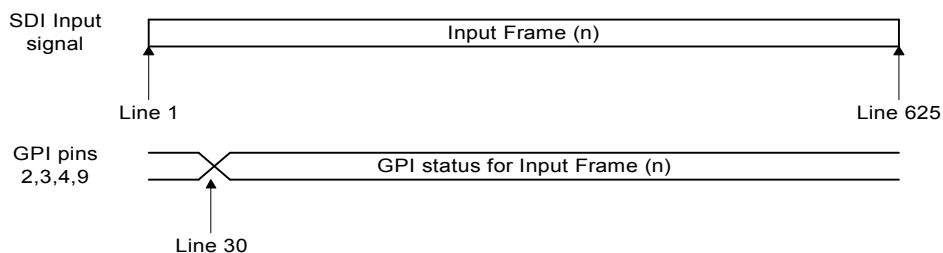
There are 4 output pins, 3 of which directly indicate the three bit Aspect Ratio (AR) value. The last pin is used to indicate if the ETSI data being read is valid. If the data is valid then the ETSI STATUS output will produce a closed contact. If the incoming data becomes invalid then the ETSI STATUS output will produce an open contact, and the status of the other 3 outputs will be held at the values set prior to the data going invalid.

Each output pin is driven by an open collector transistor switch. It is the responsibility of the user to provide a pull up resistor to a suitable positive supply (wrt gnd) at the GPI port receive end.

Please also ensure that the screen of the GPI cable is connected to the shell of the 9 way D-type connector at each end of the cable.



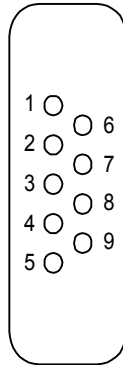
V1649ETR Reader:- GPI1 Output Timing (AR Status Output)





Vistek V1649 SDI Video Index / WSS / ETSI Line 23 Inserter / Reader

V1649ETR Reader:- GPI1 Output Pinout (AR Status Output)



- 1 RESERVED
- 2 OUTPUT :- AR[0]
- 3 OUTPUT :- AR[1]
- 4 OUTPUT :- AR[2]
- 5 RESERVED
- 6 GND
- 7 RESERVED
- 8 RESERVED
- 9 OUTPUT:- AR STATUS

V1649ETR Reader:- GPI1 Output Map (AR Status Output)

Aspect Ratio (AR) Setting	AR Value	PIN 9 (Status)	PIN 4 AR[2]	PIN 3 AR[1]	PIN 2 AR[0]
Full format 4:3	AR = 0	CLOSED	OPEN	OPEN	OPEN
Box 14:9 centre	AR = 1	CLOSED	OPEN	OPEN	CLOSED
Box 14:9 top	AR = 2	CLOSED	OPEN	CLOSED	OPEN
Box 16:9 centre	AR = 3	CLOSED	OPEN	CLOSED	CLOSED
Box 16:9 top	AR = 4	CLOSED	CLOSED	OPEN	OPEN
Box > 16:9 centre	AR = 5	CLOSED	CLOSED	OPEN	CLOSED
Full format 4x3 (S & P 14:9 centre)	AR = 6	CLOSED	CLOSED	CLOSED	OPEN
Full format 16:9 (anamorphic)	AR = 7	CLOSED	CLOSED	CLOSED	CLOSED
ETSI DATA INVALID		OPEN	HOLD LEVEL	HOLD LEVEL	HOLD LEVEL



8 Appendix

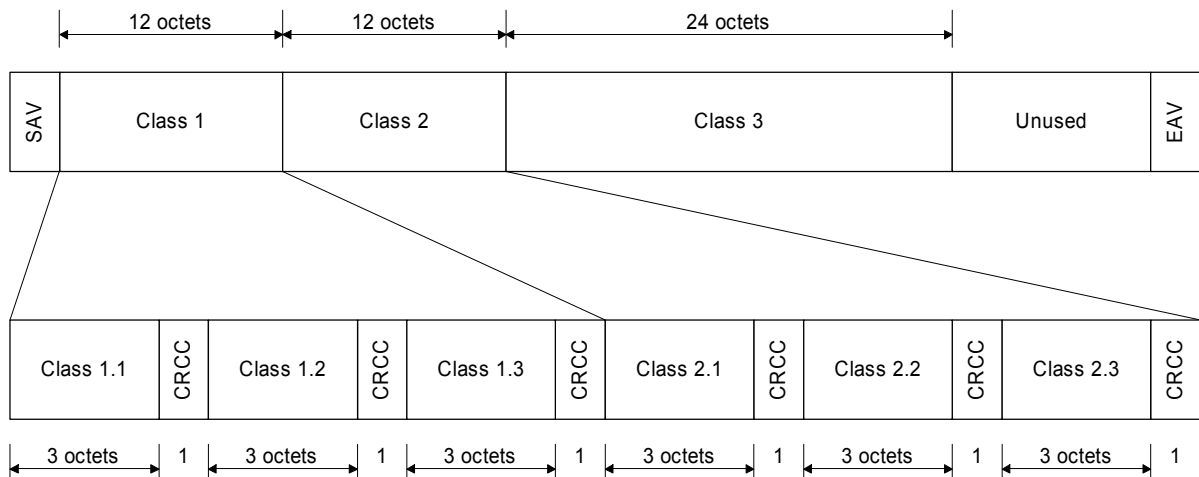
8.1 An Introduction To Video Index Coding

Video Index is a technique used to encode program and picture related source information into a component digital video signal. The data is encoded in bit 2 of the chrominance signal (assuming a 10 bit signal, where bit 0 is the LSB and bit 9 is the MSB), on lines 11 and 324 for a 625 line signal, or lines 14 and 277 for a 525 line signal. The data is organised into three groups called classes:-

- Class 1 Information required to display or perform processing upon the picture.
- Class 2 How the video was originated or previously processed.
- Class 3 Other information relating to the video but not needed for display.

The classes are further divided into sub-classes (eg Class 1.1, 1.2 and 1.3). For further details of all the information that can be transported by the video index system we advise studying the SMPTE RP186 document.

VIDEO INDEX CODING
CLASSES AND SUB-CLASSES CODING STRUCTURE



Data added to bit[2] (of a 10 bit system, where bit[0] = LSB and bit[9] = MSB) of the chrominance data, on lines:-

- 11 & 324 of a 625 line system
- 14 & 277 of a 525 line system



Vistek V1649 SDI Video Index / WSS / ETSI Line 23 Inserter / Reader

Class 1.1 is mandatory and holds information required to display the signal

Class 1.1 Data Octet 1:- Scanning System	B7	B6	B5	B4	B3	B2	B1	B0
No information	0	0	0	0	0	0	0	0
525/59.94 / 4x3	0	0	0	0	0	0	0	1
625/50 / 4x3	0	0	0	0	0	0	1	0
Reserved	0	0	0	0	0	0	1	1
Reserved	0	0	0	0	0	1	0	0
525/59.94 / 16x9	0	0	0	0	0	1	0	1
625/50 / 16x9	0	0	0	0	0	1	1	0
Reserved, from through to	0 1	0 1	0 1	0 1	0 1	1 1	1 1	1 1

In the SMPTE RP186 specification the upper 5 bits of class 1.1 data octet 1 are reserved for future use. The V1649INS uses 3 of these bits (B5, B4 and B3) to encode the Active Format Descriptor (AFD):-

AFD2 = B5

AFD1 = B4

AFD0 = B3

Active Format Descriptor (AFD)	Description
0	Active region is same as coded frame.
1	4:3
2	16:9
3	14:9
4	Reserved for future use.
5	4:3 with shoot-and-protect 14:9 centre
6	16:9 with shoot-and-protect 14:9 centre
7	16:9 with shoot-and-protect 4:3 centre

The V1649 inserts 0 (no information) in the remaining 2 data octets of class 1.1

The V1649 defaults all class 1.2, 1.3, 2.1, 2.2 and 2.3 data to zero, the no information state.

Vistek V1649 SDI Video Index / WSS / ETSI Line 23 Inserter / Reader



8.2 An Introduction To ETSI Line 23 Coding And WSS Coding

WSS coding

The waveform used is of the same specification as ETSI Line 23 coding, but the **14 data information bits** are interpreted differently. They are used to convey the source aspect ratio (4:3 or 16:9) and the active format descriptor (AFD) that is required for digital terrestrial systems. This data is the same as that transported by Video Index signalling. The advantage of this form of coding is that it will pass through an analogue system (whereas Video Index data will not).

The Vistek V1649INS inserter offers the added flexibility of allowing the user to define which line to add the data to. Many international broadcasters have used lines other than line 23.

Table 1.1 details the definition of all **14 data information bits** inscribed in an WSS encoded signal.

Table 1.1 WSS coding:- Definition of the 14 information bits

Aspect Ratio Information	Active Format Descriptor	Parity Bits	Reserved
18 elements based on 5MHz	18 elements based on 5MHz	12 elements based on 5MHz	36 elements based on 5MHz
Bit numbering 0 1 2 where 0 = LSB Per info bit '0' = 0 0 0 1 1 1 '1' = 1 1 1 0 0 0	Bit numbering 3 4 5 where 3 = LSB Per info bit '0' = 0 0 0 1 1 1 '1' = 1 1 1 0 0 0	Bit numbering 6 7 where 6 = LSB Per info bit '0' = 0 0 0 1 1 1 '1' = 1 1 1 0 0 0	Bit numbering 8 - 13 where 8 = LSB Per info bit '0' = 0 0 0 1 1 1 '1' = 1 1 1 0 0 0
LSB transmitted first	LSB transmitted first	LSB transmitted first	LSB transmitted first
0 1 2 Bit number 0 0 0 No information 1 0 0 525/59.94 4x3 0 1 0 625/50 4x3 1 1 0 Reserved 0 0 1 Reserved 1 0 1 525/59.94 16x9 0 1 1 625/50 16x9 1 1 1 Reserved	3 4 5 Bit number 0 0 0 As coded frame 1 0 0 4x3 0 1 0 16x9 1 1 0 14x9 0 0 1 Reserved 1 0 1 4x3 S&P 14x9 C 0 1 1 16x9 S&P 14x9 C 1 1 1 16x9 S&P 4x3 C	6 7 Bit number Bit 6 = Odd Parity bit Protecting bits 0, 2 & 4 Bit 7 = Odd Parity bit Protecting bits 1, 3 & 5	6 -13 Bit number Reserved for future use. Set to "0"
NOTE: One information bit consists of 6 elements based on 5MHz clock.			



Vistek V1649 SDI Video Index / WSS / ETSI Line 23 Inserter / Reader

ETSI Line 23 coding

ETSI Line 23 coding is used by many broadcasters as a method of transmitting wide screen signaling (and other) information to home consumers. The data received at the consumer's TV is used to decide how best to display the received image. The data is added to the first half line of line 23. This is within the vertical blanking interval, and should not be visible on a correctly aligned television.

A full technical description of ETSI line 23 coding is available in the ETSI document number ETS 300 294.

Table 1.2 overleaf details the definition of all **14 data information bits** inscribed in an ETSI Line 23 encoded signal.

Table 1.2 ETSI Line 23 coding:- Definition of the 14 information bits

Group 1 Aspect Ratio	Group 2 Enhanced Services	Group 3 Subtitles	Group 4 Others
24 elements based on 5MHz	24 elements based on 5MHz	18 elements based on 5MHz	18 elements based on 5MHz
Bit numbering 0 1 2 3 where 0 = LSB Per info bit '0' = 0 0 0 1 1 1 '1' = 1 1 1 0 0 0	Bit numbering 4 5 6 7 where 4 = LSB Per info bit '0' = 0 0 0 1 1 1 '1' = 1 1 1 0 0 0	Bit numbering 8 9 10 where 8 = LSB Per info bit '0' = 0 0 0 1 1 1 '1' = 1 1 1 0 0 0	Bit numbering 11 12 13 where 11 = LSB Per info bit '0' = 0 0 0 1 1 1 '1' = 1 1 1 0 0 0
LSB transmitted first	LSB transmitted first	LSB transmitted first	LSB transmitted first
0123 Bit number 0001 Full format 4x3 1000 Box 14x9 centre 0100 Box 14x9 top 1101 Box 16x9 centre 0010 Box 16x9 top 1011 Box >16x9 centre 0111 Full Format 4x3 S&P 14X9 C Full format 16x9 (anamorphic) b3 = Odd Parity Bit	4 Bit number 0 Camera mode 1 Film mode 5 Bit number 0 Standard coding 1 MACP 6 Bit number 0 No helper Modulated helper b7 = Reserved (set to 0)	8 Bit number 0 No subtitles in text 1 Subtitles in teletext 9 10 Bit number 0 0 No open subtitles 1 0 Subtitles in active image area 0 1 Subtitles out of active image area 1 1 Reserved	11 Bit number 0 No surround sound 1 Surround sound mode 12 Bit number 0 No copy right asserted 1 Copy right asserted Bit number 0 Copying not restricted 1 Copying restricted
NOTE: One information bit consists of 6 elements based on 5MHz clock.			

Vistek V1649 SDI Video Index / WSS / ETSI Line 23 Inserter / Reader



8.3 RS485 Message Protocol:- Revision 1.0

General

The protocol is designed to work with an RS232 serial communications port on a PC. The serial communications port of the V1649 is configured to conform to RS485. When connecting to a PC an RS232 to RS485 converter must be inserted between the PC (master) and the V1649 module (slave). These are available as small inexpensive inline units.

Using RS485 allows multi-drop control (i.e. up to 64 modules may be controlled by one PC. The module to be controlled is selected by a unique (6-bit) address which is set up through the front panel of the module via the **RS485 AD** item in the **CONFIG** menu.

COMM Port Settings

Transmit and Receive both 38400 Baud, 2 Stop Bits, 8 Data Bits, No Parity.
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General Protocol

- **nn** is a 2 character hex number using lower case (e.g. a7) or upper case (e.g. A7) transmitted as ASCII 'a' (0x61) or ASCII 'A' (0x41) followed by ASCII '7' (0x37).
- The **Sync Byte** is ASCII 'ESC' (0x1b)
- The **Command** is a single ASCII character e.g. ASCII 'W' (0x57)
- The **Address** is a 2 character hex number from 00 to 3f
- The **Data** is a series of bytes transmitted as 2 character hex numbers. The complete set of data is always sent.
- The **Checksum** is a 2 character hex number from 00 to ff such that the least significant byte of the sum of all bytes from address byte onwards = 0. i.e. the Sync Byte, Command, Module Type and Module Revision are not included in the checksum. Note that it is the 'bytes' as defined **nn** above which are added together to form the checksum, not the individual characters which make up the bytes.
- If the checksum received by the slave is incorrect, the data will not be downloaded into the hardware.
- The **Module Type** and **Module Revision** are to identify the type of unit being controlled. They are currently 07 and 01 respectively for a WSS Inserter and 08 and 01 respectively for an ETSI Inserter.

Operation

When the module has received a complete message, it will start transmitting a reply within 40mSec.

The module will not reply to a message unless the Source control in the SETUP menu is set to RS485 and the address sent with the message matches the RS485 address set up in the module's CONFIG menu.

The module will not download data into its hardware unless the checksum following the data is correct.



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Message Protocols

Write Message Protocol from Master – also requests Status

Sync Byte	'ESC'
Command	W
Address	nn
Data[0]	nn
..	..
Data[n]	nn
Checksum	nn

Read Message Protocol from Master

Sync Byte	'ESC'
Command	R
Address	nn

Return Status Message Protocol from Slave – reply to 'W' or 'R' message

Sync Byte	'ESC'
Command	S
Module Type	nn
Module Revision	nn
Address	nn
Data[0]	nn
..	..
Data[n]	nn
Checksum	n

Read Alarms Message Protocol from Master

Sync Byte	'ESC'
Command	A
Address	nn

Return Alarms Message Protocol from Slave – reply to 'A' message

Sync Byte	'ESC'
Command	A
Module Type	nn
Module Revision	nn
Address	nn
Alarm Byte	nn

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ALARM BYTE

byte	[bit]	Description	Range
0	[0]	INPUT FAIL	0 = OK 1 = FAIL
	[1..7]	Not used	

DATA BLOCK

WSS Inserter

byte	[bit]	Description	Range
0	[0..2]	AFD (Active Format Descriptor) 0 Full (as coded frame) 1 4:3 2 16:9 3 14:9 4 Reserved 5 4:3 with 14:9 Shoot and Protect centre 6 16:9 with 14:9 Shoot and Protect centre 7 16:9 with 4:3 Shoot and Protect centre	0..7
	[3]	Aspect Ratio 0 4:3 1 16:9	
	[4..7]	Not used	



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ETSI Inserter

byte	[bit]	Description	Range
0	[0]	Teletext 0 No subtitles within teletext 1 Subtitles within teletext	
	[1..2]	Subtitles 0 No open subtitles 1 Subtitles in active image area 2 Subtitles out of active image area	0..2
	[3]	Surround Sound 0 No surround sound information 1 Surround sound mode	
	[4]	Copyright 0 No copyright asserted or status unknown 1 Copyright asserted	
	[5]	Copying 0 Copying not restricted 1 Copying restricted	
	[6..7]	Not used	
	1	[0..2]	Aspect Ratio 0 Full format 4:3 1 Box 14:9 Centre 2 Box 14:9 Top 3 Box 16:9 Centre 4 Box 16:9 Top 5 Box > 16:9 Centre 6 Full format 4:3 with shoot & protect 14:9 Centre 7 Full format 16:9 Anamorphic
[3]		Not used	
[4]		Mode 0 Camera Mode 1 Film Mode	
[5]		Coding 0 Standard Coding 1 Motion Adaptive Colour Plus	
[6]		Helper 0 No helper 1 Modulated helper	
[7]		Not used	