

REVIEWS

NEUMANN U 67  
Large diaphragm tube microphone

## Rebirth

Neumann U 67

Large diaphragm tube microphone



# Sound & Recording

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At first glance, the U 67 reissue looks like a U 87 Ai – except for the Neumann logo in black, which indicates tube technology.



An old U 67 courtesy of the Berlin equipment rental Echoschall: some patina on the outside but technically in mint condition.

The news spread like a wildfire: Without any preannouncement the Georg Neumann company presented a reissue of its legendary tube microphone U 67 at the January NAMM show. A few months later, the first batches are now being delivered to their prospective owners. We were able to get hold of a new U 67 microphone and compare it to an old specimen from the 1960s.

It's a rare treat for me to review a product that was developed long before I was born. Especially when it is a microphone of such historic proportions as the U 67, which, after all, was the studio microphone of the 1960s. You might say, it listened to the birth pangs of modern pop music while it rapidly progressed from innocent little ditties to bewildering psychedelic experiments and ear-blasting proto heavy metal. Many of today's cultural and social achievements have their roots in the 60s, and the same is true for many technical revolutions. The Neumann U 67 being a prime example, as it already incorporated all the functions you'd expect from a universal studio microphone: three switchable polar patterns as well as pad and low cut switches. No less revolutionary was its sophisticated exterior design with a tapered microphone grille and a conically shaped body: such timeless elegance! In short, the U 67 was so far ahead of its time that, without any technical changes, it is bound to become a big seller for Neumann, again, fifty years later.

## A CASE OF U

The U 67 reissue comes in a high quality grey-colored tweed case. The lid bears an embroidered Neumann diamond; the front, near the handle, has a chrome badge with the company logo and the magic number „U 67“. Like the entire microphone, the case is made in Germany.

The interior, too, is beautifully made. On opening the case, the microphone is on display in the middle. To its left is an elastic suspension – it's the old Z 48 mount, specially reproduced for the U 67 reissue. To the right is a PSU which supplies the anode and filament voltages for the tube circuit. The multipin cable that connects the microphone to the PSU is located in a compartment below the microphone. It measures 10 meters (32.8 ft) and is more flexible than usual multipin cables. The reissue uses the same 7-pin connectors as old U 67 microphones; the new connectors are black instead of nickel, but they have the same pin orientation and are fully compatible with the old connectors. Details such as this already indicate that it wasn't enough for Neumann to build something similar; the goal, obviously, was to create an identical reproduction.

To verify this, Carsten Lohmann, who operates the Berlin equipment rental business Echoschall, kindly provided us with an old U 67. The Echoschall specimen left the Neumann factory in March 1969 and formerly belonged to Europa Studios, where it was primarily used for spoken word and audio drama productions. Which may account for its excellent condition after all those years.

## A SHORT HISTORY OF TIME PAST

Introduced in 1960, the U 67 was the successor to the eminent U 47, which had already attained legendary status by then. It certainly wasn't an easy task to supersede such a popular microphone. A few years before, however, Telefunken had ceased production of the VF14 tube, an essential part of the U 47, and it seemed wise to use this caesura to establish a new studio standard that would use an easily available type of tube and also accommodate modern "American" recording techniques. Those were the days when close miking and multi microphone setups became popular in order to obtain a more direct sound with greater impact. As is still the fashion today.

To this end the U 67 was fitted with a switchable pad, which enabled it to process high sound pressure levels without audible distortion, and a switchable low cut filter allowing the user to compensate for proximity effect in close miking situations. Additionally an internal filter (which could be deactivated) was implemented to attenuate frequencies below 40 Hz before they hit the tube, thus protecting the circuit from overload due to pops and rumble. Moreover, the U 67 had three switchable polar patterns (omni, cardioid, figure-8) instead of the U 47's two (omni and cardioid).



There was even more innovation under the hood: An all-new sound transducer was developed for the U 67, the K 67 dual diaphragm capsule with separate backplates for each half. The previously used K 47 capsule had a common backplate for both halves of the dual transducer, which made it difficult to manufacture capsules whose front and back sounded identical. The K 67's construction facilitated this process. Neumann's chief developer Dr. Gerhart Boré also came up with an ingenious idea to reduce the tube's noise floor, or, to be more precise, to make it less audible. Similar to the pre-emphasis/de-emphasis scheme in tape recording technology, the K 67 capsule was designed with a large treble boost – which the microphone circuit then compensated for an overall linear response. This was implemented via frequency dependent negative feedback across the entire microphone. The output transformer received additional windings whose signal was fed back to the capsule with reverse polarity. The result was a studio microphone that represented the state of the art in tube technology: remarkably linear and well equipped for any task in the modern studio.

Nonetheless, it wasn't long before it was superseded: In 1967 Neumann introduced the U 87, which operates with solid state technology but otherwise adheres to the same design principles – a success story that has been going on for 50 years! The tube operated U 67 was produced until 1971. In 1992 there was another limited run of a few hundred microphones, which used up remaining stock of components. The new reissue is not limited as all of its components are from current production so the U 67 can now be manufactured as long as there is sufficient demand. As Neumann told me, they are more than happy with current sales.

Which isn't surprising, given the fact that this microphone has written recording history. While Beatles fans long for a U 47,

Stones fans idolize the U 67; Mick Jagger was rarely seen with a different studio microphone throughout the 60s and early 70s. Pure U 67 sound can be heard on Simon & Garfunkel's album *Live from New York City, 1967*, which was recorded with three of those microphones. Only two were used on one of the bestselling Jazz records of all time, Keith Jarrett's *Köln Concert* (1975). The U 67 was also the microphone that the legendary engineer Glyn Johns (Rolling Stones, Beatles, The Who, Eagles, among others) used when he developed his famous drum recording technique, as he remembers in his (excellent) autobiography *Sound Man* (2014).

## MARCH 2018

Es ist schon ein eigenartiges Gefühl, ein frisch gefertigtes Vintage-Mikrofon in Händen zu halten. Der Verstand sagt »Legende«, das Auge sagt »brandneu«. Die nickel-matte Oberfläche ist absolut makellos verarbeitet. Optisch ist das U 67 kaum von seinem transistorisierten Nachfolger U 87 Ai zu unterscheiden, bis auf das Neumann-Emblem, das bei Röhrenmikrofonen schwarz ist und bei FET-Mikrofonen mit Übertrager lila. Außerdem benötigt das U 67 einen siebenpoligen Anschlussstecker, der aufgrund seines größeren Durchmessers verhindert, dass es auf die fürs U 87 Ai entwickelte EA-87-Aufhängung montiert werden kann. Daher die Rückkehr zur Z-48-Spinne. Gegenüber dem alten U 67 von Echoschall wurde bei der Neuauflage die Bänderrolenbeschriftung geändert. Beim U 67 von 1969 sieht noch »Made in Western Germany« zu lesen – bis zum Mauerfall sollten ja noch 20 Jahre vergehen. Bei der Reissue steht in etwas kleineren Lettern »Made in Germany« und »Supply: NU 67 V«.

Letzteres ist wichtig, denn die in der Neuauflage verwendete EF86-Röhre aus aktueller Fertigung zieht einen etwas höheren Heizstrom, den ein älteres U-67-Netzgerät

nicht zuverlässig liefern kann. Als Folge könnte erhöhtes Rauschen auftreten. Umgekehrt kann das Netzteil der Reissue aber problemlos für ältere U-67-Mikrofone verwendet werden. Da heute viel strengere Sicherheitsvorschriften gelten als in den 60ern, musste das Netzgerät ohnehin neu designet werden. Bei der Gelegenheit hat man eine Automatik eingebaut, durch die sich das NU 67V selbsttätig auf die jeweilige Netzspannung einstellt. Erlaubt sind 100–120 und 220–240 Volt bei 50–60 Hz; das dürfte alle halbwegs zivilisierten Orte dieser Erde abdecken. Es handelt sich jedoch nicht um ein »neomodisches« Schaltnetzteil. Da das Netzteil eines Röhrenmikrofons durchaus einen gewissen Einfluss auf den Klang haben kann, entschied man sich, bei einem linearen Netzteil zu bleiben. Im Gegensatz zu den alten Netzteilen arbeitet das neue mit einem streuarmlen Ringkerntrafo.

## INNER VISIONS

Let's take a look at the U 67's interior. The reissue's component layout and circuit boards are unchanged compared to the old U 67 from Echoschall. The only difference is in the PCB material. The hard paper boards used in the 1960s are prone to develop leakage currents due to humidity. The reissue, therefore, is built with much more resilient epoxy boards. Another troublemaker in old U 67 microphones is the acrylic glass used for the bottom of the capsule head and its counterpart on the microphone body. Acrylic glass tends to crumble with age (even more so if you try to clean it with alcohol). The reissue uses a different kind of plastic for those parts, which has proven time stable in the U 87 Ai for many years.

The reissue's current production components may not look quite as vintage and "vibey" as the 1960s components in the old Echoschall U 67, but they're certainly more reliable. A closer look at the capacitors reveals



The 1969 U 67 from Echoschall was still distributed under the Telefunken label. The band below it is a memento of a country divided: „Made in Western Germany“.



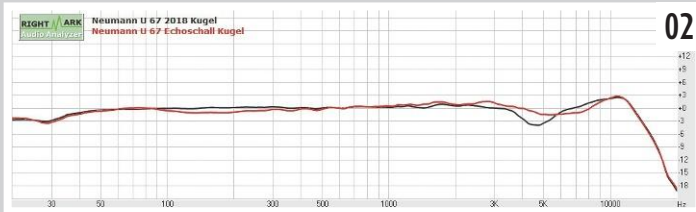
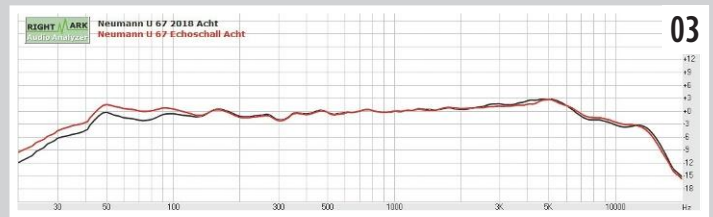
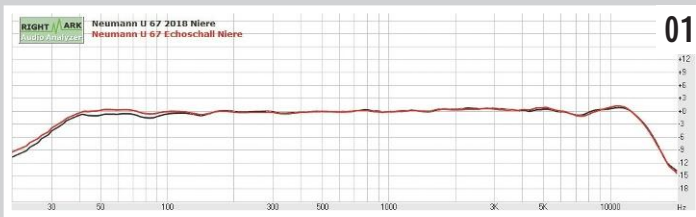
The higher filament current demands of newer tubes and stricter safety regulations necessitated a new power supply.



The new PSU has a vintage look and self-adjusts to the local mains voltage.

# The Measurements

show that the reissue performs exactly like an old U 67. Small differences are discernible in the rarely used omni setting only.



- 01** In cardioid mode the curves for the reissue and the old U 67 from 1969 are practically congruent. Although separated by almost 50 years, you could use both as a stereo pair with no problems at all.
- 02** There are small differences in omni mode: The reissue has a small dip at 4.5 kHz, otherwise its frequency response is a bit more linear than the Echoschall specimen's. The differences are probably due to the bottom of the capsule head, which was dome shaped in U 67 microphones until 1969.
- 03** In figure-8 mode the frequency plots of both U 67 microphones are mostly congruent. The old U 67 from Echoschall has a bit more bass below 150 Hz. The ripple in the lower frequencies is due to the measurement method.

that Neumann uses the same types and qualities throughout, i.e. old polyester film capacitors were replaced by new ones, and the all-important capacitor responsible for negative feedback in the high frequencies (C17) is still a polystyrene type, even though most manufacturers now replace those with polypropylene capacitors, which are easier to process.

A key part for the U 67 is its BV12 output transformer. Luckily, Neumann have archived all documents of any importance through the years, which means the BV12 can now be reproduced according to original production drawings. Neumann even has all the development documentation on file so today's developers were able to look over the shoulders of their predecessors and understand what they did and how they drew their conclusions. A few of those insights can be had in a beautifully made booklet Neumann issued when the "new" U 67 was launched.

Another key part, of course, is the tube. The original developers decided to use a tube type that was widely used in the 1960s, the EF86 pentode (which is wired as a triode in the U 67). Because of its low noise and excellent sound characteristics the EF86 was used in a lot of hi-fi and studio equipment, which means that it has become very difficult, these days, to find large batches of new old stock (NOS) tubes. Fortunately, the remaining tube manufacturers (and a few new ones) have reacted to the high demand for those tubes and have begun to produce high quality EF86 tubes, including the long-life version EF806. At least one of those new lines has proven suitable for microphone use, although tubes

always have to go through a rigorous "burn-in" and selection process; this was no different in the 1960s. Neumann therefore created dedicated test and measurement facilities to ensure that all tube parameters, including noise, are as required and each new U 67 microphone performs according to the original specifications. Replacement tubes should therefore be ordered from Neumann. However, as current production EF86 tubes draw a somewhat higher filament current of up to 270 mA, these tubes cannot be used with older U 67 power supplies. But you can use old EF86 tubes in the new U 67 without problems, provided you can find one that was selected for microphone use.

Fortunately, the situation for the most crucial element in the U 67 is fairly simple: The K 67 has continually remained in production as the U 87 Ai uses the same capsule in (almost) the same capsule head, which thus could be taken over for the U 67 reissue. There are a couple of differences compared to the old U 67 capsule head below the actual capsule: In U 67 microphones until 1969 the capsule was mounted on a dome of acrylic glass, as you can see in the pictures of the Echoschall specimen. In later U 67 and U 87 microphones, the capsule is mounted above a flat surface. For a few years Neumann fitted a ring of foam between the capsule and the bottom of the capsule head, but as the foam began to crumble after a while, thus contaminating the membranes with small particles, Neumann dropped the foam ring. The changed capsule mount does alter the capsule head's

acoustic properties a bit, but it really has consequences only for the omni setting where it produces a small dip at 4.5 kHz (as you can see in our measurements).

## IN USE

One question remains: Does the reissue sound like an old U 67 from the 1960s? Yes, it does! The reissue is a genuine U 67 without any compromises! In practical use, whatever differences could be heard between the reissue and the 1969 specimen from Echoschall were just as small you'd have between any two U 67 microphones from the 60s (provided both are in mint condition). It's hard to believe that the two U 67 microphones on test are separated by almost 50 years. Our measurements reaffirm this perception: In cardioid mode both curves are practically congruent. You could easily use the two as a stereo pair. The old U 67 has 1 dB more bass below 100 Hz – and that's about the only difference between the two! The treble response is equally smooth on both U 67s, and the entire midrange is mostly linear.

At the same time, this linear frequency response is countered by a characterful texture, even though the tube circuitry does not produce obvious saturation artifacts – after all, the U 67 was primarily designed for broadcast applications. It is the complex interplay between capsule, tube electronics and output transformer that results in a unique sound signature. Key elements of the U 67 sound are a characteristic firmness in the lower frequencies and an almost three-dimensional quality in the mids as well as very



detailed yet smooth highs. One of the U 67's most striking qualities is its very natural depiction of sibilants and other speech consonants that puts a de-esser out of work. No wonder the U 67 has remained a sought-for vocal microphone for all those years.

The U 67 is also a great microphone in more complex recording situations. If you want to record a singing guitarist the old school way, using only one microphone, the U 67 is your congenial partner. Simply place it about 60 cm (2 ft) away from the artist, at mouth height, and you're done: the authentic 1960s singer-songwriter sound. The U 67 has enough reach to get a direct sounding vocal, even at this distance; and thanks to its superior off-axis-behavior the guitar is picked up with adequate brilliance.

In general, the U 67 is a real workhorse that's up to just about any recording task. Although its maximum SPL figure of 124 dB (with the pad switch engaged) appears fairly low in comparison to more recent microphone designs, the U 67 has always been used for loud sources such as brass, guitar amps and drums (especially overheads). That's because the U 67's tube circuit has a much softer overload behavior than modern solid state circuits, which tend to go from good to evil very abruptly. Also, the max SPL figure is specified for only .5% THD; that's not very much for a tube circuit, which typically produces a relatively high amount of second-order distortion. Unlike higher order distortion, second order distortion does not sound dissonant and actually adds to the subjective appeal. So there's a wide margin above the U 67's official max SPL figure that's still absolutely usable for loud instruments. Even more so, if you like a bit of "rock 'n' roll" in your sound.

Working with the U 67, I often felt it gave me more mileage than a whole arsenal of less expensive microphones. In fact, the U 67 never seemed to be the wrong microphone



Old and new U 67 compared: The electronic layout is identical; the reissue's components are current production equivalents.



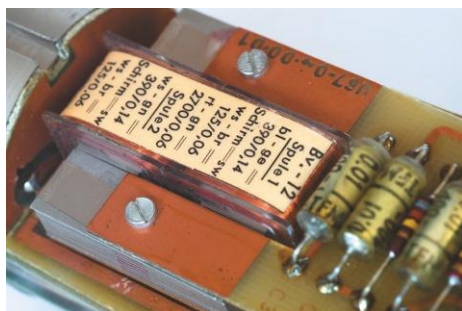
There are hardly any changes to the backside, either. The reissue has no mounting bracket for the tube because, as was found out later, it has no function: The socket is so tight that the tube won't move, with or without a bracket.

for the task at hand because it always sounded wonderfully natural, yet never lame. And although the U 67 does not have a treble boost, unlike most other large diaphragm microphones, it never seems dull or muffled. However, it does not have an obvious "wow" factor, either. At least on first listen. Compared to its predecessor, the U 47, the U 67 appears more restrained. The U 67 is not a magical dispenser of fairy dust; what makes it legendary is its consistency and versatility. As such, it is more of an engineer's dream microphone than a singer's. Although the latter will, no doubt, come to love it after a while, because the U 67 is very easy to handle. Its proximity effect is not too overwhelming and easy to control for the singer. Also, the U 67 never messes up a great performance: Its construction is fairly effective against pops, and sibilants never appear too sharp or fuzzy.

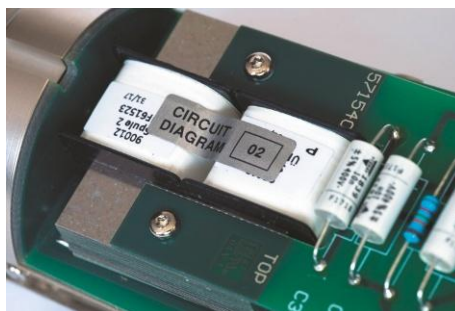
Nor does this change, if you choose to boost the treble frequencies in the mix; the U 67 reacts very gracefully to EQ.

Most users don't use the omni and figure-8 patterns. That's a shame, because U 67's additional patterns are very usable alternatives. In omni mode, the sound becomes brighter, which makes it an excellent choice for acoustic guitar and background vocals with several singers. Figure-8 mode, with its excellent rejection of sound from the sides, can be a problem solver in complex recording situations. But you can also use the U 67's figure-8 mode as a sound alternative because its on-axis frequency response has a presence boost in the upper mids that is not present in cardioid mode.

Noise is not a problem at all. Of course, the U 67 is not as noise-free as a modern state-of-the-art FET microphone, yet its noise



The legendary BV12 output transformer



The reissue's BV12 output transformer is reproduced according to original construction drawings.



The U 67 reissue uses a current production EF86 type tube without a manufacturer stamp. Each tube is meticulously tested and selected by Neumann.



The bottom of the detachable capsule head and its counterpart were made of acrylic glass, which tends to crumble with age. The U 67 from Echoschall is still immaculate, though.



The capsule head of the U 67 reissue is based on that of the current U 87 Ai, whose materials have proven time stable.



+++  
outstanding sound quality

+++  
versatile

+++  
immaculate workmanship

+++  
high quality accessories

-  
not exactly cheap

A direct comparison reveals: The reissue is a genuine U 67. Sound wise, it is almost indistinguishable from the 1969 U 67 microphone kindly provided by Echoschall.

floor rarely becomes audible. Nominally, its self-noise figure is 17 dB-A, but the noise spectrum is unusual. Thanks to its pre-emphasis/de-emphasis scheme, the noise floor is lowered in the upper frequencies, where the human ear is most sensitive. Thus, the U 67 subjectively appears to be lower noise than many more recent tube microphones.

## SUMMARY

The legend is back: Neumann's U 67 reissue is a genuine U 67. Not a limited edition for wealthy dentists, not a nostalgic replica for museums, nor a somewhat similar looking clone – this is the real deal. The new U 67 sounds exactly like an old one, and, while almost 60 years have passed since its inception, the U 67 still handles today's recording tasks gracefully. More gracefully, in fact, than many a newly developed microphone, because it combines a subjectively natural sound image with the kind of subtle texture that we often try to instill in clean sounding modern microphones using characterful preamps or plug-in emulations of classic hardware. The U 67 doesn't need all that. It sounds fantastic on any preamp, and it doesn't need digital cosmetics, either. Just fire it up, hit record, and have fun!

The only stumbling block on the way to recording bliss is the price tag: Roughly 6,000 Euros (USD 7,000) is not exactly cheap. Yet it is pretty much the going rate for a used U 67, which often enough requires service before you can use it. For the same price the reissue gives you a mint capsule, a fresh tube and a much safer power supply! I suspect, Neumann couldn't produce it much less expensive, anyway, because the U 67 is made of quality components throughout, which come at a price. Also, the reissue's 1960s construction is labor intensive: Each U 67 is completely handwired because there are no machines for traditional circuit boards like these. All things considered, the hefty price tag appears justified. If you can afford this microphone, you'll get a lot of pleasure out of it for many years. Moneywise, a U 67 may turn out to be more stable investment than government bonds. ■

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**U 67 Manufacturer/Distribution** Georg Neumann GmbH

**Price** 5.995,- Euro / ca. 5.995,- Euro

[www.neumann.com](http://www.neumann.com)