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REVISION HISTORY

REVISION	DESCRIPTION	DATE
0.1	Preliminary version	Jun 2011
1.0	First Released version	Aug 2011
1.1	Added XIO version controls and updated VLPro screens	Oct 2011
1.1.1	Added Reader and Generator functional block diagrams	Oct 2011
1.1.2	Correction made to “Selecting Generator Time Source” section	Dec 2011
1.1.3	Updated description of Timer functions in XIO version	Dec 2011
1.2	Added Info for firmware 1.5b18	Feb 2012
1.2.1	Updated Block Diagram	Mar 2012
1.3	Updated VLPro images, and Timer function description for firmware 1.5b90	Apr 2012
1.3.1	Updated VistaLINK® Screen shots for Jar 120, and firmware 1.6b28	May 2012
1.3.2	Updated GPIO specifications	Jun 2012
1.3.3	Added info on Timer LTC direction. Timer LTC Resolution controls	July 2012
1.3.4	Added info on Debug Displays	Apr 2013
1.3.5	Updated figure 5-3: Reader Functional Block Diagram – IRIG version	Sep 2014

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1 OVERVIEW

The 7800TM2 series Modular Time Code processor expands on the professional line of time code solutions by Evertz. The 7800TM series modules provide dual time code processing paths supporting 3G/HD/SD-SDI video signals. This unit is a combination generator, reader and character inserter for Linear Time Code (LTC), Digital Vertical Interval Time Code (D-VITC) (for SDI video signals only) or Ancillary Time Code (ATC). Applications such as reading LTC, D-VITC or ATC time codes and creating a visual burn-in or "transcoding" LTC to D-VITC or ATC time codes are natively supported.

The 7800TM2 series modules contain a high resolution character inserter that can display ('burn') the generator or reader time and user bits directly into the standard definition or high definition serial digital video output. The high-resolution character inserter provides independently positionable windows to show time and user bits for the SMPTE generator and readers simultaneously. It also provides two independently positionable text windows where the user can provide text messages up to 22 characters per window. In addition there are various diagnostic character windows that can be used to diagnose common time code problems. The On Screen Display (OSD) is also used in conjunction with card edge controls to provide a user menu system to control the card. The choice of white or black characters with or without contrasting background mask is available and the OSD may be overlayed on the MON or PGM outputs.

The 7800TM2 series modules are available in 3 versions. The chart below shows the various features of the different versions.

In this manual, references to 7800TM2 apply to all versions. Specific references to 7800TM2-3G, 7800TM2-XIO-3G or 7800TM2-IRIG-3G apply only to the stated version.

Model	Function	Special features
7800TM2-3G	3G/HD/SD Dual LTC to Time code Translator	For SD – D-VITC & ATC generation For HD – ATC generation Up to 2 LTC reader inputs
	3G/HD/SD Dual Time Code Reader/Translator/VCG	For SD – D-VITC & ATC reader For HD – ATC reader LTC generator output Time code Reader diagnostics
7800TM2-XIO-3G (also referred to as 'XIO version')	Same as 7800TM2-3G with GPIO and Serial IO	6 GPIOs per channel 2 serial ports for RS422/232 IO
	Production Up/Down timers	4 Up/Down Timers, up to 4 LTC outputs Ethernet port for Timer control and output
7800TM-IRIG-3G (also referred to as 'IRIG version'	HD/SD Dual IRIG Reader/VCG and ATC inserter	IRIG-B reader with insertion of IRIG data into D-VITC & VANC. Also decodes VANC and D-VITC with IRIG.

The 7800TM2-XIO-3G version additionally provides 6 GPIOs per channel for control of various functions and for encoding/decoding GPI information in the time code user bits. It also provides two serial ports that can be used to read time code from devices supporting the Sony 9 Pin RS-422 compatible ports. Four Up/Down timers can be used to time program segments, and can be set to drive up to four LTC outputs for external up/down timer displays. Timer control and timer outputs are available via on-board Ethernet port.

The 7800TM2-IRIG-3G version contains an IRIG-B Reader to burn IRIG time into the video as well as inserting the IRIG data into D-VITC and ancillary data packets. The IRIG data source for the burn-in windows is selectable between the IRIG-B reader and the ancillary data/D-VITC IRIG readers. The IRIG data can be transcoded to SMPTE time code so that video tapes and servers can be searched using commonly available SMTPE time code based equipment. Most of the regular features of the XIO version are also available on the IRIG version.

The 7800TM2 series modules are VistaLINK® capable, which allows for control and configuration via Simple Network Management Protocol (SNMP). This offers the flexibility to manage the module status monitoring and configuration from SNMP enabled control systems such as Evertz VistaLINK® Pro locally or remotely.

The 7800TM2-3G occupies one card slot and the 7800TM2-XIO-3G and 7800TM2-IRIG-3G each occupy two card slots in the 3RU 7800 series frame, which will hold up to 15 single slot modules. The 7800TM2 series modules can also be put in the 7801FR 1RU frame, which will hold up to 4 single slot modules or 2 dual slot modules.

Features:

- Two independent video paths supporting 3G/HD/SD-SDI video – supports 525i/59.94, 625i/50, 1080i/60, 1080i/50, 1080p/24sF, 720p/60, 720p/50, 1080p/50 and 1080p/60 and the 1/1.001 divisor versions where applicable - auto sense using SMPTE 352M payload ID
- 1 bypass protected BNC Serial Digital Output from each input – with embedded D-VITC according to SMPTE ST 266 (SDI formats only) and ATC according to SMPTE ST 12-2
- 1 Monitor output from each input – same as main output with visual character display of time code
- Reads LTC and transcodes it to D-VITC (SDI only) and/or ATC onto 3G/HD/SD-SDI video
- Reads LTC, D-VITC (SDI only) and/or ATC and makes visual character burn-in
- Reads D-VITC (SDI only) and/or ATC and transcodes to LTC
- Reads VITC from colour black reference and transcodes it to LTC as well as D-VITC (SDI only) and/or ATC onto 3G/HD/SD-SDI video
- Character inserter displays time and/or user bits in the picture –user programmable positioning, 3 font sizes, black or white characters on adjustable opacity background mask – available on MON and PGM outputs
- Outputs referenced to input or 7800 series frame reference
- Card Edge LEDs for signal presence, module status
- Card edge menu using On Screen Display to configure the operating modes
- VistaLINK® - enabled offering remote control, configuration and monitoring capabilities via SNMP. VistaLINK® is available when modules are used with the 7800 or 7801 series frame and a VistaLINK® Frame Controller in the frame.

XIO version (2 Slots) additional features

- 6 Programmable GPI control inputs per channel (12 total) - select modes
- External Reference BNC
- 4 Up/Down timers to time program segments – outputs available on separate LTC outputs (total of 4 LTC outputs). Timer control and outputs available via on-board Ethernet port.
- Reads *NTP,* and transcodes it to D-VITC (SDI only) and/or ATC onto 3G/HD/SD-SDI video

1.1 SPECIAL FEATURES FOR THE 7800TM2-IRIG-3G VERSION

The 7800TM2-IRIG-3G is a combination generator/reader for SMPTE ST 12-1 Linear Time Code (LTC) and SMPTE ST 12-2 Ancillary Time Code (ATC), a reader for IRIG-B code, and a generator/reader of Vertical Ancillary Data (VANC) packets or D-VITC (for Standard Definition video formats) containing the IRIG-B code.

The 7800TM2-IRIG-3G reads IRIG-B code commonly in use within the United States government agencies and supporting private industries and provides a display of days, hours, minutes, seconds and milliseconds in the character inserter. This IRIG information is inserted into special ancillary data packet in the vertical ancillary data space (VANC) of the serial bitstream. This special VANC packet can be decoded by the 7800TM2-IRIG-3G's VANC reader to allow you to encode the IRIG information onto a 'clean' videotape and then display the IRIG information later on playback. For standard definition video formats the same capability is provided using a special D-VITC line for the IRIG data.

The 7800TM2-IRIG-3G SMPTE Time code generator is output as LTC and ATC (and D-VITC for standard definition video formats) and can also be slaved to the incoming IRIG-B time code. The millisecond count will be converted to the closest frame number and can also be stored in the generator user bits along with the IRIG day of the year. In the continuous jam sync mode, the generator is slaved to the IRIG-B reader, and will follow code any discontinuities of the reader. The generator may also be momentarily synchronized to the IRIG-B reader, and then it continues to increment normally regardless of the reader code. Momentary jam is the recommended mode when synchronizing to IRIG-B sources so that the resulting SMPTE time code does not contain discontinuities due to the different time bases of 29.97 frames per second video and real time of the IRIG code. In 59.94 Hz video systems, the SMPTE generator should be operated in the Drop Frame counting mode when trying to synchronize the SMPTE generator to IRIG.

The high-resolution character inserter provides independently positionable windows to show time and user bits for the SMPTE generator and readers simultaneously. When the IRIG or VANC readers are operating in the *IRIG DAY* mode, there are two independently positionable windows for each reader to show the IRIG time to millisecond precision and the IRIG day respectively.

IRIG version (2 Slots) additional features

- IRIG reader reads 1 kHz IRIG-B format sine wave amplitude modulated and pulse width modulated codes (formats B122 and B022)
- Encodes IRIG data in VANC packets on HD and SDI output video.
- Reads IRIG data encoded in VANC packet from incoming HD or SDI video
- IRIG data encoded to second line of D-VITC generator with special CRC on SDI video
- Reads IRIG encoded in D-VITC from incoming SDI video
- SMPTE Time Code LTC, D-VITC and ATC generators can be slaved momentarily or continuously to IRIG reader – converts milliseconds to closest video frame number. Milliseconds and days can be transferred to D-VITC or ATC user bits
- Character inserter displays IRIG day and time to millisecond resolution
- IRIG CS-6 compatible serial data output to drive external IRIG display
- IRIG CS-5 compatible serial data input to read countdown program time.
- Reads *NTP,* and transcodes it to D-VITC (SDI only) and/or ATC onto 3G/HD/SD-SDI video

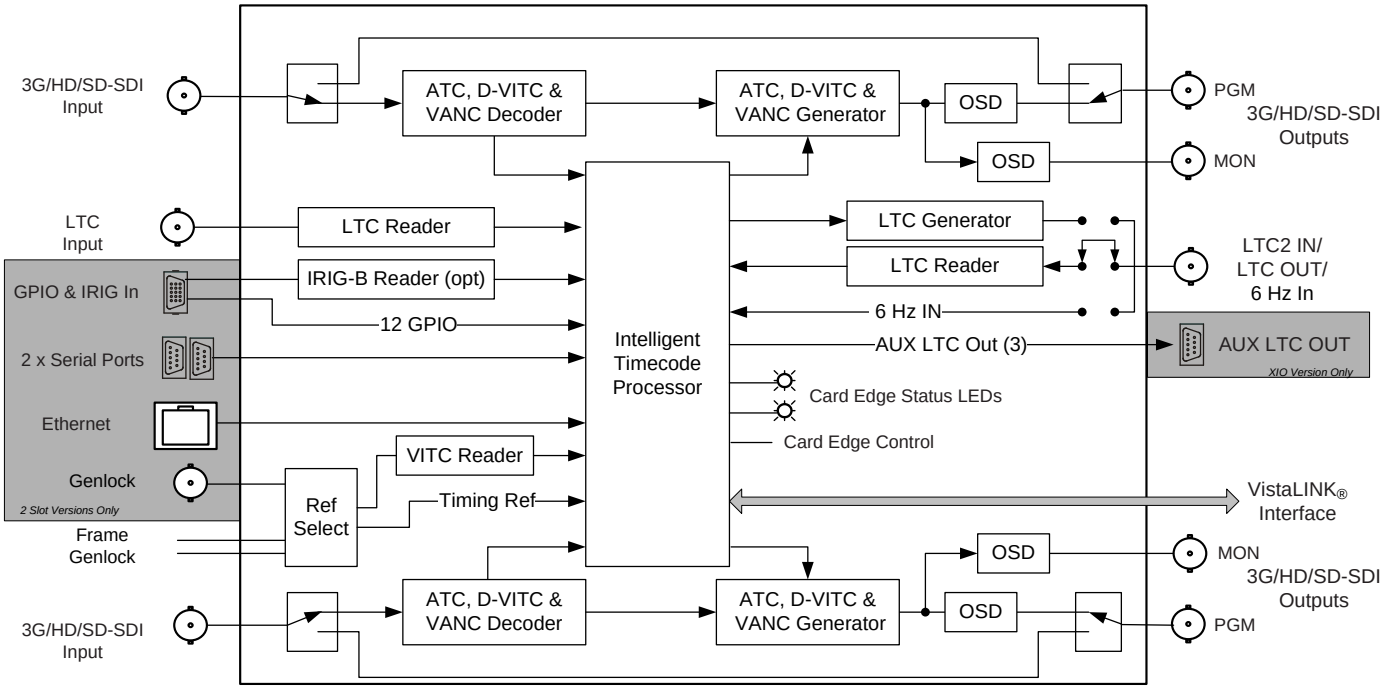


Figure 1-1: 7800TM2 Series Block Diagram

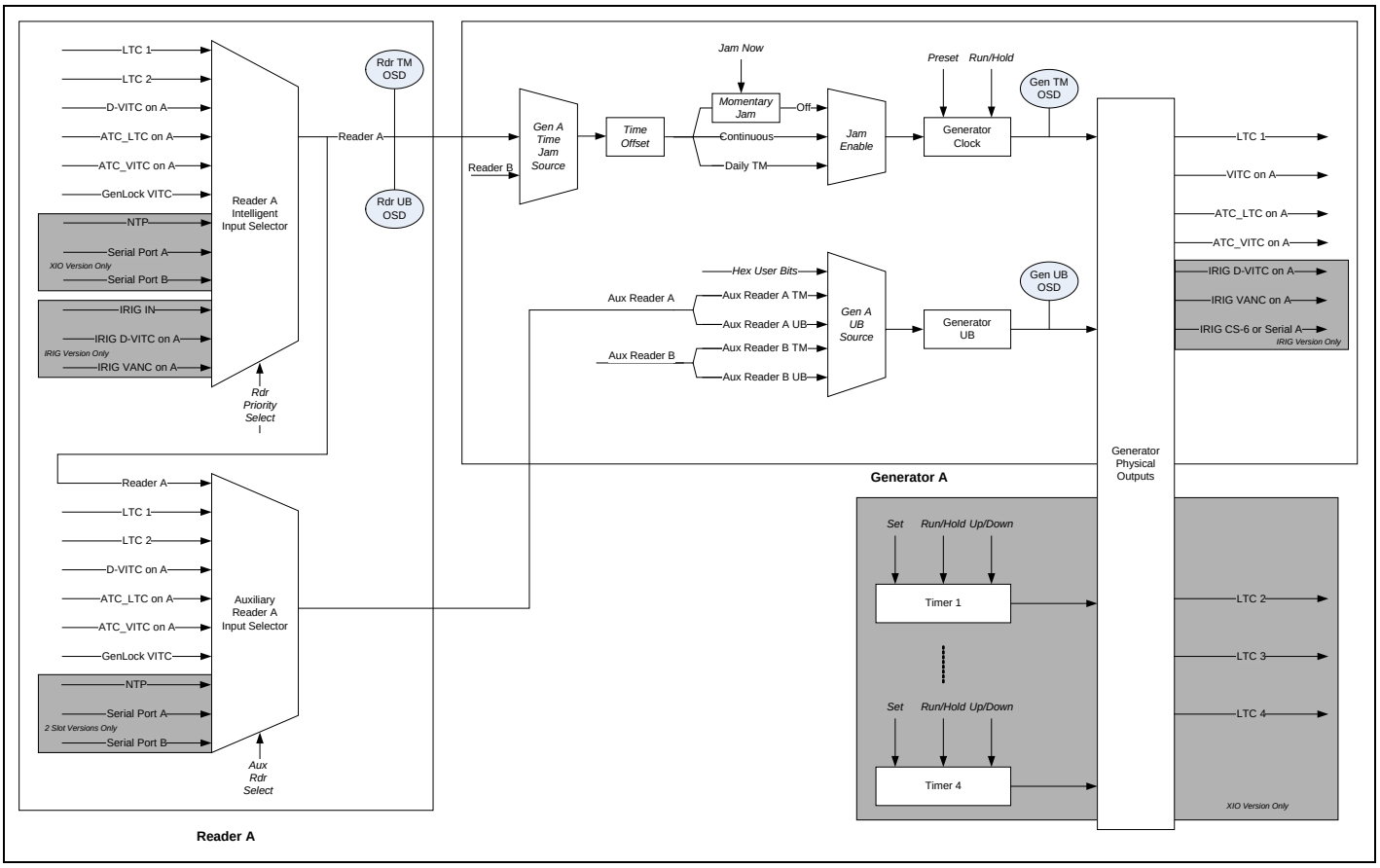


Figure 1-2: 7800TM2-3G Time Code Processing

1.2 DEFINITIONS

3G: (Also known as 3G SDI) 3Gb/s nominal High Definition Serial Digital Interface - a SMPTE standardised interface for transmitting high definition digital television signals using a coaxial cable in serial form at a nominal rate of 3Gb/s. This term is often used informally to refer to the 4:2:2 sampled high definition serial digital television signals as specified in SMPTE ST 425-1.

4:2:2 The sampling ratio used in the ITU-R Rec. 601 digital video signal. For every 4 samples of luminance there are 2 samples colour information. Colour information is carried as two colour difference signals R-Y (Red minus Luminance) and B-Y (Blue minus luminance).

6 Hz: This signal is used when operating in a hybrid system that involves 23.98 FPS and 29.97 FPS time code rates. The 6Hz pulse is usually an active high pulse of one field time (16.67 ms) duration, where the rising edge of the pulse coincides with the point where the 23.98 FPS and 29.97 FPS frames are aligned. This will occur 6 times per second, hence the name of the pulse. For the time code generator, this pulse is used to derive the 6 Hz relationship between 23.98 Fps and 29.97 Fps frame boundaries, and to ensure that the time code to 6 Hz relationship is fixed such that the 00 frame of each second is coincident with the 6Hz signal. This will ensure that conversion between 29.97 non drop frame time code and 23.98 time code can be accomplished in a deterministic algorithm, where the divisible by 4 frames of the 23.98 Hz time code become the divisible by 5 frames of the 29.97 Hz timecode.

ATC: Ancillary Time Code. This method of transmitting time code in the ancillary data space of serial digital television signals was originally standardized by RP 188, which was later revised and became SMPTE ST 12-2 in 2008. Ancillary time code uses ATC-LTC and ATV-VITC packet types to carry SMTPE ST 12-1 LTC and VITC time code data.

ATC-LTC: LTC packet type used in Ancillary Time Code. SMPTE ST 12-2 specifies this packet type for carriage of linear time code data. For HD video formats these packets are typically inserted on line 10 of the HANC data space. For SD video formats these packets are typically inserted in the VANC data space as early as possible after the switch line. There is no recommended line number for SD video formats.

ATC-VITC: VITC packet types used in Ancillary Time Code. SMPTE ST 12-2 specifies this packet type for carriage of vertical interval time code data. There are actually two types of packets, ATC-VITC1 and ATC-VITC2 which are both used to carry vertical interval time code data. Typically the ATC-VITC packets contain the same time code data as the ATC-LTC packets. For HD video formats these packets are typically inserted on line 9 (lines 9 and 571 for interlaced formats) in the HANC data space. For SD video formats these packets are typically inserted in the VANC data space as early as possible after the switch line. There is no recommended line number for SD video formats.

BNC: Acronym for British Naval Connector or Bayonet Nut Connector or Bayonet Neill Concelman - a coaxial cable connector used extensively in professional television systems. These connectors have a characteristic impedance of 75 ohms and are standardised by the IEC 60169-8 standard.

Byte: A complete set of quantized levels containing all the bits. Bytes consisting of 8 to 10 bits per sample are typical in digital video systems.

Cable equalization: The process of altering the frequency response of a video amplifier to compensate for high frequency losses in coaxial cable.

D-VITC: Digital Vertical Interval Time Code. A digitized version of SMPTE ST 12-1 VITC standardized by SMPTE ST 266 that is used on standard definition serial digital signals. See also SMPTE ST 12-1 and SMPTE ST 266.

Drop Frame: In NTSC related systems, where the frame rate is 30/1.001 (approximately 29.97002997) or 60/1.001 (approximately 59.94005994) frames per second, the time code drop frame counting mode permits approximate time of day indexing of the frame numbers by dropping certain frame numbers. Specifically, frames 0, and 1 at the beginning of each minute except minutes 0,10,20,30,40, & 50, are omitted, to compensate for an approximate timing error of 108 frames (3 seconds 18 frames) per hour. A flag bit is set in the time code to signal when the drop frame counting mode is in effect. It should be noted that the drop frame correction to real time is not exact and that there will still be an approximate timing error of 2.589 frames per day in the drop frame counting mode. It should also be noted that the drop frame correction does NOT drop video frames, rather it drops time code frame counts. It is just a different way of labelling the frames. When it is desired to correct for the long term drift that occurs between real time and drop frame counting mode, it is common practice to resynchronize the time code count to real time once per day. See section 5.3.3.7 for information on how to accomplish this with the 7800TM2 Time code processor.

EBU (European Broadcasting Union): An organisation of European broadcasters that among other activities provides technical recommendations for the European 50 Hz television systems.

EBU tech 3267-E: The EBU recommendation for the parallel interface of 625 line digital video signal. This is a revision of the earlier EBU Tech 3246-E standard that was in turn derived from ITU-R601.

HANC: Horizontal Ancillary Data. Ancillary data recorded into the horizontal blanking portion (from EAV to SAV) of all lines a serial digital signal. Examples of data stored in this area includes SMPTE ST 272 and 299-1 Embedded audio, SMPTE ST 12-2 Ancillary Time Code.

HDSDI: High Definition Serial Digital Interface - a SMPTE standardised interface for transmitting high definition digital television signals using a coaxial cable in serial form at a nominal data rate of 1.5 Gb/s. Often used informally to refer to the 4:2:2 sampled high definition serial digital television signals as specified in SMPTE ST 292-1.

IRIG 200-04: This standard published by the Range Commanders Council of the United States Army, defines the characteristics of six serial time codes presently used by United States government agencies and supporting private industries

IRIG 215-11: This standard published by the Range Commanders Council of the United States Army, defines several asynchronous ASCII event count codes, which are used for low speed "counts" (i.e. countdowns) presently used by United States government agencies and supporting private industries. The codes are informally known as CS-5 serial codes.

IRIG 216-02: This standard published by the Range Commanders Council of the United States Army, defines several asynchronous ASCII protocols for disseminating IRIG format time codes presently used by United States government agencies and supporting private industries. The codes are informally known as CS-6 serial codes.

IRIG B: One of six formats of serial time codes defined in the IRIG 200-04 standard. Within this format there are both pulse width modulated and sine wave amplitude modulated formats supported with many different variations. For the purpose of this manual the use of the term IRIG B shall refer only to the B122 (modulated sine wave 1 kHz carrier BCD) and B002 (Pulse width modulated BCD) formats within IRIG 200-04 standard. IRIG-B time code formats have a time frame of 1 second with an index count of 10 milliseconds and contain time-of-year and year information in a BCD format, and seconds-of-day in straight binary seconds

ITU: The United Nations regulatory body governing all forms of communications. ITU-R (previously CCIR) regulates the radio frequency spectrum, while ITU-T (previously CCITT) deals with the telecommunications standards.

ITU-R601: An international standard for standard definition component digital television from which was derived SMPTE ST 125 and EBU 3246-E standards. ITU-R601 defines the sampling systems, matrix values and filter characteristics for Y, B-Y, R-Y and RGB component digital television signals.

ITU-R709: An international standard for high definition component digital television from which was derived SMPTE ST 274 and SMPTE ST 296 standards. ITU-R709 defines the sampling systems, matrix values and filter characteristics for Y, B-Y, R-Y and RGB component digital television signals.

Jam sync: Refers to the operation of slaving the time code generator to data coming from the time code reader. Jam sync should be used when dubbing time code from one tape to another, as the quality of the time code signal deteriorates with each generation, and will become unusable after the third generation.

In the jam sync mode, the generator and reader times are compared with each other during each frame, automatically compensating for the decoding offsets. If for any reason they are not equal, the jam is bypassed, and the next frame number is substituted by the generator. If the number of consecutive jam bypass errors exceeds 5, the last valid reader time is jammed into the generator again. In the absence of valid reader data within the last 5 frames, the generator continues to increment normally until valid reader code resumes. At this time it will be re-jammed to the reader, thus repairing large dropouts on the reader tape.

LTC: (Linear Time Code or Longitudinal Time Code) This time and address control signal standardised by SMPTE ST 12-1 has been in widespread use in the professional video and audio industries since 1975. It is typically written on a time code or address track of a video recorder and provides an individual frame number for each video frame recorded. For progressive video formats at frame rates greater than 30 frames per second, LTC provides a frame number for each pair of video frames. Each 80 bit code word is associated with one television frame (one frame pair for progressive formats above 30 FPS), and consists of 26 time bits, 6 flag bits, 32 user bits and 16 sync bits. This time code may run at nominal 24, 25 or 30 frame counts per second depending on the video format.

LTC is also commonly used to distribute time of day information to wall clocks, automation systems and other devices throughout a television facility. In regions of the world using the NTSC or similar non-integer (1/1.001) frame rates, LTC locked to the video frame rate does not maintain accurate time and must be corrected regularly when it is used convey time of day information. (See DROP FRAME, SMPTE ST 12-1.)

In standard definition and high definition serial digital signals this information can also be carried as ATC (See ATC, ATC-LTC, SMPTE ST 12-2)

NTSC: National Television Standards Committee established the analog television and video standard previously in use in the United States, Canada, Japan and several other countries using 60 Hz AC mains. NTSC video consists of 525 horizontal lines at a field rate of approximately 60 fields per second. (Two fields equal one complete Frame). Only 487 of these lines are used for picture. The rest are used for sync or extra information such as VITC and Closed Captioning.

PAL: Phase Alternating Line. The analog television and video standard previously in use in most of Europe and other parts of the world using 50 Hz AC mains. Consists of 625 horizontal lines at a field rate of 50 fields per second. (Two fields equal one complete Frame). Only 576 of these lines are used for picture. The rest are used for sync or extra information such as VITC and Teletext.

Pixel: The smallest distinguishable and resolvable area in a video image. A single point on the screen. In digital video, a single sample of the picture. Derived from the words *picture element*.

RP 168: The SMPTE Recommended Practice for the definition of the vertical interval switching point for synchronous video switching. This recommended practice also defines a default alignment between standard definition and high definition synchronizing pulse signals.

RP 188: The SMPTE Recommended Practice for transmitting time code in the ancillary data space of serial digital television signals. This document was replaced by SMPTE ST 12-2 in 2008. See SMPTE ST 12-2

SERIAL DIGITAL (SDI): (Serial Digital Interface) A standardised interface for transmitting digital television signals using a coaxial cable in serial form at a nominal data rate of 270 Mb/s. Often used informally to refer to the 4:2:2 sampled standard definition serial digital television signals as specified in SMPTE ST 259-C.

SMPTE (Society of Motion Picture and Television Engineers): Founded in 1916, SMPTE is the award-winning technical leader serving the motion picture and television industries. SMPTE members are focused on setting technical standards for the motion imaging industry and benefit from professional development webinars, industry conferences, the SMPTE Motion Imaging Journal.

SMPTE ST 12-1: The SMPTE standard for Time and address code. Formerly known as SMPTE 12M, SMPTE ST 12-1 was revised in 2007 and defines the parameters required for both linear (LTC) and vertical interval (VITC) time codes.

SMPTE ST 12-2: The SMPTE standard for transmitting time code in the ancillary data space of serial digital television signals. This document was previously a recommended practice (RP188) and was revised and became a standard in 2007.

SMPTE ST 125: The SMPTE standard for bit parallel digital interface for component video signals. SMPTE 125M defines the parameters required to generate and distribute component video signals on a parallel interface.

SMPTE ST 259: The SMPTE standard for 525 and 625 line serial digital component and composite interfaces. Level C compliance (abbreviated as ST 259-C in this document) describes the 270 Mb/s serial digital interface for component 4:2:2 signals.

SMPTE ST 266: The SMPTE standard for carrying Vertical Interval Time Code (D-VITC) on standard definition component serial digital signals.

SMPTE ST 272: The SMPTE standard for embedding audio in serial digital standard definition (SMPTE ST 259) video signals.

SMPTE ST 274: The SMPTE standard for bit parallel digital interface for high definition component video signals with an active picture of 1080 lines x 1920 pixels. This standard defines the sampling and raster structure for Interlaced, progressive and segmented frame images for 4:2:2 YCbCr and 4:4:4 YCbCr and RGB colour spaces.

SMPTE ST 291: The SMPTE standard for ancillary data packet formatting in serial digital video signals.

SMPTE ST 292-1: The SMPTE standard for 1.5 Gb/s high definition serial digital component interfaces.

SMPTE ST 296: The SMPTE standard for bit parallel digital interface for high definition component video signals with an active picture of 720 lines x 1280 pixels.

SMPTE ST 299-1: The SMPTE standard for embedding audio in serial digital high definition (SMPTE ST 292-1 and ST 425-1) video signals.

SMPTE ST 352: The SMPTE standard for payload identifier codes for serial digital interfaces signals. This standard specifies a 4-byte payload identifier which may be added to serial digital interfaces for the purpose of identifying the payload.

SMPTE ST 424: The SMPTE standard for the physical interface layer of 3 Gb/s high definition serial digital component interfaces.

SMPTE ST 425-1: The SMPTE standard for mapping of video formats onto a 3 Gb/s high definition serial digital component interface.

SMPTE ST 2048-1: The SMPTE standard for sampling and raster structure for digital cinematography component video signals with an active picture of 1080 lines x 2048 (also known as 2K) and 2160 lines x 4096 pixels (also known as 4K). This standard defines the sampling and raster structure for progressive and segmented frame images for 4:2:2 YCbCr and 4:4:4 YCbCr, RGB and FS colour spaces.

SMPTE ST 2048-2: The SMPTE standard for the parallel digital interface for digital cinematography component video signals with an active picture of 1080 lines x 2048 (also known as 2K) defined in SMPTE 2048-1. This standard defines the sampling and raster structure for progressive and segmented frame images for 4:2:2 YCbCr and 4:4:4 YCbCr, RGB and FS colour spaces.

sF: (Also known as *segmented frame)* The picture is progressively scanned, however divided into two *segments*, containing the odd and even lines. The segments are then sent out the serial digital interface in the same way that the fields of an interlaced video signal are. This format is often used at nominal frame rates of 24, 25 or 30 frames per second. The Segmented frame structure is defined in SMPTE ST 274.

User bits: 32 bits in the time code are user assignable. They typically are used to contain dates, scene and take numbers, tape reel numbers or other user-oriented data.

VANC: Vertical Ancillary Data. Ancillary data recorded into the active portion (from SAV to EAV) of lines during the vertical blanking region of a serial digital signal. Examples of data stored in this area includes SMPTE ST 334 Closed Caption Data, SMPTE ST 2016 Active format Descriptor (AFD) and Pan-Scan, SMPTE ST 2020 Audio Metadata to name a few.

VITC: Vertical Interval Time Code. A digital code used for timing and control purposes on video tape which is recorded in the vertical blanking interval of analog standard definition video pictures, and is referred to as VITC. Each 90 bit code word is associated with one television field, and consists of 26 time bits, 6 flag bits, 32 user bits, 18 sync bits, and an 8 bit error check (CRC) code. See also SMPTE ST 12-1. In Serial digital standard definition signals this information is carried as D-VITC. (See D-VITC, SMPTE ST 266.) In standard definition and high definition serial digital signals this information can also be carried as ATC (See ATC, ATC_VITC, SMPTE ST 12-2)

1.3 HOW TO USE THIS MANUAL

This manual is organized into 5 sections: Overview, Installation, Specifications, Card Edge Controls, Operation, Jumpers, Menu Quick Reference and VistaLINK® Configuration.

Section 1 provides a brief overview of the 7800TM2 operation and features, including block diagram. There is also a glossary of terms.

Section 2 provides a detailed description of the rear panel connectors and how the 7800TM2 should be connected into your system.

Section 3 provides the specifications.

Section 4 provides card edge information such as status LEDs and Card edge controls

Section 5 provides detailed information on controlling the card using the On Screen Menu system and card edge controls.

Section 6 provides information on jumper settings.

Section 7 provides a quick reference to the On Screen menu system

Section 8 provides information regarding VistaLINK® configuration and settings.

This symbol is intended to alert the user to important operating instructions.

The exclamation point within an equilateral triangle is intended to alert the user to the presence of important safety related operating and maintenance (Servicing) instructions in this manual.

2 INSTALLATION

2.1 REAR PANEL

Figure 2-1 provides the user with an illustration of rear plates for the three versions of the 7800TM2. The 7800TM2-3G rear plate occupies 1 slot in a 3RU 7800FR MultiFrame, while the 7800TM2-XIO-3G and 7800TM2-IRIG-3G rear plates occupy 2 slots in the 3RU frame. Please see section 3 of the MultiFrame manuals for more information on installing the rear plate into the frame.

The 1 Slot version of the card requires an extra slot when installed in the 7700FR-C frames, due to the lower per slot power budget of these frames. You will need to install a blank rear plate in the adjacent slot to the module. (See section 6.5

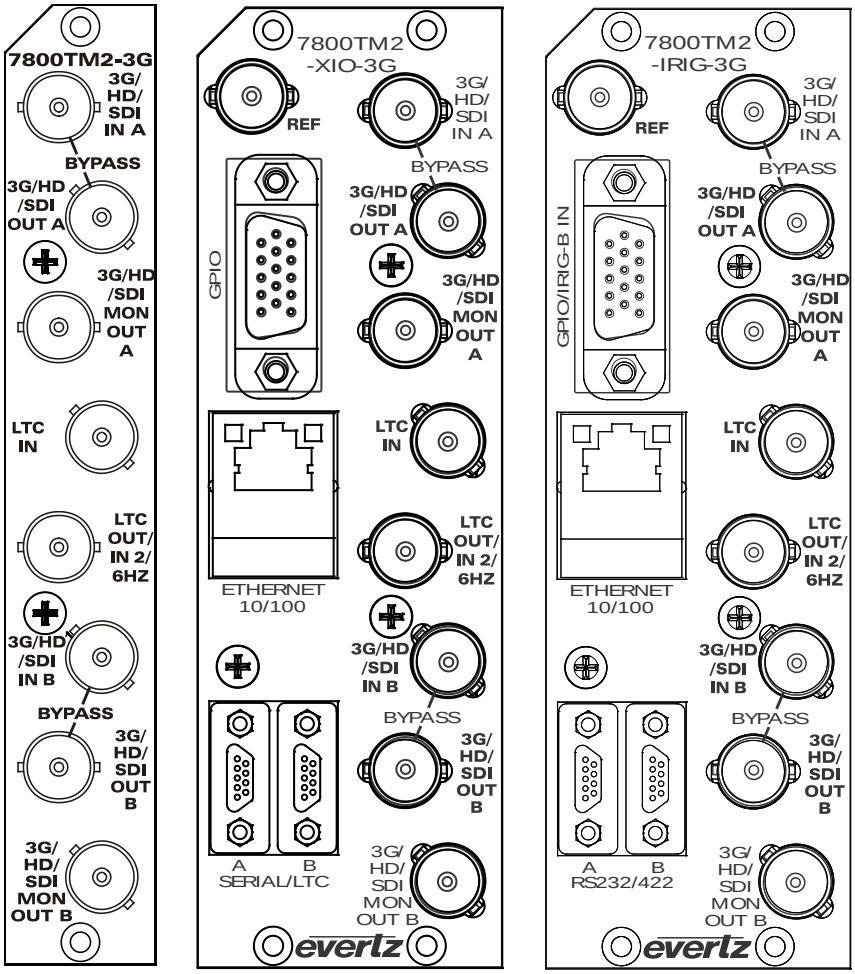


Figure 2-1: 7800TM2 Series Rear Panels

2.2 VIDEO INPUTS AND OUTPUTS

There are two separate video paths through the 7800TM2. Each video path can process a separate video format as long as the frame/field rate is the same. (For example video path A could be for 525i/59.94 while video path B could be for 1080i/59.94 or 720p/59.94) There is only one genlock path for the card so you cannot mix frame rates for the vide paths (e.g. you cannot have 1080i/50 on path A and 1080i/59.94 on path B). The following sections describe the video inputs and outputs more precisely.

2.2.1 Program Video Inputs

3G/HD/SDI IN A and B: Accepts a 4:2:2 10-bit serial digital video signal compatible with SMPTE ST 259-C (270 Mb/s), SMPTE ST 292-1, (1.5 Gb/s) and SMPTE ST 425-1 (3 Gb/s). The module can be set to receive a specific video standard or set to automatically detect supplied input video standard. See specifications in section 3.1 for a complete list of the video formats supported.

2.2.2 Program Video Outputs

3G/HD/SDI OUT A and B: These output BNC connectors provide by-pass protected outputs from the IN A and In B BNCs. Normally, they will contain the input video with D-VITC (SDI formats only) or Ancillary Time Code (ATC) inserted. There can optionally be character burn-ins superimposed on these outputs. The outputs will be in the same format as the respective inputs. The bypass relay is activated when the card is not powered, or maybe manually activated using card edge or VistaLINK® controls.

2.2.3 Monitor Video Output

3G/HD/SDI MON OUT A and B: The MON output BNC connectors provide the capability of adding decoded LTC or D-VITC, or ATC time code data burned into the input video. They are also used to display the On Screen card edge control menu. Normally, these output BNC connectors contain the input video with Time Code burned over the video. If the bypass relay is activated, this connector will have NO video output.

2.3 REFERENCE INPUT

REF: This BNC **(**available on the XIO and IRIG versions only**)** is for connecting a bi-level or tri-level reference. The reference signal format is auto-detected by the module. On all versions, reference may also be supplied via the frame reference inputs. VistaLINK® or the Card Edge menu may be used to select the module's reference source. (See section 5.3.1.4) The reference is used to provide timing for the internal black/blue video generator and the LTC generators when there is no input video. It also may be used to identify pairs of progressive HD formats with frame rates above 30. If vertical interval time code (VITC) is present on standard definition reference video, this may be used as an additional time code input for the readers in the 7800TM2. (See section 5.3.2.1)

2.4 LINEAR TIME CODE (LTC) AND 6 HZ INPUTS AND OUTPUTS

All 7800TM2 modules are provided with a dedicated LTC input BNC and a second BNC that is selectable as either a second LTC input, an LTC output or a 6 Hz reference input.

LTC IN: This BNC connector is an unbalanced input for SMPTE ST 12-1 linear time code. When using a balanced input source, connect the + side of the balanced signal to the centre pin of the BNC and the shield to the outside of the BNC.

LTC OUT/IN2/6HZ: This BNC connector is configurable using jumper J1 on the IO rear module as shown in Figure 2-2 and Figure 2-3.

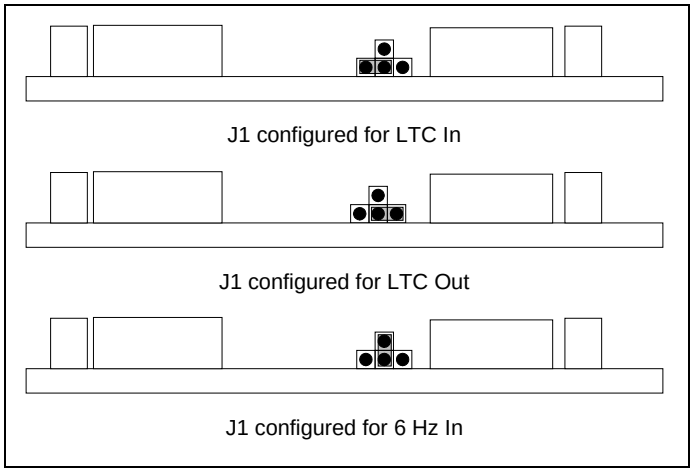


Figure 2-2: LTC Configuration Jumpers (Single Slot version)

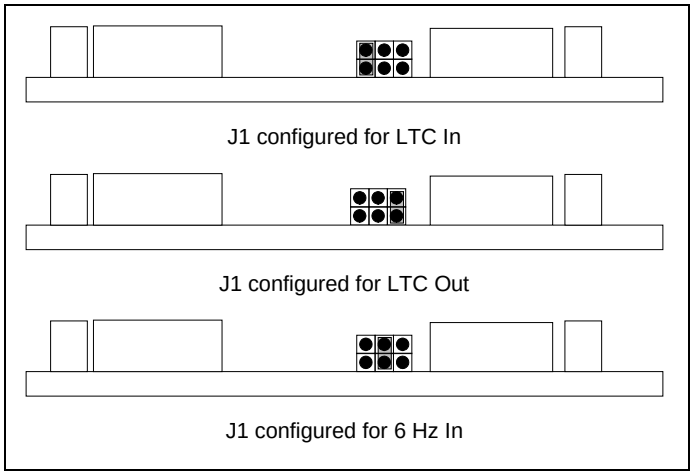


Figure 2-3: LTC Configuration Jumpers (XIO and IRIG Versions)

When jumper J1 is set to the LTC IN position this BNC provides a second unbalanced input for an additional LTC source.

When jumper J1 is set to the LTC OUT position, this BNC provides an unbalanced output for SMPTE ST 12-1 linear time code from one of the Time Code Generators on the 7800TM2. When using a device

with a balanced input, the center pin of the BNC should be connected to + side of the balanced signal and the outside of the BNC should be connected to the shield.

When jumper J1 is set to the 6 HZ IN position, this BNC provides an input for providing a 6Hz reference to the card, for 23.98 FPS alignment to 29.94 Hz systems. The timing of the 6 Hz pulse input must conform to the specifications in Figure 2-4.

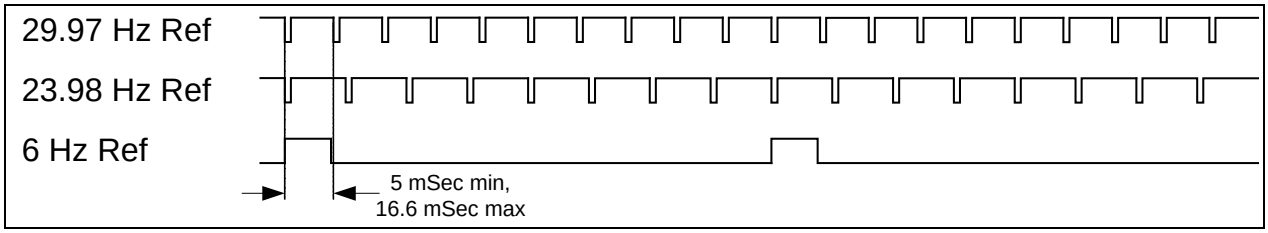
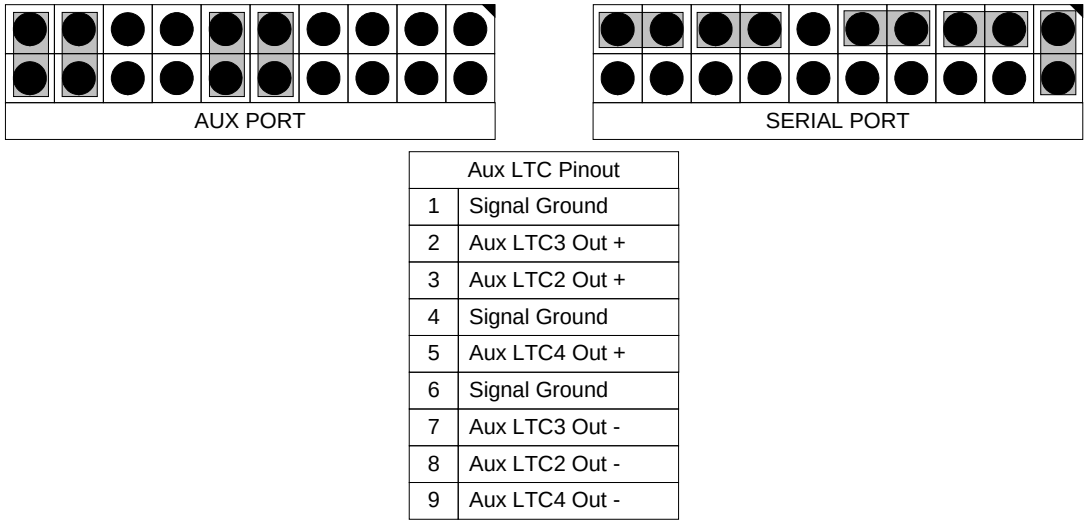


Figure 2-4: 6 Hz Reference Pulse Timing

2.4.1 Auxiliary Balanced LTC Outputs (XIO Version Only)

The 7800TM2-XIO-3G version has three additional balanced LTC outputs that are available on the Serial B connector. The SERIAL B connector must be configured properly to achieve this functionality. There are two jumper banks located on the submodule (J13 and J8 – see Figure 6-3) that are used to configure the SERIAL B pinout and logic level configuration. The diagrams below show the jumper banks as viewed with the rear of the module to the right. To configure the SERIAL B connector for balanced LTC outputs, just move the jumpers to the positions shown in Figure 2-5. The 7800TM2-XIO-3G is shipped with Micro D Female To DB9 Female adapter cables (Evertz part number WP-MICRO/CMD-DSUB/F-F) to convert the SERIAL B "Micro-D" connector to a standard female "DB9" connectors for connection to a computer or other equipment. Figure 2-6 shows the wiring to make a breakout cable to standard XLR connectors for the Aux LTC outputs.

On early versions of the submodule, the silkscreen labels for AUX PORT A and AUX PORT B are reversed. Figure 6-3 shows the correct labeling.



Aux LTC Pinout	
1	Signal Ground
2	Aux LTC3 Out +
3	Aux LTC2 Out +
4	Signal Ground
5	Aux LTC4 Out +
6	Signal Ground
7	Aux LTC3 Out -
8	Aux LTC2 Out -
9	Aux LTC4 Out -

Figure 2-5: Serial B Aux LTC Out Configuration (XIO Version Only)

7800TM2 End			Breakout End
Male DB9	Signal Name		3 pin Male XLR
1	Signal Ground	1	XLR #1
3	Aux LTC Out 2+	2	Label:
8	Aux LTC Out 2-	3	Aux LTC Out 2
Case	Shield	Case	
4	Signal Ground	1	XLR #2
2	Aux LTC Out 3+	2	Label:
7	Aux LTC Out 3-	3	Aux LTC Out 3
Case	Shield	Case	
6	Signal Ground	1	XLR #3
5	Aux LTC Out 4+	2	Label:
9	Aux LTC Out 4-	3	Aux LTC Out 4
Case	Shield	Case	

Figure 2-6: Aux LTC Out to XLR Breakout Cable

2.5 SERIAL REMOTE PORTS (XIO AND IRIG VERSIONS ONLY)

Two serial ports, labelled A and B, are available on the rear panel of the 2 slot versions of the module. The modules are shipped with 2 Micro D Female to DB9 Female adapter cables (Evertz part number WP-MICRO/CMD-DSUB/F-F) to convert these “Micro-D” connectors to standard female “DB9” connectors for connection to a computer or other equipment.

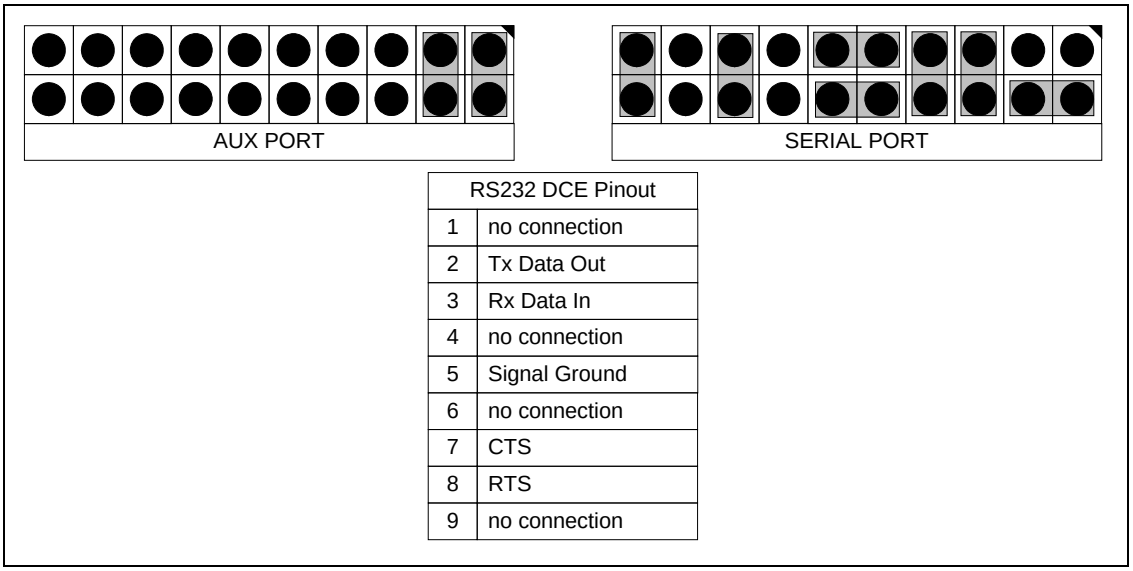
The serial ports can be used for a variety of functions. The Card edge menu or VistaLINK® can be used to set the functionality, baud rate, word size and parity for your application.

Physically, each serial port can be independently configured for RS-232 “DTE”, RS-232 “DTE”, RS-422 “Controller” or RS-422 “Tributary” logic levels and pinouts. As configured from the factory, all serial ports are configured for RS-232 DCE pinouts and logic levels. The DCE pin-out provides easy connection to RS-232 serial ports on most computers by straight-through cable. On the XIO version, serial port B connector is also used to provide the Auxiliary LTC Out Connections (see section 2.3.1).

There are four jumper banks located on the submodule (J21 and J16 for port A, J13 and J8 for port B – see Figure 6-3) that are used to configure the serial ports pinout and logic level configuration. The diagrams below show the jumper banks as viewed with the rear of the module to the right. To reconfigure the respective serial port, just move the jumpers to the positions shown in the figures below.

2.5.1 Configuring Ports for RS-232 DTE

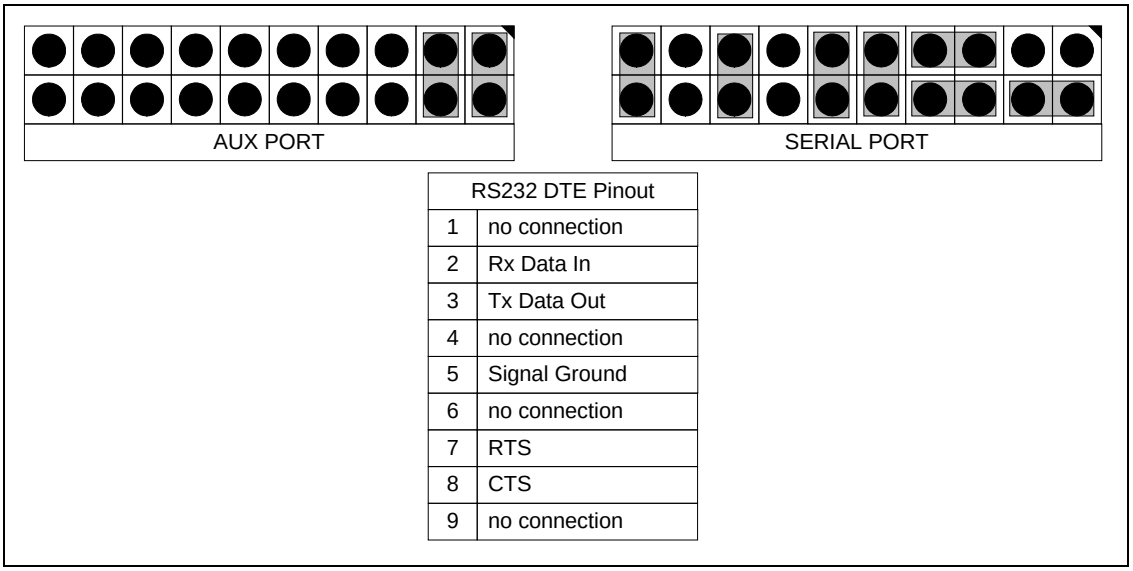
Ports A, and B are configured for RS-232 communications from the factory. The two common RS-232 pinouts are Data Terminal Equipment (DTE) and Data Communications Equipment (DCE). The serial ports are factory configured to have a DCE pinout, as shown in Figure 2-7.



RS232 DCE Pinout	
1	no connection
2	Tx Data Out
3	Rx Data In
4	no connection
5	Signal Ground
6	no connection
7	CTS
8	RTS
9	no connection

Figure 2-7: RS-232 DCE Configuration

To configure the serial port to an RS232 DTE configuration move the jumpers as shown in Figure 2-8



RS232 DTE Pinout	
1	no connection
2	Rx Data In
3	Tx Data Out
4	no connection
5	Signal Ground
6	no connection
7	RTS
8	CTS
9	no connection

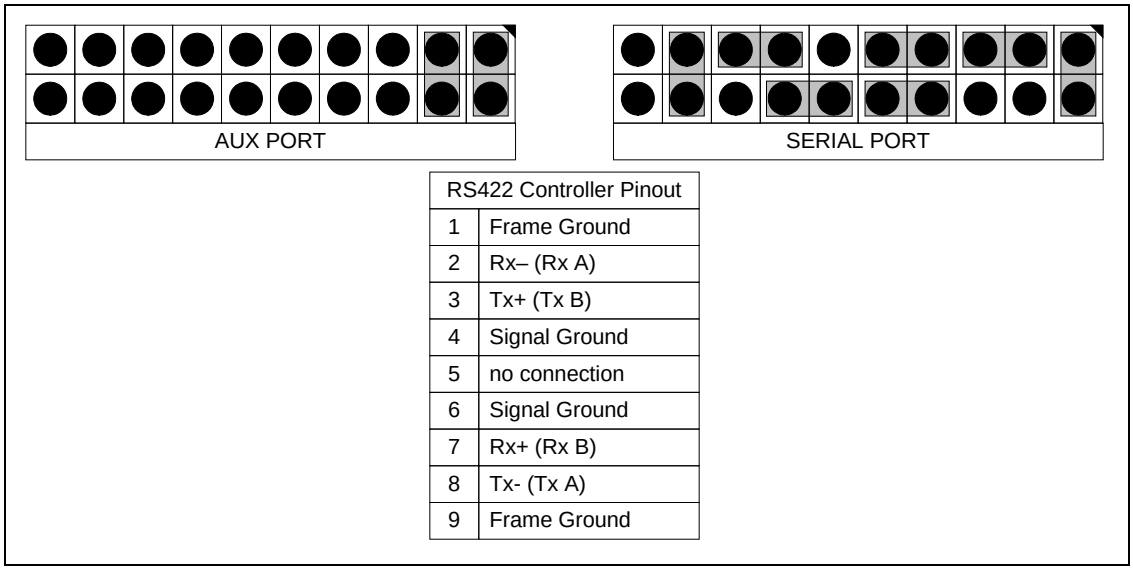
Figure 2-8: RS-232 DTE Configuration

Serial Port (A, B)			Computer End		
	Male (pins)		Female (sockets)		
Description	DB9		DB25	DB9	Description
Shield					Shield
RS 232 Transmit	3	----------	3	2	RS 232 Receive
Ground	5	----------	7	5	Signal Ground
RS 232 Receive	2	----------	2	3	RS 232 Transmit
RS 232 CTS	8	----------	4	7	RS 232 RTS
RS 232 DTR	4	----------	6	6	RS 232 DSR
RS 232 RTS	7	----------	5	8	RS 232 CTS
RS 232 DSR	6	----------	20	4	RS 232 DTR

Figure 2-9: Cable Wiring RS-232 DTE Serial Port to Computer

2.5.2 Configuring Ports for RS-422

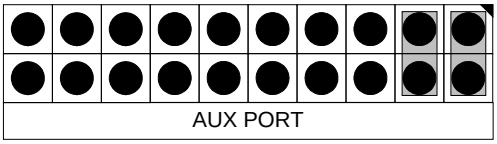
Ports A and B are separately configurable for RS-422 communication. The two common RS-422 pinouts are “Controller” and “Tributary”, sometimes also known as “Controller” and “Device”. To configure the serial port to an RS422 Controller configuration move the jumpers as shown in Figure 2-10.

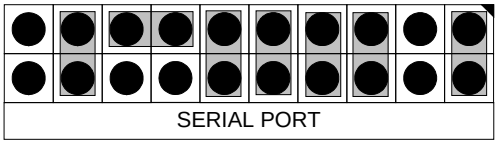


RS422 Controller Pinout	
1	Frame Ground
2	Rx– (Rx A)
3	Tx+ (Tx B)
4	Signal Ground
5	no connection
6	Signal Ground
7	Rx+ (Rx B)
8	Tx- (Tx A)
9	Frame Ground

Figure 2-10: RS-422 Controller

To configure the serial port to an RS422 Controller configuration move the jumpers as shown in Figure 2-10.





RS422 Tributary (Device) Pinout

1	Frame Ground
2	Tx- (Tx A)
3	Rx+ (Rx B)
4	Signal Ground
5	no connection
6	Signal Ground
7	Tx+ (Tx B)
8	Rx– (Rx A)
9	Frame Ground

Figure 2-11: RS-422 Tributary (also known as RS422 Device)

Device "Tributary" End			**Computer "Controller" End**	
	Male (pins)		**Male (pins)**	
Description	**DB9**		**DB9**	**Description**
Shield				Shield
Frame Ground	1	----------	1	Frame Ground
Transmit Common	6	----------	6	Receive Common
Transmit -	2	----------	2	Receive -
Transmit +	7	----------	7	Receive +
Receive +	3	----------	3	Transmit +
Receive -	8	----------	8	Transmit -
Receive Common	4	----------	4	Transmit Common
Frame Ground	9	----------	9	Frame Ground
not used	5	----------	5	not used

Figure 2-12: Cable Wiring RS-422 Tributary Serial Port to RS-422 Controller

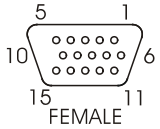
2.6 GPIO CONNECTOR (XIO AND IRIG VERSIONS ONLY)

A 15-pin D connector provides a method of connecting the remote control GPI signals to control the module. The user can configure the GPI/O functionality of the 7800TM2 via the card edge menu or VistaLINK® control. The pin assignment of the connector is illustrated in Figure 2-13.

GPI/O pull-up voltage is set to +12V or +5V with J7 on A7725 sub-board.

GPIO: **(GPIO/IRIG-B IN on IRIG version)** This female 15 pin high density D connector for connecting the general purpose inputs and outputs. The *GPIO Functions* menu is used to select the functions of the GPI inputs and outputs as well as whether the input or output is active high or active low.

On the IRIG version of the modules, this connector also has an IRIG-B input.



Pin #	Name	Description
1	GPIO_6	GPIO 6 Signal
2	GPIO_5	GPIO 5 Signal
3	GPIO_4	GPIO 4 Signal
4	GPIO_3	GPIO 3 Signal
5	GPIO_2	GPIO 2 Signal
6	GND	Signal ground
7	GPIO_12	GPIO 12 Signal
8	GPIO_11	GPIO 11 Signal
9	GPIO_10	GPIO 10 Signal
10	GPIO_9	GPIO 9 Signal
11	IRIG IN	IRIG-B Input (not used on XIO version)
12	GND	Signal ground
13	GPIO_1	GPIO 1 Signal
14	GPIO_7	GPIO 7 Signal
15	GPIO_8	GPIO 8 Signal

Figure 2-13: GPIO Connector Pinout

The GPI is pulled up with an internal pull up (100 Ohm) resistor to +5.65V or +12V set by jumper J7 on the A7725 sub board. Figure 2-14 shows the circuit when a particular GPIO is configured to be a general-purpose input. :

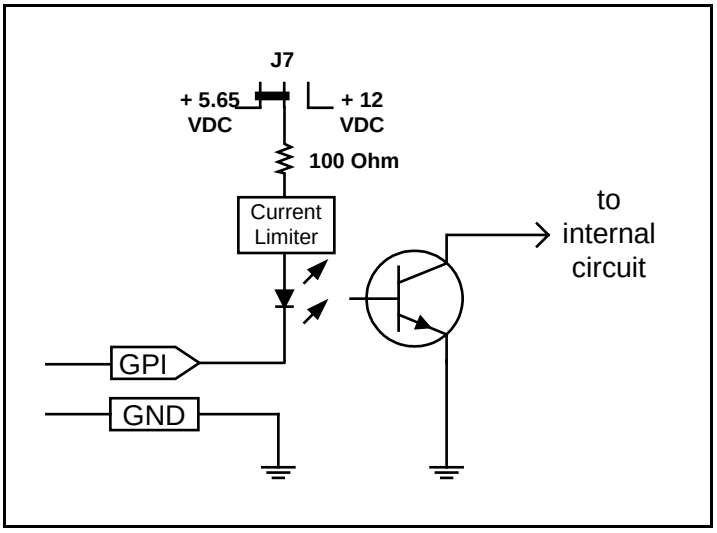


Figure 2-14: GPI Input Circuitry

When a particular GPIO is configured to be a GPO, the interface shown below shall apply. The GPO is active low with internal pull up (100 Ohm) resistors to +5.65V or +12V set by jumper J7 on the A7725 sub board. When high, the signal will go high to the pull-up voltage. Figure 2-15 shows the circuit when a particular GPIO is configured to be a general-purpose output.

The GPOs employ a current limiting circuit that limits each GPO to source a maximum of about 6mA, which is enough to drive TTL logic but not directly drive a relay. You can supply an external voltage at the same level as the GPIO voltage to supply more current. Then the limit would be max. current that the GPIO pins can sink to GND: 40mA @ 3V, 24mA @ 5V, 10mA @ 12V. That is sufficient to drive some small relays.

On early versions of this product the source current limit in the GPO circuit was set to approximately 2ma per output. Contact the factory for further information if the current source is inadequate for your application.

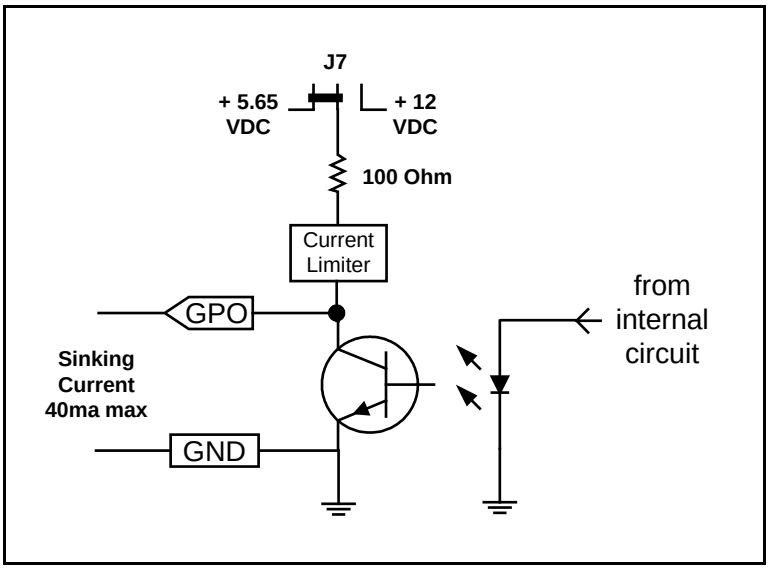


Figure 2-15: GPO Output Circuitry

2.6.1 Connecting the IRIG-B Time Code (IRIG version only)

GPIO/IRIG-B IN: This female 15 pin high density D connector for connecting the general purpose inputs and outputs as well as an unbalanced IRIG-B input. Connect the IRIG-B source to pin 11 of this connector and connect the ground of the IRIG-B input signal to pin 12.

2.7 ETHERNET CONNECTIONS

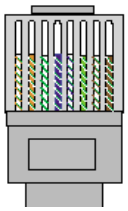
The 7800TM2-XIO-3G modules are designed to use either 10Base-T (10 Mbps) or 100Base-TX (100 Mbps) also known as *Fast Ethernet*, twisted pair Ethernet cabling systems. When connecting for 10Base-T systems, category 3, 4, or 5 UTP cable as well as EIA/TIA – 568 100 STP cable may be used. When connecting for 100Base-TX systems, category 5 UTP cable is required. Make the network connection by plugging one end of a “straight through” cable into the RJ-45 receptacle of the 7800TM2-XIO-3G modules and the other end into a port of the supporting hub. If you are connecting the 7800TM2-XIO-3G module directly to an Ethernet port on a computer you will have to use a “crossover” cable.

Straight-through RJ-45 cables can be purchased or can be constructed using the pinout information in Figure 2-16. A colour code wiring table is provided in Figure 2-16 for the current RJ-45 standards (AT&T 258A or EIA/TIA 258B colour coding shown). Also, refer to the notes following the table for additional wiring guide information.

Note the following cabling information for this wiring guide:

- Only two pairs of wires are used in the 8-pin RJ 45 connector to carry Ethernet signals.
- Even though pins 4, 5, 7 and 8 are not used, it is mandatory that they be present in the cable.
- 10BaseT and 100BaseT use the same pins; a crossover cable made for one will work with the other.
- Pairs may be solid colours and not have a stripe.
- Category 5 cables must use Category 5 rated connectors.

Pin 1



Pin #	Signal	EIA/TIA 568A	AT&T 258A or EIA/TIA 568B	10BaseT or 100BaseT
1	Transmit +	White/Green	White/Orange	X
2	Transmit –	Green/White or White	Orange/White or Orange	X
3	Receive +	White/Orange	White/Green	X
4	N/A	Blue/White or Blue	Blue/White or Blue	Not used (required)
5	N/A	White/Blue	White/Blue	Not used (required)
6	Receive –	Orange/White or Orange	Green/White or Green	X
7	N/A	White/Brown	White/Brown	Not used (required)
8	N/A	Brown/White or Brown	Brown/White or Brown	Not used (required)

Figure 2-16: Colour Code Wiring for the Current RJ 45 Standards

The maximum cable run between the 7800TM2-XIO-3G modules and the supporting hub is 300 ft. (90 m). The maximum combined cable run between any two end points (i.e. 7800TM2-XIO-3G and PC/laptop via network hub) is 675 feet (205 m).

Devices on the Ethernet network continually monitor the receive data path for activity as a means of checking that the link is working correctly. When the network is idle, the devices also send a link test signal to one another to verify link integrity. The card edge is fitted with two LEDs to monitor the Ethernet connection. (See section 4.2)

In order to use the Ethernet connection you will have to configure the module IP address for your network.

2.8 SERVICING INSTRUCTIONS

CAUTION – These servicing instructions are for use by qualified service personnel only. To reduce risk of electric shock, do not perform any servicing instructions in this section of the manual unless you are qualified to do so.

2.8.1 Replacing the Battery (2 Slot versions only)

The 7800TM2-XIO-3G and 7800TM2-IRIG-3G are fitted with a 3V 20mm diameter Lithium battery type CR2032. This battery is used to power the system time clock while power is removed from the unit. If the unit is not keeping time properly when it is powered down, the battery should be replaced according to the procedure outlined in section 2.7.1.2.

CAUTION
Danger of explosion if battery is incorrectly replaced
Replace only with the same or equivalent type

CAUTION
Danger of explosion if battery is exposed to excessive heat such as direct sunlight, fire, etc.

2.8.1.1 Safety Guidelines and Precautions Concerning the Use of 3V Lithium Batteries

Please observe the following warnings strictly. If misused, the batteries may explode or leak, causing injury or damage to the equipment.

- The batteries must be inserted into the equipment with the correct polarity (+ and -).
- Do not attempt to revive used batteries by heating, charging or other means.
- Do not dispose of batteries in fire. Do not dismantle batteries.
- Do not short circuit batteries.
- Do not expose batteries to high temperatures, moisture or direct sunlight.

Do not place batteries on a conductive surface (anti-static work mat, packaging bag or form trays) as it can cause the battery to short.

2.8.1.2 Procedure for Replacing the Battery

- Eject the main board by unlatching the ejectors on each side and pulling outwards
- The battery is located on the rear of the top board
- Carefully lift out the old battery
- Insert the new battery with the + side facing up. Make sure it is firmly inserted into the socket
- Reinsert the board by carefully lining it up on the card guides and push firmly

3 TECHNICAL SPECIFICATIONS

3.1 SERIAL DIGITAL VIDEO INPUT

Standard:	270Mb/s SMPTE ST 259-C 10 bit 4:2:2 (525i/59.94, 625i/50) 1.485 Gb/s SMPTE ST 292-1 10 bit 4:2:2 (1080i/60, 1080i/50, 1080p/30, 1080p/30sF, 1080p/25, 1080p/25sF, 1080p/24, 1080p/24sF, 720p/60, 720p/50, 720p/30, 720p/25, 2048 x 1080p/30, 2048 x 1080p/25, 2048 x 1080p/24)* 2.97 Gb/s SMPTE 424M & SMPTE 425-1 Level A and Level B-DL 10 bit 4:2:2 (1080p/60, 1080p/50, 2048 x 1080p/60, 2048 x 1080p/50)* *Includes the 1/1.001 rates where applicable
Number of Inputs:	2 (separate video paths)
Connector:	BNC per IEC 61169-8 Annex A
Equalization:	Automatic up to 80m @3Gb/s with Belden 1694A (or equivalent) Automatic up to 100m @1.5Gb/s with Belden 1694A (or equivalent) Automatic up to 300m @270Mb/s with Belden 8281 (or equivalent)
Impedance:	75 ohms
Return Loss:	> 15 dB to 1.5 GHz > 10 dB to 3.0 GHz

3.2 SERIAL DIGITAL VIDEO OUTPUT

Standard:	Same as input standard
Number of Outputs per path:	1 PGM (Relay Bypass Protected to Inputs) 1 MON with On Screen Display menu and character burn ins
Connector:	BNC per IEC 61169-8 Annex A
Signal Level:	800mV nominal
DC Offset:	0V ± 0.5V
Rise/ Fall Times:	HD: 200ps nominal SD: 740ps nominal
Overshoot:	<10% of amplitude
Wide Band Jitter:	<0.2 UI @ 1.5Gb/s, < 0.3 UI @ 3Gb/s
Impedance:	75 ohms
Return Loss:	> 15 dB to 1.5 GHz > 10 dB to 3.0 GHz

3.3 REFERENCE INPUT

Type:	HD Tri-level Sync, NTSC or PAL Colour Black 1 V p-p (with optional VITC) Composite bi-level sync (525i/59.94 or 625i/50) 300 mV
Connector:	BNC per IEC 60169-8 Annex A or Frame Reference.
Termination:	75 ohm (selectable – see section 6.3)

3.4 LINEAR TIMECODE INPUTS AND OUTPUT

Standard:	SMPTE ST 12-1
Frame Rate:	24, 25 and 30 Fps nominal
Number of Inputs:	1 Reader Input 1 (Selectable as reader input, generator output or 6 Hz Input)
Number of Outputs:	
7800TM2-3G:	1 unbalanced (Selectable as reader input, generator output or 6 Hz Input)
7800TM2-XIO-3G:	1 unbalanced (Selectable as reader input, generator output or 6 Hz Input) 3 balanced Aux LTC Out (on SERIAL B Connector)
7800TM2-IRIG-3G:	1 unbalanced (Selectable as reader input, generator output or 6 Hz Input)
Connectors:	BNC per IEC 60169-8 Annex A. Female micro DB 9 with adapter cable to standard female DB 9
Level:	
Input	0.2 to 4V p-p, unbalanced
Outputs	1V p-p nominal 5 v p-p nominal balanced (Aux LTC outputs)

3.5 GENERAL PURPOSE INPUTS AND OUTPUTS (XIO AND IRIG VERSIONS ONLY)

Number:	12 configurable as inputs or outputs
Type:	Opto-isolated, active low or high with internal pull-ups
Connector:	Female DB 15
Signal level:	+5V or +12V nominal
Function:	User preset select or programmable functions

3.6 IRIG READER (IRIG VERSION ONLY)

Standard:	IRIG 200-04 Formats B002 and B122
Connector:	Female DB 15, Pin 11 , ground on Pin 12
Level:	0.2 to 4V p-p, unbalanced

3.7 SERIAL PORTS (XIO AND IRIG VERSIONS ONLY)

Number:	2
Connector:	Female micro DB 9 with adapter cable to standard female DB 9
Signal Level:	RS-422 or RS-232
Baud Rate:	Selectable baud rates (38,400 default)
Function:	Read Sony Protocol time code, Serial A configurable for auxiliary LTC outputs (on XIO version) IRIG CS-5 input or CS-6 output (on IRIG version only)

3.8 ETHERNET (XIO AND IRIG VERSIONS ONLY)

Network Type:	Fast Ethernet 100 Base-TX IEEE 802.3u standard for 100 Mbps baseband CSMA/CD local area network Ethernet 10 Base-T IEEE 802.3 standard for 10 Mbps baseband CSMA/CD local area network
Connector:	RJ-45
Function:	NTP reader source UDP protocol for Up/Down Timer control and b roadcast (XIO version only)
NTP Standard:	RFC-1305 compliant, client mode support

3.9 CONTROL

Card Edge:	Full control of all module functions using On screen menu, controlled from card edge shaft encoder.
VistaLINK®	VistaLINK® - capable for remote monitoring, control and configuration capabilities via SNMP, using VistaLINK® PRO, CP-2116E or CP-2232E Control Panels. VistaLINK® is available when modules are used with the 3RU 7800FR frame and a 7700FC VistaLINK® Frame Controller in slot 1 of the frame.
GPIO	12 configurable General purpose inputs
User Presets	4 User presets to store and recall user configurations instantly

3.10 ELECTRICAL

Voltage:	+ 12V DC
Power:	15 Watts
EMI/RFI:	Complies with FCC regulations for class A devices. Complies with EU EMC directive.

3.11 PHYSICAL

Number of slots	
7800TM2-3G:	1 (2 in 7700FR-C and 350FR frames – slot blocker must be installed)
7800TM2-XIO-3G:	2
7800TM2-IRIG-3G:	2
Enclosures	
7700FR-C:	3RU Multiframe - holds up to 15 single slot modules
7800FR(-QT):	3RU Multiframe with Frame Genlock - holds up to 15 single slot modules
350FR:	3RU Portable Multiframe - holds up to 7 single slot modules
7801FR	1RU Multiframe with Frame Genlock - holds up to 4 single slot modules or 2 dual slot modules

3.12 REPLACEMENT CABLES (FOR 2 SLOT VERSIONS ONLY)

WP-MICRO/CMD-DSUB/F-F	Micro D Female to DB9 Female Adapter Cable

4 CARD-EDGE CONTROLS AND STATUS LEDS

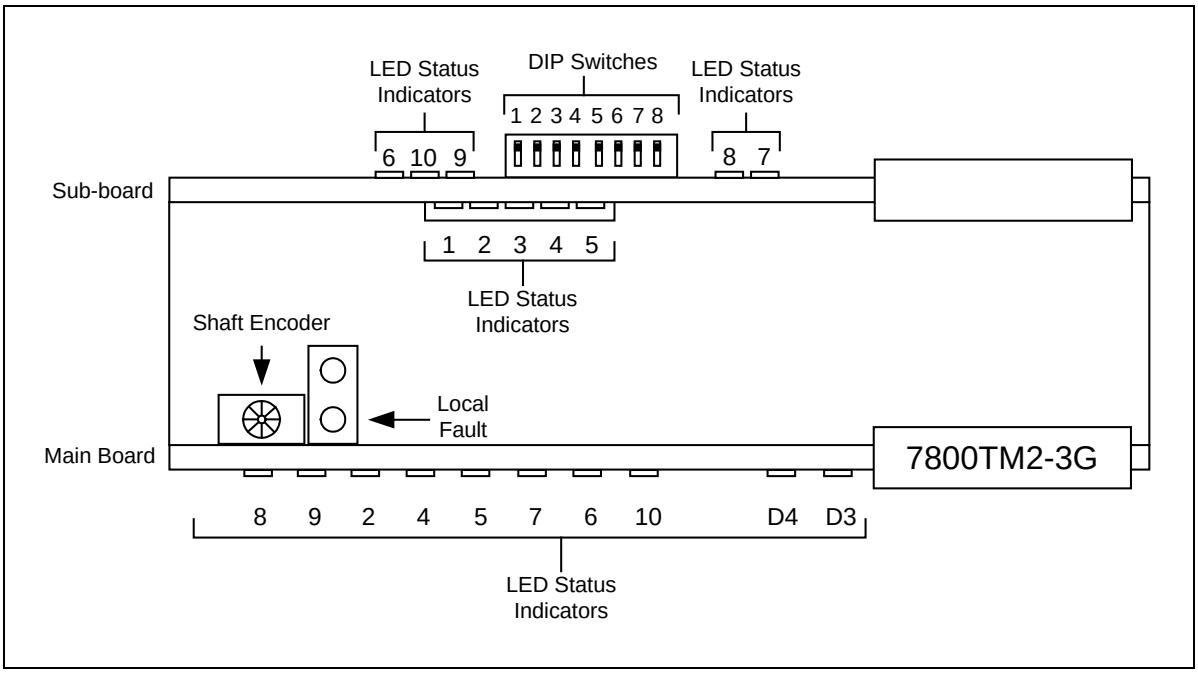


Figure 4-1: 7800TM2 Card-Edge – 2 Slot version

The two slot version card edge controls are shown in Figure 4-1. The one slot version controls are identical except that the sub-board is not installed.

4.1 MODULE HEALTH STATUS INDICATOR LEDS

Two large LEDs on the front of the main board indicate the general health and status of the module.

LOCAL FAULT: This Red LED indicates poor module health and will be On if a board power fault exists (i.e.: a blown fuse). It will also be On when video is missing from both channel A and channel B. 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 the board power is good and video is present on either channel A or Channel B.

4.2 MAIN BOARD LED DEFINITIONS

The following table provides the LED definitions for the main board:

LED	DESCRIPTION	DEFINITION
LED 8	Green = Present Red = Not Present Flashing Yellow = Relay Bypass	Video Status for Path A
LED 9	Green = Present Red = Not Present Flashing Yellow = Relay Bypass	Video Status for Path B
LED 2	Green = Present and active Off = Not Present	Reference Status
LED 4	Green = Present and active Off = Not Present	Reader A Valid Status
LED 5	Green = Primary source active Yellow = Primary source not active	Reader A using Primary reader source
LED 7	Green = Present and active Off = Not Present	Reader B Valid Status
LED 6	Green = Primary source active Yellow = Primary source not active	Reader B using Primary reader source
LED 10	-- *N/A* --	*Reserved for future use*
D3	Green = 100Base-T last detected Off = 10Base-T link last detected	Ethernet 10/100
D4	Green = Link valid Blinking = sending or receiving data	Ethernet Link/ACT

Table 4-1: Main Board LEDs

4.3 SUB-BOARD LED DEFINITIONS (2 SLOT VERSIONS ONLY)

The following table provides the LED definitions for the sub-board:

LED	DESCRIPTION	DEFINITION
LED 1	Green = Not Present Red = Present	Status for Serial Port A
LED 2	Green = Not Present Red = Present	Status for Serial Port B
LED 3	Green = Present and active Yellow = Not Present and active Red = Not Present and active	Status for IRIG Reader (IRIG Version only)
LED 4	*-- N/A --*	*Reserved for future use*
LED 5	*-- N/A --*	*Reserved for future use*
LED 6	*-- N/A --*	*Reserved for future use*
LED 7	*-- N/A --*	*Reserved for future use*
LED 8	*-- N/A --*	*Reserved for future use*
LED 9	*-- N/A --*	*Reserved for future use*
LED 10	*-- N/A --*	*Reserved for future use*

Table 4-2: Sub-Board LEDs

4.4 DIP SWITCH CONTROLS (2 SLOT VERSIONS ONLY)

The 7800TM2 2 slot versions are equipped with an 8 position DIP switch to allow the user to select various functions. DIP switch 1 is located at the top of the DIP switch (farthest from to the card ejector). Table 4-3 gives an overview of the DIP switch functions. The On (Closed) position is down, or closest to the printed circuit board.

DIP Switch	Position	Function
1	OPEN	Currently unassigned. Leave in the OPEN position.
	CLOSED	
2	OPEN	
	CLOSED	
3	OPEN	
	CLOSED	
4	OPEN	
	CLOSED	
5	OPEN	
	CLOSED	
6	OPEN	
	CLOSED	
7	OPEN	
	CLOSED	
8	OPEN	Normal IRIG Mode (IRIG version only)
	CLOSED	POSIX IRIG Mode (IRIG version only)

Table 4-3: DIP Switch Functions

4.5 CARD EDGE MENU CONTROLS

Control and configuration of this module can be done either with VistaLINK® (see section 8) or via a card edge shaft encoder with pushbutton action and an On-Screen Display menu (OSD) that is keyed over video and is output on both of the MON Out BNCs. Section 5 details how to control the card from the card edge and OSD.

4.6 ON-SCREEN DISPLAY

The On-Screen Display (OSD) is normally visible on the MON BNC outputs. The OSD functionality is divided into three modes; a **Burn-In Display, Reader Status Display** and a **Menu System** for configuring and controlling the module. The Burn-In Display is used to show the Reader and Generator time and user bit information for the respective channel and may be displayed on the OSD output when the user is not accessing the menu system, or the status display. The Burn-In display can also include various debug windows giving additional data to the user. The Reader Status Display is used to show a summary of all the readers for the card at the same time, and may be displayed on the OSD output when the user is not accessing the menu system. The Status Display turns off the normal OSD 'burn-ins' for the channel when it is active. Leaving the menu system can be accomplished by backing out of the menu hierarchy or by selecting the EXIT commands within any menu. Section 5 details how to control the card from the card edge and OSD.

You can choose to have the OSD output on both the MON and PGM output BNCs, using the *Show OSD* menu item on the *VIDEO* menu for the respective channel or Video Tab in VistaLINK®. (See section 5.3.1.5)

5 CONTROLLING THE MODULE USING THE CARD EDGE CONTROLS

5.1 OPERATING THE ON SCREEN MENU - OVERVIEW

When you push and release the shaft encoder, you will enter the menu system. The On Screen menu will appear on the output(s) configured to display the OSD display. (By default the MON OUT will function as the OSD display but may also be configured to be output on both the PGM and MON outputs). The remainder of the card configuration and control is done via the menu system on the On-Screen Display of this monitoring output.

When you press and release the shaft encoder, this will bring you to the main Setup menu where you can turn the shaft encoder to move up and down the list of available sub-menus. An arrow (➔) moves up and down the left hand side of the menu items to indicate which item you are currently choosing. Once the arrow is on the desired item, press the shaft encoder pushbutton to select the next menu level.

On all menus, there are two extra selectable items: *Back* and *Exit*. Selecting *Back* will take you to the previous menu (the one that was used to get into the current menu) while *Exit* will return the display to its normal operating mode. On the top level of the menu, ***BACK*** and **EXIT** will both exit the menu system and return you to the normal operating mode.

Once in a sub-menu, there may be another menu layer, or there may be a list of parameters to adjust. If there is another set of menu options, turn the shaft encoder to select the desired menu item and press the shaft encoder pushbutton.

To adjust any parameter, turn the shaft encoder to move up or down to the desired parameter and press the shaft encoder pushbutton. The arrow will move to the right hand side of the line (➔) indicating that you can now adjust the parameter. Turning the shaft encoder, adjusts the parameter to its desired value.

Most of the On screen menu parameters are updated in real time. They will take effect immediately, and affect the operation of the card. Some of the menu parameters will not take effect until you press the button again. The parameters that require the button press are mentioned in the help text at the bottom of the OSD menu screen for that particular parameter.

When setting numeric values in the OSD menu, the shaft encoder will use larger step sizes if it is turned faster. For example, to adjust a value by single units, turn the shaft encoder slowly. If you need to adjust a value by a large amount (say 500 units), turn the shaft encoder fast.

When you have stopped at the desired value, press the shaft encoder pushbutton. This will update the parameter to the selected value and move the arrow back to the left side of the parameter list (➔). Continue selecting and adjusting other parameters or use the ***BACK*** or ***EXIT*** commands.

5.2 TOP LEVEL MENU STRUCTURE

The OSD menu is arranged in a layered structure that groups similar configuration items together. The menu structure models the VistaLINK® tabbed GUI interface. The following section gives a brief description of the first level of menus that appear when you enter the OSD screens. Selecting one of these items will take you to the next menu level. Sections 5.3.1 to 5.7 provide detailed descriptions of each of the sub-menus. The tables in sections 5.3.1 to 5.7 are arranged in an indented structure to indicate the path taken to reach the control. Menu items or parameters that are underlined indicate the factory default values.

CHANNEL A	Configures controls related to Video channel A
CHANNEL B	Configures controls related to Video channel A
REFERENCE	Configures referemce controls for the card
LTC OUT SETUP	Configures Linear Time Code output(s)
UP/DOWN TIMERS	Configures Program Segment Timer functions (XIO version only)
COM PORTS	Configures the Serial Port functions (XIO and IRIG versions only)
UTILITIES	Configures the GPIO functions and other miscellaneous items

5.3 CONFIGURING THE CONTROLS SPECIFIC TO EACH VIDEO PATH

The *CHANNEL A* and *CHANNEL B* menus are used to configure parameters associated with each of the video paths (video, reader, generator, burn-in windows, etc.). The chart below shows the items available in the *CHANNEL A* menu. For simplicity only the controls for video path A are shown, as the controls for each video path are identical. Sections 5.3.1 to 5.3.7 give detailed information about each of the menu items.

VIDEO A	Configures the video controls for channel A
READER A	Configures time code reader controls for channel A
GENERATOR A	Configures time code generator controls for channel A
ON-SCREEN DISP A	Configures time code On screen burn-in windows controls for channel A
DEBUG OSD A	Configures Debug On screen burn-in windows controls for channel A

5.3.1 Configuring The Video Controls

The *VIDEO A* menu is used to configure parameters associated with the video input and output functions of the channel. The chart below shows the items available in the *VIDEO A* menu. Sections 5.3.1.1 to 5.3.1.6 give detailed information about each of the menu items.

Video Std	Selects the video standard for the channel.
Bypass Relay	Selects the whether the bypass relay for the channel is active or not.
Video Loss	Selects the action to take when input video is missing.
Reference Src	Selects the source of the reference.
Show OSD	Selects the video output(s) where the On Screen Display will be shown.
Line Blanking	Selects whether line blanking is active in in field 1 or field 2 or not
Line Blank Start F1	Selects the starting video line in field 1 that will be blanked (to remove upstream time code and ANC data)
Line Blank End F1	Selects the last video line in field 1 that will be blanked (to remove upstream time code and ANC data)
Line Blank Start F2	Selects the starting video line in field 2 that will be blanked (to remove upstream time code and ANC data) – not used for progressive formats
Line Blank End F2	Selects the last video line in field 2 that will be blanked (to remove upstream time code and ANC data) – not used for progressive formats

5.3.1.1 Setting the Input Video Standard

- *VIDEO*
  - *Video Std*
    - *Auto*
    - *1080I/59.94*
    - *720P/59.94*
    - *525I/59.94*
    - *1080I/50*
    - *720P/50*
    - *625I/50*
    - *1080P/59.94A*
    - *1080P/59.94B*
    - *1080P/50A*
    - *1080P/50B*
    - *1080I/60*
    - *720P/60*
    - *1080P/23.98*
    - *1080P/24*
    - *1080P/23.98SF*
    - *1080P/24SF*

This control is used to set the input video standard for the channel. If set to *Auto* mode, the card will adjust operation as needed for the incoming standard.

270Mb/s Standard Definition formats:
- 525i/59.94
- 625i/50

1.5 Gb/s High Definition formats:
- 1080i/60
- 1080i/59.94
- 1080i/50
- 1080p/23.98
- 1080p/24
- 1080p/23.98sF
- 1080p/24sF
- 720p/60
- 720p/59.94
- 720p/50

3 Gb/s High Definition formats
- 1080p/59.94A (Level A)
- 1080p/59.94B (Level B-Dual Link)
- 1080p/50A (Level A)
- 1080p/50B (Level B-Dual Link)

5.3.1.2 Setting the Bypass Relay

- *VIDEO*
  - *Bypass Relay*
    - *Normal*
    - *Bypass*

This control is used to set the whether the channel input bypass relay is active or not.

When set to *Normal,* the bypass relay is inactive and the input video will be processed by the module.

When set to *Bypass,* the bypass relay is active. The input video will be connected directly to the PGM Out BNC and the MON Out BNC will have the signal specified by the *Video Loss* control.

5.3.1.3 Selects the Action to Take when Input Video Is Missing

- *VIDEO*
  - *Video Loss*
    - *Blue*
    - *Black*

This control is used to determine what action to take when the channel video input is missing.

When set to *Blue,* the channel output video will be blue video.

When set to *Black,* the channel output video will be black video.

5.3.1.4 Selecting Where the On Screen Displays will be Output

- *VIDEO*
  - *Show OSD*
    - *Off*
    - *MON*
    - *MON+PGM*

This control is used to select the channel video output(s) where the On Screen Display will be shown.

Select *Off*, to disable the On screen menu and character burn ins.
Select *MON*, to show the On screen menu and character burn ins on the MON Out BNC only.
Select *MON+PGM*, to show the On screen menu and character burn ins on both the MON Out and PGM Out BNCs.

5.3.1.5 Controlling the VBI Line blanking

Line blanking is primarily used to remove upstream time code or ancillary data from the vertical interval prior to applying the new time code. There are 5 menu items that control line blanking.

- *VIDEO*
  - *Line Blanking*
    - *Off*
    - *Fld 1*
    - *Fld 2*
    - *Fld 1+2*

This control selects whether line blanking is active in field 1 or field 2 or not. For progressive video formats the *Fld 2* and *Fld 1+2* values are do the same as the *Fld1* value.

Select *Off*, to disable line blanking. All upstream D-VITC and VANC data will be preserved.

Select *Fld 1*, to enable line blanking on the Field 1 lines starting with the *Line Blank Start F1* line and ending with the *Line Blank End F1* line. All upstream D-VITC and VANC data on these lines will be deleted.

Select *Fld 2*, to enable line blanking on the Field 2 lines starting with the *Line Blank Start F2* line and ending with the *Line Blank End F2* line. All upstream D-VITC and VANC data on these lines will be deleted. This menu setting is ignored for progressive video formats.

Select *Fld 1+2*, to enable line blanking on both the Field 1 lines and Field 2 lines as specified above.

- *VIDEO*
  - *Line Blank Start F1*
    - *6 to max line number*

This control is used to select the starting line for Field 1 line blanking.

Select the desired Field 1 line to start blanking.

- *VIDEO*
  - *Line Blank End F1*
    - *6 to max line number*

This control is used to select the last line for Field 1 line blanking.

Select the desired Field 1 line to end blanking. Note this line number should be higher than the *Line Blank Start F1* line number

- *VIDEO*
  - *Line Blank Start F2*
    - *6 to max line number*

This control is used to select the starting line for Field 2 line blanking. This item is ignored for progressive video formats.

Select the desired Field 2 line to start blanking.

VIDEO
Line Blank End F2
6 to max line number

This control is used to select the last line for Field 2 line blanking. This item is ignored for progressive video formats.

Select the desired Field 2line to end blanking. Note this line number should be higher than the *Line Blank Start F2* line number

5.3.2 Configuring the Time Code Reader Controls

The Time Code reader system in the 7800TM2 actually consists of a set of physical time code readers for various formats of time code that can be independently enabled or disabled. The physical readers available are:

Name	Rdr #	Description
SD D-VITC	0	D-VITC decoded from the input SDI video of the channel (only valid for standard definition video formats)
ATC-LTC	1	LTC type Ancillary Time Code packets decoded from the input video of the channel
ATC-VITC	2	VITC1 or VITC2 type Ancillary Time Code packets decoded from the input video of the channel
LTC IN 1	3	Longitudinal Time Code connected to the LTC Input BNC
LTC IN 2	4	Longitudinal Time Code connected to the LTC 2 Input BNC (Jumper must be set to the LTC IN position)
GENLCK VITC	5	VITC decoded from the analog video reference to the module
NTP CLIENT	5	Time decoded from Network time Protocol (only available on XIO and IRIG Versions)
SERIAL A	6	Sony Protocol time code decoded from the Serial A port (only available on XIO Version)
SERIAL B	7	Sony Protocol time code decoded from the Serial B port (only available on XIO Version)
IRIG IN	8	IRIG-B code connected to the IRIG B Input connector (only available on IRIG Version)
IRIG ANC	9	IRIG data decoded from Ancillary Data packets on the input video of the channel (only available on IRIG Version)
IRIG D-VITC	A	IRIG data decoded from special D-VITC on the input video of the channel (only available on IRIG Version, only valid for standard definition video formats)

Table 5-1: Physical Reader Sources

The *READER A* menu is used to configure parameters associated with the time code reader functions of the channel. The chart below shows the items available in the *READER A* menu. Sections 5.3.2.1 to 5.3.2.3 give detailed information about each of the menu items. Figure 5-1 to Figure 5-3 show the Reader functional block diagrams of the three versions of the 7800TM2 module.

Rdr Src Priority	Selects the priority of each of the physical reader sources in determining the source that becomes the active reader.
Aux Rdr	Selects the source for the auxiliary reader data used for the Generator User bit source.
D-VITC Read Start	Selects the first video line for the D-VITC reader to look for D-VITC
D-VITC Read End	Selects the last video line for the D-VITC reader to look for D-VITC

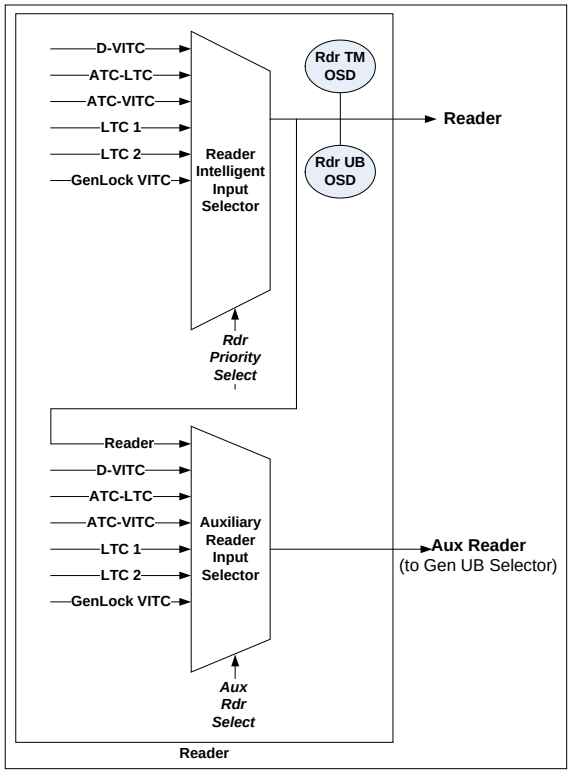


Figure 5-1: Reader Functional Block Diagram – 1 Slot version

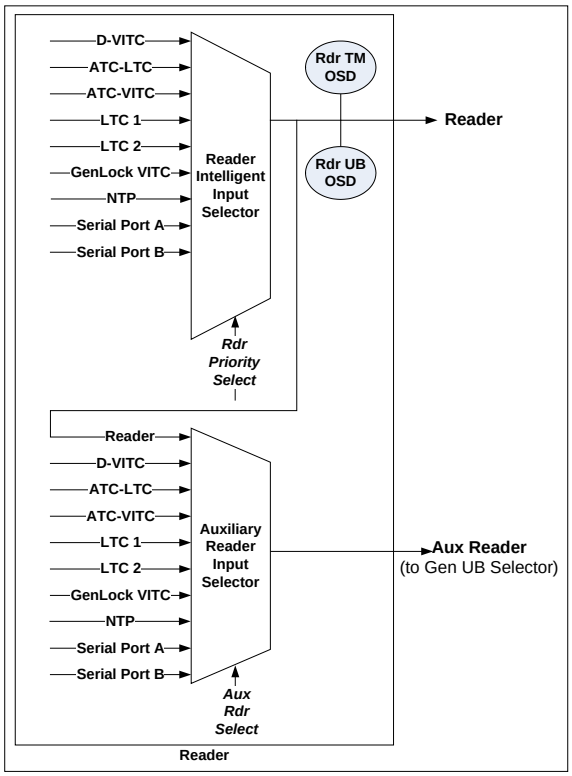


Figure 5-2: Reader Functional Block Diagram – XIO version

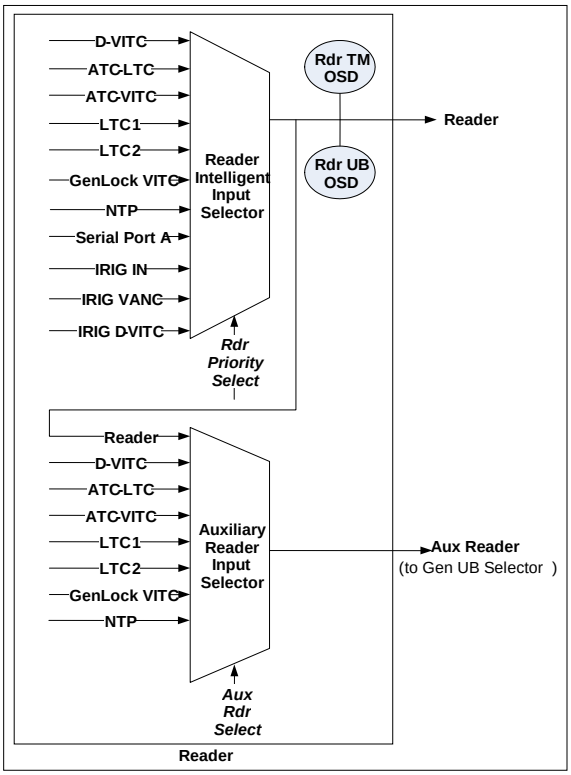


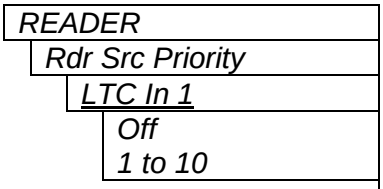
Figure 5-3: Reader Functional Block Diagram – IRIG version

5.3.2.1 Selecting which Physical Time Code Reader Source is Active

In the 7800TM2, the time code reader source is actually set by determining the relative priorities of each of the physical reader sources. An intelligent multiplexer determines which physical source will be the Active Reader. The Reader Time and Reader User Bit values come from the Active Reader. The user can also select the source for the Auxiliary Reader which is used internally in the module as one of the sources for the Generator User Bits. The Auxiliary Reader can be set to come from the Active Reader or one of the physical reader sources. The user has the ability to display each of the physical reader sources on the reader status screen, however only the Active Reader time and user bits will be shown on the main reader character burn-ins.

The Active Reader is selected by a priority scheme, with the highest priority being priority 1 (or first priority ranking), and the lowest priority being priority 10 (tenth priority ranking). The highest priority (lowest priority number) physical reader source with valid time code present will become the Active Reader. If valid time code on that reader source disappears, then the next highest priority source (with the next higher priority number) with valid code coming in will be used as the active reader. If there are two sources set with the same priority level, and one of them is the Active Reader, then the 7800TM2 will not switch to the other source, unless valid code disappears from the active source. If valid code appears on a physical source, the 7800TM2 will only switch to that source if it has a higher priority level (lower priority number) than the current active reader.

The *TM Src Priority* menu is used to configure the priorities of each of the physical readers shown in Table 5-1 to determine the ultimate source of the Reader Time data. There is one menu item for each of the physical readers. For the sale of simplicity only the menu item for LTC In 1 will be shown.



This control is used to set the priority of the LTC 1 physical reader.

When set to *Off,* the LTC 1 physical reader input will be not used in determining the active reader.

Set to a numeric value to determine the relative priority of the LTC 1 physical reader. The lower the number the higher the priority. (i.e. to set the LTC 1 to the highest (first) priority set the priority number to 1)

When set to NTP client, or one of the IRIG inputs, the time code frames number will be interpolated from the closest millisecond of the time received.

5.3.2.2 Selecting Auxiliary Reader Source

READER
Aux Rdr Source
Follow Rdr
SD D-VITC
ATC-LTC
ATC-VITC
LTC In 1
LTC In 2
GenLck VITC
NTP Client
Serial A
Serial B

This control is used to select the source of Auxiliary Reader which is used internally as one of the sources for the Generator User Bits.

When set to *Follow TM* the Auxiliary Reader source will be the Active Reader as determined by the *Rdr Src Priority* menu items.

When set to one of the physical reader sources, that reader source will be used for the Auxiliary Reader source.

When selecting *GLCK video*, the video reference source containing the VITC must also be selected (see section

NTP Client is only available on XIO and IRIG versions

Serial A and *Serial B* are only available on XIO version

5.3.2.3 Selecting D-VITC Reader Line Numbers

In standard definition video formats D-VITC is permitted on different lines in the vertical blanking interval. There are two controls that set the first and last of a range of lines that the D-VITC reader will use search for valid time code.

READER
D-VITC Read Start
6 to 21

This control is used to set the starting line for D-VITC reading. Line numbers that are not valid for the video format in use will be ignored and reading will begin on the first valid line number for that video format.

For 525 line video formats the valid line numbers are 10 to 20 inclusive. For 625 line formats the valid line numbers are 6 to 21 inclusive.

READER
D-VITC Read End
6 to 21

This control is used to set the ending line for D-VITC reading. Line numbers that are not valid for the video format in use will be ignored and reading will end on the last valid line number for that video format.

For 525 line video formats the valid line numbers are 10 to 20 inclusive. For 625 line formats the valid line numbers are 6 to 21 inclusive.

5.3.3 Configuring the Time Code Generator Controls

The *GENERATOR* menus are used to configure parameters associated with the time code generator functions of the channel. The chart below shows the items available in the *STEREO VIDEO ADJUSTMENT* menu. Sections 5.3.3.1 to 5.3.4.2 give detailed information about each of the menu items. Figure 5-1 to Figure 5-3 show the Reader functional block diagrams of the three versions of the 7800TM2 module.

TM Jam Source	Selects whether the Active Reader from channel A or B will be the Jam Sync source for the generator time.
UB Source	Selects whether the Hex user bits or the Auxiliary Reader from channel A or B will be the source for the generator user bits. Also selects whether the time or user bits from those auxiliary readers will be used for the user bits.
HEX UB	Sets static HEX user bit data for the generator
Momentary Jam	Momentarily jams the Generator Time and user bits
Jam Mode	Selects whether you want to jam Generator continuously or once per day or never
No Rdr Code Jam	Selects what action to take when the Jam Sync Source Time code is not present
Daily TM	Sets time that daily jam sync will occur
Offset	Sets an offset between the Reader and Generator when Jam Syncing
Preset Time Now	Sets a time into the free running Generator
Preset TM	Enter the time to be preset to the Generator
When Not Jamming	Selects what to do when the Generator is not Jam Synced to a Reader
Drop Frame	Selects Drop Frame mode of the Generator when not in Jam Sync
Gen Cnt Mode	Selects whether the Generator will be count in the normal SMPTE 24 hour clock or will count as in a 12 hour format to drive time of day clocks
D-VITC Line 1	Selects the first video line for the D-VITC generator
D-VITC Line 2 (IRIG D-VITC Line)	Selects the second video line for the D-VITC generator. On IRIG version selects the line for the IRIG D-VITC
ATC Pkt Type	Sets whether Ancillary Time Code will be inserted or not
IRIG VANC Line	Sets the line where IRIG VANC packets will be inserted (IRIG Version only)
IRIG VANC Src	Sets the IRIG VANC Packet Data Source (IRIG Version only)

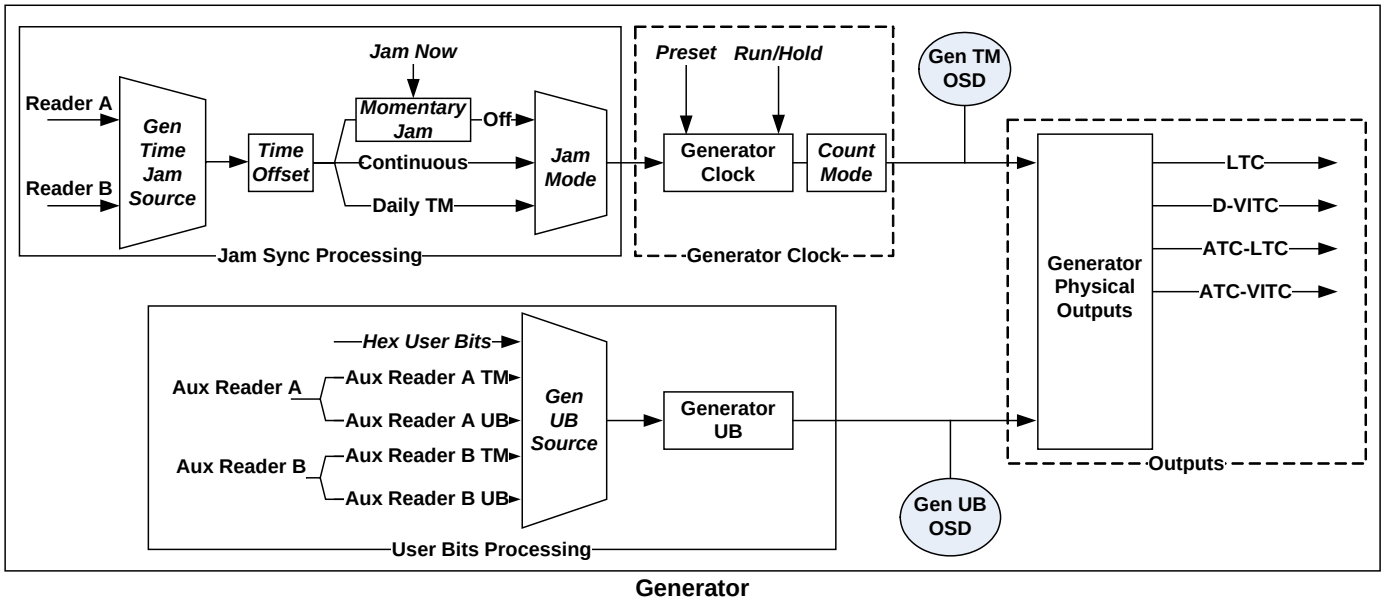


Figure 5-4: Generator Functional Block Diagram – 1 Slot version

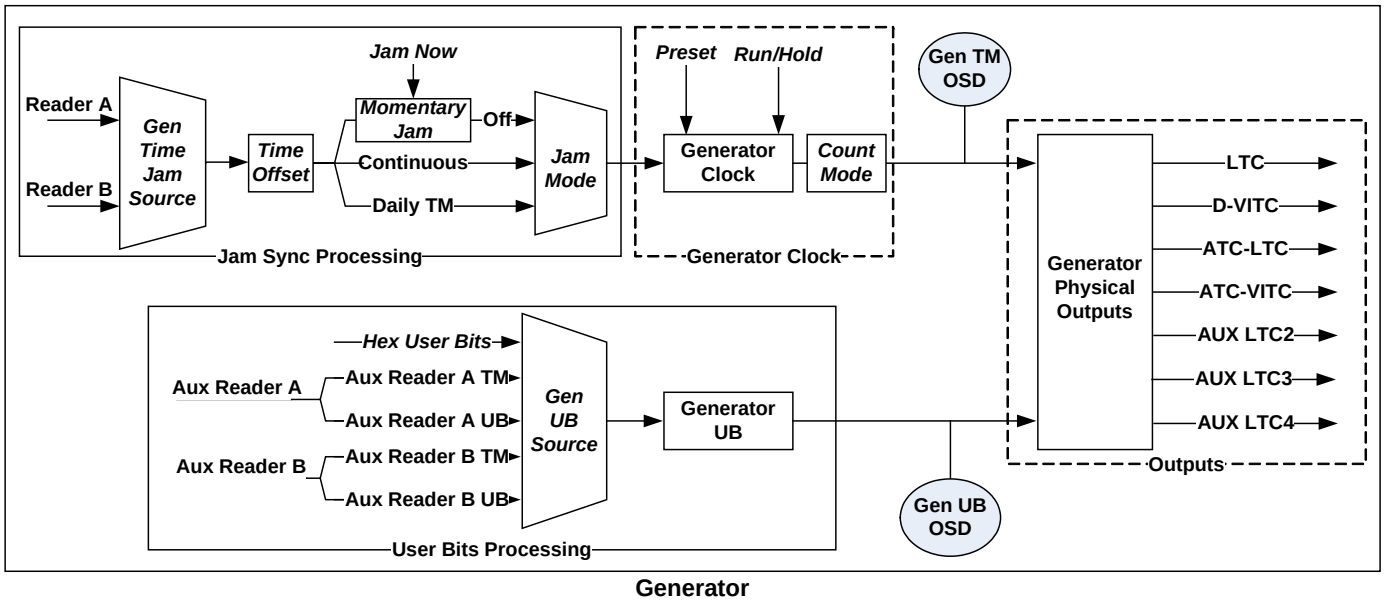


Figure 5-5: Generator Functional Block Diagram – XIO version

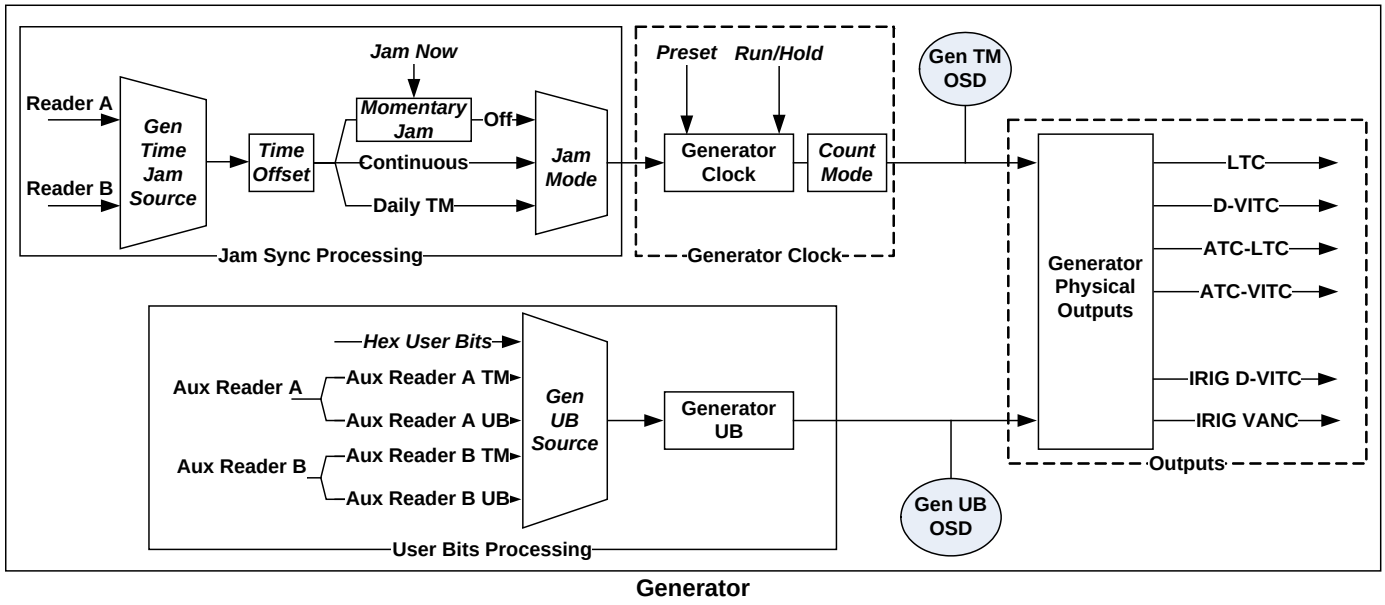


Figure 5-6: Generator Functional Block Diagram – IRIG version

5.3.3.1 Selecting Generator Time Source

GENERATOR
TM Jam Source
Rdr A
Rdr B

This control is used to set source where the Generator Time will come from. The default is the reader of the respective video channel.

Select *Rdr A* to use the Channel A active reader as the generator time source.

Select *Rdr B* to use the Channel B active reader as the generator time source.

5.3.3.2 Selecting Generator User Bit Source

GENERATOR
- *UB Source*
  - *Hex UB*
  - *Aux Rdr A TM*
  - *Aux Rdr A UB*
  - *Aux Rdr B TM*
  - *Aux Rdr B UB*

This control is used to set source where the Generator User Bits will come from. The auxiliary reader source is set by the *Aux Rdr Source* menu item on the *READER* menu for the respective channel. (See section 5.3.2.2)

Select *Hex UB* to use manually entered hexadecimal data as the generator user bit source. (See section 5.3.3.3)

Select *Aux Rdr A* TM to use the Channel A auxiliary reader time as the generator user bit source.

Select *Aux Rdr A* UB to use the Channel A auxiliary reader user bits as the generator user bit source.

Select *Aux Rdr B* to use the Channel B auxiliary reader time as the generator user bit source.

Select *Aux Rdr B* UB to use the Channel B auxiliary reader user bits as the generator user bit source.

5.3.3.3 Setting Static Hexadecimal User Bit Data

GENERATOR
- *HEX UB*
  - *02 34 56 78*

This control is used to set hexadecimal data into the Generator user bits when the *UB Source* menu item is set to *Hex UB.*

Press the shaft encoder knob to enter the 8 hexadecimal digits. You will be presented with an entry screen showing the 8 hexadecimal digits that were last entered. There is a small arrow beneath the leftmost digit. Turn the shaft encoder knob to the value you wish to enter, then press the shaft encoder pushbutton. The arrow will advance to the next digit. Continue doing this until all 8 digits have been entered. After you select the last digit you will be returned to the main menu screen, and the value you just entered will be shown.

5.3.3.4 Selecting Momentary Jam

GENERATOR
- *Momentary Jam*
  - *No*
  - *Yes*

This control is used to momentarily jam the data from the *TM Jam Source* and the *UB Source* into the Generator Time and User Bits.

Select *Yes* and press the pushbutton. The Generator will be momentarily jammed to its sources, and the menu item will return to *No*.

5.3.3.5 Selecting the Jam Sync Mode

- *GENERATOR*
  - *Jam Mode*
    - *Off*
    - *Continuous*
    - *Daily Time*

This control is used to control the Jam sync function of the generator. When the Generator is jammed, data from the *TM Jam Source* and the *UB Source* will be transferred to into the Generator Time and User Bits. The *Jam Offset* is applied to the *TM Jam Source* Time before being jammed to the generator. (See section 5.3.3.8)

Select *Off* to disable Jam Sync. The Generator will Free Run from its last value, and the last user bits will be preserved.

Select *On* to enable continuous Jam Sync Mode. The Generator Time and User Bit data will be continuously updated from its *TM Source* and *UB Source*.

Select *Daily TM* to perform a momentary jam once per day at the time set by the *Daily TM* menu item. (See section 5.3.3.7)

5.3.3.6 Selecting What to do when the Jam Sync Time Code Source Disappears

- *GENERATOR*
  - *No Rdr Code Jam*
    - *Auto*
    - *Hold*

This control is used to select what action to take when the Jam Sync Source Time code (set by the *TM Jam Source*) is not present.

When set to *Auto* the generator will either run or hold depending on whether the incoming code was running or on hold immediately before it disappeared.

When set to *Hold* the generator will hold when the Jam Sync Source time code is not present.

5.3.3.7 Setting the Daily Jam Time

- *GENERATOR*
  - *Daily Jam TM*
    - *02:00:00:00*

This control is used to set a time that the Daily Jam will be performed when the *Jam Enable* menu item is set to *Daily Jam*.

Press the shaft encoder knob to enter a sub menu that allows you to enter the time value. After you have set the desired values use the *Back* menu item to return to the main menu screen, and the value you just entered will be shown.

5.3.3.8 Setting the Jam Sync Offset

GENERATOR
Jam Offset
+00:00:00:04

This control is used to set a fixed offset to apply between the reader time and the generator time when doing a Jam Sync.

The value entered into the Offset register will be added to the reader time before it is entered into the generator time. Positive offset values indicate that the generator is leading the reader. Negative offset values mean that the generator is lagging behind the reader.

Press the shaft encoder knob to enter a sub menu that allows you to enter the sign of the offset as well as the value. After you have set the desired values use the *Back* menu item to return to the main menu screen, and the value you just entered will be shown.

5.3.3.9 Setting the Generator Time when not in Jam Sync Mode

There are two menu items that allow you to enter a starting time into the generator.

GENERATOR
Preset Time Now
No
Yes

This control is used to preset the Generator Time from the *Set Gen TM* register into the Generator Time. This control is not used when the Generator is in the continuous Jam Sync mode.

Select *Yes* and press the pushbutton. The Generator time will be set to the *Set Gen TM* value, and the menu item will return to *No*.

5.3.3.10 Setting the Time Value to be Loaded into the Generator

GENERATOR
Preset TM
12:00:00:00

This control is used to set a starting time to be used to preset the generator time when it is not in Jam sync mode.

Press the shaft encoder knob to enter a sub menu that allows you to enter the value. After you have set the desired values use the *Back* menu item to return to the main menu screen, and the value you just entered will be shown.

5.3.3.11 Configuring what to do when not in Jam Sync Mode

GENERATOR
When Not Jamming
Run
Hold

This control is used to select the behaviour of the Generator when it is not in Jam Sync Mode.

Select *Run* to have the generator clock increment normally.

Select *Hold* to have the stop the generator clock.

5.3.3.12 Configuring the Drop Frame Mode when not in Jam Sync Mode

- *GENERATOR*
  - *Drop Frame*
    - *Off*
    - *On*

This control is used to select the whether the Generator will count in Drop Frame or Non Drop Frame when the generator is not in continuous jam sync mode. When the Generator is in jam sync mode, its drop frame mode will be set from the reader source it is jam synced to. This control is only applicable when the video standard is a 59.94 related rate.

Select *Off* to have the generator clock count in Non Drop Frame Mode.

Select *On* to have the generator clock count in Drop Frame Mode. See the Definitions section for a description of Drop Frame Counting mode.

5.3.4 Configuring the Generator Counting Mode

- *GENERATOR*
  - *Gen Cnt Mode*
    - *Normal*
    - *12 Hour*

This control is used to select whether the generator will count in the normal SMPTE 24 hour clock or in 12 hour mode to drive time of day displays.

Select *Normal* for the normal SMPTE 24 hour clock counting mode

Select *12 hour* to have the generator time value converted to 12 hour format for driving time of day displays.

5.3.4.1 Setting the D-VITC Generator Line Numbers

In standard definition video formats D-VITC is permitted on one or two lines in the vertical blanking interval. There are two controls that set the first and second lines that the D-VITC will be inserted on. Set both lines to *Off* to disable the D-VITC generator. These menu items are only used for standard definition video formats. See SMPTE ST 12-1 and ST 266 for the specifications for vertical interval time code for SDI (also known as D-VITC).

- *GENERATOR*
  - *D-VITC Line 1*
    - *Off*
    - *6 to 21*

This control is used to set the first line for D-VITC insertion. Line numbers that are not valid for the video format in use will be ignored and D-VITC will be inserted on the closest valid line number for that video format.

For 525 line video formats the valid line numbers are 10 to 20 inclusive. The SMPTE recommended line is 14 (277) and optionally 16 (279).

For 625 line formats the valid line numbers are 6 to 21 inclusive. The SMPTE recommended line is 19 (332) and optionally 21 (334).

Set to *Off* to disable the first D-VITC line.

GENERATOR
D-VITC Line 2
Off
6 to 21

This control is used to set the second line for D-VITC insertion. (the second line is optional and may be turned off) Line numbers that are not valid for the video format in use will be ignored and D-VITC will be inserted on the closest valid line number for that video format. This control not available on IRIG version.

For 525 line video formats the valid line numbers are 10 to 20 inclusive. For 625 line formats the valid line numbers are 6 to 21 inclusive.

Set to *Off* to disable the first D-VITC line.

5.3.4.2 Configuring the Ancillary Time Code Inserter

GENERATOR
ATC Pkt Type
Off
LTC
VITC
LTC+VITC

This control is used to select the whether the Ancillary time code (ATC) will be inserted on the channel output or not. See SMPTE ST 12-2 for the specifications for ancillary time code packet types and there they should be inserted.

Select *Off* to disable insertion of ancillary time code.

Select *LTC* to insert ATC_LTC type ancillary time code packets.

Select *VITC* to insert ATC_VITC1 and ATC_VITC2 type ancillary time code packets.

Select *LTC+VITC* to insert ATC_LTC, ATC_VITC1 and ATC_VITC2 type ancillary time code packets. For most cases this is the preferred mode.

Packet Type	Video Format				
	525 line (interlaced)	625 line (interlaced)	750 line (progressive)	1125 line (interlaced/ segmented frame)	1125 line (progressive)
ATC_LTC	VANC, line 12	VANC. line 8	HANC, line 10	HANC, line 10	HANC, line 10
ATC_VITC1	VANC, line 12	VANC. line 8	HANC, line 9	HANC, line 9	HANC, line 9
ATC_VITC2	VANC, line 12	VANC. line 8	HANC, line 9	HANC, line 571	HANC, line 9

Table 5-2: Locations of Ancillary Time Code packets

5.3.5 Special IRIG Modes for the 7800TM2-IRIG-3G

When you want to transfer the IRIG time and day information to the SMPTE Generator, set the *Rdr Src Priority* for *IRIG-B to 1* and set the *Rdr Src Priority* for all the other readers to *Off.* Set the *Aux Rdr Source* to *Follow TM*. Set the *TM Jam Source* to the channel reader and the *UB Source* to the Rdr UB for the channel reader. Then you can perform a continuous jam sync, and the IRIG time and day will be transferred to the SMPTE generator time and user bits. Note that when you are using a 29.97 or 59.94 FPS video format you should also set the *GENERATOR Drop Frame* to *On.*

You should not attempt to transfer IRIG time information to the SMPTE time code generator time when using a 23.976 FPS video standard, as the SMPTE time will

not count at the real time rate that the IRIG time does.

5.3.5.1 Setting the IRIG D-VITC Generator Line Numbers

In standard definition video formats a special D-VITC code may be inserted to carry IRIG data in the vertical blanking interval. This menu item is only used for standard definition video formats. See SMPTE ST 12-1 and ST 266 for the specifications for vertical interval time code for SDI (also known as D-VITC).

The IRIG D-VITC must be decoded by a special IRIG D-VITC reader such as the one in the 7800TM2-IRIG-3G or the 8010TM-IRIG.

GENERATOR
- *IRIG D-VITC Line*
  - *Off*
  - *6 to 21*

This control is used to set the first line for the special IRIG D-VITC insertion. Line numbers that are not valid for the video format in use will be ignored and IRIG D-VITC will occur on the closest valid line number for that video format. Exercise caution that the IRIG D-VITC Lines do not conflict with the regular D-VITC line numbers

For 525 line video formats the valid line numbers are 10 to 20 inclusive. For 625 line formats the valid line numbers are 6 to 21 inclusive.

Set to *Off* to disable the IRIG D-VITC line.

5.3.5.2 Selecting the Line to Insert IRIG VANC Packet On.

In addition to inserting ATC packets into the HANC area of the HDSDI, the 7800TM2-IRIG-3G inserts a VANC packet that contains the IRIG information. This special VANC packet can be decoded by the 7800TM2-IRIG-3G's VANC reader to allow you to encode the IRIG information onto a 'clean' video recorder and then display the IRIG information later on playback.

GENERATOR
- *IRIG VANC Line*
  - *Off*
  - *9 to 20*

This control is used to set the line for the IRIG VANC packet insertion. Line numbers that are not valid for the video format in use will be ignored and reading will begin on the first valid line number for that video format.

Set to *Off* to disable the IRIG VANC Packet generator.

5.3.5.3 Selecting the Data Source for the IRIG VANC Packet.

GENERATOR
- *IRIG VANC Source*
  - *IRIG In*
  - *Gen TM*

This control is used to set the data source for the IRIG VANC packet insertion.

For normal operation set to *IRIG In*, where the VANC packet data comes directly from the IRIG-B Reader input

When set to *Gen TM* the card will perform additional processing to derive the packet information. This is mostly for debugging problems and should be used for special applications only.

5.3.6 Configuring the Main On Screen Character Windows

The *ON-SCREEN DISP* menus are used to configure parameters associated with the main time code burn-in character windows (On/Off, Position, Background, Font, etc.). The On Screen Display windows are available by default on the channel **MON OUT** BNC.

You can choose to have the on screen character windows enabled on the PGM Out BNC, or totally disabled on both BNC outputs using the *Show OSD* menu item *VIDEO* menu or Video Tab in VistaLINK®. (See section 5.3.1.5)

The chart below shows the items available in the *ON-SCREEN DISP* menu. Sections 5.3.6.2 to 5.3.6.4 give detailed information about each of the menu items.

Text1	Sets a text message to display in the Text 1 Window
Text2	Sets a text message to display in the Text 2 Window
Text1 Enable	Selects whether the Text 1 window will be On or Off
Text1 Height	Sets the vertical size of the Text 1 window
Text1 Row	Sets the row (vertical) position of the Text 1 window
Text1 Col	Sets the column (horizontal) position of the Text 1 window
Text2 Enable	Selects whether the Text 2 window will be On or Off
Text2 Height	Sets the vertical size of the Text 2 window
Text2 Row	Sets the row (vertical) position of the Text 2 window
Text2 Col	Sets the column (horizontal) position of the Text 2 window
Rdr TM Enable	Selects whether the Reader Time window will be On or Off
Rdr TM Height	Sets the vertical size of the Reader Time window
Rdr TM Row	Sets the row (vertical) position of the Reader Time window
Rdr TM Col	Sets the column (horizontal) position of the Reader Time window
Rdr UB Enable	Selects whether the Reader User Bits window will be On or Off
Rdr UB Height	Sets the vertical size of the Reader User Bits window
Rdr UB Row	Sets the row (vertical) position of the Reader User Bits window

Rdr UB Col	Sets the column (horizontal) position of the Reader User Bits window
Gen TM Enable	Selects whether the Generator Time window will be On or Off
Gen TM Height	Sets the vertical size of the Generator Time window
Gen TM Row	Sets the row (vertical) position of the Generator Time window
Gen TM Col	Sets the column (horizontal) position of the Generator Time window
Gen UB Enable	Selects whether the Generator User Bits window will be On or Off
Gen UB Height	Sets the vertical size of the Generator User Bits window
Gen UB Row	Sets the row (vertical) position of the Generator User Bits window
Gen UB Col	Sets the column (horizontal) position of the Generator User Bits window
OSD Font Size	Sets the Font size used for the character windows
OSD Style	Sets the Font colour and background colour of the character windows
Background Opacity	Selects whether the background of the character windows will be opaque or semi-opaque.
OSD Symbols	Selects whether character window prefix symbols are on or off
OSD Frame Cnt	Selects whether frame counts are shown on the time windows or not
OSD Field Cnt	Selects whether field counts are shown as 1/2 or 0/1

5.3.6.1 Special Character Indicators

The following special indicators are used between the seconds and frames digits of the time window in the character inserter to identify non drop frame and drop frame code

Non Drop Frame Colon (:)
Drop Frame (NTSC) Period (.) in 29.97 or 59.94 frames per second video formats only.

5.3.6.2 Entering the Text for the Text1 and Text 2 Windows

There are two menu items for that allow you to enter the text to be displayed in the Text1 and Text 2 character windows respectively. For the sake of simplicity only the menu item for the Text1 window will be described in the manual.

ON-SCREEN DISP
Text1
Text 1 message

This control is used to set the text that will be displayed in the Text 1 window. The current text message will be shown.

Press the shaft encoder knob to enter a new text message. You will be presented with an entry screen showing the text message that was last entered. A special diamond character (♦) indicates the end of the message. There is a small cursor arrow beneath the leftmost character. Turn the shaft encoder knob to the value you wish to enter, then press the shaft encoder pushbutton. The cursor arrow will advance to the next character. A back arrow (◄) in the cursor position allows you to move to the left one character to correct an error in the message. Continue doing this until the complete message has been entered. If you want the message to be shorter than the maximum allowed, set the last character to the special diamond character. If you press the push button with the cursor on the end of message character, or after you have select the last character, you will be returned to the main menu screen, and the value you just entered will be shown.

Note that messages longer than the space available on the menu screen will be truncated and followed by three dots (…).

5.3.6.3 Configuring the Individual Character Windows

There are four menu items for each character window that control its behaviour (On/Off, Vertical Size, Row and Column position). For the sake of simplicity only the menu item for the Text1 window will be described in the manual.

5.3.6.3.1 Selecting Whether the Window will be Visible or Hidden

ON-SCREEN DISP
Text1 Enable
Off
On

This control is used to select whether the Text 1 window is visible.

Set to *Off* to hide the window
Set to *On* to show the window

5.3.6.3.2 Selecting the Window Vertical Size

ON-SCREEN DISP
Text1 Height
Normal
Large

This control is used to select the Text 1 window vertical size.

Set to *Normal* to show the window in its normal size
Set to *Large* to show the window double the vertical size

5.3.6.3.3 Selecting the Window Row (Vertical Position)

ON-SCREEN DISP
Text1 Row
0 to max Vert position

This control is used to set the Text 1 window vertical position.

Press the push button to view the On Screen character windows. The widow you are controlling will be flashing. Turn the Shaft encoder to move the window vertically. When you have it in the correct position, press the pushbutton to return to the menus.

5.3.6.3.4 Selecting the Window Column (Horizontal Position)

ON-SCREEN DISP
Text1 Col
0 to max Horz position

This control is used to set the Text 1 window horizontal position. The horizontal position is for the left side of the character window.

Press the push button to view the On Screen character windows. The widow you are controlling will be flashing. Turn the Shaft encoder to move the window vertically. When you have it in the correct position, press the pushbutton to return to the menus.

5.3.6.4 Configuring the Global Character Window Attributes

There are four menu items that control the appearance of all character windows. (Font colour, Window symbol, Frames Display, Fields display).

5.3.6.4.1 Selecting the On Screen Display Font Size

ON-SCREEN DISP
OSD Font Size
Small
Medium
Large

This control is used to select the font size. There are three font sizes available. The actual font size is scaled appropriately for the video standard in use on the channel. The font size determines the maximum number of rows and columns for the On Screen Display.

5.3.6.4.2 Selecting the On Screen Display Font and Background Style

ON-SCREEN DISP
OSD Style
White/black
White/none
Black/white
Black/none

This control is used to select the font colour and background colour.

White characters keyed in with solid black background
White characters keyed in with no background
Black characters keyed in with solid white background
Black characters keyed in with no background

5.3.6.4.3 Selecting the Opacity of the Character Background

ON-SCREEN DISP
Background Opacity
100%
75%
50%
25%

This control is used to select whether the character background mask will be solid (opaque) or semi-transparent.
Set to *100%* for a solid (opaque) black or white background
Set to *75%* for a 75% opaque background
Set to *50%* for a 50% opaque background
Set to *25%* for a 25% opaque background

5.3.6.4.4 Selecting Whether the Window Symbols will be Shown

ON-SCREEN DISP
OSD Symbols
Off
On

This control is used to select whether Symbol character to designate the window will be shown on the left of the window.
Set to *Off* to hide the symbols
Set to *On* to show the symbols

5.3.6.4.5 Selecting Whether the Frames will be Shown

ON-SCREEN DISP	
OSD Frames Cnt	
	Off
	On

This control is used to select whether time code frames will be shown on the *RDR TM* and *GEN TM* windows
Set to *Off* to hide the frames
Set to *On* to show the frames (and fields)

5.3.6.4.6 Selecting Whether the Frames will be Shown

ON-SCREEN DISP	
OSD Field Cnt	
	Off
	0/1
	1/2

This control is used to select how the time code fields will be displayed on the *RDR TM* and *GEN TM* windows
Set to Off to hide the fields
Set to 0/1 to show the first field as field 0 and the second field as field 1
Set to 1/2 to show the first field as field 1 and the second field as field 2

5.3.7 CONFIGURING THE DEBUG ON SCREEN CHARACTER WINDOWS

The *DEBUG OSD* menus are used to configure parameters associated with the debug burn-in character windows (On/Off, Position, Background, Font, etc.). The Debug character windows are typically used for diagnosing time code problems and are not normally used for every day operation. The Debug character windows are available by default on the channel **MON OUT** BNC.

You can choose to have the debug character windows enabled on the PGM Out BNC, or totally disabled on both BNC outputs using the *Show OSD* menu item *VIDEO* menu or Video Tab in VistaLINK®. (See section 5.3.1.5)

The chart below shows the items available in the *DEBUG OSD* menu. Sections 5.3.7.1 to 5.3.7.1 give detailed information about each of the menu items.

RDR Status Screen	Selects whether the Reader Status Display screen will be On or Off
DBG1 Enable	Selects whether Debug window 1 will be On or Off
DBG1 Height	Sets the vertical size of Debug window 1
DBG1 Row	Sets the row (vertical) position of Debug window 1
DBG1 Col	Sets the column (horizontal) position of Debug window 1
DBG1 Show	Selects what will be shown in Debug window 1
DBG2 Enable	Selects whether Debug window 2 will be On or Off
DBG2 Height	Sets the vertical size of Debug window 2
DBG2 Row	Sets the row (vertical) position of Debug window 2
DBG2 Col	Sets the column (horizontal) position of Debug window 2
DBG2 Show	Selects what will be shown in Debug window 2
DBG3 Enable	Selects whether Debug window 3 will be On or Off
DBG3 Height	Sets the vertical size of Debug window 3
DBG3 Row	Sets the row (vertical) position of Debug window 3
DBG3 Col	Sets the column (horizontal) position of Debug window 3
DBG3 Show	Selects what will be shown in Debug window 3
DBG4 Enable	Selects whether Debug window 4 will be On or Off
DBG4 Height	Sets the vertical size of Debug window 4
DBG4 Row	Sets the row (vertical) position of Debug window 4
DBG4 Col	Sets the column (horizontal) position of Debug window 4
DBG4 Show	Selects what will be shown in Debug window 4

5.3.7.1 Selecting Whether the Reader Status Display will be Visible or Hidden

DEBUG OSD
Reader Status Enable
Off
On

This control is used to select whether the Reader Status Display is visible. The Reader Status display shows the current data being read from all the physical input sources that do not have their priority set to Off.

Set to *Off* to hide the Reader Status display
Set to *On* to show the Reader Status display. When the Reader Status display is On it replaces all the other On Screen display windows.

5.3.7.1.1 Reader Status Display

The Reader status display shows a list of all the reader sources that are enabled for the respective channel.

Only reader sources that have their Reader Source Priority set to something other than Off will be shown.

Each reader will be shown in a display that looks like the following:

`3LT 12:00:00:00.0 L 100%`

`3 LT`	Active Reader source (see Table 5-1) `GA` & `GB` are the generators for channel A and B respectively
`12:00:00:00.0`	Current timecode value
`L, etc.`	L= Locked and play speed
`100%`	Detected speed of reader code

The active reader source will be shown in inverse characters.

Time code values are not compensated for processing delays, and may lag the standard Time code displays by one or more fields (frames)

5.3.7.2 Configuring the Individual Debug Windows

There are five menu items for each debug character window that control its behaviour (On/Off, Vertical Size, Row and Column position, Mode). For the sake of simplicity only the menu item for the DBG1 window will be described in the manual.

5.3.7.2.1 Selecting Whether the Debug Window will be Visible or Hidden

DEBUG OSD
DBG1 Enable
Off
On

This control is used to select whether the Debug 1 window is visible.

Set to *Off* to hide the window
Set to *On* to show the window

5.3.7.2.2 Selecting the Window Vertical Size

ON-SCREEN DISP	
DBG1 Height	
Normal Large	

This control is used to select the Debug 1 window vertical size.

Set to *Normal* to show the window in its normal size
Set to *Large* to show the window double the vertical size

5.3.7.2.3 Selecting the Window Row (Vertical Position)

ON-SCREEN DISP	
DBG1 Row	
0 to max Vert position	

This control is used to set the Debug 1 window vertical position.

Press the push button to view the On Screen character windows. The widow you are controlling will be flashing. Turn the Shaft encoder to move the window vertically. When you have it in the correct position, press the pushbutton to return to the menus.

5.3.7.2.4 Selecting the Window Column (Horizontal Position)

ON-SCREEN DISP	
DBG1 Col	
0 to max Horz position	

This control is used to set the Debug 1 window horizontal position. The Column is the horizontal position of the left side of the character window.

Press the push button to view the On Screen character windows. The widow you are controlling will be flashing. Turn the Shaft encoder to move the window horizontally. When you have it in the correct position, press the pushbutton to return to the menus.

5.3.7.2.5 Selecting What to Show in the Debug Character Window

ON-SCREEN DISP	
DBG1 Show	
Select what to show in the window	

This control is used to select what will be shown in the Debug 1 window. Select from the list of items to show.

The list of available debug windows may change with individual firmware versions. At the time of writing the following Debug windows are shown in section 9.

5.4 CONFIGURING THE REFERENCE

The *REFERENCE* menu is used to configure parameters associated with the module video refernce. All versions of the 7800TM2 can use one of the Frame Reference inputs on the 7800 series frames. On the 2 slot versions there is also a dedicated REF BNC for the card. The chart below shows the items available in the *REFERENCE* menu. Sections 5.3.1 to 5.3.7 give detailed information about each of the menu items.

Source	Configures the video controls for channel A
VITC Read Start	Selects the first video line for the analog VITC reader to look for VITC
VITC Read End	Selects the last video line for the analog VITC reader to look for VITC

5.4.1 Setting the Reference Source

REFERENCE
- *Source*
  - *Video*
  - *Frame Reference 1*
  - *Frame Reference 2*
  - *External*

This control is used to set the video reference source. The reference is used to provide timing for the internal black/blue video generator when there is no input video. If vertical interval time code (VITC) is present on standard definition reference video, this may be used as an additional time code input for the readers in the 7800TM2. (See section 5.3.2.1)

When set to *Video,* the video reference is taken from the channel video input.

When set to Frame *Reference 1,* the reference is taken from the reference signal applied to the REF 1 BNC on the frame rear panel.

When set to *Frame Reference 2,* the reference is taken from the reference signal applied to the REF 2 BNC on the frame rear panel.

When set to *External,* the reference is taken from the reference signal applied to the GENLOCK BNC on the rear plate. (2 slot versions only)

When video is present on Channel A and/or Channel B, the output video of that channel will be phased directly by the video input on the respective channel.

The Reference video must be at the same frame rate as the input video of each channel. For progressive HD formats greater than 30 FPS, the interlaced reference at one half the frame rate may be used, and may be used to identify pairs of frames

5.4.1.1 Selecting D-VITC Reader Line Numbers

In standard definition video formats VITC is permitted on different lines in the vertical blanking interval. There are two controls that set the first and last of a range of lines that the VITC reader will use search for valid time code.

REFERENCE *VITC Read Start* *6 to 21*	This control is used to set the starting line for VITC reading. Line numbers that are not valid for the video format in use will be ignored and reading will begin on the first valid line number for that video format. For 525 line video formats the valid line numbers are 10 to 20 inclusive. For 625 line formats the valid line numbers are 6 to 21 inclusive.
REFERENCE *VITC Read End* *6 to 21*	This control is used to set the ending line for VITC reading. Line numbers that are not valid for the video format in use will be ignored and reading will end on the last valid line number for that video format. For 525 line video formats the valid line numbers are 10 to 20 inclusive. For 625 line formats the valid line numbers are 6 to 21 inclusive.

5.5 CONFIGURING THE LTC OUTPUT(S)

The *LTC OUT SETUP* menu is used to configure parameters associated with the Linear Time code (LTC) outputs of the module. All versions of the 7800TM2 have one unbalanced LTC output that is available on the LTC Out BNC. On the 7800TM2-XIO-3G version there are three additional balanced LTC outputs that are available on the SERIAL B output connectors. Section 2.3.1 shows how to configure the sub board jumpers to access these additional LTC outputs. The chart below shows the items available in the *LTC OUT SETUP* menu. For the sake of simplicity only the Items related to LTC 1 are shown in this manual as the LTC 1 output is available on all versions. Section 5.4.1 gives detailed information about each of the menu items.

To output the main LTC (LTC 1) onto the LTC OUT BNC, the jumpers must be correctly set on the rear I/O module. See section 2.3 and Figure 2-2.

On the XIO version, to output the LTC 2, LTC 3, and LTC 4 onto the Serial A or Serial B connectors, the jumpers must be correctly set on submodule board. See section 0 and Figure 2-5.

LTC 1 SRC	Selects the whether the LTC 1 output will be driven from the Channel A or B generators. On the XIO version it can also driven from one of the up/down timers.
LTC 2 SRC	Selects the whether the LTC 2 output will be driven from the Channel A or Channel B generators, or from one of the up/down timers. (XIO version only)
LTC 3 SRC	Selects the whether the LTC 3 output will be driven from the Channel A or Channel B generators, or from one of the up/down timers. (XIO version only)
LTC 4 SRC	Selects the whether the LTC 4 output will be driven from the Channel A or Channel B generators, or from one of the up/down timers. (XIO version only)
Timer LTC Direction	Selects the whether the LTC outputs driven from one of the timers are generated in a 'forward only' or 'forward' or 'reverse' bit order. (XIO version only)
Timer LTC Resolution	Selects the whether the LTC outputs driven from one of the timers will have counting frames or not. (XIO version only)

5.5.1 Configuring the LTC Output Data Source

LTC OUT SETUP
- *LTC 1 SRC*
  - *Generator A*
  - *Generator B*
  - *Timer 1*
  - *Timer 2*
  - *Timer 3*
  - *Timer 4*

This control is used to select source of data for the LTC 1 Output.

Select *Generator A* for LTC 1 Out from the A channel Generator
Select *Generator B* for LTC 1 Out from the B channel Generator
Select *Timer 1* for LTC 1 Out from Timer 1 (XIO version only)
Select *Timer 2* for LTC 1 Out from Timer 2 (XIO version only)
Select *Timer 3* for LTC 1 Out from Timer 3 (XIO version only)
Select *Timer 4* for LTC 1 Out from Timer 4 (XIO version only)

5.5.2 Configuring the Timer LTC Output Bit Orientation (XIO version only).

LTC OUT SETUP
- *Timer LTC Direction*
  - *Forward*
  - *Forward/Reverse*

This control is used to select whether the LTC outputs driven from one of the timers are generated in a 'forward only' or 'forward' or 'reverse' bit order. This control is only applicable when the respective *LTC Source* is set to one of the timers. (XIO version only). When the respective *LTC Source* is set to *Generator A* or *Generator B* the bit orientation is always in the forward direction.

Select *Forward* for the LTC bit orientation to be always in the forward direction (i.e. bit 0, bit 1, …, bit 78, bit 79 as it would be from a VTR playing in the forward direction.) This mode should be used for LTC displays that take counting direction information from analysing the counting sequence of the time code values, and not the bit order of the LTC they are reading.

Select *Forward/Reverse* for the LTC bit orientation to in the forward direction, described above, when the timer is counting up and in the reverse direction when the timer is counting down (i.e. bit 79, bit 78, … bit 1, bit 0 - as it would be from a VTR playing in the reverse direction). This mode should be used for LTC displays that take counting direction information from the bit order of the LTC they are reading.

5.5.3 Configuring Whether the Timer LTC Outputs have Counting Frame Numbers (XIO version only).

LTC OUT SETUP
- *Timer LTC Resolution*
  - *Frames*
  - *Seconds*

This control is used to select whether the LTC outputs will have counting frames or not and is only applicable when the respective *LTC Source* is set to one of the timers. (XIO version only). When the respective *LTC Source* is set to *Generator A* or *Generator B* the frame numbers fill follow the respective generator time. This setting affects how the timer value will be displayed on devices that show and devices that do not show the frame numbers. Also affect the way that the timer value is shown on the OSD debug display.

Select *Frames* for the LTC frame numbers to count. The seconds count will change at the beginning of each second. This mode should be used for LTC readers that display the frame numbers. Note that when the time is counting down toward zero, and the frame numbers of the LTC are counting, but are not displayed on the LTC display, the timer value will appear to be approximately one second ahead of the real timer value. For example the timer value 00:00:01:00 will be displayed as 00:00:01, however the timer value 00:00:00:29 will be displayed as 00:00:00. If this is the case you should use the *Seconds* resolution. Frame numbers will be displayed on the Timer OSD debug display.

Select *Seconds* for the frame numbers to be set to zero. The seconds count will change at the end of each second when the timer is counting down and the beginning of each second when the timer is counting up. This mode should be used if you are using the down counting mode of the timers and the LTC displays do not show the frame numbers. Frame numbers will not be displayed on the Timer OSD debug display.

5.6 CONFIGURING THE UP/DOWN TIMERS (XIO VERSION ONLY)

5.6.1 Timer Overview

The 7800TM2-XIO-3G version of the card has four up/down timers that can be used to time program segments. Each of the timers operates in exactly the same way. The timers can be controlled from the card edge menu, from VistaLINK Pro, or from one of Evertz Model CP-2116E or CP-2232E intelligent control panels. In addition some of the time functions such as Start, Stop and preset can be operated from the GPIO interface.

The timer displays show hours, minutes and seconds, and can down (showing time remaining), or count up from zero (showing time elapsed). They can also be operated in a bi-directional mode that initially counts down (time remaining) and then starts counting up (elapsed time) when the timer value reaches 00:00:00. The initial timer start time is contained in a separate register for a single button recall, to facilitate ease of use where the same time is used repeatedly. The start time register also allows the user to program the starting count for the next event while the current event is in progress. Initializing the timer for the next event consists of merely invoking the Timer Preset function on one of the control surfaces. There is a manual Hold/Run function so the time can be put into a pause mode and be resumes later. The timers can also be set to count to a specific time value (the stop time) and then hold.

The timers output can be used in several different ways. The timer value can be sent to one of the four LTC outputs on the 7800TM2-XIO-3G so that the timer value can be displayed on a stand-alone display such as the Evertz 1200DD. The timer value can also be sent via Ethernet to up to 8 IP addresses. The IP address of devices that want to read the timer value can be manually set into the 7800TM2-XIO-3G, or the device can subscribe to the timer service on the 7800TM2-XIO-3G. In this mode, the 7800TM2-XIO-3G will send the timer value of all 4 timers by multiple unicast to the 8 devices. The 7800TM2-3G also supports a multicast protocol for larger systems.

The top level of the UP/DOWN TIMERS menu consists of 4 pairs of sub menus, one for each of the timers, and another to set up the IP addresses for the devices that require the timer data.

TIMER 1 SETUP	Controls for Timer 1
TIMER 1 LOAD NOW	Loads Timer 1 to the Start Time
TIMER 2 SETUP	Controls for Timer 2
TIMER 2 LOAD NOW	Loads Timer 2 to the Start Time
TIMER 3 SETUP	Controls for Timer 3
TIMER 3 LOAD NOW	Loads Timer 3 to the Start Time
TIMER 4 SETUP	Controls for Timer 4
TIMER 4 LOAD NOW	Loads Timer 4 to the Start Time
UDP CLIENT LIST	Setup the Timer Client IP addresses and ports

Each of the Timer Setup submenus is used to configure parameters associated with the each of the up/down timers of the module. The Timer Load Now menu is used to actually preset the timer value to the Start time. The chart below shows the items available in the TIMER 1 SETUP menu. Sections 5.5.2.1 to 5.5.2.5 give detailed information about each of the menu items. There are five menu items for each up/down timer that control its behaviour (Set Time value, Set Timer now, Run/Hold, Up/Down, what to do at zero). The Timer Load Now menu is used to actually preset the timer value to the Start time. Section 5.5.2.6 gives information on setting the Timer. For the sake of simplicity only the menu item for Timer 1 will be described in the manual.

5.6.2 Individual Timer Controls

TMR 1 Start	Enter the Start time to be preset to Timer 1 when the *Load Timer 1 Now* is selected.
TMR 1 Start	Enter the Stop time for Timer 1
Timer 1 Run/Hold	Selects whether Timer 1 will be running (counting) or on hold
Timer 1 Up/Down	Selects whether Timer 1 will be counting up or down when it is in *Run* mode
Timer 1 Auto-Stop	Selects whether Timer 1 will be hold when it reaches the Stop time, or whether it will ignore the stop time and keep counting.
Timer 1 Set Now	Sets the time entered in the *Set TMR 1* control into Timer 1

5.6.2.1 Setting the Time Value to be Loaded into the Timer

UP/DOWN TIMERS
TIMER 1 SETUP
TMR 1 Start
↓00:00:10:00

This control is used to set the Start time for Timer 1. It also sets whether the timer will count up or down. This time (and counting direction) is loaded into the timer by the *Timer 1 Load Now* control.

Press the shaft encoder knob to enter a sub menu that allows you to enter the up or down counting mode that will be preset to the timer as well as the timer start value. After you have set the desired values use the *Back* menu item to return to the main menu screen, and the value you just entered will be shown.

5.6.2.2 Setting the Stop Time for the Timer

UP/DOWN TIMERS
TIMER 1
TMR 1 Stop
↓00:00:10:00

This control is used to set a Stop time for Timer 1 when the *Auto Stop* control is set to *Yes*. It also sets whether the stop time is active while the timer is counting up or down.

Press the shaft encoder knob to enter a sub menu that allows you to enter whether the stop time is active while the timer is counting up or down as well as the timer stop value. After you have set the desired values use the *Back* menu item to return to the main menu screen, and the value you just entered will be shown.

5.6.2.3 Configuring whether the timer will Run or Hold

UP/DOWN TIMERS
TIMER 1
Timer 1 Run/Hold
Run
Hold

This control is used to select whether Timer 1 will be running (counting) or on hold. This control will be automatically set to the value from the *Set TMR 1* value when the *Set Timer 1 Now* control is activated.

Select *Run* to have the timer count. It will increment or decrement according to the setting of the *Up/Down* control.

Select *Hold* to stop the timer.

5.6.2.4 Configuring the Up/Down counting Mode of the Timer

- *UP/DOWN TIMERS*
  - *TIMER 1*
    - *Timer 1 Up/Down*
      - *Up*
      - *Down*

This control is used to select whether Timer 1 will be incrementing or decrementing when it the *Run/Hold* control is set to the *Run* mode. Loading the Timer value using the *Timer 1 Set Now* control will affect the setting of this control, based on the up/down value stored in the *Set TMR 1* value.

Select *Up* to have the timer increment. If the timer is shown on the OSD debug display, it will be preceded by the up arrow (↑)

Select *Down* to have the timer decrement. If the timer is shown on the OSD debug display, it will be preceded by the down arrow (↓)

5.6.2.5 Configuring What Happens when the Timer reaches the Stop Time

- *UP/DOWN TIMERS*
  - *TIMER 1*
    - *Auto Stop*
      - *No*
      - *Yes*

This control is used to select the behaviour of Timer 1 when it reaches the *Stop Time* value. Note that the Up/Down part of the *Stop Time* value controls whether it is active when the timer is counting down or up.

Select *No* to have the timer ignore the *Stop Time* value and keep counting. If the timer is counting down and reaches 00:00:00:00 it will change counting directions and start counting up.

Select *Yes* to have the timer stop when it reaches the *Stop Time* value.

5.6.2.6 Loading the Start Time into the Timer

- *UP/DOWN TIMERS*
  - *TIMER 1*
    - *Timer 1 Load Now*
      - *No*
      - *Yes*

This control is used to load the data from the *TMR 1 Start* control into Timer 1. The up or down counting mode of the timer, as well as the starting time value will be set using this control.

Select *Yes* and press the pushbutton. Timer 1 and the *Timer 1 Up/Down* control will be set to the *Set TMR 1* value and the menu item will return to *No*.

5.6.3 Configuring the Timer IP Addresses

The *UDP Client List* submenu is used to configure the IP address and Port number of each client device that needs to receive the timer information from the module. Sections 5.5.3.1 and 5.5.3.2 give detailed information about each of the menu items. There are identical menu items for each of the 8 IP addresses. For the sake of simplicity only the menu items for IP Address 1 will be described in the manual. You will need to set an IP Address and Port number for each client device that wants to receive timer data from the 7800TM2. In larger systems the IP address can be a multicast destination.

IP Addr 1	Sets the IP address of Timer Destination 1
IP Port 1	Sets the Port number of Timer Destination 1
IP Addr 2	Sets the IP address of Timer Destination 2
IP Port 2	Sets the Port number of Timer Destination 2
IP Addr 3	Sets the IP address of Timer Destination 3
IP Port 3	Sets the Port number of Timer Destination 3
IP Addr 4	Sets the IP address of Timer Destination 4
IP Port 4	Sets the Port number of Timer Destination 4
IP Addr 5	Sets the IP address of Timer Destination 5
IP Port 5	Sets the Port number of Timer Destination 5
IP Addr 6	Sets the IP address of Timer Destination 6
IP Port 6	Sets the Port number of Timer Destination 6
IP Addr 7	Sets the IP address of Timer Destination 7
IP Port 7	Sets the Port number of Timer Destination 7
IP Addr 8	Sets the IP address of Timer Destination 8
IP Port 8	Sets the Port number of Timer Destination 8

5.6.3.1 Setting the Timer Destination IP Address

UP/DOWN TIMERS
UDP Client List
IP Addr 1

This control is used to the IP Address of Timer unicast destination 1.

Press the shaft encoder knob to enter the IP Address. You will be presented with an entry screen showing the four octets for the IP address that was last entered. There is a small arrow beneath the leftmost digit. Turn the shaft encoder knob to the value you wish to enter, then press the shaft encoder pushbutton. The arrow will advance to the next digit. Continue doing this until all digits have been entered. After you select the last digit you will be returned to the main menu screen, and the value you just entered will be shown.

5.6.3.2 Configuring the Timer Destination IP Port

UP/DOWN TIMERS
UDP Client List
IP Port 1

This control is used to the IP Port number of Timer unicast destination 1. The default port number used is 9660.

Press the shaft encoder knob to enter the Port number. You will be

presented with an entry screen showing the Port number that was last entered. There is a small arrow beneath the leftmost digit. Turn the shaft encoder knob to the value you wish to enter, then press the shaft encoder pushbutton. The arrow will advance to the next digit. Continue doing this until all digits have been entered. After you select the last digit you will be returned to the main menu screen, and the value you just entered will be shown.

5.7 CONFIGURING THE SERIAL PORTS (2 SLOT VERSIONS ONLY)

The *COM PORTS* menu is used to configure parameters associated with the Serial Ports of the module. The chart below shows the items available in the *COM PORTS* menu. Sections 5.6.1 to 5.6.2 give detailed information about each of the menu items.

There are three menu items for each serial port that control its behaviour (Mode, Baud Rate). For the sake of simplicity only the menu items for Serial Port A will be described in the manual.

SER A Mode	Sets the function of Serial Port A
SER A Baud	Sets the baud rate of Serial Port A
SER A Comm	Shows the format (number of bits, parity, stop bits) of serial port A
SER B Mode	Sets the function of Serial Port B
SER B Baud	Sets the baud rate of Serial Port B
SER B Comm	Shows the format (number of bits, parity, stop bits) of serial port B

5.7.1 Selecting The Serial Port Function

COM PORTS	
SER A Mode	This control is used to set the function of serial port A. The Baud rate and COMM settings are usually set for the specific mode.
Disabled	Disables the serial port
IRIG CS-6 OUT	Outputs IRIG CS-6 format data (IRIG version only)
IRIG CS-5 IN	Inputs IRIG CS-5 format event code (IRIG version only)
Sony Passthrough	Not implemented at the time of writing (XIO version only)
Sony Loop	Not implemented at the time of writing (XIO version only)
Sony Active	Not implemented at the time of writing (XIO version only)

5.7.1.1 IRIG CS-6 compatible Broadcast Data Output.

When you set the serial port Mode to IRIG CS6 the respective serial port will output an IRIG CS-6 compatible serial data stream output with the following specifications. (See IRIG Standard 216-02 for a full specification of the CS-6 serial protocol)

Baud Rate: Selectable using the *SER A BAUD RATE* control (9600 Baud is the default baud rate for CS-6)
Word Size: 8 bits, no parity, 1 stop bit

Once per field (once per frame for progressive video formats) the 7800TM2-IRIG-3G will send the IRIG time most recently read from the VANC packet in the following formatted ASCII message:

<STX>002<$D_{100}D_{10}D_1$>:$H_{10}H_1$:$M_{10}M_1$:$S_{10}S_1$.$S_{1/10}S_{1/100}S_{1/1000}$<ETX>

Where

<STX>	=	ASCII start of text character 02_h
002	=	three ASCII digits for the message address (30_h, 30_h, 32_h)
D_{100}	=	Hundreds of days (ASCII digit)
D_{10}	=	Tens of days (ASCII digit)
D_1	=	Units of days (ASCII digit)
:	=	ASCII colon character $3A_h$
H_{10}	=	Tens of hours (ASCII digit)
H_1	=	Units of hours (ASCII digit)
:	=	ASCII colon character $3A_h$
M_{10}	=	Tens of minutes (ASCII digit)
M_1	=	Units of minutes (ASCII digit)
:	=	ASCII colon character $3A_h$
S_{10}	=	Tens of seconds (ASCII digit)
S_1	=	Units of seconds (ASCII digit)
.	=	ASCII period character $2E_h$
$S_{1/10}$	=	Hundreds of milliseconds (ASCII digit)
$S_{1/100}$	=	Tens of milliseconds (ASCII digit)
$S_{1/1000}$	=	Units of milliseconds (ASCII digit)
<ETX>	=	ASCII end of text character 03_h

5.7.1.2 IRIG CS-5 compatible Event Count Input

When you set the serial port Mode to IRIG CS-5 Input the respective serial port will receive an IRIG CS-5 compatible serial data stream input with the following specifications outlined in IRIG Standard 215-11.

Baud Rate: Selectable using the *SER A BAUD RATE* control (9600 Baud is the default baud rate for CS-5)
Word Size: 7 bits, odd parity, 1 stop bit

5.7.2 Selecting the Serial Port Baud Rate

COM PORTS
SER A Baud

This control is used to view the baud rate of serial port A

5.7.3 Selecting the Serial Port Communications Format

COM PORTS
SER A COMM

This control is used to view the communications format (number of bits, parity, stop bits of serial port A

5.8 UTILITIES

The *UTILITIES* menus are used to list the module firmware version, manage the user presets, and configure the GPIOs. The chart below shows the items available in the *UTILITIES* menu. Sections 5.7.1 to 5.7.6 give detailed information about each of the parameters.

About…	Shows the firmware version of the module.
Preset Select	Selects a user preset that will be acted on by the *Recall Preset* or *Save Preset* menu items.
Recall Preset	Recall the selected preset to the card
Store Preset	Store the current configuration of the card to a user preset.
GP 1	Select the function of GPIO 1 when it is active.
GPIO 1 Active Lvl	Sets the active level of GPIO 1.
GP 2	Select the function of GPIO 2 when it is active.
GPIO 2 Active Lvl	Sets the active level of GPIO 2.
GP 3	Select the function of GPIO 3 when it is active.
GPIO 3 Active Lvl	Sets the active level of GPIO 3.
GP 4	Select the function of GPIO 4 when it is active.
GPIO 4 Active Lvl	Sets the active level of GPIO 4.
GP 5	Select the function of GPIO 5 when it is active.
GPIO 5 Active Lvl	Sets the active level of GPIO 5.
GP 6	Select the function of GPIO 6 when it is active.
GPIO 6 Active Lvl	Sets the active level of GPIO 6.
GP 7	Select the function of GPIO 7 when it is active.
GPIO 7 Active Lvl	Sets the active level of GPIO 7.
GP 8	Select the function of GPIO 8 when it is active.
GPIO 8 Active Lvl	Sets the active level of GPIO 8.
GP 9	Select the function of GPIO 9 when it is active.
GPIO 9 Active Lvl	Sets the active level of GPIO 9.
GP 10	Select the function of GPIO 10 when it is active.
GPIO 10 Active Lvl	Sets the active level of GPIO 10
GP 11	Select the function of GPIO 11 when it is active.

GPIO 11 Active Lvl	Sets the active level of GPIO 11.
GP 12	Select the function of GPIO 12 when it is active.
GPIO 12 Active Lvl	Sets the active level of GPIO 12.
IP Addr	Sets the IP address of the card
Subnet	Sets the Subnet Mask of the card
Gateway	Sets the IP Gateway of the card
Broadcast	Sets the Broadcast Address of the card

5.8.1 Accessing Information about this Module and its Firmware

UTILITIES
- *About…*

This control lists the hardware version of this module and the firmware residing within it. It gives quick access to information about revisions that can be used to determine when upgrades are required.

5.8.2 Selecting a User Preset to Recall or Save

UTILITIES
- *Preset Selection*
  - *Factory Default*
  - *User Preset 1*
  - *User Preset 2*
  - *User Preset 3*
  - *User Preset 4*

This control is used to select a User preset to Recall or Save. It is used in conjunction with the *Recall Preset* or *Save Preset* menu items.

Select the preset you want to recall or save. If you want to reset the card to its factory default condition select *Factory Default.* This is the first step in recalling or saving a preset.

5.8.3 Recalling Card Configurations from the User Presets

UTILITIES
- *Recall preset*
  - *no*
  - *yes*

This control is used to restore the current card configuration to the preset selected using the *Preset Selection* menu item. (See section 5.7.1)

To recall the selected preset, set this menu item to *Yes.* When you press the knob the current card configuration will be overwritten from the selected user preset. You can abort the operation by pressing the knob when *no* is displayed.

On a new unit that has been reset to the Factory default values; Preset 1 to Preset 10 will also be preloaded with the Factory Reset values.

5.8.4 Saving Card Configurations to the User Presets

UTILITIES
Save preset
no
yes

This control is used to save the current card configuration to the preset selected using the *Preset Selection* menu item. (See section 5.7.1)

To save the selected preset, set this menu item to *Yes.* When you press the knob the current card configuration will be saved to the selected user preset. You can abort the operation by pressing the knob when *no* is displayed.

5.8.5 Configuring the GPIO Interface

There are twelve pairs of menu items that are used to program the functions of the GPIOs. For the sake of simplicity only the menu item for GPIO1 will be described in the manual.

5.8.5.1 Selecting the Function of the GPIO

UTILITIES	
GP 1	
Preset 1	Recalls Preset 1
Preset 2	Recalls Preset 2
Preset 3	Recalls Preset 2
Preset 4	Recalls Preset 4
Other GPI function	

This control is used to select the function of GPIO 1 when it is active.

5.8.5.2 Selecting the Mode of the GPIO

UTILITIES
GPIO 1 Active Lvl
Low
High

This control is used to select whether the GPIO will be active high or active low. The *GPIO Function* menu determines what the input controls. See section 5.7.5.1.

When set to *Low* the GPIO will activate when it is low.
When set to *Low* the GPIO will activate when it is low.

5.8.5.3 Loading presets using the GPI controls

Each user preset is a complete snapshot of the settings of all the controls on the module. This includes the GPI control settings. In order to use the GPI controls to load presets, you must ensure that each of your user presets has at least one GPI control set to load a default preset that will in turn allow you to load additional presets.

Example 1
Preset 1 has the following GP1 controls

GPI	Function
1	Load Preset 2
2	Load Preset 3
3	Load Preset 4
…	
8	Other function

Preset 2 through 9 have the following GP1 controls

GPI	Function
1	Load Preset 1
2	Other function
3	Other function
…	
8	Other function

From any of the presets you can press GPI1 to get back to Preset 1 which will then allow you to choose another preset.

Example 2
If you only need two or three presets you could do it this way
Preset 1 has the following GP1 controls

GPI	Function
1	Load Preset 2
2	Load Preset 3
3	Other function
…	
8	Other function

Preset 2 has the following GP1 controls

GPI	Function
1	Load Preset 1
2	Load Preset 3
3	Other function
…	
8	Other function

Preset 3 has the following GP1 controls

GPI	Function
1	Load Preset 1
2	Load Preset 2
3	Other function
…	
8	Other function

From any of the presets you can press GPI1 or GPI2 to get to either of the other Presets.

5.8.6 Setting the Module IP Address

UTILITIES
IP Addr

This control is used to the IP Address of the module.

Press the shaft encoder knob to enter the IP Address. You will be presented with an entry screen showing the four octets for the IP address that was last entered. There is a small arrow beneath the leftmost digit. Turn the shaft encoder knob to the value you wish to enter, then press the shaft encoder pushbutton. The arrow will advance to the next digit. Continue doing this until all digits have been entered. After you select the last digit you will be returned to the main menu screen, and the value you just entered will be shown.

5.8.7 Setting the Module Subnet Mask

UTILITIES
Subnet

This control is used to the Subnet Mask of the module

Press the shaft encoder knob to enter the Subnet mask. Use the same method as the IP address to set the subnet mask.

5.8.8 Setting the Module IP Gateway Address

UTILITIES
Gateway

This control is used to the Gateway of the module

Press the shaft encoder knob to enter the Gateway. Use the same method as the IP address to set the Gateway.

5.8.9 Setting the Module IP Broadcast Address

UTILITIES
Broadcast

This control is used to the Broadcast of the module

Press the shaft encoder knob to enter the Broadcast. Use the same method as the IP address to set the Broadcast.

6 JUMPERS

Figure 6-1 and Figure 6-2 provide the locations of the jumpers and LEDs on the main module of the 7800TM2 series boards.

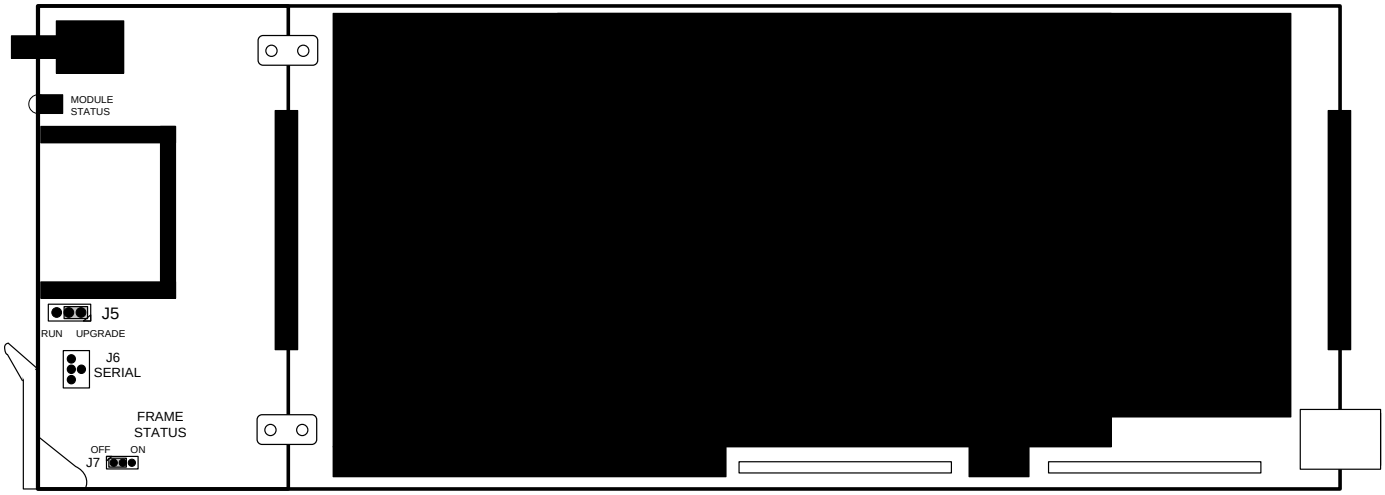


Figure 6-1: Location of Jumpers – Top View Main Module

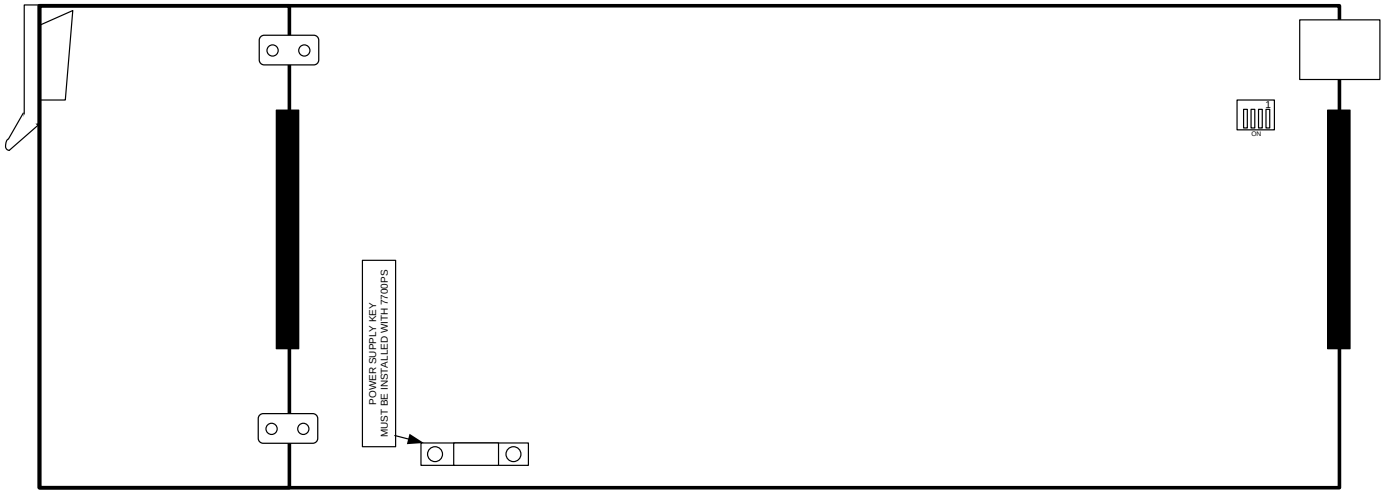


Figure 6-2: Location of Jumpers – Bottom View Main Module

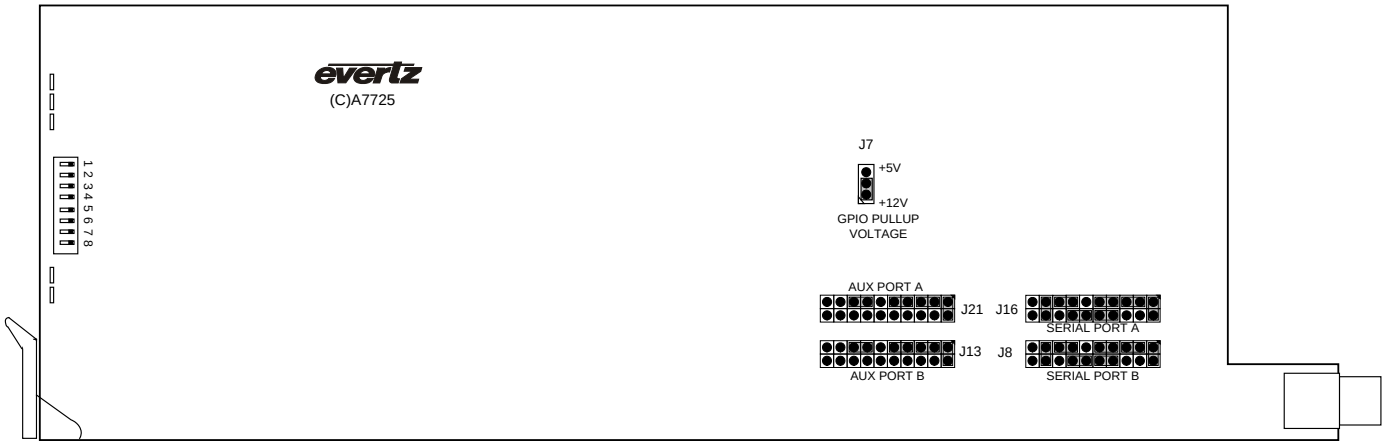


Figure 6-3: Location of Sub Module Jumpers – Top View (2 Slot versions Only)

On early versions of the submodule, the silkscreen labels AUX PORT A and AUX PORT B are reversed. The drawing above shows the correct labeling.

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

FRAME STATUS: The FRAME STATUS jumper J7 is located near the front of the board and close to the card ejector. The FRAME STATUS jumper determines whether local faults (as shown by the Local Fault indicator) will be connected to the frame's global status bus.

To monitor faults on this module with the frame status indicators (on the PS FRAME STATUS LED's and on the Frame's Fault Tally output) install this jumper in the On position. (Default)

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

Firmware updates can be performed using two methods. The preferred method is an Ethernet based up-load of firmware using VistaLINK® PRO. Consult the VistaLINK® Pro documentation for information on how to perform an Ethernet based Upload. The second method is the serial interface based up-load of firmware using the on-card upgrade serial port described below.

6.2.1 Performing Firmware Upgrades using the Serial Interface

The following outlines the details of how to perform a serial interface based upgrade.

UPGRADE: The UPGRADE jumper (J5) is located on the top side of the main board near the front of the card and is used when firmware upgrades are being done to the module using the serial port method. For normal operation it should be switched to the *RUN* position as shown in the diagrams above. See the *Upgrading Firmware* chapter 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 J5 into the *UPGRADE* position. Install the Upgrade cable provided (located in the vinyl pouch in the front of this manual) onto header J6 at the card edge. Re-install the module into the frame. Run the upgrade as described in *Upgrading Firmware* chapter. Once the upgrade is complete, remove the module from the frame, move J5 into the *RUN* position, remove the upgrade cable and re-install the module. The module is now ready for normal operation.

The Upgrade baud rate for the 7800TM2 series modules is 115,200 baud. Additional serial connection settings are as follows:

Data Bits = 8
Parity = None
Stop Bits=1

Flow Control = None

6.3 SELECTING WHETHER THE REFERENCE BNC INPUT IS TERMINATED

TERM: The micro DIP switch on the bottom of the board (near the MI connector) is used to terminate the REF BNC input. When DIP Switch 1 is set to "ON" there is in the 75 ohm terminating resistor placed between the REF input and ground. When DIP Switch 1 is set in the "OFF" position the REF input will be high impedance. Leave DIP SWITCH 2, 3 and 4 in the OFF position. This switch is applicable on 2 slot versions only.

6.4 SELECTING THE GPIO PULLUP VOLTAGE (2 SLOT VERSIONS ONLY)

GPIO SELECT: The GPIO SELECT jumper J7 is located near the center of the sub board. The GPIO SELECT jumper determines the pull-up voltage that will be used for the GPIO pins.

To select a +12V pull-up for the GPIO pins, select the +12V position

To select a +5V pull-up for the GPIO pins, select the +5V65 position

6.5 7800TM2-3G "SLOT BLOCKER" (1 SLOT VERSION ONLY)

The 7800TM2-3G modules can be installed in either the 7700FR-C or the 7800FR frames. These modules are designed to take one slot in the Evertz 7800FR frame and two slots in the 7700FR-C.

Modules can fit into one slot in a 7800FR frame because the 7800FR allows modules to consume more power on a per slot basis than the 7700FR-C frame. When a 7800TM2-3G module is installed in the 7700FR-C, the module must occupy 2 slots to ensure that the frame power is managed properly. This is accomplished by installing a "Slot Blocker" on the bottom side of the board. If the "Slot Blocker" is not installed on the card and the card is inserted into the 7700FR-C frame, the card will not power-up. When installing the card in a 7800FR, the "Slot Blocker" may be removed and it will power-up and operate normally. If the "Slot Blocker" remains installed and the card is inserted into the 7800FR, the card will also power-up and operate normally.

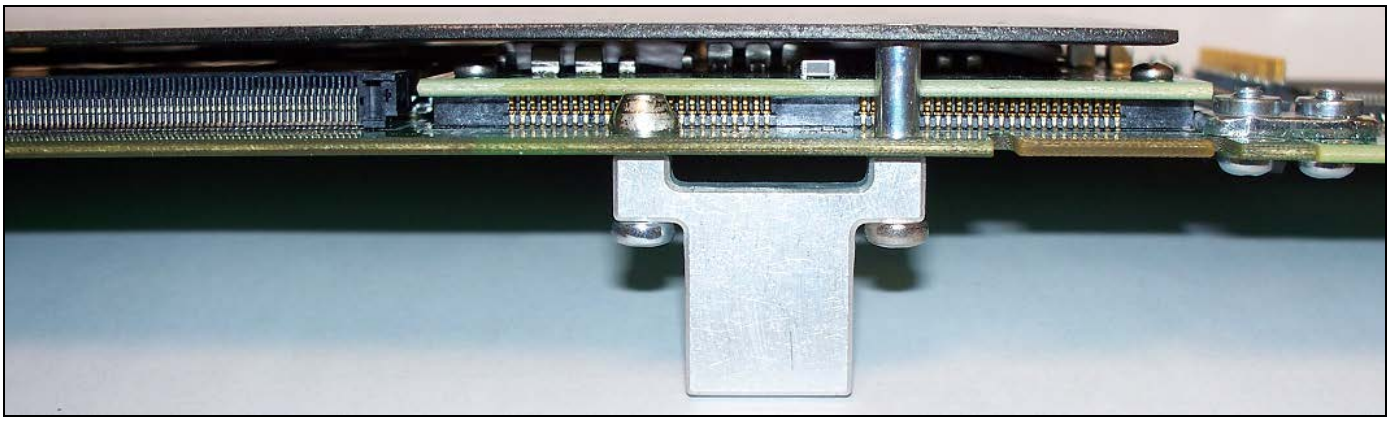


Figure 6-4: Slot Blocker

7 MENU QUICK REFERENCE

CHANNEL A

- VIDEO A
  - Video Std
  - Bypass Relay
  - Video Loss
  - Show OSD
  - Line Blanking
  - Line Blank Start F1
  - Line Blank End F1
  - Line Blank Start F2
  - Line Blank End F2
- READER A
  - TM Src Priority
  - Aux Rdr
  - D-VITC Read Start
  - D-VITC Read End
- GENERATOR A
  - TM Jam Source
  - UB Source
  - HEX UB
  - Momentary Jam
  - Jam Mode
  - No Rdr Code Jam
  - Daily TM
  - Offset
  - Preset Time Now
  - Preset TM
  - When Not Jamming
  - Drop Frame
  - Gen Cnt Mode
  - D-VITC Line 1
  - D-VITC Line 2
  - ATC Pkt Type
  - IRIG VANC Line
  - IRIG VANC Source
- ON-SCREEN DISP A
  - Text1
  - Tex 2
  - Text1 Enable
  - Text1 Height
  - Text1 Row
  - Text1 Col
  - Text2 Enable
  - Text2 Height
  - Text2 Row
  - Text2 Col

- Rdr TM Enable
- Rdr TM Height
- Rdr TM Row
- Rdr TM Col
- Rdr UB Enable
- Rdr UB Height
- Rdr UB Row
- Rdr UB Col
- Gen TM Enable
- Gen TM Height
- Gen TM Row
- Gen TM Col
- Gen UB Enable
- Gen UB Height
- Gen UB Row
- Gen UB Col
- OSD Font Size
- OSD Style
- Background Opacity
- OSD Symbols
- OSD Frame Cnt
- OSD Field Cnt

DEBUG OSD A

- RDR Status Screen
- DBG1 Enable
- DBG1 Height
- DBG1 Row
- DBG1 Col
- DBG1 Show
- DBG2 Enable
- DBG2 Height
- DBG2 Row
- DBG2 Col
- DBG2 Show
- DBG3 Enable
- DBG3 Height
- DBG3 Row
- DBG3 Col
- DBG3 Show
- DBG4 Enable
- DBG4 Height
- DBG4 Row
- DBG4 Col
- DBG4 Show

CHANNEL B

VIDEO B

- Video Std
- Bypass Relay
- Video Loss
- Show OSD
- Line Blanking
- Line Blank Start F1
- Line Blank End F1
- Line Blank Start F2
- Line Blank End F2

READER B

- TM Src Priority
- Aux Rdr
- D-VITC Read Start
- D-VITC Read End

GENERATOR B

- TM Jam Source
- UB Source
- HEX UB
- Momentary Jam
- Jam Mode
- No Rdr Code Jam
- Daily TM
- Offset
- Preset Time Now
- Preset TM
- When Not Jamming
- Drop Frame
- Gen Cnt Mode
- D-VITC Line 1
- D-VITC Line 2
- ATC Pkt Type
- IRIG VANC Line
- IRIG VANC Source

ON-SCREEN DISP B

- Text1
- Tex 2
- Text1 Enable
- Text1 Height
- Text1 Row
- Text1 Col
- Text2 Enable
- Text2 Height
- Text2 Row
- Text2 Col

- Rdr TM Enable
- Rdr TM Height
- Rdr TM Row
- Rdr TM Col
- Rdr UB Enable
- Rdr UB Height
- Rdr UB Row
- Rdr UB Col
- Gen TM Enable
- Gen TM Height
- Gen TM Row
- Gen TM Col
- Gen UB Enable
- Gen UB Height
- Gen UB Row
- Gen UB Col
- OSD Font Size
- OSD Style
- Background Opacity
- OSD Symbols
- OSD Frame Cnt
- OSD Field Cnt

DEBUG OSD B

- RDR Status Screen
- DBG1 Enable
- DBG1 Height
- DBG1 Row
- DBG1 Col
- DBG1 Show
- DBG2 Enable
- DBG2 Height
- DBG2 Row
- DBG2 Col
- DBG2 Show
- DBG3 Enable
- DBG3 Height
- DBG3 Row
- DBG3 Col
- DBG3 Show
- DBG4 Enable
- DBG4 Height
- DBG4 Row
- DBG4 Col
- DBG4 Show

- **LTC SETUP**
  - LTC 1 Src
  - LTC 2 Src
  - LTC 3 Src
  - LTC 4 Src
  - Timer LTC Direction
  - Time LTC Resolution
- **UP/DOWN TIMERS**
  - TIMER 1 SETUP
    - Tmr 1 Start
    - Tmr 1 Stop
    - Timer 1 Run/Hold
    - Timer 1 Up/Down
    - Timer 1 Auto - Stop
  - TIMER 1 LOAD NOW
  - TIMER 2 SETUP
    - Tmr 2 Start
    - Tmr 2 Stop
    - Timer 2 Up/Down
    - Timer 2 Run/Hold
    - Timer 2 Auto - Stop
  - TIMER 2 LOAD NOW
  - TIMER 3 SETUP
    - Tmr 3 Start
    - Tmr 3 Stop
    - Timer 3 Up/Down
    - Timer 3 Run/Hold
    - Timer 3 Auto - Stop
  - TIMER 3 LOAD NOW
  - TIMER 4 SETUP
    - Tmr 4 Start
    - Tmr 4 Stop
    - Timer 4 Up/Down
    - Timer 4 Run/Hold
    - Timer 4 Auto - Stop
  - TIMER 4 LOAD NOW
  - UDP CLIENT LIST
    - IP Addr 1
    - IP Port 1
    - IP Addr 2
    - IP Port 2
    - IP Addr 3
    - IP Port 3
    - IP Addr 4
    - IP Port 4
    - IP Addr 5
    - IP Port 5
    - IP Addr 6
    - IP Port 6
    - IP Addr 7
    - IP Port 7
    - IP Addr 8
    - IP Port 8
- **PORTS**
  - SER A Mode
  - SER A Baud
  - SER A Comm
  - SER A Mode
  - SER A Baud
  - SER B Comm
- **REFERENCE**
  - Source
  - VITC Rdr Start
  - VITC Rdr End
- **UTILITIES**
  - About…
  - Preset Selection
  - Recall Preset
  - Store Preset
  - GP 1
  - GPIO 1 Active Lvl
  - GP 2
  - GPIO 2 Active Lvl
  - GP 3
  - GPIO 3 Active Lvl
  - GP 4
  - GPIO 4 Active Lvl
  - GP 5
  - GPIO 5 Active Lvl
  - GP 6
  - GPIO 6 Active Lvl
  - GP 7
  - GPIO 7 Active Lvl
  - GP 8
  - GPIO 8 Active Lvl
  - GP 9
  - GPIO 9 Active Lvl
  - GP 10
  - GPIO 10 Active Lvl
  - GP 11
  - GPIO 11 Active Lvl
  - GP 12
  - GPIO 12 Active Lvl
  - IP Addr
  - Subnet
  - Gateway
  - Broadcast

LEGEND

XIO version only

IRIG Version only

8 VISTALINK® REMOTE MONITORING/CONTROL

8.1 WHAT IS VISTALINK®?

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. An 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 VLPro 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, each with a unique address (OID), communicate with the NMS through an SNMP Agent. Evertz VistaLINK® enabled 7700/7800 series modules reside in the 3RU or 1RU MultiFrame and communicate with the manager via the 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 7700FC Frame Controller chapter.

8.2 VIDEO TAB

The *Video Standard* menu enables the user to choose the input video standard.

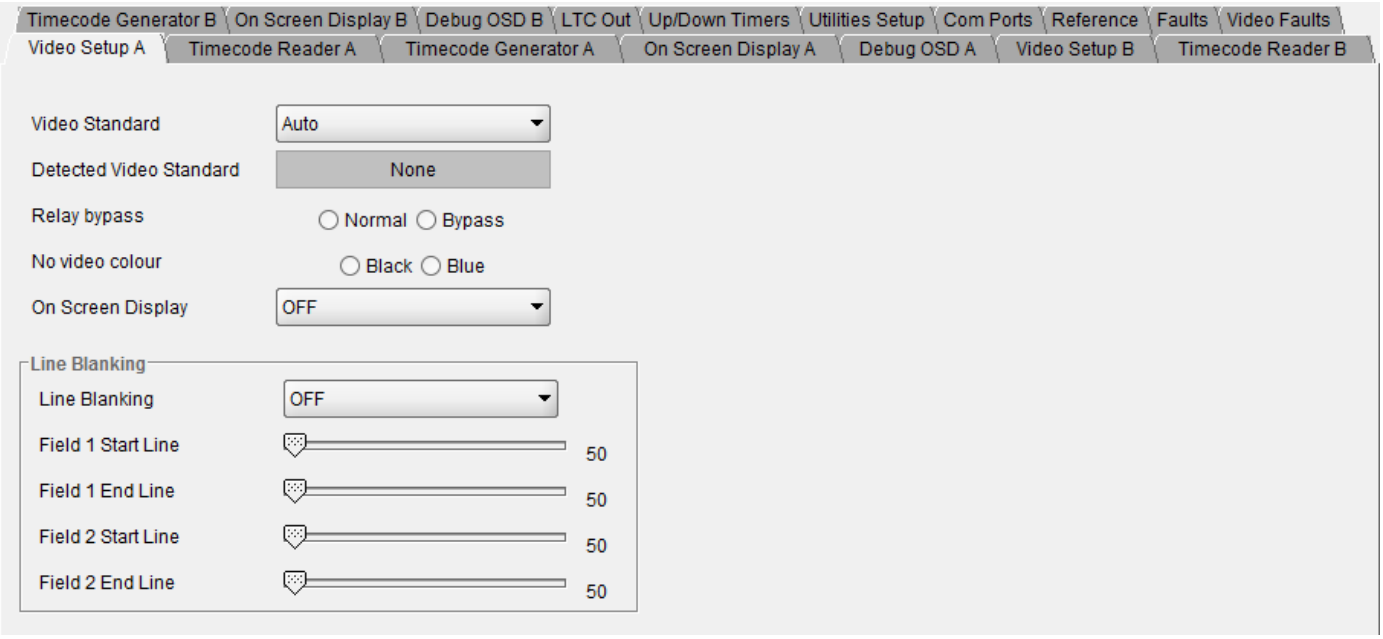


Figure 8-1: VistaLINK® Video Tab

8.3 TIME CODE READER TAB

The ***Time Code Reader*** tab enables the user to configure the time code reader settings. On the 1 slot version the *Time Code Reader* tab is as shown in Figure 8-10. On the XIO version the *Time Code Reader* tab is as shown in Figure 8-10. On the IRIG version the *Time Code Reader* tab is as shown in Figure 8-10.

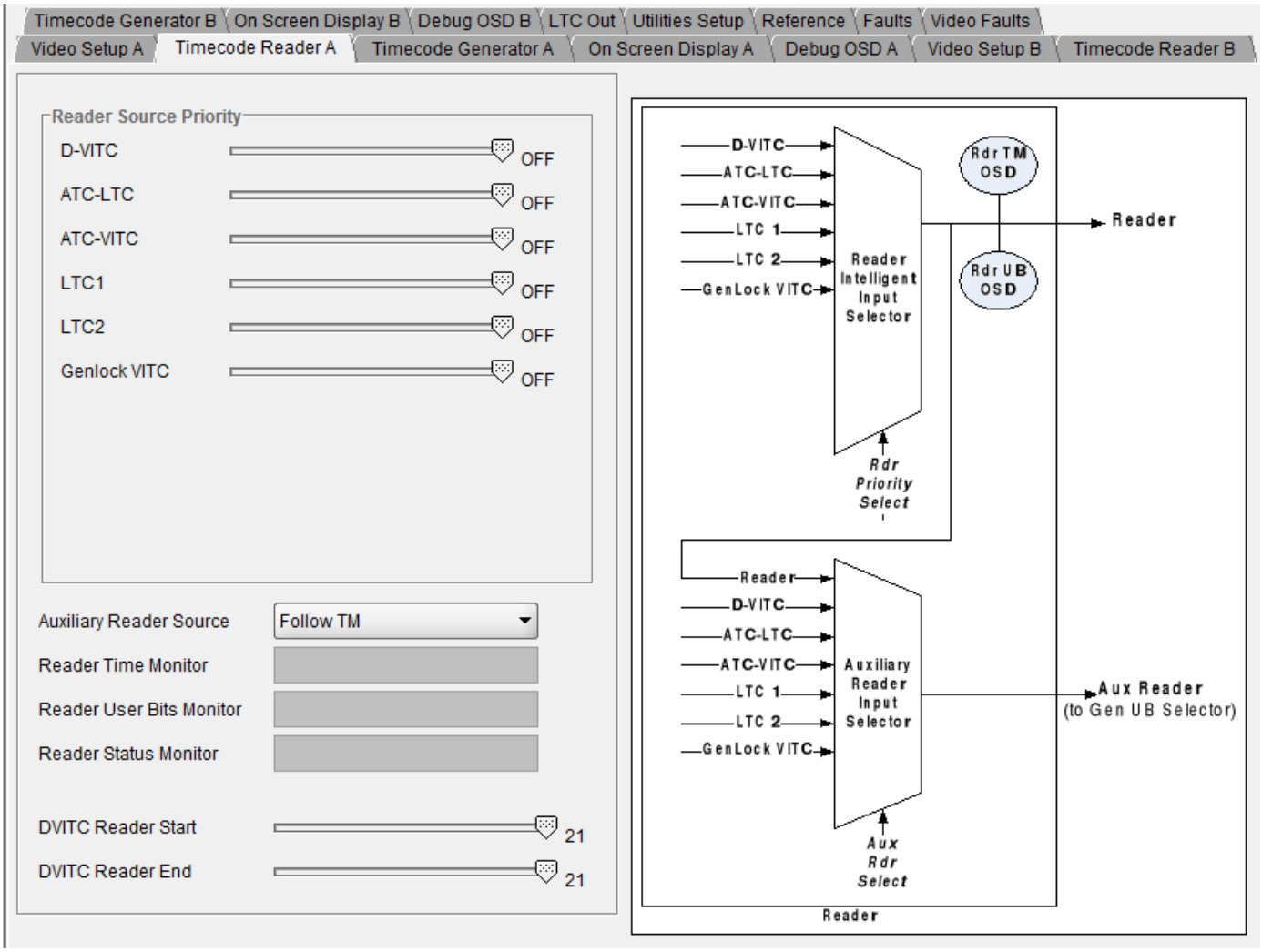


Figure 8-2: VistaLINK® Time Code Reader Tab – 1 Slot Version

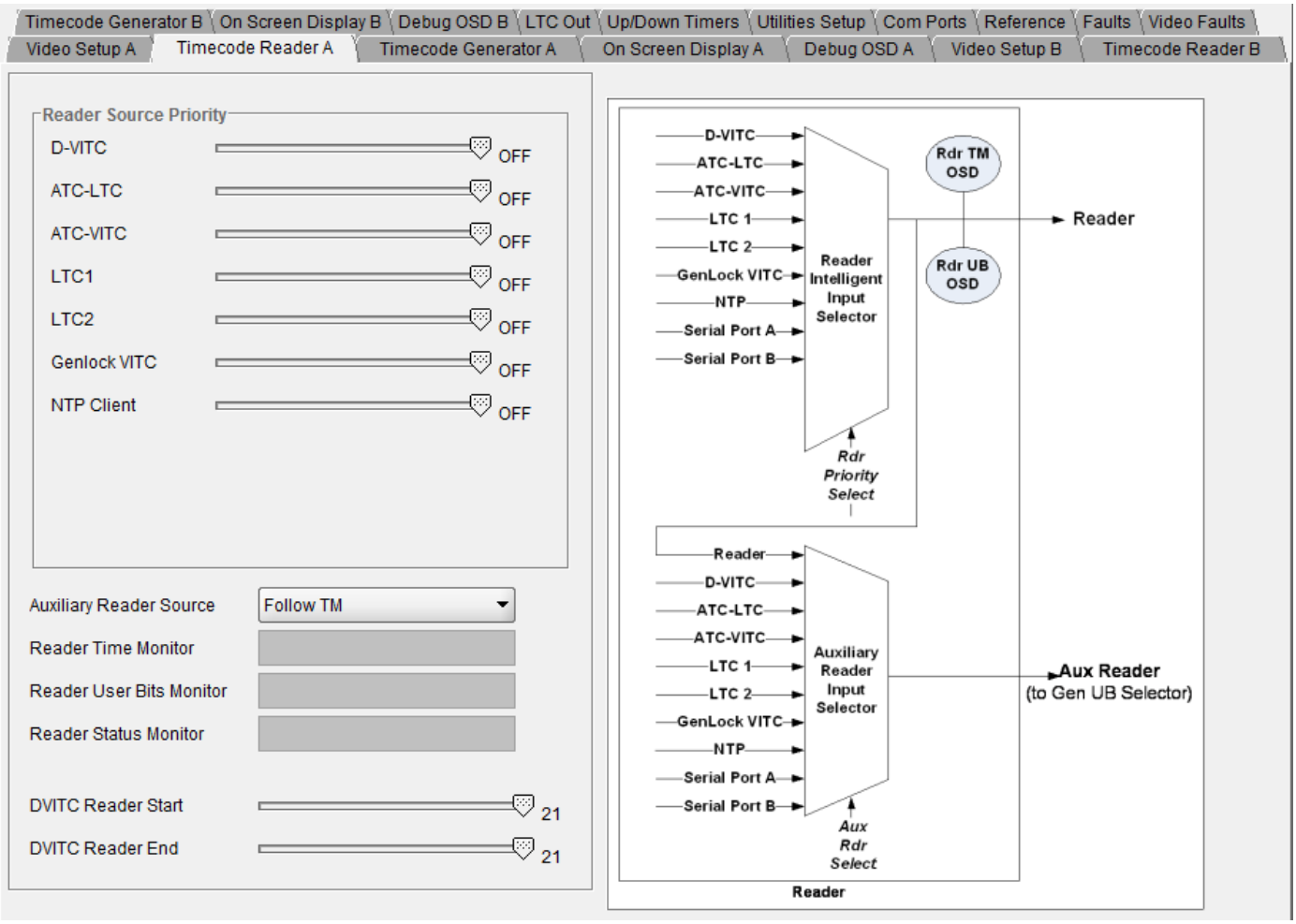


Figure 8-3: VistaLINK® Time Code Reader Tab – XIO Version

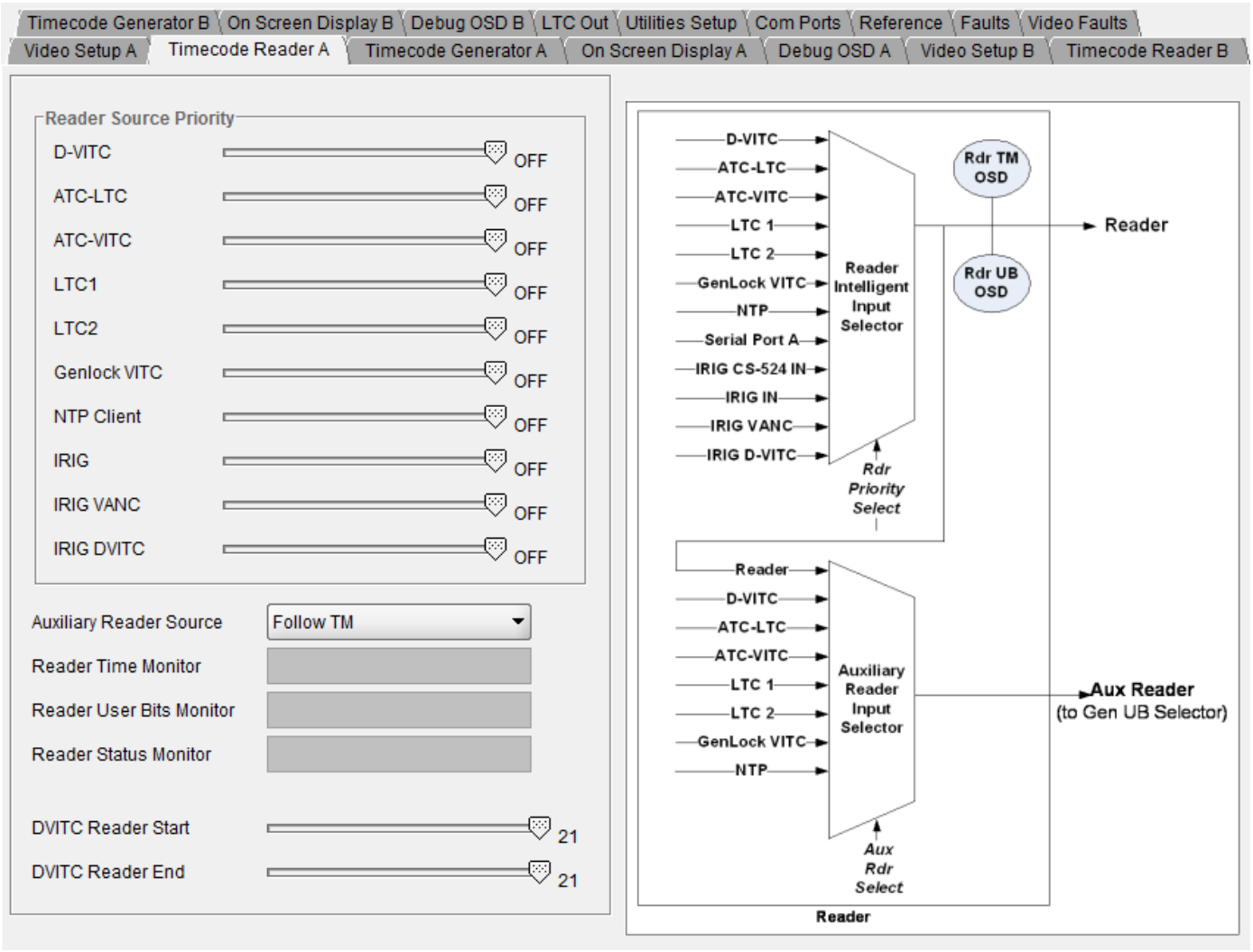


Figure 8-4: VistaLINK® Time Code Reader Tab – IRIG Version

8.4 TIME CODE GENERATOR TAB

The ***Time Code Generator*** tab enables the user to configure the time code generator settings. On the 1 slot version the *Time Code Generator* tab is as shown in Figure 8-10. On the XIO version the *Time Code Generator* tab is as shown in Figure 8-10. On the IRIG version the *Time Code Generator* tab is as shown in Figure 8-10.

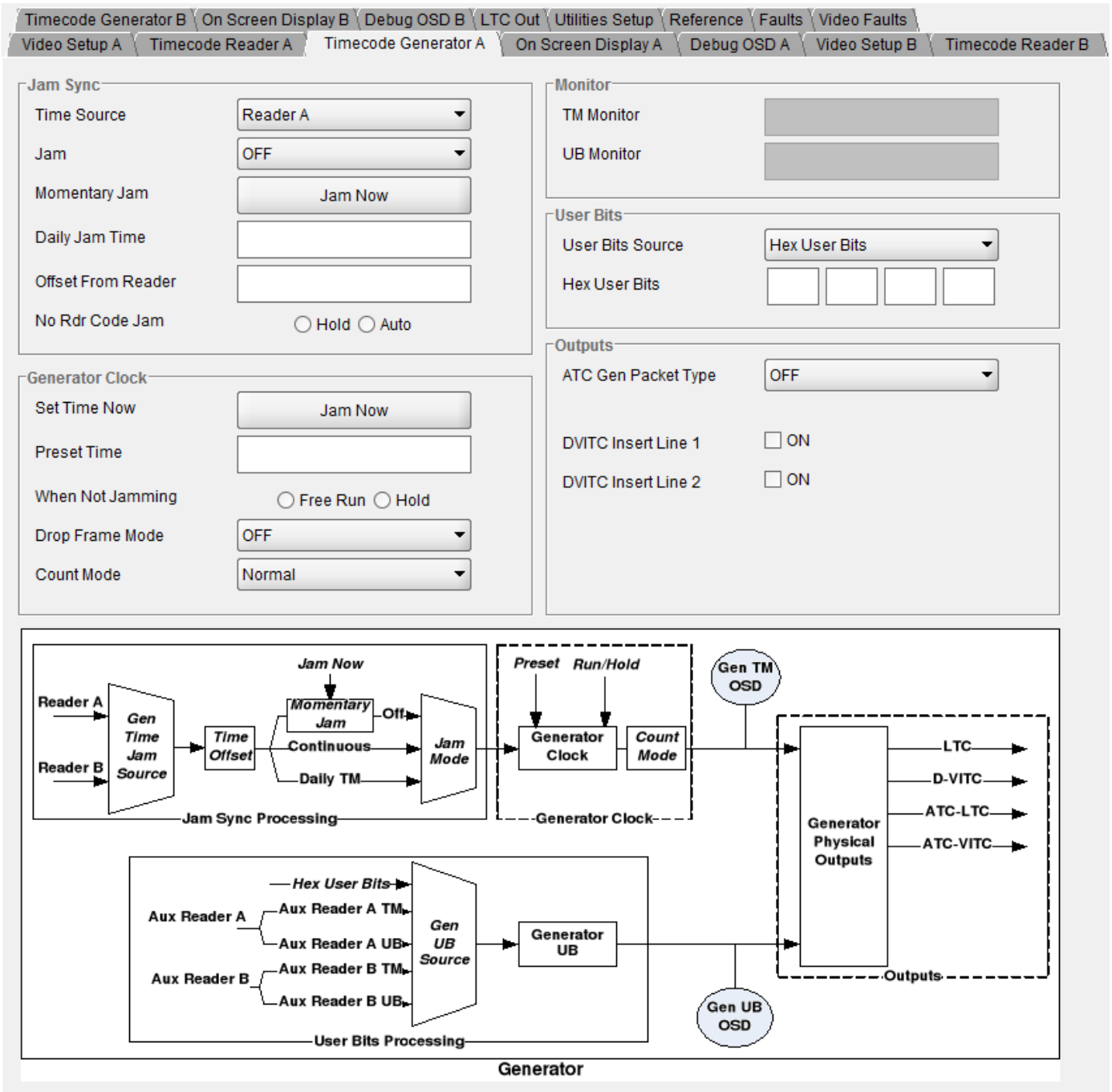


Figure 8-5: VistaLINK® Time Code Generator Tab – 1 Slot Version

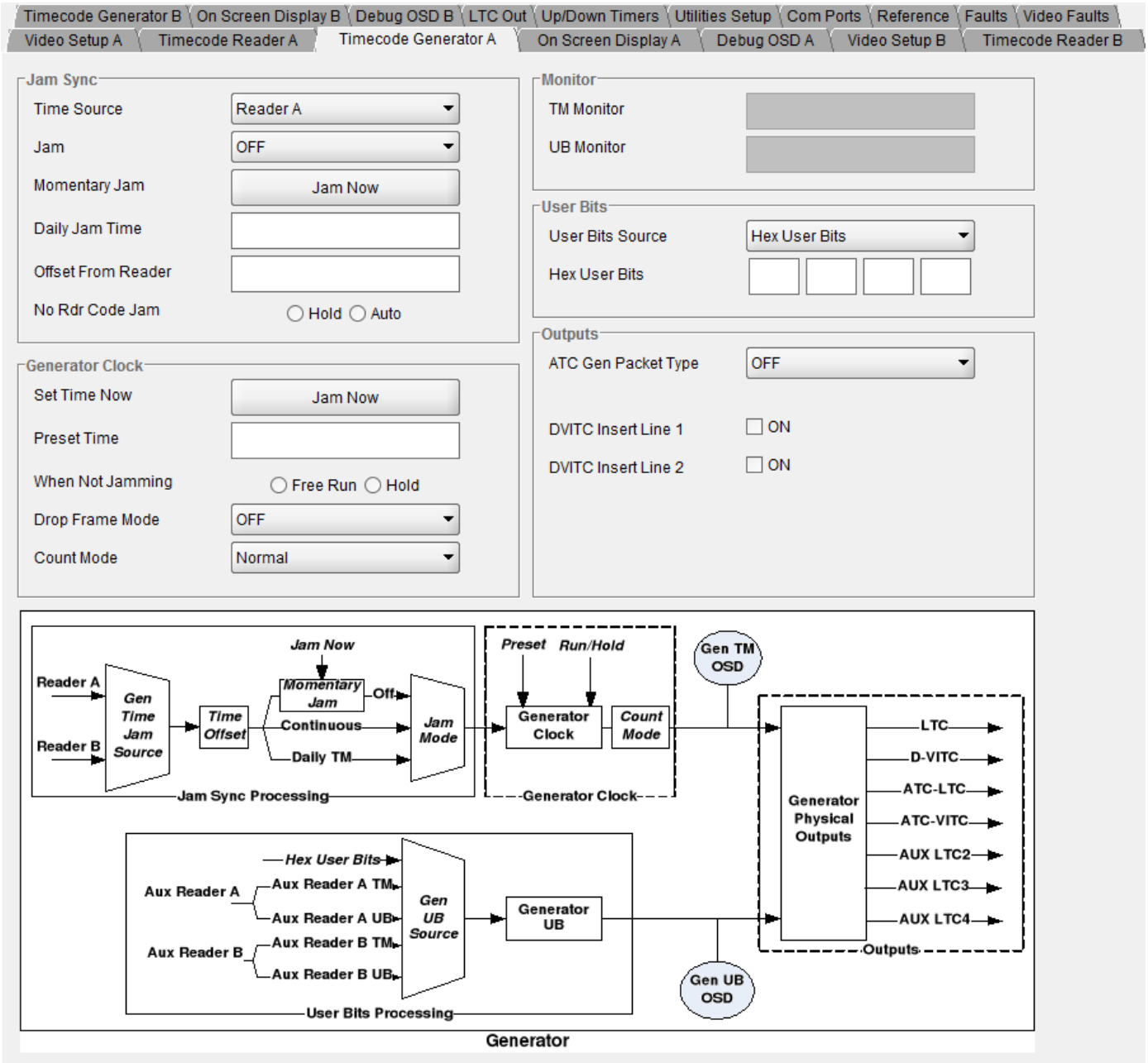


Figure 8-6: VistaLINK® Time Code Generator Tab – XIO Version

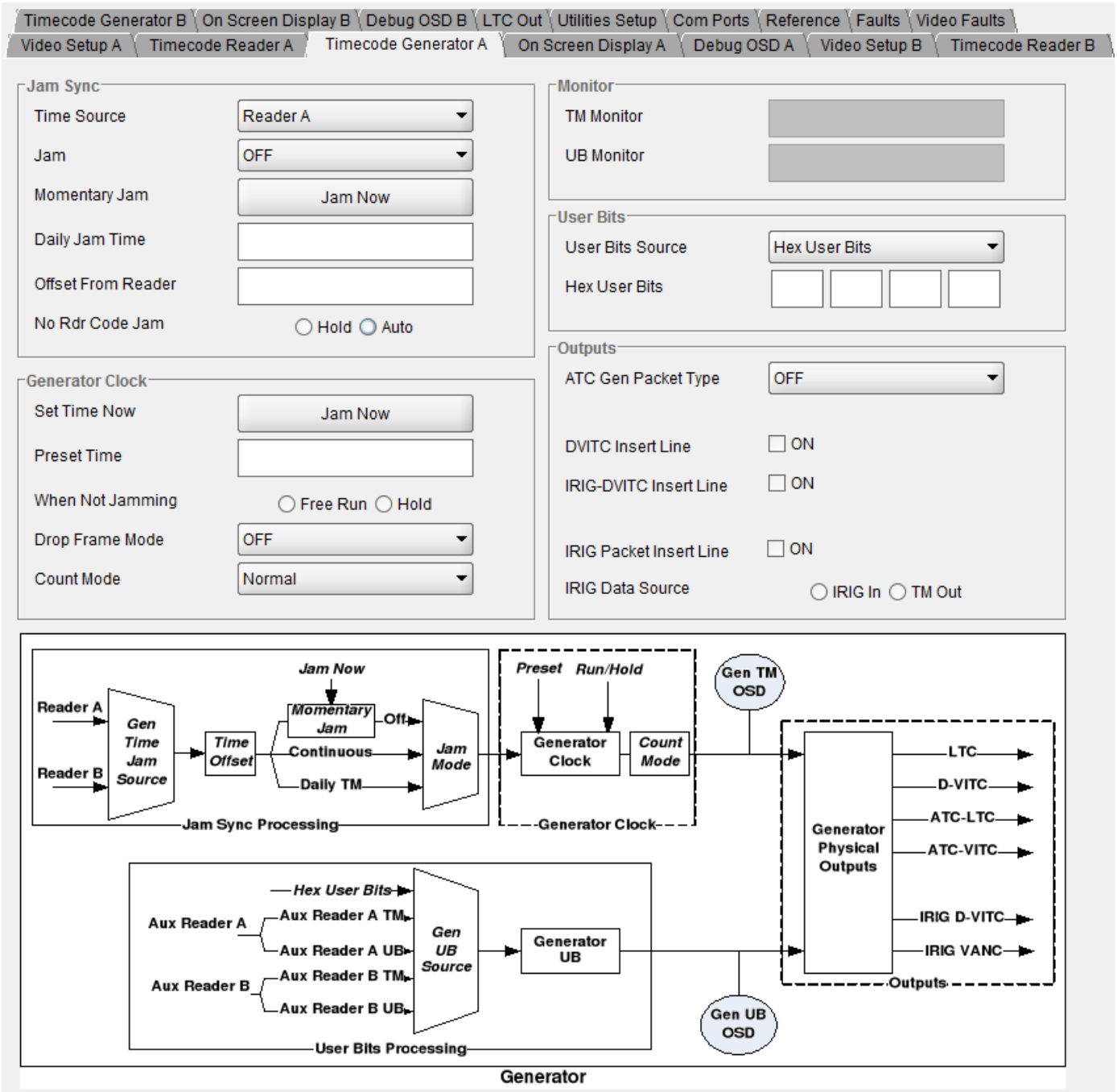


Figure 8-7: VistaLINK® Time Code Generator Tab – IRIG Version

8.5 ON SCREEN DISPLAY TAB

The ***On Screen Display*** tab enables the user to configure the settings for the On Screen display windows.

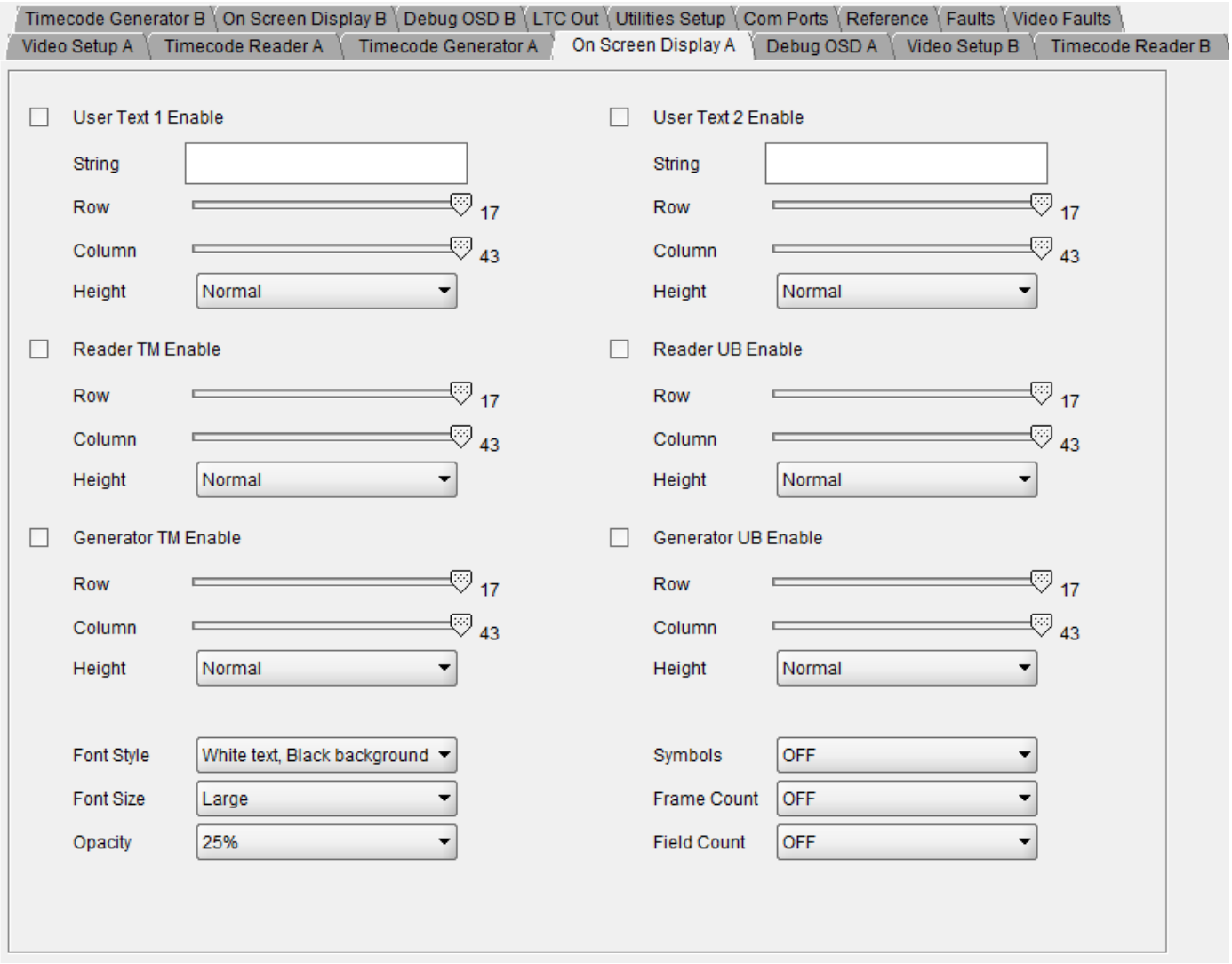


Figure 8-8: VistaLINK® On Screen Display Tab

8.6 DEBUG OSD TAB

The ***Debug OSD*** tab enables the user to configure the settings for the Debug On Screen display windows.

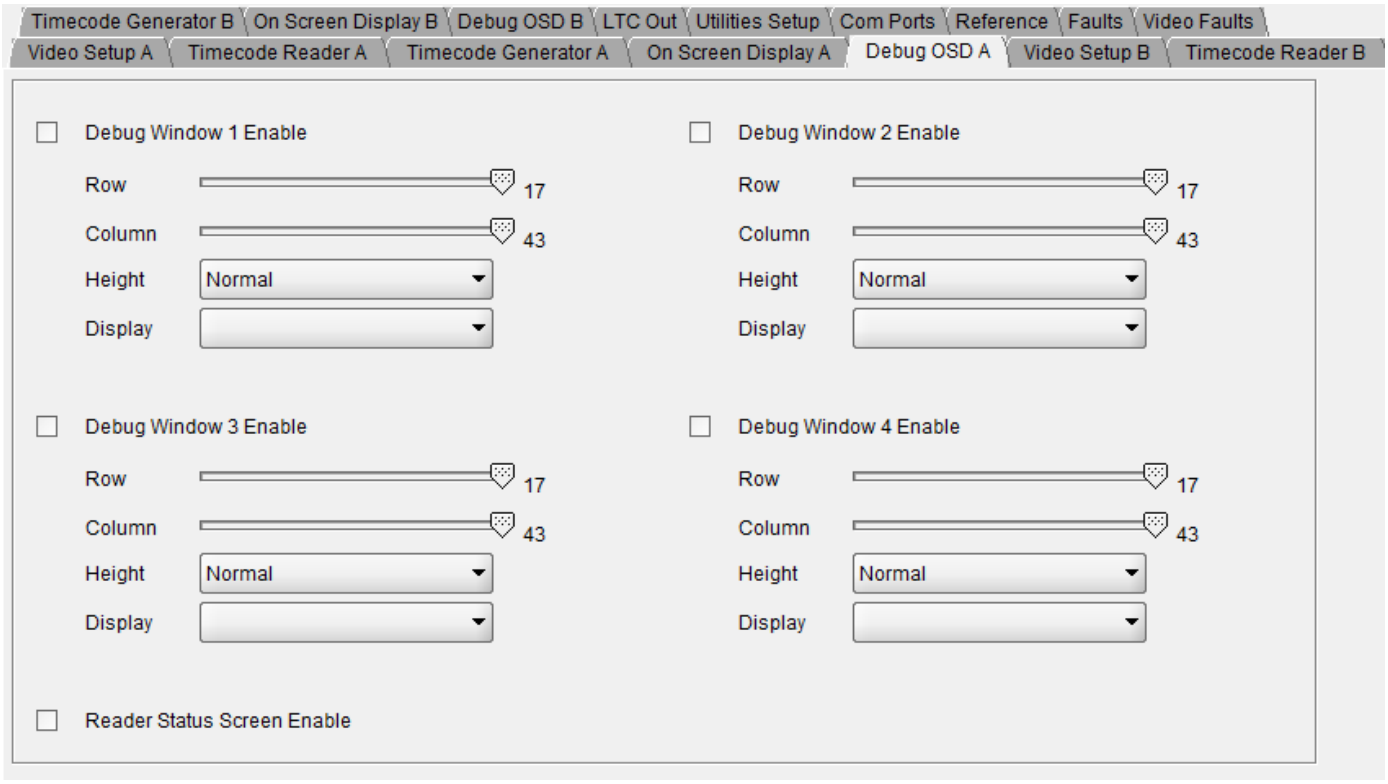


Figure 8-9: VistaLINK® Debug OSD Tab

8.7 LTC OUT TAB

The ***LTC Out*** tab enables the user to configure the settings for the LTC outputs. On the 1 slot and IRIG version the LTC Out tab is as shown in Figure 8-10. On the XIO version the LTC Out tab is as shown in Figure 8-11.

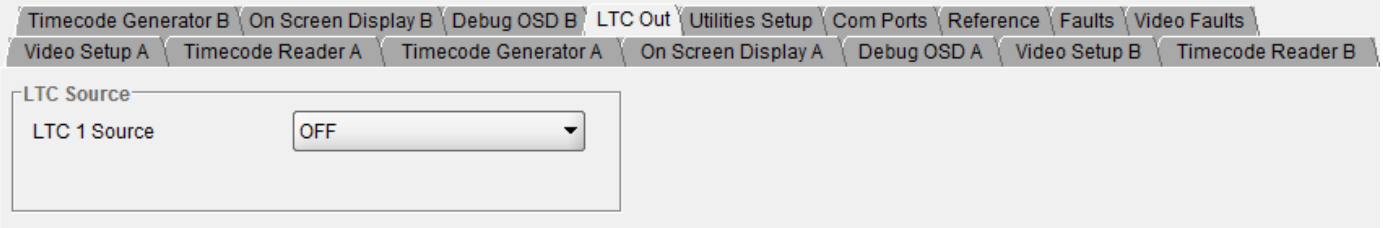


Figure 8-10: VistaLINK® LTC Out Tab

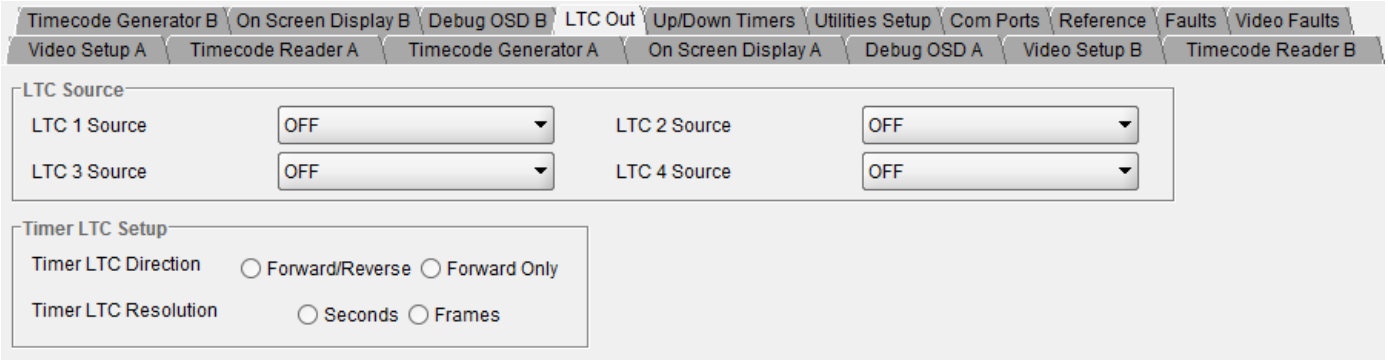


Figure 8-11: VistaLINK® LTC Out Tab – XIO version

8.8 UP\DOWN TIMERS TAB (XIO VERSION ONLY)

The ***UP\DOWN Timers*** tab enables the user to configure the settings for the Up\Down outputs. On the XIO version the *UP\DOWN Timers* tab is as shown in Figure 8-12.

Figure 8-12: VistaLINK® Up/Down Timers Tab

The Timer Start time value is the time and counting direction that will be loaded into the timer when you press the *Load Timer* button. To set the timer Start and stop values enter the desired time and counting direction (+ for count up, - for count down) and press *Apply.* To preset the timer to the start time and set its initial counting direction press the *Load Timer* button, and then refresh the configuration screen. You will see the Count Direction updated according to the direction of the Start Time. For more information about working with the timers see section 5.5.

8.9 UTILITIES TAB

The ***Utilities*** tab enables the user to configure the general settings, version information. On the 1 slot version the Utilities tab is as shown in Figure 8-14. On the 2 slot version the Utilities tab is as shown in Figure 8-14.

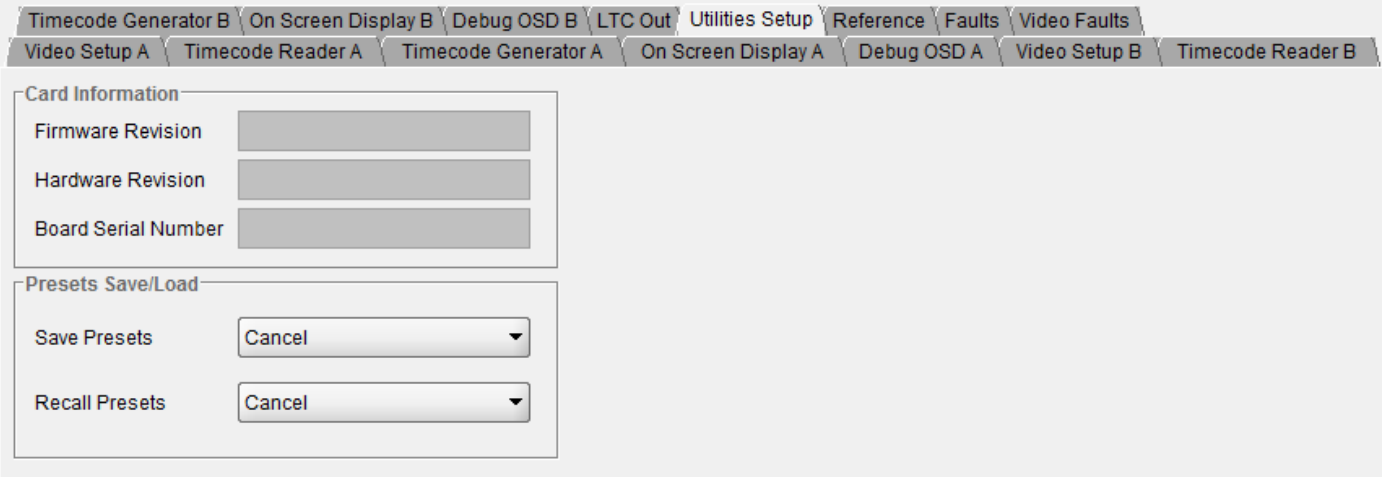


Figure 8-13: VistaLINK® Utilities Tab – 1 Slot version

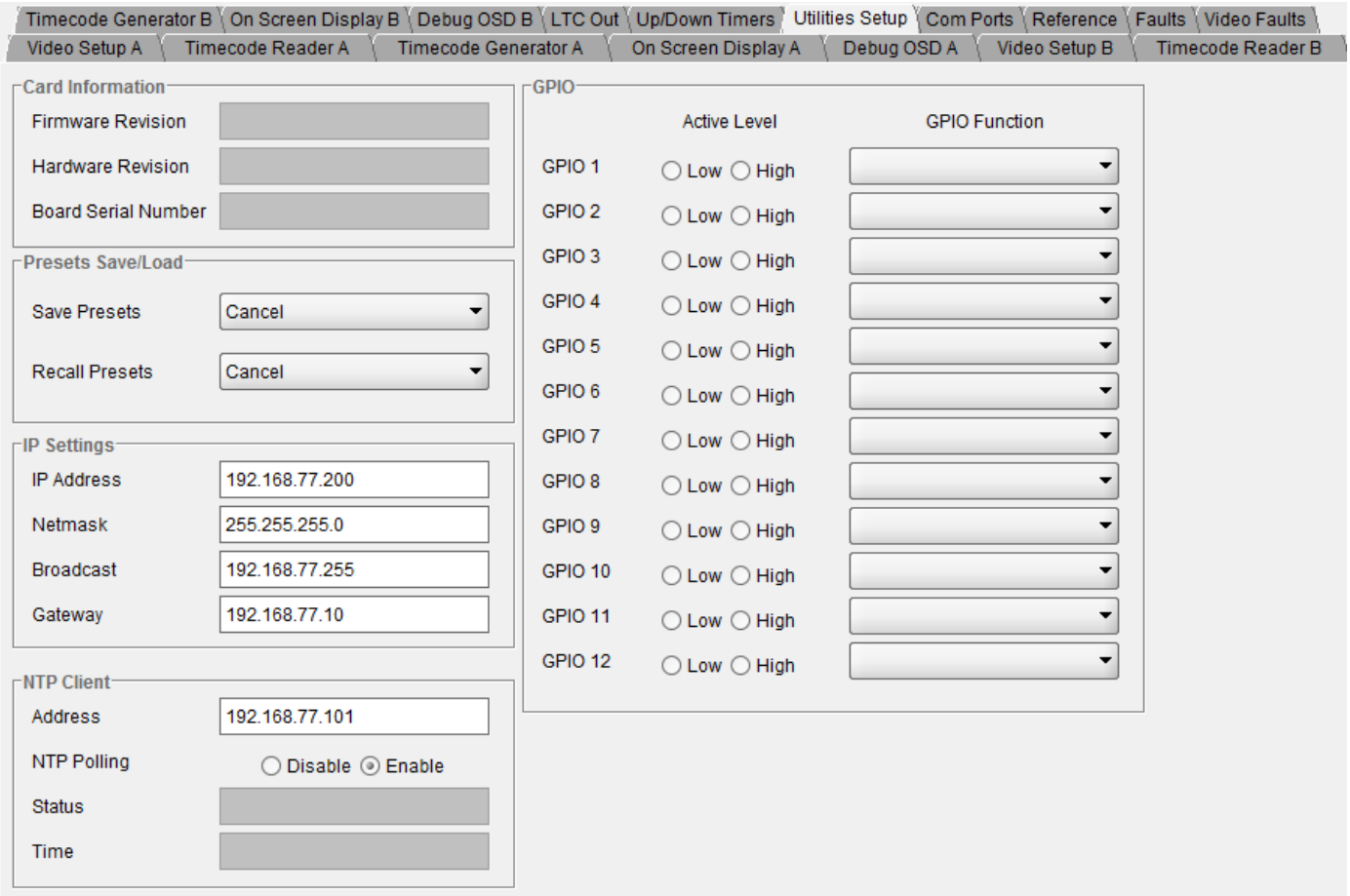


Figure 8-14: VistaLINK® Utilities Tab– 2 Slot version

8.10 COM PORTS TAB (2 SLOT VERSIONS ONLY)

The ***COM Ports*** tab enables the user to configure the settings or the serial Ports. The *COM Ports* tab for the XIO version is shown in Figure 8-15. The *COM Ports* tab for the IRIG version is shown in Figure 8-16.

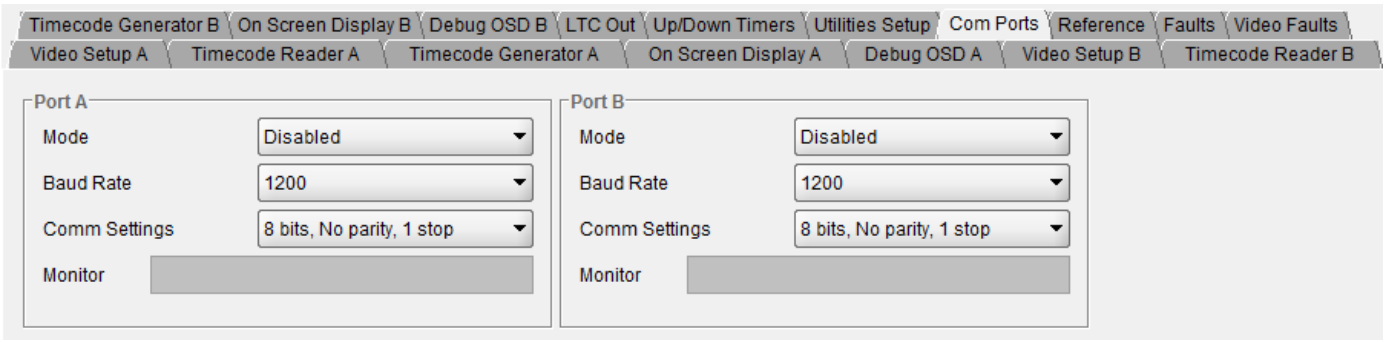


Figure 8-15: VistaLINK® COM Ports Tab– XIO version

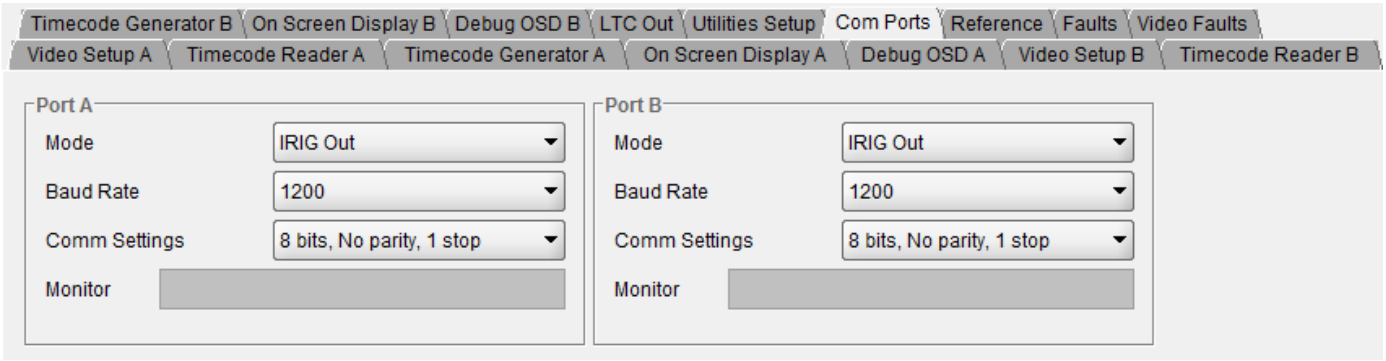


Figure 8-16: VistaLINK® COM Ports Tab– IRIG version

8.11 REFERENCE TAB

The ***Reference*** tab enables the user to select the module video Reference source and control the line numbers of the analog VITC Reader. The *Reference* tab shown in Figure 8-17.

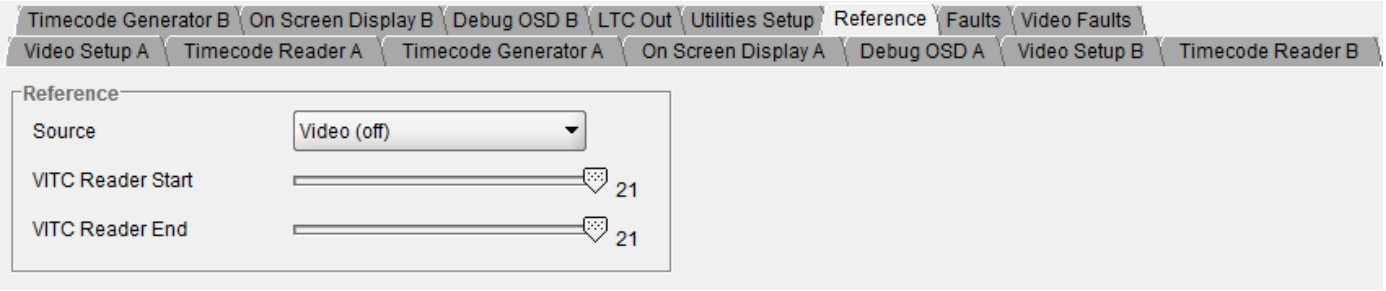


Figure 8-17: VistaLINK® Reference Tab

8.12 FAULTS

The ***Faults*** tab enables the user to select the module faults that will be reported for VistaLINK®. It also shows the status of the faults regardless of whether they are enabled or not. The *Faults* tab shown in Figure 8-18.

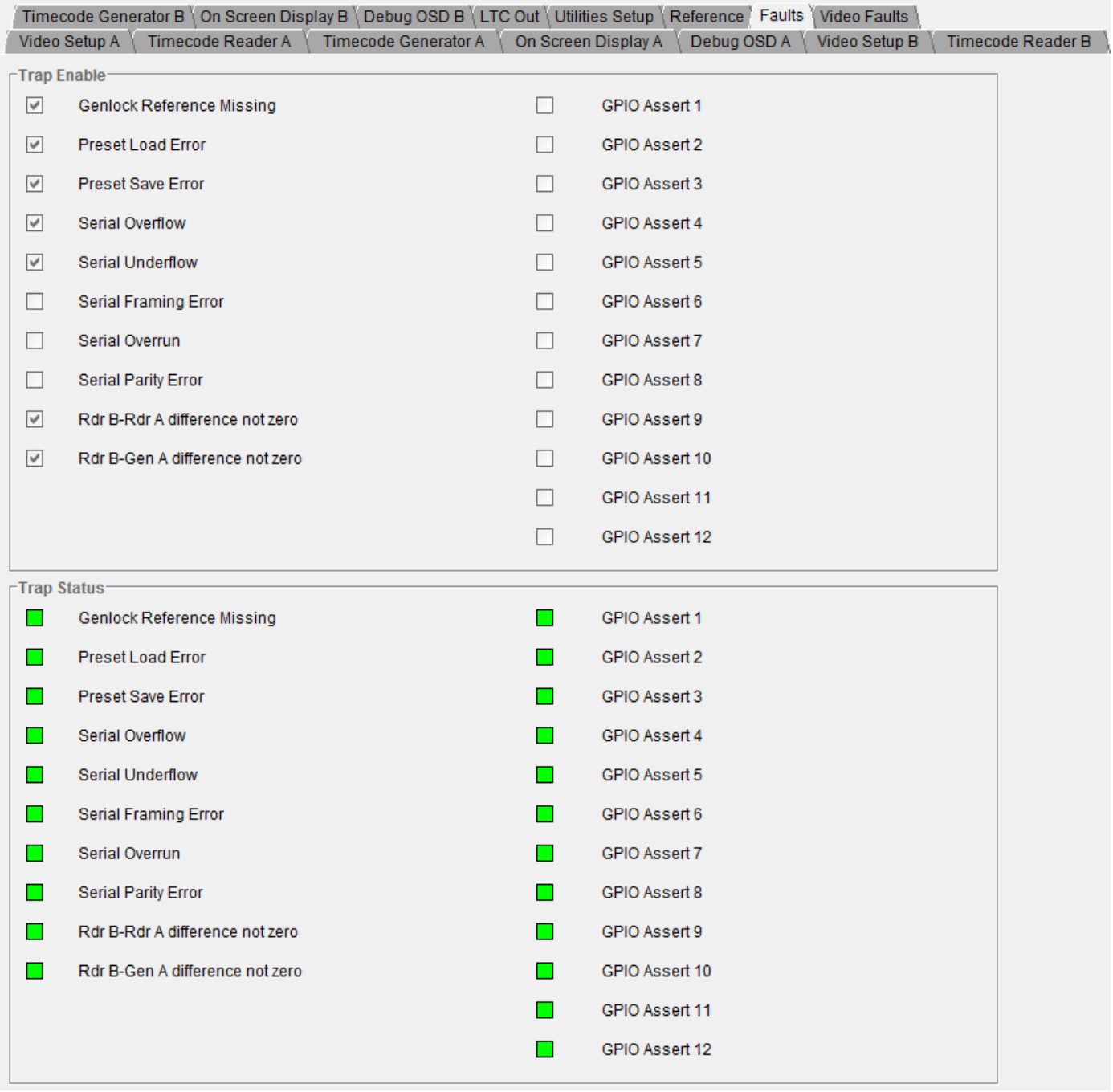


Figure 8-18: VistaLINK® Faults Tab

8.13 VIDEO CHANNEL FAULTS

The ***Video Faults*** tab enables the user to select the video channel A and channel B faults that will be reported for VistaLINK®. It also shows the status of the faults regardless of whether they are enabled or not. The *Faults* tab shown in Figure 8-18.

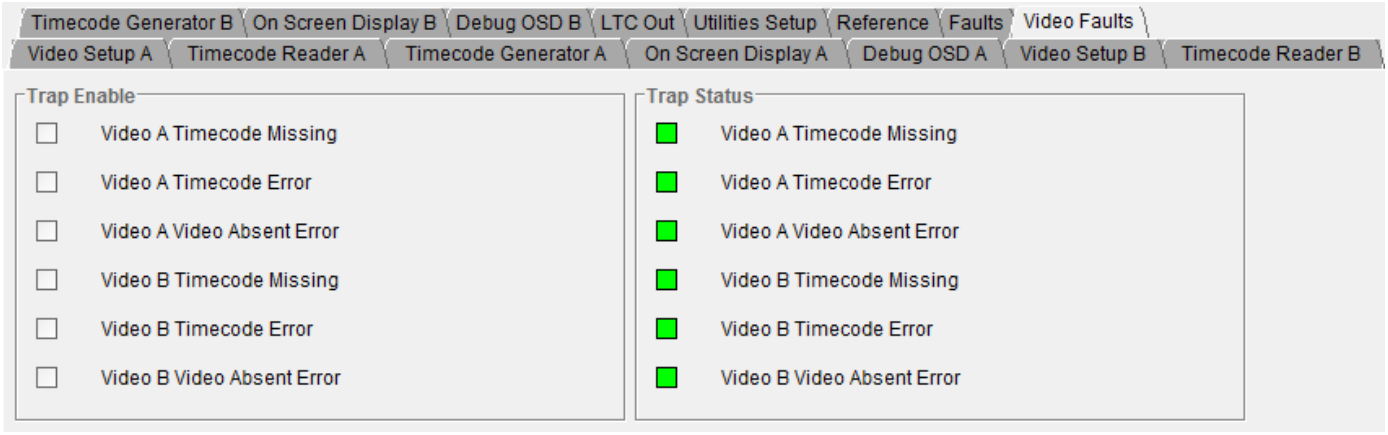


Figure 8-19: VistaLINK® Video Channel Faults Tab

9 DEBUG WINDOWS

The following tables describe the various debug windows and their functions at the time of writing.

Debug Window Name	Description
GPIO	Displays State of GPIO pins e.g. GPIO= 123456789ABC Each position displays the state of the corresponding GPIO pin 1, 2, etc. Pin is active (active state is high) 1, 2, etc. (underlined) Pin is active (active state is low) - (dash) Pin is inactive
Frame Pairing Ref	Displays Status of progressive frame pairing reference e.g. PRef: src=LTC1rdr f=1 Timecode on progressive formats above 30 FPS has one time code word per pair of frames. This display shows how the card determined how the frames were paired, and the order of the frame. Once pairing is established the 7800TM2 will insert a SMPTE 2051 Frame Pairing ANC packet. 2FrmPkt Source is SMPTE 2051 2 Frame ANC packet Genlock Source is an interlaced Genlock signal ANC Rdr Source is Ancillary Time Code frame values LTC1Rdr Source is LTC 1 input phase LTC2Rdr Source is LTC 2 input phase Freerun Two frame paring is selected at random when video is applied.

Reader Flags	Displays Reader Status e.g. 3LT100%@30 L D-F--- 3 LT Active Reader source (see Table 5-1) 100% Detected speed of reader code @30 Detected Frame rate of reader code L, etc. L= Locked and play speed P=Play Speed F=Forward non play speed R=Reverse non play speed S=Stopped D Drop Frame Flag bit set C Colour Frame Flag bit set F, f Field Flag: f = Field 1, F = Field 2 1,2,3 Binary Group Flag bits set
Reader B – Reader A	Displays difference between Reader B and Reader A e.g. 00:00:00:01, -00:00:00:01 00:00:00:00 Reader B the same as Reader A 00:00:00:01 Reader B ahead of Reader A by 1 frame -00:00:00:01 Reader B behind Reader A by 1 frame
Reader B – Generator A	Displays difference between Reader B and Generator A e.g. 00:00:00:01, -23:59:59:29 00:00:00:00 Reader B the same as Generator A 00:00:00:01 Reader B ahead of Generator A by 1 frame -23:59:59:29 Reader B behind Generator A by 1 frame
LTC In 1 Phase LTC In 2 Phase	Shows alignment of LTC x sync word to the video. e.g. -<…….|……>+ 000 | indicates LTC aligned -<…… indicates LTC early …….>+ indicates LTC late 000 shows video line number where sync word occurs

Table 9-1: Common Debug Windows

Timer 1	Displays Timer 1 value (XIO version only) e.g. 00:00:01, -00:01:00 ↑00:00:01 Timer 1 at 00:00:01 and counting up ↓00:00:59 Timer 1 at 00:00:59 and counting down
Timer 2	Displays Timer 2 value (XIO version only)
Timer 3	Displays Timer 3 value (XIO version only)
Timer 4	Displays Timer 4 value (XIO version only)

Table 9-2: Special XIO Version Debug Windows

CS-5 Event	CS-5 Event Time (IRIG version only)
CS-5 Launch	CS-5 Launch Time (IRIG version only)

Table 9-3: Special IRIG Version Debug Windows

10 GPIO FUNCTIONS

Input Function Name	Description
Disabled	GPIO pin is disabled
Gen A Jam Rdr Time	Jam Syncs Generator A from its jam source
Gen B Jam Rdr Time	Jam Syncs Generator B from its jam source
Gen A Jam Preset Time	Sets Generator A from its preset source
Gen B Jam Preset Time	Sets Generator B from its preset source
Load User Preset x	Loads user preset 1 to 4 to the module
OSD A Off	Turns off the OSD on Channel A
OSD B Off	Turns off the OSD B on Channel B

Table 10-1: Common GPI Input Functions

Video A Present	Active when video is present on Channel A
Video B Present	Active when video is present on Channel B
Reader A Code Present	Active when valid timecode is present for Channel A Reader
Reader B Code Present	Active when valid timecode is present for Channel B Reader
Reader A Code Error	Active when timecode error is detected on Channel A Reader
Reader B Code Error	Active when timecode error is detected on Channel B Reader
Reader B - Reader A = 0	Active when Channel B Reader = Channel A Reader
Fault Tally	Active when Module Fault is present

Table 10-2: Common GPO Output Functions

Input Function Name	Description
Timer 1 Run Toggle	Toggles Timer 1 Run/Hold mode
Timer 2 Run Toggle	Toggles Timer 2 Run/Hold mode
Timer 3 Run Toggle	Toggles Timer 3 Run/Hold mode
Timer 4 Run Toggle	Toggles Timer 4 Run/Hold mode
Timer 1 Run Level	Sets Timer 1 to Run when active, Hold when not active
Timer 2 Run Level	Sets Timer 2 to Run when active, Hold when not active
Timer 3 Run Level	Sets Timer 3 to Run when active, Hold when not active
Timer 4 Run Level	Sets Timer 4 to Run when active, Hold when not active
Timer 1 Load Start Time	Loads Timer 1 to its Start Time
Timer 2 Load Start Time	Loads Timer 2 to its Start Time
Timer 3 Load Start Time	Loads Timer 3 to its Start Time
Timer 4 Load Start Time	Loads Timer 4 to its Start Time

Table 10-3: Special XIO GPI Input Functions

Timer 1 at Start Time	Active when Timer 1 = Timer 1 Start Time (timer was preset to start time)
Timer 2 at Start Time	Active when Timer 2 = Timer 2 Start Time (timer was preset to start time)
Timer 3 at Start Time	Active when Timer 3 = Timer 3 Start Time (timer was preset to start time)
Timer 4 at Start Time	Active when Timer 4 = Timer 4 Start Time (timer was preset to start time)
Timer 1 at Stop Time	Active when Timer 1 = Timer 1 Stop Time
Timer 2 at Stop Time	Active when Timer 2 = Timer 2 Stop Time
Timer 3 at Stop Time	Active when Timer 3 = Timer 3 Stop Time
Timer 4 at Stop Time	Active when Timer 4 = Timer 4 Stop Time
Timer 1 Running	Active when Timer 1 is Running
Timer 2 Running	Active when Timer 2 is Running
Timer 3 Running	Active when Timer 3 is Running
Timer 4 Running	Active when Timer 4 is Running

Table 10-4: Special XIO GPO Output Functions