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Curio's - Story of the AKG C414

C12

We must start this journey by looking at AKG's legendary C12. A microphone of quite simple design, early examples were based around the 12AY7 high-mu double triode, together with the large V2148 output matching transformer. This combination along with the excellent CK12 "Brass" capsule, enabled this design to work so well.

Note - For more in depth and detailed information on the design and construction of the AKG CK12 "Brass" capsule, please see the "AKG's CK12 Capsule" page.

Later versions of the C12 were to use the smaller T14/1 output matching transformer. As that also used in the AKG designed Elam 250 and 251 series microphones. The "Cross sectional area" of laminations used in the T14/1, is considerably smaller than that of those in the V2148 transformer. Therefore, despite the small value coupling capacitor, just 0.5uF in the C12, the T14/1 would offer less magnetic/flux "Headroom" than the V2148, being somewhat prone to saturation at LF. This could make the microphone sound slightly "Compressed" at the bottom end, when used on very loud signal sources.

It is worth noting, due to the lack of available space and physical size, the C24 and C28 both use the T14/1 transformer(s), together with a coupling capacitor of 1uF and 3.2uF respectively, to a 12AY7 (6072) valve. Therefore, due to the larger value coupling capacitors, these microphones are even more prone to LF saturation than the C12. Of course, this is all part of a microphone's "Sound Signature", useful or not, it is down to personal preference.

Note - The C28c, with the 7586 "Nuvistor", uses a different transformer to the T14/1, therefore the associated problems of the T14/1 transformer are not applicable the this model.

C12A

Like most things in this world, change is inevitable, and so it was that the C12 was superceded by the C12A. Rather then using the 12AY7 (6072A) valve, as in the C12, the C12A utilized a miniature "Nuvistor" type valve. The "Selected" low noise Nuvistor, type 7586, plugging into a socket on the PCB. This, together with smaller/modern components mounted on a PCB assembly, enabled the body of the C12A to be very much smaller then it's predecessor. The C12A was our first introduction to the famous rectangular box shape that we have come to recognize as a kind of "trademark" from AKG.

The AKG C12a also appears under the name of Philips, as the LBB 9061/00, and Norelco C12a. "Norelco", being the North American Electric Company, who where distributors for the AKG C12a in America.

C12B

The C12A worked very well, but for some applications i.e. when working with very high SPL's, the microphone could be prone to overload/distortion. This problem was overcome, with the introduction of the C12B. Whereby the addition of a "Pad" switch, between the capsule and the valve (Nuvistor), could attenuate the signal by -20dB. Thus allowing the recording of far louder sound sources, without encountering any of the overload problems associated with the C12A. Other than the pad components i.e. a switch and a capacitor, the internal PCB / electronics / capsule of the C12B, are the same as that in the C12A. The body of the C12B is slightly larger than the C12A, being the same shape and size as the C412, which superceded the C12B. The "Grill" assembly used on the C12B, was of a molded plastic type of material, unlike the "Substantial" metal assembly used on the C12A. Therefore, unlike the C12A, the wire mesh forming the grill/screen of the C12B, had to be "Hard wired" to the earth point of the microphone electronics to avoid any hum/RF pick-up problems. This same grill assembly would go on to be used on the C412 and C414E/C microphones and was always a "Weak" part of the design. Either being easily damaged or causing hum/RF pick-up problems.

C412

When AKG introduced their modern semiconductor (FET) designs, the prefix of the figure 4 was utilised. The first microphone to carry the new number scheme, being the C412 i.e. a semiconductor version of the C12B. Still using the same CK12 capsule as that in the C12, C12A and C12B. The C412, had 2 on board switches. One for polar pattern selection, the other for attenuation. There seems to be various "Attenuator/Pad" levels e.g -10dB & -20dB, throughout the history of units produced. However ..... as the attenuator was purely a potential divider in the output stage of the microphone, there still were minor problems with distortion, as the FET amplifier could be still easily be over-driven by high SPL's. The C412 had only 3 switchable polar patterns i.e. Omni, cardioid and fig'8. Whereas, the C12, C12A and C12B had 9 possible polar pattern settings. This was OK for some users, but many found this a move backwards. The BBC, one of AKG's respected/influential customers, found that the C412 was unable to fill the place of the C12, C12A and C12B, as 3 polar patterns were insufficient for many applications. After much back and forth conversation's between the BBC and AKG, together with other pro-audio users, an up-dated version of the C412 was introduced. Basically the same as the C412, with an improved attenuator i.e pre-FET amplifier stage, and more importantly, the addition of a Hyper-cardioid polar pattern. As this new microphone had 4 polar patterns, the last digit of the older C412, was changed to a 4 i.e C414. Thus the start of the C414 series of microphones.

C414

The C414 was available in 2 versions. Either, the C414E, with cannon type connector or, the C414C with a connector to the "Din standard". Identical in appearance to the C412, the C414 continued to use the AKG "Custom" stand mount. Indeed, the C414 and the C412, could both be plugged into the C12A and C12B stand mounts. Fortunately the wiring arrangement is such, that no damage can take place to either the microphones or the power supplies, should the wrong microphone be inadvertently plugged into the wrong stand mount. The C414 proved be a strong competitor to the Neumann U77 and U87. The U77, being

Neumann's first semiconductor (FET) version of the U67.

Note - The U77 was one of Neumann's earliest microphones with a "Transformer-less" output stage. Mainly due to the 12volt "T" powering technique used at that time, and therefore the circuit design required by that system of powering.

C414EB

The next version of the C414, was the C414EB. Much the same as the C414, with the addition of a 3 position Attenuator switch (0,-10,-20dB) and 3 position Bass roll-off switch (Flat, 75, 150Hz). One of the major, long term, improvements, was that of the connector type. Since the introduction of the C12A, including the C12B, C412 and C414, a stand mount/connector combination had been used for mounting, and electrical connection, of the microphone. This would prove to be very unreliable throughout it's life, so the introduction of a built-in cannon type connector on the C414EB, was of great benefit to all users.

Capsule Changes

During the production years of the C414EB, manufacture of the "original" CK12 capsule ceased and a modern nylon version (2072-Z-0005) was introduced. This replacement would never live up to the standard of the "Famous" CK12, that had previously made AKG large capsule microphones so wonderful. The tonal qualities of the nylon CK12, are just so different from it's predecessor.

C414E1

A remote control version of the C414EB was produced. Known as the C414E1. This would be very useful in "Fixed Rig" situations, as the polar patterns were remotely adjustable via the S42E1 remote control box. The S42E1, offered 9 polar patterns and facilities for 2 microphones. The C414E1 looked identical to the C414EB, without the polar pattern switch. The housing used, was that of the C414EB. Hence it still had C414EB stamped on it, with the addition of the word Remote, where the polar pattern switch would have been. The capsule and pre-amplifier, were the same as that used in the C414EB. However, the polarising voltages, for both sides/faces of the capsule, were derived from a DC/DC converter in the phantom powered S42E1 box.

C414EB-P48

The "Digital Age" was now upon us, and the need for quieter microphones was very apparent. Enter the C414EB-P48. Until this time, the previous C412 & C414 series of microphones, could be powered from any "Phantom" power supply, offering +12 to +52 volts. However, the C414EB-P48, was designed to work purely on +48v phantom supplies. The polarising voltage for the capsule, is taken from the +48v supply via very high value resistors and high voltage tantalum reservoir capacitors., rather then the previous way of using a DC/DC converter. The tantalum capacitors were to be a fault liability in the "long term".

C414B-ULS

A new model, the C414B-ULS, was the next microphone to emerge. The suffix ULS, denoting that the microphone had a "completely linear transfer characteristic of all transmission parameters". Looking just like a black/matt version of a C414EB, the C414B-ULS offered better performance figures and reliability, then the C414EB-P48. The electronics took on a highly complex design. Utilising no less then 17 transistors, as opposed to the previous 4 transistors in earlier designs. Whether or not this maze of components could improve the sound quality, would be food for thought. However, we did see the return of the DC/DC converter for polarising the capsule.

C414B-TL

Getting the iron out of the audio signal i.e. no coupling transformers, was all the rage at this time. The C414B-TL (Transformer Less) version of the C414B-ULS was introduced. Offering less distortion at high SPL's then the C414B-ULS. Sounding somewhat dryer and more clinical then it's predecessor.

C414B-TLII

AKG were to re-create/emulate the sound of the original CK12 capsule, in a new nylon version (2072-Z-0009), similar to the (2072-Z-0005) already in production. This new capsule was to be used in the "Gold Grill" version of the C414B-TL, to be known as the C414B-TLII. The electronics being identical, in both the TL and TLII microphones i.e. Just a different capsule and cosmetic changes. The only audible difference, between the TL and TLII, being a "Presence" boost.

This new capsule would also be featured in the AKG C12VR (Vintage Revival), valve microphone. For those who can remember the AKG "The Tube" (Brown), using the original 2072-Z-0005 nylon type capsule ..... well the C12VR (Green) is exactly the same microphone, with the new 2072-Z-0009 capsule and an additional 3G ohm resistor. The latter wired in parallel with the capsule, front to rear diaphragm, coupling capacitor.

Note - The AKG "The Tube" should not to be confused with the AKG "Solid Tube" valve microphone, which is totally different !

C414B-XLS

So, it is farewell to the old square edged C12A shape we have known for so long (nearly 50 years), along with the associated reliability these older models gained over the years. It is also the demise of the output coupling/matching transformer, that added/subtracted something from the sound obtained. Apparently, it is all about progress .....

Along came the "New Look", rounded edged, C414B-XLS, which will hopefully earn the same positive virtues of earlier designs. Many new features are found on this electronically balanced, "Transformer-less", output design. The capsule being mounted on a internal elastic suspension system, rather then the previous fixed block method. The frame of the microphone, especially where the cage joins the main body, looking somewhat sturdier than that of it's predecessors. All PCB's being held together via their interconnecting plug/socket system. Logic circuitry is used for switching of all parameters. With LED display of chosen settings and overload. All switch settings are "Lockable" to avoid accidental changes, or tampering, of the selected settings. A useful addition, is the provision of a 5th polar pattern i.e. Soft Cardioid. Therefore, I wonder why the microphone was not called the C415B, following the tradition of the last digit being the amount of fixed polar patterns available. Who knows ?

C414B-XLII

The C414B-XLII is cosmetically and electrically identical to the C414B-XLS, other than the "Gold Grill" and gold print on the microphone together with a different capsule. The capsule used in the C414B-XLII offers the same advantages as that of the capsule used in the C414B-TLII. A "Usefull" audible difference, between the XLS and XLII, being a slight "Presence" boost above 3KHz on the later model.

C414-XLS and XLII

The latest range of C414 microphones are, cosmetically and electrically, much like the C414B-XLS and XLII above. They both offer no less than nine (9) switchable polar patterns i.e. the addition of the four intermediate patterns between the five found on the previous C414B models, together with a few other improvements over their predecessors.

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