

Cactus



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Congratulations on your purchase of the BLUE Cactus, a premium large-diaphragm, multi-pattern tube microphone made the old-fashioned way, without compromise. In the tradition of the world's best (and most expensive) vintage vocal microphones, the Cactus has been designed to provide commanding, intimate presence and larger-than-life detail in a wide variety of professional recording applications.

At a distance, and in omnidirectional and figure of eight patterns, this microphone delivers every nuance in the room, with finely focused resolution and clear, musical frequency response out to the extremes of the audible spectrum. But this is also a Cactus you'll definitely want to get close to! With its detailed highs, smooth midrange, and minimized proximity effect (a bass boost inherent in all unidirectional mics), the cardioid Cactus excels at delivering a vocal or solo track right to the front of the mix where it belongs. When processed with limiting and/or compression, as is standard practice for most pop vocals, tracks recorded with the Cactus will be free of pumping and low end thumps.



The Cactus System and Electronics

The basic Cactus microphone system includes the BLUE Series One shockmount and wire mesh pop filter assembly, a Champagne tube microphone cable, and the model 9610 power supply with adjustable pickup pattern control, shipped in a blue velvet-lined ATA flight case approved for the utmost protection. In order to familiarize yourself with the specialized and unique features of the Cactus microphone, please take the time to read this manual, and be sure to try the suggested recording tips.

The Cactus amplifier utilizes a single hand-selected sub-miniature vacuum tube. This tube circuit is Class A and fully discrete, meaning that the sound which arrives at the diaphragm of the BLUE capsule is transduced (converted to electrical energy) as accurately as possible, with no integrated circuits (a.k.a. "IC's") in the signal path. To this end, the Cactus utilizes electronic components of the highest quality (such as expensive metal-film resistors and a custom-built transformer), and there are no pad or low-cut filter switches in the microphone circuit. In short, this is a signal path of the highest possible quality, allowing the user to get the maximum benefit out of the multi-pattern capsule created by BLUE.

Getting Started

In order to get the most out of this, or any quality microphone, it is essential to pair it with a good microphone pre-amplifier. Most professional recordists prefer to have outboard preamps on hand, and will choose solid-state or vacuum tube models based on their unique characteristics. And, unlike many tube microphones, the Cactus can be run through a variety of tube preamps without excess coloration, noise, loss of detail or tube compression.

To maintain the integrity of your signal, use the BLUE Kiwi mic cable between the 9610 power supply and the mic preamp. It is not necessary or advisable to connect the 9610 power supply to a 48V phantom power source. And, whenever possible, connect the mic preamp output directly to your recorder or A/D converter, bypassing the mixing board and any unnecessary components.

For mounting the microphone on a stand, a recessed, threaded socket is built into the bottom of the Cactus, next to the multi-pin output jack. The Series One cradle and adjustable yoke mount assembly provides an alternate mounting system to enhance positioning, and is shock mounted to isolate the microphone body from low frequency vibrations conducted through the stand. The cradle mount also functions as a base for the wire mesh pop filter.

To fit the Cactus into this assembly, first stretch the elastic bands on the yoke mount over the two knurled nuts on each side of the cradle mount. Then slide the microphone into the cradle mount, with the thumbscrew at the front of the mic (under the

Cactus with Series One Shock/Pop



BLUE logo). Tighten the thumbscrew until the mic is secure within the cradle mount and won't slip out when hanging upside down. The angle of the yoke mount can be swiveled and adjusted with the large thumbscrew.

Whether you are using the microphone on its own, or with the Series One mount, you may find it easiest to 1) loosen the boom stand arm or threaded end of the mic stand, 2) grasp the mic or mount assembly in one hand, and 3) screw the mic stand threads into the mount, without over-tightening. This procedure will assure that the elastic shockmount bands stay in place, and eliminates any possibility of damage to the mic.

SAFETY NOTES: Do not attach the multi-pin Champagne cable to the Cactus until it has first been attached to a stand. Once the microphone body is secure, connect the Champagne cable to the Cactus and the 9610 power supply, and then turn on the 9610 to begin the warm-up process. At the end of a session, be sure to turn off the 9610 power supply before disconnecting the Champagne cable.

To secure the delicate capsule during transport and shipping, three brass set screws are provided. These screws should be mounted in the solid metal ring around the circumference of the grille when you first take the microphone out of its case. Remove these screws before using the microphone, and replace them (once the 9610 power supply has been turned off) if you will be transporting or shipping the microphone. *Your Cactus mic will not work properly if the security screws are not removed.*

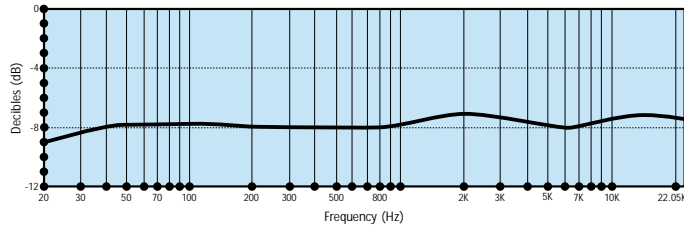
Capsule and Pattern Characteristics

At the heart of the Cactus is a multi-pattern variation of the B7 Bottle microphone capsule. This large diaphragm, single backplate capsule is our contemporary version of the unmistakably warm sound ascribed to the great 1950's tube microphones. A boost in the upper midrange response brings out just the right amount of intimate detail for vocal tracks, without emphasizing sibilance.

The B7 exhibits a silky, slightly compressed tone, with less high end presence boost than the B6/B0 Bottle capsules and related capsules in our Mouse and Blueberry microphones. Its smooth, natural highs and abundance of tone make the Cactus ideally suited to saxophones, electric guitar, organ, acoustic bass, and other solo instruments as well. Acoustic guitar, hand percussion, drums, and other critical high end sources also shine in front of the Cactus. The precision-crafted BLUE electronics add an extra measure of presence that enables the most delicate



Cactus B7 Capsule Frequency Response



This frequency chart of the Cactus B7 capsule is only a start. It gives the recordist a basis of the sound provided. How the microphone reacts in a particular application will differ greatly because of many variables. Room acoustics, distance from sound source (proximity), tuning of the instrument and microphone cabling are only a few of the interacting issues. For an artist or engineer, how the microphones are used creates the basis of the sound.



sounds to cut through a mix, even when miked at a distance or mixed at very low levels.

You will notice that the sound of the Cactus B7 capsule changes when adjustments are made to the nine-position pickup pattern switch on the 9610 power supply. In general, the omnidirectional pattern offers the flattest frequency response, with an absence of proximity effect. As the pattern becomes more directional (by clicking clockwise through the switch settings, towards the figure of eight position) bass frequencies increase proportionally due to proximity effect, and subtle changes also occur on the high end response. These shifts in overall timbre can be used to fine-tune the response of the Cactus, as well as for unconventional, creative ends.

Recording Applications

Vocals

Here's a little-known secret vocalists love singing into unique and impressive mics. And in addition to its classic styling, the Cactus was developed especially to enhance the projection, air, and midrange detail in a voice, while diminishing the proximity-induced lows which can cloud a mix or produce compression artifacts. Put it in front of any singer and you are guaranteed to get a 110% inspired performance that sits perfectly in the mix with little or no additional equalization. The Cactus is also outstanding for narration and voice-over work.

For a "big" vocal sound with maximum presence, get the vocalist within one to three inches of the capsule. There is no need to worry about overloading the microphone, but be sure to use the W1 mesh pop filter to protect the diaphragm at close distances. Tilt the Cactus up (toward the forehead) for more projection and head tone, straight on at the mouth for maximum brightness and intelligibility, or down toward the chest for more robust lows and smoother highs.

Conventional vocal recording is almost always done using a cardioid pickup pattern. But the variable pattern control on the 9610 power supply allows you to experiment with the timbre changes which occur in subcardioid (left of center on the pattern switch, towards omnidirectional) and supercardioid (right of center, towards figure of eight) settings. Whenever possible, set up the power supply in the control room, and spend a few moments exploring these tonal shifts while "tuning" the pickup patterns.

The figure of eight pattern is useful for recording two singers on one mic, or for a "hotter" solo vocal with increased proximity effect (i.e. a typical radio announcer voice). The omnidirectional pattern on the Cactus can also be put to unique effect, whether

recording a roomy, distant vocal track, capturing an unusual room ambience in combination with a close vocal mic, or on large group vocals.

Acoustic Guitar

For a balanced sound with plenty of sparkling high end, position the Cactus facing the guitar neck, right where the neck joins the body (usually around the 12th–14th frets). For starters, use the cardioid pattern, keep the capsule as close as possible, and angle it toward the sound hole to capture a blend of low end and pick sound. If you need more lows, move the capsule closer to the sound hole, or adjust the pickup pattern one click at a time toward the figure of eight position. For more high end detail, move the Cactus farther from the guitar, either at the same neck position, or above the instrument up by the guitarist's head. An omnidirectional pattern setting allows very close placement to the soundhole without boomy lows, and distant placement of three feet or more can produce interesting results throughout the available range of pickup patterns.

Electric Guitar

The Cactus B7 capsule is useful for any clean amp sound, ranging from bright rhythm chords to warm jazzy tones. Angle the capsule toward the center of the speaker to capture more highs, or turn it toward the edge of the cone for a fuller sound with more low end. The tube circuitry and natural high end response of the Cactus is also excellent for overdriven and distorted amp tones. To add a little room sound and/or soften the extreme high end, move the mic towards the outer edge of the cone, or back it away from the amp a foot or more.

For even more control over definition and room tone on electric guitar tracks, it is common practice to use an ambient room mic in addition to a close mic on the amp. The omnidirectional or figure of eight patterns on the Cactus are highly recommended for distant room miking applications on any amplified instruments, including bass, organ, and blues harmonica.

Piano

Pop and jazz piano recording is usually accomplished with a pair of microphones placed inside a grand piano, either close to the hammers for a defined, percussive sound, or roughly in the middle of the piano body to get a more resonant and blended tone. When using these methods, it is conventional to employ a coincident stereo pair, with one microphone capsule oriented to pick up the treble strings, and the other focused on the bass range of the instrument.

A less common, though very useful technique, is to position a stereo pair or single Cactus microphone just outside of the piano, either in the curve of a grand, above an upright, or a few feet away for a classically-oriented sound with a significant amount of natural room reverberation. The variable pickup pattern control can be used to dial in the desired amount of ambience.



Saxophones and Reeds

The smooth high end response and large diaphragm warmth of the Cactus B7 capsule makes it an ideal candidate for miking saxophones and other reed instruments. For soprano sax, clarinet and related instruments, position the mic about a foot away, directly above and in front of the keys between the middle of the horn and the lowest pads. Try rotating the capsule or moving the mic up or down along the length of the body to adjust the balance of airy highs (toward the mouthpiece) and cutting midrange (toward the bell).

For other members of the saxophone family, start by placing the capsule two to six inches in front of the lip of the bell. Turn the capsule up toward the mouthpiece, or raise the microphone above the bell to capture more air, brightness, and high notes. For a mellower sound, rotating the microphone toward the floor emphasizes the low range of the sax, and tames the biting upper mids that project straight out of the bell, particularly on alto saxophone.

Brass

All members of the brass family need to be miked from in front of the bell. But for studio recording it is not necessary to aim the microphone capsule right down the center of the bore, or place it too close. The trumpet, with its directional characteristics, high sound pressure level, and limited frequency range, will yield a clear, cutting tone at distances ranging from 6 inches to 2 feet. The trombone and tuba can be approached similarly, although closer miking toward the outer edge of the bell (4 to 8 inches), and the enhanced proximity effect of supercardioid and figure of eight pickup patterns will help offset a thin or overly bright timbre.

Capturing a mellow, rounded tone is a challenge with any brass instrument. To avoid buzzy highs and transient overloading, persuade the player to blow at less than peak stage volume. Cornet and flugelhorn usually have a softer, more intimate sound, are played at lower volume, and can be miked at a distance of 2 to 6 inches.

Drums

The superior SPL capability, high end detail, and fast transient response of the BLUE B7 capsule presents numerous advantages when recording drums. For kit and hand drums, begin by positioning the capsule two to four inches above the rim or hoop (where the head is secured to the shell). Angle the capsule toward the player's stick or hand to pick up more attack and definition. Turning the capsule toward the shell will soften the sharp attack of a hand drum, or pick up more of the bright, crackling buzz from a snare. Moving the microphone closer to a drum generally increases the low end, shell resonance, and separation from other sound sources, while more distant placement emphasizes the interaction of the drum and the environment, producing a blended, airier sound.

The Cactus will produce an interesting personality when used at a distance of four feet or more as an ambient room mic on drums. Many modern pop recordings (as well as classic jazz, blues, and R&B sessions) have benefited from the unique sound of minimalist drum miking, where one to three microphones are strategically placed to capture the entire set, along with the characteristics of a well-tuned studio room.

Percussion

On tambourine, shaker, bells, clave, and orchestral percussion the Cactus offers astounding clarity and realism, and can be positioned quite close to a percussive source without distortion or undue proximity effect. Start by placing the Cactus about a foot from percussive instruments. Selecting a cardioid pickup pattern, or moving the mic closer to the source will emphasize detail and tone, as well as decreasing the proportion of ambient room sound on a track. More distant placement, or the use of an omnidirectional or figure of eight pattern will yield a natural, roomy sound that blends easily with other rhythm instruments.



The Technical Page

The Cactus vacuum tube amplifier consists of a classic common cathode circuit. The amplified signal is taken from the plate and fed through a high-quality polypropylene capacitor, then output to our BLUE custom hand-built transformer. The capacitor has a low dielectric absorption coefficient and a low equivalent series resistance. These parameters are essential to high end audio, and are not present in lower priced microphones.



Inside the Cactus



D.A. (dielectric absorption) is reluctance on the part of the capacitor to give up stored electrons when the capacitor is discharged. E.S.R. (equivalent series resistance) is the resistance composed of the capacitor plate, lead, and termination resistances. If the capacitors used in the audio path possess high values of D.A. and E.S.R., the result is a loss of accuracy and dynamic structure when reproducing the finer details of the recorded source. Under these conditions, a definite “grunge” or hashy distortion is added to the reproduced signal.*

A special output transformer was designed by BLUE engineers to match the tube, and to ensure complete immunity from outside interference (RF and other sources). This hand-built transformer is balanced, using a symmetrical two-bobbin design (i.e. hum-bucking), with a transforming ratio of 10:1. With this ratio, the microphone achieves a low output impedance, typically 150 ohms. The primary transformer windings are connected in series. The transformer’s secondary windings are connected in parallel, and connect directly to the XLR output pins. The transformer lamination has a high relative permeability, which is one of the factors contributing to low distortion and higher dynamic range.

The tube used in the Cactus is a single subminiature pentode in a triode mode. After being burned in for a week, this tube is hand-selected by BLUE personnel for optimum low-noise performance. The amplifier input is separated from the microphone capsule with a polystyrene capacitor. Both the tube grid and the microphone capsule are controlled through high-quality, low-noise 0.5W 400 Mohm resistors. High-end film capacitors and low-noise metal oxide resistors are used throughout the Cactus circuit.

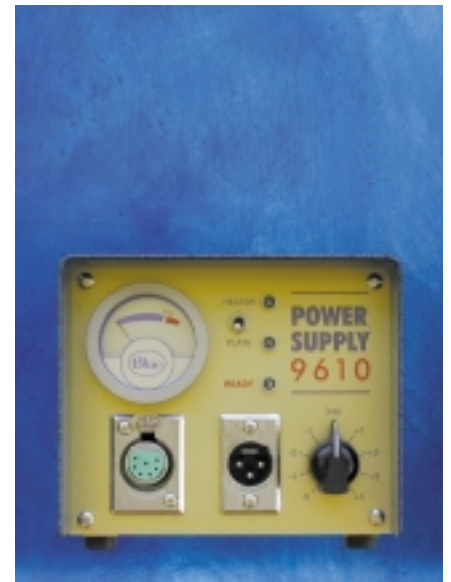
All of the Cactus microphone’s internal wiring is oxygen-free copper Teflon-insulated.

9610 Power Supply

The BLUE power supply for The Cactus microphone is based upon our 9610 model, and features a sophisticated, regulated circuit design as well as other features that are not available in any other commercially available tube mic power supply. To assure the longevity of the vacuum tube and the stability of the tube microphone circuitry, BLUE has developed the 9610 power supply with the new SOFT START feature.

In the past, power supplies have been designed to use both heater and plate voltages applied simultaneously once power has been switched on. In this case, the high voltage potential on the plate forcefully attracts electrons from the not yet heated cathode, a process is known as “cathode stripping”. In practicality, this means that each time the power supply is switched on, the microphone tube changes its electrical properties. To put it simply, the tube begins to wear and gets noisier.

9610 Power Supply



To avoid this problem the 9610’s SOFT START feature delivers the tube’s heater voltage first. The 9610’s circuitry also prevents the heater current from exceeding the limits for which the tube was designed. Without this feature the cold heater would draw more current than specified, and begin to deteriorate the valuable microphone tube. After approximately 80 seconds—when the cathode is fully heated—the plate voltage is gradually applied starting from 10V to 120V (or other voltage depending on the microphone circuitry). During this time the output of the microphone is muted.

After about three minutes the tube is settled in its correct operating mode, the muting is disabled, and audio is present. Both the heater and the plate voltages are ultra stable and non-dependent on AC main changes or fluctuations. For AC rectification, the 9610 uses only high frequency diodes to obtain the purest DC possible. And most importantly, the plate voltage supply is of low impedance, which improves sonics and clarity.

9610 Pattern Select Switch

All the potentiometer switches on the 9610 are discrete military type with enclosed contacts. The nine-position switch on the Cactus power supply allows you to determine the pickup pattern selection for your microphone capsule ranging from omnidirectional (fully counter-clockwise) to figure of eight (fully clockwise).

9610 Metering

A custom-built meter is provided to indicate the tube strength of the Cactus. In the upper position (“Heater”) the tube filament can be monitored. In the lower position (“Plate”) the tube plate voltage can be checked. This switch does not affect the performance of the microphone or the power supply.

9610 AC Voltage

The 9610 operates at either 110 or 240 AC voltage. Your power supply has been set for the proper voltage required in your country. If a voltage change is needed, push in on the fuse slot located at the AC receptacle. Remove the fuse holder and re-insert with the selected voltage (110 or 240) facing up.

*For those interested in detailed description how capacitors affect the audio circuitry, read the 1980 March & April AUDIO Magazine article by Walter G.Jung and Richard Marsh entitled, “PICKING CAPACITORS.”