

# **DL-860 HD/SD**

*High Definition/Standard Definition Serial Digital  
Legalizer*

## *Installation and Operation Handbook*

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## OPERATOR'S SAFETY SUMMARY



**CAUTION** — these instructions are for use by qualified personnel only. To reduce the risk of electric shock, do not perform this installation or any servicing unless you are qualified to do so. Refer all servicing to qualified service personnel.

To ensure safety:

- The unit should not be exposed to dripping or splashing, and no objects filled with liquids, such as vases, shall be placed on the unit.
- When the unit is to be permanently cabled, connect the protective ground conductor *before* making any other connections.
- Operate built-in units only when they are properly fitted into the system.
- For permanently cabled units without built-in fuses, automatic switches, or similar protective facilities, the AC supply line must be fitted with fuses rated to the units.
- Before switching on the unit, ensure that the operating voltage set at the unit matches the line voltage, if appropriate. If a different operating voltage is to be set, use a fuse with the appropriate rating. Refer to the Installation Instructions.
- Units of Protection Class I with an AC supply cable and plug that can be disconnected must be operated only from a power socket with protective ground contact:
  - Do not use an extension cable—it can render the protective ground connection ineffective.
  - Do not intentionally interrupt the protective ground conductor.
  - Do not break the protective ground conductor inside or outside the unit or loosen the protective ground connection; such actions can cause the unit to become electrically hazardous.
- Before opening the unit, isolate it from the AC supply. Then ensure that:
  - Adjustments, part replacements, maintenance, and repairs are carried out by qualified personnel only.
  - Safety regulations and rules are observed to prevent accidents.
  - Only original parts are used to replace parts relevant to safety (for example, the power on/off switches, power transformers, and fuses).
- Replaceable fuses can be hazardous when live. Before replacing a fuse, disconnect the AC power source.
- Use caution when cleaning the equipment; isopropyl alcohol or similar solvents can damage or remove the labels.
- Observe any additional safety instructions specified in this manual.

These symbols may appear on Videotek equipment:

### Explanation of Symbols



Read the *Operator's Handbook* or the *Service and Instruction Manual* and observe the safety symbols used.



Caution: shock hazard



Protective ground connection



Unit ground



Equipotentiality



Ground

Blank Page

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# Section 1 ♦ Introduction

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The DL-860 High Definition/Standard Definition Serial Digital Legalizer with optional Proc Amp is used for the modification of standard definition as well as high definition signals to conform to multiple color space limits. The DL-860 HD/SD accepts SMPTE 292M, SMPTE 259M-C, SMPTE 296M-2001, and SMPTE 274M formats, and outputs in the same format as the input (HD/SD-SDI legalized to HD, SD 525/625 color space, RGB color space, and/or Encoded NTSC or PAL composite color space). It monitors and recalculates the CRC/EDH values to ensure proper values, and it monitors and displays input EQ added to incoming signal. All ancillary data either passes through the DL-860 HD/SD without alteration (default) or is blanked (except CRC). The DL-860 HD/SD also has an optional Gamut Monitoring Output that indicates the corrected errors of the signal.

Features include:

- HD and SD legalization
- Selection to pass or blank ancillary data
- Alarm Mask
- Softness for encoded legalization
- CRC/EDH recalculated on output
- Range indication whenever input signal exceeds legalization limit
- Power-fail bypass (input to Primary Output)
- Throughput compensated or direct bypass through Primary Output
- Three video outputs
- Nine GPI inputs and one GPI output
- Ethernet connectivity with embedded web server and SNMP capabilities. For details on SNMP see the SNMP support CD.

Options include:

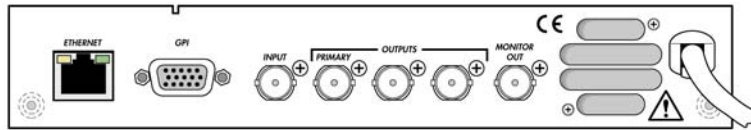
- **860-OPT-PA:** Optional Proc amp for HD and SD (this option is software enabled)
- **860-OPT-GMO:** Gamut Monitor output for HD and SD (factory install required)

The DL-860 HD/SD front and back panels are illustrated in **Figure 1-1**.

**Figure 1-1. DL-860 HD/SD Front and Back Panels**



DL-860 Front Panel



DL-860 Back Panel

## Section 2 ♦ Installation

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This section provides information about inspecting, installing, and configuring the DL-860 HD/SD.

### Inspecting the Shipment

Before installing the DL-860 HD/SD, inspect the box and the contents. Report any damage to the shipper, and telephone the Videotek Customer Service Department for service and support (see Appendix B, “Service Support”).

**NOTE:** Refer to the enclosed packing sheet for the latest list of items that are supplied in the box.

The box contains:

- DL-860 HD/SD High Definition and Standard Definition Legalizer
- *DL-860 HD/SD Installation and Operation Handbook*
- Hardware kit, item number 045572, for mounting the DL-860 HD/SD in a rack
- GPI breakout board
- Rack mount installation instructions
- One SNMP support CD
- Detachable power cord

Save the box and packing material for any future shipping requirements.

### Installing the DL-860 HD/SD

The following subsections provide instructions to rack mount the unit, connect the unit, and optionally configure the unit for remote control.

## Installing the DRT-3 Rackmount

When selecting the permanent mounting location for the DL-860 HD/SD, ensure that airflow to the ventilation holes of the DL-860 HD/SD will not be obstructed.

Figure 2-1. Mounting the DRT-3 in a Rack

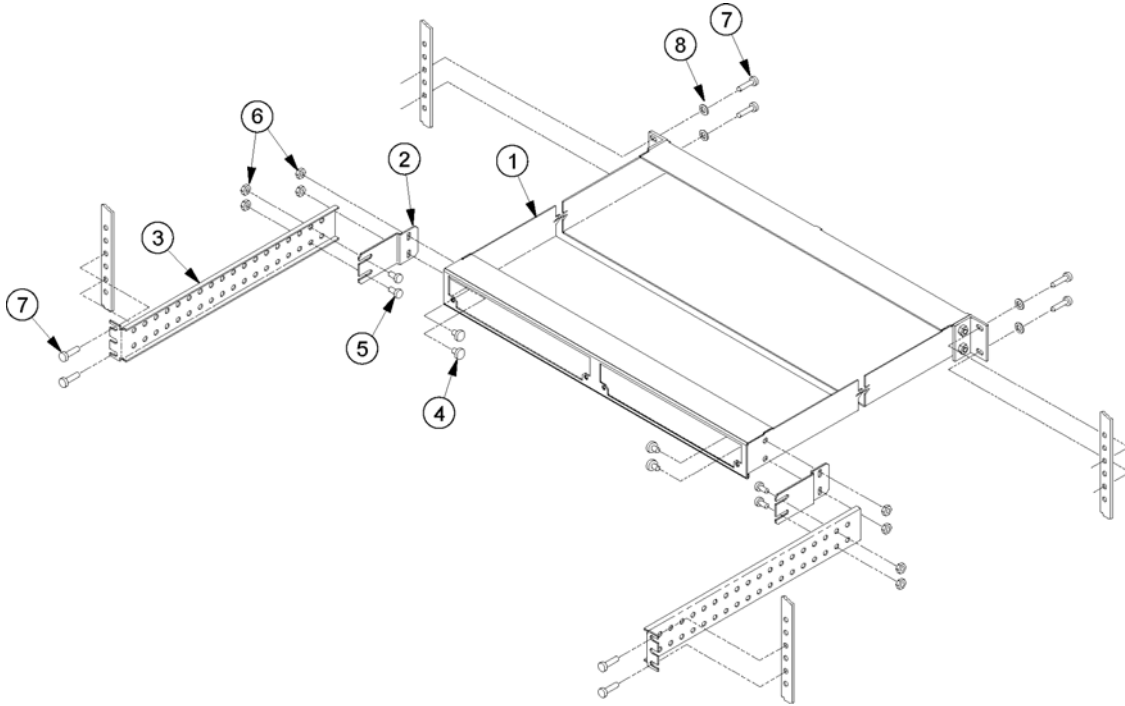


Table 2-1. Parts Required to Mount the DRT-3 in a Rack

Key	Item Number	Quantity	Description
1	201167	1	Rackmount Tray DRT-3
2	200061	2	External Mounting Brackets
3	200070	2	External Brackets
4	044027	4	Screw #10-32 x 1/4 Phillips Truss Head
5	243200	4	Screw #10-32 x 1/8 Phillips Pan Head
6	044060	8	Nut #10-32
7	044030	8	Screw #10-32 x 3/4 Phillips Pan Head
8	045020	4	Nylon Washer

## Rackmounting the DL-860 HD/SD into the DRT-3

Once the DRT-3 Rackmount is installed, the DL-860 HD/SD can be inserted into the rackmount kit.

Figure 2-2. Inserting the DL-860 HD/SD into the DRT-3

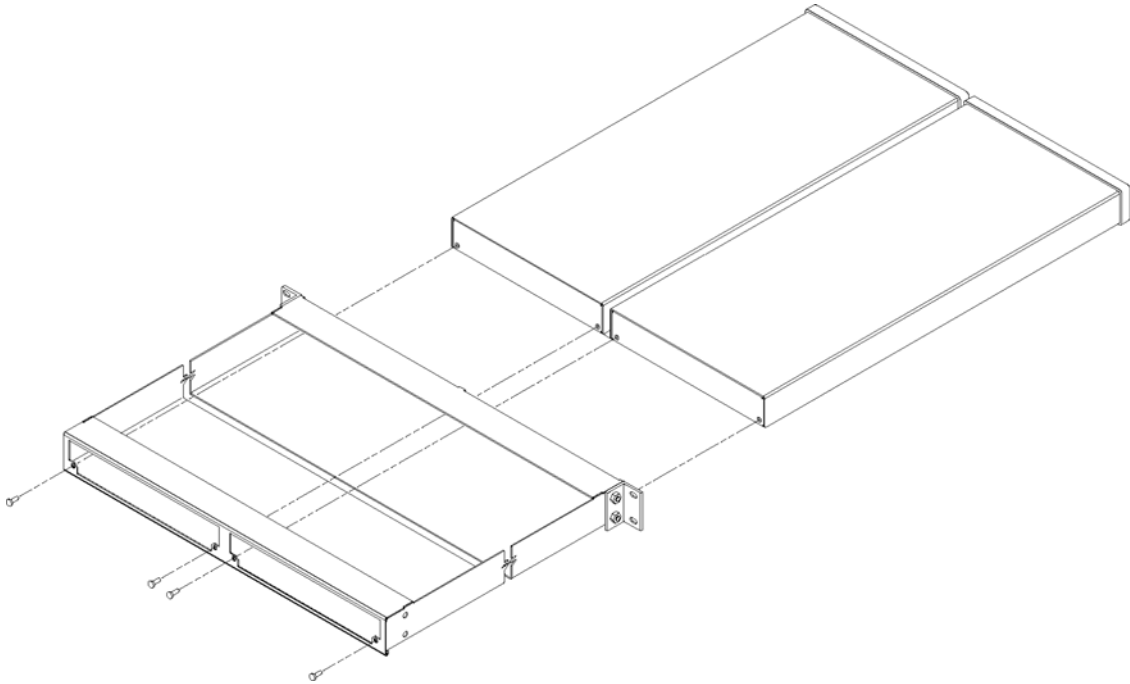


Table 2-2. Parts Required to Mount the DL-860 HD/SD into the DRT-3

Key	Item Number	Quantity	Description
1	041131	2	HDW Screw 6-32 x 3/8 PP BLK

To install the DL-860 into the rack:

1. Insert the DL-860 into a slot of the DRT-3.
2. Lock the DL-860 into the DRT-3 using the screws into the back panel.

## Connecting the DL-860 HD/SD

Figure 2-3. DL-860 HD/SD Back Panel Connectors

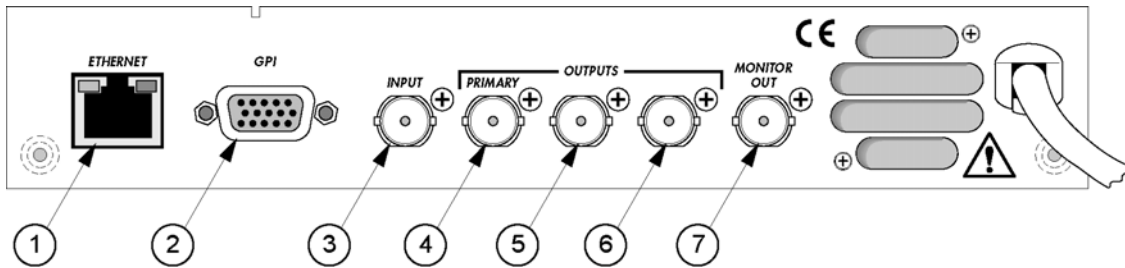


Table 2-3. Description of the DL-860 HD/SD Back Panel Connectors

No.	Label	Description
1	ETHERNET*	RJ45 female, 10/100 BaseT connection. The green LED illuminates when there is a valid Ethernet link. The yellow LED illuminates when data is transmitted and received. See Ethernet Setup on page 2-5 for Ethernet Setup information.*
2	GPI*	15-pin, D-sub, female connector for GPI output.* GPI provides functionality for input bypass, SD Legalization On/Off, HD Legalization On/Off, RGB Legalization On/Off, Encoded Legalization On/Off, and individual remote recall of four presets. The GPI connector also provides five selectable status indications on one GPI output, which are HD clip, SD clip, RGB clip, Encoded gamut, and Bypass.
3	INPUT	A female BNC connector; connects the digital video to the DL-860 HD/SD. The DL-860 HD/SD automatically legalizes up to 60 meters of Belden 8281 precision video cable.
4	OUTPUT PRIMARY (1)	A female BNC connector for primary equalized output. Output 1 is passively connected (relay bypassed) to the input during power loss.
5	OUTPUT (2)	A female BNC connector for second output. Not active during relay bypass.
6	OUTPUT (3)	A female BNC connector for third output. Not active during relay bypass.
7	MONITOR OUT (OPTION)	Female BNC connector for gamut monitoring of the input. This gamut monitor output is a source monitor only.

\* See Appendix C, "Pinouts," for the connections.

## Power Connection

Plug in AC power to a source, 90 VAC to 264 VAC at 50 or 60 Hz.

## Ethernet Setup

The DL-860 HD/SD provides a web browser interface with an Ethernet connection. To utilize the web browser interface, see Web Access on page 3-15.

To establish Ethernet connectivity:

1. Prior to DL-860 HD/SD Network configuration, obtain Transmission Control Protocol/Internet Protocol (TCP/IP) addresses from the System Administrator or from the Internet Service Provider (ISP).

These addresses are:

- A static IP address (unless a Dynamic Host Configuration Protocol (DHCP) will be used)
- A subnet mask
- An optional gateway IP
- The port number is used only for upgrading the firmware with VFlash™ software. Port 80 is always open for the web server.

Be sure to record all addresses.

The IP address, subnet mask, and port number are always necessary.

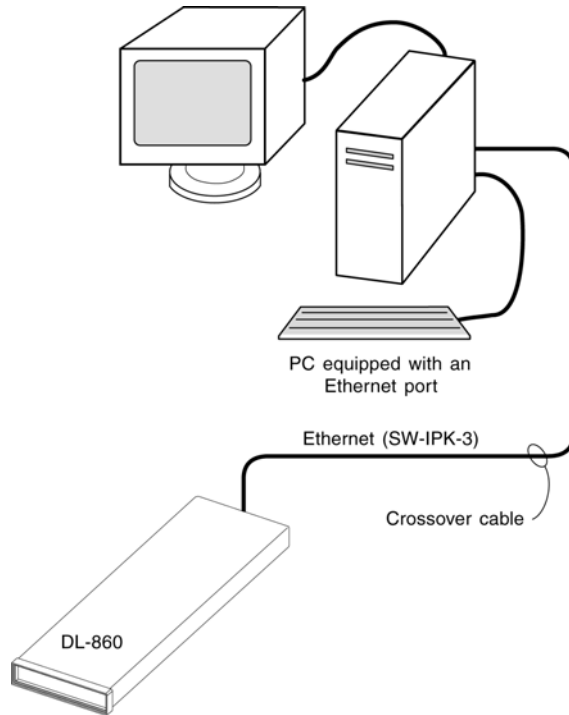
The gateway address is not needed unless routing to an outside network.

Record the addresses:

<b>DL-860 HD/SD Interface Static IP Address</b>	
<b>DL-860 HD/SD Interface Subnet Mask</b>	
<b>Gateway IP Address</b>	
<b>Port Number</b>	

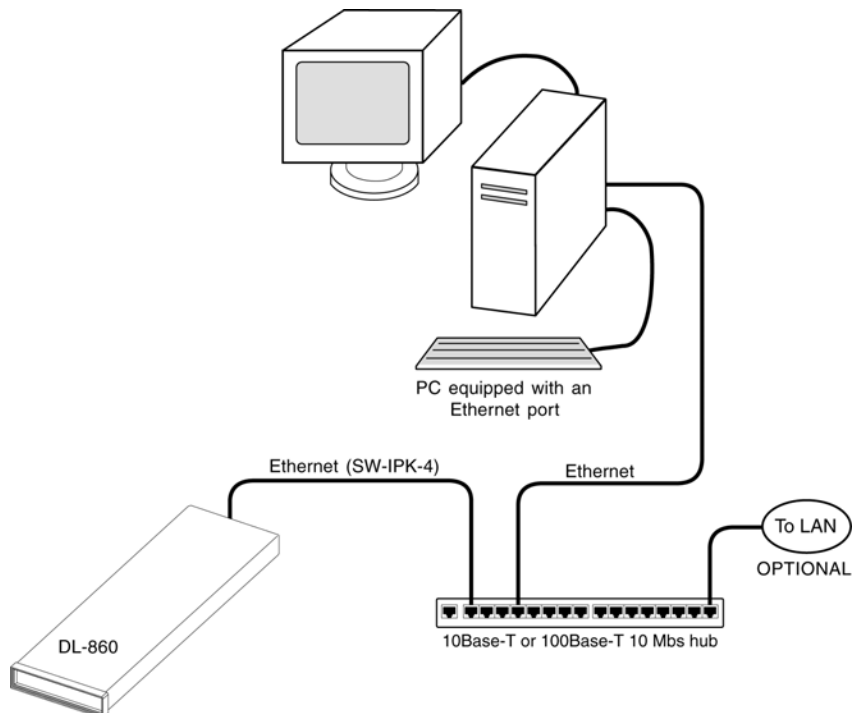
2. Identify a host PC to be used to configure and test the DL-860 HD/SD. The configuration and testing consists of running the Web Browser and accessing network addresses that were set in the DL-860 HD/SD menu system.
- 3a. (If a dedicated PC connection) Connect the host PC with a network card to the “ETHERNET” connector on the back panel of the DL-860 HD/SD using a CAT5 crossover cable (not included). See **Figure 2-4**.

Figure 2-4. DL-860 HD/SD Dedicated PC Connection



3b. (If a network connection) Connect the hub located on the network to the back panel of the DL-860 HD/SD using a CAT5 network cable (not included). See **Figure 2-5**.

Figure 2-5. DL-860 HD/SD Network PC Connection





#### 4. Ethernet Configuration

- a) Press ACCEPT to access the main menu.
- b) Turn the Rotary Encoder knob on the front panel to select CONFIGURATION. Press the ACCEPT button to access the Configuration menu.
- c) Turn the Rotary encoder knob to select ETHERNET. Press the ACCEPT button to access the Ethernet menu.
- d) (If using a DHCP) Turn the Rotary Encoder knob to select DHCP, and press ACCEPT. Press the ACCEPT button to enable a change of the DHCP setting. This is shown with brackets around the menu item. Turn the Rotary Encoder knob to select DHCP to ON. Press ACCEPT to accept the changes. The IP Address retrieved from the DHCP server is viewed in the IP ADDRESS submenu. Press EXIT and verify the IP address by following step e), the Subnet Mask by following step g), and the Gateway by following step i). The configuration is complete. No more steps are required.

(If not using DHCP) Turn the Rotary Encoder knob to select DHCP, and press the ACCEPT button. Press the ACCEPT button to enable a change of the DHCP setting. This is shown with brackets around the menu item. Turn the Rotary Encoder knob to set DHCP to OFF. Press ACCEPT to accept the changes. Press EXIT one time.

- e) Turn the Rotary Encoder knob to select IP ADDRESS, and press ACCEPT.
- f) Turn the ROTARY ENCODER knob to select the first digit (from 000 to 255) in the IP Address octet. Once the first octet is determined, press the ACCEPT button to move to the next octet. Continue until the IP Address is complete. After the last octet is set, press EXIT to move back one level.
- g) Turn the Rotary Encoder knob to select the SUBNET MASK menu item. Press the ACCEPT button when the menu item is selected.
- h) Turn the ROTARY ENCODER knob to select the first digit (from 000 to 255) in the Subnet Mask. Once the first octet is determined, press the ACCEPT button to move to the next octet. Continue until the Subnet Mask is complete. After the last octet is set, press EXIT to move back one level. If the Subnet Mask is accepted, press the EXIT button once to move back one level.
- i) Turn the Rotary Encoder knob to select the GATEWAY menu item. When the item is selected, press the ACCEPT button.
- j) Turn the ROTARY ENCODER knob to select the first number (from 000 to 255) in the Gateway. Once the first octet is determined, press the ACCEPT button to move to the next octet. Continue until the Gateway is complete. After the last octet is set, press EXIT to move back one level. If the Gateway is accepted, press the EXIT button once to move back one level.
- k) Turn the Rotary Encoder knob to select the PORT menu item. When the item is selected, press the ACCEPT button.

- l) Turn the ROTARY ENCODER knob to select the Port number (from 0 to 65535). After the Port number is determined, press the ACCEPT button to accept the values, or press EXIT. If the Port is accepted, press the EXIT button once to move back one level. The EXIT button can be pressed at any time while configuring the Port.
- m) When complete, press the EXIT until the default display appears.

**NOTE:** Test the configuration before proceeding! Once tested, understand that a cold start could reset the Ethernet IP parameters to the default settings.

## **Maintaining Ethernet Setting When a Cold Start is Performed**

To maintain the Ethernet settings when a cold start is performed:

1. Press ACCEPT to access the main menu.
2. Rotate the ROTARY ENCODER knob to select CONFIGURATION.
3. Press ACCEPT.
4. Rotate the ROTARY ENCODER knob to select the RESET OPTIONS. Press ACCEPT once RESET OPTIONS is selected.
5. Press ACCEPT to enable the ETHERNET configuration selection. Brackets appear around menu item.
6. Rotate the ROTARY ENCODER knob to select:
  - KEEP to maintain the Ethernet settings during Cold Start.
  - RESET to reset Ethernet settings during a Cold Start.
7. Press EXIT until the default display appears.

## Section 3 ♦ Operation

### Front Panel Controls and Indicators

Figure 3-1. DL-860 HD/SD Front Panel Controls and Indicators

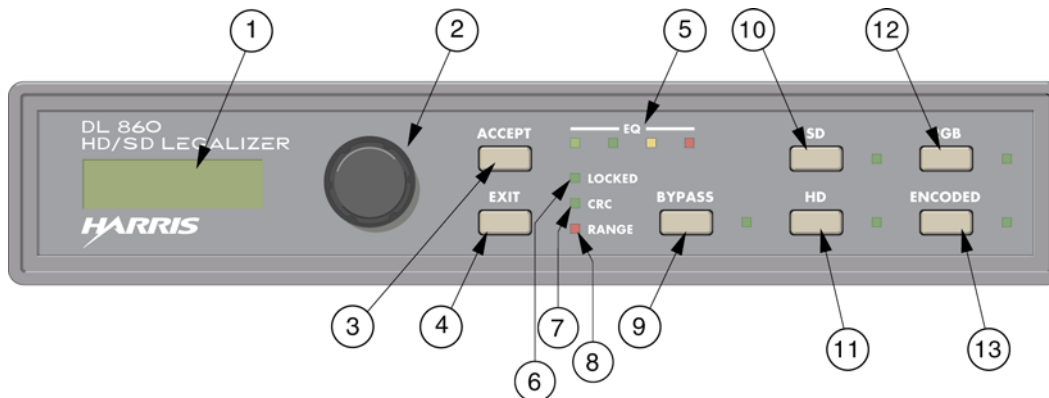


Table 3-1. Description of DL-860 HD/SD Front Panel Controls and Indicators

No.	Label	Description
1	LCD Display (No label)	2-line by 16-character backlit LCD, which displays the input format, menus, preset labels, and settings.
2	ROTARY ENCODER KNOB (No label)	32-position rotary encoder knob that is used to access and change legalizer settings.
3	ACCEPT	<ul style="list-style-type: none"> <li>When in the Setup menu, press the ACCEPT button to: <ul style="list-style-type: none"> <li>Advance to the next level of the menu structure</li> <li>Accept a change on appropriate parameters.</li> <li>Press twice to toggle between the current values and default values.</li> </ul> </li> </ul>
4	EXIT	Press the EXIT button to reject the parameter changes or to move to the previous level of the menu structure.
5	EQ	Indicates the relative amount of equalization the DL-860 HD/SD is applying to the input serial digital signal. When the red LED illuminates, the signal is exceeding the maximum specified cable length.
6	LOCKED	When illuminated, the LOCKED LED indicates that an input is present and active.
7	CRC	When illuminated, the CRC LED indicates that an incoming CRC value created an error. When in SD mode, this LED indicates EDH errors.
8	RANGE	When illuminated, the RANGE LED indicates that the incoming signal exceeds any current HD, SD, RGB, or Encoded legalizer settings.
9	BYPASS	Press the BYPASS button to enable or disable Bypass mode. When enabled, the Bypass LED turns green. This button is configurable to be either an electronic or relay bypass.

(Table continues on next page)

**Table 3-1. Description of DL-860 HD/SD Front Panel Controls and Indicators (*continued*)**

No.	Label	Description
10	SD	Press the SD button to enable and disable SD legalization and color shift in the digital signal. The green LED illuminates when SD legalization is enabled.
11	HD	Press the HD button to enable and disable HD legalization and color shift. The green LED illuminates when HD legalization is enabled.
12	RGB	Press the RGB button to enable and disable RGB legalization. The green LED illuminates when RGB legalization is enabled.
13	ENCODED	Press the ENCODED button to enable and disable Encoded legalization. The green LED illuminates when Encoded legalization is enabled.

## Calibration Interval

Calibration is recommended under any of the following conditions:

- After replacement of critical components
- After exposing unit to temperatures outside of the specified operating or storage temperature ranges

## Power

When power is applied to the unit, verify that the LCD shows the initialization display. Stars (\* \*) on the display indicate initialization. The initialization display can remain on the display for a maximum of one minute before the System menu appears.

During Power Loss, the video input is routed to the Primary video output. The DL-860 HD/SD will remain in the power-off bypass condition during the initial power-up until the power-up is complete.

## EQ Display

The EQ display indicates the relative amount of equalization the DL-860 HD/SD is applying to the input serial digital signal. The DL-860 HD/SD automatically equalizes Belden cable 8281 for a minimum of 60 meters in length for HD. The DL-860 HD/SD automatically equalizes Belden cable 8281 for a minimum of 200 meters in length for SD. The EQ display is comprised of four LEDs: two green, one amber, and one red (viewed from left to right). When the red LED is illuminated, the signal is exceeding the equalization abilities of the DL-860 HD/SD.

**Table 3-2** describes the illuminated LEDs and the signal condition with the length of Belden cable used.

**Table 3-2. EQ Display Cable Length Conditions**

LEDs Illuminated	Approximate Cable Length (L) in Meters of Belden 8281 with Colors Bars as a Signal Source for HD	Approximate Cable Length (L) in Meters of Belden 8281 with Colors Bars as a Signal Source for SD	Condition
One green	$L < 30$	$L < 150$	OK
Two green	$30 < L < 55$	$150 < L < 225$	OK
Two green + amber	$55 < L < 90$	$225 < L < 250$	Severe warning
Two green + amber + red	Greater than 90	Greater than 250	Severe warning

## Legalization

The DL-860 HD/SD legalizes HD  $YC_B C_R$ , SD  $YC_B C_R$ , RGB, and Encoded NTSC and PAL. SD legalization is used to restrict an HD signal to Standard Definition limits. HD legalization is used to restrict an HD signal to High Definition limits.

The DL-860 HD/SD accepts the following formats: 1080i/60, 1080i/59.94, 1080i/50, 1080p/30, 1080p/29.97, 1080p/25, 1080p/24, 1080p/23.98, 1080sf/30, 1080sf/25, 1080sf/23.98, 720p/60,

720p/59.94, 720p/50, 720p/30, 720p/29.97, 720p/23.98, 1080i/59.94, 1080i/50, 525/59.94, and 625/50.

## Navigating the Menu

The DL-860 HD/SD contains submenus that can be accessed by pressing the ACCEPT button and then rotating the ROTARY ENCODER KNOB. The menus are as follows:

- SET HD LEGAL
- SET SD LEGAL
- SET RGB LEGAL
- SET NTSC LEGAL
- SET PAL LEGAL
- ENC CLIP SOFT
- VECTOR CLIP
- GAMUT ALARM MASK
- MONITOR OUTPUT (OPTIONAL)
- PRESET
- FRONT PANEL LOCK
- CONFIGURATION
- PROC AMP (OPTIONAL)

Use the following controls to navigate and select values in the menus:

- ROTARY ENCODER KNOB (turn clockwise): increment to the next menu selection or parameter value
- ROTARY ENCODER KNOB (turn counterclockwise): decrement to the previous menu selection or parameter value.
- ACCEPT: Advance one level in the menu, accept changes in parameters. Press twice to toggle between the current and default settings.
- EXIT: Exit one level in the menu. Reject parameter change.

**Table 3-3. Set HD Legal Menu\***

Selection	Range	Default
Y LOWER CLIP	4 to 283	4
Y UPPER CLIP	633 to 1019	1019
CB LOWER CLIP	4 to 283	4
CB UPPER CLIP	633 to 1019	1019
CR LOWER CLIP	4 to 283	4
CR UPPER CLIP	633 to 1019	1019

\* Equivalent mV values are also displayed with the parameter.

Table 3-4. Set SD Legal Menu\*

Selection	Range	Default
Y LOWER CLIP	4 to 283	4
Y UPPER CLIP	633 to 1019	1019
CB LOWER CLIP	4 to 283	4
CB UPPER CLIP	633 to 1019	1019
CR LOWER CLIP	4 to 283	4
CR UPPER CLIP	633 to 1019	1019

\* Equivalent mV values are also displayed with the parameter.

Table 3-5. Set RGB Legal Menu

Selection	Range	Default
RGB MIN LEVEL	-50 to 50 mV	-50 mV
RGB MAX LEVEL	350 to 766 mV	766 mV

Table 3-6. Set NTSC Legal Menu

Selection	Range	Default
NTSC SETUP LEVEL	0	7.5 IRE
	7.5 IRE	
LUMA BLACK	1.5 to 15 IRE (0.5 IRE increments)	1.5 IRE
LUMA WHITE	90.0 to 108.0 IRE (0.5 IRE increments)	108.0 IRE
LUMA BLACK 0 IRE	-6.5 to 6.5 IRE (0.5 IRE increment)	-6.5 IRE
LUMA WHITE 0 IRE	95.0 to 108.5 IRE (0.5 IRE increments)	108.5 IRE
COMPOSITE LOWER	-40 to 5 IRE	-40 IRE
COMPOSITE UPPER	95 to 140 IRE	140 IRE
CHROMA AMPLITUDE	70.0 to 140.0 IRE (in 0.5 IRE increments)	140.0 IRE

Table 3-7. Set PAL Legal Menu

Selection	Range	Default
LUMA BLACK	-45.5 to 45.5 mV (0.5 mV increments)	-45.5 mV
LUMA WHITE	664.5 to 759.0 mV (0.5 mV increments)	759 mV
COMPOSITE LOWER	-245 to 35 mV	-245 mV
COMPOSITE UPPER	665 to 960 mV	960 mV
CHROMA AMPLITUDE	489.5 to 1130.0 mV (0.5 mV increments)	1130 mV

Table 3-8. ENC Clip Soft Menu

Selection	Range	Default
Softness	0 to 40%	0%

Table 3-9. Vector Clip Menu

Selection	Range	Default
Vector Clip	0 to 200%	200%

Table 3-10. Gamut Alarm Mask Menu

Selection	Submenu Selection	Range	Default
CUSTOM APERTURE MASK	-	OFF/CLEAN/CUSTOM	OFF
1080 FORMATS	HORZ. PIXELS	1536 to 1920 (2 pixel increment)	1920
	VERT. LINES	864 to 1080 lines (2 line increment)	1080
720 FORMATS	HORIZ. PIXELS	1024 to 1280 PIXELS (2 pixel increment)	1280
	VERT. LINES	576 to 720 LINES (2 line increment)	720

Table 3-11. Monitor Output (Option)

Selection	Range	Default
MONITOR RATIO	0 to 100%	0%

Table 3-12. Preset

Selection	Range	Default
RECALL	1 PRESET 1 to 20 PRESET 20	1
STORE	1 PRESET 1 to 20 PRESET 20	1
RENAME*	1 PRESET 1 to 20 PRESET 20	-

\*NOTE: Initial numeric characters are not changeable when the preset is renamed.

Table 3-13. Front Panel Lock

Selection	Range	Default
NEW PASSWORD*	0 to 1023	0
ENTER PASSWORD**	0 to 1023	0
PANEL LOCK***	UNLOCK	UNLOCK
	LOCK	

\*NOTE: New Password - only displayed when unit is unlocked.

\*\*NOTE: Enter Password - only displayed when unit is locked.

\*\*\*NOTE: Only displayed when new password and attempted password are the same.



Table 3-14. Configuration Menu

Selection	Submenu Selection	Range	Default
<b>GPI ON BYPASS</b>	-	OFF/ON	OFF
<b>GPI ON HD GAMUT</b>	-	OFF/ON	OFF
<b>GPI ON SD GAMUT</b>	-	OFF/ON	OFF
<b>GPI ON RGB GAMUT</b>	-	OFF/ON	OFF
<b>GPI ON ENC GAMUT</b>	-	OFF/ON	OFF
<b>GPI ON CRC</b>	-	OFF/ON	OFF
<b>GPI PRESET</b>	<b>GPI 1 PRESET</b>	1 to 20 or OFF	1
	<b>GPI 2 PRESET</b>	1 to 20 or OFF	2
	<b>GPI 3 PRESET</b>	1 to 20 or OFF	3
	<b>GPI 4 PRESET</b>	1 to 20 or OFF	4
<b>BACKLIGHT</b>	-	OFF/ON	ON
<b>ANC DATA</b>	-	PASS	PASS
	-	BLANK	
<b>BYPASS MODE</b>	-	ELECTRONIC	ELECTRONIC
	-	RELAY	
<b>ENCODED FORMAT</b>	AUTODETECT	-	-
	NTSC	-	-
	PAL	-	-
<b>ETHERNET</b>	<b>IP ADDRESS</b>	000.000.000.000 to 255.255.255.255	192.0.0.100
	<b>SUBNET MASK</b>	000.000.000.000 to 255.255.255.255	192.0.0.100
	<b>GATEWAY</b>	000.000.000.000 to 255.255.255.255	192.0.0.100
	<b>PORT</b>	0 to 65535	3001
	<b>DHCP</b>	OFF/ON	OFF
<b>RESET OPTIONS</b>	<b>ETHERNET CONFIG</b>	KEEP	KEEP
		RESET	
<b>SERIAL NUMBER</b>	Read Only	-	-
<b>FEATURE UPGRADE</b>	PROC AMP ENABLE 12-DIGIT NUMBER	-	-
<b>FIRMWARE VERSION</b>	-	DISPLAYED AS x.xx	-

**Table 3-15. Proc Amp Menu (Option)**

Selection	Range	Default
PROC AMP ENABLE	OFF/ON	ON
VIDEO GAIN	0 to 150%	100%
LUMA GAIN	0 to 150%	100%
CHROMA GAIN	0 to 150%	100%
PEDESTAL	-15% to +15%	0%
HUE	0 to 359.5°	0.0°
SHIFT COMPOSITE	OFF/ON	OFF

### Set HD Legal

Set HD Legal is used to implement hard clips to the upper and lower limits of the Y, CB, and CR HD component signal. Adjust the HD Legalization parameters to set the min. and max. level ranges. HD Legalization parameters are described in **Table 3-3** on page 3-4.

### Set SD Legal

Set SD Legal is used to implement hard clips to the upper and lower limits of the Y, CB, and CR SD component signal. Adjust the SD Legalization parameters to set the min and max level ranges. SD Legalization includes color correction of ITU-704 to ITU-601 color space. SD Legalization parameters are described in **Table 3-4** on page 3-5.

### Set RGB Legal

Set RGB Legal is used to implement hard clips to the upper and lower limits of the R, G, and B components. Adjust the RGB Legalization parameters to set the min and max level ranges. RGB Legalization parameters are described in **Table 3-5** on page 3-5.

### NTSC and PAL Legalization

When performing encoded legalization, the DL-860 HD/SD clips conform to NTSC or PAL standards depending on the HD/SD input format. The standard to which the signal is being legalized is indicated on the UPPER LEFT CORNER of the FRONT PANEL LCD. The DL-860 HD/SD legalizer accepts SMPTE 292M and SMPTE 259M-C, and legalizes related composite formats that are described in **Table 3-16** when ENCODED FORMAT in the CONFIGURATION menu is set to AUTO-SELECT.

**Table 3-16. Accepted SMPTE 292M or SMPTE 259M-C and Related Composite Formats**

Format	Encoded Legalization
1080i/60	NTSC
1080i/59.94	NTSC
1080p/30	NTSC
1080p/29.97	NTSC
1080sF/30	NTSC
1080sF/29.97	NTSC
720p/60	NTSC
720p/59.94	NTSC
720p/30	NTSC
720p/29.97	NTSC
525/59.94	NTSC

Format	Encoded Legalization
1080i/50	PAL
1080p/25	PAL
1080p/24	PAL
1080p/23.98	PAL
1080sF/25	PAL
720p/50	PAL
625/50	PAL

### ***Set NTSC Legal***

The Set NTSC Legal menu is used to set parameters controlling NTSC Legalization.

The NTSC Setup Level is used to determine the parameter settings for the Luma White Clip and Luma Black Clip fields. The two NTSC Setup options are 0 IRE and 7.5 IRE.

- When the NTSC Setup is set to 0 IRE, NTSC 0 IRE Luma clips are active. The Luma White Clip 0 IRE and Luma Black Clip 0 IRE parameters are used.
- When NTSC Setup is set to 7.5 IRE, the Luma White Clip and Luma Black Clip parameters are set to the NTSC Encoded Legalization setting, which indicates that the NTSC Luma clips are used.

Setup NTSC Legal parameters are described in **Table 3-6** on page 3-5.

### ***Set PAL Legal***

The Set PAL Legal menu sets the parameters to control PAL Legalization. PAL displays settings as mV.

Global clip levels for the Composite upper and lower limits are applied to all components of a video signal. The PAL Encoded Legalization parameters are described in **Table 3-7** on page 3-5.

### **ENC Clip Soft**

Softness adds rounding to the scaled  $C_B$  and  $C_R$  components. The Encoded Clip Softness menu parameters represent the range of rounding applied to the  $C_B$  and  $C_R$  components. A softness of zero percent represents no rounding, and a softness of 40 percent represents a maximum rounding factor of 40%. The Encoded Clip Softness control parameters are described in **Table 3-8** on page 3-6.

## Vector Clip

Vector Clip is used to set a special encoded clip that affects only the  $C_B$  and  $C_R$  components of the input video signal. The Vector Clip parameter represents the range of the  $C_B$  and  $C_R$  input that is modified. A Vector Clip parameter of 0% represents  $C_B$  and  $C_R$  clipped at 0 saturation. A Vector Clip of 100% represents  $C_B$  and  $C_R$  clipped at normal saturation. A Vector Clip of 200% represents  $C_B$  and  $C_R$  clipped at twice the normal saturation. The Vector Clip control parameters are described in **Table 3-9** on page 3-6.

## Gamut Alarm Mask

The Gamut Alarm Mask menu is used to limit the gamut alarm range to the selected lines. Any gamut errors that occur outside the selected area are still legalized but will not trigger alarms. The line selection is dependent upon the format (1080i and 720p) being used. The Gamut Alarm Mask parameters are described in **Table 3-10** on page 3-6.

## Monitor Output (Option 860OPT-GMO)

The monitor output option provides a serial HD or SD output of the same format as the input. The option generates an output signal of a 50% gray field with no gamut errors, and is monochrome only. The output signal duty cycle is adjustable from 0% (gray field) to 100% (input signal passed through unchanged). On the gray field, portions of the input signal that exceed minimum legalization settings will be displayed as black. Portions of the input signal that exceed maximum legalization settings will be displayed as white. Vector and chroma amplitude errors are indicated as white pixels as well. The Monitor Output parameters are described in **Table 3-11** on page 3-6.

## Preset

**NOTE:** Information must be stored in a preset location before being recalled. A cold start will reset all presets to the default values.

The DL-860 HD/SD contains twenty presets that can be used to store and recall clip settings. All information except IP configuration and Bypass Mode are retained in presets. If a preset location containing previous clip information is overwritten, any previous clip settings will be erased and the new clip settings are stored.

The Preset menu can also be used to rename the preset locations by selecting RENAME. Preset names are 10 characters long 01 Preset 01 to 20 Preset 20. The Preset parameters are described in **Table 3-12** on page 3-6.

## Front Panel Lock

The Front Panel Lock feature is used to ignore any parameters changes except the parameters necessary to unlock the front panel. The controls that are used to change the front panel lock are the ROTARY ENCODER KNOB and ACCEPT. When the front panel is locked all status displays operate as normal. The front panel lock DOES NOT limit access by the GPIs or Ethernet; therefore, any remote changes to the DL-860 HD/SD will affect the unit. The Front Panel Lock parameters are described in **Table 3-13** on page 3-6.

To lock the DL-860:

1. Press the ACCEPT button to enter the main menu.

2. Turn the ROTARY KNOB to select FRONT PANEL LOCK.
3. Press the ACCEPT button. NEW PASSWORD appears in the display.
4. (If a new password needs to be entered) Press the ACCEPT button to activate the ability to enter the new password.
5. (If a new password needs to be entered) Turn the ROTARY KNOB to select the password between 1 and 1023.
6. (If a new password needs to be entered) Press ACCEPT when complete. The brackets disappear around the CODE (Password) number.
7. Turn the ROTARY KNOB to select PANEL LOCK.
8. Press the ACCEPT button. The ability to lock and unlock the DL-860 is now available.
9. Rotate the ROTARY KNOB to select LOCK. The DL-860 is immediately locked once LOCK is selected.
10. Press EXIT to return to the main menu.

To unlock the DL-860:

1. Press the ACCEPT button to access the Main Menu.
2. Turn the ROTARY KNOB to select FRONT PANEL LOCK.
3. Press the ACCEPT button. The ENTER PASSWORD screen appears.
4. Press the ACCEPT button to begin entering the password.
5. Turn the ROTARY KNOB to select the password.
6. Press the ACCEPT button.
7. Turn the ROTARY KNOB to select PANEL LOCK.
8. Press the ACCEPT button to begin changing the Panel Lock selection.
9. Turn the ROTARY KNOB to select UNLOCK.
10. Press the ACCEPT button. The panel is unlocked.
11. Turn the ROTARY KNOB to select NEW PASSWORD.
12. Press EXIT to return to the Main Menu.

## Configuration Menu

The Configuration menu controls the GPI, Backlight, Line, Bypass, Encoded Format, Ethernet settings, Reset Options, Serial Number, and Feature Upgrade, as well as indicating the firmware version.

## GPI

The General Purpose Interface (GPI) input is optically isolated and TTL compatible. The GPI input must be externally pulled up to +5 VDC. When active, the output is set to 0 to 0.4 VDC at 10 mA when active.

The GPI connector provides remote control of the following input functions:

- HD Gamut Legalization
- SD Gamut Legalization
- RGB Gamut Legalization On/Off
- Encoded Gamut Legalization On/Off
- Input Bypass
- Individual remote recall of four presets

The GPI Output is a relay that can be selectively opened or closed at the leading edge of a single alarm or a combination of alarms. The GPI output provides an error warning to a remote location. The status indications for the GPI output are:

- CRC error detected
- Bypass enabled
- HD Gamut Error
- SD Gamut Error
- RGB Gamut Error
- Encoded Gamut Error

The GPI input selections are described in **Table 3-17**. The parameters are shown in **Table 3-14** on page 3-7.

**Table 3-17. GPI Input Selections**

GPI Input Selection	Description
GPI Bypass	Toggles Bypass mode ON/OFF
GPI HD Gamut	Toggles HD legalization ON/OFF
GPI SD Gamut	Toggles SD legalization ON/OFF
GPI RGB Gamut	Toggles RGB legalization ON/OFF
GPI ENC Gamut	Toggles encoded legalization ON/OFF
GPI Preset	This is used to recall the settings stored in one of 4 preset selections (Preset 1 to Preset 4). One pin per input on the GPI board.

### Backlight

Backlight is used to enable or disable the illumination of the front panel LCD display. The parameters for the Backlight menu selection are described in Table 3-14 on page 3-7.

### ANC Data

Ancillary Data is used to pass unlegalized ancillary data or set to blank the ancillary data. The parameters for the ANC Data menu selection are described in Table 3-14 on page 3-7.

### Bypass Mode

The Bypass Mode menu item is used to control the functionality of the BYPASS button. Bypass mode can be set to RELAY or ELECTRONIC. Relay is used to switch the input signal to the Primary Output and turns off all the processing features in the DL-860 HD/SD, but does not

maintain a throughput delay. Electronic bypass disables all legalization while maintaining a throughput delay to all outputs.

The BYPASS MODE menu selection parameters are described in Table 3-14 on page 3-7.

### **Encoded Format**

Encoded Format is used to determine which legalization parameter ranges are to be used. In Auto select mode, the format used will be determined based upon the input signal source. Setting the format field to NTSC or PAL forces the parameters to be either NTSC or PAL, which is independent of the input source.

### **Ethernet**

The Communications menu is used to establish the Ethernet communications from the DL-860 HD/SD by setting the IP Address, Subnet Mask, Gateway, Port, and DHCP. Ethernet Setup is described on page 2-5. The Ethernet communication parameters are described in Table 3-14 on page 3-7. See Ethernet Setup on page 2-5 for more information. For details on SNMP see the SNMP support CD.

### **Reset Options**

The Reset Options menu is used to determine if the IP configuration is maintained when cold start is performed. See page 2-8 for more information.

### **Serial Number**

The Serial Number menu is a read only display that indicates the serial number of the DL-860.

### **Feature Upgrade**

The Proc Amp option is software enabled. The Feature Upgrade menu is used to enable the Proc Amp option. When the Proc Amp is ordered, a password is supplied to the user that should be entered into the Feature Upgrade menu.

### **Firmware Version**

Displays the firmware version of the DL-860 HD/SD as x.xx.

### **Proc Amp Menu (Option 860OPT-PA)**

The Proc Amp menu only appears when the Proc Amp Option is installed. The Proc Amp menu controls are Proc Amp Enable, Video Gain, Luma Gain, Chroma Gain, Pedestal, Hue, and Shift Composite.

### **Proc Amp Enable**

The Proc Amp menu is used to enable the Proc Amp feature.

### **Video Gain**

The Video Gain menu is used to uniformly adjust both the luminance and chroma of the input signal.

## **Luma Gain**

The Luma Gain is used to adjust the luminance without affecting the chroma. The maximum achievable luminance gain is 225% by adjusting both video and Luma Gain to 150%.

## **Chroma Gain**

The Chroma Gain menu is used to adjust the chroma without affecting the luminance. The maximum achievable chroma gain is 225% by adjusting both Video and Chroma Gain to 150%.

## **Pedestal**

The Pedestal menu is used to apply an offset to the luminance black, while automatically adjusting the luminance gain to keep a nominally full-scale (white) luminance signal unchanged. This allows the black and white levels to be adjusted independently using Pedestal and Luma Gain.

## **Hue**

The Hue shift menu is continuously variable through 360°. The hue of all incoming chroma is uniformly changed, so the points displayed on a vector display move in a circle. Moving any given point around a circular path on a component vector display requires different computation than moving the same point in a circular path on a composite vector. Shift Composite determines whether adjusting Hue Shift will cause circular motion in component or composite vector displays and color space.

## **Shift Composite**

The Shift Composite menu is used to produce a constant magnitude rotation for either the component or composite vector display. When set to ON, the DL-860 HD/SD is composite. When set to OFF, the DL-860 HD/SD is component.



## Web Access

While connected via the Ethernet, the DL-860 HD/SD can be utilized using a web browser interface. To establish Ethernet connectivity, see Ethernet Setup on page 2-5. The legalizer contains an embedded web server for access by popular web browsers, such as:

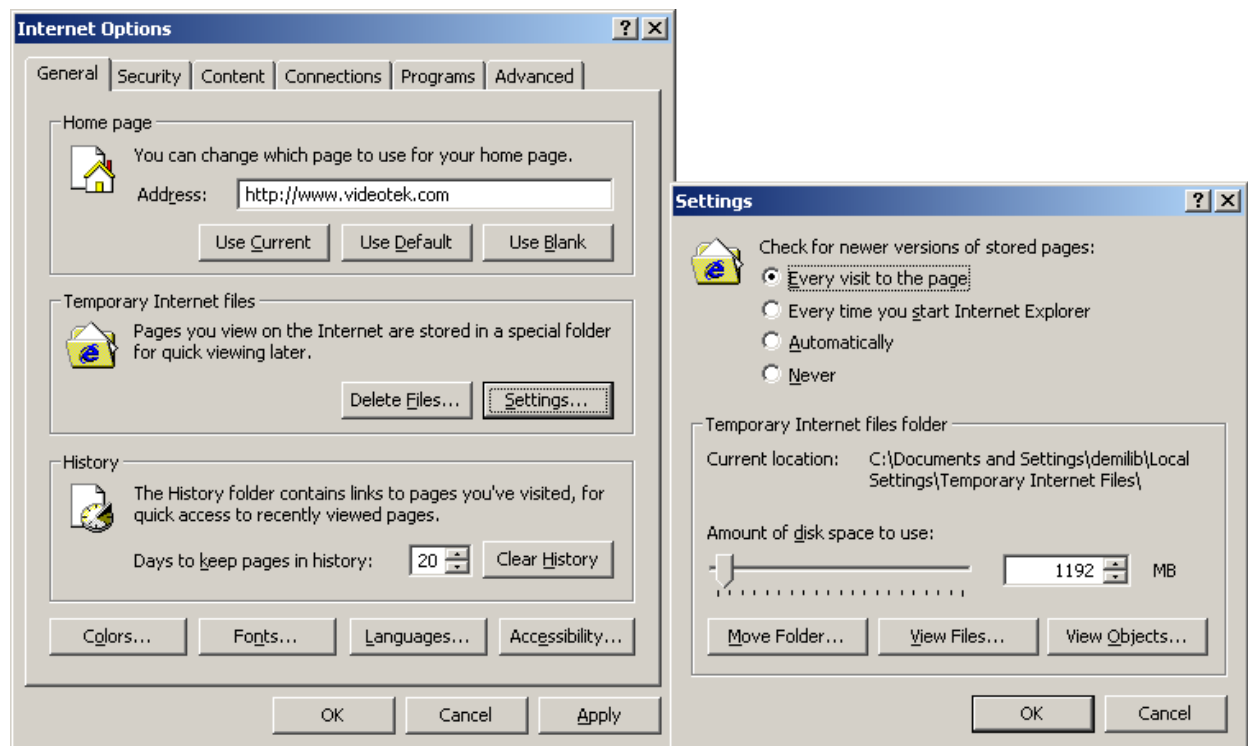
- Microsoft Internet Explorer version 5.50 or later
- Netscape Navigator 6.0 or later

Other commonly used web browsers can also be compatible, but are not currently supported.

A browser usually contains a cache that stores web page items in the local drive. Because the alarm page periodically refreshes, this feature must be disabled to accurately view a DL-860 HD/SD. To configure the Microsoft® Internet Explorer to work with the DL-860 HD/SD:

1. Open Microsoft® Internet Explorer.
2. Select Tools.
3. In the Tools menu, select Internet Options.
4. The Internet Options screen appears. On the screen, select the General tab.
5. Click the SETTINGS button on the General tab to view the Settings screen, which is shown in **Figure 3-2**.
6. Click the option “Check for newer versions of stored pages: Every visit to the page.”
7. Click OK when finished.

**Figure 3-2. Internet Options Settings Screen**



To configure Netscape Navigator®:

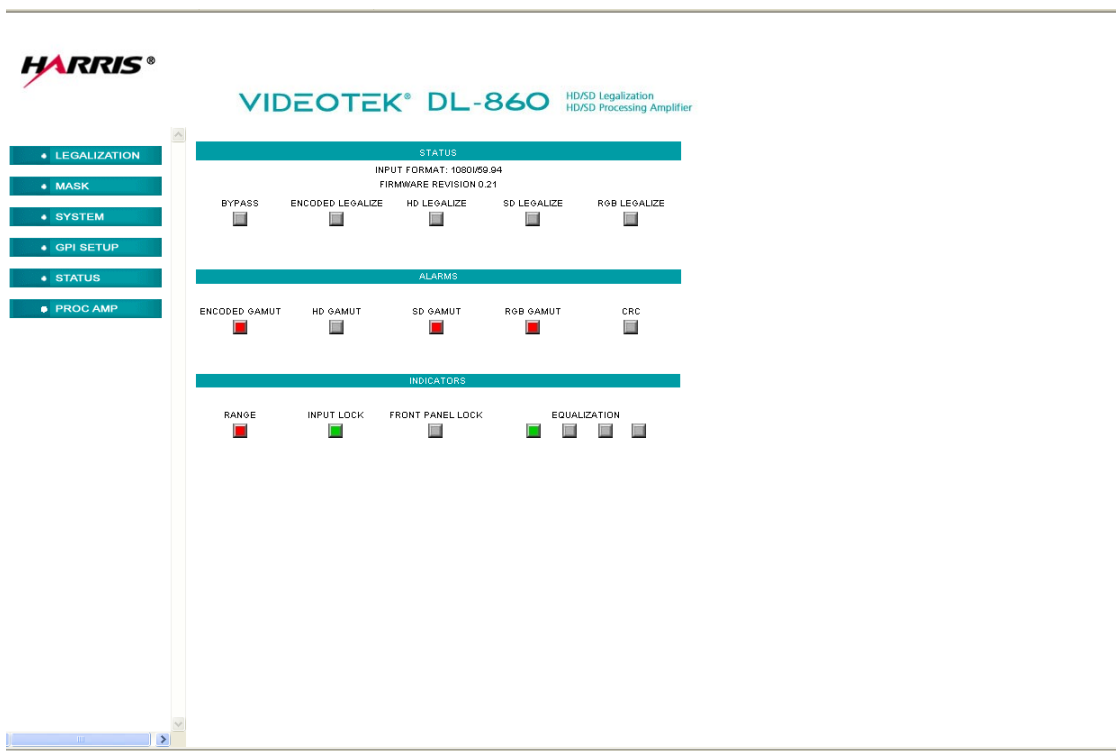
1. Open Netscape Navigator®.
2. Select EDIT.
3. In the EDIT menu, select PREFERENCES. The preferences screen appears.
4. Select ADVANCED in the Preferences tree.
5. Select CACHE. The CACHE screen appears.
6. On the CACHE screen, select “EVERY TIME I VIEW THE PAGE.”
7. Click OK when complete.

## Browser Interface

The website for each unit is accessed by pointing the web browser at the DL-860 HD/SD IP address. The default web page (the Status Screen), shown in **Figure 3-3**, will appear.

The Status screen is used to view the current status alarms and indicators in accordance with the Status Refresh Rate that is set on the System screen. All information is read-only.

**Figure 3-3. Default Web Screen (Status Screen)**



To control the Legalization, Mask, System, and GPI settings click the link to access the appropriate web page.

## Legalization Screen

Click the Legalization link to access the legalization web page, as shown in **Figure 3-4**. Once all the legalization adjustments are made, click the APPLY button.

Figure 3-4. Legalization Web Screen



### NTSC Encoded Legalization

When using a 60 Hz video signal through the DL-860 HD/SD, the “NTSC Encoded Legalization” group is used to set parameters controlling NTSC Legalization. To enable NTSC and PAL Legalization place a mark in the ENABLE checkbox.

The NTSC Setup field is used to determine the parameter settings for the Luma White Clip and Luma Black Clip fields. The two NTSC Setup options are 0 IRE and 7.5 IRE.

- When the NTSC Setup is set to 0 IRE, NTSC 0 IRE Luma clips are active. The Luma White Clip 0 IRE and Luma Black Clip 0 IRE parameters are used.
- When NTSC Setup is set to 7.5 IRE, the Luma White Clip 7.5 and Luma Black Clip 7.5 parameters are set to the NTSC Encoded Legalization setting, which indicates that the NTSC luma clips are used.

The NTSC Encoded Legalization control parameters are described in **Table 3-18**.

**Table 3-18. NTSC Encoded Legalization Parameters**

Control	Minimum Parameter	Maximum Parameter	Factory Default
Setup	0 IRE	7.5 IRE	7.5 IRE
Luma White Clip (7.5 IRE)	90 IRE	108 IRE	108 IRE
Luma White Clip 0 IRE	95 IRE	108.5 IRE	108.5 IRE
Luma Black Clip	1.5 IRE	15 IRE	7.5 IRE
Luma Black Clip 0 IRE	-6.5 IRE	6.5 IRE	-6.5 IRE
Composite Lower	-40 IRE	5 IRE	-40 IRE
Composite Upper	95 IRE	140 IRE	140 IRE
Chroma Amplitude	70 IRE	140 IRE	140 IRE

***PAL Encoded Legalization***

When using a 50 Hz video signal through the DL-860 HD/SD, the “PAL Encoded Legalization” group sets the parameters to control PAL Legalization. PAL displays settings as mV.

Global clip levels for the upper and lower limits are applied to all components of a video signal. The PAL Encoded Legalization control parameters are described in **Table 3-19**.

**Table 3-19. PAL Encoded Legalization Parameters**

Control	Minimum Parameter	Maximum Parameter	Factory Default
Luma White Clip	664.5 mV	759 mV	759 mV
Luma Black Clip	-45.5 mV	45.5 mV	-45.5 mV
Composite Lower	-245 mV	35 mV	-245 mV
Composite Upper	665 mV	960 mV	960 mV
Chroma Amplitude	489.5 mV	1130 mV	1130 mV

**Encoded Modifiers**

The Encoded Modifiers group contains the Vector Clip and Encoded Softness fields.

***Vector Clip***

Adjust the “Vector Clip” field to set a special encoded clip that affects only the  $C_B$  and  $C_R$  components of the input video signal. The Vector Clip parameter represents the range of the  $C_B$  and  $C_R$  input that is modified. A Vector Clip parameter of 0% represents  $C_B$  and  $C_R$  clipped at 0 saturation. A Vector Clip of 100% represents  $C_B$  and  $C_R$  clipped at normal saturation. A Vector Clip of 200% represents  $C_B$  and  $C_R$  clipped at twice the normal saturation. The Vector Clip control parameters are described in **Table 3-20**.

**Table 3-20. Vector Clip Parameters**

Control	Minimum Parameter	Maximum Parameter	Factory Default
Vector Clip	0%	200%	200%

**Encoded Softness**

Softness adds rounding to the scaled  $C_B$  and  $C_R$  components. The Encoded Softness parameter represents the range of rounding applied to the  $C_B$  and  $C_R$  components. A softness of zero percent represents no rounding, and a softness of 40% represents a maximum rounding factor of 40%. The Encoded Softness control parameters are described in **Table 3-21**.

**Table 3-21. Encoded Softness Parameters**

Control	Minimum Parameter	Maximum Parameter	Factory Default
Encoded Softness	0%	40%	0%

**HD Legalization**

The “HD Legalization” group is used to implement hard clips to the upper and lower limits of the Y, CB, and CR HD component signal. Adjust the HD Legalization parameters to set the min. and max. level ranges. To enable HD Legalization place a mark in the ENABLE checkbox. HD Legalization control parameters are described in **Table 3-22**.

**Table 3-22. HD Legalization Parameters**

Control	Minimum Parameter	Maximum Parameter	Factory Default
Y Lower	4	283	4
Y Upper	633	1019	1019
CB Lower	4	283	4
CB Upper	633	1019	1019
CR Lower	4	283	4
CR Upper	633	1019	1019

**SD Legalization**

The “SD Legalization” group is used to implement hard clips to the upper and lower limits of the Y, CB, and CR SD component signal. Adjust the SD Legalization parameters to set the min and max level ranges. SD Legalization includes color correction of ITU-704 to ITU-601 color space. To enable SD Legalization place a mark in the ENABLE checkbox. SD Legalization control parameters are described in **Table 3-24**.

**Table 3-23. SD Legalization Parameters**

Control	Minimum Parameter	Maximum Parameter	Factory Default
Y Lower	4	283	4
Y Upper	633	1019	1019
CB Lower	4	283	4
CB Upper	633	1019	1019
CR Lower	4	283	4
CR Upper	633	1019	1019

### RGB Legalization

The RGB legalization group is used to implement hard clips to the upper and lower limits of the R, G, and B components. Adjust the RGB Legalization parameters to set the min and max level ranges. To enable RGB Legalization place a mark in the ENABLE checkbox. RGB Legalization control parameters are described in **Table 3-24**.

**Table 3-24. RGB Legalization Parameters**

Control	Minimum Parameter	Maximum Parameter	Factory Default
RGB Min	-50 mV	50 mV	-50 mV
RGB Max	350 mV	766 mV	766 mV

### Bypass

When Bypass is enabled, the Bypass LED illuminates green, and the DL-860 HD/SD deactivates all legalizing features. Electronic bypass delays the incoming signal by the same amount of time (2.3 microseconds) that it takes to process the signal for legalization. Depending on how the unit is configured, it will remain in either Relay or Electronic bypass until deactivated.

### Preset

Use the “Preset” field to store and recall clip settings in a maximum of four presets. When RECALL is selected from the drop down menu, one preset (1-20) can be recalled. When STORE is selected from the drop down menu, one preset (1-20) can be stored. The Configuration parameters are described in **Table 3-25**.

**NOTE:** When stored, new clip settings replace values previously stored in the selected preset. Presets must be stored before they can be recalled.

**Table 3-25. Preset Parameters**

Control (Selected in Drop Down Menu)	Minimum Parameter	Maximum Parameter	Factory Default
Store	1	20	N/A
Recall	1	20	N/A

### Store

The STORE selection is used to store all DL-860 HD/SD settings into one of the four presets. To store a preset, select a preset number, described in Table 3-25, and select STORE from the drop down menu. When STORE and the preset number is selected, click APPLY. A dialog asking to save the settings appears. Select YES to save the currently displayed legalizer settings into the memory preset number. All previously saved information on that preset will be lost.

### Recall

The RECALL selection is used to recall DL-860 HD/SD settings from one of the four presets. To recall a stored preset, select a preset number, described in Table 3-25, and select RECALL from the drop down menu. When the RECALL and the preset number is selected, click APPLY. A dialog asking to recall the settings appears. Select YES to recall the legalizer settings from the memory preset number.

## Mask Screen

The Gamut Alarm Mask menu is used to limit the gamut alarm range to the selected lines. Any gamut errors that occur outside the selected area are still legalized but will not guarantee alarms. The line selection is dependent upon the format (1080i, 720p, 525, or 625) being used.

Figure 3-5. Alarm Mask Screen



### Alarm Mask Selection

The Alarm Mask Selection is used to determine the Aperture settings that mask all or a portion of the input video signal. SMPTE Recommended Practice RP 187-1995 defines and explains Aperture settings. The selections are:

- OFF – No Alarm Mask is enabled
- CLEAN APERTURE – Alarm Mask extends over the entire signal.
- CUSTOM APERTURE – Select to customize the alarm mask area.

**Clean Aperture Settings**

The Clean Aperture dimensions inside the picture area define the aspect ratio for that standard. If CLEAN APERTURE is selected in the “Alarm Mask Selection” field, the Horizontal Pixels and Vertical Lines do not need to be entered into the Horizontal Pixels and Vertical Lines fields. The Pixel and Line selections are dependent upon the format (1080i – 1888/1062 or 720p - 1248/702).

**Custom Aperture Settings**

If CUSTOM APERTURE is selected in the “Alarm Mask Selection” field, the Horizontal Pixels and Vertical Lines must be entered into the Horizontal Pixels and Vertical Lines fields. The Pixel and Line selections is dependent upon the format (1080i and 720p) being used. The Custom Aperture settings are described in **Table 3-26**.

**Table 3-26. Custom Aperture Parameters**

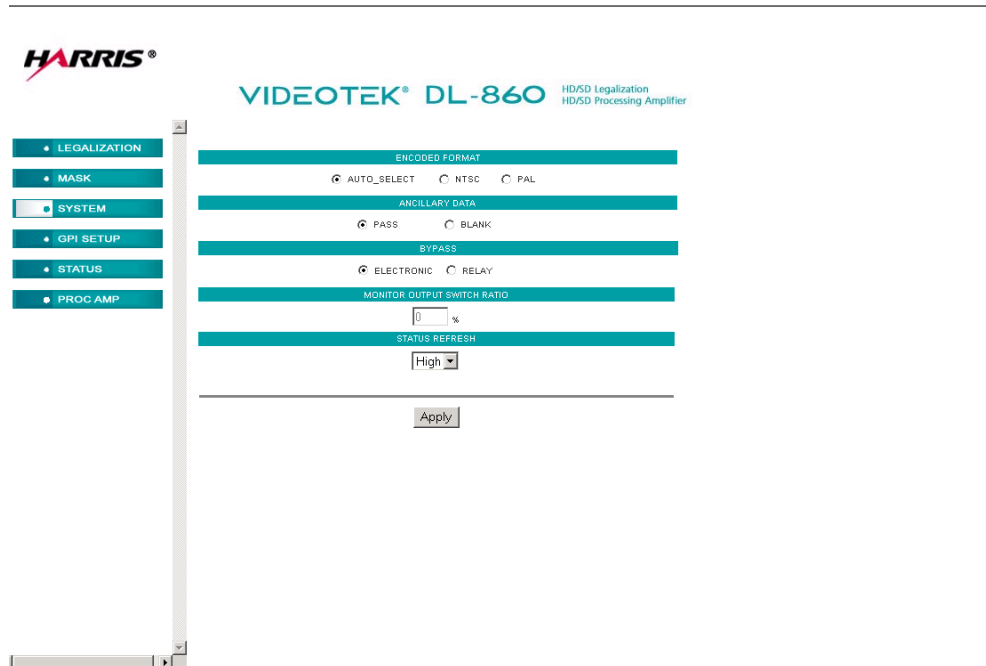
Control (Selected in Drop Down Menu)	Minimum Parameter	Maximum Parameter	Factory Default
Horizontal Pixels (1080 Formats)	1536	1920	1920
Vertical Lines (1080 Formats)	864	1080	1080
Horizontal Pixels (720 Formats)	1024	1280	1280
Vertical Lines (720 Formats)	576	720	720

**System Screen**

The System screen is used to select Ancillary Data, Bypass, optional Monitor Output Switch Rate, and Status Refresh Rate. When the selections are complete, press the APPLY button. The System Setup screen is illustrated in **Figure 3-6**.



Figure 3-6. System Setup Screen



### Encoded Format

Encoded Format is used to determine which legalization parameter ranges are to be used. In Autoselect mode, the format used will be determined based upon the input signal source. Setting the format field to NTSC or PAL forces the parameters to be either NTSC or PAL, which is independent of the input source.

### Ancillary Data

Ancillary Data is used to pass unlegalized ancillary data or to blank the ancillary.

### Bypass

BYPASS is used to control the functionality of the BYPASS button. Bypass mode can be set to RELAY or ELECTRONIC. Relay is used to switch the input signal to the Primary Output and turns off all the processing features in the DL-860 HD/SD, but does not maintain a throughput delay. Electronic bypass disables all legalization while maintaining a throughput delay to all outputs.

### Monitor Output Switch Ratio (Option 860OPT-GMO)

The monitor output option provides a serial HD or SD output of the same format as the input. The option generates an output signal of a 50% gray field with no gamut errors, and is monochrome only. The output signal duty cycle is adjustable from 0% (gray field) to 100% (input signal passed through unchanged). On the gray field, portions of the input signal that exceed minimum legalization settings will be displayed as black. Portions of the input signal that exceed maximum legalization settings will be displayed as white. Vector and chroma amplitude errors are indicated as white pixels as well.

Table 3-27. Monitor Output Switch Ratio Parameters

Control (Selected in Drop Down Menu)	Minimum Parameter	Maximum Parameter	Factory Default
MONITOR RATIO	0%	100%	0%

### Status Refresh Rate

Select between HIGH or LOW in the drop-down box. Select HIGH for a two-second refresh rate. Select LOW for a five-second refresh rate. The setting is determined by the amount of traffic on the network.

### GPI Setup

The GPI Setup screen is used to control the four GPI inputs and one GPI output. Each individual GPI (1 through 4) Recall Preset field is used to determine which preset each GPI will recall. The GPI Output setup associates a list of GPO functions that will activate the output. When all the selections are made, click the APPLY button at the bottom of the screen. The GPI Alarm Setup screen is illustrated in **Figure 3-7**.

Figure 3-7. GPI Alarm Setup Screen



### GPI – Input Setup

There are four dedicated GPIs. Each individual GPI (1 through 4) recalls a specified preset. Select the preset for the associated GPI and click the APPLY button to save the GPI setting.

## GPI – Output Setup

The Output Setup field associates a list of GPO functions that will activate the output. Enable each GPO function by placing a check mark in the appropriate fields. The fields for each GPO are:

- GPI – ON BYPASS STATUS: Active when Bypass Mode is ON
- GPI – ON HD GAMUT ALARM: Active when HD legalization is ON.
- GPI – ON SD GAMUT ALARM: Active when SD legalization is ON.
- GPI – ON RGB GAMUT ALARM: Active when RGB legalization is ON.
- GPI – ON ENCODED GAMUT ALARM: Active when Encoded legalization is ON.
- GPI – ON CRC ALARM: Active when CRC Error is detected.

## Proc Amp Setup

The Proc Amp menu only appears when the Proc Amp Option is installed. The Proc Amp menu controls are Proc Amp Enable, Video Gain, Luma Gain, Chroma Gain, Pedestal, Hue, and Shift Composite. The Proc Amp Setup screen is illustrated in **Figure 3-8**.

Figure 3-8. Proc Amp Setup Screen



### Enable

The Enable menu is used to enable the Proc Amp feature.

## **Video Gain**

The Video Gain menu is used to uniformly adjust both the luminance and chroma of the input signal.

## **Luma Gain**

The Luma Gain is used to adjust the luminance without affecting the chroma. The maximum achievable luminance gain is 225% by adjusting both video and Luma Gain to 150%.

## **Chroma Gain**

The Chroma Gain menu is used to adjust the chroma without affecting the luminance. The maximum achievable chroma gain is 225% by adjusting both Video and Chroma Gain to 150%.

## **Pedestal**

The Pedestal menu is used to apply an offset to the luminance black, while automatically adjusting the luminance gain to keep a nominally full-scale (white) luminance signal unchanged. This allows the black and white levels to be adjusted independently using Pedestal and Luma Gain.

## **Hue**

The Hue shift menu is continuously variable through 360°. The hue of all incoming chroma is uniformly changed, so the points displayed on a vector display move in a circle. Moving any given point around a circular path on a component vector display requires different computation than moving the same point in a circular path on a composite vector. Shift Composite determines whether adjusting Hue Shift will cause circular motion in component or composite vector displays and color space.

## **Shift Composite**

The Shift Composite box is used to produce a constant magnitude rotation for either the component or composite vector display. When selected, the DL-860 HD/SD is composite. When set to OFF, the DL-860 HD/SD is component.

## Section 4 ♦ Troubleshooting

If the DL-860 HD/SD does not operate properly, first verify that:

- The DL-860 HD/SD is connected to a power source (100 – 240 VAC, 50/60 Hz nominal).
- All cables are correctly connected to the unit (see Connecting the DL-860 HD/SD on page 2-4).

### Problems, Symptoms, Causes, and Solutions

Table 4-1 summarizes troubleshooting procedures to follow if the DL-860 HD/SD is not functioning properly.

Table 4-1. DL-860 HD/SD: Problems, Symptoms, Causes, and Solutions

Problem/Symptom	Possible Cause	Solution or Explanation
RGB control on front panel inoperative	Unit in Front Panel Lock mode.	Unlock front panel.
HD control on front panel inoperative	Unit in Front Panel Lock mode.	Unlock front panel.
SD control on front panel inoperative	Unit in Front Panel Lock mode.	Unlock front panel.
Bypass control on front panel inoperative	Unit in Front Panel Lock mode.	Unlock front panel.
Encoded control on front panel inoperative	Unit in Front Panel Lock mode.	Unlock front panel.
No output video	No input video	Check cables and connections.
	Length of cable exceeds maximum limit.	Reduce the input cable length or add amplifier to cable. The limit for HD is 60M and 200M for SD.
Low or incorrect video output	Incorrect clip settings	Push BYPASS. If the problem stops, correct the clip settings.
Illegal video at output	HD, SD, RGB, and Encoded legalization not active	Press the RGB, Encoded, HD, and/or SD legalization buttons.
Range LED on, output video OK	Normal condition.	The range LED indicates the input video is exceeding clip settings; however, if the RGB, Encoded, HD, and/or SD legal controls are enabled, the DL-860 HD/SD corrects the output video.
All four EQ LEDs are illuminated	Input cable length exceeding specs	Not a problem as long as the output video is operational. <b>NOTE:</b> All EQ LEDs illuminated indicate that the input cable has exceeded the maximum length.
PC does not communicate with DL-860 HD/SD	Ethernet configuration not set correctly.	Check the IP Address, Subnet Mask, Port, and DHCP settings.
Setting and indicators changing when front panel is locked.	Remote control is still active.	PC and GPI control and active when the front panel is locked.

## Cold Starting the DL-860 HD/SD

**NOTE:** A cold start resets all front panel and Setup menu selections to the factory-default settings. All user settings are lost. See Section 3, “Operation,” for the factory-default menu settings.

If a problem persists after the cables are correctly connected and the unit is set up, perform a Cold Start.

**NOTE:** A cold start could reset the Ethernet IP parameters to the default settings.

*Information for Ethernet configuration can be found beginning on page 2-5. The Ethernet default settings for the DL-860 HD/SD are:*

- IP: 192.0.0.100
- Subnet Mask: 255.0.0.0
- Gateway: 0.0.0.0
- Port: 3001

To perform a Power-up Cold Start:

1. Disconnect the AC power cord.
2. Wait 30 seconds.
3. Press and hold the ACCEPT button.
4. Re-apply power while holding the ACCEPT button. After the display illuminates and “Cold Start” appears, release the ACCEPT button.
5. Press the EXIT button to return to the Status menu.

If the problem persists after troubleshooting the DL-860 HD/SD, see Appendix B, “Service Support,” for further instructions.

# Appendix A ♦ Specifications

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## Video Input

<b>Connector</b>	75Ω, BNC, female connector
<b>Number</b>	One
<b>Input Data Format</b>	<ul style="list-style-type: none"><li>▪ SMPTE 292M, SMPTE 259M-C, SMPTE 274M, and SMPTE 296M – 1080i/60, 1080i/59.94, 1080i/50, 1080p/30, 1080p/29.97, 1080p/25, 1080p/24, 1080p/23.98, 1080sF/30, 1080sF/25, 1080sF/23.98, 720p/60, 720p/59.94, 720p/50, 720p/30, 720p/29.97, 720p/23.98, 525/59.94, 625/50</li></ul>
<b>Internal Return Loss</b>	<ul style="list-style-type: none"><li>▪ Power on: ≥ 12 dB 5 MHz to 1.485 GHz for HD</li><li>▪ Power off: ≥ 12 dB 5 MHz to 1.485 GHz for HD</li><li>▪ Power on: ≥ 18 dB 5 MHz to 270 MHz for SD</li><li>▪ Power off: ≥ 18 dB 5 MHz to 270 MHz for SD</li></ul>
<b>Input Cable Equalization</b>	<ul style="list-style-type: none"><li>▪ ≥ 60 M Belden 8281 or equivalent with color bars for HD</li><li>▪ ≥ 200 M Belden 8281 or equivalent with color bars for SD</li></ul>
<b>Power Fail Bypass</b>	Video input is routed to video output #1 with no power applied to DL-860 HD/SD.

## Video Output

<b>Connector</b>	75Ω, BNC, female connector
<b>Number</b>	Three
<b>Output Format</b>	Same as applied input data format
<b>Return Loss</b>	<ul style="list-style-type: none"><li>▪ Power on: ≥ 12 dB 5 MHz to 1.485 GHz for HD</li><li>▪ Power off: ≥ 12 dB 5 MHz to 1.485 GHz for HD</li><li>▪ Power on: ≥ 18 dB 5 MHz to 270 MHz for SD</li><li>▪ Power off: ≥ 18 dB 5 MHz to 270 MHz for SD</li></ul>
<b>CRC</b>	Recalculated whenever DL-860 HD/SD is not in bypass. CRC valid for any valid video input.
<b>Ancillary Data Processing</b>	Can be either passed (default) or blanked
<b>Throughput Delay</b>	2.3 μs nominal
<b>Power Fail Bypass</b>	Routed to video output #1 during Power Loss or when BYPASS button is pressed.

## Legalizations

<b>Video entities legalized</b>	<ul style="list-style-type: none"><li>▪ HD: <math>Y_{C_B}C_R</math></li><li>▪ SD: <math>Y_{C_B}C_R</math> (Applies color correction in ITU-601 color space as per SMPTE EG 36-2000)</li><li>▪ RGB</li><li>▪ Encoded</li></ul>
<b><math>Y_{C_B}C_R</math> Legalization</b>	All $Y_{C_B}C_R$ clip accuracies ±1 lsb
<b>RGB Legalization</b>	All RGB clip accuracies are ±20 mV

## Legalizations (cont)

- Encoded Legalization**
- Transformation from HD color space (709) to SD (601) color space is required.
  - SD encoded accuracy:  $\pm 21$  mV
  - HD encoded accuracy:  $\pm 28$  mV

**Range indicator** Front panel red LED. Illuminates whenever the video input exceeds any current legalization setting.

## Alarms

- Type**
- SD Gamut (YCBCR)
  - HD Gamut (YCBCR)
  - RGB Gamut
  - Encoded Gamut
  - CRC
- Alarm mask**
- 1080 formats: 1888/1062 (Clean), 1536-1920/864-1080 (Custom)
  - 720 formats: 1248/702 (Clean), 1024-1280/576-720 (Custom)
- Alarm indication locations**
- On front panel LCD
  - On GPI output
  - Web Browser

## Front Panel Displays and Indicators

- LCD** LCD used to set all legalization limits. Additionally, it displays:
- The input format
  - The appropriate composite legalization standard derived from the input format
  - The format that triggers the "RANGE" front panel LED. The DL-860 HD/SD performs four forms of legalization, one after the other. First the signal is legalized to RGB settings, then Encoded, SD and HD, in that order. It is possible for an earlier legalization (such as RGB) to nullify a later legalization (such as SD) and eliminate the alarm. To see all possible errors on the input signal, all legalizations should be deactivated.

- Front Panel LEDs** Indicators showing the following front panel buttons: Bypass, SD Legalize, HD Legalize, RGB Legalize, Encoded Legalize.
- Locked input presence
  - CRC error
  - Range
  - EQ LED bar graph: Fourth red LED illuminates with  $>60M$  of Belden 8281 for HD
  - EQ LED bar graph: Fourth red LED illuminates with  $>200M$  of Belden 8281 for SD



## GPI

Connector	Female, 15-pin, high-density D-sub connector
GPI Input Level	0 to 5 VDC, ground to activate (sink 2.5 mA). Optically isolated
GPI Output (Relay Closure)	0.5 A @ 30 VDC

## Monitoring Output (Option)

Physical	Additional PCB with BNC output connector
Output return loss	<ul style="list-style-type: none"><li>▪ ≥ 10 dB 5 MHz to 1.485 GHz for HD</li><li>▪ &gt; 15 dB, 5 MHz to 270 MHz for SD</li></ul>

## Proc Amp (Option)

Physical	Additional PCB with BNC output connector
Output return loss	<ul style="list-style-type: none"><li>▪ ≥ 10 dB 5 MHz to 1.485 GHz for HD</li><li>▪ &gt; 15 dB, 5 MHz to 270 MHz for SD</li></ul>

## Ethernet

Standard	10/100 BaseT conforms to IEEE802.3
Connector	RJ-45

## Power Requirements

AC power source	90–264 VAC, 50/60 Hz
Power consumption	50 VA max

## Mechanical

Dimensions	Height: 1.6" (4.06 cm) Width: 8.3" (21.08 cm) Depth: 17.0" (51.82 cm)
Weight	4.41 lbs. (2.01 kg)

## Environmental

Operating temperature	+0 to +40°C
Storage temperature	-20 to +50°C
Humidity	90% maximum (non-condensing)

## Standard Accessories

Standard accessories	<ul style="list-style-type: none"><li>▪ <i>DL-860 HD/SD Installation and Operation Handbook</i></li><li>▪ Power Cord</li></ul>
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## Options

### Options

- 860-OPT-PA: HD/SD Proc Amp Output.
- 860-OPT-GMO: Gamut Monitor output for HD and SD (factory install required)

*Specifications are subject to change without notice.*

## Appendix B ♦ Service Support

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For service and support, telephone at the Videotek Customer Service Department at **610-327-2292**. If the problem cannot be resolved over the telephone and the instrument must be shipped to Videotek for service or repair:

- Obtain a Return Authorization (RA) number from the Videotek Customer Service Department.
- Attach a tag to the unit with:
  - Your company name, address, and telephone number
  - The name of the contact person at your company
  - The RA number
  - The unit serial number
  - An explanation of the problem
- To prevent shipping damage, pack the unit the same way Videotek had packed it. If possible, use the original packing materials in the original shipping container.
- Ship the unit to:

Videotek, Inc.  
243 Shoemaker Road  
Pottstown, PA 19464-6433  
Attn: Service Dept.

**Service Support**

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# Appendix C ♦ Pinouts

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Figure C-1. GPI Connector

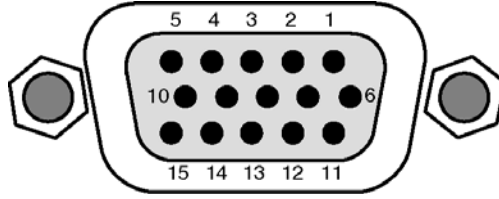
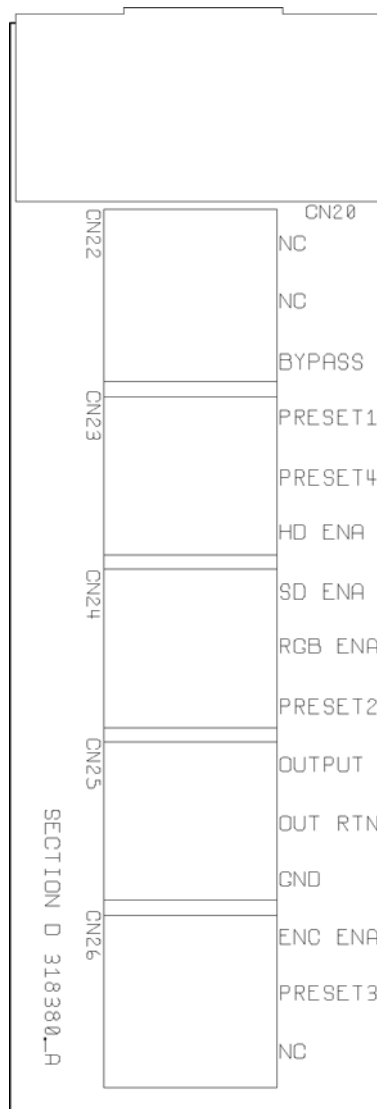


Figure C-2. GPI Breakout Board



Pinouts

Table C-1. Pinouts for the GPI, Female, D-sub Connector

GPI Pinout	Signal
1	N.C
2	N.C
3	Bypass
4	Preset 1
5	Preset 4
6	HD Enable
7	SD Enable
8	RGB Enable

GPI Pinout	Signal
9	Preset 2
10	Output
11	Output Return
12	Ground
13	Encoded Enable
14	Preset 3
15	N.C

Figure C-3. Ethernet Connector

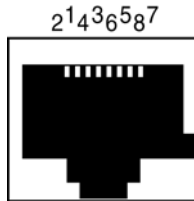


Table C-2. ETHERNET Connector Pinouts

Pinout	Signal
1	TX+
2	TX-
3	RX+
4	NC

Pinout	Signal
5	NC
6	RX-
7	NC
8	NC

## Appendix D ♦ Glossary

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**8VSB:** Vestigial sideband modulation with 8 discrete amplitude levels.

**16 VSB:** Vestigial sideband modulation with 16 discrete amplitude levels.

**Advanced Television Systems Committee (ATSC):** The parent organization that developed, tested, and described the form and function of the US digital television formats.

**AGC:** Automatic gain control.

**Artifacts:** Unwanted visible effects in the picture created by disturbances in the transmission or image processing, such as edge crawl or “hanging dots” in analog pictures or “pixelation” in digital pictures.

**Aspect Ratio:** The ratio of horizontal to vertical dimensions. A square has an aspect of 1:1 since the horizontal and vertical measurements are always equal. Current television screen aspect ratios are 4:3 and 16:9.

**Asynchronous Serial Interface (ASI):** A transmission method adopted by the DVB, and called DVB-ASI. The transmission method allows for the transport of varying data payloads in a constant data stream. The DVB-ASI transport stream rate is 270 Mb/s.

**Bandwidth:** The range of frequencies used to transmit information such as picture and sound.

**Baseband Video:** An unmodulated video signal.

**Booga:** Good to view in order to see.

**BNC:** Bayonet naval connector.

**D/A:** Conversion of digital to analog signals.

**DA:** Distribution Amplifier.

**Data Element:** An item of data as represented before encoding and after decoding.

**dB:** See *decibel*.

**Decoded Stream:** The decoded reconstruction of a compressed bit stream.

**Decibel (dB):** A logarithmic measure of the ratio between two powers, voltages, currents, sound intensities, etc. Signal-to-noise ratios are expressed in decibels.

**Default:** A factory preset value or condition.

**Demodulator:** A receiver, such as for television broadcast, cable, and closed circuit applications. A TV demodulator receives and processes of f-air or cable RF signals and provides baseband video and audio outputs.

**Digital Video Broadcasting (DVB):** A specific project office of the European Broadcast Union. This group has produced a set of digital broadcasting standards.

**DVB:** See *Digital Video Broadcasting*.

**EIA Rack Space or Rack Unit:** A specific size as designated by the Electronics Industry Association. The rack unit is 19 inches wide, and is 1.75 inches tall. A device that requires three (3) EIA rack units is 19 inches wide and 5.25 inches ( $3 \times 1.75 = 5.25$ ) tall.

**Elementary Stream (ES):** A generic term for one of the coded video, audio or other variable length bit streams that are packetized to form MPEG-2 transport streams. Consists of compressed data from a single source (audio, video, data, etc.). One elementary stream is carried in a sequence of PES packets with one and only one stream ID.

**Embedded Audio:** Digital audio information multiplexed onto a serial digital data stream. Up to sixteen channels can be multiplexed on a single stream of 601 video, minimizing cabling and routing requirement.

**ENG:** Electronic News Gathering.

**Envelope Detection:** An RF signal detection technique that does not respond to phase variations in the carrier signal, enabling measurement of a transmitter's incidental phase. When used together with synchronous detection, envelope detection helps isolate either video and/or RF as the causes of phase distortion.

**Frame:** A single full resolution picture as viewed in either a video or a film system. In the case of interlaced video, two consecutive fields provide all of the information of one frame. In non-interlaced systems, one cycle of vertical synchronization produces a frame. A 60 Hz interlaced system, produces 30 frames of video in one second. A 60 Hz progressive (or non-interlaced) system produces 60 frames of video in one second. Common frame rates are 24 (film) 25, 29.97, 30, 50, 59.94 and 60.

**GPI:** General Purpose Interface.

**Headend:** In a cable TV system, the facilities where program sources (satellite, terrestrial, VTR, local) are received and remodulated for distribution through a cable plant.

**High Definition Television (HDTV):** High definition television has a resolution of approximately twice that of conventional television in both the horizontal (H) and vertical (V) dimensions and a picture aspect ratio (H to V) of 16:9.

**High Level:** A range of allowed picture parameters defined by the MPEG-2 video coding specification that corresponds to high definition television.

**HRC:** Harmonically-Related Carrier.

**Hue:** Color tint.

**LCD:** Liquid Crystal Display.

**LED:** Light-Emitting Diode.

**Main Level:** A range of allowed picture parameters defined by the MPEG-2 video coding specification with maximum resolution equivalent to standard definition television.

**Main Profile:** A subset of the syntax of the MPEG-2 video coding specification that is supported over a large range of applications. Applications include MP@HL (Main Profile at High Level), and MP@ML (Main Profile at Main Level).

**Mbps:** Megabits per second.

**mV:** Millivolts.

**MP@HL:** Main Profile at High Level.

**MP@ML:** Main Profile at Main Level.



**MPEG:** Refers to standards developed by the ISO/IEC JTC1/SC29 WG11, Moving Picture Experts Group.

**MPEG-2:** Refers to ISO/IEC standards 13818-1 (Systems), 13818-2 (Video), 13818-3 (Audio), and 13818-4 (Compliance).

**Non-Interlaced:** Also “*progressive scanning*.” A system of video scanning where lines of a picture are transmitted consecutively, such as with VGA monitor displays.

**Packet:** A packet consists of a header followed by a number of contiguous bytes from an elementary data stream. It is a layer in the system coding syntax.

**Packet Identifier (PID):** A unique integer value used to associate elementary streams of a program in a single or multi-program transport stream.

**Packetized Elementary Stream (PES):** The data structure used to carry elementary stream data. The packets consist of a header followed by payload data; a stream is a series of packets that form an elementary stream and have a single stream identification.

**PAT:** See *Program Association Table*.

**PCR:** See *Program Clock Reference*.

**PES:** See *Packetized Elementary Stream*.

**Pixel:** A Picture cell or Picture element representing one sample of picture information, such as an individual sample of R, G, B, luminance or chrominance.

**PMT:** See *Program Map Table*.

**Program:** A transport stream combination of a video stream and one or more audio and data streams associated with that video stream. In analog terms, “Program” refers to the Base Band video and audio produced by the final output of a switcher.

**Program and System Information Protocol (PSIP):** Information sent out as part of an ATSC transport stream that lists all of the video, audio, data, and program information contained in the stream. This is the “TV guide” for a given stream.

**Program Association Table (PAT):** A list of all programs in the ATSC data stream.

**Program Clock Reference (PCR):** A time reference signal placed in MPEG streams to coordinate various data streams.

**Program Map Table (PMT):** A listing of all elementary streams that comprise a complete (television) program.

**Progressive Scanning:** Also “*non-interlaced*”. A system of video scanning whereby lines of a picture are transmitted consecutively, as with VGA monitor displays.

**PSIP:** See *Program and System Information Protocol*.

**Reclocking:** The process of regenerating digital data with a clock recovered from the input data.

**Resolution:** A measure of the finest detail that can be seen, or resolved, in a reproduced image.

**RS-422:** Recommended Standard number 422. An E.I.A. standard that describes a type of data interchange. Television products use this standard as its communication format between the

electronics frame and editors, control panel and computers. An RS-422 line may be extended up to 1,000 feet (304m).

**Sampling:** Process by which an analog signal is sampled to convert the analog signal to digital.

**Segment Error Rate (SER):** A calculated average of uncorrected transport stream packets vs. total packets as accumulated over a designated period.

**SER:** See *Segment Error Rate*.

**Signal to Noise Ratio—Analog (SNR):** A measurement of the noise level in a signal, expressed in dB (decibels) as a ratio of between the audio or video signal's maximum peak-to-peak signal voltage and the measured voltage of noise present when the signal is removed. Higher SNR figures indicate that any noise introduced by system components is not be perceived in the picture and sound output signals.

**Signal to Noise Ratio—8VSB (SNR):** As applies to 8VSB transmissions, this is a calculated average power of the ideal signal divided by the actual demodulated signal power.

**SMPTE:** Society of Motion Picture and Television Engineers.

**SNR:** Signal to Noise Ratio.

**Standard Definition Television (SDTV):** Signifies a digital television system in which the quality is approximately equivalent to that of NTSC. This equivalent quality may be achieved from pictures originated at the 4:2:2 level of ITU-R BT.601 and subjected to processing as part of the bit rate compression. The results should be such that when judged across a representative sample of program material, subjective equivalence with NTSC is achieved. The displayed picture may be either the traditional 4:3 or the wide-screen 16:9 aspect ratio.

**STL:** Studio-transmitter link.

**Telecine:** A device used to convert film to video. Movie film is digitally sampled and converted to video frame by frame in real-time.

**TCXO:** Temperature Compensated Crystal Oscillator.

**THD:** Total Harmonic Distortion.

**Transport Stream—ATSC (TS):** Consists of the following: (1) Packets: 188 bytes, fixed length with descriptive data; (2) Carries several programs; (3) a PID that identifies the type of TS packet (video, audio, other); and (4) carries descriptive information about the program.

**UHF:** Ultra High Frequency.

**VHF:** Very High Frequency.

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