

## **Variable-D and Beyond: Classic EV Microphone Design & Evolution**

Lou Burroughs would demonstrate the 664's ruggedness by smacking it on a two-by-four...

June 25, 2010, by Rick Chinn

The Electro-Voice (EV) model 664 microphone, introduced in the mid-1950s, was designed for typical sound reinforcement applications of that era.

EV employees with the company at the time recall that one of the reasons for the 664's development was to answer the considerable success of the Shure model 55 (Unidyne). Yet the 664 was hardly an imitation. It's the first microphone to employ the company's renowned Variable-D design principle, which is still at the heart of some EV mics popular to this day.

Patented by Alpha (Alphie) M. Wiggins in 1963, Variable-D mics use frequency selective rear ports to achieve a cardioid pattern. This results in considerably less proximity effect in comparison to single-D designs.

Whether this is a positive or a negative is in the ears of each beholder, but suffice to say that Variable-D has earned its place in the "microphone hall of fame." (Well, if one actually existed.)

The 664 also earned the nickname "Buchanan Hammer," a moniker paying homage to the company's then headquarters in Buchanan, Michigan as well as some serious durability.

Word has it that EV co-founder and mic guru Lou Burroughs would demonstrate the 664's ruggedness by smacking it on a two-by-four board. A later (unconfirmed) demo reportedly had Lou using the mic to actually drive a nail into the board.

The model 635A later assumed the “hammer” nickname, but it pales in comparison: think tack hammer versus framing hammer. However, the 635A did carry on the tradition of being able to withstand brutal punishment. (*Editor’s Note: while working at EV, I indeed drove large nails into boards with the head of a 635A, and it still performed just fine - in addition to providing a chuckle.*)

A short time after the 664 debut, EV introduced the models 665 and 666 for broadcast. The 665 looks and feels like a 664, but its finish is non-reflecting gray rather than chrome.



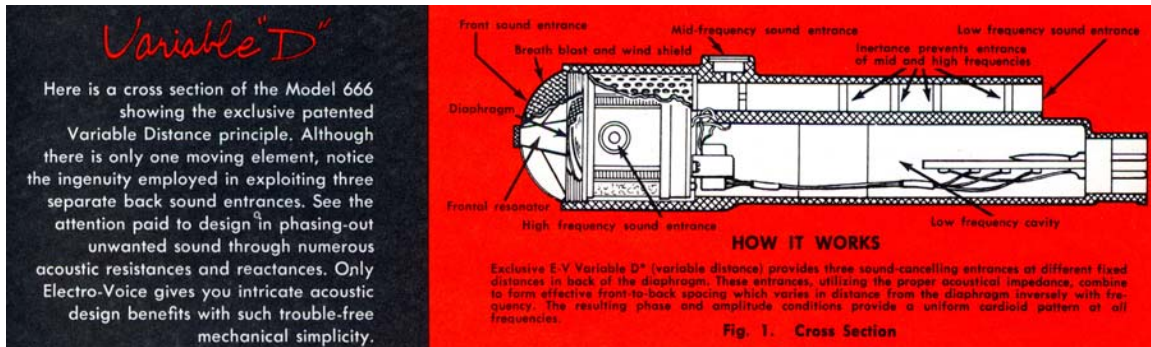
Left to right: EV microphone models 664, 666, RE15 and RE20 - an interesting evolution. Photo by Rick Chinn.

And while the 664 was capable of high- and low-impedance operation, the 665 and 666 were low-impedance only.

The 665’s connector is an XLR instead of the dreaded 91-series Amphenol four-pin used on the 664. Meanwhile, the 666 was the premium broadcast model, outfitted with a Cannon UA series connector (which looks vaguely like an XLR, but is larger and “D shaped”).

Where the 664 and 665 could attach directly to a mic stand, the 666 required a specialized clip.

Although the 666 was discontinued by the late 1960s, it still commands a premium price on eBay, and many live sound engineers still prefer it for kick drum and bass.



Straight from the source: How EV explained Variable-D in its marketing materials

It's also an excellent horn microphone, and I happen to like the 666 (and its newer incarnations) for electric guitar amps.

The subsequent model 667 combined the 666 design with a transistorized preamplifier. This preamp could supply extra gain if needed, and offered equalization switches for the low and high ends of the spectrum.

A separate on/off switch could be used to add in a presence peak, if desired. The preamp used a mercury battery; it predates phantom powering by many years.

Later, the preamp was abandoned on the models 667A and 668, replaced with internal equalization settings that allowed frequency response to be tailored with use of several pins that "programmed" the equalizer.

The 667A and 668 were primarily intended as boom mics - and -they were the first mics to make use of the Continuously Variable-D principle, with that patent credited to Harold S. Mawby.

The model RE15 came along to replace the 666, but those who knew still preferred the 666, establishing its beginnings as a cult object of present day.

A popular myth goes that the 666 was discontinued because of the satanic implications of the model number, but the people who were there at the time say this just isn't so. Competition, not the devil, was the end of this microphone.

The RE15 also offered a Continuously Variable-D design, meaning that it had even less proximity effect than the 666, and its polar patterns were very consistent with frequency.



The 667 mic and its companion preamplifier/equalizer. Note the “curve-plotting” capability on the preamp - very cool. Photo by Rick Chinn.

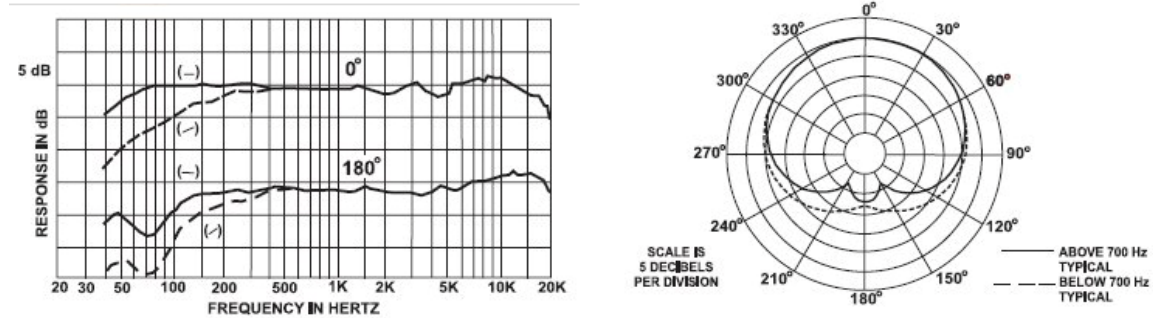
Although the RE15 never attained the cult status of its older brother, it was a favorite with broadcasters because of its smaller size.

Laugh if you want, but The Lawrence Welk Show used a bunch of RE15s to replay its 666s. The more uniform polars contributed to less acoustic phase interference in the finished mix, and the resulting cleaner sound was not lost on the ABC television network’s technical crew or on Welk’s people.

The final chapter in our story is the model RE20 - ever have heard of it? The late Tom Lininger was the principal designer, and it was originally conceived as a “condenser

killer.” It was quickly adopted for a variety of tasks in the studio, mostly relating to things that were either loud or low.

Broadcasters also found it to be a very good announce mic, and it’s still popular in that application today, as is the RE27N/D, which incorporates a neodymium element.



Frequency response and polar response of the RE20

Oh - and let’s not forget that the RE20 (sometimes also branded as the PL20) is still one of the most popular kick drum mics in sound reinforcement some 35-plus years after its introduction.

Take a look at the RE20 response curve, and you can see that it indeed offers the high end of a good condenser.

While history says that it didn’t really “kill” the condenser genre, the RE20 has nonetheless more than earned its place in the “mic lockers” of many. (There’s an interesting marketing lesson to be found here.)

*Rick Chinn is a long-time audio professional and history buff. He heads up Uneeda Audio. Find out more about Rick and the company at [www.uneeda-audio.com](http://www.uneeda-audio.com).*

## References

Telex Communications and Electro-Voice

Allied Radio Catalogs: 1954, 1955, 1956, 1957

US Patents: 3,115,207, 3,378,649

*And “Those Who Were There” - the author’s heartfelt thanks to all of the following EV folks for helping with 50-plus-year-old memories:*

Jim Long, senior sales support engineer (current)

Bill Raventos, product manager, professional products

George Riley, marketing manager

Don Kirkendall, manager of advertising and promotion

Frank Spain, national service manager

Lloyd Loring, sales promotion manager

Link to original article on ProSoundWeb:

[http://www.prosoundweb.com/article/print/variable\\_d\\_and\\_beyond\\_classic\\_ev\\_microphone\\_design\\_evolution](http://www.prosoundweb.com/article/print/variable_d_and_beyond_classic_ev_microphone_design_evolution)