Figures

Tables

REVISION HISTORY

REVISION	DESCRIPTION	DATE
1.0	Original Version	Jan 02
1.1	Minor typographical corrections	Aug 02
1.2	Block diagram in Figure 1 updated	Jan 03

1. OVERVIEW

The Evertz 7740 series Video Delay modules are full function video delay units for standard definition digital video. The delay can be set in video units (frames, lines and samples) or time units (seconds). The 7740 series video delay modules delay the complete VBI and all ancillary data including embedded audio, VITS and D-VITC.

There are two models available with different amounts of delay possible. Both versions will be referred to as the 7740DLY throughout this manual except where the delay values are referred to.

Model	Delay Range
7740DLY	100 μs up to 0.5 seconds
7742DLY	100 μs up to 2.3 seconds

Possible Applications:

- satellite uplinks
- cable headends
- mobile vehicle outputs
- broadcast transmitter inputs
- anywhere video delay is required
- re-entry feeds into Master Control Switcher for re-timing
- audio compression delay equalization

Features:

- Delay programmable in video units (frames, lines, and samples) or as time units (seconds)
- Auto senses video standard and switches between 525 and 625 video formats
- Delays SMPTE 259M Serial digital video up to ½ second (2.3 seconds for 7742)
- Pass or blank individual lines in the vertical blanking interval
- Bypass relay for program video path – activated on unit failure or from GPI
- Card edge controls operate on screen menu system to program delay settings and VBI line blanking

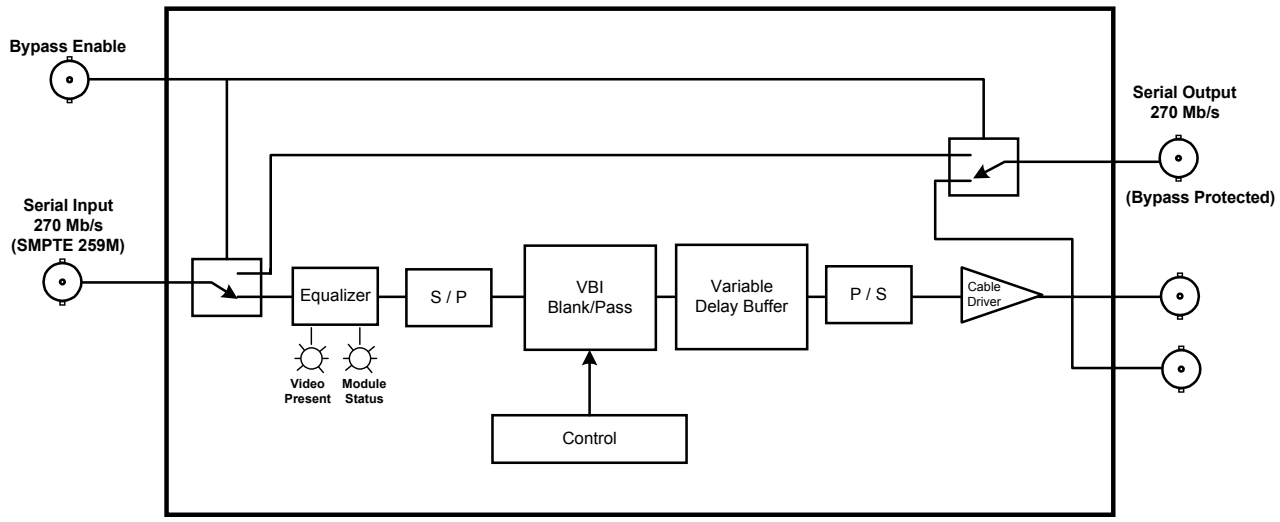

Figure 1: 7740 Block Diagram

2. INSTALLATION

The 7740DLY series modules come with a companion rear plate that has 5 BNC connectors and occupy one slot in the frame. For information on mounting the rear plate and inserting the module into the frame see the 7700FR chapter section 3.

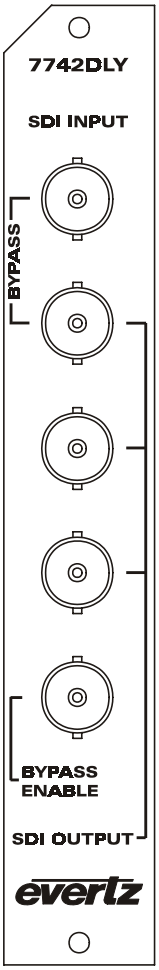

Figure 2: 7742DLY Rear Panels

SDI INPUT Input BNC connector for 10-bit serial digital video signals, compatible with the SMPTE 259M (CCIR601) standard.

SDI OUTPUTS Three BNC serial digital video outputs are provided. Output 1 is protected by a bypass relay, which will activate in the event of power loss to the module, or can be activated from the Bypass BNC input. The remaining two outputs are not bypass protected.

BYPASS BNC input for Bypass relay control. If you leave the input floating (not connected) then it will not be activated. Connecting the GPI input (center) to ground activate the bypass relay. The Bypass relay can also be activated by using the BYPASS jumper located near the front of the module. (See section 6.2)

3. SPECIFICATIONS

3.1. SERIAL VIDEO INPUT

Standards: SMPTE 259M (270 Mb/s)
Connector: 1 BNC input per IEC 169-8
Equalization: Automatic
Max. Cable Length: 210m recommended, tested to 225m @ 270 Mb/s with Belden 8281 or equivalent cable
Return Loss: > 15 dB up to 540 Mb/s

3.2. SERIAL VIDEO OUTPUTS

Number of Outputs: 1 with relay bypass, 3 additional outputs.
Connector: BNC per IEC 169-8
Signal Level: 800mV nominal
DC Offset: 0V ±0.5V
Rise and Fall Time: 470ps nominal
Overshoot: <10% of amplitude
Return Loss: > 15 dB up to 540 Mb/s
Wide Band Jitter: < 0.2 UI

3.3. FUNCTIONAL

Minimum Delay: 815 nsec (22 samples)
Maximum Delay:
Model 7740: 525 line: 17 frames, 625 line: 14 frames (approx. .56 sec)
Model 7742: 525 line: 70 frames, 625 line: 59 frames (approx. 2.3 sec)

3.4. ELECTRICAL

Voltage: + 12VDC
Power: 10 watts
EMI/RFI: Complies with FCC regulations for class A devices.
Complies with EU EMC directive.

3.5. PHYSICAL

7700 or 7701 frame mounting:
Number of slots: 1

Stand Alone Enclosure:
Dimensions: 14 " L x 4.5 " W x 1.9 " H
(355 mm L x 114 mm W x 48 mm H)
Weight: approx. 1.5 lbs. (0.7 Kg)

4. STATUS LEDS

MODULE OK This Green LED will be On when the module is operating properly

LOCAL FAULT This Red LED makes it easy to identify one module in a frame that is missing an essential input or has another fault.

The LED will blink on and off if the microprocessor is not running.

The LED will be on solid when the cable length warning is active, when input video is lost or there is a fault in the module power supply.

VIDEO PRESENT: This Green LED will be On when there is a valid video signal present at the module input.

5. CONFIGURING THE 7740DLY USING THE ON SCREEN MENU

An On screen menu (OSD) is used to configure many of the test generator's parameters. The three position, return to center, toggle switch and momentary pushbutton located on the front edge of the module are used to navigate the OSD setup menus and configure the cards various controls.

To enter the OSD menu system, press and hold the pushbutton and then press the toggle switch up for 5 seconds. This will bring you to the main setup menu where you can use the toggle switch 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 pushbutton to select the next menu.

On all menus, there is a selectable item *Done*. Selecting *Done* will take you to the previous menu (the one that was used to get into the menu). If you are at the top level of the menu tree then selecting *Done* will exit the OSD menu and return the 7740DLY to the normal operating mode.

Once you are in a sub menu, there may be another menu level, or there may be a list of parameters to adjust. If there is another set of menu choices, use the toggle switch to select the next choice with the same procedure as in the main menu.

If there is a list of parameters to adjust, use the toggle switch to move up or down to the desired parameter and press the pushbutton. The arrow will move to the right hand side (<) indicating that you can now adjust the parameter. Using the toggle switch, adjust the parameter to its desired value. If the parameter is a numerical value, the number will increase if you lift the toggle switch and decrease if you push down on the toggle switch. If the parameter contains a list of choices, you can cycle through the list by pressing the toggle switch in either direction.

When you have stopped at the desired value, depress the pushbutton. This will update the parameter with 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 *Done* commands to return to the next higher menu level.

5.1. TOP LEVEL MENU STRUCTURE

The following is a brief description of the top level of the menu tree that appears when you enter the On screen menu. Selecting one of these items will take you down into the next menu level.

Video Delay	Sets the amount of delay through the 7740DLY
VBI Blanking	Configure what lines of the VBI will be blanked and which ones will be passed through..
Done	Exit On Screen Menu System

5.1.1. Setting the Video Delay

The *VIDEO DELAY* menu item allows the user to set the video delay. The maximum delay is approximately ½ second (2.3 seconds for 7742DLY) even though it is set using video units (frames, lines and samples). The video delay is set using frame, line or sample increments. Each time the pushbutton is pressed to accept a portion of the total delay, the new video delay will be implemented.

Frame = xxx	Sets the amount of delay in whole numbers of frames
Line = yyy	Sets the amount of delay in whole numbers of lines (the sub-frame)
Sample = zzz	Sets the amount of delay in samples (the sub-line delay)
Done	Return to main menu
Delay = ttt.ddd sec	Displays the amount of delay in seconds

Step 1: Coarse Adjustment

Press the toggle switch up or down until the right arrow (>) is beside the Frames menu item. Press the pushbutton to set the whole frame delay. The display will show `frames = xxx` where xxx is the frames part of the delay value. Press the toggle switch up or down to adjust the value. Holding the toggle switch will change the value at a faster rate. Press the pushbutton to accept the video frames part of the delay. The arrow (>) will appear back at the left side of the display.

Step 2: Medium Adjustment

Press the toggle switch down until the right arrow (>) is beside the Lines menu item. Press the pushbutton to set the whole line delay. The display will show `line = yyy` where yyy is the lines part of the delay value. Press the toggle switch up or down to adjust the value. Holding the toggle switch will change the value at a faster rate. Press the pushbutton to accept the video lines part of the delay. The arrow (>) will appear back at the left side of the display.

Step 3: Fine Adjustment

Press the toggle switch down until the right arrow (>) is beside the Samples menu item. Press the pushbutton to set the sample delay. The display will show `sample = zzz` where zzz is the samples part

of the delay value. Press the toggle switch up or down to adjust the value. Holding the toggle switch will change the value at a faster rate. Press the pushbutton to accept the video sample part of the delay. The arrow (>) will appear back at the left side of the display.

Table 1 shows the maximum number of video units of delay available in 525 and 625 line video for the model 7740. Table 2 shows the maximum number of video units of delay available in 525 and 625 line video for the model 7742. Table 3 shows typical conversions between video units and time units for 525 and 625 line video. The calculations are based on the total samples per line shown in Table 1, and the time per sample which is 1 / (27 x 10^6) seconds.

Video Type	Lines per frame	Samples per line	Maximum delay			
			Video Units			Time Units
			Frames	Lines	Samples	Milliseconds
525	525	1716	16	525	1716	567.296
625	625	1728	13	625	1728	560.064

Table 1: Model 7740 Video Delay Units – 525 and 625 Line Video

Video Type	Lines per frame	Samples per line	Maximum delay			
			Video Units			Time Units
			Frames	Lines	Samples	Seconds
525	525	1716	69	525	1716	2.33573
625	625	1728	58	625	1728	2.36064

Table 2: Model 7742 Video Delay Units – 525 and 625 Line Video

Video Type	Desired Delay		Video Units		
	Milliseconds	Total Samples	Frames	Lines	Samples
525	50	1,350,000	1	261	1224
	100	2,700,000	2	523	732
	200	5,400,000	5	521	1464
625	50	1,350,000	1	156	432
	100	2,700,000	2	313	239
	200	5,400,000	5	1	478

Table 3: Typical Video Delay Settings – 525 and 625 Line Video

5.1.2. Choosing Which lines in the Vertical Blanking interval will be Blanked

The *VBI BLANKING* menu item allows the user to select what lines of the VBI will be blanked and which ones will be passed through.

Line = yy	Select a line in the vertical interval
Blanking	Sets whether the line selected using the *Blanking* menu item will be blanked or not
Done	Return to main menu

Step 1: Choosing the VBI line
Press the toggle switch up or down until the right arrow (>) is beside the Line menu item and press the pushbutton. The display will show

`Line = yy <` `Blanking:off`	or	`Line = yy <` `Blanking:on`

Press the toggle switch up or down to select the VBI line you want to configure. Only valid VBI lines for the current video standard are shown. Press the pushbutton to select this line. The arrow (>) will appear back at the left side of the display.

Step 2: Enabling Blanking for a VBI line
Press the toggle switch down until the right arrow (>) is beside the Blanking menu item and press the pushbutton. The display will show whether blanking is On or Off for the line selected above. Press the toggle switch up or down to enable or disable blanking for this line and press the pushbutton to accept your choice. The arrow (>) will appear back at the left side of the display.

To configure other VBI lines repeat steps 1 and 2. When you are finished select the Done menu item and press the **pushbutton.**

6. JUMPERS AND USER CONTROLS

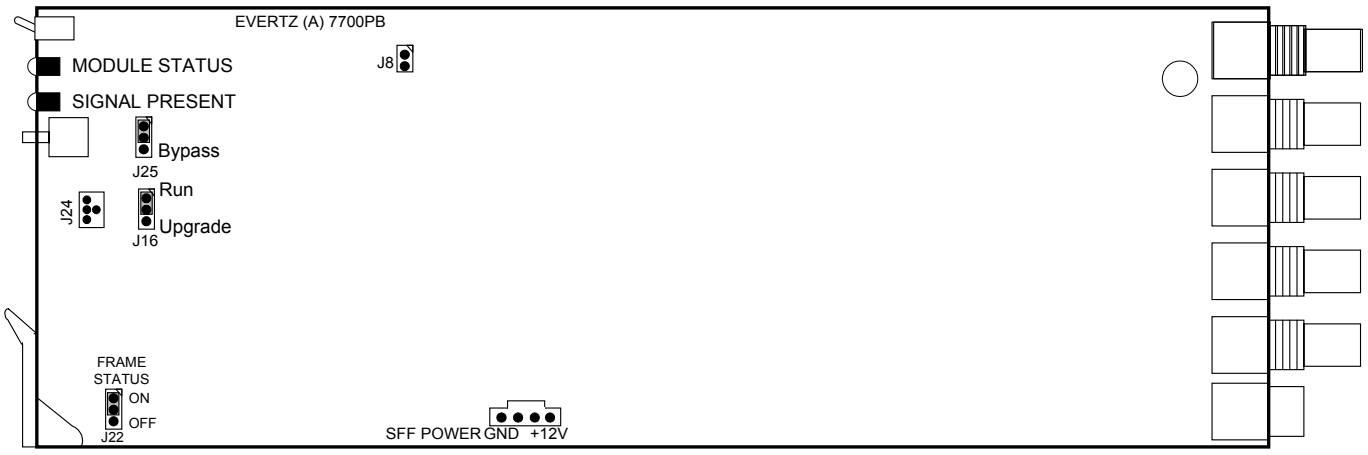

Figure 3 : Location of Jumpers on 7740DLY Boards

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

FRAME STATUS

The FRAME STATUS jumper located at the front of the module determines whether local faults (as shown by the Local Fault indicator) will be connected to the 7700FR frame's global status bus. (This feature is not available on Rev 1 versions of the board)

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. ENABLING THE BYPASS RELAY

BYPASS

The BYPASS jumper J25 located at the front of the module allows the user to manually activate the video bypass relay. When the video bypass relay is activated the incoming video connected to the **SDI INPUT** BNC will be directly connected to the top **SDI OUTPUT** BNC and will bypass the delay and VBI blanking processing of this module. There will not be signal on the other **SDI OUTPUT** BNCs when the video bypass relay is activated. The video bypass relay will also be activated in the event of a power loss to the module, preserving the integrity of your program video path.

To activate the video bypass relay connect this jumper on the BYPASS side. If you connect this jumper on the other side or leave it off then the video bypass relay will not be activated. You can also activate the video bypass relay by connecting the center of the GPI BNC to ground (See section 2)

6.3. CONFIGURING THE MODULE FOR FIRMWARE UPGRADES

UPGRADE

The UPGRADE jumper J16 located at the front of the module is used when firmware upgrades are being done to the module. For normal operation it should be installed in the *RUN* position. On Rev 1 versions of this board the upgrade jumper is located in another location. See the *Upgrading Firmware* section of this manual for more information.

To upgrade the firmware in the module unit pull it out of the frame. Move Jumper J16 into the *UPGRADE* position. Install the Upgrade cable provided (located in the vinyl pouch in the front of this manual) onto header J24 at the card edge. Re-install the module into the frame. Run the upgrade as described in the *Upgrading Firmware* section of this manual. Once the upgrade is completed, remove the module from the frame, move J16 into the *RUN* position, remove the upgrade cable and re-install the module. The module is now ready for normal operation.