television

orban

audio processing

OPTIMOD-Surround 6585

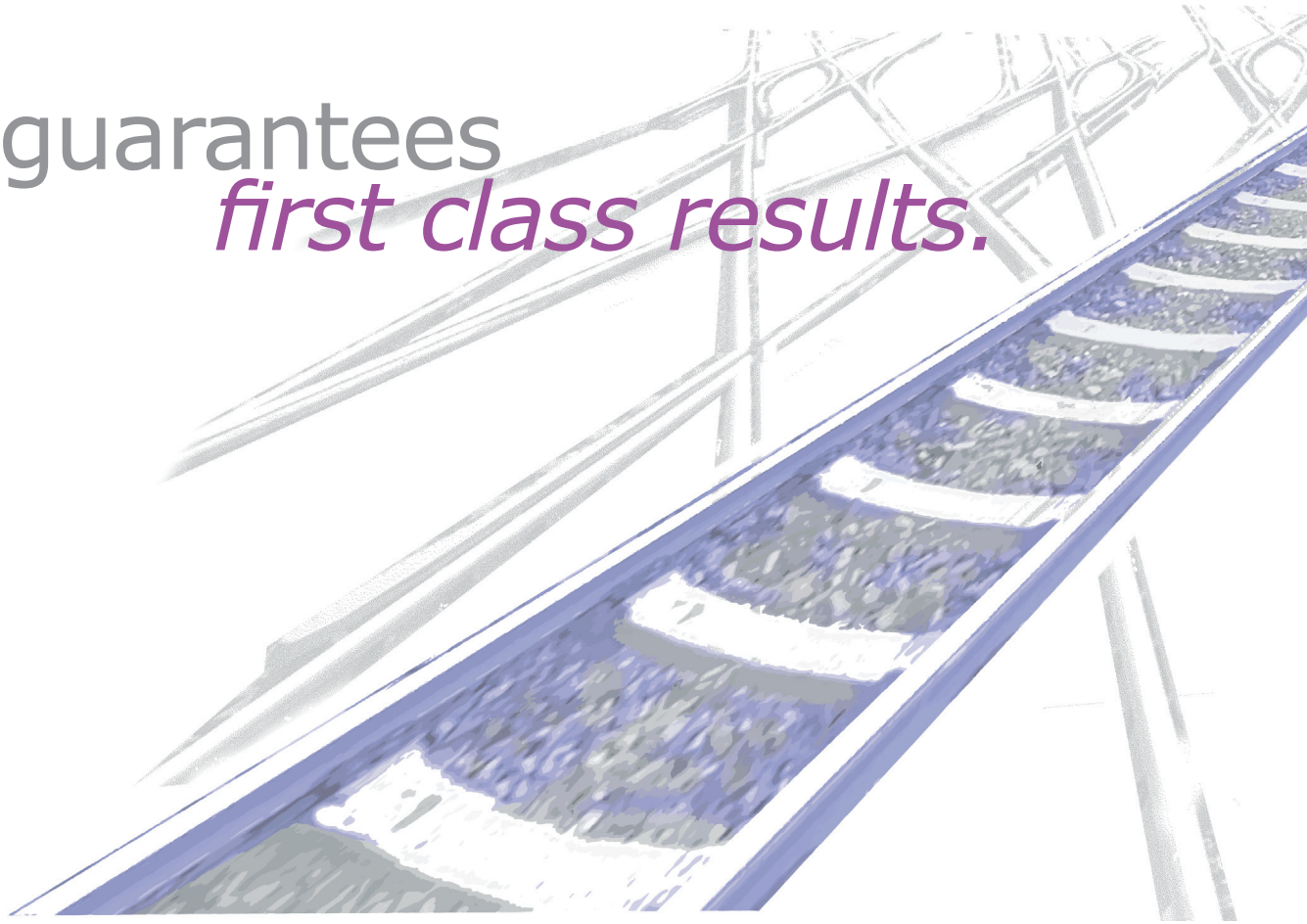
Loudness Controller

Orban's 30+ years of

TV loudness control expertise —

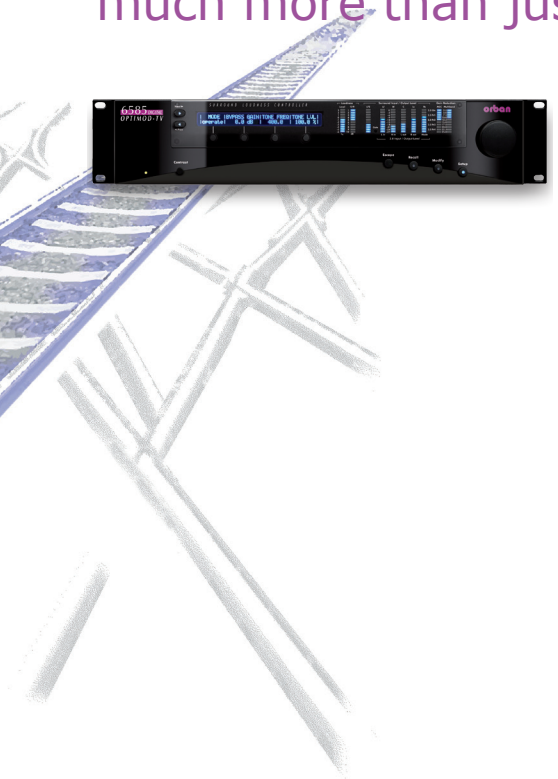
guarantees

first class results.



Orban's value-priced OPTIMOD 6585 surround/stereo television loudness controller builds on Orban's 30+ year experience in television audio processing to provide audibly transparent automatic loudness control and dialog intelligibility control for one surround program (up to 7.1) or four stereo (stereo) programs. The stereo processing can operate in dual-mono mode, so it can process four subchannels in stereo or eight subchannels in mono. Put in-line and operated correctly, the 8685 will ensure that loudness meets the requirements of the CALM Act and EBU R-128.

Artifact-Free Automatic Loudness Control requires much more than just "Processing for the BS.1770 Meter"



The 6585 features 3G HD-SDI and AES3id input/output, plus comprehensive handling of metadata. The 6585 is Dialnorm-aware and can re-author metadata as needed. Seamless switching between processing and pass-through modes (where both audio and metadata are passed through without further processing) allows the 6585 to pass pre-qualified material without modification — you can use the 6585's transparent-sounding loudness control only when needed. This makes it easy to comply with the requirements of network program providers who preprocess their audio feeds to comply with Recommendations A/85 and R-128.

For each logical processing channel (surround or stereo), the 6585 has one loudness controller and two loudness meters. The short-term meter uses second-generation CBS Technology Center loudness metering technology with an integration time of 200 ms, which is slightly faster than a standard VU meter. The long-term meter, which has an integration time of several seconds, is switchable between the ITU-R BS.1770-1 and 1770-2 standards (i.e. ungated or gated). Its readings can be logged for up to a week in the 6585's internal memory and for an essentially unlimited time via the included 6585 PC Remote Software for Windows®. This allows you to retain proof that your transmissions have complied with the CALM Act.

overview

Next and Previous buttons scroll display horizontally to access hidden menu items.

Bright, legible LCD display allows you to recall, edit, and save presets, and to set up system technical parameters like input and output levels.

BS.1770-2 Loudness meter and CBS Loudness Controller gain reduction meters.

Multiband and AGC gain reduction meters for easy setup and alignment.

LCD contrast adjustment optimizes the display to your preferred viewing angle.

Four context-sensitive soft keys repurpose themselves for the task at hand.

Dedicated keys for Escape, Recall Preset, Edit Preset, and System Setup.

Surround and 2.0 I/O level meters

Knob lets you easily customize presets and tweak system setup parameters.

The 6585 controls loudness smoothly and unobtrusively without the unnatural-sounding gain pumping, noise breathing, harshness, stereo image shifts, and compromised dialog intelligibility that can result from naive designs whose only goal is to make a BS.1770 loudness meter look good. Only experienced human listeners can assess these artifacts; the BS.1770 meter cannot indicate them.

Since 1980, Orban has sold thousands of OPTIMOD-TV processors and these have processed millions of hours of on-air programming. No other manufacturer can make this claim. Over the decades, we have constantly refined and polished our loudness control algorithms to provide audibly transparent loudness control that never annoys audiences. Instead of using BS.1770 as a simplistic internal model that determines how loudness is controlled, we use a much more sophisticated multiband psychoacoustic model to do this. This model is based on years of research at CBS Laboratories and CBS Technology Center, and was further refined by us. This model allows the 6585 to control both short-term and long-term loudness. The only purpose of the 6585's built-in BS.1770 meter is to verify that our model controls long-term loudness effectively according to the BS.1770 standard. Thousand of hours of subjective listening tests have verified that our model controls loudness without irritating audiences. The 6585 meters the processing; it doesn't process for the meter.

control for short- & long-term loudness

Automatic loudness control is just the beginning. Because not all program material is mixed perfectly, we have designed the 6585 to re-equalize and de-ess dialog and will automatically correct the balance between dialog and other program elements as necessary.

In surround mode, the 6585 provides a simultaneous stereo downmix that is loudness-controlled, peak-controlled, and pre-emphasis aware, so it can drive an analog TV transmitter in countries that simulcast digital and analog signals. In stereo mode, the four stereo processors can be made pre-emphasis aware, allowing the 6585 to be purchased for immediate use with analog transmitters with the assurance that it will provide no-compromise processing for digital transmissions when the need arises. A second use for the stereo processors is processing up to four different languages in DTV program streams.

non-compromise processing

The 6585 can accept and emit Dolby-E metadata via RS485 serial (per SMPTE RDD 6-2008) and SDI [per SMPTE 2020-2-2008 (Method-A) and SMPTE 2020-3-2008 (Method-B)].

Dual redundant power supplies with independent AC line inputs help ensure maximum uptime.

details

Two analog outputs can emit any output channel or channel pair, including a stereo downmix of the multichannel processing's outputs.

Dual-redundant power supplies with automatic switchover.

RS232 serial connector for computer control, simple ASCII remote control and future developments.

Three AES3id digital inputs – highly configurable via remote-controllable internal routing switchers.

Two RS485 can accept and emit Dolby Digital® metadata.

Three AES3id outputs – highly configurable via remote-controllable internal routing switchers.

Sync input, configurable to accept AES11id or wordclock sync.

HD-SDI input and output supports upto 3Gb/s (3G) rates.

Eight optically isolated GPI inputs for contact-closure remote control.

100 Mbps Ethernet facilitates network control.

6585 Audio Processing in Detail

Experience has shown that the mass television audience wants two things from television audio: dialog should be comfortably intelligible and commercials should not be irritatingly loud compared to program material. Home theater owners may want the opportunity to watch feature films while hearing a wide dynamic range signal. However, even these viewers usually consume television in a much more passive way when viewing garden-variety programs. To be an acceptable part of the domestic environment, television sound cannot overwhelm household members not interested in viewing (not to mention neighbors, particularly in multi-family dwellings). For a variety of reasons, the dynamic range of sound essential to the intelligibility of the program should not exceed 15 dB in a domestic listening environment. Of course, underscoring and ambient sound effects will be quieter than this.

accept the domestic enviroments

Orban understands such issues well. Since 1980, we have provided analog television broadcasters with industry-standard dynamics processors: OPTIMOD-TV 8180, 8182, 8282 and 8382. In 1998, we introduced OPTIMOD-DAB 6200 — two-channel processing specifically tailored for digital channels using lossy compression like Dolby's AC-3, which is used for ATSC transmissions. Our 6300, introduced in 2006, is a second-generation two-channel processor for digital channels, including DTV, DAB and netcasting.

The 6585 features OPTIMOD-quality two-band and five-band audio processing for surround sound broadcasting and netcasting. The multiband processing permits "automatic re-equalization" of program material. The 6585's multiband compressor can automatically re-equalize program material towards a preset target spectral balance by applying more gain reduction to frequency bands containing more power. The 6585 compressor's band coupling controls determine the maximum amount of re-equalization permitted.

In the two-band compressor, automatic re-equalization controls excessive bass, which can otherwise cause muddy balances. The five-band compressor can perform more detailed automatic re-equalization, which can be particularly useful for program material such as live news and for any material where dialog intelligibility is a problem or where de-essing is required.

ideal for mastering

Thanks to versatile compression ratio controls and a mastering-quality look-ahead peak limiter, the 6585 is also ideal for mastering audio in broadcast productions as well as productions intended for media such as DVD and Blu-ray. Our customers know that there is no substitute for the smooth, natural-sounding control that only OPTIMOD provides, particularly with speech material.

In typical analog television practice, all audio is applied to a single transmission audio processor that automatically controls the average modulation and the peak-to-average ratio while smoothing out transitions between program elements. Simple compression and peak limiting cannot do this effectively. Starting with the 8182, all OPTIMOD-TV processors have incorporated various generations of the CBS Loudness Controller™.

much more than procesing for the BS.1770 meter

Developed after 15 years of psychoacoustic research at CBS Laboratories, the CBS Loudness Controller accurately estimates the amount of perceived loudness in a given piece of program material. If the loudness exceeds a preset threshold, the controller automatically reduces it to that threshold. The CBS algorithm has proven its effectiveness by greatly reducing viewer complaints.

In ITU parlance, the CBS Loudness Controller relies on a "short-term" loudness measurement that takes into account the human ear's loudness integration time — approximately 200 milliseconds. The CBS algorithm's attack time is fast enough to prevent audible and irritating loudness overshoots — blasts of sound that have viewers scrambling for their remote controls. Loudness control is always smooth and unobtrusive.

Unlike "long-term" loudness measurement and control technologies, the CBS Loudness Controller recognizes that a piece of program material whose average loudness seems acceptable according to a long-term loudness measurement may nevertheless have short sections whose loudness should be reduced because it is extremely annoying. While main purpose of this processing is to control the loudness of commercials, other exuberantly mixed elements can also benefit. A good example is applause with whistling.

The 6585 starts with the technology of Orban's popular OPTIMOD 6300 and takes it to the next level with surround processing that reflects the latest psychoacoustic research into loudness perception. The 6585's CBS Loudness Controller works in both two-band and five-band modes. Third generation improvements reduce annoyance better than simple loudness control alone, doing so without audible gain pumping.

The 6585 is built on Orban's mid-level hardware platform. This features a monochrome text-mode LCD and full-time LED bargraph meters. The 6585 front panel offers a simplified control and display interface that allows you to set up the technical parameters of the processing, choose a processing preset, and modify it if you wish using Orban's simplified LESS-MORE control. This interface is sufficient for most users.

A guided setup procedure called QUICK SETUP is available from the front panel. U.S. users can comply with the CALM Act by following it, as can European users who wish to comply with EBU R-128. Executing the QUICK SETUP procedure is all that is needed to implement fully effective automatic loudness control.

For those who want more control or feel that the factory presets do not entirely meet their needs, the free 6585 PC Remote software for Windows® PCs displays all metering and technical parameters and allows fine-tuning of processing presets at an extremely detailed level. However, Orban's experienced audio processing experts have carefully crafted the factory presets and we believe that they will meet almost all users' needs.

Unlike audio processors built on a PC platform, dedicated Freescale 24-bit DSP chips do all audio processing in the 6585, while a separate microcontroller supports the GUI and control functions. Even if this controller malfunctions, the 6585 will continue to process audio normally.

Minimum latency of the fully processed signal is 21 milliseconds, which can be padded to exactly one frame delay for any video standard.

The 6585 and

There are three important pieces of metadata in the AC3 bitstream.

- Dialog Normalization, which in essence sets the receiver's volume control to complement the dynamic range of the program material being transmitted.
- Line-Mode Dynamic Range Control, which allows the receiver to perform wideband dynamics compression if the listener chooses.
- RF-mode Dynamic Range Control, which applies more extreme compression.

When used correctly, these can help address the problem of inconsistent loudness between different sources while allowing viewers to individually choose the amount of dynamic compression they hear. However, experience so far has shown that the metadata implementation in the broadcast chain has often been too haphazard to prevent audience irritation.

Orban believes that the most realistic approach to handling AC3 dialog normalization is a hybrid approach. It is important to consider carefully what program material will truly benefit from the ability to be heard

Dolby Digital® (AC3) Metadata

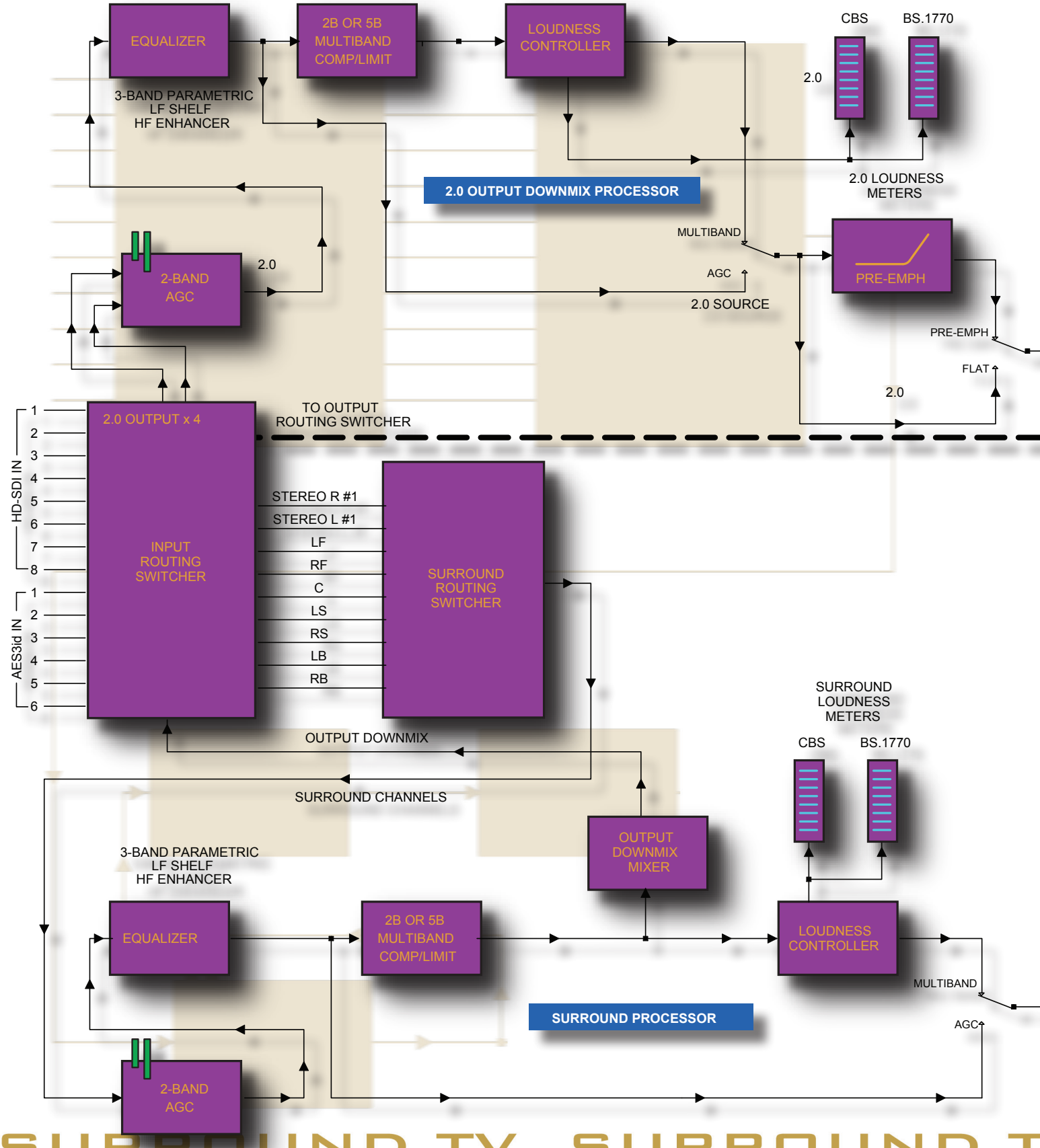
with unprocessed dynamic range. Prime-time dramatic shows, newer feature films, and classical music concerts all use dynamic range for dramatic impact and are therefore candidates for full exploitation of the AC3 DRC metadata. Material that airs with full Dynamic Range Control implemented should be refined in production so that it sounds polished and consistent without further processing. Each show, film, and concert must have a dialog normalization value pre-assigned to it, derived from a BS.1770 meter or preferably, by human audition. It is probably impractical to pass through, without review, dialog normalization values created by program and commercial providers because some commercial providers will inevitably try to game the system to make their commercials excessively loud. Instead, if dialog normalization is to be actively used in transmission, the broadcaster must strip its existing value from the program and then must preview each piece of program material, replacing the value with one that will ensure consistency from one piece of program material to the next.

Even program segments whose Dialnorm value is set automatically according a long-term loudness measurement like ITU BS.1770 may still have short-term loudness peaks that are extremely annoying. Any program material that will not benefit from being heard with full dynamic range should be processed with the 6585 so that viewers can hear the audio comfortably. They should not be blasted by loud effects or commercials or being forced to strain to understand dialog. Most program material, including commercials, live news, sports, most documentaries, game shows, talk shows, soap operas, and pop music videos and concerts, can receive 6585 processing. The 6585 controls subjective loudness very well, so a single dialog normalization value can be applied to all program material whenever the 6585 is online. The advantage of this strategy is that the 6585 will guarantee that all of this material is comfortably listenable and that commercials are not excessively loud. With the possible exception of sports and some concerts, this program material does not rely on extreme dynamic range to make its point, so it is unlikely that compression will damage the artistic integrity of this programming. No one needs more dynamic range on talk shows or on the local news. The 6585 can smoothly activate and defeat its dynamics processing on-air via GPI triggers or other remote control, so it is easy to implement this strategy.

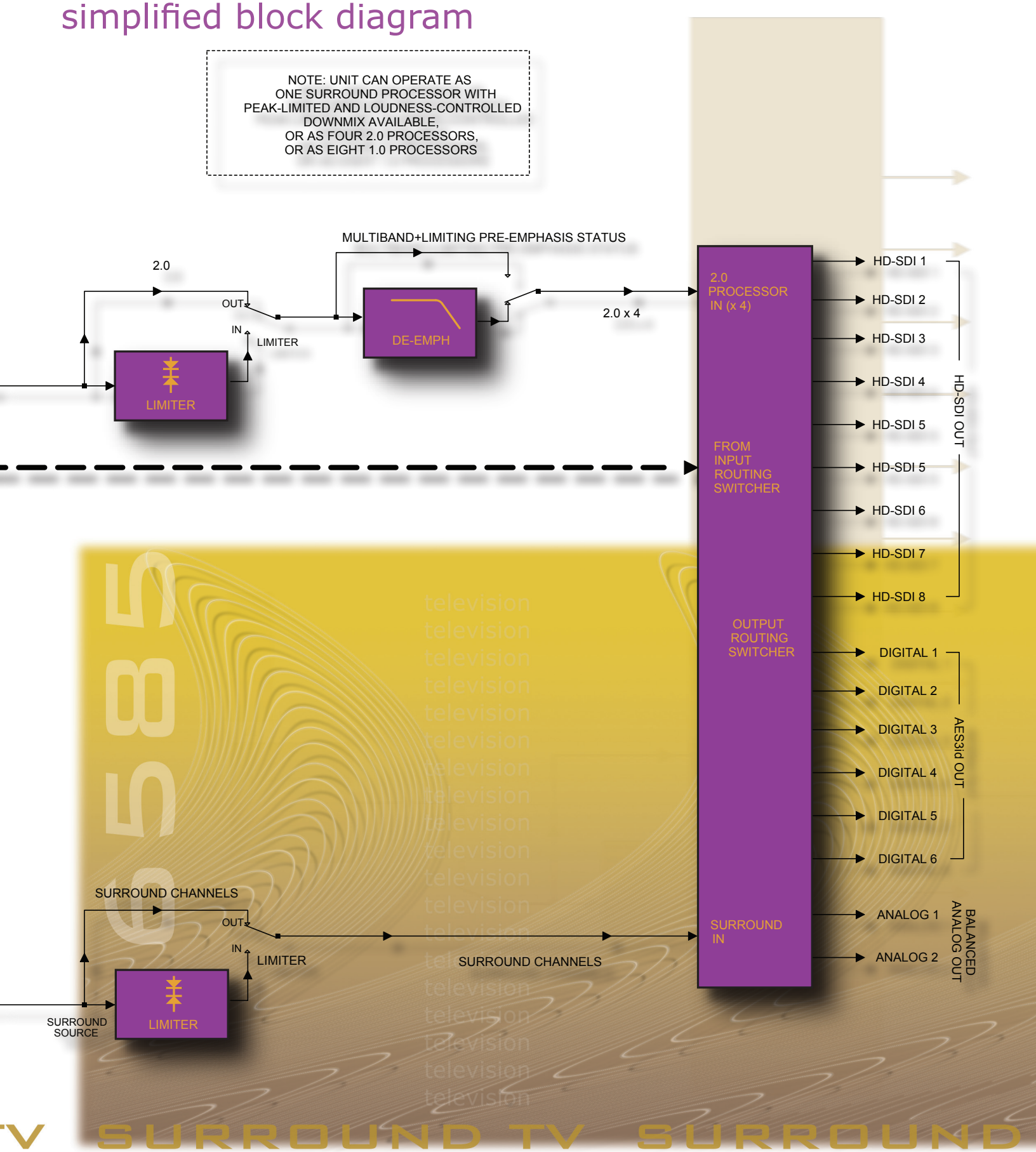
Dynamic range compression in Dolby Digital (using DRC metadata to achieve compression at the receiver) is a simple dynamic gain adjustment performed over the entire audio bandwidth; it does not do automatic re-equalization. The level detector determining the amount of DRC compression is frequency-contoured to mimic the equal-loudness curves of the ear and has the ability to "look ahead" at upcoming program level changes. This is sufficient for many applications, but may be improved with the addition of a multiband device like the 6585 to handle certain programming that may not get sufficient treatment from a single-band device like that in DRC.

The 6585 can convey and process Dolby Digital metadata. See Conveying and Re-authoring Dolby Metadata in the Specifications section.

6585 tv loudness controller



simplified block diagram



features & benefits

USER FRIENDLY INTERFACE	
LCD and **full-time LED meters**	An **LCD** and **full-time LED meters** make setup, adjustment and programming of the 6586 easy — you can always see the metering while you're adjusting the processor. Navigation is by dedicated buttons, soft buttons (whose functions are context-sensitive), and a large rotary knob. The LEDs show all metering functions of the processing structure (Two-Band or Five-Band) in use.
ABSOLUTE CONTROL OF PEAK MODULATION	
Precise control of **peak levels**	The 6585 **precisely controls peak levels** to prevent digital clipping. The maximum level of the digital samples is controlled to better than 2%.
Pre-emphasis limiting for the two standard pre-emphasis curves of **50 µs** & **75 µs**	While **primarily oriented toward "flat" media**, the 6585's stereo processors can also provide pre-emphasis limiting for the two standard pre-emphasis curves of 50 µs and 75 µs. This allows the 6585 to protect pre-emphasized microwave links, satellite uplinks and similar channels where protection limiting or light processing is required. It can also drive an analog television transmitter.
	Note that the 6585's stereo processing cannot provide simultaneous, independent audio processing for flat and pre-emphasized channels. Even though one output may be pre-emphasized while other is flat, the only difference between the outputs is that the "flat" output has de-emphasis applied to it after the processing while the pre-emphasized output does not.
FLEXIBLE CONFIGURATION	
Up to four processors in one	A gain-coupled multichannel processor for **up to 7.1 channels** or **four independent stereo processors** (each of whose performance is equivalent to an 6300) that can be used for many tasks such as processing the audio for a second language or for processing up to four ATSC subchannels.
Processing in **dual-mono mode**	The 6585's **stereo processing offers a dual-mono mode** that allows two entirely separate mono programs to be processed, facilitating multiple-language operation.
	In this mode, both processing channels operate using the same processing parameters (like release time); you cannot adjust the two channels to provide different processing textures.
Video delay by up to 11 frames	The 6585 can **delay the video** by up to 11 frames **to match the delay of the 6585's loudness processing** (typically 20 ms) and optional Penteo™ upmixer.
Input and output interfaces	The I/O interface includes an **HD-SDI input and output** [(per SMPTE 259M); **1.5 Gbit/s HD-SDI** (per SMPTE 292M; up to 720p and 1080i) and **3.0 Gbit/s single-wire HD-SDI** (per SMPTE 424M; 1080p)], plus three **AES3id inputs** and three **AES3id outputs**, which can be used as a loop-through for Orban's Penteo® 2.0→5.1 upmixer or to provide I/O for up to three channels of stereo processing.
Hard-wire safety bypass	**Relays** provide **hard-wire safety bypass** from the **SDI input** to the **SDI output** and from corresponding **AES3id inputs** to **outputs**.
Use 6585 as an **AES splitter**	Via the internal output routing switcher, a given output signal can be applied to more than one hardware output. This allows using the 6585 as an **AES splitter**.
Highly configurable via routing switchers	OPTIMOD 6585's inputs and outputs are **highly configurable via remote-controllable internal routing switchers**. Additionally, the outputs of the multichannel and stereo processing chains can be independently configured to emit the output of the **AGC** or the output of the **multiband compressor/limiter**, all configurable to use or bypass look-ahead limiting.
Highest transparency and **accurate pulse response**	A **stereo analog monitor output** appears on XLR connectors on the rear panel. It can be configured to emit any 6585 output signal, including a downmix of the multichannel audio. The analog outputs are transformerless, balanced and floating (with 50 Ω impedance) to ensure **highest transparency and accurate pulse response**. They can be used to drive a transmitter, although their normal function is monitoring.

features & benefits

Dolby Digital metadata accepted and emited	Two **RS485 serial ports** allow the 6585 to **accept and emit Dolby Digital metadata**. Metadata can also be de-embedded and re-embedded in the HD-SDI VANC area [per SMPTE 2020-2-2008 (Method-A) or SMPTE 2020-3-2008 (Method-B)].
Video sync via BNC connector	A BNC connector can accept **video sync** per SMPTE 274M and SMPTE 296M, which can be used as a **reference for the output audio sample rate** and to correctly **align metadata frames** with video per Dolby's requirements. The signal applied to the SDI input can also be used as a sync reference.
Audio sync input	An **audio sync input** is configurable to accept **AES11id** or **wordclock** sync. You can synchronize the output sample rate of all AES3id outputs to this input. You can also **synchronize the outputs** to the **AES3 digital input #1**, the **SDI input,** the **Video Sync input** or the **6585's internal crystal-controlled clock**. The sync source of each AES3 output is independently selectable.
Dual power supplies	**Dual power supplies** with independent AC line inputs provide redundant operation.
RFI-suppressed	All input, output and power connections are **rigorously RFI-suppressed** to Orban's traditional exacting standards, ensuring trouble-free installation.
International safety and **emissions standards**	The 6585 is designed and certified to **meet all applicable international safety and emissions standards**.
ADAPTABILITY THROUGH MULTIPLE AUDIO PROCESSING STRUCTURES	
Complete **audio processing system**	A **processing structure** is a program that operates as a complete audio processing system. Only one processing structure can be on-air at a time. OPTIMOD 6585 realizes its processing structures as a series of high-speed mathematical computations made by Digital Signal Processing (DSP) chips.
Two processing structures	The 6585 features **two processing structures: Five-Band** for a spectrally consistent sound and **Two-Band** for a more transparent sound that preserves the frequency balance of the original program material.
"Protect" function	A special Two-Band preset creates a no-compromise **"Protect" function** that is functionally similar to the "Protect" structures in earlier Orban digital processors.
Mute-free crossfade	The Five-Band and the Two-Band structures can be switched via a **mute-free crossfade**.
Pass-Through via **remote control** or **clock-based automation**	**Audio processing can be smoothly activated and defeated on-air**, allowing programs that can benefit from full dynamic range to pass through the 6585 without dynamics compression. This **pass-through mode**, which passes both audio and metadata, can be activated and defeated via **clock-based automation**, from the 6585's front panel, from 6585's PC Remote software, from 6585's programmable GPI inputs, or from 6585's Ethernet or RS232 serial API.
Phase-linear processing structures	The 6585's processing structures are all **phase-linear** to maximize audible transparency.
CBS Loudness Controllers™	The 6585 includes third-generation **CBS Loudness Controllers™ for DTV applications**. Loudness controllers are available in the **surround** and **2.0 processing modes** and work with the both Two-Band and Five-Band structures. The third-generation improvements **reduce annoyance more than simple loudness control alone**, doing so without audible gain pumping. Attack time is fast enough to prevent audible loudness overshoots, so the control is smooth and unobtrusive. Material processed by the CBS Loudness Controller™ has been shown to be well controlled when measured with a long-term loudness meter using the ITU-R BS.1770-2 standard.

features & benefits

ADAPTABILITY THROUGH MULTIPLE AUDIO PROCESSING STRUCTURES *(continued)*	
Rides gain over an adjustable range of up to 25 dB	The 6585's **AGC rides gain** over an adjustable range of up to 25 dB, compressing dynamic range and compensating for both operator gain-riding errors and gain inconsistencies in automated systems. The AGC output is available to drive STLs, so the 6585 can be used as a studio AGC.
48-bit equalizers and crossovers	The 6585's equalizers and crossovers use **48-bit arithmetic to ensure mastering-quality noise** and **distortion performance**.
Orban's **PreCode™** technology	Orban's **PreCode™** technology manipulates several aspects of the audio to minimize artifacts caused by low bitrate codecs, ensuring consistent loudness and texture from one source to the next. It is particularly useful when processing for netcasts or mastering for any low bitrate channel. PreCode™ includes special audio band detection algorithms that are energy and spectrum aware. This can improve codec performance on some codecs by reducing audio processing induced codec artifacts, even with program material that has been preprocessed or mastered by other processing than OPTIMOD. There are several factory presets tuned specifically for low bitrate codecs.
CONTROLLABLE	
Eight programmable, optically isolated **"general-purpose interface" (GPI) ports**	The 6585 can be **remote-controlled by 5 - 12 V pulses** applied to eight programmable, optically isolated "general-purpose interface" (GPI) ports. These can be programmed to recall factory and user presets, factory and user setups, and to activate test modes.
6585 PC Remote software	**6585 PC Remote software** is a smooth, responsive graphical application that runs under Windows XP and Vista. It communicates with a given 6585 **via TCP/IP over modem, direct serial and Ethernet connections**. You can configure PC Remote to switch between many 6585s via a convenient organizer that supports giving any 6585 an alias and supports grouping multiple 6585s into folders. Clicking an 6585's icon causes PC Remote to connect to that 6585 through an Ethernet network or initiates a Windows Dial-Up or Direct Cable Connection if appropriate. The PC Remote software allows the user to access all 6585 features and allows the user to archive and restore presets, automation lists, and system setups (containing I/O levels, digital word lengths, GPI functional assignments, etc.).
Remote administration over **TCP/IP**	An API provides **remote administration over TCP/IP via the RS232 serial or Ethernet ports**. The 6585 hosts a TCP/IP terminal server to allow external control of the 6585 from either a Telnet/SSH client or a custom third party application. All commands are **simple text strings**. You can recall presets, operate the input and output routing switchers and more. Password security is provided.
Versatile **real-time clock**	The 6585 contains a versatile **real-time clock**, which allows automation of various events (including recalling presets) at pre-programmed times. To ensure accuracy, the clock can be synchronized to an Internet timeserver.
Silence alarm and **tally outputs**	**Silence alarm** and **digital audio fault tally outputs** are available.
Bypass Test Mode	A **Bypass Test Mode** can be invoked locally, by remote control (from either the 6585's GPI port or the 6585 PC Remote application) or by automation to permit broadcast system **test and alignment** or "proof of performance" tests.
Built-in **line-up tone generator**	The 6585 contains a **built-in line-up tone generator**, facilitating quick and accurate level setting in any system.
Software Upgrade	The 6585's **firmware can be upgraded** from PC Remote software. The upgrade can occur remotely through the 6585's Ethernet port or serial port (connected to an external modem) or locally (by connecting a Windows® computer to the 6585's serial port through the supplied null modem cable or to the 6585's Ethernet port via a crossover Ethernet cable).

About Surround Synthesis

When the 6585 was first introduced, we chose not to include stereo to 5.1 surround synthesis. There were several technical reasons (including stereo and mono downmix compatibility), but our dominant concern was the subjective quality of the algorithms, none of which sounded fully convincing and some of which sounded downright ridiculous.

Since then, we have evaluated and licensed the Penteo® Surround "panorama slicing"™ algorithm (http://www.penteosurround.com/). For the first time, we heard an upmix that sounds like discrete five-channel while preserving the balance of the stereo source without coloration. We were particularly impressed by Penteo's ability to place dialog firmly in the center channel even when the mix includes other elements placed around the stereo soundstage. Moreover, Penteo surround material downmixes back to the original stereo, absolutely respecting the vision of the original mixing engineers.

"The Penteo system is based on entirely new stereo analysis," says John Wheeler, Penteo, LLC founder and inventor of the new technology. "We believe it's the first truly significant breakthrough in the art of converting stereo into 5.1 surround sound in the last 15 years."

Orban's Penteo upmixer for the 6585 resides in a stand-alone 1 rack unit chassis that is controlled by the 6585 via an Ethernet connection The Penteo unit will only upmix if it detects a controlling 6585 on the same subnet; otherwise it will remain in "pass-through" mode.

The Penteo upmixer has three AES3 inputs and three AES3 outputs. In a facility using the 6585's AES3id I/O, the Penteo upmixer is placed immediately before the 6585's inputs in the signal chain. In facilities using HD-SDI I/O, the 6585's three AES3id inputs and outputs allow the Penteo upmixer's I/O to be wired in a loopthrough configuration that allows audio originally embedded in the HD-SDI bitstream to be sent to the Penteo upmixer and then to the 6585 for loudness processing. Penteo includes a cable assembly for this purpose.

The Penteo upmixer expects stereo material to be applied to its Lf/Rf input. Program-adaptive automatic mode switching is available, where the Penteo detects whether its input is receiving stereo or 5.1 material and automatically activates upmixing if it detects stereo. If 5.1 material is detected, it is passed through to the Penteo's output with the same delay as the upmixed material, preserving AV sync. One can also control the Penteo's modes from the 6585 by using its GPI, clock-based automation, terminal mode via RS232 or Ethernet, or PC Remot e via RS232 or Ethernet.

The combined delay of the Penteo and OPTIMOD processing is a minimum of about 281 ms. The 6585's HD-SDI signal path automatically delays the video to maintain AV-sync.

specifications

It is impossible to characterize the listening quality of even the simplest limiter or compressor based on specifications because such specifications cannot adequately describe the crucial dynamic processes that occur under program conditions. Therefore, the only way to evaluate the sound of an audio processor meaningfully is by subjective listening tests.

Certain specifications are presented here to assure the engineer that they are reasonable, to help plan the installation, and make certain comparisons with other processing equipment.

PERFORMANCE	**Frequency Response** (Bypass Mode)	±0.10 dB, 20 Hz–20 kHz for 44.1 kHz or higher input/output sample rates. At 32 kHz input and/or output sample rate, the passband is reduced to approximately 14.7 kHz.
PERFORMANCE	**Noise**	Output noise floor will depend upon how much gain the processor is set for (Limit Drive, AGC Drive, Two-Band Drive, and/or Multiband Drive), gating level, equalization, noise reduction, etc. The dynamic range of the A/D Converter, which has a specified overload-to–noise ratio of 110 dB, primarily governs it. The dynamic range of the digital signal processing is 144 dB.
PERFORMANCE	**Polarity** (Bypass Mode)	(Operate Mode when processing chain is configured for linear phase): Absolute polarity maintained. Positive-going signal on input will result in positive-going signal on output.
PERFORMANCE	**Internal Processing Sample Rate**	48 kHz. We believe this provides maximum audible transparency by minimizing numerical "noise" in the equalizers and filters while still preserving a pure, transparent sound. The double-precision equalizers and crossover filters used throughout the 6585 produce at least 6 dB lower noise and nonlinear distortion than they would at 96 kHz.
PERFORMANCE	**Processing Resolution**	Internal processing has 24 bit (fixed point) or higher resolution; uses 9 Freescale (formerly Motorola) 250 MHz DSPB56724 dual-core 24-bit fixed-point DSP chips.
PERFORMANCE	**Delay**	The minimum available input/output delay is approximately 20 ms with look-ahead limiting active and 6 ms with look-ahead limiting bypassed. This can be padded to exactly one or two frames of 24, 25, 29.97, 30, 50, 59.94 or 60 frames/second video up to a maximum delay of 60 ms. (Two frames are required for 59.94/60 fps progressively scanned video.) HD-SDI I/O provides video delay of up to 11 frames to compensate for the delay of the 6585's loudness processing (approximately one frame) and optional Penteo® upmixer (approximately seven frames).
PERFORMANCE	**Surround Processing Stereo Coupling**	All channels of the AGC and compressors are coupled using r.m.s. summation. The user can select whether or not the LFE channel contributes to the r.m.s. sum in the AGC and compressor control sidechains. Peak limiters in the multiband compressor limiter and look-ahead limiters all operate uncoupled to prevent transients in a given channel from causing audible loudness modulation in other channels. In additional, the compressors acting on the center channel can be uncoupled from the remaining channels within a user-selectable window, allowing the processing to correct the balance between dialog and remaining program elements automatically.
PERFORMANCE	**2.0 Processing Stereo Coupling**	Stereo or dual-mono. In dual-mono mode, both processing channels have the same subjective adjustments (as determined by the active preset) but are otherwise independent, making this mode appropriate for dual-language transmissions. In stereo mode, the user can set the maximum permitted gain difference between the channels in each band of the multiband compressor/limiter. stereo Stereo/Dual-Mono operating mode can be set via GPI, Ethernet and serial connections, internal clock-based automation, and AES3 Status Bits.
PERFORMANCE	**Loudness Level Meter (x4)**	One meter for the surround processing or four meters for the four stereo processing channels, all meters realized in software. For a given processing chain, two meters operate simultaneously: a long-term loudness meter displays loudness over an ungated 3-second integration time or 10-second integration time using the ITU-R BS.1770-2 algorithm (per ATSC A/85 and EBU R-128) and a short-term loudness meter uses the Jones & Torick algorithm developed at CBS Technology Center in 1981. The Jones & Torick meter's display time constants are matched to the psychoacoustic loudness integration time of the human ear, reaching steady-state level in approximately 200 ms and having a decay time constant of approximately 300 ms. Hence, this meter can indicate the momentary loudness of transient events like pistol shots, which may be annoying to viewers but which the BS.1770-2 meter ignores because of its longer integration time. (B. L. Jones & E. L. Torick: "A New Loudness Indicator for Use in Broadcasting," J. SMPTE, September 1981, pp 772-777.) One ITU BS.1770-2 meter is always displayed on the 6585's front-panel; it indicates the Surround loudness when the 6585 is in Surround mode and it indicates the stereo loudness of one of the four stereo processing channels (user selected) when the 6585 is in stereo Mode. In 8685 PC Remote software, all four loudness meters are displayed simultaneously when the 6585 is in stereo mode.

AES3id Digital Audio Inputs (x3)	
Configuration	Each of three hardware inputs accepts two audio channels per AES3id standard, 24 bit resolution. Internal programmable routing switcher allows any of the six physical audio input channels to be routed to the LF, RF, C, LB1, RB1, LFE, LB2, RB2, STEREO L1, STEREO R1, STEREO L2, STEREO R2, STEREO L3, STEREO R3, STEREO L4, or STEREO R4 inputs of the audio processing. For the stereo processing, unit can detect Stereo or Two-Channel status bits appearing at Input #1 and switch the stereo processor between stereo and dual-mono modes.
User Bits	Unit can pass AES3id User Bits from Input #1 to Output #1.
Sampling Rate	32, 44.1, 48, 88.2 or 96 kHz, automatically selected.
Connector	BNC, female, shell bypassed to chassis via 1000 pF capacitor, EMI-suppressed. 75 Ω impedance, terminated.
Input Reference Level	Variable from –30 dBfs to –10 dBfs.
Hard-Wire Bypass	Hard-wire relay bypass connects corresponding AES3id inputs and outputs when the 6585 is unpowered or if certain faults have been detected automatically.
Filtering	RFI filtered.
AES3id Digital Audio Outputs (x3)	
Configuration	AES3id. Internal, remote-controllable routing switcher allows sending LF, RF, C, LB1, RB1, LFE, LB2, RB2, DOWNMIX L, DOWNMIX R, STEREO L1, STEREO R1, STEREO L2, STEREO R2, STEREO L,3 STEREO R3, STEREO L4 and STEREO R4 to any hardware output channel.
Sampling Rate	Internal free running at 32, 44.1, 48, 88.1 or 96 kHz, selected in software. Can also be synced to the AES3id Input #1,or to the sync input (which supports AES11id and wordclock) at 32, 44.1, 48, 88.1 or 96 kHz, as configured in software. (Passband is limited to approximately 14.7 kHz when using 32 kHz input and/or output sample rate.)
Word Length	Software selected for 24, 20, 18, or 16-bit resolution. First-order highpass noise-shaped dither can be optionally added, Dither level is automatically adjusted to complement the word length.
Connector	BNC, female, shell bypassed to chassis via 1000 pF capacitor, EMI-suppressed. 75 Ω impedance, terminated.
Output Level	(100% peak modulation): –20.0 to 0.0 dBfs software controlled.
Filtering	RFI filtered.
Audio Reference Input	
Configuration	Can accept wordclock or AES11id (75 Ω) sync, automatically detected.
Connector	Female BNC.
Termination	Internally terminated with 75 Ω.
Conveying and Re-authoring Dolby Metadata	
Automatically conveying of active surround metadata value	The 6585 can, via an SMPTE RDD 06-2008-compliant RS485 serial connection or via an HD-SDI connection, automatically convey its active surround metadata value to a downstream Dolby Digital encoder like the Dolby DP-569, which must be set up according to its operating instructions to receive and act upon this input. This greatly reduces the possibility that operator error will cause the wrong value of surround metadata to be transmitted to consumers.
	To emit an RDD 06-2008-compliant signal, the 6585 must be receiving a valid input stream that is compliant with RDD 06-2008—this is necessary to synchronize the output metadata to video frame boundaries per the Dolby specification. When a valid input stream in present, the 6585 passes this stream unchanged to its output except for the following modifications:
	• The ac3_dialnorm word in the output metadata stream is re-authored so it is the same as the 6585's active Dialnorm value. • The ac3_dynrnge word in the output stream is set to 0, indicating that the downstream AC3 encoder must re-author the line-mode DRC metadata, following the level compression profile found in the ac3_dynrng1 word in the input metadata. • The ac3_compre word in the output stream is set to 0, indicating that the downstream AC3 encoder must re-author the RF-mode DRC metadata, following the level compression profile found in the ac3_compr1 word in the input metadata.

specifications

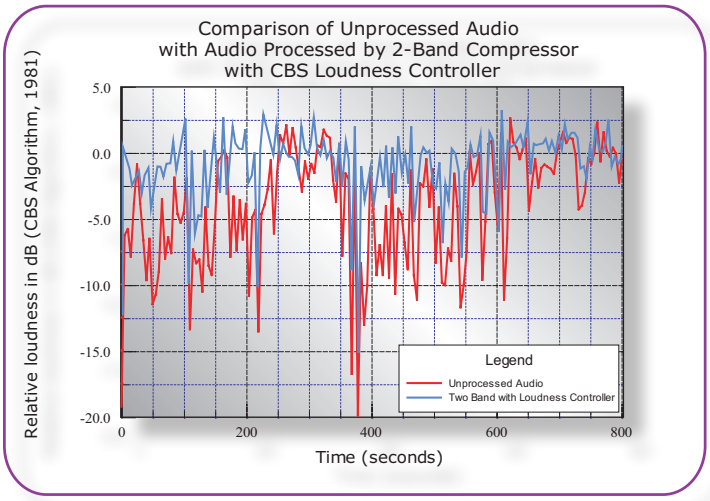
HD-SDI Input/Output	
HD-SDI and 3x AESid Inputs/Outputs	SD-SDI (per SMPTE 259M); 1.5 Gbit/s HD-SDI (per SMPTE 292M; up to 720p and 1080i) and 3.0 Gbit/s single-wire HD-SDI (per SMPTE 424M; 1080p). Input and output are on BNC connectors. A bypass relay is provided. Unless the bypass relay is directly connecting the HD-SDI input to the HD-SDI output (which is true when no AC power is applied to the 6585), the HD-SDI input is internally terminated with 75 Ω.
	Supports only SDI audio channels 1 through 8.
	Includes up to 11 frames of video delay to preserve AV-sync. Normal 6585 loudness control processing requires one frame of delay; the Penteo upmixer requires an additional 261 ms delay.
	Supports Dolby-E metadata received through HD-SDI and RS485 interfaces per SMPTE RDD 06-2008. The metadata in the HD-SD stream must be embedded the HD-SDI VANC data per SMPTE 2020-2-2008 (Method-A) or SMPTE 2020-3-2008 (Method-B).
	Includes a video reference input (per SMPTE 274M and SMPTE 296M) that can be used as a reference for the output audio sample rate and to correctly align Dolby-E metadata with video per Dolby's requirements (SMPTE RDD 6-2008 and Dolby Labs published specifications) in cases where HD-SDI is not in use. When HD-SDI is in use, frame sync is obtained from the HD-SDI input stream. The video reference input is on a female BNC connector and is internally terminated with 75 Ω.
Analog Audio Outputs	
Configuration	One pair of outputs, which can be configured in software to emit LF, RF, C, LB1, RB1, LFE, LB2, RB2, STEREO L, STEREO R, DOWNMIX L, DOWNMIX R, LF/RF, C, LB1/RB1, LB2/RB2, STEREO L/R and DOWNMIX L/R signals.
Source Impedance	50 Ω, electronically balanced and floating.
Load Impedance	600 Ω or greater, balanced or unbalanced. Termination not required or recommended.
Output Level	(100% peak modulation): Adjustable from –6 dBu to +24 dBu peak, into 600 Ω or greater load, software-adjustable
Signal-to-Noise	≥ 100 dB unweighted (Bypass mode, 20 Hz – 20 kHz bandwidth, referenced to 100% modulation).
Distortion	≤ 0.01% THD (Bypass mode, de-emphasized) 20 Hz – 20 kHz bandwidth.
Connectors	Two XLR-type, male, EMI-suppressed. Pin 1 chassis ground, Pins 2 (+) and 3 electronically balanced, floating and symmetrical.
Filtering	RFI filtered.
Audio Sync Input	
Configuration	Can accept wordclock or AES11id (75 Ω) sync, automatically selected.
Connector	Female BNC, shell grounded to chassis.
Termination	Internally terminated with 75 Ω.
Remote Computer Interface	
Configuration	TCP/IP protocol via direct cable connect, modem, or Ethernet interface. Modem is not supplied.
Serial Port	115 kbps RS232 port DB-9 male, EMI-suppressed.
Ethernet Port	100 Mbit/sec on RJ45 female connector.
RS485 Serial Interface (x2)	
Hardware	115 kbps RS485 port DB-9 male, EMI-suppressed.
Compatibility	Designed to be hardware-compatible with Dolby-E hardware that sends and receives Dolby-E metadata.
Remote Control (GPI) Interface	
Configuration	Eight (8) inputs, opto-isolated and floating.
Voltage	6 – 15 VAC or VDC, momentary or continuous. 12 VDC provided to facilitate use with contact closure.
Connector	DB-25 male, EMI-suppressed.
Control	User-programmable for any eight of user presets, factory presets, bypass, test tone, stereo or mono modes, analog and digital input.
Filtering	RFI filtered.

INSTALLATION

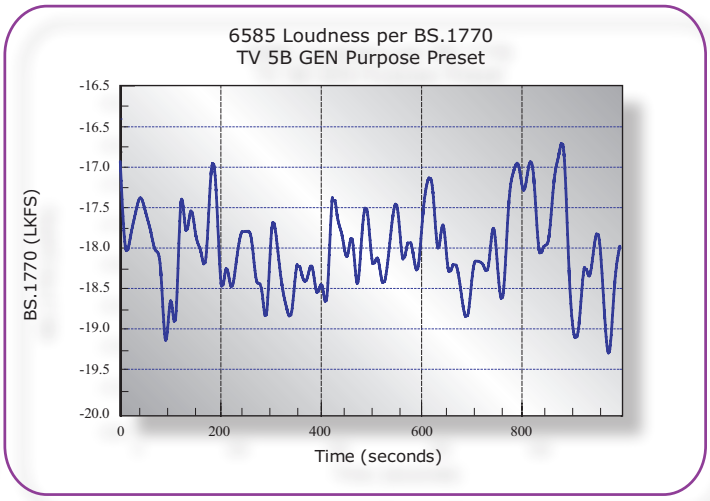
Tally Outputs	
Circuit Configuration	Two NPN open-collector outputs.
Voltage	+15 Volts maximum. Do not apply negative voltage. When driving a relay or other inductive load, connect a diode in reverse polarity across the relay coil to protect the driver transistors from reverse voltage caused by inductive kickback.
Current	30 mA maximum.
Indications	Tally outputs can be programmed to indicate a number of different operational and fault conditions.
Power	
Voltage	100 – 264 VAC, automatically selected, 50 – 60 Hz, 75 VA.
Connector	IEC, EMI-suppressed. Detachable 3-wire power cord supplied.
Configuration	Two independent power supplies with independent IEC input connectors. Power supply health is monitored and the good supply is automatically connected to the load should one supply fail.
Safety Standards	ETL listed to UL standards, CE marked.
Environmental	
Operating Temperature	32 to 122 °F / 0 to 50 °C for all operating voltage ranges.
Humidity	0 – 95% RH, non-condensing.
Dimensions (W x H x D)	19” x 3.75” x 15.5” / 48.3 cm x 9.5 cm x 39.4 cm. Two rack units high.
RFI / EMI	Tested according to Cenelec procedures. FCC Part 15 Class A device.
Shipping Weight	40 lbs. / 18.1 kg
Warranty	
Two Years, Parts and Service	Subject to the limitations set forth in Orban’s Standard Warranty Agreement.

Because engineering improvements are ongoing, specifications are subject to change without notice.

Automatic Loudness Control in Television Broadcast:Orban’s Implementation of the CBS Loudness Meter and Loudness Controller



Loudness control of the 6585 when loudness is measured using the ITU-R BS.1770 algorithm



www.orban.com

r12-2012_RO/Lo

ORBAN Headquarters
8350 East Evans, Suite C4 | Scottsdale, AZ. 85260 USA
[p] +1 480.403.8300 | [f] +1 480.403.8301 | www.orban.com

Northern California Design Center Group
14798 Wicks Blvd. | San Leandro CA 94577 USA
[p] +1 480.403.8300 | [f] +1 480.403.8301 | [e] info@orban.com

ORBAN Europe GmbH
Businesspark Monreposstr. 55 | 71634 Ludwigsburg Germany
[p] +49 7141 22 66 0 | [f] +49 7141 22 66 7 | www.orban-europe.eu

ORBAN Netherlands B. V.
Signaal 74 | 1446 XA Purmerend, Netherlands
[p] +31 299 40 25 77 | [f] +31 299 40 29 04