

# SE Electronics RNR1

## Active Ribbon Microphone

If you put together a classical musician turned mic manufacturer, and analogue audio legend Mr Rupert Neve, you'd expect the outcome to be something rather special — and it is.

*Paul White*

**S**E started out by building good value, workhorse microphones that were aimed at the project studio market, and they're probably now the largest independent mic manufacturer in China, with their own manufacturing facility and research/design department. In recent years, more 'serious' microphones aimed at the recording professional have been added to the SE range, including the impressive-looking twin-tube Gemini, the titanium-diaphragm Titan and, more recently, the 4400A multi-pattern mic. All of these have been favourably received in professional circles, but the SE RNR1 ribbon microphone sees the company going even further up market — and Mr Rupert Neve's involvement with the design has ensured that its launch will not go unnoticed.

Apparently, SE's Mitch Carey started the ball rolling by suggesting that a Rupert Neve transformer might work well in one of their

ribbon mics, and once Rupert met SE's Siwei Zou, they soon discovered that they had interests in common.

By the time the collaboration got fully under way, Siwei Zou and Rupert Neve were good friends, and discussed theoretical microphone designs at every opportunity. Many companies would pay good money to get Rupert Neve's name on their products, but he already had some ideas of what he'd like to do with microphone electronics — especially in the context of ribbon microphones — and liked the idea of working with a relatively small company that had the necessary enthusiasm and expertise in manufacturing to bring the microphone to market without having to make compromises.

The first official announcement of the SE Electronics RNR1 active ribbon microphone was made on Friday 3rd October 2008 at the AES Convention in San Francisco, an event that I attended to record a brief interview with Rupert Neve and Siwei Zou for *SOS*. We were also told at that meeting that the RNR1 was to be the first mic in a series of collaborative projects with Rupert, and that further designs were in progress that would make up the Rupert Neve Signature SE series.

As you'd expect, ever since it was announced that Rupert Neve was



Photos: Mike Cameron

**SOUND ON SOUND**

**SE Electronics RNR1 £2179**

### pros

- All the warmth of a high-end ribbon mic, but with the benefit of an extended HF response.
- Produces a natural sound in most applications.
- Gives good, pleasing results on a wide range of sound sources.

### cons

- The price puts it out of reach of all but the serious professional user.

### summary

The combination of SE's manufacturing expertise and Rupert Neve's circuit-design skills have really paid off in this distinctive microphone.

collaborating with SE on a high-end ribbon microphone design, there has been a lot of speculation as to how the end product might perform in relation to the ribbon mics that are already established in professional recording circles. After all, how different can another ribbon mic be?

We had a few sneak previews of work in progress, but I only heard this mic in action for the first time when I participated in a session at AIR Lyndhurst studios in Hampstead, London, set up to directly compare the RNR1 with a selection of well-known ribbon and capacitor microphones on a range of musical subjects, including grand piano, drum kit, saxophone (played for us by Courtney Pine) and guitars. Since then, I've also tested the mic in my own studio, with some interesting results.

### Why Ribbons?

Ribbon microphones are 'old technology' and have been around since before the existence of electrical amplification (at which time they were looked upon as scientific curiosities with little practical application). That all changed when the age of electronics gave us amplifiers and loudspeaker systems, and before long the ribbon mic was an established part of the audio chain. Those early mics had a warm sound that probably suited the tweeterless speaker systems used at the time, so their lack of high-end definition probably wasn't an issue. (Back then, of course, reproduced sound in any form must have been a thing of wonder!) The early models would break if dropped, blown on, or even just looked at in a funny way, but as recording technology became more sophisticated, ribbon designs were improved and built to be more mechanically resilient.

Today there are several companies, including Coles, AEA and Royer, who build excellent ribbon mics for the professional market, and for the project studio there are low- and mid-price models from numerous companies, including SE themselves. In certain applications, their warm sound and smooth high-end make them better suited than capacitor models with extended HF responses. For example, ribbons are popular for making smooth-sounding string recordings, or for use as drum overhead mics. However, there are occasions when engineers will use a ribbon mic in conjunction with a condenser, just to help lift out the high-end detail — so Mr Neve's contribution was to design the electronics of the microphone to usefully extend its high-frequency performance.

The concepts employed by Rupert draw a parallel to those used in his Rupert Neve Designs 5088 console, more specifically the use of discrete single-sided circuitry and custom-designed audio transformers. Rupert has always stressed the importance of really high-quality audio transformers, and nowhere is this as crucial as in a ribbon microphone, because the transformer that is necessary to convert the ultra-low impedance of the ribbon capsule to a standard mic output impedance of around 200Ω also imposes electrical loading on the ribbon, which restricts its ability to handle high frequencies.

Rupert's solution was to use two transformers. One is coupled directly to the capsule, as is to be expected, but rather than feeding the output directly, it feeds his high-headroom, class-A, discrete circuitry, that in turn drives the output transformer to accomplish the final impedance matching and balancing — and this is all run from a standard phantom-power source. The strategy reduces the electrical loading on the capsule, and also provides the opportunity to apply some frequency correction above the point where the capsule starts to roll off naturally. Building high-quality audio

### Alternatives

Although every ribbon mic has its own character, the additional HF reach of the RNR1 means that there's no obvious direct equivalent: treating most other ribbons with high-frequency EQ boosts tends to give you more noise as well as the 'air' you're looking for. Companies including AEA, Crowley & Tripp, Royer and Coles offer high-end ribbon mics that have earned great respect in the professional audio marketplace. We evaluated a range of these and more affordable models in SOS November and December 2007 ([www.soundonsound.com/sos/nov07/articles/ribbonmics1.htm](http://www.soundonsound.com/sos/nov07/articles/ribbonmics1.htm) and [www.soundonsound.com/sos/dec07/articles/ribbonmicspt2.htm](http://www.soundonsound.com/sos/dec07/articles/ribbonmicspt2.htm)).

transformers is costly, but in this case it seems to have paid off, because the end result is a ribbon mic that retains the classic ribbon warmth, but at the same time delivers a better transient response than a conventional ribbon model.

The frequency response of a typical ribbon mic rolls off quite steeply above 10kHz, with little or nothing left above 16kHz. If you look at a plot of the RNR1, you'll also see a roll-off above 10kHz, running into a significant dip centred at 16kHz (of around 10dB at the deepest point), but rather than diving away to nothing, the response simply dips and then



Courtney Pine plays sax at AIR Lyndhurst studios while the RNR1 is put through its paces against a range of more established ribbon and condenser mics.

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Putting an array of ribbon mics through their paces on electric guitar. Ribbon mics, of course, are a classic choice for guitar cab miking, where capturing the high end isn't really crucial.

it with the best capacitor mics, it is impressive for an active ribbon. Passive ribbons often require so much preamp gain that noise from the preamp becomes an issue. The mic is also quite happy working at high SPLs, with a maximum SPL of 135dB before significant distortion sets in.

### Testing

The first comparison we made at AIR was to set a pair of RNR1s against a pair of Neumann U87s, to

comes up again by 20kHz, and extends as far out as 25kHz. According to Mr Neve, the 20-25kHz region is very important, because although those frequencies can't be heard in isolation, they have a significant impact on the way frequencies in the 8-12kHz range are perceived. This assertion seems to be borne out in practice, because in comparison with a number of other well-known ribbon mics in the tests at AIR, the RNR1 presented a real sense of 'air' and definition. At the same time, though, the character of the sound was unmistakably 'ribbon' — warm and comfortable to listen to, with a smooth, non-fatiguing character.

### In The Flesh

So that's the background, but how is this mic actually put together? The eye-catching casework apparently takes many hours of precision machining, but as well as looking dramatic, it provides a stable acoustical and mechanical environment for the capsule and associated electronics. Those slots milled into the side are apparently there to minimise the case's effect on the magnetic field of the capsule. The shape reminds me of the TransAmerica building in San Francisco; Siwei has connections with that city, so it may not be entirely coincidental! Large mesh panels front and back protect the capsule, and the main part of the tapered body is finished in a matte, non-slip coating with a rubber-like texture, which is either Nextel or something very similar. Rupert Neve's signature adorns

the mic body and the only control is a low-cut switch. A thread around the output connector XLR mates with a ring at the bottom of the included shockmount, and the mic itself is packed inside a lined hardwood box. The boxed mic and shockmount come in an aluminium camera case, with a registration card that gives registered owners an extended warranty of two years.

The ribbon itself, which is visible through the grille, is just 2.5 microns thick and has a tension adjuster that can be set at the factory. In theory, anyone with detailed knowledge of ribbon mics could make their own adjustments to, in effect, tune the response of the ribbon, but this isn't something the typical user is recommended to try — and I'm pretty sure it would void the warranty! Siwei Zou believes that in normal use the RNR1's ribbon capsule should be as robust as a capacitor capsule, but up to three replacement ribbons will be fitted free of charge if problems arise.

This ribbon capsule has a symmetrical figure-of-eight polar pattern and, like any pressure-gradient microphone, will exhibit proximity effect if used very close to a source. Rupert's electronics give the microphone a self-noise or EIN figure of 15dBA, which allows the 16kHz dip to be equalised flat with no significant noise penalty if that is really what is required, although in most applications the mic seems to work best with little or no EQ. Although this noise figure may not seem outstanding when you compare

record a grand piano in Studio One. The mics were placed quite close to the open lid — and for classical work I'd have preferred a more distant position — but as the mic positions were as close as possible to identical, the comparison was fair. The U87s were set for cardioid mode, as the engineer said that's how he'd normally use them. I was concerned that this might skew the results slightly because the RNR1's figure-of-eight pattern would inevitably pick up more of the room sound, but the degree of difference in sound in the control room was a surprise. The U87s sounded quite brash, which kept making me want to turn the monitors down. By contrast, the RNR1 delivered a wonderfully warm and musically involving sound, in which the transient detail was adequately well-defined but still felt very smooth. The other invited guests included a number of producers and engineers — all of whom came to the same conclusion as I did.

Our next test involved miking a drum kit using a single mic a few feet in front of the kit. This time we bunched together half a dozen alternative mics, including an AEA R44 ribbon mic (which costs a little more than the RNR1), a less costly Royer, an AKG C414, an SE4400A and an SE Gemini. The ribbon mics delivered the best sense of a real drum kit being played in a real room, with the RNR1 and the AEA R44 having the best balance of punch and detail. The Royer sounded a bit lightweight in this role by comparison, although this actually worked in its favour

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► when used as a drum overhead, which we tried directly afterwards. Of the RNR1 and the AEA R44, it was generally felt that the RNR1 scored at the high end, where it picked up the cymbal detail nicely, but in the lower and mid ranges, the sound of the two mics was very close indeed.

Courtney Pine dropped in to give our bunch of mics a run through on the sax, and the same two mics came out on top — although it's worth stressing that every mic produced a good, usable sound. This time the outcome was more subjective and came down to interpretation and personal taste, but Courtney picked out the RNR1 as the mic that gave him what he felt was the most realistic balance of warmth and 'breath sound', but without a harsh edge. The AEA R44 also sounded great, with a very smooth, vintage vibe that I liked, but in an A/B test you could tell the RNR1 was capturing more of the high end.

A test on electric guitar showed the RNR1 to be a capable performer, but a hugely extended HF response is not necessarily an advantage in this application,

because guitar cabinets roll off quite steeply above 4 or 5kHz, so I later decided to repeat this test in my own studio, and also to try the RNR1 on acoustic guitar.

For my own electric guitar test, I set up the original SE R1 passive ribbon towards one edge of my amp's speaker cone and the RNR1 the same distance from the opposite edge. To keep things on an equal footing, I plugged both into the non-esoteric mic inputs of my audio interface, but checked again later using my rather better Universal Audio Solo 110. I've always managed to get a good sound from the R1, but the RNR1 was noticeably less woolly at the low end, and it picked out more detail in the attack of the notes. In fact the RNR1 came very close to how I perceived the sound of the amp in the room, whereas the original SE Ribbon gives a warmed-up, smoothed-over interpretation of it — which usually means experimenting with the mic position and the amp EQ to get exactly the right sound. Of course, this is a very subjective test, because there are hundreds of ways of getting a great electric guitar sound, and having an accurate microphone is by no means a necessity.

On acoustic guitar, the RNR1 again got very close to capturing what I was hearing directly from the instrument, although quite a lot of gain was needed (its sensitivity is quoted as -32dB) so I stuck with the Solo 110 for this test. I found that if more 'zing' were needed, the sound responded well to EQ in the 8-12kHz region. In fact, considering that a ribbon mic would never have been my instinctive first choice for acoustic guitar recording, the results were most impressive: you wouldn't choose the RNR1 to create a bright, Eagles-type acoustic guitar sound, but for a solo piece, or something played on a nylon-string classical, it could be exactly the right thing to use.

My final tests were conducted on vocals and on a Native American wooden flute. The vocal test again sounded very much like the voice heard in the room: smooth with adequate detail but not

hyped or over-bright, as many capacitor mics tend to be. It would be perfect for smooth jazz vocals or for female vocalists who need help smoothing over the sound, but maybe less well-suited to more in-your-face rock and pop. The flute sounded exactly right with no added EQ, capturing plenty of breath but no spitty harshness.

### Tying Up The Ribbon

Of the ribbon mics we tried at AIR, the RNR1 seemed to me to come out top — or at least very close to the top — in the majority of applications, although it must be said that the AEA R44 also sounded excellent, with its warm lower registers and smooth, silky high end. The fact that most of the other people attending the tests felt the same way suggests that we may finally be ending our love affair with bright, aggressive sounds, and realising that music is more enjoyable to listen to for longer periods if the top end is smooth and natural rather than fatiguing and aggressive. That's not to say that a ribbon mic will be suitable for all applications, but if we continue to see ribbon mics of this calibre being developed, I wouldn't be at all surprised to see them taking over more roles where we'd otherwise instinctively reach for a capacitor model.

The less good news for the majority of us is that the RNR1 costs around the same as a top-of-the-range studio computer, so it needs to be a carefully considered purchase — and to get the best out of it you'll need a good mic preamp too. In reality, that means that it will appeal mainly to professional studio users and those project studios that are run by people who make money from their craft. Nevertheless, it does help spotlight the benefits of ribbon mics in general, and there are lower-cost models that you can cut your teeth on before moving up to something like the RNR1.

While it's always more difficult for a company to start lower in the market and then work up than it is to start at the top and work down, Rupert Neve's name and credentials will no doubt focus attention on this microphone — and once you've tried it, you'll realise that his name is far more than a marketing tool. His input has helped create a great microphone that could well go on to become a classic. **EOS**



Along with the mic, you get a sturdy camera case, within which there's a shockmount and a hardwood box for the RNR1.

### information

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