TABLE OF CONTENTS

Figures

Tables

REVISION HISTORY

REVISION	DESCRIPTION	DATE
1.0	Preliminary Version	Sep 01
1.1	Rear panel changed, Jumper numbers updated, general cleanup	Mar 02
1.2	First Release	Apr 02
1.3	Menu structure and specifications updated	Apr 02
1.4	DIP switch settings updated	Sep 02
1.5	Added REF IN and removed 50i/25pSf	Oct 02
1.6	Added 50i /25pSf, DIP switch settings updated	Mar 03
1.7	Added pinout for 9 pin D connector, info on GPO function	Mar 04
1.8	Remove Reference Input	June 04
1.9	Minor corrections	Nov 04

1. OVERVIEW

The 7770DS-HD, HDTV Decompression Codec converts a 270Mb/s SDTi (SMPTE 305M) input signal containing HDCAM compressed data with embedded AES audio, into a SMPTE 292M (1.485Gb/s) component serial digital stream with embedded or separate AES audio. An additional stereo analog audio channel is also available for local monitoring. The 7770DS-HD supports 1080i/59.94, 1080i/50, 1080p/29.97sF, 1080p/25sF, 1080p/23.97sF and 1035i/59.94 video formats.

The 7770DS-HD occupies two card slots and is housed in the standard Evertz 3RU frame that holds up to 15 modules.

Features:
- Industry proven HDCAM video decompression for origination quality video
- Supports 1080i/59.94, 1080i/50, 1080p/29.97sF, 1080p/25sF 1080p/23.98sF and 1035i/59.94 formats
- Automatic detection of 1035i/1080i active lines
- Detection of uncompressed SD or compressed HD input stream and outputs GPO control for downstream equipment.
- Outputs up to four channels of uncompressed embedded AES audio
- Audio delay processing to match video compression/decompression delay
- Four separate stereo AES unbalanced outputs
- One stereo analog audio output
- Fully hot swappable from front of frame
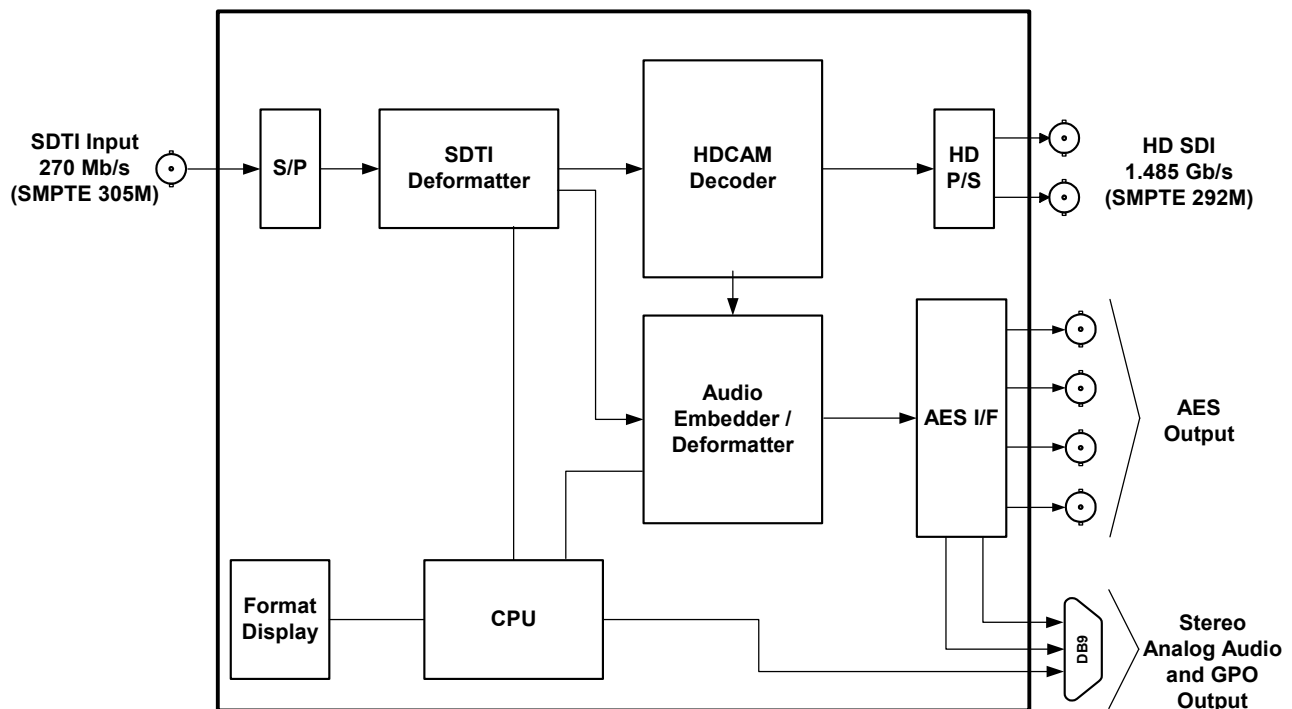
Figure 1: 7770DS-HD Block Diagram

2. INSTALLATION

The 7770DS-HD comes with a companion rear plate that has eight BNC connectors, occupying two slots in the 7700FR frame. For information on mounting the rear plate and inserting the module into the frame see the 7700FR chapter section 3.
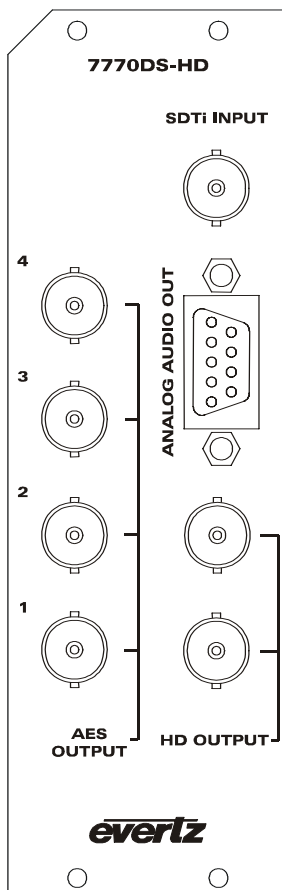
Figure 2: 7770DS-HD Rear Panel

2.1. VIDEO CONNECTIONS

Connect a source of SDTi compressed HD serial component video, compatible with the SMPTE 259M and SMPTE 305M standards, to the BNC labeled **SDTi INPUT**. See Table 2 for a list of the video formats supported. Uncompressed HD video output, compatible with the SMPTE 292M standard, is available on the **HD OUTPUT** BNCs.

2.2. AUDIO CONNECTIONS

The 7770DS-HD has the ability to de-embed up to 4 uncompressed AES audio streams (8 channels) from 2 groups on the compressed video input. The de-embedded audio can be either re-embedded on the HD video output or output as AES audio on the 4 BNCs labeled **AES OUTPUT**. Selection of the audio destination and embedding group is done by DIP switch (see section 5.6).

A 9 pin D connector labeled **ANALOG AUDIO OUT** contains 2 balanced analog audio outputs. The connector pinout is shown in Table 1. See sections 5.5 and 5.9 for more information about the analog audio outputs.

Pin #	Name	Description
1	A1-	Audio 1 (Left) - Output
2	Gnd	Signal Ground
3	A2+	Audio 2 (Right) + Output
4	Gnd	Signal Ground
5	Gnd	Signal Ground
6	A1+	Audio 1 (Left) + Output
7	A2-	Audio 2 (Right) - Output
8	GPO	General Purpose Output
9	Gnd	Signal Ground

Table 1: 9 Pin D Connector Pin Definitions

2.3. GENERAL PURPOSE OUTPUT CONNECTION

A pair of pins on the 9 pin D connector labeled **ANALOG AUDIO OUT** contains a general purpose output. The connector pinout is shown in Table 1. See section 4.3 for more information about the operation of the general purpose output.

3. SPECIFICATIONS

3.1. SDTI VIDEO INPUT

Standard: SMPTE 259M-C – 525 line component.
                         Video compressed in accordance with SMPTE 305M
Connector: BNC per IEC 169-8
Signal Level: 800mV nominal
DC Offset: 0V ±0.5V
Return Loss: > 15 dB at 270 Mb/s

3.2. HD SERIAL VIDEO OUTPUT

Standard: 1.485 Gb/sec SMPTE 292M – standards supported are shown in Table 2.
Number of Outputs: 2
Connectors: BNC per IEC 169-8
Signal Level: 800mV nominal
DC Offset: 0V ±0.5V
Rise and Fall Time: 200ps nominal
Overshoot: <10% of amplitude
Wide Band Jitter: < 0.2UI

SDTi Input	HD Output				
	Common Name	**Pixels / Active Lines**	**Frame Rate**	**Progressive /Interlace**	**SMPTE Standard**
525/29.97	1080i/59.94	1920 x 1080	29.97	I	274M
525/29.97	1080p/29.97sF	1920 x 1080	29.97	P (sF)	274M
625/25	1080i/50	1920 x 1080	25	I	274M
625/25	1080p/25sF	1920 x 1080	25	P (sF)	274M
525/23.98	1080p/23.98sF	1920 x 1080	23.98	P (sF)	274M
525/29.97	1035i/59.94	1920 x 1035	29.97	I	260M

Table 2: Video Output Formats

3.3. AES AUDIO OUTPUTS

Standard:	SMPTE 276M, single ended synchronous AES
Number of Outputs:	4
Connectors:	BNC per IEC 169-8
Signal Level:	1V p-p ±0.1V
Resolution:	24 bits
Sampling Rate:	48 kHz
Impedance:	75 Ohms unbalanced

3.4. ANALOG AUDIO OUTPUTS

Number of Outputs: 2
Type: Balanced analog audio
Connector: 9 pin female D connector
Output impedance: 66Ω
Sampling Frequency: 48kHz
Signal Level: 0dB FS => 20dBu into high impedance loads (10 kOhms)
Not good for low impedance loads (i.e. 600 Ohm)
Frequency Response: 50Hz to 20kHz: +/- 0.20dB
SNR: >85dB (50Hz to 20 kHz)
THD+N: 65 dB @ 1kHz, 0 dBFS, typical

3.5. GPO

Number of GPO's: 1
Type: TTL
Connector: 9 pin female D connector (same connector as analog audio output)

3.6. SDTI TO OUTPUT DELAY

Video: 2 frames
AES:
    Evertz Source: 5 frames
    Sony Source: 2 frames
VANC: 9 fields

3.7. ELECTRICAL

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

3.8. PHYSICAL

7700 frame mounting: 2 slots
7701 frame mounting: 1 slots

4. STATUS INDICATORS AND DISPLAYS

The 7770DS-HD has 7 LED Status indicators and a 4 digit alphanumeric display on the front card edge to show operational status of the card at a glance. Figure 3 shows the location of the LED's, display and card edge DIP switches.
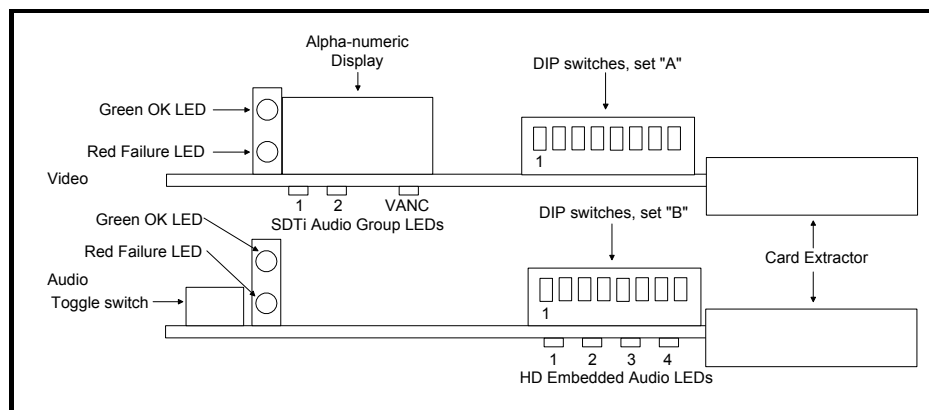
Figure 3: LED and Switch Locations

4.1. STATUS AND INDICATOR LEDS

4.1.1. Module Status LEDs

Two large LED's on the front of the bottom board indicate the general health of the module

LOCAL FAULT: This Red LED indicates poor module health and will be On during the absence of valid embedded audio in group 1 or group 2 of the SDTi input or if a local input power fault exists on the bottom board (i.e.: a blown fuse). The LOCAL FAULT indication can also be reported to the frame through the FRAME STATUS jumper on the bottom board.

MODULE OK: This Green LED indicates good module health. It will be On when both audio groups 1 and 2 are present, and board power is good.

Two large LED's on the front of the top board indicate the presence of video to the module. DIP switches 1 to 3 on the top board are used to select the video standard (see section 5.1). The alphanumeric display will show the video standard in use (see section 4.2).

VIDEO FAULT: This Red LED will be On during the absence of valid video input of the selected standard or if a local input power fault exists on the top board (i.e.: a blown fuse). This condition can also be reported to the frame through the FRAME STATUS jumper on the top board.

VIDEO OK: This Green LED will be On when a valid video signal of the selected standard is present.

4.1.2. SDTi Audio and VANC Present LEDs

There are three small LED's on the back side of the top board that indicate the presence of embedded audio groups 1 and 2 and embedded VANC on the SDTi input.

GROUP 1 PRESENT: This Green LED indicates the presence of Group 1 embedded audio.

GROUP 2 PRESENT: This Green LED indicates the presence of Group 2 embedded audio.

VANC PRESENT: This Green LED indicates the presence of VANC data in either Group 3 or group 4.

4.1.3. HD Output Embedded Audio Present LEDs

There are four small LED's on the backside of the bottom board that indicate the presence of embedded audio on the HD video output.

GROUP 1 PRESENT: This Green LED indicates the presence of Group 1 embedded audio.

GROUP 2 PRESENT: This Green LED indicates the presence of Group 2 embedded audio

GROUP 3 PRESENT: This Green LED indicates the presence of Group 3 embedded audio

GROUP 4 PRESENT: This Green LED indicates the presence of Group 4 embedded audio

4.2. DOT-MATRIX DISPLAY

The 4-digit alphanumeric display located on the card edge of the top board is used to display the video standard in use. If manual video standard selection is set (DIP switch 1 On) then the display will always display the selected standard. If auto standard selection is set (DIP switch 1 Off) the alpha-numeric display will read AUTO until a valid input standard is detected. When valid input video is detected the detected standard will be displayed. The following messages will be displayed.

AUTO	Auto video standard selected, and no video present
59	1080i/59.94 or 1080p/29.97sF
50	1080i/50 or 1080p/25sF
35	1035i/59.94
23	1080p/23.98sF
SD	SDI input, not an SDTi compressed stream

4.3. GPO FUNCTION

The GPO output (pin 8 on the 9 pin D connector) is for use in switching downstream equipment between SD and HD mode. When the 7770DS-HD detects a non SDTi (i.e. SDI) video in it will set this output to 5V. At this time "SD" will be displayed on the dot-matrix display. When SDTi input video is found this output will be 0V (ground).

5. CARD EDGE CONTROLS

The 7770DS-HD is equipped with two 8 position DIP switches to allow the user to select various functions. The DIP switch on the bottom card is used control the embedding of audio on the SDTi output. The DIP switch on the top card is used to set the input video standard. All positions are assigned sequentially such that the first position is located at the top of the DIP switch (farthest from to the card ejector). The On (closed) position is down, or closest to the printed circuit board. The Off (open) position is up, or farthest from the printed circuit board.

Table 3and Table 4 give an overview of the DIP switch functions. Sections 5.1 to 5.9 give detailed descriptions of each of the DIP switch functions. A three position, return to center toggle switch is used to control the volume of the analog audio output.

DIP Switch	Function
1	Group 1 Source Select
2	Group 1 mapping from Input Embedded Groups
3	Group 1 mapping from Input Embedded Groups
4	Group 2 Source Select
5	Group 2 mapping from Input Embedded Groups
6	
7	Group 2 enable/disable
8	Auto/Manual Audio selection

Table 3: Bottom Board DIP Switch Functions

DIP Switch	Function
1	Auto/Manual Video Format Selection
2	Video Standard Selection
3	Video Standard Selection
4	AES input's Sample Rate Converter enable/disable
5	VANC embed to HD enable/disable
6	Audio delay Evertz/Sony
7	Analog monitor audio channel source
8	

Table 4: Top Board DIP Switch Functions

5.1. SELECTING THE OUTPUT VIDEO STANDARD (TOP BOARD)

DIP switches 1 to 3 on the top card control the selection of the output video format. DIP switch 1 selects whether the input video format will be automatically detected or set using DIP switches 2 and 3.

DIP 1	DIP 2	DIP 3	Video Standard
Off	---	---	Auto
On	Off	Off	1080p/23.98sF
On	Off	On	1035i/59.95
On	On	Off	1080i/50 or 1080p/25sF
On	On	On	1080i/59.94 or 1080p/29.97sF

Table 5: Video Standard Switch Settings

5.2. SELECTING HOW THE AUDIO WILL BE OUTPUT (TOP BOARD)

DIP switch 4 on the top card controls whether sample rate conversion is enabled on the AES outputs.

DIP 4	AES output sample rate converter
Off	Disabled
On	Enabled

Table 6: AES Output Sample Rate Converter Enable/Disable Switch Settings

5.3. SELECTING VANC EMBEDDING INTO THE HD OUTPUT (TOP BOARD)

DIP switch 5 on the top card controls whether VANC data, if present in the SDTi stream (see 7770CS manual) will be embedded into the HD stream.

DIP 5	VANC embedder
Off	Disabled
On	Enabled

Table 7: VANC embedder enable/disable Switch Settings

5.4. SELECTING AUDIO DELAY (TOP BOARD)

DIP switch 6 on the top card controls the audio delay through the card. Since the Evertz 7770CS does not delay the audio to synchronize it with the video a longer delay is needed in the 7770DS when the 7770CS is it's SDTi source. If a Sony generated SDTi source is used a shorter audio delay is needed since the SDTi input to the 7770DS will then have the audio and video in sync.

DIP 6	SDTi source
Off	Sony SDTi source (short delay)
On	Evertz 7770CS (long delay)

Table 8: Audio delay Switch Settings

5.5.   SELECTING THE ANALOG AUDIO SOURCE CHANNEL (TOP BOARD)

The 7770DS supports two groups of audio or 4 stereo pairs however only has one stereo pair of analog monitor output. DIP switches 7 and 8 on the top card select which of the four stereo channels transported is output to the analog monitor channels.

DIP 8	DIP 7	Monitor source
On	On	Group one, channel one
On	Off	Group one, channel two
Off	On	Group two, channel one
Off	Off	Group two, channel two

Table 9: Video Standard Switch Settings

5.6.   SELECTING HOW THE AUDIO WILL BE OUTPUT (BOTTOM BOARD)

Up to 2 groups of 4 audio channels can be de-embedded from the 270 Mb/s SDTi bit stream and either be re-embedded on the HD video output or output as AES audio. DIP switch 1 on the bottom board controls whether group 1 will be output as AES1 and AES2 or embedded on the HD output. When DIP switch 1 is set for HD embedded audio, DIP switches 2 and 3 are used to select which group on the HD output will be used to embed the audio according to Table 10

DIP 1	DIP 2	DIP 3	Audio Group 1 Destination
Off	---	---	AES outputs 1 and 2
On	Off	Off	HD Output group 1
On	Off	On	HD Output group 2
On	On	Off	HD Output group 3
On	On	On	HD Output group 4

Table 10: Audio Group 1 Destination Selection Switch Settings

DIP switch 4 on the bottom board controls whether group 2 will be output as AES3 and AES4 or embedded on the HD output. When DIP switch 4 is set for HD embedded audio, DIP switches 5 and 6 are used to select which group on the HD output will be used to embed the audio according to Table 11.

DIP 4	DIP 5	DIP 6	Audio Group 2 Destination
Off	---	---	AES Outputs 3 and 4
On	Off	Off	HD Output group 1
On	Off	On	HD Output group 2
On	On	Off	HD Output group 3
On	On	On	HD Output group 4

Table 11: Audio Group 2 Destination Selection Switch Settings

5.7. SELECTING IF AUDIO GROUP 2 IS ENABLED OR DISABLED (BOTTOM BOARD)

DIP switch 7 on the top board allows the second audio group to be output or not (whether embedded in HD or output as AES). When audio selection is manually controlled this switch should reflect the encoders setting.

DIP 7	Audio Group output
Off	Disabled
On	Enabled

Table 12: Audio Group 2 Enable/Disable Switch Settings

5.8. AUDIO OUTPUT AUTO/MANUAL SELECTION (BOTTOM BOARD)

DIP switch 8 on the top board controls whether the destination for the embedded audio data is determined automatically or by DIP switches 1 through 7 on the bottom board. Note: if VANC transport on the encoder is turned off or an SDTi stream from another product is input and this switch is set to auto (off) then group 1 will be embedded to group 1 of the HD output video and group 2 if it is present will be embedded to group 2 of the HD output video.

DIP 8	Auto Audio destination
Off	enabled
On	disabled

Table 13: Auto/Manual Audio Output Switch Settings

5.9. ANALOG AUDIO MONITOR VOLUME

The toggle switch is used to control the volume of the analog audio outputs. Pressing the switch up (away from the card ejector) increases the volume, and pressing the switch down (towards the card ejector) decreases the volume.

6. JUMPERS

Several jumpers, located at the front of the module are used to preset various operating modes. Figure 4 and Figure 5 show the location of the jumpers on the bottom and top boards respectively.
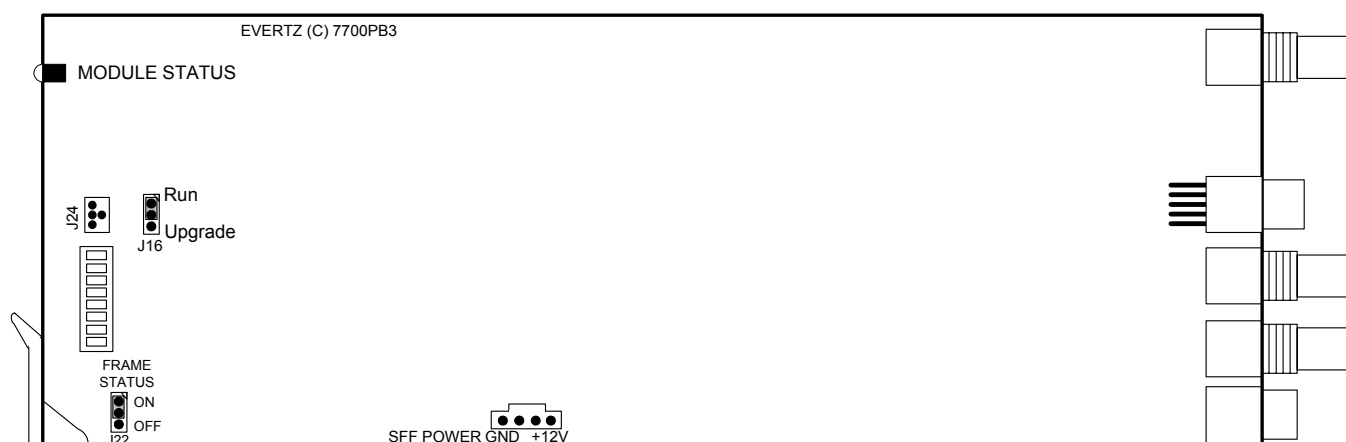
Figure 4: Location of Jumpers Bottom Board

Figure 5: Location of Jumpers Top Board

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

The FRAME STATUS jumper J4 on the bottom board determines whether local faults (as shown by the Local Fault indicator) on the bottom board will be connected to the 7700FR frame's global status bus.

FRAME STATUS   To monitor faults on this module with the frame status indicators (on the Power Supply 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. SELECTING WHETHER LOCAL FAULTS ON THE TOP BOARD WILL BE MONITORED BY THE GLOBAL FRAME STATUS

The FRAME STATUS jumper J4 on the top board determines whether local faults (as shown by the Local Fault indicator) on the top board will be connected to the 7700FR frame's global status bus.

FRAME STATUS   To monitor faults on this module with the frame status indicators (on the Power Supply 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.

6.3. CONFIGURING THE MODULE FOR FIRMWARE UPGRADES

✍	**The UPGRADE jumper J16 is installed on the underside of the bottom board.**

UPGRADE The UPGRADE jumper J5 on the bottom board is used when firmware upgrades are being done to the module. For normal operation it should be installed in the *RUN* position. See the *Upgrading Firmware* chapter of this manual for more information.

To upgrade the firmware in the module unit pull it out of the frame. Move the UPGRADE jumper into the *UPGD* position. Install the Upgrade cable provided (located in the vinyl pouch in the front of this manual) onto the SERIAL header 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 the UPGRADE jumper into the *RUN* position, remove the upgrade cable and re-install the module. The module is now ready for normal operation.