RANE

AD22S

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User Guide (English)

Introduction

The Rane AD22S is a fully balanced two-input, two-output audio delay unit designed for multiple applications, including speaker array synchronization and precision audio-to-video alignment. With two distinct modes, the AD22S offers the functionality of dedicated devices within a single rack unit. Featuring a range of 2.00 to 999.99 ms, this unit provides delay displayed in units of time, distance, or frames. Use the dedicated Video mode to provide almost a full second of audio delay in 0.5 frame increments for all standard NTSC or PAL/SECAM frame rates.

The AD22S can operate as two independent channels or as a linked or stereo pair. Front panel controls let you choose settings for each channel that can be stored into two nonvolatile memory locations for quick and easy access at any time. Bypass relays for each channel automatically connect should the device lose power. Your settings are always saved into working memory and restored upon power up. Rear terminals let you connect standard switches to recall settings remotely.

The AD22S's balanced XLR inputs and outputs offer the Rane standard of audio quality, with 24-bit processing and delay precision down to 0.01 ms. With the ability to provide unity gain up to a maximum input level of 24 dBu, the unit can be used with standard high-impedance devices or in a mixed environment using 600 Ω equipment. LEDs on the front panel indicate signal presence and alert when the signal is nearing the maximum input level.

Box Contents

AD22S

Power Cable

User Guide

Safety & Warranty Manual

Support

For the latest information about this product (documentation, technical specifications, system requirements, compatibility information, etc.) and product registration, visit **rane.com**.

For additional product support, visit **rane.com**/**support**.

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Quickstart

FRONT PANEL CONTROLS

The first thing to decide is which alignment mode to use. If you're using the AD22S to synchronize audio with video, then select Video mode. Otherwise select Distance alignment. The Distance and Video buttons on the left hand side of the unit switch between the two modes. Display settings and delay values are controlled by using the Channel button to toggle between channels 1 or 2, and by using the Cursor buttons to select the value you wish to change. The Coarse and Fine buttons increment or decrement the value currently selected.

DISTANCE ALIGNMENT

One of the main applications for the AD22S is synchronizing an audio signal coming from separate sources at two different distances. Say, for example, you want the music emanating from a stack of loudspeakers on the lawn at an amphitheater to get to your audience at exactly the same time as sound coming from the speaker arrays on stage. The amount of delay needed is the time it takes sound to travel from the stage to the lawn. While in Distance mode, this can be displayed in feet, meters, or milliseconds.

VIDEO ALIGNMENT

The AD22S is also excellent for synchronizing audio with video feeds, especially in a live environment where video processing typically adds several milliseconds to the signal that can have a noticeable effect on the final output. To assist in this application, the AD22S can show your delay value directly in terms of frames. All common frame rates for NTSC and PAL/SECAM are supported, and the audio stream can be delayed with a precision of 0.5 frames to line up perfectly with any video stream.

SETTING DELAY

Use the Cursor ◄ and ► buttons to select the unit type, then press the Coarse or Fine buttons to cycle through options. In Distance mode, choose between feet, meters, or milliseconds; in Video mode the delay is shown in frames or milliseconds. If you know the distance between the sources you are summing, set the units for feet or meters. The ambient temperature also affects the speed of sound. To set the temperature, use the Cursor buttons to select either °C or °F, then set the value to the approximate temperature at your speaker location. The AD22S calculates the correct delay based on your environment.

Note: Changing units from distance to time does not change the output delay. For example, if you are viewing the settings for channel 1 in meters, a change from meters to milliseconds keeps the same amount of delay but shows it in milliseconds rather than distance.

LINKING CHANNELS

The Link button connects the controls so that all changes apply to both channels. Channels do not need to share the same setting. While linked, incrementing or decrementing a value changes the delay for both channels at once. To treat the channels as a stereo pair, first set the delay value to the same setting on both channels before pressing the Link button.

MEMORY FUNCTIONS

Each channel has two memory banks, A and B. The * character at the right of the display indicates that the current setting does not match what is stored in memory. Press Store to copy the current settings into the selected Memory, clearing the * character. The cursor must be over the Memory Bank field before pressing Store. To activate a stored setting, press Recall to change the active delay to the value stored in the memory location shown. If channels are linked, both will be recalled.

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Features

Front Panel
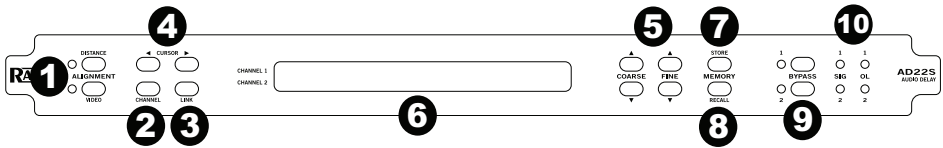
1. **Alignment Mode Buttons:** Press Distance for delay in feet, meters, or milliseconds. Press Video for alignment by frames or milliseconds.
2. **Channel Button:** Press this to switch the cursor location between channels. This button has no effect if the channels are linked.
3. **Link Button:** Links channels together so changes made affect both channels at once. To treat the channels as a stereo pair, make sure settings for each channel are identical before pressing the Link button. Press the Link button again to unlink.
4. **Cursor Buttons:** Press ◄ or ► cursor to select the value for editing.
5. **Coarse and Fine Controls:** These buttons affect the setting that is currently highlighted to change settings or delay values. Coarse increments or decrements delay by 1 ms/feet/meters or 1.0 frames. Fine increments or decrements delay by 0.1 ms/feet/meters or 0.5 frames.
6. **LCD Display:** Shows the current readout of settings for each channel. Fields may be selected using the Cursor buttons and changed using the Coarse / Fine controls.
7. **Store Button:** Stores the Delay configuration into current memory for the selected channel. If the asterisk * character is shown to the right of the display, the current value does not match the memory location.
8. **Recall Button:** Copies the stored delay setting into the active channel. If channels are linked, then both are recalled.
9. **Bypass Buttons:** Toggle relays for each channel. If the LED is on, bypass is enabled and the device functions like a wire. If bypass LED is off, the channel is active.
10. **Signal / Overload LEDs:** SIG LEDs indicate signal presence on the input. OL LEDs light red when an input signal is near the maximum level and may clip.
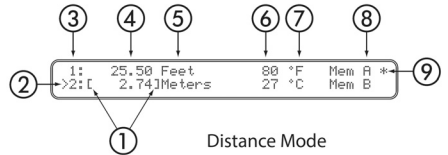
Rear Panel
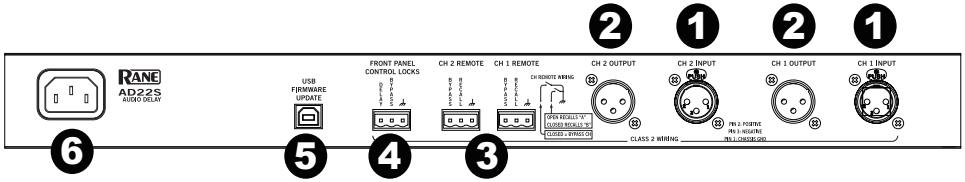
1. **Channel Inputs:** Balanced XLR input jacks, 24 dBu max level.
2. **Channel Outputs:** Balanced XLR outputs, 600 Ω min. load.
3. **Remote Recall Terminals:** Wire external switches to remotely recall Memory settings or toggle bypass relays.
4. **Front Panel Control Locks:** A wired external switch disables the front panel controls to prevent accidental changes.
5. **USB Firmware Update:** This USB connection facilitates possible firmware upgrades in the future. This port provides no other functions and should not be connected during normal use.
6. **Power Supply:** Connect the included power cable here.

Display Panel

Distance Mode:

1. Cursor
2. Active Channel(s)
3. Channel #
4. Delay Setting
5. Units (Feet, Meters, ms)
6. Temperature
7. Temp. Units
8. Mem. Bank
9. Memory Indicator - * Shown if different than stored value

Distance Mode

Video Mode:

1. Cursor
2. Active Channel(s)
3. Channel #
4. Value
5. Units (Frames, ms)
6. Frame rate
7. Units (Frames per second)
8. Mem. Bank
9. Memory Indicator - * Shown if different than stored value

Video Mode
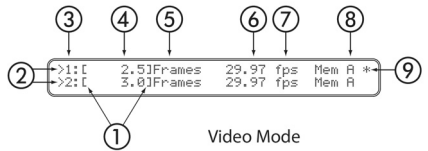
Operation

INITIAL SETUP
The AD22S is always on while plugged in. Out of the box, both channels are in Bypass mode with the inputs routed directly to the outputs. This makes it easy to set up and verify that signals are present before turning on any delay. The yellow bypass indicators mean that Bypass is active; press each Bypass button to disable.

ALIGNMENT MODE
Two modes of operation are available. If working with video and wish to set delay by number of frames, press Video for video alignment. Otherwise press Distance for distance alignment. Both modes offer milliseconds as a simple display option in addition to their distance or video functions.

SETTING THE DELAY
A '**>**' by the channel number indicates the channel is selected for editing. This appears on both channels if Link is active. The delay setting can also be viewed in terms relative to distance by changing the displayed units to feet or meters and by selecting the ambient temperature in either °C or °F. The AD22S calculates the precise environmental delay by using the relationship of air pressure and temperature to the speed of sound.

Distance Mode: Use Cursor buttons to highlight the unit type, then select between milliseconds, feet, or meters. The AD22S also needs to know the temperature. To set, select and set the unit type to °C or °F, then select and set the temperature.

The AD22S is an effective solution to the problem of aligning audio with video in broadcast. Because of the latency involved in processing video streams, timing offset accumulates that can run as high as several frames or lead to noticeable synchronization issues. While in Video mode, the AD22S displays the delay time in the precise number of frames calculated for your current format and frame rate. You may choose from a selection of the most common frame rates to match your work situation and environment. As you adjust the number of frames needed to synchronize the audio, the AD22S calculates the delay to match exactly what you need.

Video Mode: Choose between frames or milliseconds as the display setting. For frames, the delay value is based on the number of frames per second, denoted by "fps" on the display. Set this first and make sure it matches your video frame rate.

Linked Channels: With channels linked, any changes made are applied to both channels at once. This does not force the delay values to be the same.
Example: For two speaker arrays at different distances from a performer, linking the two channels lets you change temperature settings for both at once. For stereo operation, set each channel to the same value before pressing Link.

STORING DELAYS
The ***** character on the display means the current setting differs from the memory bank shown. Move the Cursor to the memory field, then press Coarse or Fine to toggle between Mem A or Mem B. Press Store to copy the current setting into this location (note that ***** is no longer displayed). If channels are linked, both channels will be stored.
Note: The Cursor must be on the Memory Bank field in order to store. This is to prevent an accidental overwrite of saved settings.

RECALLING DELAYS
Press Recall to copy from the Memory shown to the active setting for the selected channel. If Link is active, both channels will be recalled. This will overwrite any current settings.

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REMOTE RECALL

The Remote Recall terminals on the rear of the unit are functionally equivalent to the Recall button. With a switch wired between the Recall terminal and the GND terminal, close the switch to recall Memory B. Open the switch to recall Memory A.

In some situations it may be necessary to recall a stored setting or enable channel bypass from a location other than where the AD22S is located. Have a room divider wall? You can install a switch to select between the two room settings automatically when the wall is moved. Does the delay for your outdoor speaker array change with the temperature? Wire up a switch to change from a memory setting adjusted for one temperature to one saved for the other when the weather warms up. For these reasons we have provided remote recall connections on the rear of the unit that can be wired to standard switches installed in any other location.

FIRMWARE UPDATE

Should a firmware upgrade become available, it will be posted on the Rane website: **rane.com**. The USB port provides the connection to a PC enabling the file transfer. Perform the following steps to update:
1.   Ensure the unit is powered on.
2.   Connect a USB cable from AD22S's USB port to the USB port on a computer.
3.   AD22S will appear as an external drive containing one file (named "AD22S_XX.BIN" or similar).
4.   Delete this file.
       Note: After deleting this file, the folder may disappear, then re-open after a few seconds.
5.   Copy or drag the new firmware file to the AD22S.
6.   After transfer, AD22S will restart automatically and briefly display the new revision info.
7.   Disconnect the USB cable and resume normal operation.
       Note: If the revision number displayed does not match the new firmware, make sure you have the latest file and try again.
Tip: Press and hold both Cursor buttons simultaneously for one second to view the currently running firmware version. If an error occurs during transfer or a file is corrupted, the AD22S will revert to the last working version.

Appendix (English)

Block Diagram (both channels identical)

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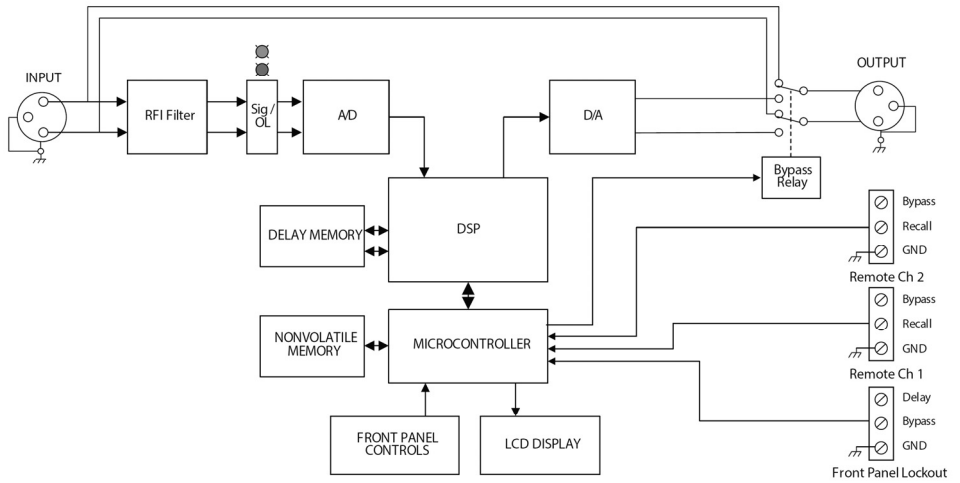
Technical Specifications

Delay Range	2.00-999.99 ms
Distance Increment	0.01 ms and 1.00 ms (each channel independent)
Video Increment	0.5 frames (each channel independent)
NTSC (North America, Philippines, Japan)	23.976, 24, 29.97, 59.94, 60 fps
PAL / SECAM (Europe, Australia, China, Brazil)	25, 50 fps
Sampling Frequency	50,000 Hz
Data Conversion	24 bit
Audio Connectors	XLR, Pin 2 (+)
Inputs: Type	Active Balanced
Impedance	20 k Ω, Balanced, line to line
Max Level	24 dBu (±0.5 dBu)
Outputs: Type	Active Balanced
Impedance	50 Ω, ±10 Ω (balanced, line to line)
Max Level	24 dBu (+0/-0.6 dBu)
Output Relays	Yes (auto-bypass on power loss)
LED Thresholds: Clip	3 dB before converter overload, +22 dBu @ 1 kHz
Signal Present	-47 dB below Clip LED, -25 dBu @ 1 kHz
Frequency Response	20 Hz - 22 kHz (+0/-3 dB), +4 dBu, 20 Hz to 20 kHz
System Gain: High Impedance Load	0 dB (±0.5 dB) Load = 10 kΩ balanced, +4 dBu, 20 Hz to 22 kHz
600 Ω Load	0 dB (+0/-1 dB) Load = 600 Ω balanced, +4 dBu, 20 Hz to 22 kHz
THD + Noise	0.006% (±0.002%) +4 dBu, 20 Hz to 20 kHz, 30 kHz BW
Signal-to-Noise	86 dB (±2 dB) +4 dBu, 20 Hz to 20 kHz
Dynamic Range	108 dB (±1 dB) +24 dBu, 20 Hz to 20 kHz, A-weighted
Crosstalk	-90 dB, +4 dBu, 20 Hz to 20 kHz
Propagation Delay	2 ms (Bypass off)
Power Supply	100-240 VAC, 50/60 Hz, 7W
Conformity	CE, FCC, cULus
Construction	Steel
Dimensions (height x width x depth)	1.75" x 19" x 5.25" (4.4 x 48.3 x 13.3 cm)
Weight	4 lbs. (1.8 kg)

Note: 0 dBu = 0.775 Vrms
Specifications are subject to change without notice.

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