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REVISION HISTORY

REVISION	DESCRIPTION	DATE
0.1	Preliminary Version	Sept 03
1.0	Updated section on ACO Extension mode	Sept 03
1.1	Added DVB-ASI Exclusive mode	Oct 03
1.2	Added VistaLINK® Support	May 04
1.2.1	Corrections made to Figure 6-1 and Section 6.2	Jul 04
1.3	Updated Table 5-1: Mode Selection DIP Settings Added Section 5.3.2 Setting the Switching Priority Mode Added Section 5.3.3 ACO1 Master Mode	Aug 04
1.4	Added new ACO1 Master Mode with GPI Override (section 5.3.4)	Feb 06
1.5	Updated features and technical description	Jan 07

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1. OVERVIEW

The Evertz 500ACO2-HD/SD dual SDI Auto Changeover is designed to provide extension to the 5600ACO for HD or SD SDI, DVB-ASI, SMTPE 310M, AES audio, bi-level/tri-level syncs and NTSC/PAL video. The unit can also be operated as a standalone changeover unit with two independent 2X1 banks. The 500ACO2-HD/SD uses latching relays to ensure maximum reliability and minimal disruption in the event of any failure.

The 500ACO2-HD/SD is housed in the 500FR exponent Frame that will hold up to 16 modules.

Features:

- Auto detection of six signal types
- Five modes of operation (including VistaLINK®)
  - Auto changeover – two standalone auto-changeovers or two linked changeovers
  - Manual DIP Switch control – two independently controlled 2x1 switchers
  - GPI Control – two independently GPI controlled 2x1 switchers
  - ACO Extension – slave unit of the 5600ACO (require 5600ACO firmware version 1.2 or higher)
- Support for VistaLINK® monitoring and control
- Fully hot-swappable from front of frame with no BNC disconnect required
- Tally output on Frame Status bus upon loss of input signal for quality monitoring
- Ability to pass any 1Vp-p signal
- HD and SD will suffer slight loss in amplitude through relays (HD-15% loss, SD-5% loss)
- HD rise/fall times will be increased (HD rise/fall by 50%, SD by 15%)
- Signal is split from relays to detection logic (signals only validated in auto mode)
- Latching relays maintain the current path on loss of power
- SMPTE 310M signal detection is only available with hardware build 2 or newer

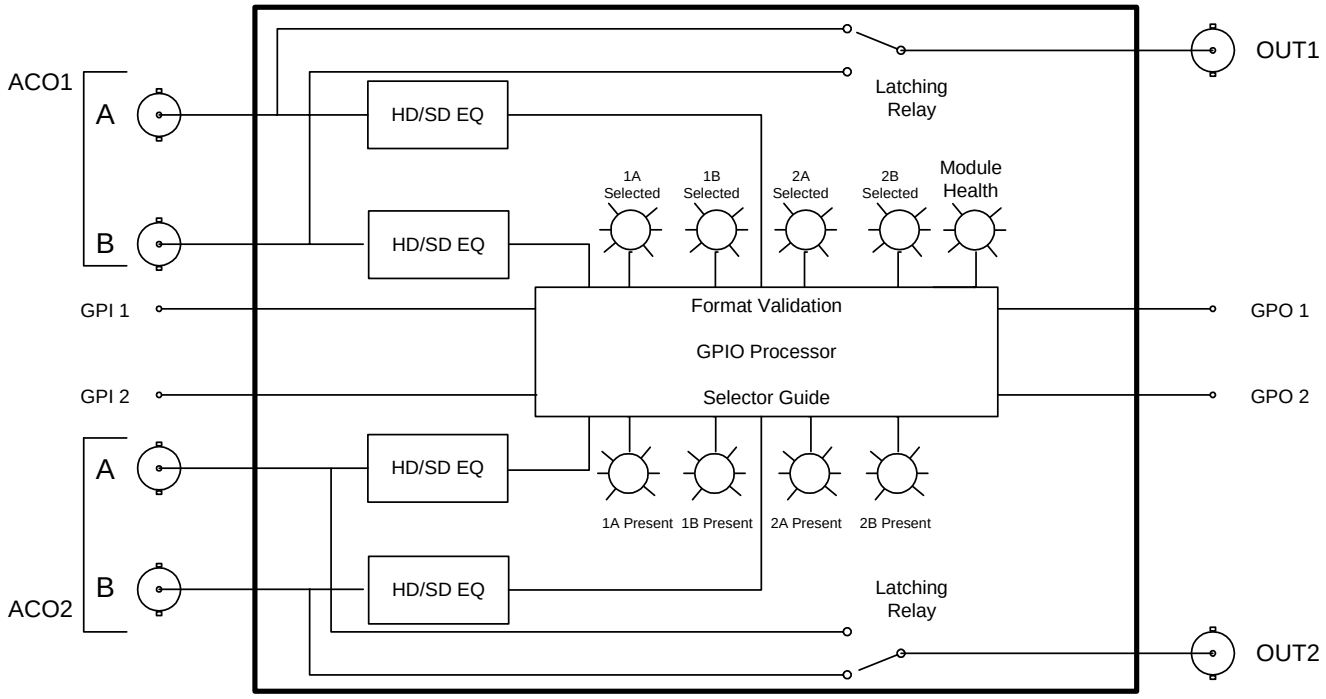

Figure 1-1: 500ACO2-HD/SD Block Diagram

2. INSTALLATION

The 500ACO2-HD/SD comes with a companion rear panel overlay that can be placed over the rear panel BNC connectors to identify their function. For information on inserting the module into the frame see section 3 of the 500FR manual.

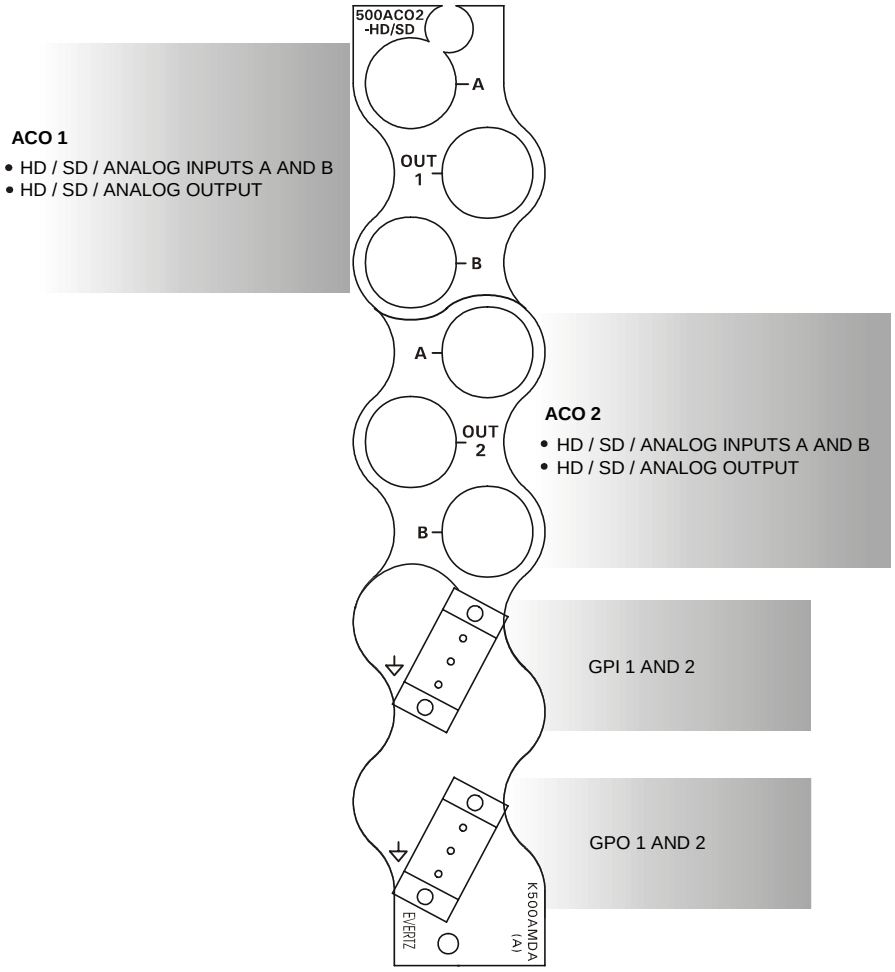

Figure 2-1: 500ACO2-HD/SD Rear Panel Overlay and Panel Adapter

IN A & Bs Input BNC connector for HD & SD SDI, DVB-ASI, SMPTE 310M, AES audio, and bi-level/tri-level sync signals.

OUT 1 & 2 There are two latching relay outputs to pass either input A or B depending on user controls. **These outputs must be terminated with 75Ω.**

GPI1 & 2 General purpose interface input connections

GPO1 & 2 General purpose interface output connections

The K500AMDA-IO adapter has two 3 pin terminal blocks containing GPI and GPO connections. There are labels on the side of the terminal strips identifying the GPI1 and GPI2 inputs and GPO1 and GPO2 outputs. The GPI and GPO cables can be secured into the removable portion of the terminal strips using a small screwdriver. The removable part of the terminal strip is then inserted into the rear panel. Please refer to Figure 2-2 for additional information on installing the panel adapter.

2.1. INSTALLING THE GPIO PANEL ADAPTER

1. Using a Philips screwdriver, remove the M25x8mm screw at the bottom of the slot where you want to install the panel adapter.

2. Install the jack post that was supplied with the panel adapter. Tighten with pliers or a hex wrench.

3. Slide the BNC connectors of the panel adapter into the BNC connectors on the rear of the frame. The panel adapter should be pressed all the way in until it touches the jack post. Be sure to install the panel adapter with the rounded side facing upwards.

4. Reinstall the screw and tighten with a Philips screwdriver.

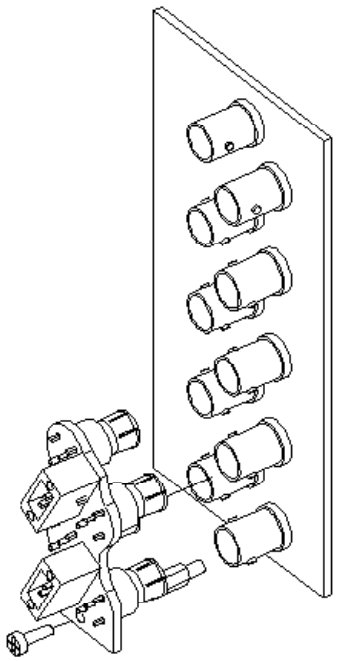

Figure 2-2: K500AMDA-IO Rear Panel Adapter Installation

2.2. CONNECTING THE GENERAL PURPOSE INPUTS AND OUTPUTS

The two, three pin terminal connector has two general purpose inputs and two general purpose outputs for control and status of the 500ACO2-HD/SD. The GPI wires can be secured into the removable portion of the terminal strips using a small screwdriver. The removable part of the terminal strip can then be inserted into the panel adapter.

The GPI inputs are considered high if they are left floating (not connected) or pulled up to +5 volts. The GPI inputs are considered low when the GPI input is pulled below 0.8 volts. The user can make the GPIs low simply by connecting the GPI input pins to ground using a button, switch, relay or an open collector transistor. Figure 2-3 shows the circuitry for each of the GPI input pins.

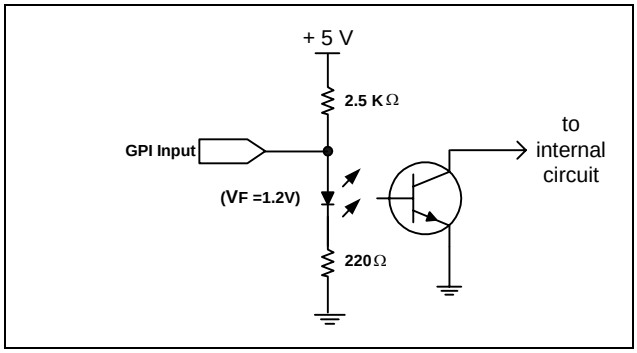

Figure 2-3: GPI Circuitry

Maximum Voltage to GPI = 5V
Maximum Resistance to GND to trigger GPI = 1K

5V is the maximum voltage that should be applied to the GPI. A voltage higher than 5.9V will exceed the power dissipation of the 220Ω 0603 resistor.

The GPO outputs are internally pulled up to 5 volts. Care must be taken to limit the load to 0.1W so there is no effect on the power supply of the module.

Figure 2-4 shows the circuitry for each of the GPO output pins.

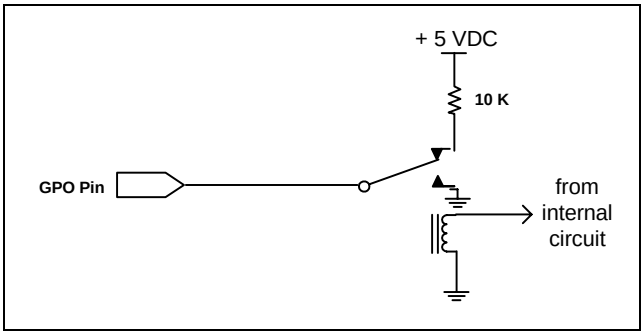

Figure 2-4: GPO Circuitry

2.2.1. GPO Behaviour

GPO1 = Low (GND) when ACO1 is on input A
Hi-Z (open) when ACO1 is on input B

GPO2 = Low (GND) when ACO2 is on input A
Hi-X (open) when ACO2 is on input B

GPO Maximum sink current = 500mA
GPO Maximum voltage = 30V

The GPOs will always possess these behaviours in all modes expect for ACO Extension mode.

When power is lost both GPOs will be open circuit.

3. SPECIFICATIONS

3.1. RELAY INPUTS

Recognized Signal Types: SMPTE 292M, SMPTE 259M A, B, C, D, DVB-ASI and SMPTE 310M
Connectors: 4 BNC per IEC 60169-8 Amendment 2
Maximum Cable Length: 100m of Belden 1694A or equivalent cable combined input and output
Return Loss: 10 dB up to 1.5 Gb/s
Maximum Signal Level: 1Vp-p

SMPTE 310M is only available on hardware build 2 or newer with firmware version 1.7 build 31 or newer.

3.2. RELAY OUTPUTS

Number of Outputs: 2 passive relay outputs
Connectors: BNC per IEC 60169-8 Amendment 2
Maximum Cable Length: 100m of Belden 1694A or equivalent cable combined input and output
Return Loss: 10 dB up to 1.5 Gb/s
DC Offset: 0V ±0.5V

3.3. GENERAL PURPOSE INPUTS AND OUTPUTS

Type:
Inputs: Opto-isolated input with internal pull-up to + 5volts.
Outputs: Normally 10K internal pull-up to + 5volts. Ground to rear panel when relay is in active position.
Connector: Two 3 pin terminal blocks with one ground each.
Signal Level: +5V nominal

3.4. ELECTRICAL

Voltage: + 12VDC
Power: 6 Watts
EMI/RFI: Complies with FCC Part 15 Class A, EU EMC Directive

3.5. PHYSICAL

Number of slots: 1

3.6. SIGNAL PRESENT AND CHANGEOVER CONDITIONS

The input signals are considered present according to the following criteria:
SDI: Valid SD or HD carrier
DVB-ASI: Valid SMPTE sync word
Sync: H timing detect, NTSC and PAL/Tri-level (Sync pulse must be greater than 100mV)
AES: Valid AES carrier

4. STATUS LEDS

The 500ACO2-HD/SD has 10 LED Status indicators on the front card edge to show operational status of the card at a glance. Figure 6-1 shows the location of the LEDs.

4.1. MODULE STATUS LEDS

Two large LEDs on the front of the board indicate the general health of the module

LOCAL FAULT: This Red LED indicates poor module health and will be ON if no valid input signals are detected or if a local input power fault exists (i.e.: a blown fuse). The LOCAL FAULT indication can also be reported to the frame through the FRAME STATUS jumper.

MODULE OK: This Green LED indicates good module health. It will be ON when at least one valid input signal is present, and board power is good.

4.2. SIGNAL PRESENT LEDS

There are four small green LEDs that indicate the presence of valid recognized input signal type.

4.3. INPUT SELECTED LEDS

There are four small green LEDs that indicate the current selected input for each 2X1 unit.

5. MODES OF OPERATION

The 500ACO2-HD/SD is equipped with a 4 position DIP Switch for selection of various modes of operations. Please refer to Table 5-1. Setting a DIP Switch UP (away from the circuit board) puts it in the Open position.

#	DIP Switch				Mode of Operation	Description
	1	2	3	4		
1	Close	Close	Close	Close	VistaLINK® Remote Mode (Section 7)	VistaLINK® remote control mode
2	Close	Close	Close	Open	Auto Changeover (Secton 5.3.3 ACO1 Master Mode)	Auto Changeover mode where ACO1 is the Master and ACO 2 follows ACO1. GPI reset to unlock after a switchover.
3	Close	Close	Open	Close	Auto Changeover (Secton 5.3.4 ACO1 Master Mode with GPI Manual Override)	Auto-Changeover mode where ACO1 is the Master and ACO 2 follows ACO1. GPI can be used to override auto changeover and select an input for ACO1 (and ACO2).
4	Close	Close	Open	Open	ACO Extension Mode (Section 5.1)	Function as a slave unit of the 5600ACO
5	Close	Open	Close	Close	Reserved	
6	Close	Open	Close	Open	Reserved	
7	Close	Open	Open	Close	Reserved	
8	Close	Open	Open	Open	GPI Control Mode (Section 5.2)	GPI Control of two 2x1 switchers
9	Open	Close	Close	Close	Auto Changeover Mode (Section 5.3) DVB-ASI Exclusive Mode Enabled Input A Priority Mode Enabled	Two standalone auto changeovers Only DVB-ASI signals are considered valid A Input has higher priority
10	Open	Close	Close	Open	Auto Changeover Mode (Section 5.3) DVB-ASI Exclusive Mode Disabled Input A Priority Mode Enabled	Two standalone auto changeovers. All supported signals are considered valid. An Input has higher priority.
11	Open	Close	Open	Close	Auto Changeover Mode (Section 5.3) DVB-ASI Exclusive Mode Enabled	Two standalone auto changeovers. Only DVB-ASI signals are considered valid.
12	Open	Close	Open	Open	Auto Changeover Mode (Section 5.3) DVB-ASI Exclusive Mode Disabled	Two standalone auto changeovers. All supported signals are considered valid.
13	Open	Open	Close	Close	Manual Control Mode (Section 5.4)	DIP Switch control two 2X1 switchers. Input 1 B is selected as output 1. Input 2 B is selected as output 2.
14	Open	Open	Close	Open	Manual Control Mode (Section 5.4)	DIP Switch control two 2X1 switchers. Input 1 B is selected as output 1. Input 2 A is selected as output 2.
15	Open	Open	Open	Close	Manual Control Mode (Section 5.4)	DIP Switch control two 2X1 switchers Input 1 A is selected as output 1 Input 2 B is selected as output 2
16	Open	Open	Open	Open	Manual Control Mode (Section 5.4)	DIP Switch control two 2X1 switchers. Input 1 A is selected as output 1. Input 2 A is selected as output 2.

Table 5-1: Mode Selection DIP Settings

5.1. ACO EXTENSION MODE

When the 500ACO2-HD/SD operates in ACO Extension mode it provides the capability to extend the changeover capabilities of the 5600ACO to switch HD or SD SDI, DVB-ASI, AES audio or additional analog video. The 5600ACO will act as the master and multiple 500ACO2-HD/SD can be used as slaved devices. In order to use the 500ACO2-HD/SD with the 5600ACO, the 5600ACO DIP Switch must be set to enable ACO Extension mode. The DIP Switch is located inside the 5600ACO, and is accessible by removing the top cover of the unit. To enable ACO extension mode set DIP Switch 1 to the ON (Closed) position. Multiple 500ACO2-HD/SD can be connected using the two available GPI outputs as shown in Figure 5-1.

The Front Panel GPI operating mode of the 5600ACO will be disabled when it is operating in ACO Extension mode.

When the 5600ACO is operating in ACO Extension mode, the 500ACO2-HD/SD modules will signal to the 5600ACO the status of all the inputs by means of the *GPO1* and *GPO2* outputs. The 5600ACO will decide if a changeover is necessary based on all the inputs on the 5600ACO, and its GPI inputs from all the 500ACO2-HD/SD connected on the wired OR bus. The 5600ACO provides control of the 500ACO2-HD/SD module's switches by means of its *ACO GPO1* output connected to the 500ACO2-HD/SD *GPI1.* Table 5-2 shows how the general purpose outputs are used to report status to the 5600ACO. The GPO status is an OR'ed condition from switch 1 and switch 2. The GPI2 is ignored.

Input A	Input B	GPO1	GPO2
Present	Present	High	High
Missing	Present	Low	High
Present	Missing	High	Low
Missing	Missing	High	High

Table 5-2: GPO Operation in ACO Extension Mode

The 5600ACO firmware must be version 1.2 or higher to operate in this mode.

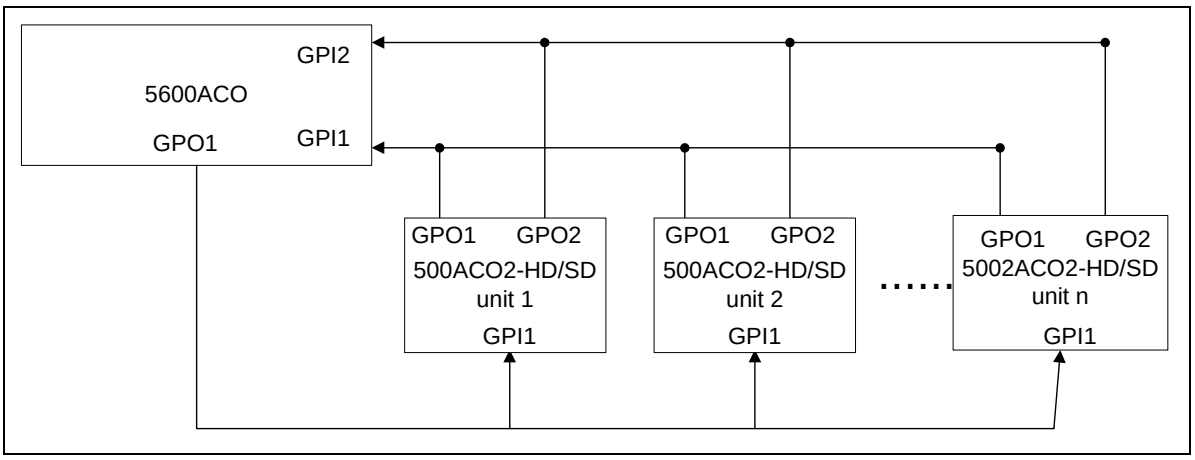

Figure 5-1: ACO Extension Mode Diagram

5.2. GPI CONTROL MODE

In the GPI control mode, the output of each 2x1 can be independently selected using the two available GPI inputs, as described in Table 5-3 and Table 5-4. Please refer to section 2.2 for details on GPIO connections.

Output 1	GPI1	GPO1
Input 1A	Low	Low
Input 1B	High	High

Table 5-3: GPI Control Mode for GPI in/out 1

Output 2	GPI2	GPO2
Input 2A	Low	Low
Input 2B	High	High

Table 5-4: GPI Control Mode for GPI in/out 2

5.3. AUTO CHANGEOVER MODE

In Auto Changeover mode, input signals are validated. Upon loss of signal the auto changeover will switch to the backup signal on the corresponding input of each 2x1 independently. The behavior is summarized in Table 5-5. The GPI outputs are used for status reporting, and are described in Table 5-6 and Table 5-7. The output of both ACOs can be controlled with GPI inputs as described in Table 5-8

Input A	Input B	Output
Present	Present	Current output
Present	Absent	A
Absent	Present	B
Absent	Absent	Current output

Table 5-5: Auto changeover Behavior for each 2X1

Output 1	GPO 1
Input 1A selected	Low
Input 1B selected	High

Table 5-6: GPI Out 1 Status

Output 2	GPO 2
Input 2A selected	Low
Input 2B selected	High

Table 5-7: GPI Out 2 Status

GPI input 1	GPI input 2	Output of ACO1, and ACO2
Low	Low	Current output
Low	High	B
High	Low	A
High	High	Current output

Table 5-8: GPI inputs in Auto Changeover mode

5.3.1. DVB-ASI Exclusive Mode

While in Auto Changeover mode, activating the DVB-ASI Exclusive mode will force the 500ACO2-HD/SD to only validate DVB-ASI signals. All other input signals will be considered invalid.

DIP Switch				Mode
1	2	3	4	
Open	Close	X	Open	Normal auto changeover mode
Open	Close	X	Close	DVB-ASI Exclusive Mode

Table 5-9: DVB-ASI Exclusive Mode DIP Settings

5.3.2. Setting the Switching Priority Mode

With firmware version 1.5 and later, the DIP Switch 4 controls whether the 500ACO2 operates with input A at a higher priority or equal priority as input B. When input A has higher priority, the 500ACO2 will switch back to input A if the input signal becomes valid again.

DIP 4	Input A Priority Mode
Off	Input A and B have equal priority
On	Input A has higher priority

Table 5-10: DIP Setting for Input A Priority Mode

5.3.3. ACO1 Master Mode

Available with firmware version 1.6 and later.

In this mode, the 500ACO2 will monitor signal validity of ACO1's A input. On failure, both ACO1, and ACO2 will switch to B input regardless of signal validity. Both ACOs will now be locked in this state, until GPI inputs are set as described in Table 5-8.

5.3.4. ACO1 Master Mode with GPI Override

Available with firmware version 1.7 and later.

In this mode, the 500ACO2 will monitor signal validity of ACO1's A input. On failure, both ACO1 and ACO2 will switch to B input regardless of signal validity. Both ACOs will now be locked in this state, unless GPI inputs are set as described in Table 5-11.

GPI input 1	GPI input 2	Output of ACO1, and ACO2
Low	Low	Current output, re-enable auto changeover
Low	High	B, disable auto changeover
High	Low	A, disable auto changeover
High	High	Current output, re-enable auto changeover

Table 5-11: GPI inputs in Auto Changeover mode with GPI Override

5.4. MANUAL DIP SWITCH CONTROL MODE

In manual control mode, the DIP Switch selection will override all other controls. The selection is described in Table 5-12 and Table 5-13.

DIP Switch				Output 1 Selection
1	2	3	4	
Open	Open	Open	X	Input 1 A
Open	Open	Close	X	Input 1 B

Table 5-12: Manual Mode DIP Settings for Output 1

DIP Switch				Output 2 Selection
1	2	3	4	
Open	Open	X	Open	Input 2 A
Open	Open	X	Close	Input 2 B

Table 5-13: Manual Mode DIP Settings for Output 2

6. JUMPERS AND USER ADJUSTMENTS

Figure 6-1: LED and Jumper Locations

6.1. SELECTING WHETHER LOCAL FAULTS WILL BE MONITORED BY THE GLOBAL FRAME STATUS

The FRAME STATUS jumper J2, located at the front of the module, determines whether local faults (as shown by the Local Fault indicator) will be connected to the 500FR frame's global status bus.

FRAME STATUS: To monitor faults on this module with the frame status indicators (on the power supply's FRAME STATUS LED's and on the Frame's Fault Tally output), install this jumper in the ON position.

When this jumper is installed in the OFF position local faults on this module will not be monitored.

6.2. CONFIGURING THE MODULE FOR FIRMWARE UPGRADES

UPGRADE The UPGRADE jumper J3 is located at the front of the module and is used when firmware upgrades are being performed on the module. For normal operation it should be installed in the *RUN* position. See the *Upgrading Firmware* section in the front of the binder for more information.

To upgrade the firmware in the module unit pull it out of the frame. Move Jumper J3 into the *UPGRADE* position. Install the Upgrade cable provided (located in the vinyl pouch in the front of this manual) onto header J1. Re-install the module into the frame. Perform the upgrade as described in the *Upgrading Firmware* section in the front of the binder. Once the upgrade is complete, remove the module from the frame. Move J3 into the *RUN* position, remove the upgrade cable and re-install the module. The module is now ready for normal operation.

7. *Vista*LINK® REMOTE MONITORING/CONTROL

7.1. WHAT IS *Vista*LINK®?

VistaLINK® is Evertz's remote monitoring and configuration platform which operates over an Ethernet network using Simple Network Management Protocol (SNMP). SNMP is a standard computer network protocol that enables different devices sharing the same network to communicate with each other. VistaLINK® provides centralized alarm management, which monitors, reports, and logs all incoming alarm events and dispatches alerts to all the VLPro Clients connected to the server. Card configuration through VistaLINK® PRO can be performed on an individual or multi-card basis using simple copy and paste routines, which reduces the time to configure each module separately. Finally, VistaLINK® enables the user to configure devices in the network from a central station and receive feedback that the configuration has been carried out.

There are 3 components of SNMP:

1. A SNMP manager, also known as a Network Management System (NMS), is a computer running special software that communicates with the devices in the network. Evertz VistaLINK® Pro Manager graphical user interface (GUI), third party or custom manager software may be used to monitor and control Evertz VistaLINK® enabled products.

2. Managed devices (such as 500ACO2-HD/SD), each with a unique address (OID), communicate with the NMS through an SNMP Agent. Evertz VistaLINK® enabled 500 series modules reside in the 3RU 500FR MultiFrame and communicate with the manager via the 500FC VistaLINK® frame controller module, which serves as the Agent.

3. A virtual database, known as the Management Information Base (MIB), lists all the variables being monitored, which both the Manager and Agent understand. Please contact Evertz for further information about obtaining a copy of the MIB for interfacing to a third party Manager/NMS.

For more information on connecting and configuring the VistaLINK® network, see the 500FC Frame Controller chapter.

7.2. *Vista*LINK® MONITORED PARAMETERS

The following parameters can be remotely monitored through the *Vista*LINK® interface.

Parameter	Description
Module Status	Indicates the health of the card
Master jumper	Indicates remote or local control of the card
Operating Mode	Indicates the selected operating mode
DVB–ASI Exclusive Mode	Indicates the selection for DVB-ASI exclusive mode
Signal Presence 2B	Indicates the presence of a valid signal on input 2B
Signal Presence 2A	Indicates the presence of a valid signal on input 2A
Signal Presence 1B	Indicates the presence of a valid signal on input 1B
Signal Presence 1A	Indicates the presence of a valid signal on input 1A
Signal Standard 2B	Indicates the signal standard on input 2B
Signal Standard 2A	Indicates the signal standard on input 2A
Signal Standard 1B	Indicates the signal standard on input 1B
Signal Standard 1A	Indicates the signal standard on input 1A
ACO 2 Output	Indicates the currently selected output ACO unit 2
ACO 1 Output	Indicates the currently selected output ACO unit 1

Table 7-1: *Vista*LINK® Monitored Parameters

7.3. *Vista*LINK® CONTROLLED PARAMETERS

Parameter	Description
Operating Mode	Indicates the selected operating mode
DVB–ASI Exclusive Mode	Indicates the selection for DVB-ASI exclusive mode
ACO 2 Output	Indicates the currently selected output ACO unit 2
ACO 1 Output	Indicates the currently selected output ACO unit 1

Table 7-2: *Vista*LINK® Controlled Parameters

7.4. *Vista*LINK® TRAPS

Parameter	Description
Module Status	Indicates the health of the card
Signal Presence 2B	Indicates the presence of a valid signal on input 2B
Signal Presence 2A	Indicates the presence of a valid signal on input 2A
Signal Presence 1B	Indicates the presence of a valid signal on input 1B
Signal Presence 1A	Indicates the presence of a valid signal on input 1A

Table 7-3: *Vista*LINK® Traps

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