



442

Field Mixer



User Guide and Technical Information for 442 and 442 Nordic Field Mixers

website edition - posted December 17, 2002

Sound Devices, LLC
300 Wengel Drive
Reedsburg, WI 53959 USA
phone: (608) 524-0625
fax: (608) 524-0655
www.sounddevices.com

Welcome to the 442 Field Mixer

Developed with input from the industry's top audio engineers, the 442 Field Mixer encompasses the audio performance, feature set, and mechanical construction demanded by those who rely on audio gear for their livelihood. The 442 contains four high-performance microphone preamplifiers, many outputs, and flexible monitoring. Its inputs and outputs, including direct outputs per channel, make the 442 at home in small "run-and-gun" applications as well as large, multiple input productions.

The 442 incorporates a complete feature-set into a compact, functional design. All controls are accessible on its three main surfaces; no hidden controls. The high-efficiency circuitry allows the mixer to run from either four internal AA batteries or external 5-18 VDC.

The 442, like all Sound Devices professional audio products, is designed to withstand the physical and environmental extremes of field production. Its compact mechanic construction strikes the perfect balance between access to all functions, uncluttered design, and durability.

The 442 has an extensive feature list including:

- | | |
|---|--|
| ✓ Maximum of 84 dB of gain | ✓ Comm mic function |
| ✓ Premium Lundahl input transformers | ✓ 'Ear-saver' tone oscillator/ headphone monitor |
| ✓ Custom-wound output transformers | ✓ 40 segment, three-color peak+VU meter, sunlight viewable |
| ✓ Distortion-canceling output driver circuitry | ✓ PFL per channel |
| ✓ Sealed, conductive plastic faders | ✓ Direct outs per channel |
| ✓ T-power or 48 V or 12 V phantom per channel | ✓ Two master output pairs, transformer isolated |
| ✓ Sweepable high-pass per channel 80-240 Hz, 12 dB/oct. | ✓ Powered from 4 "AA" batteries |
| ✓ Pop-up knobs for roomy mixing surface | ✓ 5-18 V external power |
| ✓ Dynamic range > 115 dB | ✓ Extensive headphone monitoring |
| ✓ 5 to 50kHz bandwidth (-1 dB) | ✓ Gain trim per channel, front panel |
| ✓ Two separate monitor returns | ✓ Pulsing left output tone function |
| ✓ Input limiters | ✓ Setup menu for extensive customizing |
| ✓ Output limiters | |

Table of Contents

Front Panel4	Headphone Monitoring11	Appendix A - 442 Nordic19
Input Panel5	Powering12	Appendix B - Accessories19
Output Panel6	Tone/Slate Mic13	Appendix C - Setups (v 5)20
Input Channels7	Accessing User Setups13	Appendix D - Setups (v 3&4)21
Outputs9	Specifications14	Appendix E - Setups (v 2)22
Output Limiters10	Block Diagram - Ins and Outs .16	
Mix In10	Block Diagram - Monitoring . .17	
Metering10	Approvals/Warranty18	

Quick Start Guide

For those familiar with field mixers or mixing consoles, this "Quick Start Guide" highlights basic functionality to begin operating the 442.

Powering

To power the 442 and get it ready for operation:

1. Insert four AA batteries into the battery compartment. INSERT WITH THE POSITIVE (+) SIDE FIRST.
2. Or, connect external DC power (5 - 18 VDC) to the unit's DC connector.
3. Slide the power switch to the intended power source.
4. View battery level by depressing the battery check button.

Input Channel Setup

To set up a gain level for an input channel:

1. Connect a signal source (microphone or line level signal) to a channel input connector.
2. Select the input type - MIC or LINE level.
3. Activate Phantom or T-powering, if required by the microphone.
4. Set the Channel Fader to the 0 (unity) position.
5. Adjust the Channel Pan for the appropriate position.
6. Adjust the High-Pass filter as needed.
7. Place the Master Gain control to the 0 (unity) position.
8. Adjust the Channel Gain/trim control for the required level.
9. Verify that there is signal present on the output meter.

Output Connection

To connect to the 442 master outputs:

1. Connect to the XLR output of the 442.
2. Select the output type - MIC, -10, or LINE level.
3. Verify that the destination input is receiving signal.

Headphone Monitoring

1. Connect headphones to the headphone connector on the output panel.
2. Select the ST position on the headphone selection switch to listen to stereo mixer program.
3. Monitor audio in the headphones.

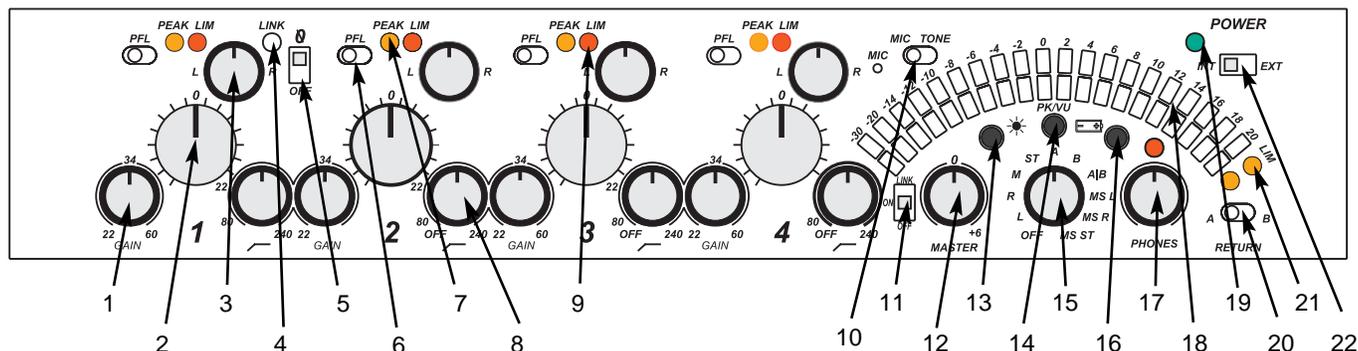
Metering

1. View the master output level on the LED output meter.
2. Toggle between VU, PPM (Peak), or combined VU/PPM metering with the PK/VU button.
3. Adjust the meter brightness among its intensities with the meter brightness button.

Limiting

1. Activate the input and output limiters by engaging the front panel switch - either stereo linked or dual mono.
2. Note limiting activity via the limiter LEDs and the output level.
3. Adjust the output limiter threshold and input limiter availability in the Setup Menu (see Appendix).

Front Panel Descriptions



1. Gain

Controls the gain of the microphone preamp. Range is from +22 dB to +60 dB to accommodate different input sources. Can be thought of as a "coarse" gain adjustment.

2. Channel Fader

Controls a channel's gain. Ranges from 'off' to +15 dB. Nominal setting is in the middle (0 dB). Can be thought of as a "fine" gain adjustment.

3. Channel Pan

Controls the Left/Right balance of the input signal to the outputs. Signal is 3 dB greater than center position when panned hard right or left.

4. LINK LED

Indicates that channels 1 and 2 are linked as a stereo pair, set via the Link Switch on the input panel.

5. Channel 2 Polarity Reverse

Reverses the polarity of input channel 2.

6. PFL (Solo)

Sends the channel signal to the headphones for troubleshooting and gain set-up. Does not affect master output signal at all.

7. Peak LED

Indicates that the input signal is 3 dB from clipping. Indicates that Gain is set too high if LED comes on.

8. High-Pass Filter

Adjusts corner (-3 dB) frequency of high-pass filter. Fully counter-clockwise (detented) removes the high-pass filter. Range is 80 Hz to 240 Hz, 12dB/oct to 6 dB/oct.

9. Input Limiter LED

Illuminates orange in proportion to the amount of input limiting. Indicates that Gain Trim is set too high if significant limiting is occurring.

10. Slate Mic / Tone Oscillator

Activates the slate microphone in the left position (momentary) and activates the tone oscillator in the right position (latched).

11. Limiter Switch

Activates both input and output limiters. Input limiters can be defeated in the Setup Menu. ON = output limiters are not linked to each other. LINK = output limiters are linked to each other for stereo outputs.

12. Master Gain

Controls overall level of signals to both left and right outputs.

13. Meter Brightness

Adjusts the overall mixer LED brightness level among four intensities (or meter off).

14. Meter Ballistics Selection

Selects among output meter ballistics - VU, PPM (Peak), combined VU/PPM, or VU-PPMHold (see Metering). Hold down while powering to access the Setup Menu.

15. Monitor Selection Switch

Selects the audio source sent to the headphones.

Off	...no signal
L	...left output only to both ears
R	...right output only to both ears
M	...summed (mono) left and right to both ears
ST	...stereo - left output to left ear and right output to right ear
A	...stereo Return A to headphones
B	...stereo Return B to headphones
A B	...Return A (summed) to left ear, and Return B (summed) to right ear
MS L	...decoded MS Left to both ears
MS R	...decoded MS Right to both ears
MS ST	...decoded MS Stereo to headphones

16. Battery Level

Views the battery level on the output meter. Left meter indicates internal battery level, right meter indicates external battery level. See POWERING.

17. Headphone Gain

Adjusts the overall headphone gain.

18. Output Meter

40 segment output meter. Markings indicate output level (at line-level) in dBu for Peak setting. For VU setting, markings indicate Volume Units. See APPENDIX A for 442N scale.

19. Power LED

Illuminates when unit is powered. Flashes when power supply is low. With external DC supply the LED flashes at select voltage. See POWERING.

20. Monitor Return A|B

Allows for quick selection of return audio signals to be sent to the headphones. Function can be modified in the Setup Menu.

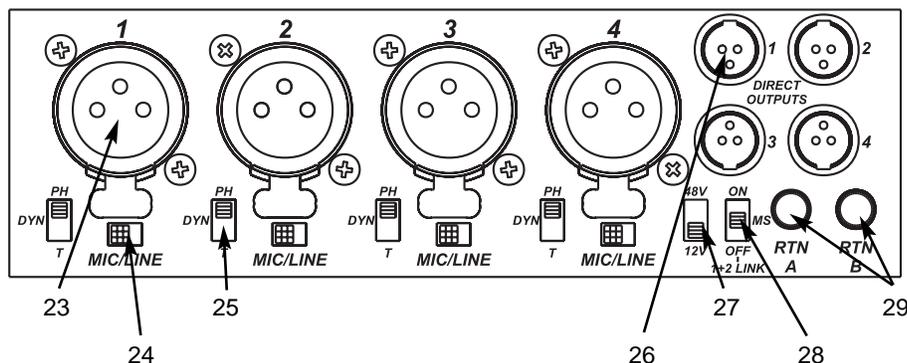
21. Output Limiter LEDs

Illuminates orange in proportion to the amount of output limiting. Indicates that Master or Faders are set too high if significant limiting is occurring.

22. Power Switch

Selects internal or external power source for the mixer.

Input Panel Descriptions

**23. XLR Inputs**

Transformer-balanced channel inputs. Can be unbalanced by grounding pin-3 to pin-1 of the XLR connector. Pin-1 = Ground; pin-2 = 'Hot'; pin-3 = 'Cold'.

24. Mic/Line Channel Switch

Selects the input level of its associated input connector.

25. Phantom/DYNAMIC/T-Power Selection

Selects the microphone powering type of the associated channel.

NOTE: Use T-Powering only for T-Powered microphones.

26. TA3-type Channel Direct Outputs

Balanced, line level channel output. Signal is pre-fader, post-trim, post-input-limiter, post high-pass. Selectable Line or Mic level output via User Setup. Pin-1 = Ground; pin-2 = 'Hot'; pin-3 = 'Cold'. Can be used unbalanced with pin-2 and ground.

27. Phantom Voltage Selection

Selects either 48 V or 12 V phantom voltage for the input channels.

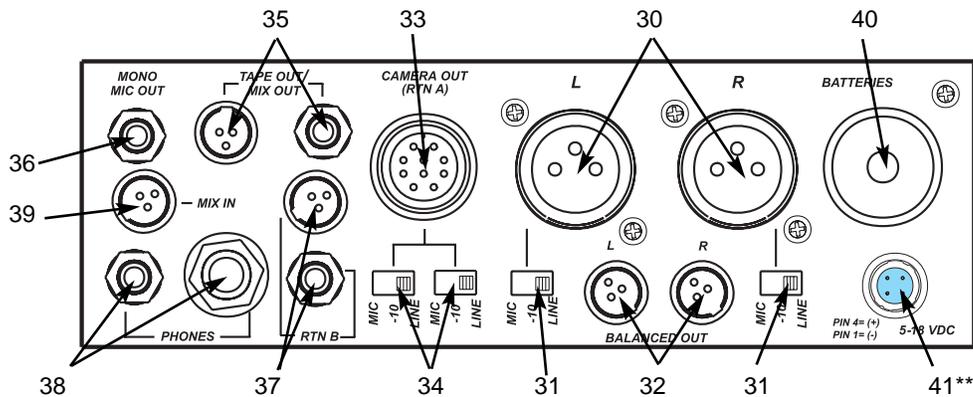
28. 1 + 2 LINK

Groups channels 1 and 2 as a stereo pair. ON selects a L/R stereo pair, MS selects a Mid-Side stereo pair. See Stereo Link for more information.

29. RTN A and RTN B Level

Adjusts the input sensitivity for the Return A and Return B signals. Useful for balancing levels when toggling between program and return audio.

Output Panel Descriptions



30. XLR Master Outputs

Transformer-balanced outputs. Pin-1 = Ground; pin-2 = 'Hot'; pin-3 = 'Cold'. Can be unbalanced by grounding pin-3 to pin-1 of the XLR connector.

31. XLR Output Level

Sets the nominal output level for the XLR Master Outputs to Mic, Tape (-10), or Line levels.

32. TA3-type Master Outputs

Selectable Line (factory default) or Mic level output set in Setup Menu. Pin-1 = Ground, pin-2 = 'Hot', pin-3 = 'Cold'. Can be used unbalanced with pin-2 and ground.

33. Hirose Multi-Pin Output (Return A)

Multi-pin connector includes second master output (on separate winding from XLR outputs). Also includes unbalanced stereo Return A. (See block diagram for pin out.)

34. Hirose Multi-Pin Hirose Output Level

Selects output level for the Hirose Multi-Pin Output to Mic, Tape, or Line Level.

35. Tape Output(s) / Mix Out

Unbalanced stereo outputs on 3.5 mm and TA3-type connectors. For TA3, pin-1 = Ground, pin-2 = Left, pin-3 = Right. For 1/8", sleeve = Ground, tip = Left, ring = Right. Also used to link to the Mix In to add inputs to a 442.

36. Mono Mic Out

1/8-inch, mono, mic level connection designed to connect to wireless IFB transmitters or transcription recorders. Unbalanced. Tip = Hot, sleeve = Ground.

37. Return B Input

Unbalanced stereo TA3-type or 3.5 mm input connectors for Return B audio. TA3: Pin-1 = Ground, pin-2 = Left, pin-3 = Right. 1/8": Sleeve = Ground, tip = Left, ring = Right.

38. Headphone Outputs

1/4-inch and 3.5 mm stereo connectors can drive headphones from 8 to 2000 ohm impedances to required monitoring levels.

39. Mix In

An input to the master bus designed exclusively to link another 442, MixPre, or MP-2 to the 442 for additional inputs. Pin-2 = Left, pin-3 = Right, pin-1 = Ground. Shell of TA3 connector must be grounded to pin-1 to open connection.

40. Battery Compartment

Holds four AA batteries required for internal powering. Accepts alkaline and lithium cells or NiHM rechargeable cells.

41. DC Input

Accepts DC voltages from 5 - 18 V for mixer powering. Four-pin Hirose connector is wired pin-4 positive (+), pin-1 negative (-). Ext DC is completely isolated (floating) from the rest of the circuitry.

** Note

Early versions (s/n < 0303) of the 442 use a coaxial DC power connector with tip (+) and sleeve (-).

Input Channels

The inputs of the 442 consist of four, full-featured microphone preamplifiers. Each channel has a wide gain range to accommodate nearly all signal types. The 442 accepts signals ranging from low-sensitivity ribbon and dynamic microphones to medium level wireless and condenser mic outputs up to "hot" line levels.

442 input channels are transformer-balanced. The isolation characteristics of transformers are superior to other balancing techniques for the hostile and uncontrolled environments of field production. Transformers provide galvanic isolation from the driving source, meaning there is no direct electrical connection. Signals are "transformed" magnetically. The input transformers in the 442 use premium magnetic core material to achieve high signal handling capability (especially at low frequencies) while keeping distortion to a minimum. Because of their inherently high common mode impedance, transformers are unrivaled by any other type of input for common-mode noise rejection.

The inputs of the 442 can be used as either balanced or unbalanced connections. *When unbalancing, ground pin-3 to pin-1.* There is no change in gain between unbalanced and balanced connections into the 442.

Mic/Line Level Selection

The Mic/Line switch is used to select the input level for the channel. Taking into account all available gain stages, the 442 has up to 84 dB of available gain from mic input to line output. When in the LINE position, the input channel sensitivity is reduced by 40 dB.

Gain

Like traditional mixing consoles, the 442's microphone preamp gains are set via the Gain control. The Gain, or trim, adjusts the input sensitivity of the channel input so that the channel fader can be set to operate in a usable range. Once set, the Gain is typically kept at the set level and all mixing is done on the Channel Fader. The Gain adjustment features a pop-up knob so that it can be adjusted easily and then hidden from the mixing surface.

Faders

While both the Gain and the Fader control the gain of a given channel, the Fader is the primary channel level control. The Gain can be thought of as a "coarse"

gain adjustment to be adjusted during setup, and the Fader is a "fine" gain adjustment to be adjusted while recording. With a properly set up Gain, the Fader can be set to a nominal 0 (unity) level. With the Fader at unity, the dynamic range of the mixer is maximized. There is a wide range of gain control for the input, allowing for smooth gain changes with adequate control of attenuation and gain.

Phantom Powering

The 442 can provide phantom power to each channel and is selected per channel. The 442 can provide up to 10 mA to each input at 48 V, sufficient for the most power-hungry condenser microphones. When acceptable, using 12 V phantom is recommended to extend battery runtime. Many microphones do not require 48 V phantom and can be properly powered from 12 V phantom power. The phantom voltage level is globally selected for all inputs - either 12 V or 48 V.

The 12 V/48 V phantom voltage switch is located on the input panel.

Phantom Basics

Phantom powering is a method of providing power to microphones by applying a voltage to the microphone using the same wires that carry the audio signal. Phantom power is produced by the 442 for microphones that require power.

Condenser microphones require power for various parts of their operation, including impedance converters, preamplifier circuitry, and in some cases, to polarized microphone capsules. Phantom powering utilizes a fixed DC voltage between 12 and 48 volts. This voltage is resistively applied to pin-2 and pin-3 of an XLR connector relative to pin-1. (Note that as there is no voltage difference between the signal pins -2 and -3, a dynamic mic can operate just fine in the presence of phantom powering.)

Microphones draw differing amounts of current based on their design. Many phantom-powered mics will operate at 12 V with no difference in performance as compared to operating off of 48 V. As the mics draw the same current no matter what the phantom voltage, operating at 48 V consumes four times the power as 12 V with no performance gain! This excess power draw can make a significant difference in battery life and is the reason that the 442 allows the user to select phantom voltage.

It is generally good practice to turn off phantom power when not using a phantom powered mic, as phantom power can capacitively couple noise into the mic inputs with poor mic cables. Also, turn phantom power off when using ribbon microphones since an improperly wired cable can permanently damage the microphone.

The DYN (dynamic) position applies no voltage to the microphone input.

T-Powering

T-powering is a microphone powering scheme used by several European condenser microphone manufacturers. Today, T-powered microphones are not as common as phantom microphones, but many are still in regular use. Unlike phantom power, T-power resistively applies 12 V between the signal pins -2 and -3. The 442 provides selectable T-power for each input. The 442 provides positive T-power, where pin-2 on the XLR-3 connector has +12 volts relative to pin-3. When using "red dot" T-powered microphones (reverse polarity T-power) use a polarity-reversing adapter on the input, otherwise damage to the microphone may occur. Do not apply phantom power to T-powered microphones.

NOTE: Phantom and T-powering are not interchangeable. Use T-powering only for T-powered microphones.

High-Pass Filters

Each channel of the 442 has an adjustable high-pass filter. High-pass (or low-cut / low roll-off) filters are useful for removing excess low frequency energy in audio signals. Wind noise is a common unwanted low frequency signal and a high-pass filter is effective for reducing wind noise. For most audio applications engaging the high-pass filter is beneficial, since little useable audio information exists below 100 Hz, especially for speech reproduction.

The 442's high-pass circuit features an adjustable corner (-3 dB) frequency over a range from 80 Hz to 240 Hz. Below 80 Hz, the filter's slope is 12 dB/octave. At higher corner frequency settings, the slope is 6 dB/octave, and then below 80 Hz, it increases to 12 dB/octave (see Specifications). The purpose for this compound slope is to give additional roll-off at the 80 Hz setting to reduce wind noise and rumble. The higher settings can be used to counteract proximity effect of directional mics where a more gentle slope is desirable. The 442's high-pass circuit is unique because of its placement before any electronic amplification. Most mixer's high-pass circuits are placed after the mic pre-

amp, where all of the high-energy low-frequency signals get amplified. By virtue of the 442's circuit cutting the low-frequency signals before amplifying, higher headroom is achieved in presence of signals with a lot of low-frequency energy.

Where possible, attempt to equalize at the sound source with microphone selection, use of windscreens, microphone placement, and onboard microphone filtering. Many microphones have on-board high pass filters, and the high-pass filters on the 442 can be used in conjunction with the microphone's filters to increase the filter's slope.

The filter can be removed from the circuit completely by moving the high-pass control fully counterclockwise. The high-pass features a pop-up knob so that it can be adjusted easily and then hidden from the mixing surface.

Pan Controls

The pan control routes an input channel signal anywhere between the Left and Right output. The 442 uses constant loudness pan controls, meaning that the signal is 3 dB louder at the full-right or full-left position relative to the center position. For most applications the channel will be panned either full left, full right, or to the center; the 442 features excellent "off-attenuation" of the channels in the hard- left and right positions. The pan pot has a detent in the center position, and is calibrated at Sound Devices for a maximum difference of +/- 0.1 dB between the left and right output in this position. Since pan is not often used after channel setup, the pan pot is on a pop-up knob so it can be hidden from the mixing surface during normal operation.

Channel Limiters

The channel limiter acts solely as a "safety" limiter, and is enabled when the output limiters are enabled via the "LIM" switch on the front panel. (See Setup Menu to defeat Channel Limiters entirely.) In normal operation, with a properly set gain structure the threshold of the channel limiter will not be reached. If extremely high input signal levels exist, such as in high SPL environments or with misadjusted settings, the channel limiter(s) will activate to prevent the input channel from clipping. Without a channel limiter, high signal conditions would overload the channel and cause distortion. It is recommended that the channel limiters be used at all times. Below the set threshold (just below clipping), the limiter does not affect the sound in any way.

When input channels 1 & 2 are linked as a stereo pair, their channel limiters also link to perform the same gain reduction to both channels equally. Each channel has an orange limiter LED which illuminates in proportion to the amount of limiting. If the orange LED for a channel comes on substantially, it is recommended to turn down the Gain.

Peak LEDs

Each channel has an indication of peak signal activity. When a channel approaches 3 dB below its clipping level, the red Peak LED illuminates. If the red Peak LED for a channel comes on often, it is recommended to turn down the Gain.

Polarity Reversal - Channel 2

Engaging the polarity reverse switch inverts the polarity of channel 2. Polarity reversal is often used when booming from below or to quickly reverse the stereo field in MS recording. The normal position is OFF, with polarity reversal occurring when the switch is in the \ominus position.

NOTE: Do not change the polarity of channel two during recording, since a pop occurs when the switch changes states.

Stereo Link ON - Channels 1 and 2

When Stereo Link is set to ON, input channels 1 and 2

are turned into a single, stereo pair controlled by channel one's fader. The Pan control for channel 1 becomes a balance control between left and right. The Fader and Pan on channel 2 are disabled. Channel 1 and 2's trim level and high-pass filters remain active on their respective signals. When linked, channel 1 & 2's channel limiters are also linked.

Stereo Link MS - Channels 1 and 2

When Stereo Link is set to MS, input channels 1 and 2 are linked as an MS pair where input 1 is the Mid signal and input 2 is the side signal. The Channel 1 Pan Control functions as a left/right balance control for the matrixed MS signal. The Fader and Pan on channel 2 are disabled. The Gain Trims and high-pass filters still act individually. The Gain Trim controls for inputs 1 and 2 can be used to vary the Mid and Side levels respectively. When linked, channel 1 and 2's channel limiters are also linked.

PFL (Channel Solo Monitoring)

When the momentary PFL switch is activated the channel audio is routed (in mono) to the headphones. This signal is post-trim, post high-pass, post-limiter, and pre-fade. From the factory the left meter indicates the signal level of the channel. PFL monitoring does not disrupt audio sent to the master outputs. The PFL metering function can be deactivated in the Setup Menu.

Outputs

The 442 is a two-bus mixer with several outputs - essential for multi-camera, multi-source productions. Because each input can be continuously panned from left to right, the mixer can be used with either two mono buses or with a single stereo bus.

Master Gain Control

A single master gain control adjusts the overall output level of the left and right outputs. The gain range of the Master is from complete attenuation (master outputs off) to +6 dB of gain. For most applications the Master control should be set at the unity gain (0) position. The master gain is on a pop-up knob so it can be set and hidden from the main surface so inadvertent adjustments are avoided.

Master Outputs - XLR and Hirose Multi-Pin

The master XLR and Multi-Pin outputs are trans-

former-balanced connections each driven from their own transformer windings for excellent isolation. Additionally, the outputs can independently be set to Line, Tape (-10 setting, 14 dB of attenuation from Line), or MIC Level (40 dB of attenuation from Line). The master outputs are capable of driving long lines.

The multi-pin connector also includes a stereo, unbalanced Return A input for headphone monitoring.

Secondary Balanced Outputs

The TA3-type connectors below the Master XLR pair are an additional set of master outputs. These outputs are impedance-balanced (pin-2 is driven and pin-3 is not) and can be used as either balanced or unbalanced outputs. The output level from the factory is Line-Level (+4 dBu nominal). This level can be changed in the Setup Menu to Mic-Level.

Tape Outputs (Mix Output)

The 442 has an unbalanced, tape level output available on both a locking TA3-type connector and a 3.5 mm connector. These two connectors are resistively in parallel. Tape outs are typically used to interface with consumer inputs such as MiniDisc, DAT, and compact cassette recorders. Tape outputs are isolated from the main outputs, so any devices connected to these will have no effect on the master outputs.

Output Limiter

With the input and output limiters active, it is nearly impossible to clip (overload) the 442 mixer. To activate the 442 limiters, set the front-panel "LIM" switch to either the LINK or ON positions. See "Channel Limiter" section for more information on the input limiters.

The output limiters prevent the peak output signal level from exceeding the set limiter threshold. The output limiter threshold is set in the Setup Menu to any level from +4 dBu to +20 dBu in 1 dB increments (see Setup Menu). From the factory, the mixer is set to limit the output signal peak levels to +20 dBu. This assures that the output of the 442 will not overload inputs that can accept full line-level signals (+24 dBu peak).



Mono Mic Output

The Mono Mic Output is a sum of the two output channels intended for portable transcription recorders. This signal is mono, Tip/Sleeve, and is a microphone level. This output can also feed a wireless IFB transmitter.

The orange LIM LEDs at the end of the meter scale illuminate in proportion to the amount of limiting.

LINK or ON?

The output limiters can be selected to act together as a single limiter controlling both the left and right output channels equally (LINK) or act as two independent limiters (ON). The LINK position is recommended when recording stereo program, so that level changes are identical for both channels. The ON position is recommended when using the 442 outputs as two separate buses.

Mix Input (linking mixers)

The Mix In connector allows two 442 mixers to be connected for a total of eight input channels. The signal of all eight input channels are present at the output of the 442 to which the Mix In connector is connected. The other 442's outputs will contain only its own four input channels. To link two 442 mixers, simply connect the Mix Out of the first mixer to the Mix In of the sec-

ond 442 with Sound Devices XL-1 link cable (included). Alternatively, a Sound Devices MixPre or MP-2 can be connected to the 442's Mix In with the proper cable. *The connector shell of the Mix In TA3 connector must be grounded to pin-1 of the connector to open the connection.*

Metering

The 442 features a large 40-segment (20 per channel) LED output meter with selectable ballistics. The meter uses energy-efficient GaN LED's, which can be viewed in full sunlight. The 442 output meter is unaffected by shock, temperature, or humidity extremes. The microcontroller-based output meter provides a selection of ballistics and lighting intensities.

Meter Ballistics

The output meter can be set to display any of four types of meter ballistics - VU, Peak, a composite of VU and Peak, and a composite of VU with Peak hold. The

button labeled PK/VU toggles the ballistics. The meter button can be pressed any time to change ballistics. See the Setup Menu for selections.

VU - (Volume Units) meter ballistics correspond closely to how the human ear perceives loudness and provides a good visual indication of how loud a signal will be. In VU mode, the attack and decay of the meter signal is 300 mS. While giving a very good visual indication of how loud a signal will be, a VU meter gives poor information on actual signal peaks. In VU mode, the front panel meter labeling is in volume units. VU meters are always referenced to an

actual signal level in dBu, and the 442 VU meter is referenced with 0 VU corresponding to 0 dBu at the Line-Level outputs. If needed, the reference level can be changed via a User Setup to +4 dBu or +8 dBu.

Peak - Peak-reading ballistics correspond to actual signal peaks, but don't necessarily correspond to perceived signal loudness. The peak meter has an instantaneous attack to display all peaks and a slow decay to allow the user to see them. Peak metering is useful when interconnecting to modern audio inputs on digital equipment, as signal overload can cause immediate distortion. The peak meters front panel markings are calibrated in peak dBu level at the Line-Level outputs.

VU/Peak - The 442 can simultaneously display VU and Peak level information. In this mode the perceived loudness (VU) is displayed on a bar graph, and the Peak signal on a dot above the VU. With this combination the user gets the best of both VU and Peak metering by seeing the "loudness" of the signal while observing peaks at the same time.

VU/Peak Hold (firmware v. 3+ only) - Similar to VU/Peak mode, this mode holds the peak level indication for several seconds before releasing. Peak Hold indicators are useful for metering in applications when an overload condition is unacceptable.

Meter Lock (firmware v. 3+ only)- Simultaneously pressing the battery check and meter brightness buttons locks the selection of the meter setting. This setting is saved on power down.

Headphone Peak LED

Like the Channel Peak LEDs, the headphone circuit has an indicator for peak overload. This LED is very useful, since headphones can often overload before the mixer overloads. Monitoring without a visual indication of headphone clipping could mislead the operator into thinking that the output or return feeds are distorted. The Headphone Peak LED also doubles as a clip indicator for the stereo Return A and Return B signals. If any of the Return signals clip (after the Return gain stage), the Headphone Peak LED illuminates.

Headphone Monitoring

The 442 can drive headphones to dangerously high volumes. Turn down the headphone gain control before selecting a headphone source to prevent accidental signal extremes.

Headphone Source Selection

The rotary headphone source switch sets the audio source sent to headphones. The selections available are:

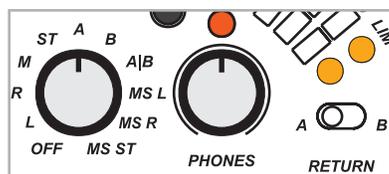
- Off**no signal
- L**left output only to both ears
- R**right output only to both ears
- M**summed (mono) left and right to both ears
- ST**stereo - left output to left ear and right output to right ear
- A**stereo Return A to headphones
- B**stereo Return B to headphones
- A|B**Return A (summed) to left ear, and Return B (summed) to right ear
- MS L**decoded MS Left to both ears
- MS R**decoded MS Right to both ears
- MS ST**decoded MS Stereo to headphones

Headphone Gain

Headphone gain is controlled by a pop up knob to remove it from the mixing surface.

Return A and B

The Return monitor switch has two positions, A and B. When switched to the A position, Return A audio is sent to the headphones, taking precedence over the Headphone Source selection. Similarly, when toggled to the B position, Return B audio is sent to the headphones. This switch can change assignments performed in the Setup Menu.



Powering

The 442 can be powered from either internal batteries or externally via DC powering. The internal batteries can be used as either a primary power source or as a back-up in the event that external power is removed or depleted. The power switch selects the power source - either internal or external powering. There is a large enough power reserve to be able to switch back and forth from one source to the other without interruption of mixer signal.

The 442 is very power efficient and can run from four-AA alkaline batteries (without phantom) for approximately eight hours. As additional load is placed on the mixer, battery life is reduced.

Internal Powering

The 442 can be powered via AA-sized batteries of various types. Lithium cells, alkaline, and NiMH rechargeable AA battery types are all popular batteries for internal AA powering. The 442 will achieve longest battery life with use of Lithium or NiMH batteries.

External Powering

The 442 can be powered from any DC voltage from 5 to 18 VDC. Pin-4 of the locking, Hirose connector is positive (+) and pin-1 is negative (-). The external DC supply is completely isolated (floating) from the rest of the mixer for easy and safe interconnection to other external audio gear.

Power Metering

The battery check button indicates battery voltages of internal and external power supplies. The left meter shows the internal battery voltage and the right meter shows the external battery voltage. Since many different battery types are available for external use, the external DC metering can be customized for a given battery in the Setup Menu.

Power Consumption

The 442 can vary in the amount of current it draws. Several functions of the 442 directly affect current draw in different ways. The following list highlights the larger current drawing functions (listed from highest to lowest current draw).

1. **Microphone powering** - the main source of extra 442 current draw. (See Phantom Power) 48 V Phantom can draw copious amounts of current out of the batteries depending on what model microphone is used. Two phantom powered microphones draw twice as much current as one. Microphones vary widely in their current draw depending on type and phantom voltage applied.
2. **Output drive level** - higher output drive levels into multiple, low-impedance inputs increases current draw.
3. **Headphone output circuit** - high headphone output levels increase current draw.

Experimentation is recommended to determine battery life for each individual setup and application.

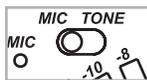
Chart of Setups for Battery Metering

Setting	High Voltage	LED Flash Point	Low Voltage	Power Source
	6.0	4.5	4.0	Internal batteries
1	13.0	11.5	11.0	12 V NiCad, NiMH, Li, etc.
2	17.0	11.5	11.0	Expanded range of setting #1
3	8.5	5.75	5.5	6 V NiM, Li, etc.
4	14.0	11.4	10	12 V Lead Acid
5	7.0	5.7	5.0	6 V Lead Acid
6	17.0	11.5	5.0	Full range of DC input, w/ cutoff for 12 V NiCad, etc.

→ **Factory setting.** The full length of the meter scale indicates the voltage range of 13 V to 11 V, in 0.1 V increments. Experiment to determine battery runtime.

Tone Oscillator / Slate Microphone

A single 3-position switch controls both the tone oscillator and the slate microphone.



Tone Oscillator

Tone is used to set gain structure between the 442 and the next device in the signal path. The tone oscillator uses the locking position of the switch.

From the factory, the tone oscillator is set to output a 1 kHz tone at 0 dBu to the outputs (when the outputs are set to Line level). Tone is also sent at the same level to the direct outputs. In the Setup Menu, the tone frequency and output level can be changed. Also, the tone oscillator can be removed from the direct outputs or the tone switch can be defeated.

The 442 oscillator contains a unique feature: the headphones are attenuated by 20 dB when the tone is active to save the operator's ears. This feature can be defeated in the Setup Menu.

When the tone oscillator is active, press the battery check button to cycle between 0 and -20 dB in the left output. This is helpful to verify left and right channel. Turning off the tone oscillator or pressing the battery check button again stops the output cycling.

Accessing the Setup Menu

The 442 has 18 available setup options (see Appendix for setup charts). Setups, while not typically changed during normal operation, are easily accessed directly on the front panel.

Enter the Setup Menu

To access the setup menu perform the following steps:

1. Turn off the mixer, if already on.
2. Depress and hold the Peak/VU selection switch while switching internal power on.
3. The setup mode is now enabled.

The mixer will not pass audio when in the setup menu.

In setup menu the left meter (L) position indicates the selected setup. The right meter (R) position indicates the values selected for the Setup. Use the PK/VU button advance from one setup to another. If you pass up the intended option, you must re-enter Set Up Mode since you cannot go backward, only forward when selecting individual setups.

To adjust values, the meter brightness button (left) and the battery check button (right) allow you to choose among setup values. Some setups have multiple values while others have only two values.

Example: Change the Tone Oscillator Frequency from the factory

Slate Microphone

The slate microphone is used to audibly notate scenes at the mixer location. Its audio performance is not suitable for critical recording applications; it should only be used for documenting scenes to tape. The slate mic uses the momentary switch position.

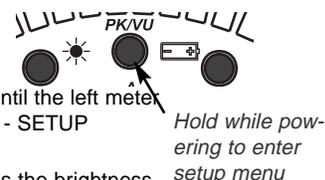
In the Setup Menu, a one second 400 Hz tone can be set to precede the slate microphone.

The slate microphone signal is sent to all outputs except the Direct Outs. In the Setup Menu, the slate microphone can be disabled to prevent unintended activation.

The slate mic can function as a communication mic in addition to the normal Slate Mic. This function is normally disabled and is turned on in the Setup Menu. In this mode, program audio at the right secondary-master TA3 connector is disabled. Instead, the audio from the slate mic appears at this output when the RTN A/B toggle switch is actuated. Normal program audio is unaffected. This function can be used in conjunction with a Sound Devices MM-1 to create a flexible communications system with a boom operator.

default (1 kHz) to 100 Hz.

1. Enter the setup menu by holding down the PK/VU button while powering the mixer.
2. Press the PK/VU button several times until the left meter LED is at the -8 position (see Appendix - SETUP MENU).
3. To move among parameter values, press the brightness LED and battery check LED until the 100 Hz position is selected (-14 LED).
4. Press the PK/VU button multiple times until the meters perform their scrolling dance. This sets the parameter into memory.

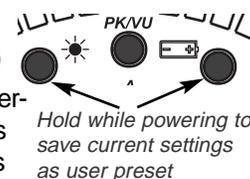


To save new values to memory, the PK/VU button must be repeatedly pressed until the last setup is reached. At that point the meters will scroll and the new values will be saved to memory.

User Default (v5 firmware only)

A memory location is available to store user-defined default settings. The user default is helpful to save a new "baseline" of settings different than the factory default settings. To save a user default hold down both the meter brightness button and battery check button while powering the mixer.

The current settings will be saved as the user default. These settings can be recalled from the setup menu.



Specifications

Measurement Settings (unless otherwise specified): Gain controls for the channel being measured at mid point, all other channel gains fully down; pan controls centered; low-cut off; inputs in 'MIC' position; outputs in LINE position. Mic input driven with 150 ohm source. Outputs measured with 100k ohm load. Temperature at 25°C.

Maximum Gain, typical (Trim, Fader, Master, Phones, RTN A, RTN B fully up):

	XLR Input MIC Setting	XLR Input LINE Setting	RTN A, B
XLR, Multi-pin Outs @ LINE Setting	81 dB	41 dB	-
XLR, Multi-pin Outs @ -10 Setting	67 dB	27 dB	-
XLR, Multi-pin Outs @ MIC Setting	41 dB	1 dB	-
Balanced TA3-type Outs @ LINE Setting	81 dB	41 dB	-
Balanced TA3-type Outs @ MIC Setting	41 dB	1 dB	-
Tape Out, TA3-type and 1/8"	67 dB	27 dB	-
Mono Mic Out	41 dB	1 dB	-
Headphones, 1/4" and 1/8"	101 dB	81 dB	30 dB

Frequency Response:

20 Hz - 30 kHz, +0.2, -0.5 dB, -1 dB @ 5 Hz and 50 kHz typical

Equivalent Input Noise:

-126 dBu (-128 dBV) maximum. (22 Hz - 22 kHz bandwidth, flat filter, trim control fully up)

Input Clipping Level:

0 dBu minimum (trim control fully down)

Line Output Clipping Level (1% THD):

20 dBu minimum
18 dBu minimum w/600 ohm load

Dynamic Range:

115 dB minimum (trim fully down)

THD + Noise:

0.007% typical (1 kHz, +4 dBu at line out)
0.09% max (50 Hz - 20 kHz, +18 dBu at line out, fader fully up)

Output Noise:

-100 dBu (-102 dBV) maximum (22 Hz - 22 kHz bandwidth, flat filter, master gain fully up, faders fully down)

Common Mode Rejection Ratio:

120 dB minimum at 80 Hz, mic input
100 dB minimum at 10 kHz, mic input

L/R Gain Matching, Mic in to Line Out:

+/- 0.1 dB

INPUTS:

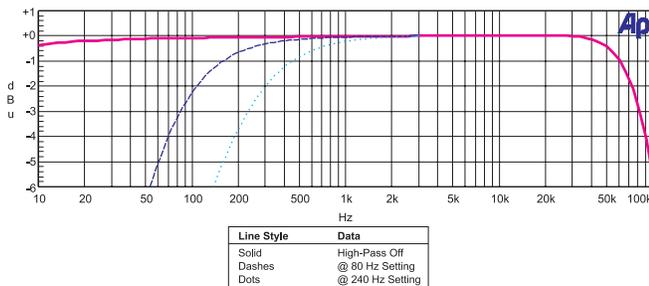
	Impedance (Ohms)	Type	For use with:	Max Input Level
XLR - MIC setting	2k	transformer-balanced	< 600 ohm mics	0 dBu (0.78 Vrms)
XLR - LINE setting	16k	transformer-balanced	< 2k ohm outputs	+40 dBu (80 Vrms)
RTN A, B (3.5 mm/ TA3/Multipin)	20k	unbalanced, stereo	< 2k ohms outputs	+24 dBu (12.4 Vrms)
Mix In	4.2k	unbalanced, stereo	442 Mix Out (1.8k)	+6 dBu (1.5 Vrms)

OUTPUTS:

	Impedance (Ohms Actual)	Type	For use with:	Max Output Level
XLR, multi-pin - LINE setting	85	transformer-balanced	\geq 600 ohm inputs	+20 dBu (7.8 Vrms)
XLR, multi-pin - -10 setting	3.2k	transformer-balanced	> 10k ohm inputs	+6 dBu (1.5 V rms)
XLR, multi-pin - MIC setting	150	transformer-balanced	> 600 ohm inputs	-20 dBu (0.078 Vrms)
TA3-type, LINE setting	1k	impedance-balanced, pin-2 driven	> 3k ohm inputs	+20 dBu (7.8 Vrms)
TA3-type, MIC setting	1k	impedance-balanced, pin-2 driven	> 3k ohm inputs	-20 dBu (0.078 Vrms)
Direct Outs - LINE setting	1k	impedance-balanced, pin-2 driven	> 3k ohm inputs	+20 dBu (7.8 Vrms)
Direct Outs - MIC setting	1k	impedance-balanced, pin-2 driven	> 3k ohm inputs	-20 dBu (0.078 Vrms)
Tape Outs - 3.5 mm and TA3-type	1.8k	unbalanced, stereo	> 6k ohm inputs	+6 dBu (1.5 Vrms)
Mono Mic Out	150	unbalanced, mono	> 600 ohm inputs	-20 dBu (0.078 Vrms)
Headphones - 3.5 mm and 1/4"	200	unbalanced, stereo	8 - 2k ohm headphones	+20 dBu (7.8 Vrms)

High-Pass Filters:

Sweepable 80 Hz to 240 Hz, 12 dB/oct at 80 Hz,
6 dB/octave at 240 Hz

**Mic Powering** (each mic selectable):

Dynamic (no power applied),
12 V Phantom - though 680 ohm resistors, 10 mA per mic available,
48 V Phantom - through 6.8k resistors, 10 mA per mic available,
12 V T-Power - through 180 ohm resistors, 10 mA per mic available.

Input Limiters:

Affects the output of the mic preamps only ('Trim' stage),
+18 dBu threshold, 20:1 limiting ratio,
1 mS attack time, 200 mS release time.

Temperature:

Operating: -20°C to 60°C , 0 to 95% relative humidity;
(non-condensing)
Storage: -40°C to 85°C

Audio Connectors:

10-pin Hirose multipin (see pg. 18 for pin assignments) to mate with Hirose #RM15TD-10P,
TA3M to mate with TA3F-type

Output Limiters:

Affects the outputs of the mixer.
Threshold selectable from +4 dBu to +20 dBu,
1 dB steps, 20:1 limiting ratio, 1 mS attack time,
200 mS release time.

Power supply:

Internal ± 16 V (bi-polar) regulated audio rails,
3.2-8 V range internal batteries,
Isolated (floating) external DC input jack, 5-18 V
Locking 4-pin Hirose connector, pin-4 = (+), pin-1 = (-),
Use gold Hirose #HR10A-7P-4P (DigiKey# HR110-ND)
or silver Hirose #HR10-7P-4P (DigiKey# HR100-ND) for
locking mating DC connector.

Metering:

40 segment, sunlight-viewable
Selectable Peak, VU, or Peak (with or without peak hold)
+ VU ballistics.

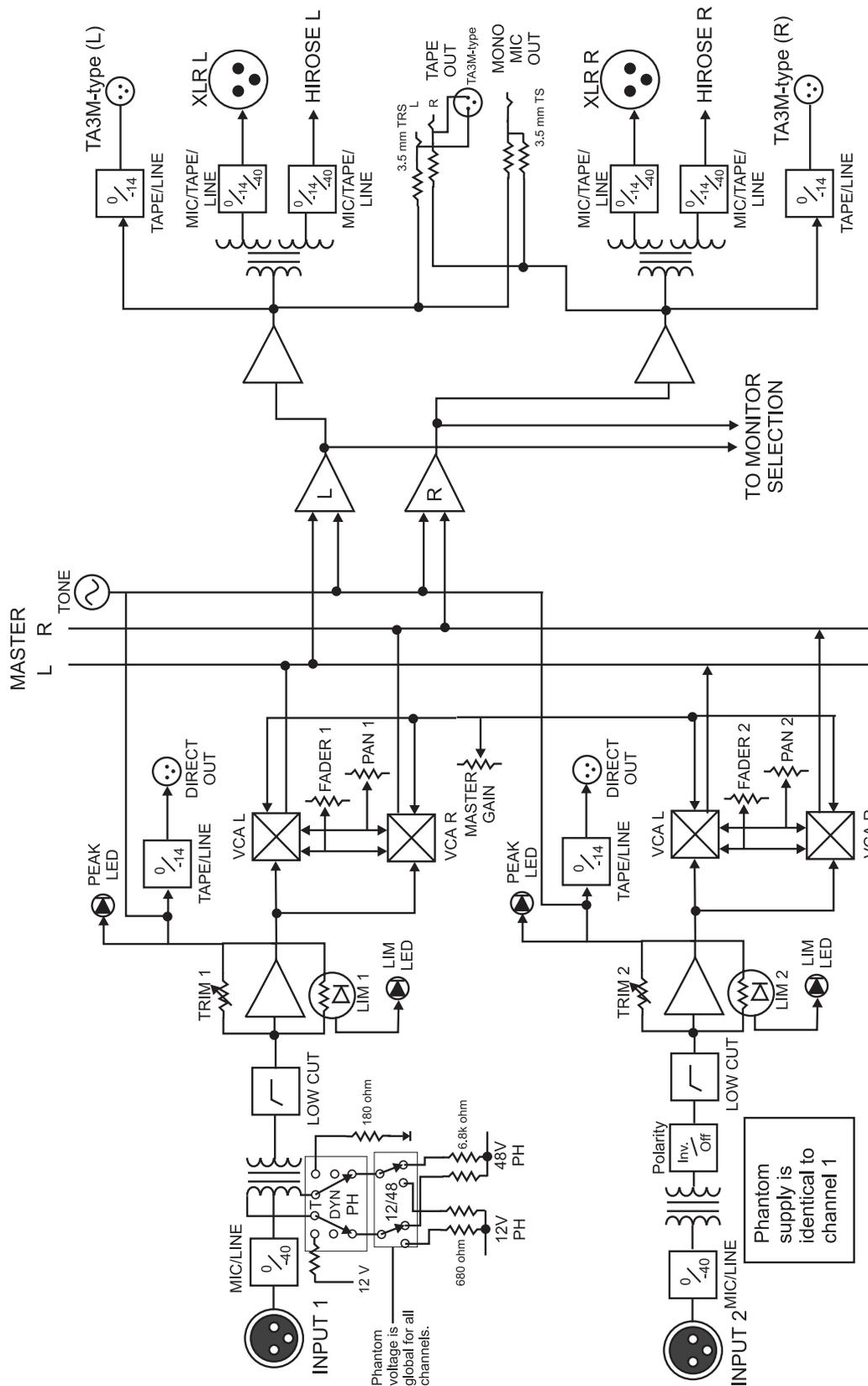
Weight:

2.0 kg, (4.5 lbs) unpackaged with four alkaline AA batteries

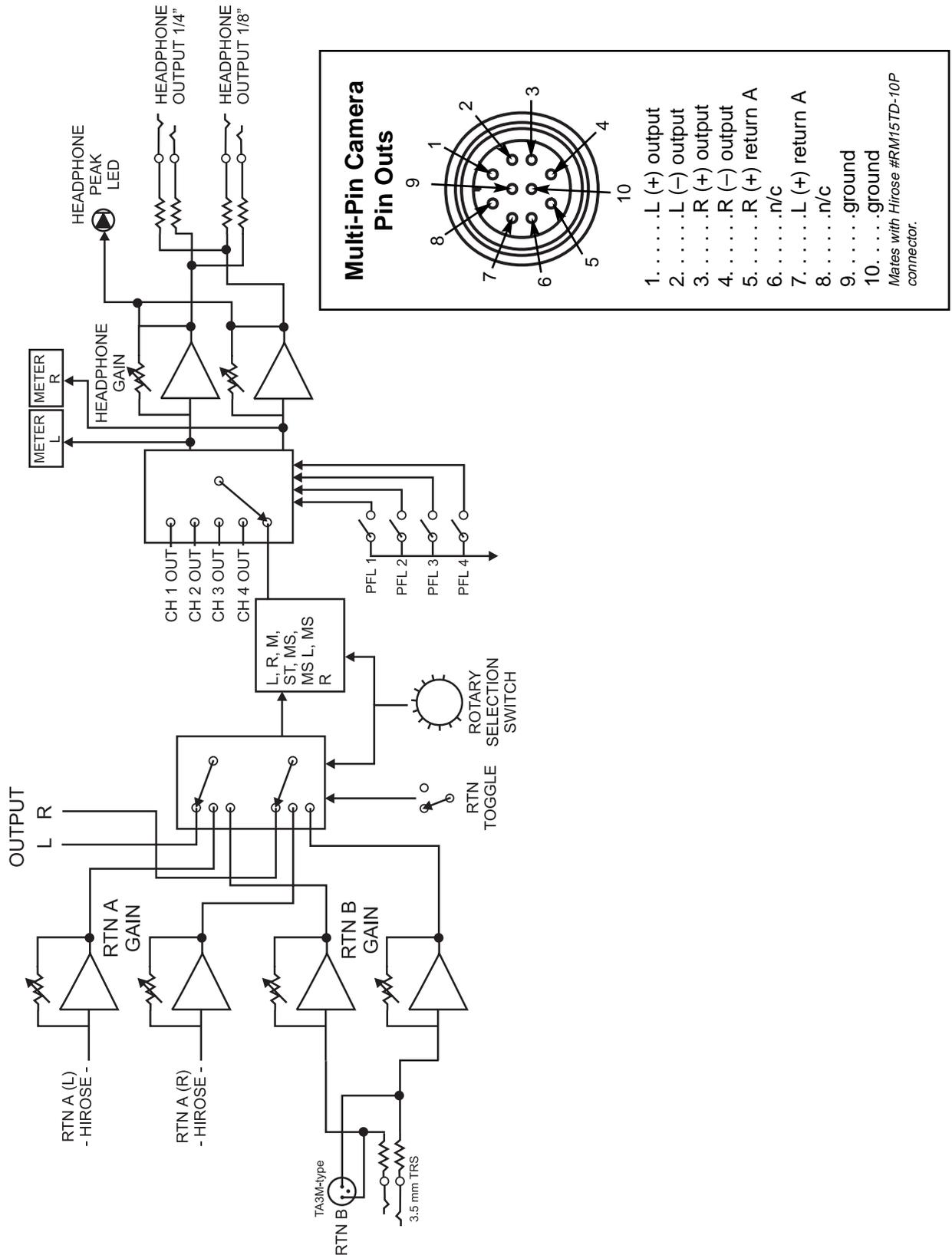
Dimensions:

53 mm x 165 mm x 279 mm (H x W x D)
2.1" x 6.5 x 11"

Block Diagram - Inputs and Outputs



Block Diagram - Monitoring



Approvals

FCC Statement

This device has been tested and found to comply with the limits for a class B digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

CE Conformity Statement

Declaration of Conformity

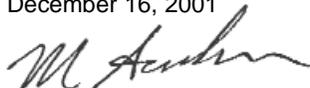
According to ISO/IEC Guide 22

Manufacturer's Name: Sound Devices, LLC
 Manufacturer's Address: Sound Devices, LLC
 300 Wengel Drive
 Reedsburg, WI 53959 USA

declares that the product:
 is in conformity with: 442 Field Mixer

Document No.	Description
EN55103-1 (1997)	Emissions standard for product family audio devices for professional use
EN55103-2 (1997)	Immunity standard for product family audio devices for professional use
EN55022 (1995)/ CISPR 22 (1997)	Radiated and Conducted emissions, Class B
EN61000-4-2 (1995)/ IEC1000-4-2 (1995)	ESD - 6kV contact, 8kV air-discharge
EN61000-4-3 (1995)/ IEC1000-4-3 (1995)	Radiated RF Immunity, 10 V/m, 80% 1 kHz amplitude modulation
EN61000-4-4 (1995)/ IEC1000-4-4 (1995)	EFT/Burst, I/O lines, +/- .25 kV to +/- 1.0 kV
EN61000-4-6 (1996)/ IEC1000-4-6 (1996)	Conducted RF Immunity, 10 V, 80% 1 kHz amplitude modulation
L. S. Compliance, Inc. Cedarburg, Wisconsin	

Tested by:
 December 16, 2001



Matthew Anderson
 Director of Engineering

Warranty

Sound Devices, LLC warrants the 442 Field Mixer against defects in materials and workmanship for a period of ONE (1) year from date of original retail purchase. This is a non-transferable warranty that extends only to the original purchaser. Sound Devices, LLC will repair or replace the product at its discretion at no charge. Warranty claims due to severe service conditions will be addressed on an individual basis. THE WARRANTY AND REMEDIES SET FORTH ABOVE ARE EXCLUSIVE. SOUND DEVICES, LLC DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. SOUND DEVICES, LLC IS NOT RESPONSIBLE FOR SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES ARISING FROM ANY BREACH OF WARRANTY OR UNDER ANY OTHER LEGAL THEORY. Because some jurisdictions do not permit the exclusion or limitations set forth above, they may not apply in all cases.

For all service, including warranty repair, please send the 442, along with proof of purchase date to:

Sound Devices, LLC
 Service Repair
 300 Wengel Drive
 Reedsburg, WI 53959 USA

Appendix A - 442 Nordic Information

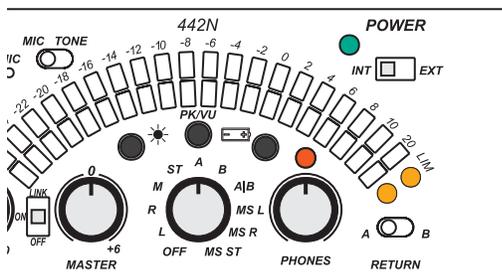
The 442 Nordic (442N) is identical to the 442 except for its Nordic scale PPM meter.

Setup Menus

The Setup Menus vary slightly between the 442 and the 442N. To set the limiter threshold level an additional LED is illuminated for calculation. To find the limiter threshold value, consult the chart below.

Example: Change the Limiter Threshold from the factory default of +20 dBu to +14 dBu.

1. Enter the Setup Menu by holding down the PK/VU button while powering the mixer.
2. The Limiter Threshold setup is the first position (see Setup Menu).
3. To move among parameter values, press the brightness LED and battery check LED until the left meter illuminates "10" and the right meter illuminates "4".
4. Press the PK/VU button multiple times until the meters perform their scrolling dance. This sets the parameter into memory.



Level (in dBu)	Left (top) Meter	Right (bottom) Meter
+20	20	0
+19	10	10+8
+18	10	8
+17	10	8+6
+16	10	6
+15	10	6+4
+14	10	4
+13	10	4+2
+12	10	2
+11	10	2+0
+10	10	0
+9	10+8	0
+8	8	0
+7	8+6	0
+6	6	0
+5	6+4	0
+4	4	0

Appendix B - Accessory Products

Sound Devices offers several accessories to add value to the 442. These are available from any authorized Sound Devices Reseller or direct from Sound Devices.

- CS-442** Carry case designed exclusively for Sound Devices 442 Field Mixer. Includes a dedicated pouch for an NP-type battery and leather shoulder strap. Accepts RM-series accessories and AH-2 harness (not included).
- XL-1** TA3-F to TA3-F link cable for 442 to 442 linking; 6-inch.
- XL-2** TA3-F to XLR cable; 15-inch; connects balanced TA3 to XLR inputs; package of two cables.
- XL-3** 3.5 mm to TA3-F link cable for MixPre/MP-2 Tape Output to 442 Mix In; 12-inch.
- XL-4** Bag of four (4) TA3-F-type connectors.
- XL-10** Hirose 10-pin to two-XLR (balanced L/R) and 3.5 mm plug (442 Stereo Return A) breakout cable; includes in-line 20-foot extension cable.
- XL-H** Bare Hirose connector, (Hirose p/n HR10-7P-4P) to mate with locking 4-pin DC power jack.
- XL-NP** NP-type battery cup with 12-inch cable with Switchcraft locking DC jack at equipment end. For use with HX-3, MixPre (s/n <0506...), MM-1, MP-2, and 442 (s/n <0303...).
- XL-NPH** NP-type battery cup with 12-inch cable with Hirose 4-pin locking power jack at equipment end. For use with 442N, 442 (s/n >0303...), and MixPre (s/n >0506...).

Appendix C - Setup Menu (firmware v 5)

The chart below shows the available setups for the 442 and 442N. The flashing left (top) meter LED indicates the setup selected. The right meter LED indicates the available values, read from left to right.

L Meter Position 442 (442N)	Setup	Description	Values bold is factory default (indicated meter value on R meter of 442)
-30 (-30)	Output Limiter Threshold Adjustment	Sets the output limiter threshold in dBu	1 dB increments from +4 dBu to +20 dBu at Line Level output
-20 (-24)	Input Limiter Defeat	Allows the input limiters to remain OFF when the LIM switch is activated	OFF (-30), ON (-20)
-14 (-22)	Balanced TA3 Output Level	Selects the nominal output level of the active-balanced TA3 outputs	Line-Level (-30), Mic-Level (-20)
-12 (-20)	Direct Output Level	Selects the nominal output level of the active-balanced TA3 channel direct outputs	Line-Level (-30), Mic-Level (-20)
-10 (-18)	Tone Oscillator Frequency	Selects the <i>f</i> of the sine wave setup tone	1000 (-30), 400 (-20), 100 (-14) Hz
-8 (-16)	Tone Oscillator Level	Selects the output level of the tone oscillator in dBu	OFF (-30), -20 dBu (-20), -10 dBu (-10), 1 dB increments to +8 dBu, 0 dBu = default.
-6 (-14)	Tone @ Direct Output	Selects whether tone is present on the Direct Outputs	ON (-30), OFF (-20)
-4 (-12)	Slate Mic Toggle	Selects whether slate mic is activated when slate toggle switch is activated	ON (-30), ON with 1 second of 400 Hz tone preceding (-20), OFF (-14).
-2 (-10)	Comm Mic Function	Allows return A B toggle to be defeated and be reassigned to send slate mic signal to right TA3 output when toggled	OFF (-30), ON (-20)
0 (-8)	PFL Level to Meter	Selects whether PFL level is indicated on the output meter	ON (-30), OFF (-20)
2 (-6)	Monitor In Metering	Selects indication of monitor in signal level on the output meter (post monitor gain control) when the monitor toggle is activated	OFF (-30), ON (-20)
4 (-4)	VU Reference Level	Selects 0 VU to dBu reference	0 dBu (-30), +4 dBu (-20), +8 dBu (-14)
6 (-2)	Split-Ear Monitor A	Changes monitoring to hear program audio in one ear and monitor A in the other ear. Return A is summed and appears in R (right) headphone and L program appears in L (left) headphone. Is only active when Return toggle switch is activated.	OFF (-30), ON (-20)
8 (0)	Split-Ear Monitor B	Changes monitoring to hear program audio in one ear and monitor B in the other ear. Return B is summed and appears in L (left) headphone and R program appears in R (right) headphone. Is only active when Return toggle switch is activated.	OFF (-30), ON (-20)
10 (2)	Return Toggle Assignment	Allows the three-position monitor toggle to be assigned depending on preferred monitor connection used	A OFF B (-30), B OFF A (-20), A OFF A (-14), B OFF B (-12)
12 (4)	Headphone Attenuation with Tone	Reduces the headphone level by 20 dB when the tone oscillator is activated	ON (-30), OFF (-20)
14 (6)	External Battery Voltage Reference	Selects the Voltage range of the battery check function with external power. Also adjusts the flashing power LED voltage under external power.	1 (-30), 2 (-20), 3 (-14), 4 (-12), 5 (-10), 6 (-8) - see POWERING for index
16 (8)	Meter Ballistics Select	Selects the meter ballistics options available at the meter selection button.	PPM VU VU-PPMHold VU-PPM (-30), PPM VU-PPMHold VU-PPM (-20), VU VU-PPMHold VU-PPM (-14), PPM VU-PPM (-12), VU-PPM VU-PPMHold (-10)
18 (10)	Default Restore	Restores setup menu to the stored user default or to the factory default settings	OFF (-30) , User Default (-20), Factory Default (-14)

Appendix D - Setup Menu (firmware v 3 & 4)

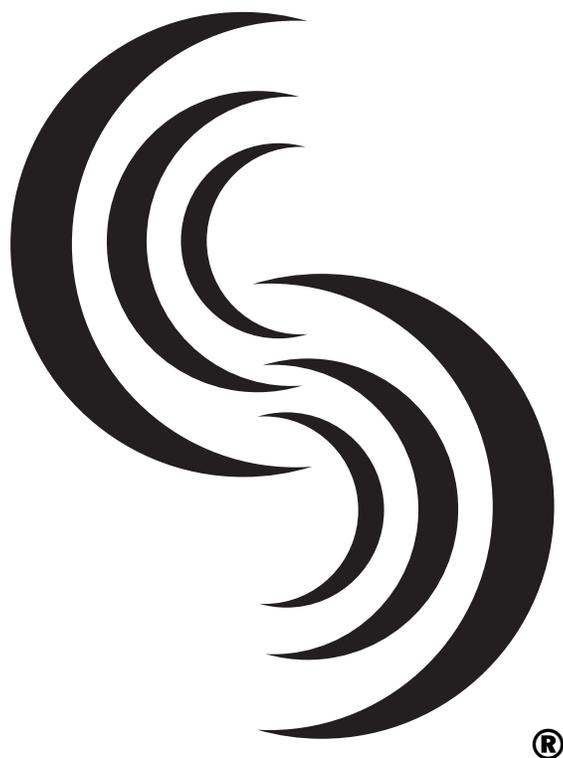
The chart below shows the available setups for the 442 and 442N. The flashing left (top) meter LED indicates the setup selected. The right meter LED indicates the available values, read from left to right.

L Meter Position 442 (442N)	Setup	Description	Values bold is factory default (indicated meter value on R meter of 442)
-30 (-30)	Output Limiter Threshold Adjustment	Sets the output limiter threshold in dBu	1 dB increments from +4 dBu to +20 dBu at Line Level output
-20 (-24)	Input Limiter Defeat	Allows the input limiters to remain OFF when the LIM switch is activated	OFF (-30), ON (-20)
-14 (-22)	Balanced TA3 Output Level	Selects the nominal output level of the active-balanced TA3 outputs	Line-Level (-30), Mic-Level (-20)
-12 (-20)	Direct Output Level	Selects the nominal output level of the active-balanced TA3 channel direct outputs	Line-Level (-30), Mic-Level (-20)
-10 (-18)	Tone Oscillator Frequency	Selects the frequency of the sine wave setup tone	1000 (-30), 400 (-20), 100 (-14) Hz
-8 (-16)	Tone Oscillator Level	Selects the output level of the tone oscillator in dBu	OFF (-30), -20 dBu (-20), -10 dBu (-10), 1 dB increments to +8 dBu, 0 dBu = default.
-6 (-14)	Tone @ Direct Output	Selects whether tone is present on the Direct Outputs	ON (-30), OFF (-20)
-4 (-12)	Slate Mic Toggle	Selects whether slate mic is activated when slate toggle switch is activated	ON (-30), ON with 1 second of 400 Hz tone preceding (-20), OFF (-14). <i>Note: tone not an option on firmware v3.</i>
-2 (-10)	Comm Mic Function	Allows return A/B toggle to be defeated and be reassigned to send slate mic signal to right TA3 output when toggled	OFF (-30), ON (-20)
0 (-8)	PFL Level to Meter	Selects whether PFL level is indicated on the output meter	ON (-30), OFF (-20)
2 (-6)	Monitor In Metering	Selects indication of monitor in signal level on the output meter (post monitor gain control) when the monitor toggle is activated	OFF (-30), ON (-20)
4 (-4)	VU Reference Level	Selects 0 VU to dBu reference	0 dBu (-30), +4 dBu (-20), +8 dBu (-14)
6 (-2)	Split-Ear Monitor A	Changes monitoring to hear program audio in one ear and monitor A in the other ear. Return A is summed and appears in R (right) headphone and L program appears in L (left) headphone. Is only active when Return toggle switch is activated.	OFF (-30), ON (-20)
8 (0)	Split-Ear Monitor B	Changes monitoring to hear program audio in one ear and monitor B in the other ear. Return B is summed and appears in L (left) headphone and R program appears in R (right) headphone. Is only active when Return toggle switch is activated.	OFF (-30), ON (-20)
10 (2)	Return Toggle Assignment	Allows the three-position monitor toggle to be assigned depending on preferred monitor connection used	A OFF B (-30), B OFF A (-20), A OFF A (-14), B OFF B (-12)
12 (4)	Headphone Attenuation with Tone	Reduces the headphone level by 20 dB when the tone oscillator is activated	ON (-30), OFF (-20)
14 (6)	External Battery Voltage Reference	Selects the Voltage range of the battery check function with external power. Also adjusts the flashing power LED voltage under external power.	1 (-30), 2 (-20), 3 (-14), 4 (-12), 5 (-10), 6 (-8) - see POWERING for index
16 (8)	Meter Ballistics Select	Selects the meter ballistics options available at the meter selection button.	PPM VU VU-PPMHold VU-PPM (-30), PPM VU-PPMHold VU-PPM (-20), VU VU-PPMHold VU-PPM (-14), PPM VU-PPM (-12), VU-PPM VU-PPMHold (-10)
18 (10)	Factory Default Restore	Enables the factory defaults to be reset	OFF (-30) , Reset (-20)

Appendix E - Setup Menu (firmware v 2, 442 only)

The chart below is provided for users with the original production 442 firmware. Determine the firmware revision by viewing the meters when the unit is powered up. The left meter indicates the firmware version. The meters “dance” then an LED is lit. If the second LED from the left is lit, the unit has firmware version 2.

L Meter Position 442	Setup	Description	Values bold is factory default (indicated meter value on R meter)
-30	Output Limiter Threshold Adjustment	Sets the output limiter threshold in dBu	1 dB increments from +4 dBu to +20 dBu at Line Level output
-20	Input Limiter Defeat	Allows the input limiters to remain OFF when the LIM switch is activated	OFF (-30), ON (-20)
-14	Balanced TA3 Output Level	Selects the nominal output level of the active-balanced TA3 outputs	Line-Level (-30), Aux-Level (-20)
-12	Direct Output Level	Selects the nominal output level of the active-balanced TA3 channel direct outputs	Line-Level (-30), Aux-Level (-20)
-10	Tone Oscillator Frequency	Selects the frequency of the sine wave setup tone	100 (-30), 400 (-20), 1000 (-14) Hz
-8	Tone Oscillator Level	Selects the output level of the tone oscillator in dBu	-20 dBu (-30), -10 dBu (-20), -8 dBu (-14), 0 dBu (-12) , +4 dBu (-10), +8 dBu (-8), OFF (-6)
-6	Tone @ Direct Output	Selects whether tone is present on the Direct Outputs	OFF (-30), ON (-20)
-4	Slate Mic Toggle	Selects whether slate mic is activated when slate toggle switch is activated	ON (-30), OFF (-20)
-2	Comm Mic Function	Allows return A B toggle to be defeated and be reassigned to send slate mic signal to right TA3 output when toggled	OFF (-30), ON (-20)
0	PFL Level to Meter	Selects whether PFL level is indicated on the output meter	OFF (-30), ON (-20)
2	Monitor In Metering	Selects indication of monitor in signal level on the output meter (post monitor gain control) when the monitor toggle is activated	OFF (-30), ON (-20)
4	VU Reference Level	Selects 0 VU to dBu reference	0 dBu (-30), +4 dBu (-20), +8 dBu (-14)
6	Split-Ear Monitor A	Changes monitoring to hear program audio in one ear and monitor A in the other ear. Return A is summed and appears in R (right) headphone and L program appears in L (left) headphone. Is only active when Return toggle switch is activated.	OFF (-30), ON (-20)
8	Split-Ear Monitor B	Changes monitoring to hear program audio in one ear and monitor B in the other ear. Return B is summed and appears in L (left) headphone and R program appears in R (right) headphone. Is only active when Return toggle switch is activated.	OFF (-30), ON (-20)
10	Return Toggle Assignment	Allows the three-position monitor toggle to be assigned depending on preferred monitor connection used	A OFF B (-30), B OFF A (-20), A OFF A (-14), B OFF B (-12)
12	Headphone Attenuation with Tone	Reduces the headphone level by 20 dB when the tone oscillator is activated	OFF (-30), ON (-20)
14	External Battery Voltage Reference	Selects the Voltage range of the battery check function with external power. Also adjusts the flashing power LED voltage under external power.	1 (-30), 2 (-20), 3 (-14), 4 (-12), 5 (-10), 6 (-8) - see POWERING for index
16	Factory Default Restore	Returns the 442 to the factory defaults settings	OFF (-30) , Reset (-20)



®

www.sounddevices.com