KT34A M2 Upgrade 15 meters Issue

I upgraded my old triband (~1984) KLM KT34A that worked great, with the available M2 kit, to the (upgrade version of the) KT34M2. The 15 m performance (pretty much a dipole pattern with F/B a few dB at best using my modest test range) and SWR (> 2 on low end of band) were not up to expectations. Tests of DC continuity of all the joints were done, all seemed fine. (Poor contacts in these joints are a well known cause of KT34 problems, especially for the older hardware – see reflector archives.) Email exchanges with M2 first recommended replacement of all 8 of the 15m capacitor tubes (16") - the thinking of Mike Staal at M2 (designer of the antenna) being that the Q of the traps was degraded. This purchase and replacement of new tubes (from M2) made no difference in performance (in the replacement process all joints were checked for tightness and all dimensions verified yet again).

I asked M2 if there were any simple (no high end test eqpt) diagnostics that might be helpful and was told that measurement of the element resonant behavior could be definitive. The high Q of the 15 m traps produces relatively sharp resonances. M2 provided a copy of a 1980 test notebook page giving resonant frequencies for the individual elements (for the KT34XA, which is, I believe, the same as the KT34A except for an additional director element). Here is the M2 (really KLM) table of resonant frequencies (MHz):

| Band | 20 | 15 | 10 |
|---|---|---|---|
| Reflector | 13.8 | 20.9 | 27.8 |
| Rear Driven | 14.03 | 20.925 | 28.75 |
| Front Driven | 15.075 | 21.86 | 29.4 |
| 1st Director | 14.4 | 21.9 | 29.35 |
| 2nd Director | 14.6 | 21.65 | 29.15-29.20 |

These values were measured with the individual elements removed from the antenna and fed with a 1:1 balun, in the clear (at 28 ft).

I carried these painful measurements with my antenna elements and at 15 m (did the other bands too) and found these resonant frequencies (min VSWR ~ 1.3 with RG-8, 50 ohm feedline):

| | |
|---|---|
| Reflector | 21.05 |
| Rear Driven | 20.9 |
| Front Driven | 22.1 |
| Director | 22.0 |

The most notable result is for the reflector which is high and in band. Mike indicates that the high reflector resonance value would be expected to kill the F/B.

So now what? The resonances are all fairly narrow indicating that the high Q traps are working so it looks as if the sole issue is resonance location. However, tinkering with

this antenna is not for the faint-hearted since it has a novel, even unique, design with low loss traps, dual driven elements and linear loading.

My pleas for further recommendations from M2 for the final fix are no longer answered. Getting the info I did required playing the role of the informed pest (and buying some parts) but the undertone of some responses indicated that a lot of the performance complaints to M2 are rooted in customer's inability to follow directions (which is likely true). Not too surprising that they are not too interested in fudging the dimensions to make up for what appears to be some assembly problems. However, IMHO the assembled dimensions are not the problem. The problem is not known.

For entertainment, and with low expectations, I put together a model of the KT34A using MMANA, recognizing that, for free, you cannot get high quality results. I can supply the input file if anyone is interested. M2 indicates that more sophisticated models are need to handle the novel loading. Using capacitive loads in the model for the two traps, I experimented with values of capacitance that would produce resonances that were either my observed ones or M2 measured ones for the individual elements. Somewhat surprisingly, the required Cs are not terribly different from what you get by calculation for a co-cylinder cap of the actual dimensions. Note that the inductances for the traps are determined by the dimensions of the loops in the elements and these are probably modeled okay. The model has all the segments of the actual antenna, aside from capacitors.

The model of the assembled elements produces patterns on 10 and 20 pretty much like you might expect for a yagi – in spite of the fact that on 20 m where there was no resonance data fitting done. On 15 m the pattern is very sensitive to frequency and gives a F/B that actually goes negative (in dB) at frequencies below the resonance of the reflector (21.05 MHz) agreeing with expectations. If I use the M2 resonances, the F/B is still not impressive, less than 5 dB. In both the 15 m cases, the current flowing on the DIRECTOR is very low in the model, in contrast with the other bands. All this may not be very meaningful.

So finally I get to the point - are there any folks out there who have experienced similar problems with the KT34 on 15 meters and was there any resolution?

(BTW, it is reported that KLM during some of its history sent out capacitor tubes with a wall thickness, and inner diameter, that was not quite right – thus giving the wrong capacitance and bad 15 m performance. This is not the case for my problem.)

Has anyone modeled this antenna?

I believe it is possible to tune the resonances for the elements by adjustment of the shorting bars that determine the length of the 15 m and 10 m inductance loops but I was hoping for some experience for guidance before venturing into unknown territory.

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