

# CM-8E Manual

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## Booth Monitor



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## 1.0 Safety Notice

### Safety Notices

Review the following safety precautions to avoid injury and prevent damage to this product. To avoid potential risk, use this product only as specified and only for the purpose described in the instruction manual.

#### To Avoid Fire and Personal Injury:

- **Use correct power cable.** Use only the power cable provided. Ensure that the AC power outlet is located near the product and is easily accessible.
- **Use a correctly grounded power source.** The power supply earth ground is established through the ground conductor in the power cable. To avoid the potential of electric shock, the ground conductor must be correct.
- **Observe source ratings.** To avoid risk of fire or electric shock, the power source must be 100 – 240 VAC, 50 – 60 Hz.
- **Do not operate with suspected failures.** If you suspect there is damage or malfunction with this product, call the factory.
- **Do not attempt repair.** Only a trained factory service person is authorized to repair this product.
- **Do not operate this product near heat sources.** This product should not be located near heat sources such as radiators, heat registers, or stoves.
- **Provide proper ventilation.** The operating temperature range is between 0° C and 40° C. The humidity range is between 20% and 80%, non-condensing. The cooling method is convection.
- **Keep product surfaces clean and dry.** Disconnect the power cable from the power source before cleaning. Do not use liquid cleaners or aerosol cleaners. Use a damp cloth for cleaning.
- **Do not push objects into openings of this product.** Never insert objects into the product through openings.
- **Do not operate in wet or damp conditions.**
- **Do not operate in an explosive atmosphere.**
- **Inspect the power cable and all cables prior to use.** Confirm that the power cable and other interconnecting cables are free from damage.

## 2.0 Regulatory Compliance

### EN 60950-1

The EN 60950-1 standard specifies the safety design requirements that reduce or eliminate the risk of personal injury to both the product user and service personnel. This product is designed and tested to meet the standards of the International Electrotechnical Commission (IEC)

European Norm EN 60950-1, IEC 60950-1 (the standard for information technology equipment including electrical business equipment).

### **Le Résumé de la Sécurité general Européen**

Examinez les précautions de la sécurité suivantes éviter la blessure et prévenir le dégât à ce produit. Éviter le risque potentiel, utilisez ce produit seulement comme a spécifié et seulement car le but a décrit dans le manuel d'instructions.

#### **Éviter Feu et Blessure Personnelle**

- Utilisez le Câble du Pouvoir Correct. Utilisez seulement le câble du pouvoir fourni. Assurez que les AC font fonctionner le débouché est localisé près le produit et est accessible facilement.
- Utilisez une Source du Pouvoir Correctement Fondée.
- La terre du monde de la Provision du Pouvoir est établie à travers le conducteur moulu dans le câble du pouvoir. Éviter le potentiel de choc électrique, le conducteur moulu doit être correct.
- Observez des Estimations de la Source. Pour éviter risque de feu ou choc électrique, la source du pouvoir doit être 220-240 VAC 50 Hz.
- N'opérez pas ce Produit avec Toutes Clôtures Ouvertes ou Enlevez.
- Évitez l'Ensemble de circuits Exposé. N'entreprenez pas ouvrir la Provision du Pouvoir parce que sa certification de la sécurité serait invalidée. La Provision du Pouvoir est un appareil scellé non-réparable.
- N'opérez pas avec les Échecs Suspects. Si vous suspectez il y a le dégât ou mal fonctionner avec ce produit, appelez l'usine.
- N'entreprenez pas Réparation. Seulement une personne du service de l'usine compétente est autorisée pour réparer ce produit.
- N'opérez pas ce Produit Sources de la Chaleur Proches. Ce produit ne devrait pas être localisé des sources de la chaleur proches tel que radiateurs, registres de la chaleur, poêles, ou amplificateurs.
- Fournissez Ventilation Adéquate. La température du fonctionnement devrait être entre 0° C et 40° C.
- L'humidité devrait être 20% et 80%. La méthode refroidissante est par convection et un ventilateur interne.
- Gardez les Surfaces du Produit Nettoient et Sec.
- Déconnectez le câble du pouvoir de la source du pouvoir avant de nettoyer. N'utilisez pas de nettoyeurs. liquides ou de nettoyeurs de l'aérosol Utilisez un tissu humide pour nettoyer.
- Ne poussez pas d'Objets Dans Ouvrir de ce Produit.
- Jamais objets de l'encart dans le produit à travers ouvertures.
- N'opérez pas Dans les Conditions Mouillées ou humides.
- N'opérez pas Dans une Atmosphère Explosive.
- Prévenez le Répandre des Liquides sur les Composants du Système.

- Inspectez le câble du pouvoir et tous les câbles antérieur à usage. Confirmez que le câble du pouvoir et autres interconnectant câbles sont libres de dégât.

### **Le Niveau de la sécurité**

L'EN 60065 niveau spécifie exigences du dessin de la sécurité qui réduisent ou éliminent le risque de blessure personnelle à l'utilisateur du produit et personnel du service. Ce produit est conçu et est testé pour satisfaire aux niveaux de l'Electrotechnical Commission International (IEC) Norm Européen (EN) 60065 (Le Niveau pour Matériel de la Technologie de l'Information qui Inclut le Matériel de l'Affaire Électrique).

### **Allgemeine Sicherheit-Zusammenfassung Europäisch**

Überprüfen Sie die folgend Sicherheit-Vorkehrungen, Verletzung zu vermeiden und Schaden zu diesem Produkt zu verhindern. Um potentiell Risiko zu vermeiden, benutzen Sie dieses Produkt nur als vorgeschrieben hat und nur denn der Zweck beschrieb in der Bedienungsanleitung.

### **Um Feuer und Persönliche Verletzung zu vermeiden:**

- Benutzen Sie Korrektes Macht-Kabel. Benutzen Sie nur das Macht-Kabel, das bereitgestellt wurde. Stellen Sie sicher, daß der WECHSELSTROM-Macht-Abfluß in der Nähe vom Produkt gefunden wird und leicht zugänglich ist.
- Benutzen Sie eine Korrekt geerdet Macht-Quelle. Der Macht Versorgung Erde Boden wird durch den Boden-Schaffner im Macht-Kabel gegründet. Das Potential elektrischen Schocks zu vermeiden muß der Boden-Schaffner korrekt sein.
- Beobachten Sie Quelle-Klassen. Risiko von Feuer oder elektrischem Schock zu vermeiden muß de Macht-Quelle 100 sein-240 VAC 50-60 Hz.
- Operieren Sie dieses Produkt mit Irgendwelchen Gehegen nicht, die geöffnet wurden, oder entfernen Sie.
- Vermeiden Sie Ungeschützten Schaltkreise. Versuchen Sie, die Macht-Versorgung zu öffnen nicht, weil seine Sicherheit-Zulassung ungültig gemacht werden würde. Die Macht-Versorgung ist ein nicht-reparierbares luftdicht verschlossene Gerät.
- Operieren Sie mit verdächtig Mißerfolgen nicht. Wenn Sie verdächtigen, gibt es Schaden oder Funktionsstörung mit diesem Produkt, rufen Sie die Fabrik.
- Versuchen Sie keine Reparatur. Nur eine erzogen Fabrik-Dienst-Person wird ermächtigt, dieses Produkt zu reparieren.
- Operieren Sie dieses Produkt Nahe Hitze-Quellen nicht. Dieses Produkt sollte keine nahe Hitze-Quellen wie Heizkörper, Hitze-Register, Herde, oder Verstärker gefunden werden.
- Stellen Sie Richtige Belüftung bereit. Die operierend Temperatur sollte zwischen 0° C und 40° C. Die Luftfeuchtigkeit sollte sein 20% und 80%. Die erfrischend Methode ist durch Konvektion und einen innereren Fächer.
- Bleiben Sie, Produkt-Oberflächen reinigen und Trocken. Trennen Sie das Macht-Kabel von der Macht-Quelle vor dem Reinigen. Benutzen Sie keine flüssige Reiniger oder Aerosol-Reiniger. Benutzen Sie einen klammen Stoff für das Reinigen.

- Schieben Sie keine Gegenstände ins Öffnen von diesem Produkt. Nie Befügung-Gegenstände ins Produkt durch Öffnungen.
- Operieren Sie In Nassen oder Klammern Zuständen nicht.
- Operieren Sie In einer Explosiven Atmosphäre nicht.
- Verhindern Sie das Verschütten von Flüssigkeiten auf die System-Bestandteile.
- Inspizieren Sie das Macht-Kabel und alle Kabel vorausgehend zu Verwendung. Bestätigen Sie, daß das Macht-Kabel und andere verbindend Kabel frei von Schaden sind.

### **Sicherheit-Standard**

Der EN 60065 Standard schreibt Sicherheit-Entwurf-Anforderungenvor, der reduzieren oder das Risiko persönlicher Verletzung zu sowohl dem Produkt-Benutzer als auch Dienst-Personal ausschließen. Dieses Produkt wird entworfen und wird geprüft, um den Standards vom Internationalen Electrotechnical Commission zu entsprechen (IEC) europäischer Norm (EN) 60065 (Der Standard für Informationen-Technologie-Ausrüstung, die Elektrische Unternehmen-Ausrüstung einschließt).

### **2.1 Declaration of Conformity**

The CM-8E meets the intent of Directive 89/336/EEC for Electromagnetic Compatibility and Low Voltage Directive 73/23/EEC for Product Safety. Compliance was demonstrated to the following specifications as listed in the Official Journal of the European Communities:

#### **EN 55022: 2006 Conducted and Radiated Emissions**

- Conducted Emissions
- Radiated Emissions, Class A Limits

#### **EN 55024: 1998 + A1: 2001 & A2: 2003 Immunity**

- Electrostatic Discharge Immunity
- RF Electromagnetic Field Immunity
- Power Line Surge Immunity
- Conducted RF immunity
- Power Frequency Magnetic Field Susceptibility
- Voltage Dips, Short Interruptions and Variations
- EN 61000-3-3: 1995 +A1: 2001 & A2: 2005 Voltage Fluctuation and Flicker

#### **FCC Part 15, Subpart B**

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful

interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at user's own expense.

### **Certifications**

- Low Voltage Directive 73/23/EEC.
- EN 60950 Information Technology, Video, and similar Electronic Apparatus.
- IEC 60950 Safety Requirements.
- CE, UL, cUL Safety and Overall Compliance.
- VDE Certified Power Cords.
- Pollution: Not intended for environments where conductive pollutants may be present.

### **2.2 Equipment Class**

Type A: Equipment that is intended for connection to the building power supply wiring via nonindustrial plugs and sockets or via appliance couplers, or both.

### **2.3 Disposal and Recycling**

#### **Wheelie-Bin Symbol**



The Wheelie-Bin symbol is attached to this product in compliance with the EU Directive 2002/96/EC on Waste Electrical and Electronic Equipment (WEEE). Its purpose is to deter the improper disposal of this product and to promote reuse and recycling.

#### **Proper Disposal**

In conformance with the Directive, at end of life this product should be either sent to an appropriate recycling facility for disassembly and recycling or returned to the supplier. Under no circumstances should this product be deposited in a landfill for disposal.

#### **Hazards of Noncompliance**

Electrical and electronic products may contain chemicals, which can leach into the groundwater and cause health concerns through contaminated drinking water. Failure to dispose of this product in compliance with the WEEE Directive may result in penalties as determined by local ordinance. Please contact your dealer or USL, Inc., with questions regarding the proper disposal of this or any other USL product. USL, Inc. contact information: USL, Inc., 181 Bonetti Drive, San Luis Obispo, CA 93401-7397, USA. Phone: +1 805 549 0161 Fax: +1 805 549 0163 [www.uslinc.com](http://www.uslinc.com)

### 3.0 System Version

The CM-8E is continuously being improved. New features are added through firmware. This manual describes the CM-8E versions available at this writing.

Firmware/software versions for the systems described in this manual are listed in the table below:

| Component   | Version |
|-------------|---------|
| P32         | 140714  |
| Boot loader | 130806  |
| P24         | 130820  |

Check website [www.uslinc.com](http://www.uslinc.com) for latest firmware.

### 4.0 System Overview

#### 4.1 System Description

The CM-8E expands upon the standard booth monitor to allow network monitoring of cinema audio for quality control purposes. Network monitoring can meet the needs of a large network operations center, or allow the manager to monitor auditorium audio from his or her office. Of course, the CM-8E also serves the standard booth monitor purpose of allowing listening to various audio channels through the front panel speaker or headphones. Two user interfaces (the front panel and a web browser interface) are provided. The capabilities of each are listed below.

##### 4.1.1 Front Panel User Interface

- Push button selection of audio channels to listen to, including HI and VI-N
- Listen to processor output or amplifier output
- Listen to individual bands of biamp crossover whether located in processor or amplifier
- LED level indicator of channels being listened to
- Front panel volume control controls speaker and headphones
- Internal speaker
- Front panel headphone jack

##### 4.1.2 Network User Interface

- Web browser based (no software to install, use any operating system, monitor on desktop or tablet computer)

- Bar graph display of all processor output or amplifier output levels (individual biamp bands if crossover in processor or amplifier)
- Streaming audio monitoring of selected audio channels or bands from processor or amplifier

#### **4.1.3 Audio Inputs and Outputs**

The CM-8E simplifies the audio wiring of the booth. Audio from the cinema sound processor is delivered over one or two (for biamp crossover in processor) standard 25 pin D connectors (DB-25F). This eliminates the need for special cables or “break-out boards” for processors that have outputs only on DB-25 connectors (such as the USL JSD-60 or the Dolby® CP750).

The CM-8E has standard DE-15F (also known as HD-15 or VGA) connectors to drive the amplifiers. These standard connectors drive two channel amplifiers with balanced audio and provide a “V-mon” return signal so the amplifier output can be monitored.

The CM-8E also has pluggable terminal blocks for the interface to the amplifiers. These are used with amplifiers that do not have the DE-15 connectors. Terminals are provided for balanced audio to each channel of each amplifier. Terminals also accept a sample of the amplifier output so the output of the amplifier can be monitored.

#### **4.1.4 Biamped Systems**

The CM-8E supports the monitoring of systems with biamped screen channels (left, center, and right). If the crossover is located before the monitor (either within the sound processor or between the sound processor and the CM-8E), the CM-8E can monitor the total audio for each channel as well as the individual bands for the screen channels. If the crossover is located after the monitor (within the amplifiers or after the amplifiers), the CM-8E can monitor the full-range audio from the processor and monitor the individual bands from the amplifiers or crossover outputs. If the crossovers are located within the speakers, individual band samples are generally not available for monitoring. In this case, the CM-8E is configured for no crossover. When individual band monitoring is available, the front panel and web browser buttons “scroll” through the bands. The sequence is off – both – low – high – off.

#### **4.2 Block Diagrams**

The following simplified block diagrams assist the user in understanding the signal flow within the CM-8E. The CM-8E provides a direct connection from the sound processor to the amplifiers, converting from DB-25 connectors to DE-15 and terminal block, with no intervening electronics. The CM-8E does not affect the auditorium audio. Even if the CM-8E is turned off, the show goes on! The CM-8E bridges each processor balanced audio line with a differential

amplifier with an input resistance of greater than 600k. These differential amplifiers drive the audio switching matrix and the band/channel level detection circuitry. Front panel and web browser buttons select which channels and bands drive the front panel speaker, the front panel VU indicator, the web stream, and the web copy of the front panel VU indicator. All bands of all channels are measured continuously and sent to the web server for display on a remote web browser.

Band and channel audio from the audio switching matrix is sent to a digital signal processor (DSP) where the audio is digitized. The digitized audio level is measured to drive the front panel VU indicator and its web browser copy. The digital audio is then split to drive two compressors, one for the web stream and one for the front panel speaker. These compressors reduce the dynamic range of the audio to make it more suitable for the front panel speaker and the web stream. The speaker audio is also passed through an equalizer to compensate for the frequency response of the speaker itself. Finally, the speaker audio passes through a level control, then digital to analog conversion to drive the front panel speaker.

The output of the web stream compressor is sent to the web server. The web server streams the selected audio at 44.1k samples per second monaural as either IMA ADPCM (4 bits per sample for a total of 176kbps) or PCM (16 bits per sample for a total of 706kbps). The web server also sends the measured levels of each band and channel to the web browser to display them on a single bar graph.

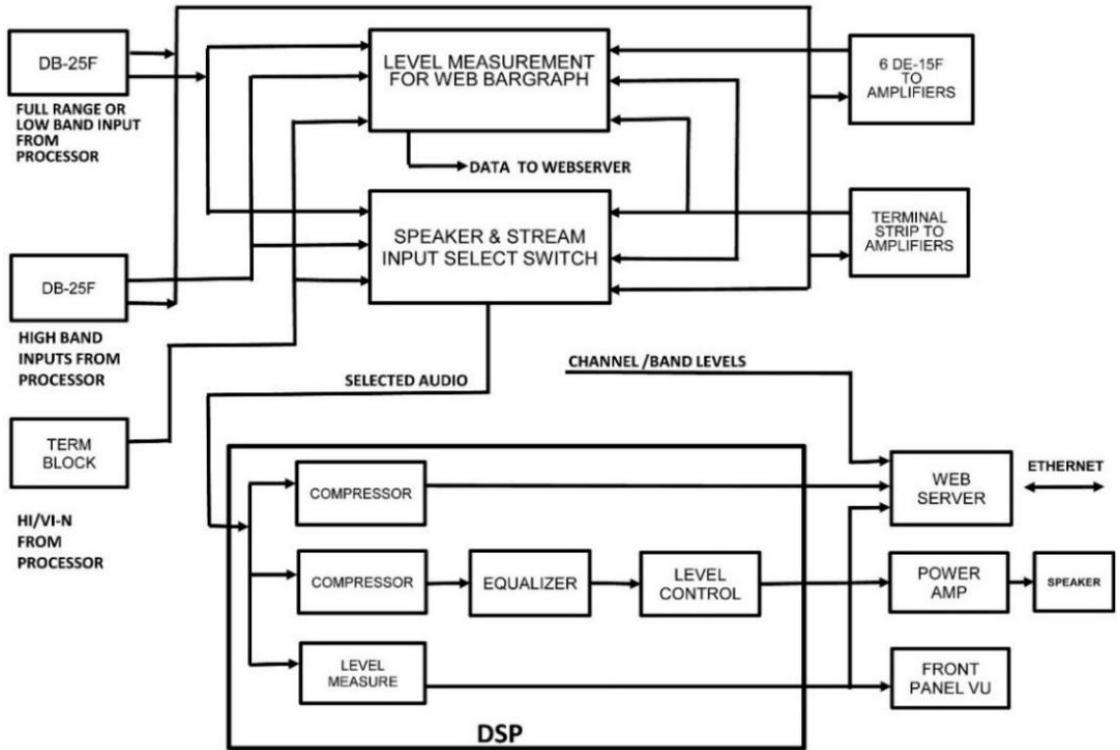


Figure 4.2a Audio Overview

## 5.0 Installation

### 5.1 Initial Power Up

A quick power-up test of the CM-8E is suggested before mounting it in the equipment rack and wiring it up. This test can quickly detect shipping or other damage.

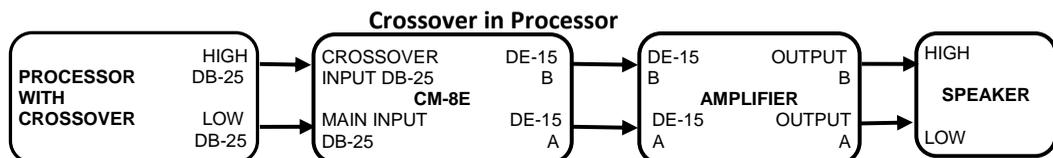
- Turn the AC power switch to the off position.
- Using the supplied AC line cord or one appropriate for the installation location (the power supply is a universal input supply 100-240 VAC, 50/60 Hz), connect the CM-8E to the AC line.
- Turn on the AC power switch. The red LED above the power switch should light. The other LEDs will flash as the unit goes through its power on self test. After the power on self-test, only the Power and Processor LEDs should remain lit.
- Press each of the channel buttons several times. LEDs above the buttons should change. If a screen channel is set for biamp, the LED will stay lit through several button presses since the sequence is off – all – low – high – off.
- Press the PROC/AMP button and verify that the LEDs above the button toggle with each button push.

### 5.2 System Hardware Mounting and Grounding

The CM-8E is designed to mount in a standard 19 inch (482.6mm) rack and is two rack units high (3.5 inches, 88.9mm). The CM-8E should be mounted at a convenient height in the equipment rack considering ease of use of the front panel controls and the routing of wiring between the CM-8E, the processor, and the amplifiers. The CM-8E includes a three-prong grounding plug and a three-wire power cord to accommodate a safe ground path from the chassis to the electrical system ground. Defeating this ground by removing the ground prong is not recommended.

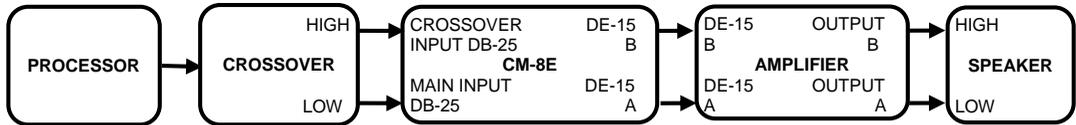
### 5.3 Crossover Options

The CM-8E is designed for use in auditoriums with a variety of crossover options. These are illustrated in the figure below. In addition, the DE-15 connectors are wired on the assumption that the left, center, and right channels will either be biamped or operated in bridge mode (with a “bridge tied load.”). If there is not a crossover before the CM-8E, the channel B outputs of the DE-15 connectors will have no audio. If there are crossovers in the amplifier, the CM-8E can be set to monitor the amplifier returns for each band.



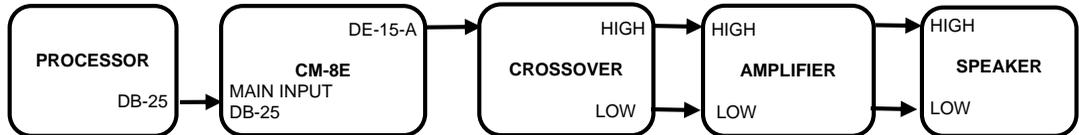
CM-8E can monitor individual bands from processor and amplifier on screen channels.

### Crossover between Processor and Monitor



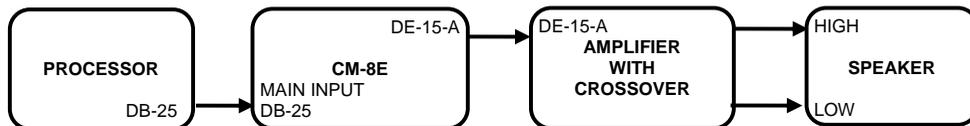
CM-8E can monitor individual bands from processor and amplifier on screen channels.

### Crossover between Monitor and Amplifier



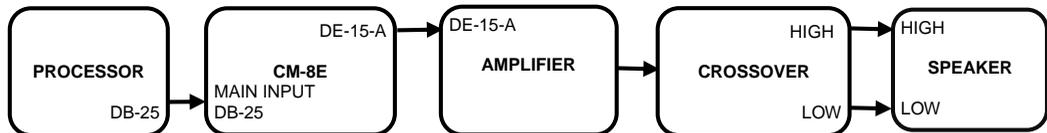
CM-8E can monitor full range audio from processor. If individual amplifier returns are brought back to the CM-8E, it can monitor individual amplifier bands on screen channels.

### Crossover in Amplifier



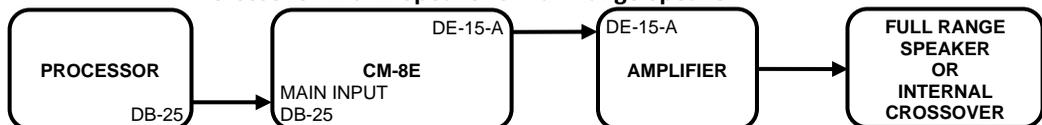
CM-8E can monitor full range audio from processor and individual bands from amplifier if the amplifier drives both Vmon pins on the DE-15 or individual amplifier outputs are brought back to terminal block.

### Crossover between Amplifier and Speaker



Full range audio from processor can be monitored. Full range audio from amplifier can be monitored if amplifier returns are from amplifier. It may also be possible to get returns after the crossover, in which case individual bands can be monitored.

### Crossover within Speaker or Full Range Speaker

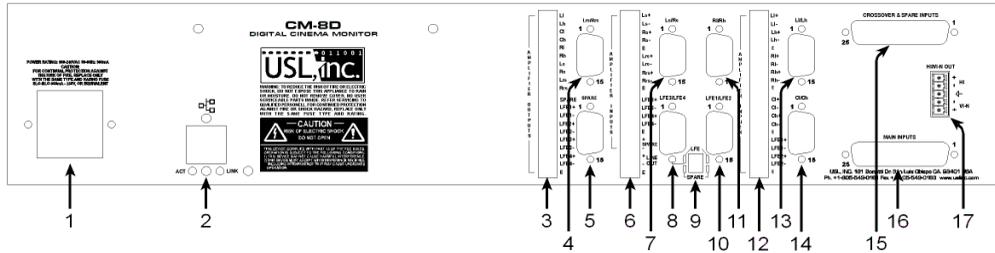


Full range audio from processor and amplifier can be monitored.

The DE-15 connectors on the surround channels are wired for stereo full-range operation. For example, one DE-15 connector has Ls on channel A and Rs on channel B.

### 5.4 Rear Panel Connections

The rear panel connections are shown in the drawing below.



1. Power Inlet. 100 – 240VAC, 50/60 Hz, 300mA maximum.
2. Ethernet. 10/100Mbps
3. Amplifier Returns. Connect the positive side of amplifier outputs here if the DE-15 connectors are not used.
4. Lrs/Rrs DE-15F. Drives the rear surround amplifier with left rear surround on channel A and right rear surround on channel B. Also provides amplifier returns (Vmon) for amplifier output monitoring.
5. Spare DE-15F. The “spare” input (top DB-25 connector) drives channel A on this connector.
6. Surround and LFE Terminal Block. These outputs can be used to drive amplifier inputs if the DE-15 connectors are not used. This terminal block also has “Line Out” terminals. This balanced output can drive an external power amplifier with the selected audio signals without compression or equalization. Such an amplifier could be used to drive a higher quality speaker than can practically be placed within the CM-8E.
7. Ls/Rs DE-15F. Drives the surround amplifier with left surround on channel A and right surround on channel B. Also provides amplifier returns (Vmon) for amplifier output monitoring.
8. LFE3/LFE4 DE-15F. Drives the LFE3/LFE4 amplifier with LFE3 on channel A and LFE4 on channel B. Also provides amplifier returns (Vmon) for amplifier output monitoring.
9. LFE3/LFE4 Source Select Jumpers. Put both jumpers in the up position to drive these outputs with the LFE input from the processor. Put both jumpers in the down position to drive these outputs with the spare input from the processor.
10. LFE1/LFE2 DE-15F. Drives the LFE1/LFE2 amplifier with LFE1 on channel A and LFE2 on channel B. Also provides amplifier returns (Vmon) for amplifier output monitoring.
11. Right Channel DE-15F. Drives the right channel amplifier. If there is a crossover before the CM-8E, channel A is driven with the low band, and channel B is driven with the

- high band. If there is no crossover before the CM-8E, full range audio drives channel A and nothing drives channel B. The amplifier can have internal crossovers or operate in bridge mode. Also provides amplifier returns (Vmon) for amplifier output monitoring.
12. Screen and LFE Terminal Block. These outputs can be used to drive amplifier inputs if the DE-15 connectors are not used.
  13. Left Channel DE-15F. Drives the left channel amplifier. If there is a crossover before the CM-8E, channel A is driven with the low band, and channel B is driven with the high band. If there is no crossover before the CM-8E, full range audio drives channel A and nothing drives channel B. The amplifier can have internal crossovers or operate in bridge mode. Also provides amplifier returns (Vmon) for amplifier output monitoring.
  14. Center Channel DE-15F. Drives the center channel amplifier. If there is a crossover before the CM-8E, channel A is driven with the low band, and channel B is driven with the high band. If there is no crossover before the CM-8E, full range audio drives channel A and nothing drives channel B. The amplifier can have internal crossovers or operate in bridge mode. Also provides amplifier returns (Vmon) for amplifier output monitoring.
  15. Crossover and Spare DB-25F. Receives high band audio for the left, center, and right channels from the processor or crossover. Also receives a spare audio channel.
  16. Main DB-25F. If there is a crossover in front of the CM-8E, receives the low band audio for the left, center, and right channels from the processor or crossover. If there is no crossover in front of the CM-8E, receives full range audio for the left, center, and right channels from the processor. Also receives full range audio for the surround channels.
  17. HI/VI-N Terminal Block. Receives HI and VI-N from the processor.

#### **5.4.1 Main Inputs**

The CM-8E main input is on a DB25F connector. This input receives “full range” audio from the sound processor if the sound processor does not have a crossover or there is no other crossover between the processor and the monitor. If the processor does include a biamp crossover for the screen channels or there is a crossover between the processor and the monitor, this input receives the low band of the screen channels. All other channels are full range. The L, C, and R inputs on this connector drive the “channel A” pins on the DE-15 connectors for the left, center, and right channels. The inputs are active balanced (differential) inputs. They may be driven by balanced or unbalanced sources. When driven by an unbalanced source, the negative input should be connected to the low side of the source at the source equipment to minimize ground loop noise. The cable should be twisted pair with individual shields, even when driven by an unbalanced source. The DB25F connector uses the THX® pin out as specified in the table in Appendix A.

### 5.4.2 Crossover and Spare Inputs

This connector receives the high band audio for the screen channels (left, center, right) when there is a crossover before the CM-8E (either in the processor or between the processor and the CM-8E). These inputs drive the “channel B” pins on the DE-15 connectors for the left, center, and right channels. This connector also has an additional spare input that can drive an additional amplifier or additional LFE outputs and be monitored. The inputs are active balanced (differential) inputs. They may be driven by balanced or unbalanced sources. When driven by an unbalanced source, the negative input should be connected to the low side of the source at the source equipment to minimize ground loop noise. The cable should be twisted pair with individual shields, even when driven by an unbalanced source. The DB25F connector uses the THX® pin out as specified in the table in Appendix A.

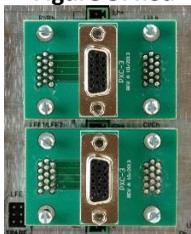
### 5.4.3 DE-15F Amplifier Connectors

The CM-8E converts the DB-25 audio connector common on sound processors to the DE-15F connector (also called HD-15 or VGA) connector common on amplifiers. As described previously, the surround channels are “stereo” with two channels per connector. The screen channels have one channel per connector. If the screen channel is biamped before the CM-8E, channel A carries the low frequencies, and channel B carries the high frequencies. If the screen channel is not biamped before the CM-8E, channel A carries the full range audio, and channel B is silent.

The DE-15F connectors also provide an amplifier output return (Vmon or Voltage Monitor) to the CM-8E. Surround channels return the left on channel A and the right on channel B. The screen channels return the low band on channel A and the high band on channel B if the crossover is located before the CM-8E (in the processor or between the processor and the CM-8E) or if crossovers in the amplifier are enabled.

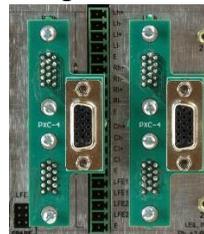
The CM-8E, by itself, always sends one screen channel through a two channel amplifier on the assumption there is a crossover in the processor or amplifier. This is not always the case. USL offers the "PXC" series of adapters for those auditoriums that have crossovers in the speakers and need to carry two screen channels through one two-channel amplifier.

Figure 5.4.3a



The PXC-3 combines left and right to drive one amplifier. A second PXC-3 combines center and LFE1 to drive a second amplifier.

Figure 5.4.3b



The PXC-4 combines left and center to drive one amplifier. A second PXC-4 combines the right and LFE1 to drive a second amplifier.

#### **5.4.4 Terminal Block Amplifier Connectors**

The CM-8E provides pluggable terminal blocks to connect to the power amplifiers. These are commonly used with amplifiers that do not use the DE-15 connectors. Balanced outputs (+ and -) are provided for amplifier channels A and B. As with the DE-15 connectors, channel A carries the low band and channel B carries the high band in biamped installations. These are marked with l and h on the rear panel (for example, Lh+ for the positive side of the high band of the left channel). If there is not a crossover before the CM-8E, the full range signal will be available on the low band output of the CM-8E. In addition, terminals marked E (earth) are available for connection to cable shields.

There are also pluggable terminal blocks to connect to amplifier outputs when DE-15 connectors are not used. One of these terminals connects to the positive terminal each amplifier output. The E terminal should be used to connect to a cable shield. Do NOT connect this to the negative output of the amplifier. Doing so could damage the amplifier or result in feedback. As with the terminals driving the amplifier, l is for the low band (channel A) and h is for the high band. If biamped amplifier outputs are not available, connect only to the 'l' terminals (the low band return).

#### **5.4.5 LFE Connections and Configuration**

The CM-8E can drive up to four LFE amplifiers. All four can be driven by a single LFE input from the processor, or LFE3 and LFE4 can be driven by the "spare" input (on the top DB25 connector on the rear panel). A 6 pin header with two jumpers is visible on the rear panel. Move both jumpers to the top position (jumping top left to middle left and top right to middle right) to have the LFE input drive LFE3 and LFE4. Move these jumpers to the bottom position to have the spare input drive LFE3 and LFE4.

#### **5.4.6 HI/VI-N Connections**

The CM-8E includes a pluggable terminal block for connection to the HI and VI-N outputs of the sound processor. A cable should be run from the CM-8E to these outputs on the sound processor. At the sound processor, these terminals also connect to the HI/VI-N transmitter (such as a USL UPC-28). These connections allow the CM-8E to show the levels of the HI/VI-N signals and allow the signal to be listened to both locally and remotely.

#### **5.4.7 Ethernet Connector**

The Ethernet connector allows for remote monitoring of the audio passing through the CM-8E. A remote web browser can be used to select audio to listen to, see levels, and listen to the audio. In addition, the Ethernet connector is used when configuring the CM-8E.

## 6.0 System Configuration

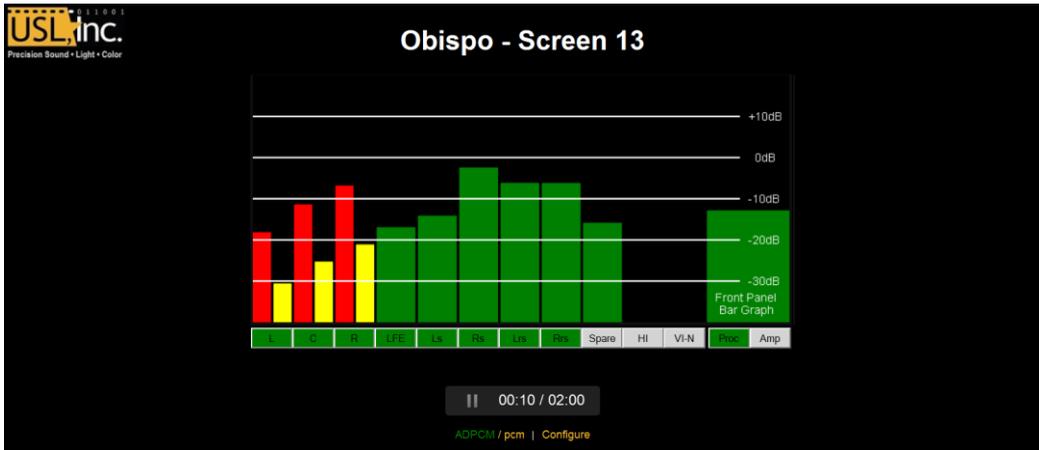
### 6.1 Configure LFE3/LFE4

LFE3 and LFE4 can be driven by the LFE output of the processor or a spare input to the CM-8E. If LFE3 and LFE4 are to be driven by the LFE output of the processor, put both LFE jumpers in the up position (one jumper between the top left pin and the center left pin, the other between the top right pin and the center right pin). If LFE3 and LFE4 are to be driven by the spare audio input, put both jumpers in the down position.

### 6.2 Computer Network Connection

Connect an Ethernet cable between the CM-8E and a computer. In most cases, a “straight through” cable will work, but some older computers may require a “crossover cable.”

Open a web browser and type 169.254.1.10 (the default IP address of the CM-8E). You should see a page similar to that shown below. If the browser does not connect, try setting the IP address of your computer to be on the same subnet as the CM-8E. A good address to try is 169.254.1.123 with a subnet mask of 255.255.0.0. If the IP address has been changed away from its factory default, you can use the USL Ethernet Discoverer (available on the USL web site) to determine the IP address of the CM-8E. In addition, you can hold down the Left and Center buttons during power up to restore the factory configuration (including the default IP address). Note that these restored values are only held until the next power cycle unless they are saved.



### 6.3 Configuration Screen

Click “Configure” at the bottom of the page. The system will ask for a username and password. The username is “admin”, and the password is “ultra” (both lower case, no quotes). A page similar to the image below should appear.

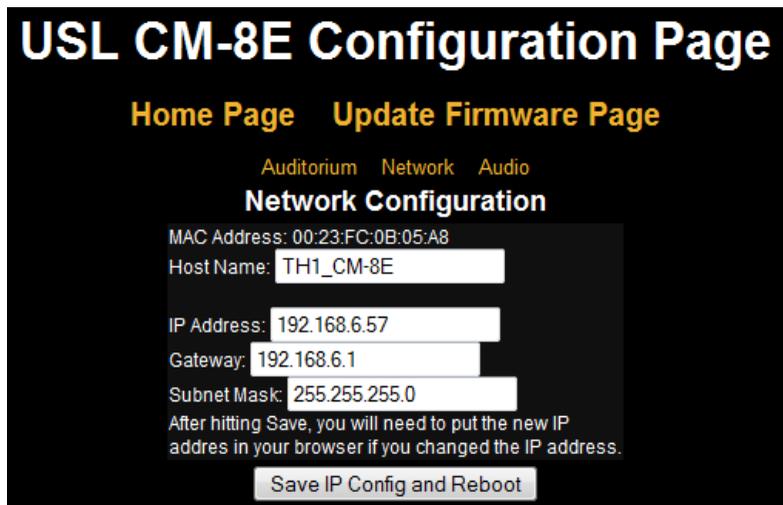


The right side of the page shows information about the CM-8E including the serial number, circuit board revision, and firmware versions. There are two microcontrollers in the CM-8E, identified as P24 and P32. The P24 does audio level measurement for the web bar graphs. The P32 does everything else, including the web server. Each of these processors has a boot loader that allows for field updates to the system. The version of the boot loader is also shown on this screen.

This page allows you to set auditorium specific data that is saved in the CM-8E. The theater name and screen number are shown on the web home page. After changing settings, click the Save User Data button to save the data.

### 6.4 Network Configuration

Click the Network link on the third line of the page to get to the network configuration screen. An image of that screen is shown below.

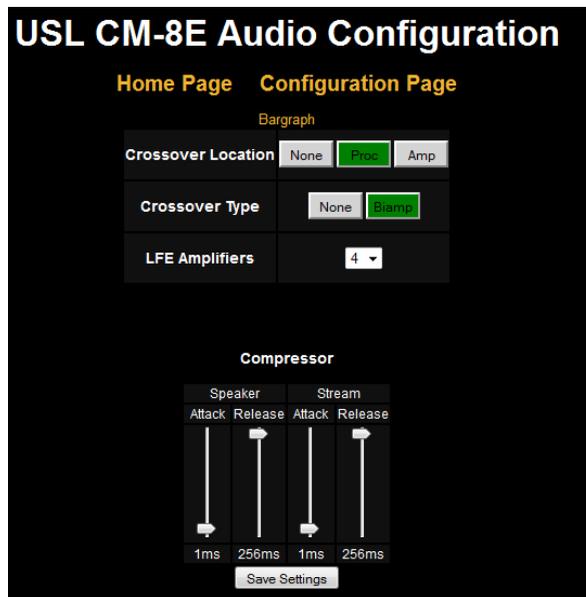


The Host Name is the Net BIOS host name. This can be used by Microsoft Windows computers to find the CM-8E by name instead of IP address. This name is also shown in the USL Ethernet Discoverer (download from the USL web site). You may want to set a name that starts with the auditorium number and ends with the function. For example, “7 – Monitor” to indicate this is the booth monitor for screen 7. This will make the CM-8E easy to find with Ethernet Discoverer.

Set the desired IP address, gateway, and subnet mask as appropriate for your theater IP addressing scheme. When all the information is complete, click the “Save IP Config and Reboot” button. Change the IP address in the browser address window to point to the new IP address. You should see the CM-8E appear at this new address (though you may need to change the IP address of your computer to be on the same subnet).

### 6.5 Audio Configuration

Click the Audio link on the third line of the configuration page. A screen similar to that below should appear.



Select the location of the crossover, if any. If none is selected, the left, center, and right channels are assumed to be full-range. Pressing the front panel or browser button will toggle these channels on and off on the monitor speaker and web stream. If the crossover location is set to Proc, the left, center, and right channels will step through an off- full range – low band – high band – off sequence for both the processor and amplifiers. If the crossover location is set to Amp, the left, center, and right channels will toggle on and off if the processor is selected and through the sequence of off- full range – low band – high band – off when the amplifier is

selected. These settings also affect the web bar graph display. If biamp audio is available on the processor or amplifier, the individual bands are shown on the bar graph. The crossover type can be biamp or none.

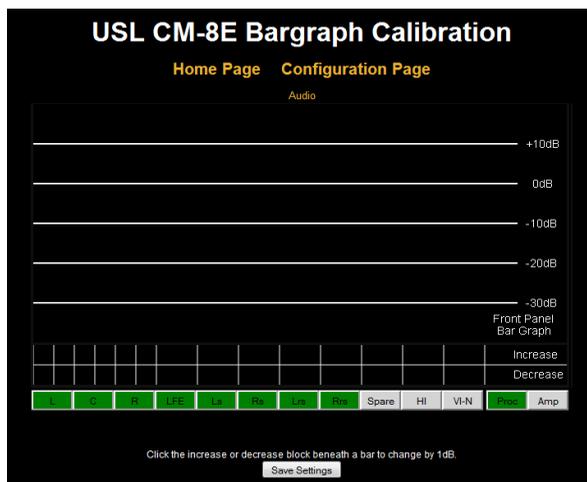
The CM-8E allows for monitoring of the individual LFE amplifier returns. Select the number of LFE amplifiers that are used in this auditorium. The front panel and web LFE buttons allow sequencing through the individual LFE returns when the amplifier is selected (instead of the processor). In addition, the individual LFE returns are shown on the web bar graph when the amplifier is selected.

The CM-8E includes compressors for the speaker and web stream. These reduce the dynamic range to be suitable for these applications. The attack and release times are adjustable, though the default values are normally suitable. A significantly slower attack time can cause clipping because the compressor would react too slowly to a loud sound. A shorter release time increase the average volume but can result in low frequency distortion as the compressor starts to follow low frequency waveforms.

Once the settings on this page are complete, press the “Save Settings” button.

## 6.6 Bar Graph Calibration

The CM-8E is calibrated to show 0dB with processor and amplifier return (through the DE-15 connector) levels of 300mVrms. This is correct for most installations. However, you can adjust the bar graph calibration for your particular installation. Click the “Bar graph” link at the top of the audio configuration page to get a page similar to that shown below.



Play pink noise on a channel at reference level. Select only that channel using the front panel or web buttons. A bar (or two for biamp) should appear above the button corresponding to that channel. Click the mouse in the top box above the button to increase the height of the bar and the bottom box to decrease the height of the bar. As shown in the image above, when a

channel is biamped, two sets of boxes appear above each button. The left one represents the low frequency band, and the right one indicates the high frequency band.

While one channel is being driven and is selected, click the increase or decrease words above the proc and amp buttons. This will increase or decrease the height of the VU indicator on the front of the CM-8E and on the bar immediately above the proc and amp buttons on the web page.

Note that the CM-8E uses an averaging circuit instead of an adding circuit to combine audio for the speaker, stream, and front panel VU. Consider what happens in an auditorium if a second channel is brought up with audio identical to the first. Since there are now two amplifiers driving the auditorium with the same sound, the power has doubled, indicating an increase of 3dB. If a voltage adder (or summer) were used in the CM-8E, adding two identical voltages would result in a doubling of the voltage, or an increase of 6dB. As more channels are added, the sound in the auditorium increases by 3dB each time the number of channels is doubled, while the output of a summer would increase by 6dB each time the number of channels was doubled. This could easily result in an overload and clipping within the CM-8E.

With an averaging circuit, the voltages are averaged instead of summed. Averaging the voltage of two channels with identical audio results in the same audio level no matter how many identical channels are averaged. In this case, doubling the number of channels results in an increase of 0dB. If, however, we average a channel and silent channels, the resulting level drops. If there is audio on only one channel, but we select a second silent channel, the average drops to  $\frac{1}{2}$  the previous value (a drop of 6dB). In the auditorium, of course, adding additional silent channels results in a sound level change of 0dB. As such, the front panel VU indicator should be considered accurate only when a particular channel is being monitored and not when multiple channels are being listened to.

When all the bar graphs are calibrated, press the “Save Settings” button to save the bar graph calibration.

## **6.7 Power Up Configuration**

The “Save Settings” buttons on the various configuration screens save all the current settings. The currently selected audio channels/bands for monitoring and the processor/amp selection are also saved. Use the buttons on the unit or the web page to select which channels are fed to the speaker and stream, then hit “Save Settings.” These button settings will be restored the next time the unit is powered up.

## **6.8 Firmware Update**

The CM-8E contains two microcontrollers, identified as P32 and P24. As improvements are made to the CM-8E, firmware updates will be available on the USL web site.

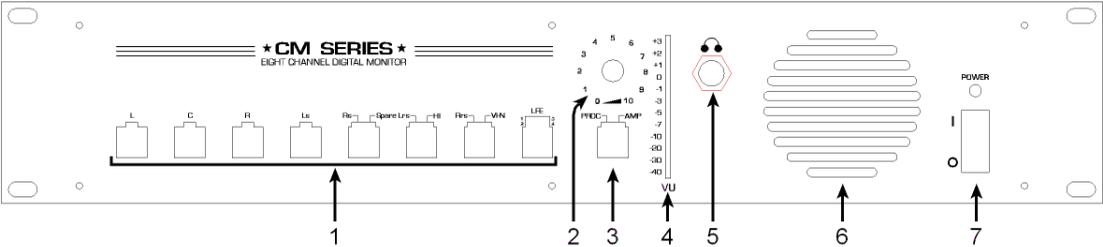


The update buttons on the firmware update page (shown above) show the version number of the firmware in each of the microcontrollers. If USL has supplied you with a newer version (a .hex file), use the appropriate browse button to locate the file, then click the appropriate update button. During the update process, the front panel LEDs will flash. When the update is complete, the web page will time out. You should then be able to go back to this page (don't hit reload, as that will do the update again) or the configuration page to see that the new versions have been installed.

The P32 includes the web server that is used during the update. During the update process, the memory in this processor is erased, then reloaded with the new firmware. If something goes wrong in this process, it is possible to end up with an inoperable unit. Should this happen, you can restore the factory firmware by holding down the Left and LFE buttons when powering up the CM-8E. The front panel LEDs should flash as the factory firmware is restored.

## 7.0 System Operation

The CM-8E allows the auditorium audio to be monitored both in the booth and remotely. A drawing of the front panel is below.



1. Input select buttons. These determine which channels and bands are driving the front panel VU indicator, the front panel speaker, and the web stream. If the unit is configured for biamp operation, the left, center, and right buttons “scroll” through the full-range audio, the low band, and the high band before returning to off. Similarly, if there is more than one LFE amplifier, the combined LFE can be monitored along with each individual LFE amplifier. Finally, the Rs, Lrs, and Rrs buttons select one source, the other, or both. For example, the first button press of Lrs selects the left rear surround audio. The next selects the HI audio. The next selects both. The next turns both off.

2. Volume control for the front panel speaker.
3. Processor/Amplifier select switch. When processor is selected, the front panel speaker and the web stream play the processor audio output of the selected channels and bands. The VU indicates the relative level of the same audio. When amplifier is selected, these each play the audio from the amplifier outputs (Vmon). This button also determines whether the processor or amplifier is driving the web bar graphs.
4. VU audio level indicator. Displays the approximate audio level of the selected channels and bands. See section 6.6 for more details on the VU indication.
5. Headphone jack. Plug monaural or stereo headphones into this jack. The speaker is muted when the headphones are plugged in. The front panel volume control adjusts the headphone volume. Do not plug test equipment into this jack that may ground any of the headphone connections (including the connector sleeve).
6. Speaker. The selected audio channels and bands are heard through this speaker.
7. Power switch and power indicator. The power must be on for the CM-8E to operate. However, even when the power is off, audio from the processor is passed through to the amplifiers.

## **7.1 In-Booth Operation**

The CM-8E operates very much like a traditional booth monitor. Pressing a front panel button selects one or more audio channels to be listened to. You can listen to the audio at both the output of the processor and the output of the amplifiers (using the Vmon return from the amplifiers). If the screen channels have crossovers, you can listen to the combined audio (both high and low bands), and the individual bands. When no crossovers are present, pressing a button toggles that channel between on and off. When crossovers are present, pressing the button cycles through an off- full range – low band – high band – off sequence. Similarly, if more than one LFE amplifier is present, the LFE amplifier outputs can be sequence through when the amplifiers are selected (instead of the processor). Finally, the buttons used to select the right surround, left rear surround, and right rear surround can also be used to select the spare, HI, and VI-N inputs. The button sequences through one input, then the other, then both, before returning to off. The LEDs above the buttons indicate which audio channels are selected.

The CM-8E includes an internal speaker, volume control, and headphone jack. Adjust the volume control to the desired level on the speaker or headphones. Headphones with a ¼ inch monaural or stereo plug can be plugged into the headphone jack. Do not plug test equipment or anything that may ground one of the headphone connections (including the sleeve) into the headphone jack, as this could damage the power amplifier.

The front panel VU indicator provides an approximate indication of the sound level of the selected audio channels.

If an external power amplifier has been connected to the line out terminals of the CM-8E, the channel select buttons determine which audio is heard out of this amplifier. The volume control has no effect on the line out signal.

## 7.2 Browser Compatibility

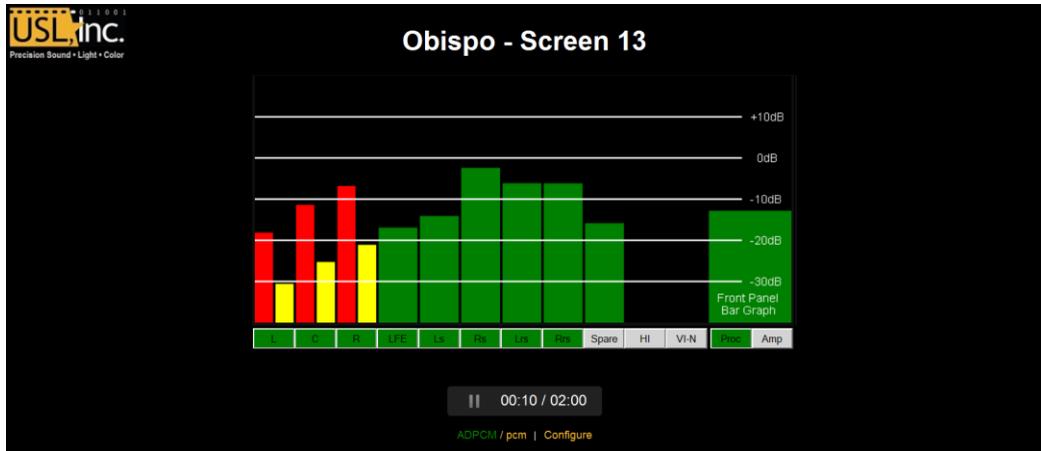
The CM-8E uses HTML5 features that are available in most modern web browsers. The CM-8E decodes ADPCM in javascript on most browsers so no plugin is required. Browsers that cannot decode ADPCM in javascript will generally be able to decode it with a plugin (such as QuickTime or VLC). The table below shows browsers that have been tested and shown to work with the CM-8E.

| OS        | Browser        | Audio Streaming                        |
|-----------|----------------|--|
| Android   | Chrome 35.0    | ADPCM supported.                       |
| Android   | Dolphin 11.0.1 | PCM supported                          |
| Android   | Firefox 30.0   | ADPCM and PCM supported.               |
| Fedora 19 | Arora 0.11.0   | PCM supported.                         |
| Fedora 19 | Firefox 30.0   | ADPCM and PCM supported.               |
| Fedora 19 | Midori 0.5.5   | PCM supported                          |
| Fedora 19 | Rekonq 2.4.2   | PCM supported                          |
| Fedora 19 | SeaMonkey 2.26 | ADPCM and PCM supported.               |
| Fedora 19 | Web 3.8.2      | PCM supported.                         |
| iOS       | Chrome 35.0    | ADPCM supported                        |
| iOS       | Safari         | ADPCM supported                        |
| OSX       | Chrome 35.0    | ADPCM supported                        |
| OSX       | Safari 6.1.4   | ADPCM and PCM supported                |
| Windows   | IE 11          | ADPCM supported with QuickTime plugin. |
| Windows   | Firefox 31.0   | ADPCM and PCM supported.               |
| Windows   | Chrome 35.0    | ADPCM and PCM supported.               |
| Windows   | Opera 22.0     | ADPCM supported.                       |

### 7.3 Remote Monitoring

The CM-8E supports continuous level monitoring of all audio channels and short term (two minutes) listening to a selected combination of audio channels and bands. Remote operation of the CM-8E is done with a standard web browser.

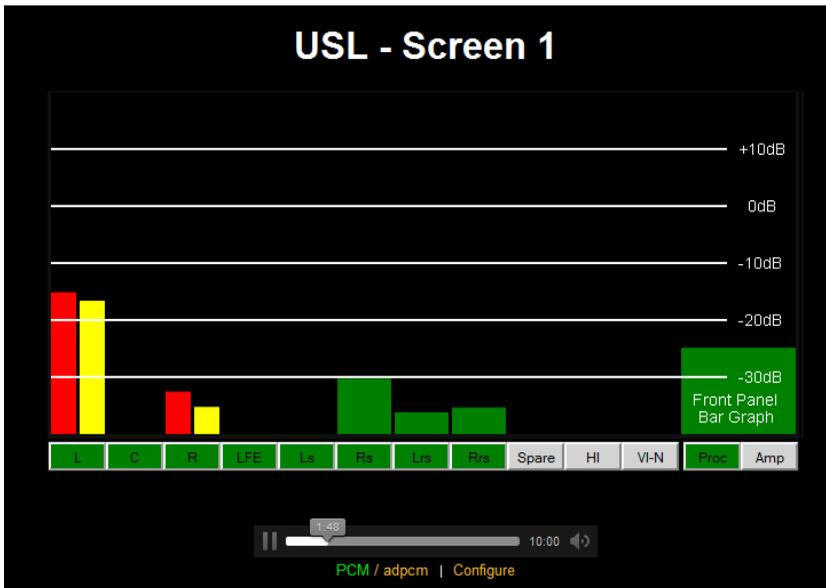
Use Ethernet Discoverer (available on the USL web site) to find the CM-8E on the network, or type the IP address of the CM-8E in the address field of a web browser. A screen similar to the image below should appear.



In this installation, the biamp crossover is in the processor (a USL JSD-60). The green buttons indicate that we are listening to the combined audio of a 7.1 auditorium from the processor (the Amp button is not green). The channel select buttons are green when we are listening to a full range signal, red when we are listening to the low band, and yellow when we are listening to the high band. The red bar shows the low band level for a channel. The yellow bar shows the high band level. A green bar shows the level of a full-range channel. The green bar on the far right shows the level indicated by the front panel VU indicator on the CM-8E.

The internal ADPCM player is visible near the bottom of the screen. Press the arrow button to start playback for two minutes. Press the pause button to pause the playback.

The green ADPCM at the bottom of the page indicates that the ADPCM stream is being played. A PCM stream (which takes more bandwidth, but is higher quality and supported by more browsers) is available by clicking “pcm” at the bottom of the screen. A screen with PCM audio playing appears below.



The PCM page uses a standard HTML5 audio tag, so no browser plugin is required. Reload the page to play the stream for an additional two minutes.

## **8.0 Product Support**

### **One-Year Limited Warranty**

**USL, Inc. warrants that each product manufactured by it will be free from defects in material and workmanship under normal usage for a period of one (1) year after its purchase new from an authorized dealer. Our obligation under this warranty is limited to repairing or replacing any product or component which we are satisfied does not conform to the foregoing warranty and which is returned to our factory, freight paid, or serviced by one of our authorized contractors. The foregoing warranty is exclusive and in lieu of all other warranties, whether expressed or implied. Such warranty shall not apply to any product or component (A) repaired or altered by anyone other than USL, Inc. or an authorized service contractor; (B) tampered with or altered in any way or subjected to misuse, negligence or accident or (C) which has been improperly connected installed or adjusted other than in accordance with USL, Inc.'s instruction.**

USL proudly stands behind its products. We are ready to answer questions about the installation or operation of the CM-8E. Application notes, manuals, and other documents are available on our website. You may contact us by:

- Phone: +1 805 549 0161
- E-mail: [support@uslinc.com](mailto:support@uslinc.com)
- You may file a support ticket at: [www.uslinc.com/support](http://www.uslinc.com/support)

*USL Inc. is interested in your comments. Please feel free to contact us with any comments or suggestions.*

# Appendix A – Connector Pin Outs

## Connector Pin Outs

For convenience, all connector pin outs are located in this appendix.

### Main Inputs

The main inputs are on a DB-25F on the rear panel. These are full range on all channels if there is no crossover in front of the CM-8E. They are the low band of the screen channels if there is a crossover in front of the CM-8E (typically in the processor)

#### Main Inputs, Full Range and Crossover

| Audio Channel | DB-25F Main Input Pins (+, -, shield) |
|---------------|---------------------------------------|
| Left          | 2, 14, 1                              |
| Center        | 5, 17, 4                              |
| Right         | 8, 20, 7                              |
| LFE           | 25, 12, 13                            |
| Ls            | 23, 10, 22                            |
| Rs            | 24, 11, 9                             |
| Lrs           | 16, 3, 15                             |
| Rrs           | 19, 6, 18                             |

#### Signals Listed By Connector Pins

| DB-25F Pin | Signal Name | Channel Name           |
|------------|-------------|------------------------|
| 1          | GND         |                        |
| 2          | L+          | Left+                  |
| 3          | Lrs-        | Left Rear Surround-    |
| 4          | GND         |                        |
| 5          | C+          | Center+                |
| 6          | Rrs-        | Right Rear Surround-   |
| 7          | GND         |                        |
| 8          | R+          | Right+                 |
| 9          | GND         |                        |
| 10         | Ls-         | Left Surround-         |
| 11         | Rs-         | Right Surround-        |
| 12         | LFE-        | Low Frequency Effects- |
| 13         | GND         |                        |

| DB-25F Pin | Signal Name | Channel Name           |
|------------|-------------|------------------------|
| 14         | L-          | Left-                  |
| 15         | GND         |                        |
| 16         | Lrs+        | Left Rear Surround+    |
| 17         | C-          | Center-                |
| 18         | GND         |                        |
| 19         | Rrs+        | Right Rear Surround+   |
| 20         | R-          | Right-                 |
| 21         |             |                        |
| 22         | GND         |                        |
| 23         | Ls+         | Left Surround+         |
| 24         | Rs+         | Right Surround+        |
| 25         | LFE+        | Low Frequency Effects+ |

### Crossover and Spare Inputs

When there is a crossover before the CM-8E, this connector carries the high band audio for the screen channels. In addition, this connector has a “spare” audio input.

### Signals Listed By Channels

| Audio Channel | DB-25F Crossover Input Pins (+, -, shield) |
|---------------|--|
| Left High     | 2, 14, 1                                   |
| Center High   | 5, 17, 4                                   |
| Right High    | 8, 20, 7                                   |
| Spare         | 25, 12, 13                                 |

### Signals Listed By Connector Pins

| DB25F Pin Out | Signal Name | Channel Name |
|---------------|-------------|--------------|
| 1             | GND         |              |
| 2             | Lh+         | Left High+   |
| 3             |             |              |
| 4             | GND         |              |
| 5             | Ch+         | Center High+ |
| 6             |             |              |
| 7             | GND         |              |
| 8             | Rh+         | Right High+  |
| 9             | GND         |              |

| DB25F Pin Out | Signal Name | Channel Name |
|---------------|-------------|--------------|
| 10            |             |              |
| 11            |             |              |
| 12            | Spare-      | Spare-       |
| 13            | GND         |              |
| 14            | Lh-         | Left High-   |
| 15            | GND         |              |
| 16            |             |              |
| 17            | Ch-         | Center High- |
| 18            | GND         |              |
| 19            |             |              |
| 20            | Rh-         | Right High-  |
| 21            |             |              |
| 22            | GND         |              |
| 23            |             |              |
| 24            |             |              |
| 25            | Spare+      | Spare+       |

### HI/VI-N Inputs

The CM-8E has balanced HI and VI-N inputs that can monitor the audio from the processor to the HI/VI-N transmitter (such as the USL UPC-28).

### Signals Listed By Channels

| Audio Channel | HI/VI-N Phoenix Connector Pins (+, -, shield) |
|---------------|---|
| HI            | 1, 2, 3                                       |
| VI-N          | 5, 4, 3                                       |

### Signals Listed By Connector Pins

| Phoenix Pin | Signal Name | Channel Name                   |
|-------------|-------------|--------------------------------|
| 1           | HI+         | Hearing Impaired+              |
| 2           | HI-         | Hearing Impaired -             |
| 3           | GND         |                                |
| 4           | VI-N-       | Visually Impaired – Narrative- |
| 5           | VI-N+       | Visually Impaired – Narrative+ |

## DE-15F Amplifier Outputs

The CM-8E has several DE-15F connectors to drive power amplifiers. On screen channels, one two channel amplifier per screen channel is used. Channel A carries the low band audio, and channel B carries the high band audio. If the crossover is before the CM-8E (typically in the processor), the channel A and B amplifier inputs carry the low and high band signals and the amplifier returns also carry the low and high band signals. If the crossover is in the amplifier, the amplifier channel A input is driven with full-range audio. The channel B input is not used. The amplifier returns low band audio to the CM-8E on the channel A return and high band audio on the channel B return. If the screen channels operate without a crossover (or with a crossover within the speaker), only the channel A input and return are used. The amplifier is typically placed in bridging mode so both channels drive one speaker. On the surround channels, the left surround (side or rear) is on channel A, and the right surround is on channel B.

### DE-15F Signals by Pin

| Pin | Signal  |
|-----|---|
| 1   | Channel A – input   |
| 2   | Standby – Pulled low to put amplifier in standby            |
| 3   | Channel A Vmon (output voltage monitor)                     |
| 4   | Channel A Imon (output current monitor – not used on CM-8E) |
| 5   | No Connect  |
| 6   | Chassis Ground (shield)                                     |
| 7   | Channel A +input  |
| 8   | Channel B +input  |
| 9   | +15V from amplifier (not used by CM-8E)                     |
| 10  | Signal Ground (reference for Vmon and Imon)                 |
| 11  | Channel B –input  |
| 12  | No Connect  |
| 13  | Channel B Vmon (output voltage monitor)                     |
| 14  | Channel B Imon (output current monitor, not used by CM-8E)  |
| 15  | No Connect  |

### Terminal Block Amplifier Outputs

The CM-8E has two terminal blocks providing outputs to the amplifiers plus a line output of the selected audio channels. The function of these terminals is shown on the rear panel and in the tables below. The amplifier output terminals duplicate the functionality of the DE-15F connectors. These terminals are normally used only if the amplifiers do not have DE-15 input connectors.

### Screen Channel Terminal Block

| Terminal Number | Signal                               |
|-----------------|--------------------------------------|
| 1               | Left High +                          |
| 2               | Left High -                          |
| 3               | Left Low +                           |
| 4               | Left Low -                           |
| 5               | Earth (chassis ground, cable shield) |
| 6               | Right High +                         |
| 7               | Right High -                         |
| 8               | Right Low +                          |
| 9               | Right Low -                          |
| 10              | Earth (chassis ground, cable shield) |
| 11              | Center High +                        |
| 12              | Center High -                        |
| 13              | Center Low +                         |
| 14              | Center Low -                         |
| 15              | Earth (chassis ground, cable shield) |
| 16              | LFE1+                                |
| 17              | LFE1-                                |
| 18              | LFE2+                                |
| 19              | LFE2-                                |
| 20              | Earth (chassis ground, cable shield) |

### Surround Channel Terminal Block

| Terminal Number | Signal                               |
|-----------------|--------------------------------------|
| 1               | Left Surround +                      |
| 2               | Left Surround -                      |
| 3               | Right Surround +                     |
| 4               | Right Surround -                     |
| 5               | Earth (chassis ground, cable shield) |
| 6               | Left Rear Surround +                 |
| 7               | Left Rear Surround -                 |
| 8               | Right Rear Surround +                |
| 9               | Right Rear Surround -                |

| Terminal Number | Signal                               |
|-----------------|--------------------------------------|
| 10              | Earth (chassis ground, cable shield) |
| 11              | LFE3+                                |
| 12              | LFE3-                                |
| 13              | LFE4+                                |
| 14              | LFE4-                                |
| 15              | Earth (chassis ground, cable shield) |
| 16              | Spare +                              |
| 17              | Spare -                              |
| 18              | Line Out +                           |
| 19              | Line Out -                           |
| 20              | Earth (Chassis ground, cable shield) |

### Amplifier Return Terminal Block

| Terminal Number | Signal  |
|-----------------|---|
| 1               | Left High +   |
| 2               | Left Low +  |
| 3               | Center High +   |
| 4               | Center Low +  |
| 5               | Right High +  |
| 6               | Right Low +   |
| 7               | Left Surround +   |
| 8               | Right Surround +  |
| 9               | Left Rear Surround +  |
| 10              | Right Rear Surround +   |
| 11              | Spare   |
| 12              | LFE1 + (LFE amplifiers have two returns since they normally operate in bridge mode) |
| 13              | LFE1 -  |
| 14              | LFE2 +  |
| 15              | LFE2 -  |
| 16              | LFE3 +  |
| 17              | LFE3 -  |
| 18              | LFE4 +  |
| 19              | LFE4 -  |
| 20              | Earth (chassis ground, cable shield)  |

## ***Appendix B – System Restore and Power-Up Buttons***

The CM-8E has two methods of recovering from an unlikely failure. These are detailed below.

### **Restore Factory Firmware**

If a firmware update of the main (P32) processor is interrupted, it is possible to leave the system inoperable. To restore the factory installed firmware, turn off the CM-8E, and then hold down the Left and LFE buttons while turning the power back on. The front panel LEDs will flash as the factory firmware is restored. The CM-8E will then restart with the factory firmware.

### **Restore Default Configuration**

Hold down the Left and Center buttons while powering up the CM-8E to restore the factory default configuration. This causes the CM-8E to skip reading of the user defined configuration. The factory configuration is not saved to flash by this operation. If you wish to save the factory configuration to flash, hit the save settings button on any of the configuration pages (each of these save all the current configuration).

## ***Appendix C – CM-8E Accessories***

### **Cables**

USL can supply the cables listed in the table below to simplify your CM-8E installation.

| <b>USL Part Number</b> | <b>Description</b>  |
|------------------------|---|
| IMF-6                  | DB-25M to DB-25F, 6 feet (914mm). Connect processor to CM-8E. Two required for biamp crossover in processor |
| VXC-2                  | DE-15M to DE-15M, 2 feet (610mm). Connect CM-8E output to amplifier input.                                  |
| VXC-6                  | DE-15M to DE-15M, 6 feet (1.8m). Connect CM-8E output to amplifier input.                                   |

### **DAT-100**

DAT-100 Digital Audio Generator generates tone, voice, and pink noise signals on 16 AES/EBU channels. The DAT-100 can be used to verify the correct routing and operation of audio through the processor, monitor, and amplifiers.

### **VP-1**

Vent panel to fill the space and provide ventilation above and below the CM-8E.

### **PXC-3 Adapter**

The PXC-3 combines left and right to drive one amplifier. A second PXC-3 combines center and LFE-1 to drive a second amplifier. See section 5.4.3 for details.

### **PXC-4 Adapter**

The PXC-4 combines left and center to drive one amplifier. A second PXC-4 combines right and LFE-1 to drive a second amplifier. See section 5.4.3 for details.

## ***CM-8E Manual History***

| <b>Version</b> | <b>Description</b>              | <b>Date Code</b> |
|----------------|---------------------------------|------------------|
| 0.1            | Original                        | 131007           |
| 0.2            | Revise text and charts          | 131008           |
| 0.3            | Update format and edits         | 131009           |
| 0.4            | Revised text and format         | 131011           |
| 0.5            | Format                          | 131015           |
| 0.6            | Update pictures and edits       | 131017           |
| 0.7            | Update format and styles        | 131022           |
| 0.8            | Update layout                   | 131106           |
| 0.9            | Revised text and layout         | 131113           |
| 1.0            | Updated layout                  | 131114           |
| 1.1            | Added PXC, minor corrections    | 131115           |
| 1.2            | Revised for new ADPCM streaming | 140715           |
| 1.3            | Added power up configuration.   | 140716           |
| 1.4            | Formatting Standarized          | 140724           |





