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# AEA R84

CLASSIC PASSIVE RIBBON MIC INSPIRED BY THE 44

{ OWNER'S MANUAL }

*Revision 4, April 2016*

# { WELCOME }

Congratulations on your purchase of the AEA R84 microphone. The R84 is a sensibly priced Big Ribbon™ microphone which delivers high performance and value. Call it a “Swiss army knife”, your “desert island mic”, or simply “the workhorse” – the R84 was designed to be flexible and practical in a myriad of recording settings. Developed to have a classic sound from the same family as the R44, the R84 delivers exceptional headroom while maintaining an intimate performance quality with smooth highs and extended lows. These aspects, combined with the reduced proximity effect, make the R84 incredibly well suited for both close-up and ambient mic applications. It’s just as versatile as an R44, flattering voice, strings, brass and drums alike. Protect it from puffs of air, phantom power, and tramp iron, and it is nearly invulnerable. Treat it well, and it will last decades.

Your R84 microphone is 100% handcrafted in Pasadena, CA. AEA is a family owned company with a small crew of skilled technicians – most of them being musicians themselves. Proudly independent, we still manufacture all our ribbon microphones and preamps by hand from locally sourced parts.

We hope that the R84 will capture many magical performances that touch the heart. This manual will help ensure that you get the best sound and longevity from your new microphone. Please become part of the AEA community by sharing your experiences with the R84 via e-mail, phone or our social media channels.

*Wes Dooley*

*President of AEA*

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## { INTRODUCTION }

The R84 is a pill-shaped, side-address, passive ribbon microphone with a bidirectional (or figure-of-8) pickup pattern. It is assembled with the same Big Ribbon™, tuning (16.5 Hz) and transformer as the R44 and shares many of the unique sound characteristics with its historic predecessor. With improvements in ribbon technology and manufacturing since the 30's and 40's, AEA engineered the R84 to be more efficient, lighter and less expensive. Designed to accommodate distant and medium miking duties, it exhibits a flat frequency response when placed 3 feet (1 meter) away from the source. As a result, the mic performs well on a variety of recording applications including vocals, brass, strings, woodwinds, guitars, and drums. The R84 microphone continues to gain followers with its natural sound, articulate midrange and forgiving nature. Whether used on vocals or instruments, its performance is intimate, warm and detailed, yet never harsh.

## { GENERAL GUIDELINES }

To maintain the best performance from your new AEA R84 microphone, take note of these four basic rules:

- 1) Keep the microphone covered when it is not in use.
- 2) Always use a sturdy microphone stand.
- 3) Never expose the microphone to strong air turbulence.
- 4) Be nice to the microphone, and it will be nice to you.

1) Keeping the microphone covered when it is not in use will reduce the possibility of damage that might result from a sudden gust of air coming from air-conditioning or an open door or window. Place the supplied protective bag over the microphone when it is not in use. For long term storage, place the microphone in its protective case.

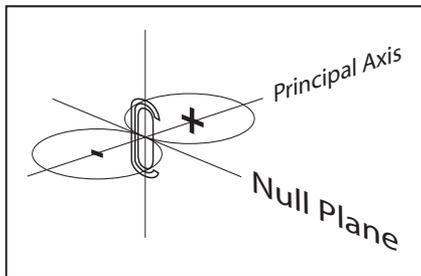
2) While the R84 was designed to work well with all standard microphone stands, a high-quality boom stand will make your life a little bit easier. Mounting the microphone on a strong, sturdy microphone stand with a heavy base (or tripod) is essential. If you are using a boom, make sure that it is properly balanced and that the tripod legs are positioned appropriately to prevent tipping.

3) Ribbon microphones can withstand very high SPL (Sound Pressure Level) without difficulty, but can be damaged easily by a sudden, strong gust of air or high levels of very low frequency sound waves (like from a kick drum or bass cabinet). This can stretch the ribbon, causing the microphone to start sounding flabby. To avoid possible damage, follow this simple procedure when positioning the microphone: put the back of your hand where the mic will be; if you can feel the motion of air on your hand, place a pop-filter between the microphone and the source of the wind gusts or simply pull the mic further back. When recording kick drums or bass guitar cabinets, angle the microphone to make sure that no wind blasts hit the microphone directly on-axis from the front or back.

4) Your R84 is a valuable and important investment. Like any piece of recording equipment or musical instrument, it requires common sense and good basic care to keep it working properly. Given simple, basic care as described above, your new microphone will perform admirably for decades.

## { APPLICATION ADVICE }

### *“This Side” vs. “That Side”*



Here is an illustration of the pickup pattern of the R84. The AEA logo on the front of the R84 points directly towards the 'principal axis' (+) indicated in the diagram.

Figure-of-8 microphones are constructed with positive polarity on the front and negative polarity on the back. Positive pressure on the front side of the ribbon produces a positive voltage on Pin-2, with respect to Pin-3 on the output connector.

The sound of your R84 is slightly different between the front and the back – subtle, but sufficient to offer two “flavors.” In addition to polarity, this is the result of using two wraps of grille cloth on the back and only one on the front. When using the rear lobe, remember to invert the

polarity on your preamp or DAW. This ensures your recordings with the back lobe will be in-phase with other microphones.

### *Controlling Leakage*

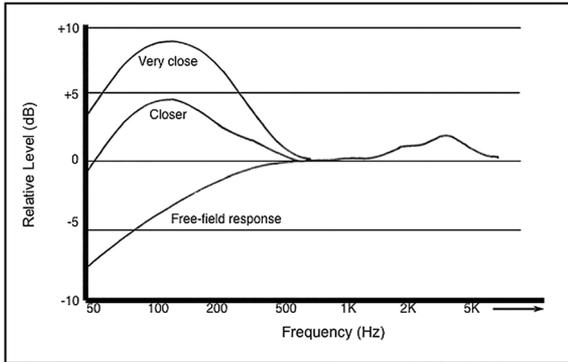
A significant and ever-present challenge in contemporary studio recording is minimizing “bleed” (also called “leakage” or “crosstalk”) from nearby instruments into the various microphones. The deep nulls of bidirectional ribbon microphones provide good rejection of unwanted sounds, which also can be beneficial in sound reinforcement situations where feedback is always a threat. While gobos can be effective in isolating performers from each other, they introduce their own set of problems - not the least of which are reflections in close proximity to the performers and/or microphones that result in comb-filter distortions. Since gobos usually are bulky, they also inhibit the ability of the musicians to hear and see each other easily. Such a setup requires complex and often cumbersome headphone monitor mixes for the musicians.

Since the R84 is bidirectional, it exhibits nulls at right angles to the principal axis. These nulls produce a “plane of rejection” around the sides, top and bottom of the mic that can be used effectively to reduce leakage. Simply arrange the musicians so that nearby instruments are placed in the “null” of their neighbor’s microphone, and vice versa. Although this does not entirely eliminate the need for gobos, it can significantly reduce their number.

Keep in mind that a certain degree of bleed does not necessarily have to be bad. For some styles and genres, it can, in fact, be beneficial to embrace a little bit of bleed in order to create cohesive and natural sounding recordings. The important thing to listen for is whether or not other instruments that bleed into a specific instrument microphone still sound natural. You will generally find that well-designed ribbon microphones like the R84 capture a natural off-axis sound, which means that bleed from other instruments can contribute to the overall sound in a pleasing way.

### *Proximity Effect*

Proximity effect is a characteristic of all directional microphones; it is a rise in low-frequency response that increases at closer working distances. While this can be used to good effect, particularly with male voices to give them an enhanced richness and depth, the potential trade-off is reduced articulation or clarity that can result from the masking effect on the treble due to “excessive” bass boost.



The R44's proximity effect begins at six feet (1.8 M) and can become huge. The RCA 44 was developed when studios were larger and mics were rarely used close up. The R84 has a more moderate proximity effect, better suited for closer use in contemporary studios. Designed to accommodate distant and medium miking duties, it exhibits a flat frequency response when placed 3 feet (1 meter) away from the source

Experienced vocalists instinctively locate the proper working distances for the microphones they are using. From as early as the 1930s, Frank Sinatra always kept one hand on the microphone stand while singing. Some joked that he simply was steadying himself, but more knowledgeable people noticed that he would bring the mic closer for more intimate moments, and then move it farther away when he belted out a line. This technique became known as “working the mic.” A simple technique for maintaining the proper working distance from the microphone is to place a pop-screen between the performer and the microphone. By doing this, nothing need be said to the performers, as they naturally will work at the distance you have established.

## *Preamps*

The R84's passive system yields spectacular headroom and operates with very low distortion over a huge dynamic and frequency range. Without active electronics, the R84 can handle 136dB SPL at 40 Hz and withstand 165+ dB SPL at 1 kHz and higher. Passive ribbon microphones generally have low output level and require preamps that supply a high level of gain. If the preamp you use does not have enough gain, the signal might seem too soft or noisy.

The preamp input impedance affects the output level of the mic in addition to the mic's frequency and transient response characteristics. It is generally recommended to use a preamp that is at least four times

the input impedance of the microphone's output impedance. However, a low or very high input impedance on a preamp will not hurt a ribbon microphone. We recommend clean, high impedance preamps with a minimum input impedance of 1.2K  $\Omega$  and at least 65dB of gain.

It is recommended to make a habit of disengaging phantom power a minute or two before plugging in your R84.

To unleash the full potential from your R84, AEA manufactures high-quality, high-gain, low-noise preamps with a very high input impedance designed to bring out the full frequency response of ribbon microphones. Visit our preamplifier page ([www.ribbonmics.com/preamps](http://www.ribbonmics.com/preamps)) to view our line of exceptional preamps.

### *Application Examples*

Your ears are obviously the best judge of microphone choice and placement, but AEA has garnered a great deal of experience testing the R84 in a variety of recording settings and from talking to experienced musicians and engineers. As a result we suggest the following guidelines to help you to achieve optimum results when using the R84.

Watch the videos on our website ([www.ribbonmics.com](http://www.ribbonmics.com), [www.AEAsessions.com](http://www.AEAsessions.com)) and on our YouTube channel ([www.youtube.com/AEARibbonmics](http://www.youtube.com/AEARibbonmics)) for more tips and tricks for our microphones and preamps.

### *Vocals*

Our experience with the R84 is that it sounds best on vocals when used at a distance of 6 to 24 inches (15-60 cm). However, you may find that positioning the microphone closer or further away from the singer yields better results depending on the voice, the room or the musical style. When recording at 6 inches (15 cm) or closer, it is advisable to have a pop filter handy. The ribbon is well protected from damaging plosive blasts, but to avoid noises from wind blasts, we recommend using a pop filter.

If you are recording a musician who sings and plays an instrument at the same time, you can make use of the exceptional rejection offered by the 90° null planes of the bidirectional pickup pattern to reduce the pickup of the instrument in the vocal microphone.

## *Acoustic Guitar*

When recording a solo acoustic guitar a good starting point is to position the R84 4 to 8 inches (10-20 cm) away from the guitar roughly pointing at the 12th fret or where the neck meets the body. This placement will capture clear midrange and pick articulation with a balanced low end.

Since the bass response of the R84 is sensitive to the miking distance, try rotating the mic to use its excellent horizontal off-axis performance to find the “sweet spot”. Try pulling the microphone away from the guitar in increments of 1 to 2 inches (2-5 cm). Listen to the guitar up close and when you find a spot that sounds good, try putting the R84 there. Let your ears be your guide.

## *Electric Guitar*

To capture an authentic and balanced guitar tone with your R84, place the mic directly in front of the amp grille. Identify where the center of the speaker cone is located, and place the R84 4 to 8 inches (10-20 cm) away from the speaker. Pointing the mic at the center of the cone will deliver a very direct, “in-your-face” sound. This is the spot that will obtain the most high-frequency content. If it sounds too harsh, try moving the microphone slightly off center of the speaker cone. You can also try positioning the R84 at an angle. You will find that small differences in positioning can make huge differences in the sound, so experiment until you find the spots you like. Close up, the R84 is very good at spotlighting a speaker’s unique sounds at various locations.

When using multiple microphones on a guitar cabinet at the same time, it is important to pay attention to the phase relationship between the different signals. Try to position the different microphones as close to each other as possible to avoid phase problems caused by sound arriving at the microphones at slightly different path lengths. Make sure to listen to the combined signal summed to mono to catch potential comb filtering that could be caused by out-of-phase signals. If you are recording with the back lobe of the R84, it is important to invert the polarity on the preamp or DAW.

For a more natural sound that captures the sound of the amp in your room, try moving the microphone back a couple of feet.

## *Brass and Woodwind*

The R84 has become one of the top go-to microphones to record brass instruments for engineers and musicians alike. Whether live or in the studio, the R84 is known for capturing the full-bodied sound of brass and woodwind instruments. Soprano saxophone, trumpet, and most high-pitched brass and woodwind instruments are known to have “edgier” or “brilliant” frequency characteristics. The R84’s smooth treble response is great at preserving these frequencies without aggravating the striking tonal qualities.

Depending on the instrument’s dynamic range, we recommend starting by positioning the R84 8 to 16 inches (20-41 cm) away from the source.

Unlike brass instruments, whose sound emanates entirely from the bell, woodwinds produce sound from the entire length of the body of the instrument. When mics are placed favoring the bell, only lowest fundamentals dominate. For a focused sound, use the yoke mount (not the mic stand) to point the microphone on axis so that its pickup encompasses the entire instrument.

If you are concerned about wind blasts, use a pop filter, or position the microphone slightly off axis.

## *Strings*

The R84 excels at capturing the richness and full sound of string groups and string soloists. For string soloists, start by positioning the R84 3-5 feet (1-2 m) on axis towards the sound hole. To achieve a balanced string group sound, try placing the R84 5 to 8 feet (2-3 m) away (either in front or above) from the section. Use the R84’s exceptional null points to isolate the R84’s pick up from other sources. If more ambience texture is desired, pull the microphone further away from the source.

R84s in a Blumlein configuration (coincident pair at 90-degree angle) positioned at a distance of 10 to 15 feet (3-5 m) from a string section will capture a deep and wide image.

For bass string instruments that are bowed and plucked, placing the R84 about a foot away (0.3-0.5 m) will give you a very nice and defined low end. The proximity effect of the R84 can be used to your advantage.

## *Piano*

The R84 delivers a great sound as a close-up and distant mic on both upright and grand pianos. On grand piano we have found two positions to be particularly useful:

1. Spaced pair of R84s looking at the hammers in the front. You will need to remove the lid of the grand piano. This position will yield a very natural, hi-fi sound. It is common to pull the mics farther out of the piano than you would with a pair of condensers. You can change the amount of natural room reverb by changing the distance between the mics and piano.
2. Blumlein pair (coincident pair at 90-degree angle) of R84s positioned on the side of the piano facing the player: one microphone pointing towards the treble side of the piano, and the other microphone facing towards the bass side that can result in a larger than life recording.

## *Drums and Percussion*

Whether as an overhead configuration, or mono drum room, the R84's extended low end and smooth high end gives your drum sound that thickness, warmth, and detail without unintended harshness. For mono drum room, start by positioning your R84 at head level 9 feet (3 m) in front of the kit. Depending on the size of the room and kit arrangement, you may want to position the R84 further away if you wish to capture more room ambiance.

Another popular technique to record drum overheads is to set up the mics in a Blumlein configuration (coincident pair at 90-degree angle) above the head of the drummer with each mic pointing in a different direction. This will give you a very wide image of the drums that sounds like you are in sitting center stage.

Both of these techniques also work well for recording the sound of the room. The closer that the R84s are positioned to the drummer, the more direct sound and less room ambiance will be captured by the mics.

## { PRECAUTIONS }

Most ribbon microphones need little, if any, maintenance. Given proper care they last for decades. Bing Crosby's personal RCA-44BX (now in the collection of the Pacific Pioneer Broadcasters in Hollywood) sounds as good today as it did when he recorded his radio broadcasts in the 1940s.

A few simple precautions will help you to keep your AEA R84 working well for life.

### *Phantom Power*

Phantom power is not required or recommended for passive ribbon mics. Passive ribbon or other any other microphones with transformer-coupled outputs, from Shure SM57s to Neumann U47s, may be damaged by phantom power. In most circumstances, accidentally supplying phantom power to your passive ribbon or other transformer-coupled mics will NOT hurt the mic.

With a correctly wired cable and a properly working phantom power supply, there is actually little danger of damaging an R84 microphone with phantom power. However, passive ribbons such as the R84 WILL get hurt if ground Pin 1 is accidentally shorted, or miswired to Pin 2 or 3. Using phantom power with a faulty or miswired cable or a defective supply can severely stretch or break a ribbon. Even if the ribbon survives, the microphone's output transformer core will now be magnetized and the sound of the microphone will have changed. We recommend avoiding the use of phantom power with your R84 as a general rule. It is recommended to make a habit of disengaging phantom power a minute or two before plugging your R84.

Since passive ribbon microphones or other transformer-coupled microphones are particularly sensitive to phantom-power, it is recommended to make disengaging phantom-power before plugging and unplugging a habit.

### *Wind Gusts*

A second and equally important rule is never blow directly into any microphone to test it. Not only does this force moisture and dirt into

the microphone, strong air movement also can stretch the ribbon and while it may not break, it nonetheless could significantly degrade the microphone's performance. The ribbon in the R84 is protected by multi-layered screens and grille cloths to provide superior wind protection. Nonetheless, using it outdoors requires special care to avoid wind which can damage the ribbon. Indoors, however, it is also important to avoid serious air movement from stage curtains, open windows, doors, or air-conditioning systems. High SPL sound sources do not usually pose a problem because AEA's passive ribbon microphones can handle 165 dB SPL or more without difficulty. It is only those "explosive" sources that produce a strong blast of air, such as the bass port on an electric guitar or bass amp, a guitar being plugged (or unplugged) while the amp level is turned fully up, an on-axis kick-drum (particularly with a port on the head), that are potentially damaging. If you are unsure about how much wind is hitting the microphone, place the back of your hand where the microphone is going to be. If you can feel significant wind blasts, angle the microphone or use a pop screen to avoid direct hits.

### *Tramp Iron*

Minute iron particles, sometimes known as "tramp iron," are common within our environment. AEA ribbon microphones contain powerful magnets that produce strong magnetic fields. These fields can attract any ferric metal near the microphone that, if they are small enough, can penetrate the outer screening and work their way inside the microphone. Over time, this "tramp iron" can build up sufficiently in the magnetic gap to rub against the ribbon causing distortion, electrical shorts or tearing of the ribbon. The best prevention is to keep the microphone covered with the supplied plastic bag when it is not in use.

The R84 was designed to be less sensitive to external interference. Its design attracts less "tramp iron" while retaining the overall sound and 20 Hz bass response of the original RCA 44.

Under no circumstances should you disassemble and take the grille off of the microphone as this could allow tramp iron to enter the narrow gap between the ribbon and the pole pieces. Disassembling the microphone will VOID your warranty.

### *Magnetic Stray Fields*

Ribbon microphones are fundamentally prone to picking up strong external magnetic fields caused by light dimmers or nearby power

transformers. Guitar players will know this phenomenon from single-coil pickups. Even though much attention was paid to suppressing such sensitivity to external magnetic fields in the design of the R84, it is still possible that you might encounter this problem. If you should pick up a hum, try rotating or moving the microphone to find a spot where the hum disappears, and try eliminating potential sources of stray magnetic fields. You can use the microphone to find where hum is originating. Rotate the mic for maximum interference and move it back and forth to sense its direction.

The high-performance magnets used in AEA microphones are incredibly strong, and a significant amount of stray magnetic field lines surround the microphone. Avoid placing the microphone in close proximity to hard drives, credit cards, analog tape, or any other magnetically sensitive items to prevent any data loss.

### *Microphone Positioning*

The R84 was designed with placement versatility and vibration isolation in mind. The microphone body is supported by a U-shaped yoke. To obtain the shock mount benefits of the R84, we suggest adjusting the swivel mount towards the source then positioning the angle of the mic stand.

The R84 includes a fixed captive XLR cable which is routed from the bottom of the mic and secured to the yoke mount. Securing the XLR cable to the stand is suggested to avoid accidents. To complete isolation of the microphone from external sources of mechanical noise, it is important to provide a slack loop by tying the microphone cable tightly to the microphone stand with a cable tie, shoelace, or string. (A Velcro® tie will not be tight enough.)

## { SPECIFICATIONS }

Operating Principle:	Pressure gradient transducer
Directional Pattern:	Bidirectional
Frequency Range:	<20 Hz to >20 kHz
Maximum SPL:	165 + dB SPL (1% third harmonic > 1 kHz)
Sensitivity:	2.5 mV/Pa (-52 dBV/Pa) into unloaded circuit
Output Impedance:	270 $\Omega$ nominal
Recommended Load Impedance:	1.2K $\Omega$ or greater
Phantom Power:	Not required or recommended

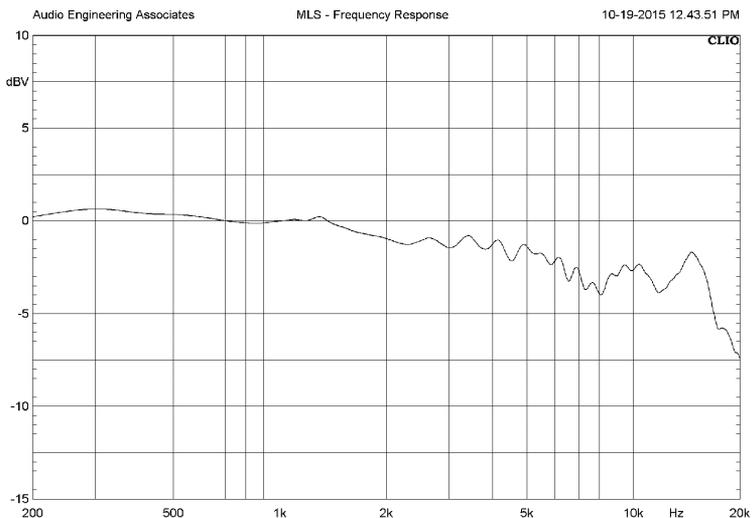
Polarity: Pin 2 high for positive pressure on front of microphone.  
 Polar Response: Native bidirectional, figure-of-8 pattern  
 Horizontal: Up to 90 dB rejection at right angles to the front/back axis.  
 Vertical: Level changes with angle of incidence, but frequency response is consistent.

Transducer Element Material: Pure aluminum corrugated ribbon  
 Thickness: 1.8  $\mu$ m  
 Width: 0.185 in (4.7 mm)  
 Length: 2.35 in (59.7 mm)

**Microphone Dimensions**

Height: 11.6 in (29.5 cm)  
 Width: 3.9 in (9.9 cm)  
 Depth: 2.5 in (6.4 cm)  
 Weight with cable: 3 lb (1.36 kg)  
 Shipping Weight: 4 lb (1.8 kg)  
 Connector: XLR-3M

**R84 Frequency Response**

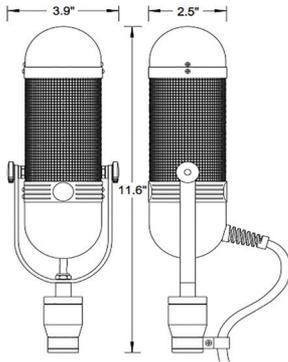


Data below 200 Hz omitted due to measuring room restrictions.  
 0 dBr is equivalent to 2.5 mV/Pa at 1kHz.  
 Normalized to 0 dBr at 1kHz.

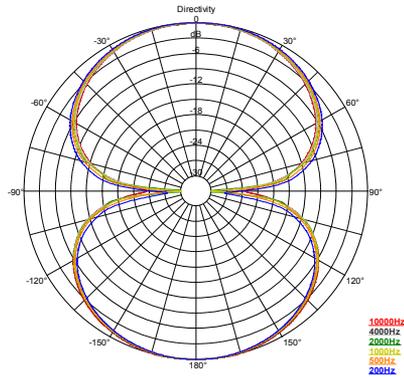
**Accessories Included:**

Vertical softcase, user manual, captive 10' (3 meter) output cable with XLR-3M connector.

## R84 Dimensions



## R84 Polar Pattern



Your R84 microphone comes with a one-year limited warranty on parts and labor, shipping not included. Please see the supplied warranty card for details.

Registering your microphone with AEA will extend the warranty to a full three years. Simply fill out the supplied registration form and send it to:

Audio Engineering Associates  
1029 N. Allen Ave  
Pasadena, CA 91104

You may also register your AEA equipment online at:  
<http://www.ribbonmics.com/aea/form.php>



If you should encounter any problems with your microphone, or if you have questions regarding using the R84 in specific application, please contact our customer support team at [support@ribbonmics.com](mailto:support@ribbonmics.com)

To talk to a live human being, call +1 (626) 798-9128, between 9:00 - 5:00 pm PST Monday through Friday.

Manufactured by AEA Ribbon Mics & Preamps  
1029 N. Allen Ave. Pasadena, California 91104, USA  
Tel: +626-798-9128 Fax: +626-798-2378 [www.ribbonmics.com](http://www.ribbonmics.com)