Audio Engineering Associates

- STUDIO RIBBON MICS
- M/S STEREO
- TALL STANDS
- MIC POSITIONERS

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AEA R88 Ribbon Microphone User's Manual

The R88 has two figure-8 ribbon microphone transducers angled at 90 degrees to each other. A stereo microphone configuration is useful for recording situations where it is more convenient to have one microphone housing for both capsules, such as live concert recordings or drum overheads. The R88 has been optimized to produce the most natural stereo pickup possible with ribbon transducers. It has a very uniform polar frequency response, and is therefore relatively free from the "hole in the middle" effect that can occur when recording Blumlein stereo.

A few things to remember about this microphone:

1) Keep it covered when not in use.

Since the R88 contains powerful magnets, it is possible for tiny pieces of metal to be drawn into the ribbon gap. The microphone's acoustically transparent cloth surround protects the transducer from this so-called "tramp iron," but it is wise to safeguard your investment by keeping the mic covered with the bag supplied when not in use. Avoid leaving the microphone sitting out on a table or workbench. In our experience this is a likely place where tramp iron may be attracted to the microphone.

2) **Store the mic vertically.**

Our ribbon transducers are tensioned very lightly, so that coupled air damping provides excellent transient response. To help ensure a long life and consistent sound keep the microphone stored vertically whenever possible to prevent "sagging" that may occur during long term horizontal storage.

3) **Avoid phantom power.**

Using a correctly wired cable and a decent phantom power supply, there is little danger of damaging the microphone with phantom power. However since a faulty or miswired cable or a poorly designed phantom power supply can cause severe damage to the transducer we recommend avoiding the use of phantom power with your R88 as a general rule.

4) **Protect the microphone from wind blasts.**

In order to produce the most natural sounding pickup possible, the mic is minimally protected from wind blasts. Avoid recording horns, drums or anything that might produce large movements of air within 12 inches of the microphone. A good rule is if you can feel wind on your hand where you would like to place the mic, don't put it there! For closer vocal recordings, use a "popper-stopper" type windscreen to protect the mic from plosive blasts. This mic is designed for indoor recording situations, although a "big furry windscreen" may be adequate for some outdoor recording situations.

Using the R88

When placing the R88, try to imagine how the position of instruments in front of the microphone will translate to the stereo image. The “sweet spot” of the R88 is the 90 degree angle found between the principal axis of each transducer (indicated by channel numbers “1” and “2”). Recording instruments in this region will ensure the consistency of phase information reaching the microphone. Recording instruments, or prominent early reflections outside of this region can result in inconsistent phase information between the channels, which will result an ill-defined and inaccurate stereo image.

In the vertical direction, the best frequency response is obtained within 30 degrees up or down of the principal pickup axis. When recording an ensemble, try to keep all of the instruments towards the center of vertical pickup pattern for the most natural sound quality.

The R88’s extended and natural bass response is due to the very low resonance frequency (16 Hz) to which our ribbons are tuned. However this low resonance frequency also makes the microphone susceptible to mechanical “rumble” from air conditioning systems, passing trucks, etc. The integrated shockmount system helps to reduce this noise, but in some cases it may be helpful to use a “low cut” filter such as those commonly found on quality recording channels to attenuate the very lowest frequencies, and thereby relieve the strain on amplifiers and speakers that can be caused by subsonic noise. In most of these cases it is possible to retain the useful bass content of the recording, while substantially attenuating very low frequency noise.

Like all passive ribbon microphones, the R88 contains minimal internal electronics. This means that the microphone can operate with very low distortion throughout a huge dynamic range. The SPL handling of these microphones at 1kHz is greater than 160dB! However the passive design also means that a large amount of gain is often required at the preamplifier stage. Low preamp noise specs are desirable, since the preamp will often need to be operated at its highest gain settings. As a starting point, here are a few specs to look for in a mic preamp to use with your R88:

- Abundant gain (at least 60dB of clean gain, quiet recordings may require up to 70dB)
- Low noise (EIN -127dB or better)
- High input impedance (we suggest at least 1.5 kOhm for good bass performance)

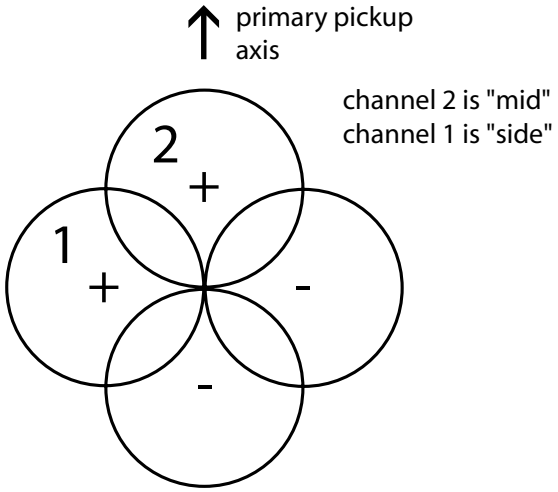
Coincident Stereo Microphone Techniques

The R88 is a *coincident* stereo microphone system. Coincident microphone techniques use two or more microphones placed as closely together as possible, but aimed in different directions. Coincident stereo recording systems have *phase coherence* between the stereo channels. This means that an incoming sound wave arrives at roughly the same time to both of the microphone transducers. The R88 may be used with “Blumlein” or “M-S” stereo techniques. There are other stereo recording techniques generally referred to as *spaced* stereo techniques, where the microphones used are physically separated in order to produce timing differences between the microphones.

One advantage of phase coherence is that when listening to a mono sum of the stereo mix, or to a stereo playback in the “far field,” a phase coherent recording will exhibit much less of the coloration

known as *comb filtering*. Comb filtering occurs because spaced microphones necessarily capture different phase information depending on the difference in path length from each sound source to each microphone. When the stereo channels are added together comb filtering will appear as "holes" in the frequency response. Moreover these aberrations in frequency response depend on the angle of sound incidence, so equalization alone cannot correct comb filtering problems. Some engineers prefer spaced stereo recording techniques regardless of potential mono summing problems, because of the impression that the stereo field produced is "wider" and more "enveloping." Obviously any single-housing stereo microphone system employs a coincident (or near-coincident) micing technique.

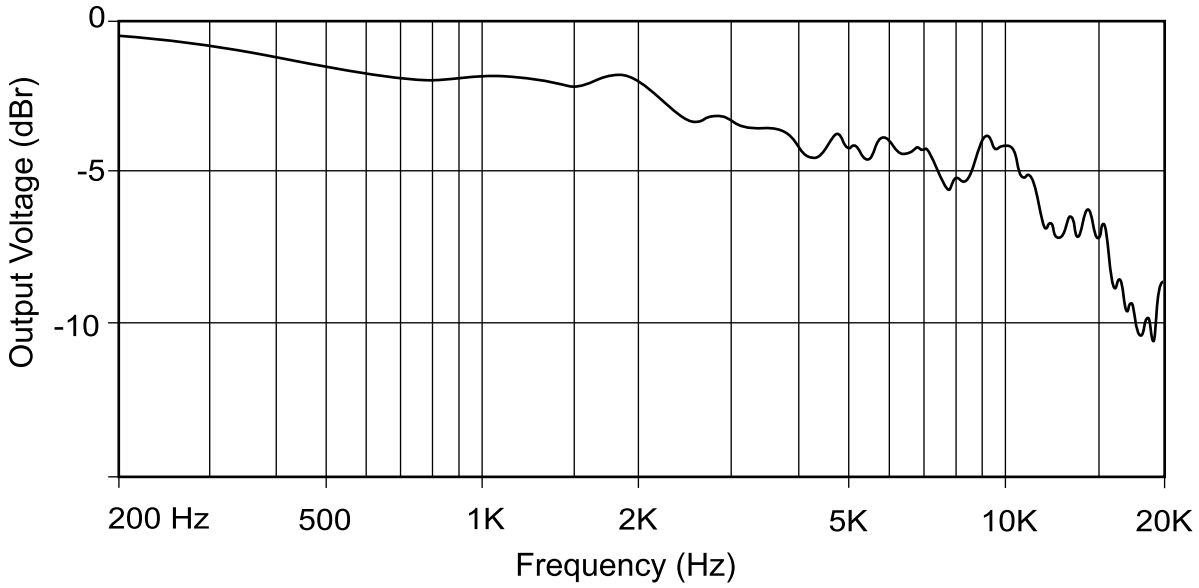
Blumlein stereo is recorded using two figure of 8 microphones arranged at 90 degrees to one another. The stereo effect occurs because of the intensity differences between the two channels. Blumlein stereo creates a very *precise* stereo image, with each instrument clearly identifiable at a point in the soundstage. To use the R88 in Blumlein configuration simply align the AEA logo with the center of the instrument or ensemble you would like to record. Keep the sound source or ensemble in the 90 degree angle found between the channel indicators "1" and "2" to ensure consistency of phase information and an accurate stereo image. This area is referred to as the "*in phase positive polarity"* quadrant. Any sounds arriving in this quadrant will have consistency phase between the capsules. On the opposite side of the mic the signals will be "*in phase out of polarity"* meaning the phase will be consistent between capsules but the overall polarity will be reversed. On the sides of the microphone the phase will be different between the two capsules. These quadrants are therefore referred to as "*out of phase*."



R88 MS Stereo Setup

The other stereo technique we recommend for the R88 is mid-side, or "M-S" recording. One microphone capsule is aligned on-axis to the primary sound source, with the other mic capsule oriented 90 degrees counter-clockwise to the primary axis. The stereo channels are taken as the sum and difference of the left and right channels. With an "ideal" ribbon microphone these techniques should be able to yield identical results, with the advantage of MS allowing a variable "width" to the stereo field. However since no real ribbon microphone has a *perfect* polar response pattern, the M-S technique can be useful for recording a single sound source where emphasis on the center of the stereo image is desired. The main drawback of M-S recording is that a "decoding matrix" is necessary to process the M-S signal into a stereo recording. M-S decoding is very easy to implement in software, and several developers offer M-S decoding tools in popular plug-in formats.

On-Axis Frequency Response (1 meter)



Specifications:

Operating Principle: Pressure Gradient

Frequency Response: 20 Hz to 20 kHz
Maximum SPL: 165 + dB SPL above 1 kHz for 1% third harmonic
Output Sensitivity: -52 dBv/Pa
Output Impedance: 270 ohms nominal
Recommended Load: 1.2 K ohm or greater
Powering: Not required or recommended
Polarity: Pin 2 high
Connector: XLR-3M wired to a 4 meter captive stereo cable
Includes custom hard case with padded interior for storage and shipping
Operating manual for proper care and usage.

Off Axis Response:

Polar Pattern: Native bi-directional
Horizontal: Level changes with angle, frequency response is consistent, –35 dB null at 90 / 270 degrees
Vertical: Level changes with angle, reduced HF response above and below 0 / 180 degree axis, null at 90 / 270 degrees

Transducer element

Ribbon Thickness: 1.8 microns (.0000018 meter) of pure aluminum
Ribbon Width: 4.7 mm
Ribbon Length: 59.7 mm

References and Recommended Reading:

BASIC STEREO MICROPHONE PERSPECTIVES - A REVIEW, first published in the AES *Journal*, vol. 33, no. 7/8, pp. 548-586, 1985 July/August; republished in the *STEREOPHONIC TECHNIQUES ANTHOLOGY*, pp. 297-305

THE BIDIRECTIONAL MICROPHONE: A FORGOTTEN PATRIARCH, was first presented at the 113th AES Convention in Los Angeles, 2002 October, Preprint no. 5646; it is scheduled for publication in the AES *Journal* in the 2003 April issue (vol. 51, no. 4)

THE NEW STEREO SOUNDBOOK, second edition, by Ron Streicher and F. Alton Everest, published by Audio Engineering Associates, 1998; www.stereosoundbook.com.

RIBBON MICROPHONE ESSAYS by Wes Dooley, Ron Streicher and Philip Merrill published by Audio Engineering Associates, June 2003; www.wesdooley.com.

Other Products by Audio Engineering Associates:

TRP - The Ribbon Pre

AEA/Fred Forsell collaboration preamp with no phantom power and 83dB of clean gain

RCA Working Reproduction Microphones and replacement parts

AEA R44C and CNE Microphone - Tribute to the classic RCA 44B using NOS ribbons
AEA R44CX Microphone - 6db more output for critical digital recordings
RCA44 and RCA77 microphones - Spare parts and prop shells

AEA Ribbon Microphones

AEA R92 Microphone - Large-ribbon optimized for guitar and other close-micing situations
AEA R88 Microphone - Large-ribbon coincident pair in a sleek black "stealth" package
AEA R84 Microphone - That big ribbon sound in a smaller more affordable package

Modular Microphone Positioners

SMT - Stereo Microphone Template for Blumlein and ORTF spacing
SMP-17, 1M and 1.25M - Stereo bars in three lengths for the ultimate in positioning flexibility
Decca and Mini-Decca Trees - For microphone arrays including recording for multichannel

Modular Studio Microphone Stands and Booms

Flightweight Stands
Medium-Duty Vertical Stands and Booms
Heavy-Duty Stands and Booms
Crank-up Stands

Since 1983 we've been the US agent for Coles Electroacoustics, manufacturers of the 4038 studio ribbon microphone and the 4104B, "lip" mic for voice-over work in high noise environments. We sell and service Coles microphones and genuine Coles parts.

In North America we represent CB Electronics, a leading worldwide supplier of machine control equipment to the sound-for-picture industry. Their products specialize in professional control of and translation between bi-phase, 9-pin serial and time code machines. Their SR line provides low cost multiple machine remote controls for RS-422, Sony, and Tascam DA88 protocol machines. The new P2DVD Interface may is a RS422 controlled Master with most RS422 synchronisers and Console automation systems.

Our Audio Test Department buys, sells, trades, and rents new and used audio test gear. Audio Precision, B&K, Hewlett Packard, Galaxy, Goldline, Neutrik, and Amber are among the lines we maintain in stock for audio measurements of Level, Polarity, Phase, THD and IMD, W&F, SPL, and Real-Time Analyzers.

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