

Vintage Radio restorers should replace capacitors

I am very concerned at the following statement in the Vintage Radio article in the January 2004 issue: "most of the capacitors in this design can be quite leaky without causing any harm". In fact, there are many places in a radio circuit where a leaking capacitor will cause problems, ranging from distortion to the destruction of other components and, in some cases, fire.

It was indeed unfortunate that non-leaking capacitors were not available

Mailbag: continued

to the radio trade until the advent of the Philips Polyester capacitors in the late 1950s. Up until this time, paper capacitors were commonly used and these were notorious for becoming leaky. In other words, they became the equivalent of a capacitor with a resistor across it.

Every old paper capacitor left in radio is a potential problem with perhaps the exception of the RF and IF cathode bypass ones. It makes good sense to replace all these old capacitors as a matter of course. The point is that this leakage increases with time. A radio may work in a fashion now but trouble can be expected in future. The modern replacements appear to be everlasting and therefore well worth the trouble.

The article states it is essential to replace the audio coupling capacitor. This is certainly an important one but why only in a set without AGC? Surely a leaking capacitor in this position is going to play havoc regardless. AGC has nothing to do with it (was this a typo?).

I believe a well-restored radio will be around for many years to come so we owe it to posterity to make as good a job as possible of the restoration. The following is a list of some of the points in a typical radio circuit where a leaky capacitor could cause trouble:

(1). The screen bypass. Leakage here lowers the screen voltage and overloads the screen-dropping resistor which may go up in value or even burn out.

(2). As above with the B+ supply to the heterodyne oscillator.

(3). Most sets have a RF bypass from the B+ line to earth, usually 0.1 μ F or more. This item is prone to failure after restoration. A dead short here could (and has) caused the power transformer to catch on fire.

(4). Leakage in AGC bypass capacitors will cause overload distortion on local stations.

(5). Some sets use an audio driver such as a 6B6G with a 10M Ω grid leak resistor to develop a small amount of grid bias. The coupling capacitor here isolates the grid for DC thereby keeping the valve working in the straight por-

tion of its characteristic curve (class A). Leakage in the capacitor will cause distortion.

(6). As mentioned, no leakage can be tolerated in the audio coupling capacitor between the driver stage plate and grid of the output valve.

A typical radio circuit will therefore have very few paper capacitors that could safely be left in the set. Most restorers simply replace them all as a matter of course. Replacing the electrolytic capacitors as a matter of course is also good insurance. I do leave the mica capacitors in place as they rarely give trouble. All resistors should also be checked and those out of tolerance replaced.

Ted Baker, VK2ABW, via email.

Rodney Champness replies: I agree with Ted Baker's statement in the last sentence of his first paragraph and I agree with all of the second paragraph. However, I feel he has gone overboard in his almost blanket condemnation of paper capacitors, as many are still usable with acceptable leakage resistance.

While replacing every paper capacitor may be an easy approach, the question could then be asked "How many 1930s sets had polyester capacitors?" We are taking away the authenticity of our restoration projects and no one will know what a paper capacitor looks like! I think this is important too, don't you?

I know one restorer who takes the old capacitors out of a set, removes the insides and then inserts polyester capacitors. If a restorer has the time and patience to do this, the set will look original. A set converted this way would then need to have a placard in it pointing out that "The capacitors in this set ARE POLYESTER therefore do not replace unless definitely proven faulty!"

In a set without AGC the most important capacitor to have little or no leakage is the audio coupler. I did not say that I didn't replace it in a set with AGC, as I was only talking about a set with no AGC. Previous articles show that I replace the audio coupler AND the AGC bypass capacitors as a matter

of course. An audio coupler should, in my opinion, have no less than 50M Ω leakage resistance, and higher resistance in some circuits. A paper capacitor would automatically be replaced as it is unlikely to meet this requirement, when tested as I suggested on page 88 of the article.

I agree with the six points Ted Baker makes on possible consequences of faulty capacitors. Now let's look at how bad paper capacitors really are. In the critical spots that I consistently mention in my articles, no leakage below the 50M Ω mark can be tolerated. Nor would I consider using a capacitor with below 5M Ω leakage in other locations in a set, with rare exceptions.

The RF bypass on the HT line needs care in assessing its suitability to remain in the set. I would measure it as I have indicated in the article. However, if the test indicates the capacitor is OK, I would then put it back into the set, turn the set on and keep an eye on it. I would then touch the capacitor after a short time (after switching off) to see if there is any build-up of heat in it. If there is, the capacitor is removed as it will short out or explode after a little while.

Screen bypass capacitors can't be checked in the same way. In this case, measure the voltage across them and if it drops more than a few volts, the capacitor is suspect and should be given the heave-ho.

After a restoration job, any set should be left running under supervision for quite a few hours to make sure ANY component (capacitor, resistor, transformer, valve, etc) that breaks down is caught before significant damage is done.

Paper capacitors ARE the most troublesome components in vintage radios but some brands are better than others. In my experience, the worst were the 1940s and 1950s Ducons and UCCs. Many of the old Chanex capacitors and some of the AWA "moulded mud" capacitors are OK, despite their age. I do however, suggest checking all of them.

Old scopes were built to last

I recently bought two Tektronix 475 analog 200MHz oscilloscopes from Oatley Electronics for the princely