Rewinding Toko 10k Series Coils

Dave Powis, G4HUP

One of the easiest coil formers to obtain these days are the Toko 10K series – in the UK they are obtainable from Sycom and BEC, and in the US from Digikey. These companies stock different items from the range, and if you just require an inductor, you may well find one suitable from stock.

However, Toko no longer produce the range of RF transformers that they used to, so if you need a secondary winding, or a tapped primary for your project, the following may be of interest!

Tools for the job

Like any job, this is easier if you have the right tools – some are essential, others useful. Fig 1 shows the tool set I use for this task – a headband magnifier (age-related assistance!), an engineers vice (handy for many tasks on the construction bench), small scalpel, 5mm drill bit, miniature long nose pliers, precision cutters and small tweezers.

Fig 1 – Tools needed for this task!

10K Construction

The 10K coil has 3 main parts – the screening can, the ferrite cup and the bobbin, which is integral with the base – see Fig 2, which shows the parts after separation.

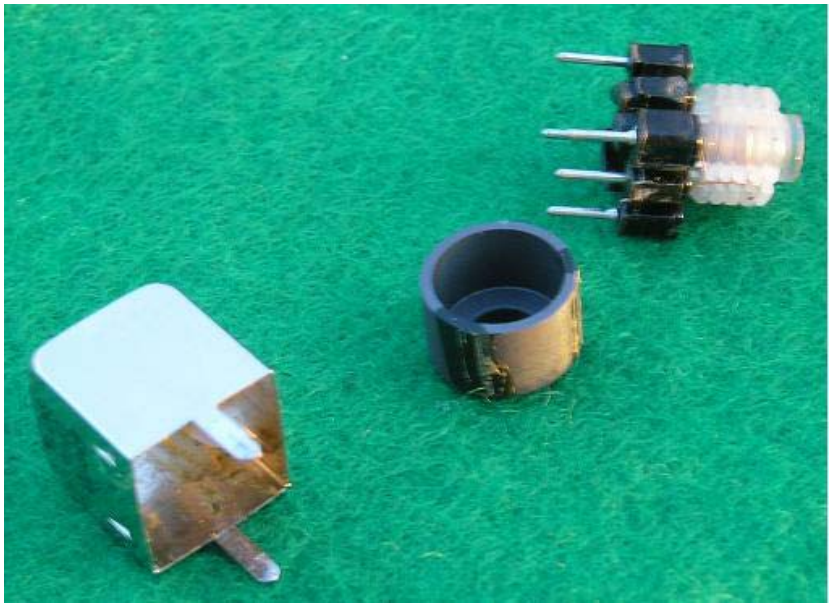

Fig 2 – the 10K Components – can, cup and bobbin

*Getting the **! thing Apart*

Probably the most difficult part of the task is getting into the can! Although there are four small indentations which clip the can to the base, the main problem to be overcome is the glue! You can see in Fig 2 the remains of the glue down two sides of the cup.

Carefully insert the small scalpel down the inside of each side of the can in turn and lever it backwards and forwards to break any glue contact – you may need to go round the can several times. Take care, because you need to hold the can while you are doing this, and a scalpel blade is very sharp! I have not found any suitable alternative blade for this – but if you know of one, please let me know!

Once the glue has been broken, lay the can flat on the edge of the bench and using the shank end of the drill bit, push on the top of the bobbin, through the adjustment hole. I find it helps to gently turn the bit as I push. The bobbin and cup will not fly out of the can – it is a process of push and twist, turn the can through 180º and repeat – several times. Gradually the bobbin and cup will slide out of the can – it may take a few minutes to achieve this – and longer the first few times you try. Not all examples are the same – some come out relatively easily – others are more obstinate.

Now you can easily take the cup off the bobbin. As you can see from Fig 3, the bobbin has 4 slots to hold the turns of the coils – for many needs there will be no requirement to alter this.

Reading the Pins

There are 5 pins on the base of the 10K bobbin – numbered 1 to 6, as pin 5 is not present. Fig 4 shows a view of the base with the pins numbered.

The existing winding will be between pins 1 and 3. If all you need to do is add a secondary, then this should be between pins 4 and 6 to conform with normal practice on these bobbins. Pin 1 and Pin 4 are the 'start' pins for the windings, so note which direction the turns go round the bobbin in, and wind your extra winding in the same direction.

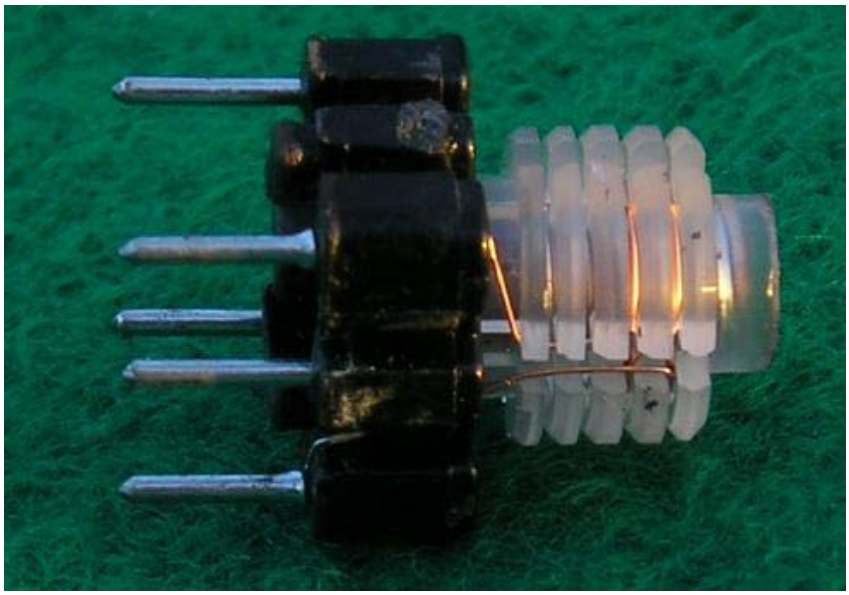

Fig 3 – The Bobbin – the slots are clearly visible here

Rewinding – or Adding Turns

If you are winding a completely new coil, then remove the existing winding – I find this is easiest by snipping through the wires near the pins – I can then remove the windings as one operation and clean up the tails off the pins as a second job.

For all new work on the coil, the best wire size is 40swg – or 0.125mm/0.0048in – the same size as the original windings. In the UK this size wire is available from Maplin – their smallest size. The closest US wire size is 37AWG at 0.0045in dia. Most varieties availble are self-fluxing and the fumes are not likely to cause or aggravate any respiration problems – but it still make sgood sense to try and avoid inhaling fumes, just as with any soldering process.

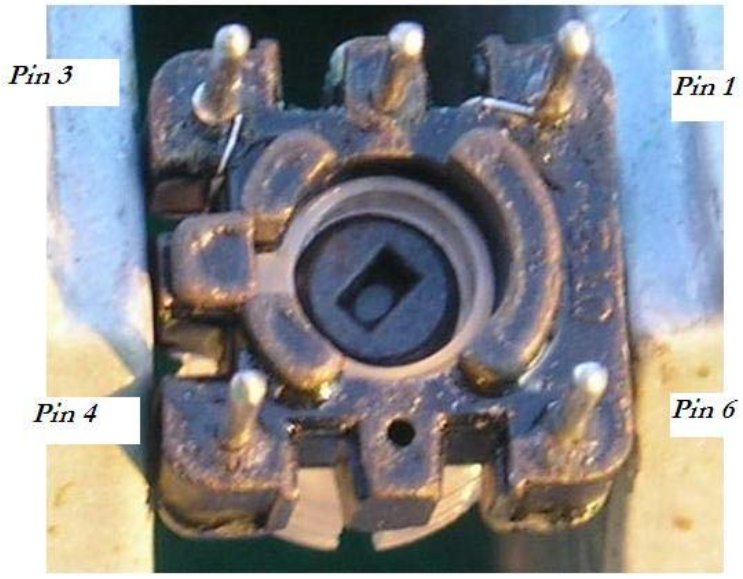

Fig 4 – Coil base with pin numbering

The following information is based on winding a complete new coil, tapped primary and secondary – so sift out the information that is relevant to job you have in hand!

Wind the secondary first – tin a short length at the wire end and make one turn around pin 4 – quickly solder it in place. Lay the wire down the side of the base, and run it up to the lowest slot on the bobbin – wind your required number of turns around the bobbin, then bring the wire back down to pin 6 – tin a suitable length, and secure to the pin.

Now terminate the end of the wire on pin 1 to deal with the primary. As before, take the wire up the channel and now go to the second slot up the bobbin. Winding **in the same direction** as you did for the secondary, wind the necessary number of turns for the primary, coming out to pin 2 for a tap if your design needs one.

I find that using the 40swg wire, each slot will take approx 15 turns – so given that there are three slots available, the maximum space available will accomodate about 45 turns on the primary in total.

Once the windings are complete, slip the cup back in place and slide the can on. If you have an inductance meter, you can make a measurement of the inductance between pins 1 and 3 with the cup in place – there is no significant change in this value with or without the can.

So what do you do when you need more turns?

Winding LF coils

If you need to work below about 3 MHz, then it is worth modifying the bobbin. Using the same small scalpel, carefully remove the wall between two adjacent slots – this is a cut and turn operation, and you will have to go several times round the bobbin to achieve it. In some cases I have removed two slot walls, opening up the entire space for winding primary turns.

But I don't have an Inductance Meter..

..so how do I know the coil is right? Well thankfully there is some information available on Toko 10K coils, in terms of inductance vs number of turns – some is previously published (by Ambit – remember them? - in the 1970's!) and some is from experience of re-winding. Table 1, below, gives,the currently known data.

Inductance (µH)	Turns (1 – 3)
45	55
38	51
9	28
6.8	20
5.5	18
1.2	8

Table 1 – Inductance vs Turns for ToKo 10K series (40swg wire)

This data is offered as a guide – in practice, I have found that the tuning range of the core is very wide – typically from 3.4 to 8.3µH for 20t and 12 to 36 µH for 45 turns.

In Conclusion..

I understand that this is not a task for everyone – however, with the availability of small formers for coils being somewhat limited these days, and ready wound transformers virtually non-existant, this does represent a route to getting the coil you need for your project!

I hope you find it useful – and please let me know if you generate any more inductance vs turns data – I can add it to the table!

References and Web Links

Sycom: http://www.sycomcomp.co.uk/

BEC: http://www.bec.co.uk/

Digikey: http://www.digikey.com/

Maplin: http://www.maplin.co.uk/search.aspx?MenuNo=12277&MenuName=Enamelled+Copper+Wire&worldid=-10&FromMenu=y&doy=14m10

Toko 10K data: The World of Wireless from Ambit International, 1978