

Making Atwater Kent Breadboard Buss Sleeving

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Many of us interested in the first generation of broadcast receivers made in the early 1920s are fascinated by the Atwater Kent “open sets”. The company had entered the radio manufacturing market by making individual components designed to be mounted onto, usually wood, panels. They were absolute masters in turning-out the highest quality Bakelite moldings to house or support their electrical parts. They expanded their product line and eventually offered fully assembled radios. The components were interconnected using tinned, single-strand copper buss wire of about 18 AWG. All the top side wires and some on the bottom side were covered by lengths of sleeving generically called “varnished cambric tubing”. This tubing is tightly braided linen thread coated with multiple coats of translucent dark amber varnish. Over time it becomes a dark, glossy brown and most becomes extremely brittle.

The unhappy truth is that some of this sleeving breaks off or is gnawed-off by insects or mice and replacements must be found, however I have not been successful in finding any modern equivalents that



come anywhere close to appearing true to the original.

That sent me off on a quest to find a way to make convincing replica sleeving in my home shop.

It is very difficult to photograph this tubing but maybe this shot will give you some idea of what is possible.

This process may seem complicated at first, but once you have the materials, the actual labor to make a length of sleeving is less than an hour divided over a few days.

Hobby shops have lengths of “music wire” used in model aircraft building. Buy a three-foot length of 0.047” diameter. (A popular brand is K & S Engineering part number 502.) Make sure your wire is smooth and free of rust. Cut the wire to about 24”. Slip a length of 3/32” 2:1 thin wall polyolefin shrink-tubing over the music wire and use a temperature regulated heat gun to carefully shrink the tubing. Begin at one end and move slowly along to allow air to escape completely, you cannot tolerate any trapped air bumps along the finished diameter. If you do get an air bubble you cannot work out, take a very fine sewing needle and carefully poke a hole for air to escape as you reheat the area; but you don’t want to make it so large that any glue can leak-in to contact the music wire.

There is a brand of 3mm dia. “waxed cotton beading cord” available from this link: <https://www.firemountaingems.com/itemdetails/h201349bs>. Similar “3mm Waxed Cotton” cord is available in some craft stores in seven-yard lengths..... DO NOT use 3mm Cotton “Macramé cord” or “Thick Cotton Cord” because the braiding threads are much too coarse. Beware that some vendors have

bold print and pictures at the top of their product pages that people would interpret to describe the product you are shipped. In this case the bold print may say “cotton”, say “Ivory Color”, and “Korea” when the fine print below says “Material: Polyester” and is brilliant white and the product has no country of origin and is shipped via China Post. On an attempt to return the product, you are told that the bold print is only a “name” and because the small print says “Material: Polyester” they refuse to accept return or issue refund. Bizarre, but I’m told this endemic to certain trading platforms.

The correct waxed cotton bead cord consists of tightly braided fine threads over parallel strands of filler cord. It is easy to use tweezers to pull out the filler strands on a length of cord that is about 1 ½ times longer than your length of music wire. Your hollow braided cotton tube can now be slipped over the shrink tubing. Pushing this braid over the shrink tubing is not a fun task, but I can do it in about 8 to 10 minutes when using the 0.047” wire. It is possible to slip over the next larger 0.055” wire but it may take twice as long. When done, clamp a length of 2 x 4 lumber in a bench vise and drive or screw two heavy nails or wood screws just a little farther apart than your length of music wire. Securely tie one end of your cotton sleeving to one of the nails or screws. Grasp the other sleeving end and work the sleeving to stretch it as tightly a practical along your shrink-fit covered music wire before tying the end around the other nail or screw. When finished, take a gauze pad saturated with lacquer thinner to wash-out most of the wax on the thread.

Now you are ready to coat your sleeving with alcohol base “medium walnut” wood dye. I use Mohawk “Ultra” Penetrating Stain. The sleeving will dry to a milk chocolate color.

After drying, coat the sleeving with a mixture of “Titebond Veneer Glue” and the same wood dye mixed to the color of milk chocolate. Use a short-bristle hogs-hair brush to vigorously massage the glue into the braid; but finish by removing any excess from the surface. (I wrap a bit of plastic wrap around the sleeving and just pull it along with my fingers.) I repeat the process and allow the glue to dry completely.

You can then use a bit of 220 sandpaper to knock-down any rough spots along the length. Finish by dragging a small wad of #0000 steel wool across the length. If you think you have lightened the color of your length too much, wipe a thin coat of the stain onto the length and allow to dry.

Cut away enough cotton sleeving and heat-shrink tubing to expose one end of the music wire. Cut the other end free of its nail or screw. Put on clean rubber gloves and clamp only the exposed music wire into a secure bench vise jaws and carefully pull the tubing off the wire. Do not pull with the expectation that the sleeving will release all at once. Instead, pull just a little bit at various points along the length and repeat a few times. Eventually the sleeving will begin to slide off smoothly. Note that the shrink fit tubing remains as the inside wall of your finished product and the gloves prevent skin oils from contaminating your tubing for the final step.

The sleeving is brushed with satin finish marine spar varnish. This varnish has a heavy body and a transparent amber hue. (Indoor spar varnish is much thinner, often has no tint and will therefore have more of an appearance of a clear plastic glaze. Note that there are glossy versions of these varnishes that you should avoid.)

The finished product appears very, very close to the size, look and function of the original varnished cambric tubing. So close as to be intermixed with the vintage sleeving without attracting undue attention to how clever you might have been in your restoration activities.

You should be able to apply the same technique to make larger diameter sleeving for up to 10 AWG buss wire using 4mm braided cord. However, keep in mind that this cord is usually braided with more coarse thread and will often be described a macramé cord. Some descriptions will include “draw string” and tend to have a finer braid which is desirable for our uses. In all cases, we want to use cord made of cotton, not synthetics so be sure to read the fine print. The cotton can be colored with various dyes to mimic the yellow and deep amber colors seen in some equipment.

Be aware that you can now purchase small quantities of high flexibility, silicone rubber insulated wire rated for 300 or 600 Volt, similar to Style UL3132.

Where you have American made radios of the early 1930s with exposed chassis and loudspeaker wiring bundles, the cotton 3mm waxed beading cord can be dyed various colors and used as sleeves for modern hook-up wire exiting the chassis. This can greatly improve the look of authenticity to any repairs made. For much of such exposed wiring, 24 AWG 300 Volt insulation wire with this cotton sleeve will look very close to original wire diameters. To my way of thinking, you do not want to distract the viewer from the appreciating the original construction features of the chassis.

IMPORTANT SAFETY NOTE: It is your responsibility to properly determine if this replica tubing will safely meet your specific application requirements.

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