The KU4 is a modern build of a classic design.

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AEA KU4 Unidirectional Ribbon Microphone

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Most of the time, reviewing replica and reissue products is easy. You get the "Pultec-like" equalizer, you put it on the bench next to a Pultec, and compare the two. With microphones it can get a bit more difficult, since sometimes microphones change with age (and sometimes people like the changes with age and sometimes they don't), but you still have a reference point...

The problem with doing that in this review is that with the KU4, Wes Dooley of Audio Engineering Associates (AEA) has adapted the design from the RCA KU3A microphone, and hardly anyone has ever seen an actual KU3A. Whereas the 77 and 44 microphones could be found in every radio station and studio in the country, the KU3A was a small production product of which RCA Photophone made two runs of under 300 units each for the film industry.

Researching

I remember hearing people in the 1980s talking about the "MI-10001" microphone for scoring stage use, as if it was some rare legendary Hollywood thing. That was the catalogue number for the KU3A, I now learn, "MI" meaning Manufacturing Inventory.

What I do know about the KU3A is that it was originally intended for dialogue recording on film sets. It is considered one of AEA's Big Ribbon family, but its ribbon is 1.25" long vs. the 2.35" ribbon on the figure-8 AEA mics like the 44, 84, 88 and 92. Rather than being suspended in free air, it has a labyrinth behind the ribbon and some venting in order to give the microphone a very tight cardioid pattern. Because these mics were made in very small quantities they didn't get the kind of careful cost-engineering that mass production products did, and some parameters on them seem to have been tweaked by hand.

Now, when you make a replica of a vintage product, a lot of what goes into the reissue is knowing what needs to be precisely machined and what does not. Machine a part to too tight a tolerance and you increase the cost unncessarily. Machine it with tolerances that are too loose, and you degrade performance. The problem is that I suspect the original engineers of the KU3A didn't put much effort into this; when you're making a small handful of products one at a time by hand, you don't have a chance to find out where the tolerances can be relaxed vs. where they need to be tightened. Folks who have used the KU3A confirm that many of them have "file-until-it fits" hand work in places, and a modern reissue cannot do this.

The RCA 77 was an adjustable pattern microphone. It was a figure-8 ribbon but with an acoustical delay line (which RCA called the labyrinth) connected to the rear, and a plate that allowed the rear vents to be open or closed to change the mic pattern.

Looking at the KU4, to some extent it looks to me like someone took a 77 design and enlarged and re-engineered the labyrinth to reduce internal reflections at the expense of having the pattern fixed. Then they replaced the grille with one that has fewer internal reflections. It is a large and imposing microphone and much heavier than the 77DX, and upon listening to the mic, I find it also has more clarity and detail than a 77DX... which is not something I had expected.

Peeking

First of all, this microphone, although it's a part-for-part replica, is not identical to the original RCA. AEA uses Phillips-head screws, for instance, which were still patented (and therefore avoided by RCA) at the time the originals were made, and they are locked into place with modern RTV rather than the glyptol that RCA would originally have used. Some of the metal finishes and the electroplating job on the yoke are different than what you'd find on 1940s productions. None of this is bad -- in fact, from the standpoint of having a product that is reliable and maintainable it's all very good.

Inside, the motor assembly looks a little like a 77DX, but with a tube leading from a sealed chamber behind the ribbon down into a hidden box in the bottom half of the microphone. There's also a lot of baffling in there which isn't in the 77DX, presumably to improve directionality at high frequencies.

Underneath that is the acoustic delay assembly, which is a huge aluminum piece that has been machined with multiple holes and grooves in order to form a long mostly-nonresonant tube. My guess is that the two bumps in the midrange frequency response have to do with the length of this tube and possibly with the way the line from behind the ribbon is routed. My guess is also that with modern manufacturing methods it's probably done in a very accurate and repeatable way so that all the KU4 mics sound the same. This is something that was not really possible in the 1940s and again will result in a reliable and repeatable mic in a way the KU3A could not be.

The transformer appears to be an RCA-style one, and the wiring from the motor to the transformer is heavy and carefully twisted. My demo mic had an odd open splice in the wire which might result some magnetic noise pickup in a poor environment, but I couldn't hear any problem in any of my tests and I am assuming that this will not be the case in the production units.

The wiring is not supported but it's heavy-gauge enough that vibration of the wiring should not be a serious problem, and my guess is that adding additional supporting would be deviating too much from the original RCA design (as would using a modern transformer).

Measuring

Since this mic is a supercardioid, it has a small lobe in the rear which makes measurement in my small hemianechoic chamber a bit more difficult, since measurement artifacts from the rear lobe become evident. Still, I can get a rough overall response at low frequencies and better narrowband response in the top two octaves.

Frequency response is (like all large ribbon mics) very irregular in the top octave but it changes less as the source moves than the 77 and 44 mics, probably due to the improved ribbon design. The bass end is a little light and there are a couple midrange dips and a little presence boost. I found this kind of surprising, actually, as in the listening tests (see below) I didn't notice any of the little midrange blips at all, and I thought the low end response sounded more rolled off than it measured. That change in low end between my perception and the curve may have something to do with the microphone pattern.

Looking at the published curves for the KU3A on the coutant.org microphones website, the midrange dips are at just the same location, as is that little presence peak. The coutant.org curves are smoothed "marketing department" curves from RCA, though, and at high frequencies measurements are very touchy about direction, so although I see some differences in where the peaks and valleys in the top end are, I'm prepared to believe they're in the same places as those of the original RCA design.

The response is actually very smooth with direction, with a clean drop off of level as you move to the side, then an abrupt polarity change at the null and then you get to the rear lobe. The nulls aren't really very clean nulls and they are kind of rough, but they're much closer to real nulls than you'll get with a conventional cardioid microphone. Actual testing in the studio with a monitor wedge in the null bears that out; you can use these mics in this situation if you're careful about levels and reflections from walls. Plenty of mics don't work when you do this.

A 1W walkie-talkie at 146 MHz does not result in appreciable interference.

Listening

On a first listening test the first thing that really jumped out at me was the microphone pattern. It's a supercardioid, which is to say it's a figure-8 whose rear lobe has been reduced in size but still exists. The front lobe is kind of wide, and there is a very abrupt polarity change as you move across the two nulls, which are 120 degrees off-axis. These nulls aren't as deep as with a figure-8 mic, but they are deep enough that they can be used to reduce leakage from a monitor wedge, or from a nearby instrument in the studio very effectively.

It's a very, very clean vocal sound, and my first thought about the mic was to use it for male vocals. This isn't surprising given that it was intended for dialogue recording. So the first thing I did was to put it up with a bluegrass group that wanted to all play around a single microphone, and it worked very well. The low end was a little bit light and had to be EQed up a notch to balance the upright bass, but vocals on-axis were clean and the instruments off-axis were detailed and clear without being too bright.

On horns it was lovely, if anything a little bit too bright until I pulled it back a few more feet than I would normally put a ribbon. The mic's character and eventual positioning smoothed the horn sound out without losing any of the blattiness.

The KU4 also worked very well also on electric guitar. That's not a huge surprise -- I have never used any microphone that wasn't useful in some application on an electric guitar amp -- but the beauty of the KU4 is that it could be pulled back some distance and be used as a single mic, combining both room and direct sounds on the amp. Try that with an SM57...

Acoustic guitar? I rather liked the sound, although the producer I was working with on that project decided it was too mellow and not edgy enough. And on piano, while it wasn't the piano sound I wanted for that particular session, it was definitely more accurate-sounding than typical ribbons would be.

I know that one popular use of the KU3A in recent years has been on scoring stages as sectional microphones. I would like to have given it a chance for that but only had one orchestral gig during the time I had the mic. This was an oratorio with a small orchestra and a choir, and two vocal soloists. I ordinarily put RCA BK-5s as spot mics on the soloists, five or six feet from them, when I encounter soloists who may not be quite as able to project as they might need to be. In this case I used one BK-5 and one KU4, and comparing the two was very enlightening. The BK-5 had much less leakage than the KU4, but the leakage was less accurate than the leakage on the KU4... in other words, there was plenty of orchestra in the KU4 but it sounded good.

I could see this mic quickly becoming a "go-to" mic for vocals for a lot of people who are looking for a clean and accurate vocal track that sits well in the mix, rather than a forward and bright modern pop-style vocal.

Concluding

This is an interesting and different ribbon mic. It's one with a very subtle coloration, and because it's subtle it is usable on a very wide variety of sources. The supercardioid pattern makes it dramatically different than most ribbons and is a useful tool you can turn to your advantage.

Almost as important is that this is not just a microphone, it's a legend, and it's an RCA legend of very long standing. Don't underestimate the power of the legend; sometimes it just makes people perform better. I know, it's silly, but that's how the studio is. The KU3A was made by hand for a special job, and became a legend much the way the Stradivarius did. The KU4 makes it possible to actually own the legend. Is it worth the money just to own the legend? Not to my mind -- but it's totally worth the money for the mic itself, and the legend is a free bonus.

Yes, this is an expensive microphone, but that's what happens when you build things by hand one at a time. Is it worth the labor that has been put into it? When you consider what an original KU3A is selling for on the used market, the KU4 would seem an low-cost alternative. And as I said above, its modern construction and tolerances may well make this one of those rare cases where the new version is a more sound investment than the original.

Price: $4720 ($4248 street)

More from: Audio Engineering Associates (AEA), **www.ribbonmics.com**

Scott Dorsey (dorsey@recordingmag.com) wishes to thank Dave Gordon of Quad-8 fame, who has actually used a KU3A and was able to talk a bit about his experiences with it, and to the folks at the coutant.org website who are a good source for factory documentation on weird old mics.